7 HIGH-SPEED TRAIN NETWORK AND ALIGNMENT ALTERNATIVES COMPARISONS

7.1 Introduction

7.1.1 Purpose and Content of This Chapter

The purpose of this chapter is to summarize and compare the physical and operational characteristics and potential environmental consequences associated with different combinations of alignment alternatives that comprise the HST Network Alternatives, as well as differences among alignment alternatives and potential station location options. This chapter summarizes potential environmental consequences for each of 21 representative network alternatives for the environmental resource areas where relative differences were identified (refer to Chapter 3 under Affected Environment, Environmental Consequences, and Mitigation Strategies for a comprehensive presentation of potential environmental consequences in each environmental resource area for each alignment alternative). The 21 representative network alternatives present a range of reasonable alternatives among the three basic approaches for linking the Bay Area and Central Valley: Altamont Pass (11 network alternatives); Pacheco Pass (6 network alternatives); and Pacheco Pass with Altamont Pass (local service) (4 network alternatives).

For many of the environmental topics discussed in this chapter, the quantities presented represent areas within which potential impacts might occur. For example, the area of floodplains includes all floodplains within 100 ft (30.5 m) of either side of the centerline of the alignment considered; whereas the right-of-way necessary for the improvements considered is smaller (e.g., only 25 ft [7.6 m] on either side of the centerline for the HST infrastructure). Therefore the magnitude of potential impacts reported in this document is considerably larger than the actual impacts that would be expected from the HST system within the study area.

7.1.2 Organization of This Chapter

The network alternatives and alignment alternatives comparisons are presented in tabular form. The station location options are presented individually and compared where multiple options are considered for the same general station area. The network alternatives, alignment alternatives, and station location options are briefly described in the tables and illustrated on the associated maps. For each alternative comparison, the following summary information is presented and compared where relative differences were identified.

- Physical/operational characteristics.
  - Alignment.
  - Length.
  - Capital cost.
  - Travel time.
  - Ridership.
  - Constructability.
  - Operational issues.
- Potential environmental impacts.
  - Transportation and related topics (travel conditions, noise and vibration).

- Human environment (land use and community impacts, farmlands and agriculture, aesthetics and visual resources, and socioeconomics).
- Cultural resources (archaeological resources, historical properties) and paleontological resources.
- Natural environment (geology and seismic hazards, hydrology and water resources, and biological resources and wetlands).
- Section 4(f) and 6(f) resources (certain types of publicly owned parklands, recreation areas, wildlife/waterfowl refuges, and historical sites).

The environmental topics for traffic, energy and air quality are not included in this chapter. The network alternatives have the potential to reduce overall air pollution, total energy consumption, and traffic congestion as compared to the No Project Alternative. The representative base HST forecast would result in a reduction of 22 million barrels of oil and 17.6 billion pounds of CO_2 emissions annually by 2030, as compared to the No Project Alternative. Diversions from the automobile to HST could lead to a projected 5% statewide reduction in vehicle miles traveled (VMT) on the highway system, with VMT reductions of between 7% and 12% in Bay Area and Central Valley counties.

The network alternatives with the highest ridership levels show the greatest reductions in VMT on the roadways in the region. The reduction in VMTs results in a corresponding reduction in vehicular emissions, energy consumption, and traffic. Therefore, in this chapter ridership is a proxy for traffic, energy and air quality benefits since the network alternatives with the highest ridership would have the greatest traffic, energy and air quality benefits.

7.2 Network Alternatives

The HST Network Alternatives represent different ways to implement the HST system in the study region along combinations of HST Alignment Alternatives and station location options. The HST system would continue outside the study region to the major metropolitan areas in the state, as described in the statewide program EIR/EIS (California High-Speed Rail Authority and Federal Railroad Administration 2005). Because there are many possible combinations of alignment alternatives and station location options, 21 representative network alternatives were selected (Section 2.5 and Table 2.5-1) and the findings for these alternatives are presented in tabular form in the following sections. Note that many other possible network combinations of alignment alternatives are possible. The following network alternatives have been selected as a representative sample to help identify major distinctions between network options and to define major tradeoffs among the possible networks for the Bay Area to Central Valley Region. The network alternatives vary in their ability to meet the purpose and need and objectives of the HST system and provide additional data to inform the future identification of preferred alignment alternatives and station location options. Although HST Alignment Alternatives and station location options were screened and evaluated to identify those that are likely to be reasonable and practicable and meet the project's purpose and need, the representative HST Network Alternatives have not yet been so evaluated. The network alternatives were developed to enable an evaluation and comparison of how various combinations of alignment alternatives would meet the project's purpose and need and how each would perform as a HST network (e.g., travel times between various station locations, anticipated ridership, operating and maintenance costs, energy consumption, and auto trip diversions). The different system characteristics as well as environmental factors of the network alternatives present complex choices that will be better supported and informed following public review and comment on this document.

7.2.1 Altamont Pass Alternatives

A. SAN FRANCISCO AND SAN JOSE TERMINI

The San Francisco and San Jose termini network alternative is shown in Figure 7.2-1 and described in Table 7.2-1. The segments used for this representative alternative are Caltrain Corridor (San Francisco to Dumbarton), Dumbarton (high bridge)[1], Niles/I-880 (Niles Junction to San Jose via I-880)[2], East Bay Connection (Dumbarton/Niles XS), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

Table 7.2-1
Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)

Physical/Operational Characteristics	
Network Alternative Description	From San Francisco to Redwood City, this network alternative would use the existing Caltrain rail right-of-way and would cross the San Francisco Bay in the Dumbarton corridor. To San Jose, the Niles/I-880 alignment alternative would be used south of Niles. The Altamont Pass would use the UPRR alignment alternative through downtown Tracy, and the Central Valley would use the UPRR N/S alignment alternative. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City (Caltrain), Fremont (Warm Springs), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
Length	203.34 mi (327.24 km)
Cost (dollars)	$12.7 billion
Express Travel Times (minutes)	SF–LA=2:36; SF–Sac=1:06; SF–Fresno=1:18; SJ–LA=2:19 ; SJ–Sac=0:49; SJ–Fresno=1:01; Livermore–LA=2:06; Tracy–LA=1:59; SF–Tracy=0:42; SJ–Tracy=0:25.
Ridership	This network alternative would directly serve downtown San Francisco and SFO, San Jose, the I-580 corridor, and a portion of the I-880 corridor, and the Central Valley and would have high ridership and revenue potential. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 87.9–116 million passengers and $2.84–$3.8 billion per year by 2030[3].
Constructability	Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative include alignments in or along operating commuter and intercity rail lines. Maintaining operations on the existing commuter and intercity rail service while constructing grade separations, tunnels, elevated sections, and stations would involve considerable construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.

[1] Does not include "Dumbarton Wye South to Caltrain" segment.

[2] Does not include Niles Junction to Niles Wye S ("Niles/I-880 5A") segment.

[3] The "Base Case" network alternative for the Altamont Pass and Pacheco Pass show a range for ridership and revenue forecasts where the "low-end" is the base forecast and the "high-end" is the high-end sensitivity analysis. For all other network alternatives, ridership and revenue numbers are only shown for the base case (low-end) assumptions.

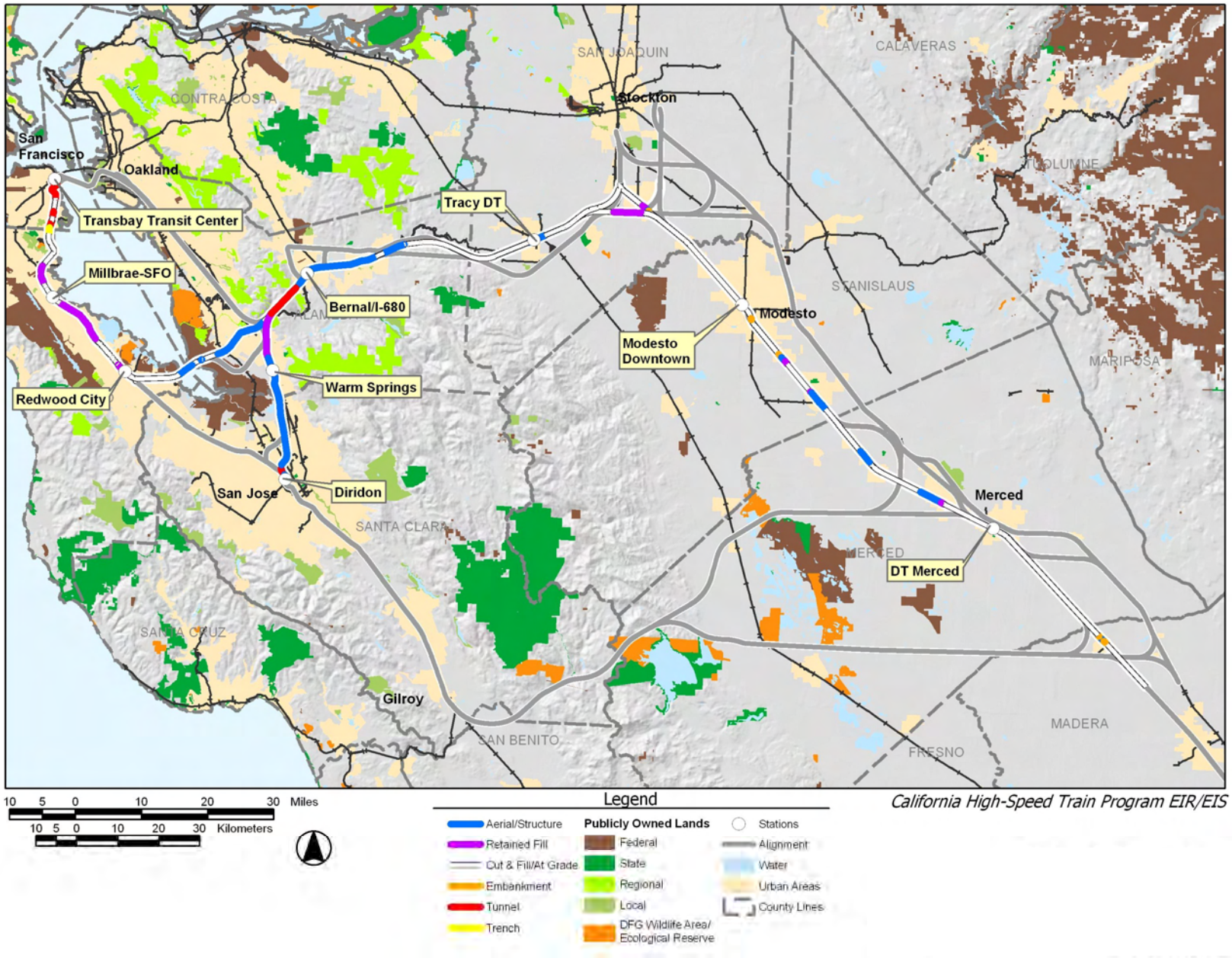

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Figure 7.2-1
Network Alternatives
Altamont Pass
San Francisco and San Jose Termini

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Table 7.2-1
Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)

O & M Cost (dollars per year)	$1,099 million
Operational Issues	Average Speed SF–LA=168.8 mph (281.2kph); SF–Sac=129.5 mph (215.8 kph); SF–Fresno=148.0 mph (246.7 kph); SJ–LA=178.7 mph (297.9 kph);SJ–Sac=144.1 mph (240.2 kph);SJ–Fresno=165 mph (275 kph); Livermore–LA=182.9 mph (304.8 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=107.1 mph (178.5 kph); SJ–Tracy=120.7 (201.2 kph). Maximum Speed SF–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph); SJ–LA=210 mph (350 kph);SJ–Sac=198 mph (330 kph);SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=169.2 mph (282 kph); SJ–Tracy=180 mph (300 kph). This network alternative would require the system to split in two separate directions to serve both San Jose and San Francisco, given a constant number of trains. This decreases the frequency of service from southern California to these stations by a factor of two as compared to network alternatives using the Pacheco Pass alignment alternatives. Based on forecasted travel demand, two-thirds of the trains would be directed to San Francisco and one-third of the trains would be directed to San Jose. HST operations would need to be coordinated and integrated with Caltrain service on the San Francisco Peninsula and ACE service in the I-580 corridor.
Potential Environmental Impacts	
Travel Conditions	This network alternative would cross the San Francisco Bay in the Dumbarton corridor. The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco, with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Redwood City, an East Bay station at Fremont (Warm Springs), a South Bay station at San Jose (Diridon), a Tri-Valley station at Pleasanton (I-680/Bernal Road), a downtown station in Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the northern peninsula and SFO (the hub international airport for northern California), southern Alameda County, San Jose, the I-580 corridor and Tri-Valley area, and the Central Valley. This network alternative would provide a safer, more reliable, energy-efficient intercity mode along the northern part of the San Francisco Peninsula, while improving the safety, reliability, and performance of the regional commuter service. This network alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S alignment alternative through the Central Valley. This network alternative would not provide direct HST service to Oakland, Oakland International Airport, or South Santa Clara County.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential for noise impacts for the overall alternative, with a high potential for noise impacts in the Dumbarton corridor. Medium potential for vibration impacts for the overall alternative. Medium potential for vibration impacts from San Francisco/San Jose to downtown Tracy, and an overall low potential in the Central Valley, with the exception of urban areas.

Table 7.2-1
Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)

	Along the Caltrain corridor from Redwood City to San Francisco, there would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway right-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, and in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas. Environmental Justice: This network alternative has medium environmental justice rating for the Caltrain Corridor (north of Redwood City) and the East Bay alignment to San Jose and low environmental justice rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice is rated as medium in the Central Valley, except in the Manteca area, where the rating is low. Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway right-of-way. Property: This network alternative has the potential for high property impacts in the Niles Canyon, Shinn, and Manteca areas, where additional right-of-way would be required.
Aesthetics and Visual Resources: General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Niles Junction to San Jose =medium; (3) UPRR =medium; (4) Tracy Downtown =low (5) Dumbarton High Bridge =medium; and (6) UPRR N/S =low. Overall network alternative rating is low to medium
Farmlands:[ii] Ac (ha) potentially affected	Farmland: 764.2 ac (309.28 ha). Impact up to 429.1 ac (173.65 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative along with the San Francisco, Oakland, and San Jose Termini would have the greatest potential impact on farmland in the Altamont Pass network alternatives. The difference in overall farmland impacts in the Altamont Pass network alternatives is less than 9 ac (3.6 ha).
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 151 known cultural resources. This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects, along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.

Table 7.2-1
Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)

Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 308.3 ac (124.76 ha) direct and 969.4 ac (392.30 ha) indirect. Streams: 16,824 linear ft (5,127.9 linear m) direct and 71,320 linear ft (21,738.30 linear m) indirect. Lakes/Waterbodies: 39.6 ac (16.03 ha) direct and 154.9 ac (62.68 ha) indirect. Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified as having the highest area of impact on lakes and the San Francisco Bay due to the Dumbarton crossing. This network alternative was also identified as having the potential to impact the most groundwater resources. Potentially affect San Francisco Bay, Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River, as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct, among other water resources. Includes tunnels that would avoid impacts on the floodplain and aboveground water resources and aerial structures that would minimize impacts on floodplains, streams, creeks, and channels.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 45.9 ac (18.59 ha) direct and 2,526 ac (1,022.2 ha) indirect. Nonwetland Waters: 16,773 linear ft (5,122.4 linear m). Species: 56 special-status plant and 50 special-status wildlife species. Of the Altamont Pass network alternatives, this network alternative along with two other network alternatives would have the potential to impact the most special-status wildlife species. This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters. This network alternative would be along existing transportation corridors, with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management , such as the Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
Fault Crossings	San Bruno (Potentially Active) – At Grade Hayward (Active) – At Grade Silver Creek (Potentially Active) – Above Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Vernalis (Active) – At Grade Buried Trace of Unnamed Fault (Potentially Active) - At Grade Silver Creek (Potentially Active) - At Grade Hayward (Active) - Above Grade Mission (Potentially Active) - At Grade

Table 7.2-1
Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)

Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	There are 32 public parks, recreation lands, wildlife and waterfowl refuges that are 0-150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated because much of the network alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.

[i] Generally, vibration is not a significant impact. However, sensitive and specific areas, such as historical structures and special habitats, could be affected.

[ii] The farmland resources study area is defined as 25 ft (7.6 m) on each side of the alignment. When the alignment is adjacent to an existing rail corridor, the study area extends 50 ft (15 m) from the rail right-of-way on the side the alignment would run. The study area for impacts of stations is the station area footprint.

[iii] The cultural resources and paleontological resources study area is defined as the area within 500 ft (152 m) on each side of the alignment centerline for new routes, 100 ft (30 m) from centerline along existing transportation facilities, and 500 ft (152 m) around station locations.

[iv] The hydrology and water resources study area is defined as 25 ft (7.6 m) on each side of the alignment for two tracks and as 50 ft (15 m) on each side of centerline for four tracks. The study area for indirect impacts is 50 ft (15 m) on each side of the alignment for two tracks and as 100 ft (30 m) on each side of centerline for four tracks. The study area for direct impacts of stations is the station area footprint, and the study area for indirect impact for stations is 50 ft (15 m) from the outside edge of the station footprint area.

[v] The biological resources and wetlands study area for direct impacts is defined as 50 ft (15 m) on each side of the alignment in urban areas and 0.25 mi (0.41 km) in rural areas. The study area for indirect impacts is 1,000 ft (305 m) in urban areas and 0.25 mi (0.41 km) in rural areas on each side of the alignment. The study area for direct impacts of stations is the station area, and the study area for indirect impacts for stations is 1,000 ft (305 m) in urban areas and 0.25 mi (0.41 km) in rural areas from the outside edge of the station footprint area.

[4] The 4(f) and 6(f) resources study area is defined as 900 ft (274 m) on each side of the alignment centerline.

C. SAN FRANCISCO, OAKLAND, AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-3 and described in Table 7.2-3. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Dumbarton (High Bridge)[6], Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880)[7], East Bay Connections (Dumbarton/Niles XS & Dumbarton/Niles XN), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

Table 7.2-3
Altamont Pass: San Francisco, Oakland, and San Jose Termini

Physical/Operational Characteristics	
Network Alternative Description	From Oakland to San Jose, this network alternative would use the Niles/I-880 Alignment. From San Francisco to Redwood City, this network alternative would use the existing Caltrain rail right-of-way. This network alternative would cross the San Francisco Bay in the Dumbarton corridor. The Altamont Pass would use the UPRR Alignment through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City (Caltrain), West Oakland/7th Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
Length	241.16 mi (388.12 km)
Cost (dollars)	$15.1 billion[8]
Express Travel Times (minutes)	SF–LA=2:36; Oakland–LA=2:23; SJ–LA=2:19; SF–Sac=1:06; Oakland–Sac=0:53; SJ–Sac=0:49; SF–Fresno=1:18; Oakland–Fresno=1:04; SJ–Fresno=1:01; Livermore–LA=2:06; Tracy–LA=1:59; SF–Tracy=0:42; Oakland–Tracy=0:29; SJ–Tracy=0:25
Ridership	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), Oakland and the Oakland International Airport (Coliseum/BART), San Jose and the I-580 and I-880 corridors, and the Central Valley. The ridership and revenue is less for this network alternative than other Altamont network alternatives because of the reduced frequency of service to major markets (some trains serving Oakland, some San Francisco, and some San Jose). Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 81.1 million passengers and $2.63 billion per year by 2030. Additional frequency of service to San Francisco, San Jose, and Oakland (along with higher operational costs) would be needed to increase ridership for this network alternative. Ridership for this network alternative is forecast to be about 7.7% less than the Altamont "Base Case" network alternative.

[6] Does not include "Dumbarton Wye South to Caltrain" segment.

[7] Does not include Niles Junction to Niles Wye S ("Niles/I-880 5A") segment.

[8] Includes terminal at 4th and King. Does not include segment cost from 4th Street to Transbay Transit Center or station cost for the Transbay Transit Center.

Table 7.2-3
Altamont Pass: San Francisco, Oakland, and San Jose Termini

Constructability	Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail and automobile traffic service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
O & M Cost (dollars per year)	$1,098 million
Operational Issues	Average Speed SF–LA=168.8 mph (281.2 kph); Oakland–LA=176.3 mph (293.8 kph); SJ–LA=178.7 mph (297.9 kph); SF–Sac=129.5 mph (215.8 kph); Oakland–Sac=140.1 mph (233.5 kph); SJ–Sac=144.1 mph (240.2 kph); SF–Fresno=148 mph (246.7 kph); Oakland–Fresno=162.9_ mph (271.6 kph); SJ–Fresno=165 mph (275 kph); Livermore–LA=182.9 mph (304.8 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=107.1 mph (178.5 kph); Oakland–Tracy=116.6 mph (194.3 kph); SJ–Tracy=120.7 mph (201.2 kph) Maximum Speed SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); Oakland–Sac=198 mph (330 kph); SJ–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=169.2 mph (282 kph); Oakland–Tracy=178.2 mph (297 kph); SJ–Tracy=180 mph (300 kph) HST operations would need to be coordinated and integrated with Caltrain service on the SF Peninsula and ACE service in the I-580 corridor. Using the Altamont Pass would require the system to split in three different directions at Newark/Fremont to simultaneously serve San Jose, San Francisco, and Oakland in addition to the line split in the Central Valley to serve both Sacramento and the Bay Area. This would mean that some trains from Los Angeles or Sacramento would go to San Francisco and some to Oakland, while others would go to San Jose.[9] The variety of service types (express, semi-express, suburban express, regional, and local) and the comparatively short distances (relative to international high-speed train services in operation) between the three potential Bay Area terminus stations contribute to the significant inefficiency of serving all three of these stations. Based on forecasted travel demand, one-third of the trains were directed to each terminus, which is equivalent to two-thirds of the trains serving San Francisco and Oakland, with one-third of the trains serving San Jose.

[9] Separate trains are required because the trainsets cannot be easily split to send some vehicles to each destination. Although some passenger train services operate in this manner, the time required to physically separate a trainset into smaller units and prepare them for individual operation (e.g., ensuring separation of passengers, separating vehicles, initiating additional onboard personnel, switching power supply connections, completing system initiation checks after power switch, providing appropriate power vehicles) would be prohibitive, and the process would be highly undesirable for the passengers involved. In addition, the trainsets would be sealed for aerodynamic and passenger comfort purposes, further constraining the ability to physically split the trainsets, unless the trainsets were preconfigured in specific subsets prior to the start of service. Thus, it is assumed that the high-speed trainsets would not be physically separated during the operational period.

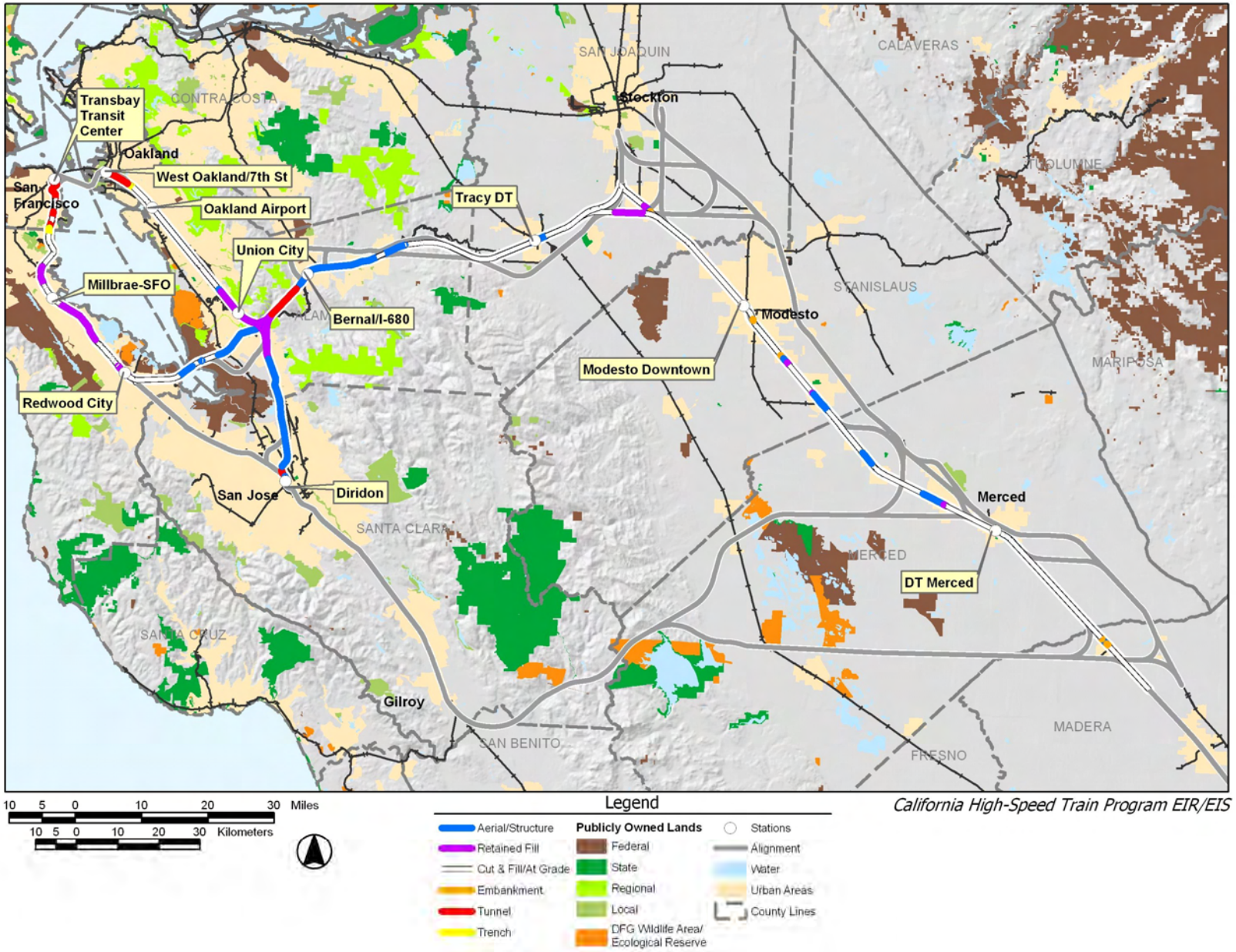

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Figure 7.2-3
Network Alternatives
Altamont Pass
San Francisco, Oakland, and San Jose Termini

Table 7.2-3
Altamont Pass: San Francisco, Oakland, and San Jose Termini

Potential Environmental Impacts	
Travel Conditions	The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula from Redwood City to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Redwood City, to the East and South Bay with stations in Oakland, Oakland Airport (Coliseum/BART), Union City (BART) and San Jose (Diridon), to the Tri-Valley with a station in Pleasanton (I-680/Bernal Road), a downtown station in Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the northern Peninsula and SFO, the hub international airport for northern California, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, the I-580 Corridor and Tri-Valley area, and the Central Valley. This network alternative would provide a safer, more reliable, energy-efficient intercity mode along the northern portion of the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City, Niles/I-880 Alignment between Oakland and Union City, would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to south Santa Clara County.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from San Francisco/Niles Junction/San Jose to downtown Tracy and a low potential in the Central Valley.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas. Environmental Justice: This network alternative has medium environmental justice impact rating for the Caltrain Corridor (north of Redwood City) and the east bay alignment from Oakland to San Jose. It has a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low. Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This network alternative has the potential for high property impacts in the Niles Canyon, Shinn, and Manteca areas, where additional right-of-way would be required.
Aesthetics and Visual Resources: General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Oakland to Niles Junction =low; (3) Niles Junction to San Jose =medium; (4) UPRR =medium; (5) Tracy Downtown =low; (6) Dumbarton High Bridge =medium; and (7) UPRR N/S =low. Overall network alternative rating is low to medium.

Table 7.2-3
Altamont Pass: San Francisco, Oakland, and San Jose Termini

Farmlands:[ii] Ac (ha) potentially affected	Farmland: 764.2 ac (309.28 ha) Impact up to 429.1 ac (173.65 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative along with the San Francisco and San Jose Termini would have the greatest potential impact on farmland within the Altamont Pass network alternatives.
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 175 known cultural resources. This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a high sensitivity for cultural resources.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 315.3 ac (127.62 ha) direct/ 983.7 ac (398.12 ha) indirect Streams: 19,814 linear ft (6,039.3 linear m) direct/ 82,951 linear ft (25,283.31 linear m) indirect Lakes/Waterbodies: 39.6 ac (16.03 ha) direct/ 154.9 ac (62.68 ha) indirect Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified to have the highest area of impact on lakes and the San Francisco Bay due to the Dumbarton crossing. This network alternative was also identified as having the potential to encounter the most erosive soils. Potentially affect the San Francisco Bay, Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 46.3 ac (18.73 ha) direct/ 2,594 ac (1,049.7 ha) indirect Non-Wetland Waters: 16,932 linear ft (5,160.9 linear m) Species: 57 special-status plant and 50 special-status wildlife species Of the Altamont Pass network alternatives, this network alternative would have the potential to impact the most special-status plant species, wetlands, and waters. Along with two other network alternatives would have the potential to impact the most special-status wildlife species. This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters. Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.

Table 7.2-3
Altamont Pass: San Francisco, Oakland, and San Jose Termini

Fault Crossings	San Bruno (Potentially Active) – At Grade Hayward (Active) – At Grade - Adjacent and Parallel Hayward (Active) – At Grade Silver Creek (Potentially Active) – Above Grade Calaveras (Active) – At Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Vernalis (Active) – At Grade Buried Trace of Unnamed Fault (Potentially Active) - At Grade Silver Creek (Potentially Active) - At Grade Hayward (Active) - Above Grade Mission (Potentially Active) - At Grade
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	There are 39 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.

E. SAN FRANCISCO TERMINUS

This network alternative is shown in Figure 7.2-5 and described in Table 7.2-5. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Dumbarton (High Bridge)[11], UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

Table 7.2-5
Altamont Pass: San Francisco Terminus

Physical/Operational Characteristics	
Network Alternative Description	From San Francisco to Redwood City, this network alternative would use the existing Caltrain rail right-of-way north of Redwood City and would cross the San Francisco Bay in the Dumbarton Corridor. The Altamont Pass would use the UPRR Alignment through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City (Caltrain), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
Length	191.55 mi (308.27 km)
Cost (dollars)	$11.0 billion
Express Travel Times (minutes)	SF-LA=2:36; SF-Sac=1:06; SF-Fresno=1:18; Livermore-LA=2:06; Tracy-LA=1:59; SF-Tracy=0:42
Ridership	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), Union City, the I-580 corridor, and the Central Valley. Although this network alternative does not directly serve Oakland or San Jose, it provides high ridership and revenue because of the high frequency of service provided to San Francisco. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 93.9 million passengers and $3.13 billion per year by 2030. Ridership for this network alternative is forecast to be about 6.8% higher than the Altamont "Base Case" network alternative and with revenue about 10% higher.
Constructability	Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
O & M Cost (dollars per year)	$1,124 million
Operational Issues	Average speed SF-LA=_168.8 mph (281.2 kph); SF-Sac=129.5 mph (215.8 kph); SF-Fresno=148 mph (246.7 kph); Livermore-LA=182.9 mph (304.8 kph); Tracy-LA=183.4 mph (305.7 kph); SF-Tracy=107.1 mph (178.5 kph Maximum speed

[11] Does not include "Dumbarton Wye South to Caltrain" segment.

Table 7.2-5
Altamont Pass: San Francisco Terminus

	SF-LA=210 mph (350 kph); SF-Sac=198 mph (330 kph); SF-Fresno=210 mph (350 kph); Livermore-LA=210 mph (350 kph); Tracy-LA=210 mph (350 kph); SF-Tracy=169.2 mph (282 kph) HST operations would need to be coordinated and integrated with Caltrain service on the SF Peninsula and ACE service in the I-580 corridor.
Potential Environmental Impacts	
Travel Conditions	The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Redwood City, a Tri-Valley in Pleasanton (I-680/Bernal Road) Station, a downtown station in Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the northern Peninsula and SFO, the hub international airport for northern California, southern Alameda County, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula and in the Tri-Valley while improving the safety, reliability, and performance of the regional commuter service to San Francisco. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to Oakland, Oakland Airport, San Jose, and south Santa Clara County resulting in considerably less Travel Conditions benefits (travel times, reliability, safety, connectivity, and passenger cost) than other network alternatives that directly serve additional stations/markets in the Bay Area.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. Medium potential of vibration impacts, from San Francisco to downtown Tracy and a low potential in the Central Valley.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas. Environmental Justice: This network alternative has a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low. Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This network alternative has the potential for high property impacts in the Niles Canyon, Shinn, and Manteca areas, where additional right-of-way would be required.

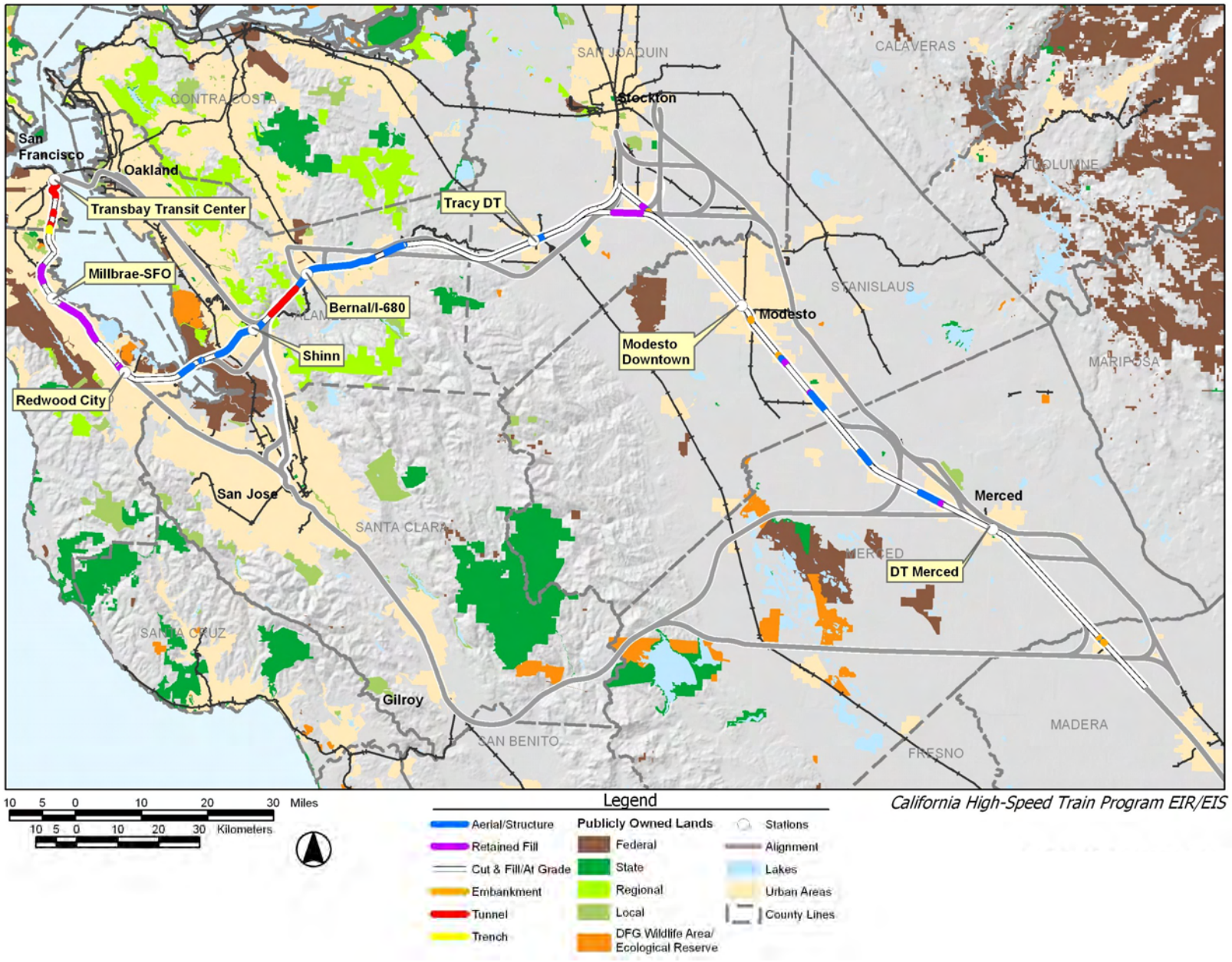

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Figure 7.2-5
Network Alternatives
Altamont Pass
San Francisco Terminus

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Table 7.2-5
Altamont Pass: San Francisco Terminus

Aesthetics and Visual Resources: General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) UPRR =medium; (3) Tracy Downtown =low: (4) Dumbarton High Bridge =medium; (5) UPRR N/S =low. Overall network alternative rating is low to medium.
Farmlands:[ii] Ac (ha) potentially affected	Farmland: 757.8 ac (306.68 ha) Impact up to 422.7 ac (171.05 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative would have moderate impacts to farmland within the Altamont Pass network alternatives.
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 146 known cultural resources. This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 270.7 ac (109.57 ha) direct/ 817.1 ac (330.68 ha) indirect Streams: 15,995 linear ft (4,875.1 linear m) direct/ 67,867 linear ft (20,685.76 linear m) indirect Lakes/Waterbodies: 39.6 ac (16.03 ha) direct/ 154.9 ac (62.68 ha) indirect Potentially affect the San Francisco Bay, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the South Bay Aqueduct and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 44.4 ac (17.97 ha) direct/ 2,259 ac (914.4 ha) indirect Non-Wetland Waters: 15,947 linear ft (4,860.6 linear m) Species: 56 special-status plant and 49 special-status wildlife species This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters. Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
Fault Crossings	San Bruno (Potentially Active) – At Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade

Table 7.2-5
Altamont Pass: San Francisco Terminus

	Vernalis (Active) – At Grade Buried Trace of Unnamed Fault (Potentially Active) - At Grade Silver Creek (Potentially Active) - At Grade Hayward (Active) - Above Grade Mission (Potentially Active) - At Grade
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	There are 24 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.

7.2.2 Pacheco Pass Alternatives

A. SAN FRANCISCO AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-12 and described in Table 7.2-12. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Caltrain (Dumbarton to San Jose), Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, BNSF-UPRR.

Table 7.2-12
Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)

Physical/Operational Characteristics	
Network Alternative Description	From San Francisco to San Jose, this network alternative would use the existing Caltrain rail right-of-way. The Pacheco and Henry Miller (to the UPRR) Alternatives would be used between San Jose and the Central Valley. The BNSF N/S (north of Merced) and UPRR N/S (south of Merced) Alignments would be used in the Central Valley. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City, San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Briggsmore (Amtrak).
Length	267.53 mi (430.55 km)
Cost (dollars)	$12.4 billion
Express Travel Times (minutes)	SF–LA=2:38; SJ–LA=2:09; SF–Sac=1:47; SJ–Sac=1:18; SF–Fresno=1:20; SJ–Fresno=0:51; Gilroy–LA=1:57; SF–Gilroy=0:44; SJ–Gilroy=0:15
Ridership	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), San Jose, southern Santa Clara County, and the Central Valley and would have high ridership and revenue potential. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 93.9 million passengers and $3.1 billion per year by 2030.
Constructability	Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
O & M Cost (dollars per year)	$1,182 million
Operational Issues	Average Speed SF–LA=164.2 mph (273.6 kph); SJ–LA=179.5 mph (299.2 kph); SF–Sac=152.8 mph (254.7 kph); SJ–Sac=174 mph (290 kph); SF–Fresno=139.5 mph (232.5 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); SF–Gilroy=102.3 mph (170.6 kph); SJ–Gilroy=114.6 mph (191 kph) Maximum Speed SF–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); SF–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SF–Gilroy=180 mph (300 kph); SJ–Gilroy=180 mph (300 kph)

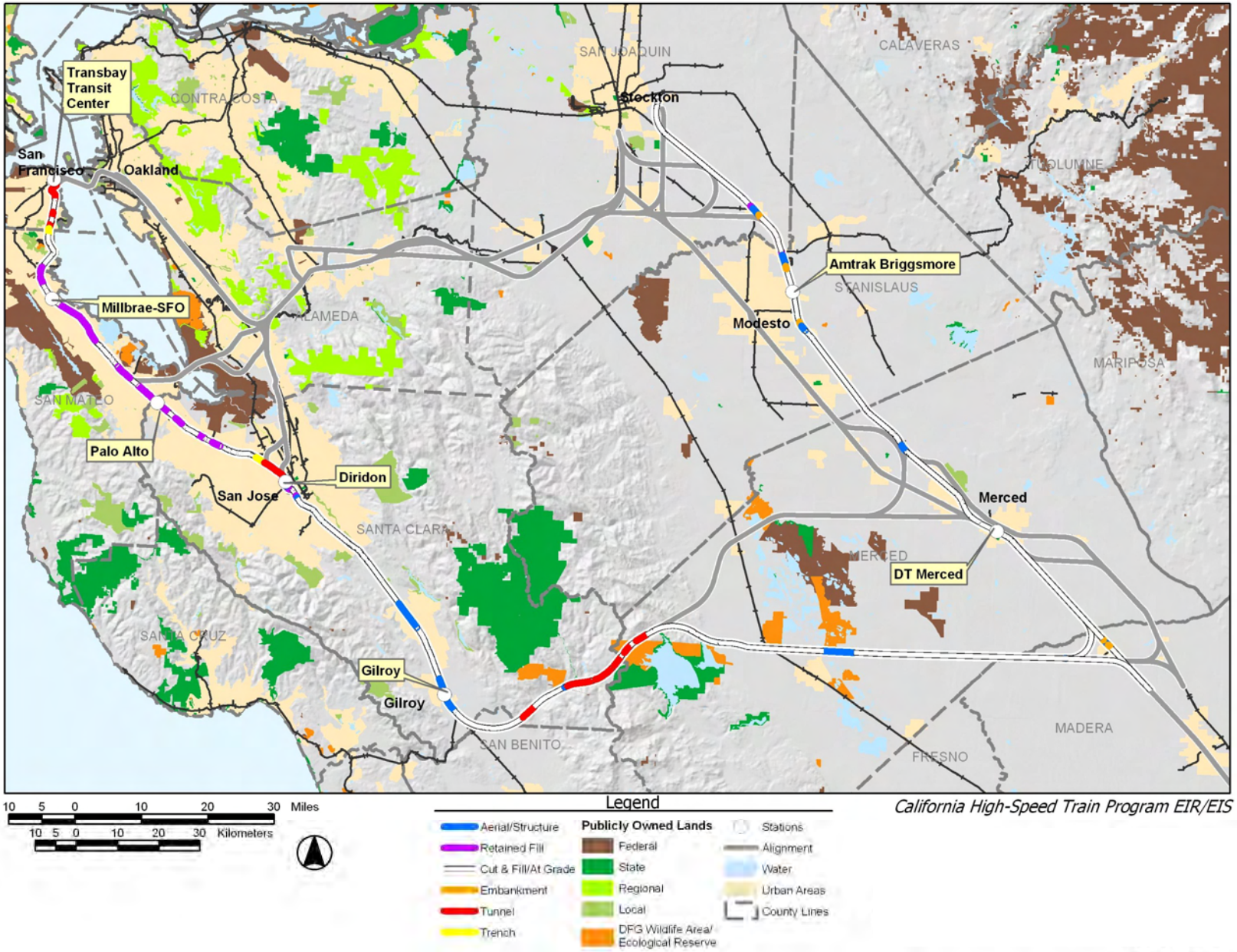

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Figure 7.2-12
Network Alternatives
Pacheco Pass
San Francisco and San Jose Termini

B004769

Table 7.2-12
Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)

	HST operations would need to be coordinated and integrated with Caltrain service.
Potential Environmental Impacts	
Travel Conditions	The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), and a mid-Peninsula station at either Redwood City. The network alternative would serve Southern Santa Clara County with a Station in Gilroy, and the Central Valley, with station in Merced and Briggsmore. This network alternative would increase connectivity and accessibility to San Francisco, the Peninsula and SFO, the hub international airport for northern California, San Jose, Southern Santa Clara County and the Monterey/Santa Cruz/Salinas area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Gilroy would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) in the Central Valley. This network alternative would not provide direct HST service to Oakland, Oakland Airport, the East Bay, south Alameda County, and the I-580 corridor.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Francisco to Dumbarton. High potential of vibration impacts from Dumbarton to San Jose. Medium potential of vibration impacts, from San Jose to Gilroy and a low potential in the Central Valley.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S or BNSF N/S in the Chowchilla area and a medium compatibility along the BNSF N/S Alignment in the Central Valley. Environmental Justice: This network alternative has medium environmental justice impact rating for the Caltrain Corridor between San Francisco and Gilroy and a low impact rating from Gilroy to the Central Valley. The BNSF N/S alignment has a medium impact rating except for low impact ratings in the Briggsmore and Chowchilla areas. Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This network alternative has the potential for low property impacts as the alignment either traverses existing transportation right-of-way or through rural land. This network alternative
Aesthetics and Visual Resources: General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Caltrain – Dumbarton to San Jose =low; (3) Pacheco =medium; (4) Henry Miller to UPRR =low, and (5) BNSF N/S =low. Overall network alternative rating is low to medium.

Table 7.2-12
Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)

Farmlands:[ii] Ac (ha) potentially affected	Farmland: 1,372.3 ac (555.36ha) Impact up to 663.3 ac (268.45 ha) of prime farmland. The majority of potential farmland impacts would occur along the Pacheco, Henry Miller, BNSF (North/South), and UPRR (North/South) segments. Overall, this network alternative along with the San Jose Terminus and San Jose, San Francisco, and Oakland via transbay tube would have the Least Potential Impacts (LPI) to farmland within the Pacheco Pass network alternatives.
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 167 known cultural resources. This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, a sanitary sewer system from 1912, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 520.8 ac (210.76 ha) direct/ 1633.2 ac (660.96 ha) indirect Streams: 20,276 linear ft (6,180.1 linear m) direct/ 90,572 linear ft (27,606.42 linear m) indirect Lakes/Waterbodies: 3.8 ac (1.55 ha) direct/ 19.7 ac (7.97 ha) indirect Of the Pacheco Pass network alternatives, this network alternative along with one other network alternative was identified to have the least amount of impact on lakes and would not impact San Francisco Bay. Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 15.6 ac (6.30 ha) direct/ 1,601 ac (648.1 ha) indirect Non-Wetland Waters: 14,395 linear ft (4,387.5 linear m) Species: 58 special-status plant and 53 special-status wildlife species Of the Pacheco Pass network alternatives, this network alternative along with two other network alternatives would have the potential to impact the most special-status wildlife species, but the least area of impact on wetlands. Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters. Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.

Table 7.2-12
Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)

Fault Crossings	San Bruno (Potentially Active) – At Grade Buried Trace of Unnamed Fault (Potentially Active) – At Grade Silver Creek (Potentially Active) – At Grade Calaveras (Active) – At Grade Ortigalita (Active) – At Grade
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	There are 18 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way.

7.3 Alignment Alternatives

The HST Alignment Alternatives are general locations for HST tracks, structures, and systems for the HST system between logical points within study corridors; they are generally configured along or adjacent to existing rail transportation facilities. These HST Alignment Alternatives are described in Chapter 2, analyzed in Chapter 3, and compared and used to create the HST Networks Alternatives.

To facilitate the alignment alternative analysis, the study area was divided into six corridors within the study region:

- San Francisco to San Jose.
- Oakland to San Jose.
- San Jose to Central Valley.
- East Bay to Central Valley.
- San Francisco Bay Crossings.
- Central Valley Alignment.

These corridors connect different parts of the study region and are fundamentally different and distinct in terms of land use, terrain, and construction configuration (mix of at-grade, aerial structure, and tunnel sections). The HST Alignment Alternatives and station location options considered in each corridor of the study region are discussed below. The analyses in Chapter 3 under Affected Environment, Environmental Consequences, and Mitigation Strategies compile and report information about the affected environment and environmental consequences for each alignment alternative and segment as outlined in the tables. The purpose of this chapter is to summarize and compare the physical and operational characteristics and potential environmental consequences associated with the HST Network Alternatives and for the various HST alignment alternatives within the six corridors. The HST Alignment Alternatives and station location options are described below.

A. CALTRAIN (SAN FRANCISCO TO DUMBARTON)

This alignment alternative is shown in Figure 7.3-1 and described in Table 7.3-1.

Table 7.3-1
Caltrain: San Francisco to Dumbarton

Physical/Operational Characteristics	
Alignment Alternative Description	From San Francisco to Dumbarton, this alignment would use the existing Caltrain rail right-of-way. Station location options considered for this alternative are Transbay Transit Center or 4th and King, Millbrae/SFO, Redwood City (Caltrain).
Length	27.70 mi (44.58 km)
Cost (dollars)	$3.08 billion
Express Travel Times	20 minutes SF–Dumbarton (Transbay to Redwood City Station)
Ridership	This alignment would directly serve downtown San Francisco and San Francisco International Airport (SFO).
Constructability	Maintaining operations on the existing commuter rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.
Operational Issues	Average speed =76.6 mph (127.5 kph) Maximum speed =120 mph (200 kph) HST operations would need to be coordinated and integrated with Caltrain service.
Potential Environmental Impacts	
Travel Conditions	The Caltrain corridor alignment alternative would bring direct HST service up the San Francisco Peninsula from Redwood City to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), and a mid-Peninsula station at Redwood City. This alignment alternative would increase connectivity and accessibility to San Francisco, the Peninsula, and SFO, the hub international airport for northern California. This alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. It would also greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City would improve local traffic flow and reduce air pollution at existing rail crossings.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts and medium potential of vibration impacts. Dense urban area surrounding land uses. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
Land Use and Planning, Communities and Neighborhoods,	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or

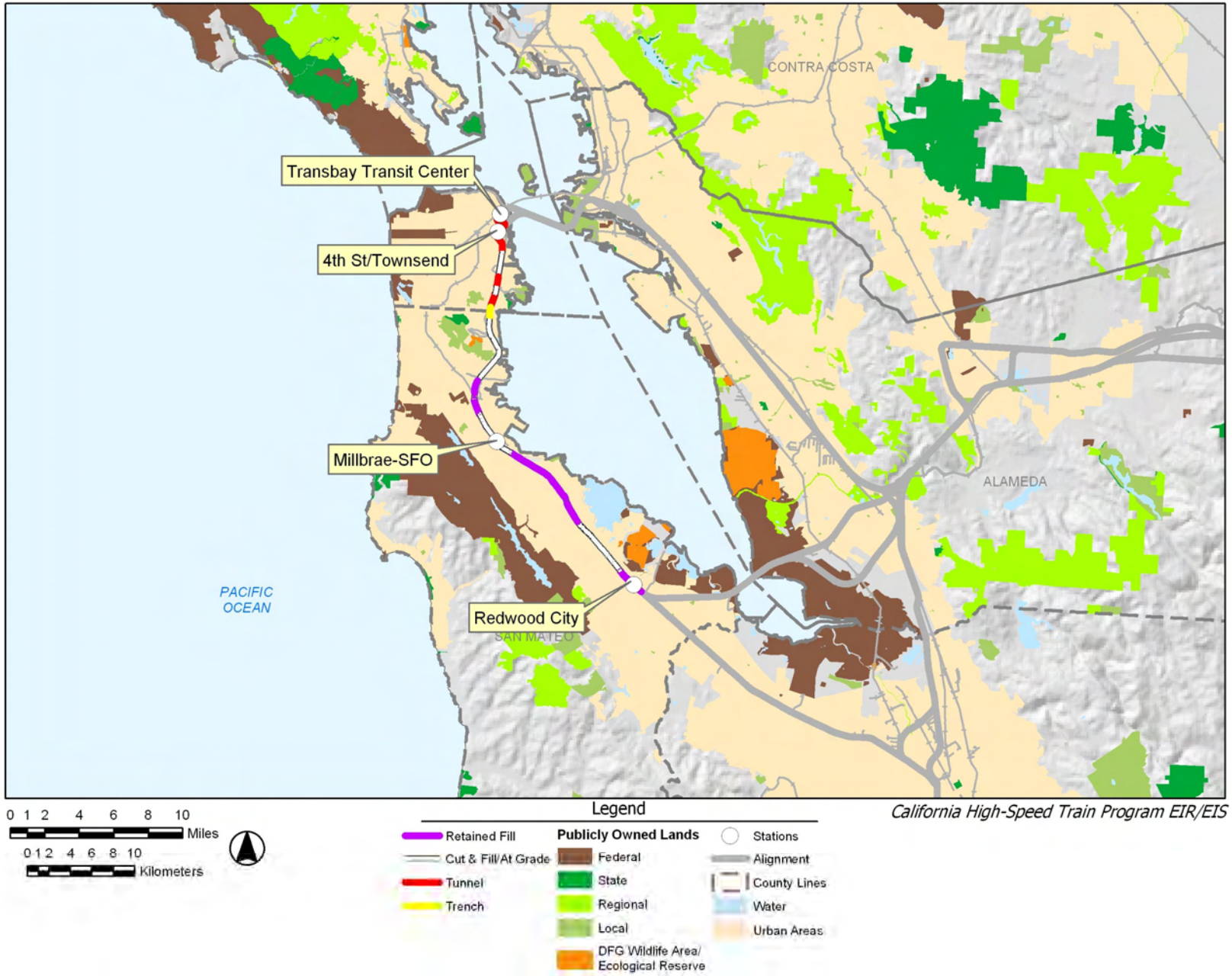

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Figure 7.3-1
HST Alignment Alternatives
Caltrain (San Francisco to Dumbarton)
B004831

Table 7.3-1
Caltrain: San Francisco to Dumbarton

Property, and Environmental Justice	immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has medium environmental justice impact rating for the Caltrain Corridor north of Dumbarton. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for high property impacts in the 4th and Townsend to Millbrae segment.
Aesthetics and Visual Resources: General impacts and rating.	Includes two additional tracks, pedestrian overcrossings and undercrossing at stations, and a raised Caltrain right-of-way. Overall low visual impact
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 51 known cultural resources. The alignment alternative extends through numerous historic districts between Transbay Terminal and Millbrae/SFO. The alignment alternative also includes a number of historic buildings and archaeological resources.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 49.3 ac (19.95 ha) direct/ 101.2 ac (40.96 ha) indirect Streams: 1,178 linear ft (359.1 linear m) direct/ 6,617 linear ft (797.7 linear m) indirect Lakes/Waterbodies[5]: 0.0 ac (0.0 ha) direct/ 3.4 ac (1.38 ha) indirect Potentially affect at least 16 named and unnamed water resources, including Oyster Point Channel, San Bruno Channel, San Bruno Canal, Colma Creek, Mills Creek, San Mateo Creek, and Pulgas Creek.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 0.08 ac (0.032 ha) direct/ 147.9 ac (59.85 ha) indirect Non-Wetland Waters: 590 linear ft (179.8 linear m) Species: 19 special-status plant and 29 special-status wildlife species This alignment alternative would have potential to directly and indirectly impact wetlands and non-wetland waters. Alignment alternative would have the potential to impact both special-status plant and wildlife species. Potential species impacts include San Mateo thorn-mint, Contra Costa goldfields, California clapper rail, and California least tern. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	San Bruno (Potentially Active) – At Grade
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Herman Street Park. (2) Washington Park, (3) Trinta Park, and (4) San Mateo County Fairgrounds. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

B. CALTRAIN (DUMBARTON TO SAN JOSE)

This alignment alternative is shown in Figure 7.3-2 and described in Table 7.3-2.

Table 7.3-2
Caltrain: Dumbarton to San Jose

Physical/Operational Characteristics	
Alignment Alternative Description	From Dumbarton to San Jose, this alignment alternative would use the existing Caltrain rail right-of-way. Station location options considered for this alternative are Palo Alto (Caltrain), and San Jose (Diridon).
Length	21.38 mi (34.40 km)
Cost (dollars)	$1.61 billion
Express Travel Times	13.5 minutes Dumbarton–San Jose (Redwood City–San Jose)
Ridership	This alignment alternative would provide direct HST service on the SF Peninsula/Caltrain Corridor between San Jose and Redwood City.
Constructability	Maintaining operations on the existing commuter rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.
Operational Issues	Average speed =92 mph (153.3 kph) Maximum speed =120 mph (200 kph) HST operations would need to be coordinated and integrated with Caltrain service.
Potential Environmental Impacts	
Travel Conditions	The Caltrain corridor alignment alternative would bring direct HST service to the Southern Peninsula with potential stations in Palo Alto, and a Station in downtown San Jose (Diridon). This alignment alternative would increase connectivity and accessibility to San Jose and the Peninsula. The HST system would provide a safer, more reliable, energy-efficient intercity mode along the Peninsula while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor south of Dumbarton would improve local traffic flow and reduce air pollution at existing rail crossings.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts. High potential of vibration impacts. Dense urban area surrounding land uses. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has medium environmental justice impact rating for the Caltrain

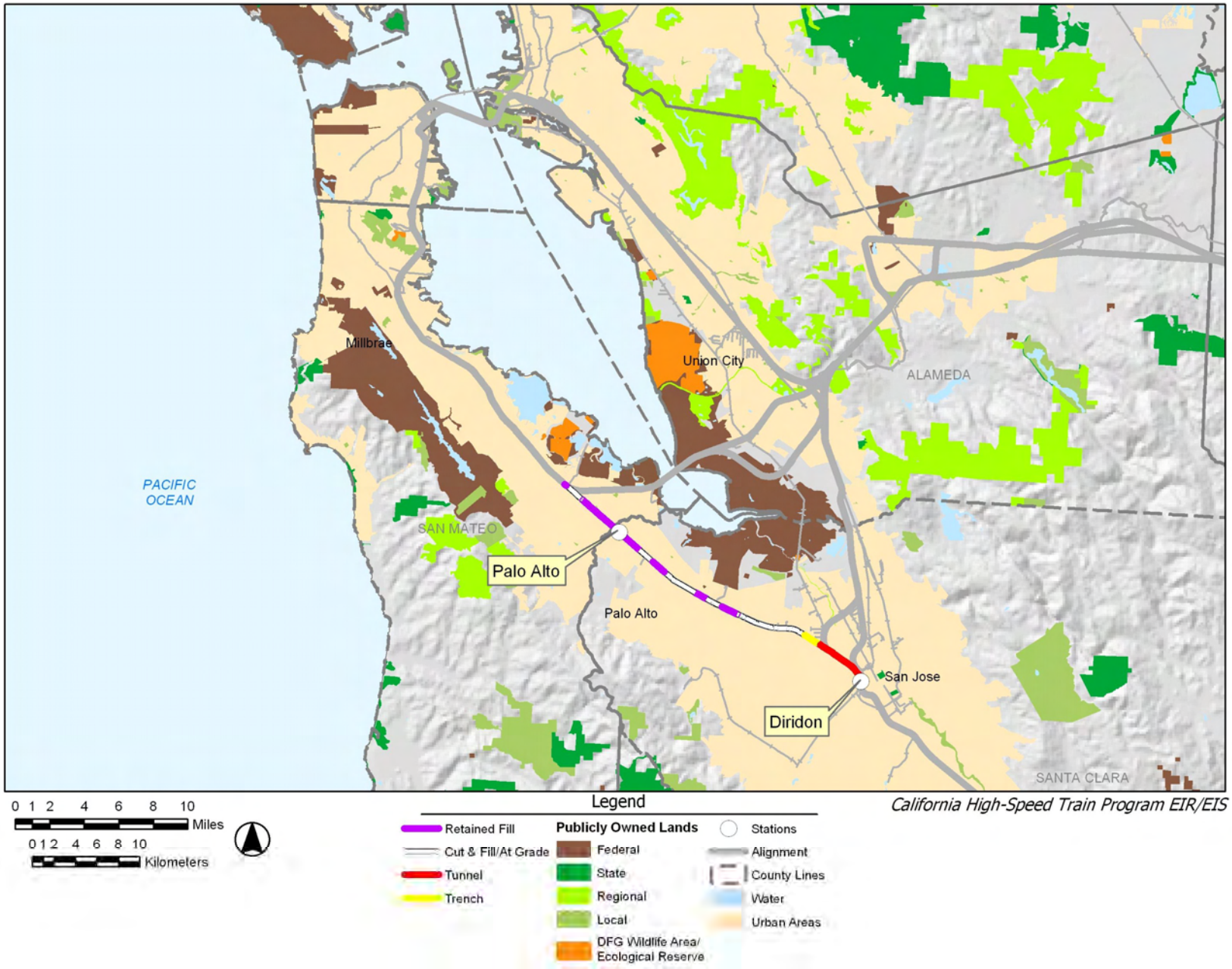

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Figure 7.3-2
HST Alignment Alternatives
Caltrain (Dumbarton to San Jose)

Table 7.3-2
Caltrain: Dumbarton to San Jose

	Corridor south of Dumbarton to San Jose. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low property impacts.
Aesthetics and Visual Resources: General impacts and rating.	Includes two additional tracks, pedestrian overcrossings and undercrossings at stations, a raised Caltrain right-of-way, a new two-track bridge next to historic San Francisquito Creek truss bridge, and elevated facilities at the Diridon San Jose station. Overall low visual impact
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 34 known cultural resources. The area around San Jose has a high density of cultural resources. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 46.5 ac (18.82 ha) direct/ 74.2 ac (30.03 ha) indirect Streams: 1,435 linear ft (437.4 linear m) direct/ 2, 649 linear ft (807.4 linear m) indirect Lakes/Waterbodies[5]: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect Potentially affect at least nine named and unnamed water resources, including San Francisquito Creek, Matadero Creek, Barron Creek, Permanente Creek, Stevens Creek, Calabasas Creek, and Saratoga Creek.
Biological Resources Including Wetlands: Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 0.0 ac (0.0 ha) direct/ 4.1 ac (1.66 ha) indirect Non-Wetland Waters: 672 linear ft (204.8 linear m) Species: 5 special-status plant and 9 special-status wildlife species This alignment alternative would have potential to directly impact non-wetland waters and indirectly impact wetlands. Alignment alternative would have the potential to impact both special-status plant and wildlife species. Potential species impacts include Contra Costa goldfields, San Francisco garter snake, California tiger salamander, and California red-legged frog. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	Buried Trace of Unnamed Fault (Potentially Active) – At Grade
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Holbrook Palmer Park, (2) El Camino Park, (3) Peers Park, (4) Bowden Park, (5) Rengstorff Park, (6) Bracher Park, and (7) San Francisco Bay Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

C. NILES/I-880 ALIGNMENT ALTERNATIVES (OAKLAND TO NILES JUNCTION)

All information presented is for the area from Oakland to Niles Junction. These alternatives are shown in Figure 7.3-3 and described in Table 7.3-3.

Table 7.3-3
Niles/I-880: Oakland to Niles Junction

	West Oakland to Niles Junction	12th Street/City Center to Niles Junction
Physical/Operational Characteristics		
Alignment Alternative Description	From the West Oakland station site, this is the alignment alternative currently used by the Capitol intercity rail service. From Oakland, this alignment alternative would travel south along the Union Pacific Railroad (UPRR) Hayward Line. Station location options considered in this segment include West Oakland, Oakland International Airport (Coliseum BART) Station, and Union City.	From the 12th Street/City Center downtown Oakland station site, this alignment alternative would travel south following the UPRR Hayward rail line. Station location options considered in this segment include 12th Street/City Center, Oakland International Airport (Coliseum/BART) Station, and Union City.
Length	27.74 mi (44.64 km)	26.73 mi (43.02 km)
Cost (dollars)	$2.34 billion	$2.25 billion
Travel Time	12 min (West Oakland-Union City)	11 min (12th Street-Union City)
Ridership	This alignment would directly serve Oakland and Oakland International Airport.	Sensitivity analysis for the Altamont Pass forecast this alternative to have somewhat higher ridership and revenue potential (2.7% more ridership and 1.5% more revenue) than the network alternative to West Oakland. In contrast, for the Pacheco Pass this alternative resulted in somewhat lower ridership and revenue potential (0.6% ridership and 2.5% revenue).
Constructability	Maintaining operations on the existing rail services while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.	Maintaining operations on the existing rail services while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.
Operational Issues	Average speed =103.5 mph (172.5 kph) Maximum speed =172.2 mph (287 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.	Average speed = 107.7 mph (179.5 kph) Maximum speed =172.2 mph (287 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.

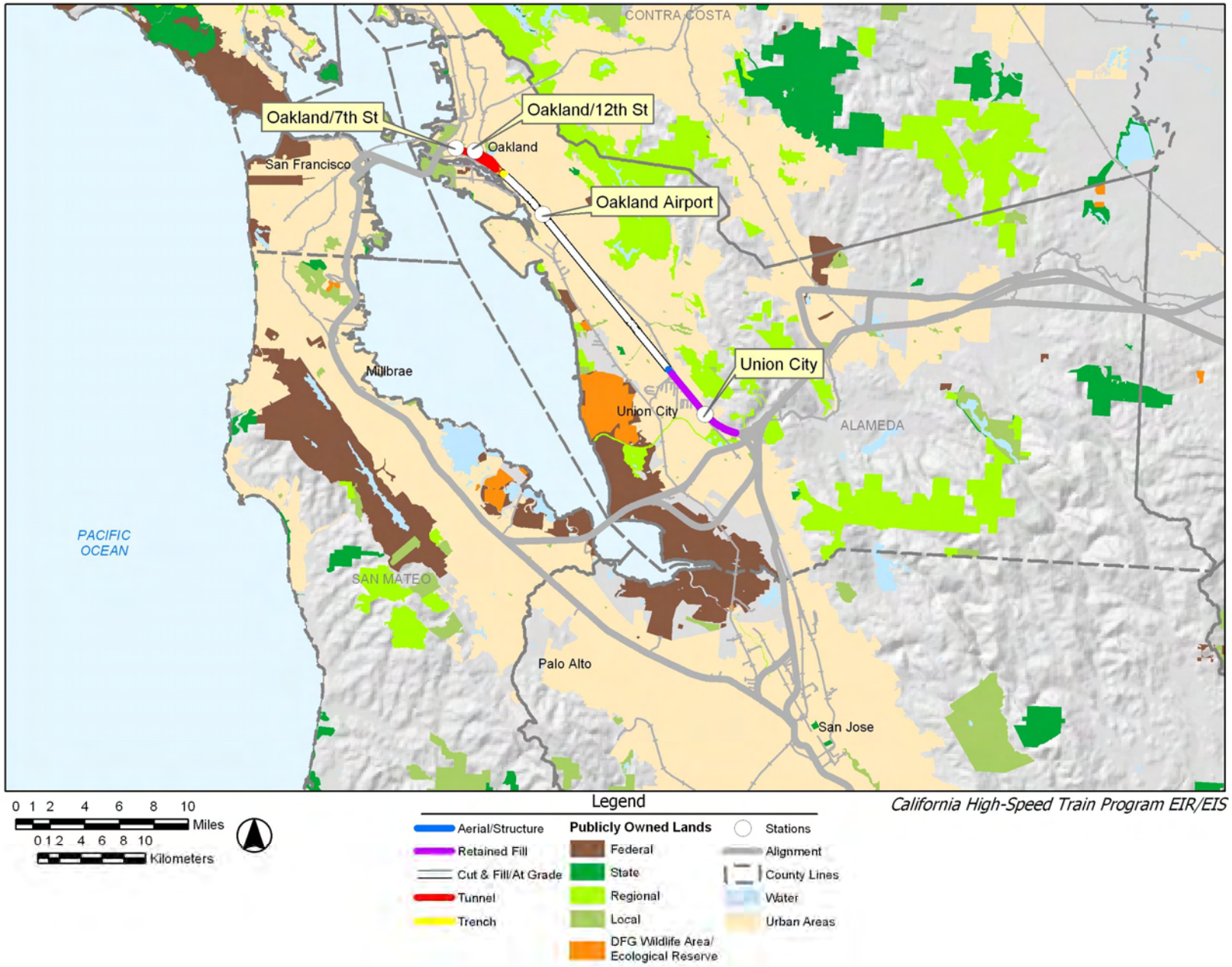

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Figure 7.3-3
HST Alignment Alternatives
Niles/I-880 (Oakland to Niles Junction)
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Table 7.3-3
Niles/I-880: Oakland to Niles Junction

	West Oakland to Niles Junction	12th Street/City Center to Niles Junction
Potential Environmental Impacts		
Travel Conditions	The Oakland to Niles Junction alignments would bring direct HST service up the East Bay to Oakland with a potential station in West Oakland, at Oakland International Airport (OAK) (Oakland Coliseum), and a potential southern Alameda County station at either Union City or Fremont (Warm Springs). These alignments would increase connectivity and accessibility to Oakland, the East Bay, and Oakland International Airport. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay while improving the safety, reliability and performance of the existing Capitol intercity service (Sacramento to San Jose via I-80) through grade separation improvements between Oakland and Niles Junction. This alignment alternative would increase the capacity for intercity travel in the East Bay and reduce highway congestion.	The Oakland to Niles Junction alignments would bring direct HST service up the East Bay to Oakland with potential stations in Downtown Oakland, at Oakland International Airport (Coliseum/BART), and a potential southern Alameda County station at either Union City or Fremont (Auto Mall Parkway). These alignments would increase connectivity and accessibility to Oakland, the East Bay, and Oakland International Airport. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay while improving the safety, reliability and performance of the existing Capitol intercity service (Sacramento to San Jose via I-80) through grade separation improvements between Oakland and Union City. This alignment alternative would increase the capacity for intercity travel in the East Bay and reduce highway congestion.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts. High potential of vibration impacts. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.	Medium potential of noise impacts. High potential of vibration impacts. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or

Table 7.3-3
Niles/I-880: Oakland to Niles Junction

	West Oakland to Niles Junction	12th Street/City Center to Niles Junction
	adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low property impacts.	immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low property impacts.
Aesthetics and Visual Resources: General impacts and rating.	Includes highway grade separations and an elevated alignment. Overall low visual impact	
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 24 known cultural resources. The majority of resources are located within the city of Oakland and include the Old Oakland Historic District. Resources include buildings and industrial complexes dating from the 1920s and 1940s and residential properties dating from the 1880s to the 1940s.	32 known cultural resources. This alignment alternative has the highest density of cultural resources within this corridor. The majority of resources are located within the city of Oakland and include buildings and residential properties dating from the 1880s to the 1920s.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 4.3 ac (1.74 ha) direct/ 9.5 ac (3.84 ha) indirect Streams: 1,035 linear ft (315.5 m) direct/ 8,828 linear ft (2,690.8 linear m) indirect Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect Potentially affect at least 13 named and unnamed water resources, including Arroyo Viejo, Lion Creek, San Leandro Creek, San Lorenzo Creek, and Alameda Creek. Includes tunnels that would avoid impacts on the floodplain, and aerial structures that would minimize impact on the floodplain and streams, creeks, and channels.	Floodplains: 4.3 ac (1.74 ha) direct/ 9.5 ac (3.84 ha) indirect Streams: 1,035 linear ft (315.5 m) direct/ 8,828 linear ft (2,690.8 linear m) indirect Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect Potentially affect 8 named and unnamed water resources, including Mission Creek, Alameda Creek, the Lagoon/Elizabeth Lake, Penitencia Creek, and Mud Slough/Coyote Creek. Includes tunnels that would avoid impacts on the floodplain, and aerial structures that would minimize impact on the floodplain and streams, creeks, and channels.

Table 7.3-3
Niles/I-880: Oakland to Niles Junction

	West Oakland to Niles Junction	12th Street/City Center to Niles Junction
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 0.11 ac (0.04 ha) direct/ 52.1 ac (21.07 ha) indirect Non-Wetland Waters: 455 linear ft (138.7 linear m) Species: 5 special-status plant and 23 special-status wildlife species This alignment alternative would have potential to indirectly impact the most wetlands. Alignment alternative would have the potential to impact the least plant species. Potential species impacts include Presidio clarkia, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 0.11 ac (0.04 ha) direct/ 30.2 ac (12.21 ha) indirect Non-Wetland Waters: 455 linear ft (138.7 linear m) Species: 6 special-status plant and 23 special-status wildlife species This alignment alternative would have potential to indirectly impact the least wetlands. Alignment alternative would have the potential to impact the most plant species. Potential species impacts include Presidio clarkia, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	Hayward (Active) – At Grade - Adjacent and Parallel	
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of Alignment Alternative include (1) Coliseum Gardens Park, (2) Stonehurst Recreation Area Park, (3) Charles F. Kennedy Park, (4) Quarry Lakes Regional Park, (5) Rancho Arroyo Park, and (6) San Francisco Bay Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–50 ft from center of alignment alternative include Madison Park, (2) Coliseum Gardens Park, (3) Stonehurst Recreation Area Park, (4) Charles F. Kennedy Park, (5) Quarry Lakes Regional Park, (6) Rancho Arroyo Park, and (7) San Francisco Bay Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

D. NILES/I-880 ALIGNMENT ALTERNATIVES (NILES JUNCTION TO SAN JOSE)

All information presented is for the area from Niles Junction to San Jose. This alignment alternative is shown in Figure 7.3-4 and described in Table 7.3-4.

Table 7.3-4
Niles/I-880: Niles Junction to San Jose

	Niles Junction to San Jose via Trimble	Niles Junction to San Jose via I-880
Physical/Operational Characteristics		
Alignment Alternative Description	From Niles Junction, this alignment alternative would travel south along the Union Pacific Railroad (UPRR) Hayward Line to the UPRR Milpitas Line (through Fremont), transition to the I-880 median, and then transition to Trimble road to San Jose. Station options considered in this segment include Fremont (Warm Springs) and San Jose Diridon.	From Niles Junction, this alignment alternative would travel south along the Union Pacific Railroad (UPRR) Hayward Line to the UPRR Milpitas Line (through Fremont), and then transition to the I-880 median to San Jose. Station options considered in this segment include Fremont (Warm Springs) and San Jose Diridon.
Length	17.04 mi (27.43 km)	16.22 mi (26.10 km)
Cost (dollars)	$2.18 billion	$1.61 billion
Travel Time	15 min (San Jose–Union City)	13 min (San Jose–Union City)
Ridership	Would have slightly less intercity ridership potential as Niles Junction to San Jose via I-880 alternative (as a result of the 2-minute additional travel times).	Would have about slightly more ridership potential as Niles Junction to San Jose via Trimble alternative.
Constructability	Major construction issues associated with constructing columns and footings in the wide median of I-880 (between San Jose and Fremont) and tunneling adjacent to San Jose Airport along Trimble Road.	Major construction issues associated with constructing columns and footings in the wide median of I-880 (between San Jose and Fremont).
Operational Issues	Average speed =87.1 mph (145.2 kph) Maximum speed =134.4 mph (224 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.	Average speed =93.3 mph (155.5 kph) Maximum speed =151.8 mph (253 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.
Potential Environmental Impacts		
Travel Conditions	These alignments would increase connectivity and accessibility to the East Bay and San Jose The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay. This alignment alternative would increase the capacity for intercity travel in	These alignments would increase connectivity and accessibility to the East Bay, and San Jose. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay. This alignment alternative would greatly increase the

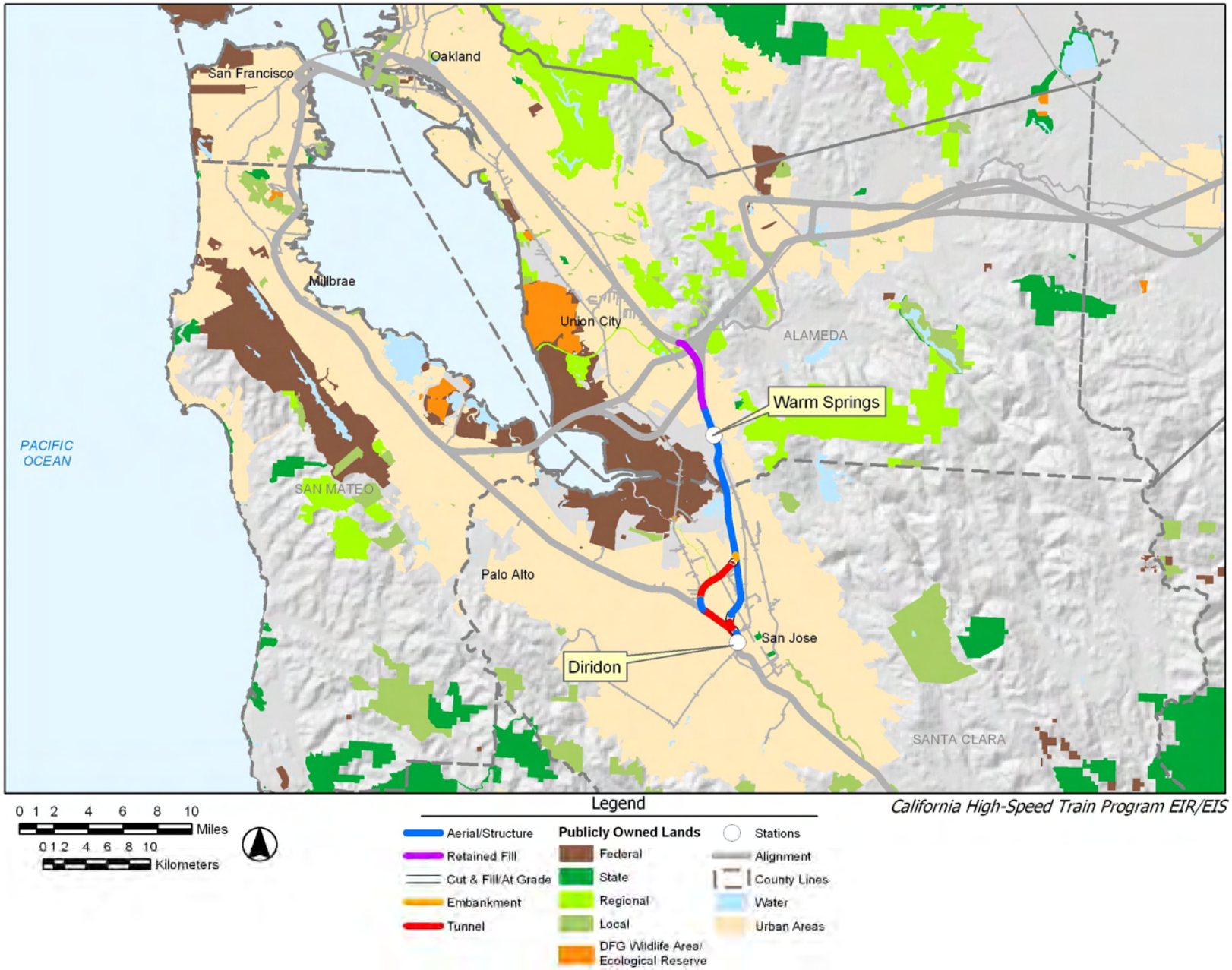

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Figure 7.3-4
HST Alignment Alternatives
Niles/I-880 (Niles Junction to San Jose)
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Table 7.3-4
Niles/I-880: Niles Junction to San Jose

	Niles Junction to San Jose via Trimble	Niles Junction to San Jose via I-880
	the East Bay and reduce highway congestion.	capacity for intercity travel in the East Bay and reduce highway congestion.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts. Medium potential of vibration impacts.	Medium potential of noise impacts. Medium potential of vibration impacts.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has medium environmental justice impact rating for East Bay between Niles Junction and San Jose, using Trimble Road. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low property impacts.	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has medium environmental justice impact rating for East Bay between Niles Junction and San Jose. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low property impacts.
Aesthetics and Visual Resources: General impacts and rating.	Includes elevated alignment adjacent to residential, along I-880 freeway and at the Diridon San Jose station. Overall medium visual impact	Include elevated alignment adjacent to residential, along I-880, along Montague and Trimble Road, near the historic Santa Clara Depot and Tower, and at the Diridon San Jose station. Overall medium visual impact
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 31 known cultural resources. The majority of resources are located within San Jose, which includes the Santa Clara de Asis Mission. The remains of a Pleistocene mammoth were discovered near the airport in 2005.	There are 4 known cultural resources. There are few archaeological or architectural resources located in the area of San Jose.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 36.4 ac (14.73 ha) direct/ 129.8 ac (52.53 ha) indirect Streams: 1,013 linear ft (308.8 m) direct/ 2,220 linear ft (676.7 linear m) indirect Lakes/Waterbodies: 0.7 ac (0.28 ha) direct/ 1.3 ac (0.53 ha) indirect	Floodplains: 45.5 ac (18.41ha) direct/ 167 ac (67.58 ha) indirect Streams: 1,135 linear ft (345.9 m) direct/ 2,707 linear ft (825.1 linear m) indirect Lakes/Waterbodies: 0.7 ac (0.28 ha) direct/ 1.3 ac (0.53 ha) indirect

Table 7.3-4
Niles/I-880: Niles Junction to San Jose

	Niles Junction to San Jose via Trimble	Niles Junction to San Jose via I-880
	Potentially affect 8 named and unnamed water resources, including Mission Creek, Alameda Creek, the Lagoon/Elizabeth Lake, Penitencia Creek, and Mud Slough/Coyote Creek. Tunnel would extend under the Guadalupe River and Coyote Creek.	Potentially affect 10 named and unnamed water resources, including Mission Creek, Alameda Creek, the Lagoon/Elizabeth Lake, Penitencia Creek, Mud Slough/Coyote Creek, and Guadalupe River. Aerial structure would extend over the Guadalupe River and Coyote Creek.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 1.27 ac (0.51 ha) direct/ 302.3 ac (122.34 ha) indirect Non-Wetland Waters: 958 linear ft (292.0 linear m) Species: 6 special-status plant and 25 special-status wildlife species This alignment alternative would have potential to directly and indirectly impact the least wetlands and non-wetland waters. Alignment alternative would have the potential to impact the most plant species. Potential species impacts include Contra Costa goldfields, vernal pool tadpole shrimp, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 1.80 ac (0.73 ha) direct/ 323.7 ac (131.01 ha) indirect Non-Wetland Waters: 1,080 linear ft (329.2 linear m) Species: 5 special-status plant and 25 special-status wildlife species This alignment alternative would have potential to directly and indirectly impact the most wetlands and non-wetland waters. Alignment alternative would have the potential to impact fewer plant species. Potential species impacts include Contra Costa goldfields, vernal pool tadpole shrimp, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	Hayward Fault (Active) – At Grade Silver Creek Fault (Potentially Active) – Above Grade	
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Fremont Central Park, (2) Grimmer Park. Few potential direct impacts are anticipated given that much of the Alignment Alternative is within or directly adjacent to existing transportation rights-of-way, and no resources exist in areas where the Alignment Alternative is not adjacent to or within this existing right-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Fremont Central Park, (2) Grimmer Park, (3) Columbus Park, (4) Heritage Rose Garden, and (5) Guadalupe Gardens. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

E. PACHECO PASS ALTERNATIVE

All information presented is for the area from San Jose Diridon Station to San Luis Reservoir. This segment is shown in Figure 7.3-5 and described in Table 7.3-5.

Table 7.3-5
Pacheco Pass Alternatives: San Jose Diridon Station to San Luis Reservoir

Alignment Alternative Description	From the Diridon Station site in downtown San Jose, this alignment alternative would travel south following the Caltrain alignment to Gilroy. From Gilroy, the alignment alternative would travel east through Pacheco Pass to the Central Valley floor. Station options considered in this segment include Morgan Hill (Caltrain) or Gilroy (Caltrain).
Length	57.48 mi (92.5 km)
Cost (dollars)	$3.74 billion
Travel Time	14.5 min (San Jose–Gilroy)
Ridership	This alignment alternative provides high HST ridership potential to the Bay Area via the Pacheco Pass.
Constructability	Difficult to maintain roadway and existing freight and passenger rail operations during construction of the HST infrastructure.
Operational Issues	Average speed = 118.6 mph (197.6 kph) Maximum speed =178.8 mph (298 kph) Potential for shared tracks with Caltrain commuter rail Service. Potential conflict with UPRR freight access and operations.
Travel Conditions	The Pacheco alignments would bring direct HST service up the Caltrain alignment with a potential station at Gilroy (Caltrain) or Morgan Hill (Caltrain). This alignment alternative would increase connectivity and accessibility to Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to Santa Clara County while improving the safety, reliability and performance of the existing Caltrain commuter rail service through grade separation improvements between Gilroy and San Jose. This alignment alternative would greatly increase the capacity for intercity travel in Santa Clara County and reduce highway congestion. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties.
Noise and Vibration:[i] High, medium, or low potential impacts	Medium potential of noise impacts. Medium potential of vibration impacts. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way east of Gilroy.

Table 7.3-5
Pacheco Pass Alternatives: San Jose Diridon Station to San Luis Reservoir

Justice	Environmental Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way in the urban areas. Property: This alignment alternative has the potential for low property impacts.
Aesthetics and Visual Resources: General impacts and rating.	Includes elevated facilities at the Diridon San Jose station, elevated facilities south of Diridon station, highway grade separations, expansion of existing railway corridor along Monterey Highway, new transportation corridor between Gilroy and Pacheco Valley, elevated crossing of SR 152 in Pacheco Valley, and cut and fill sections over Pacheco Pass. Overall medium visual impact.
Farmlands:[ii] Ac (ha) potentially affected	Farmland: 241 ac (97.5 ha) Impact up to 176 ac (71.2 ha) of prime farmland. High potential for farmland severance south of Gilroy.
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 11 known cultural resources. Little development has taken place along this alignment. Resources include buildings, canals, and a bridge as well as potentially historic resources in the Santa Clara Valley, including Morgan Hill and Gilroy.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 103.4 ac (41.85 ha) direct/ 303.5 ac (122.8 ha) indirect Streams: 2,674 linear ft (815.0 m) direct/ 9,215 linear ft (2,808.7 linear m) indirect Lakes/Waterbodies[5]: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect Potentially affect at least 13 unnamed and named water resources, including Los Gatos Creek, Guadalupe River, Little Llagas Creek, Llagas Creek, Miller Slough, Pajaro River, Pacheco Creek, and Tequisquita Slough. A combination of at-grade permeable track, aerial structure, and tunnels would minimize impacts.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 0.11 ac (0.04 ha) direct/ 43.8 ac (17.73 ha) indirect Non-Wetland Waters: 1,960 linear ft (597.4 linear m) Species: 23 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to indirectly impact a substantial amount of wetlands and non-wetland waters. Alignment alternative would also have the potential to impact plant and wildlife species. Potential species impacts include Tiburon Indian paintbrush, Santa Clara Valley dudleya, Bay checkerspot butterfly, California red-legged frog, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	Silver Creek (Potentially Active) – At Grade Calaveras (Active) – At Grade

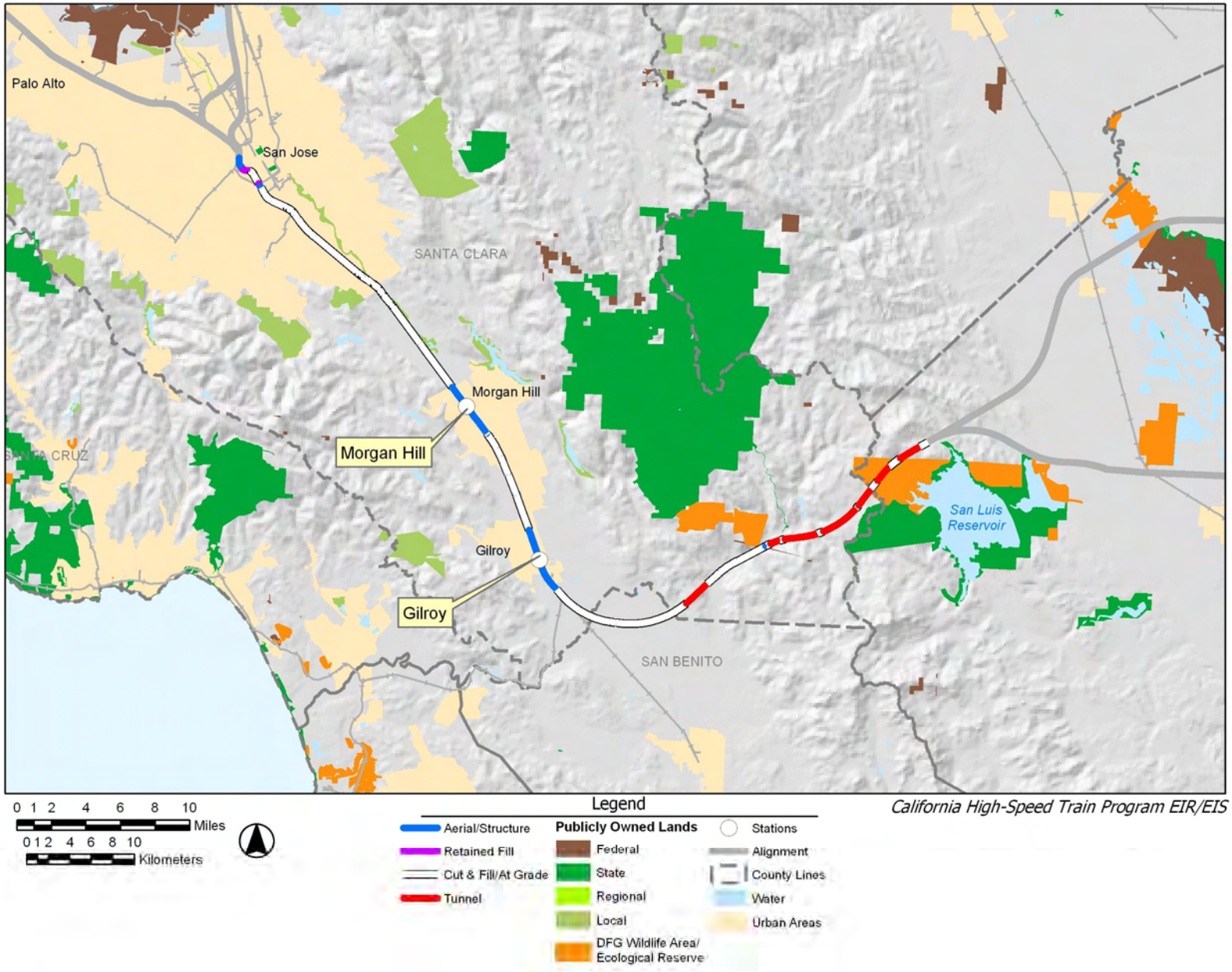

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Figure 7.3-5
HST Alignment Alternatives
Pacheco Pass Alternatives
(San Jose to San Luis Reservoir)
B004851

Table 7.3-5
Pacheco Pass Alternatives: San Jose Diridon Station to San Luis Reservoir

Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Edenvale Garden Park, (2) Coyote Creek Park, and (3) Upper Cottonwood Wildlife Area. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the alignment alternative is not adjacent to or within this existing right-of-way.

F. PACHECO PASS ALTERNATIVES

All information presented is for the area from San Luis Reservoir to UPRR or BNSF. This segment is shown in Figure 7.3-6 and described in Table 7.3-6.

Table 7.3-6
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF

	GEA North	Henry Miller (UPRR Connection)	Henry Miller (BNSF Connection)
Alignment Alternative Description	From the Central Valley floor, this alignment alternative would pass through the northern portion of the GEA.	From the Central Valley floor, this alignment alternative would pass north of Santa Nella and would then generally follow Henry Miller Avenue to the UPRR N/S line in the Central Valley.	From the Central Valley floor, this alignment alternative would pass north of Santa Nella and would then generally follow Henry Miller Avenue to the BNSF N/S line in the Central Valley.
Length	60.22 mi (96.92 km)	62.69 mi (100.89 km)	65.06 mi (104.70 km)
Cost (dollars)	$1.41 billion	$1.36 billion	$1.40 billion
Travel Time	Gilroy–Briggsmore=32 min (88.66 mi; 142.7 km) Gilroy–Modesto=33 min (91.04 mi; 146.5 km) Gilroy–Fresno (UPRR)=43 min (128 mi; 206 km) Gilroy–Fresno (BNSF)=44 min (135.4 mi; 217.8 km)	Gilroy–Briggsmore=44 min (133 mi; 214 km) Gilroy–Modesto=45 min (130 mi; 209 km) Gilroy–Fresno=40 min (115 mi; 185 km)	Gilroy–Briggsmore=48 min (150 mi; 241 km) Gilroy–Modesto=49 min (147 mi; 237 km) Gilroy–Fresno=40 min (119 mi; 192 km)
Ridership	Forecast to have slightly less ridership (2.3%) and revenue (1%) than the Henry Miller Road (UPRR Connection) Alternative. Higher ridership between Sacramento and the Bay Area would offset less ridership between the Bay Area and southern California.	This Alternative would have slightly higher ridership potential than the GEA North Alternative.	This Alternative would have slightly less ridership potential than the Henry Miller Alternative (UPRR Connection) as a result of longer travel times between the Bay Area and Sacramento.
Constructability	Would require more grade separations than Henry Miller at the eastern end of the alignment.	Would require aerial segment through sensitive grasslands/wetlands area.	Would require aerial segment through sensitive grasslands/wetlands area.

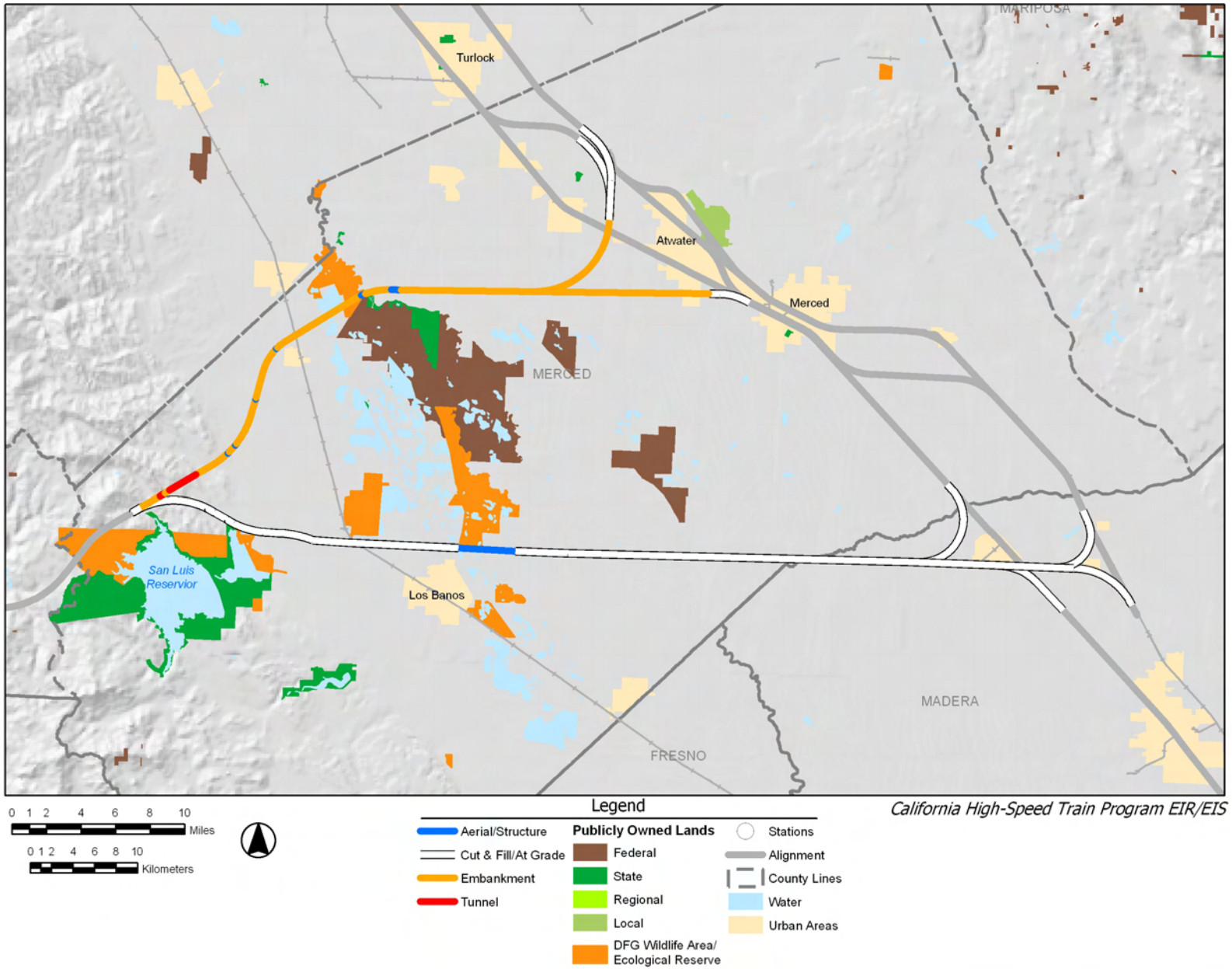

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Figure 7.3-6
HST Alignment Alternatives
Pacheco Pass Alternatives
(San Luis Reservoir to UPRR or BNSF)

B004855

Table 7.3-6
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF

	GEA North	Henry Miller (UPRR Connection)	Henry Miller (BNSF Connection)
Operational Issues	Gilroy–Briggsmore Average speed=161.1 mph (268.6 kph) Maximum speed=210 mph (350 kph) Gilroy–Modesto Average speed=161.8 mph (269.6 kph) Maximum speed=210 mph (350 kph) Gilroy–Fresno (UPRR) Average speed=170.8 mph (284.6 kph) Maximum speed=210mph (350 kph) Gilroy–Fresno (BNSF) Average speed=171 mph (285 kph) Maximum speed=210 mph (350 kph)	Gilroy–Briggsmore Average speed=168.6 mph (281 kph) Maximum speed=210 mph (350 kph) Gilroy–Modesto Average speed=170.1 mph (283.5kph) Maximum speed=210 mph (350 kph) Gilroy–Fresno Average speed=166.8 mph (277.9kph) Maximum speed=210 mph (350 kph)	Gilroy–Briggsmore Average speed=168.6 mph (281 kph) Maximum speed=210 mph (350 kph) Gilroy–Modesto Average speed=172.2 mph (287 kph) Maximum speed=210 mph (350 kph) Gilroy–Fresno Average speed=166.9 mph (278.2 kph) Maximum speed=210 mph (350 kph)
Travel Conditions	This alignment alternative would have increased travel times between Los Angeles and San Jose, but would reduce travel times between San Jose and Sacramento.	This alignment alternative would generally parallel an existing roadway corridor (Henry Miller Road) in the Central Valley. It would provide the most direct route between Los Angeles and San Jose.	
Noise and Vibration:[i] High, medium, and low potential impacts	Low potential of noise impacts. Low potential of vibration impacts.. Introduces new potential impacts in partially residential area on what is currently a sparsely used freight line.	Low potential of noise impacts. Low potential of vibration impacts... Trains at conventional speeds. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings. The grade crossing noise reduction (elimination of horn noise and gate noise from existing services) as a result of the grade separations would offset the increase in train frequencies.	
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is incompatible (low rating), given that it is within or immediately adjacent to agricultural land. Environmental Justice: This alignment alternative has high environmental justice impact rating. It traverses lower	Compatibility: Highly compatible with existing Henry Miller Road between Santa Nella and Elgin Avenue. New alignment right-of-way would be incompatible with agricultural uses east of Elgin Avenue. Environmental Justice: This alignment alternative has low environmental justice impact rating. Although the environmental justice percentage thresholds are exceeded east of Gilroy, the environmental justice populations are sparse and distant from the HST line.	

Table 7.3-6
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF

	GEA North	Henry Miller (UPRR Connection)	Henry Miller (BNSF Connection)
	land use density areas with higher minority and low income populations. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way in the urban areas. Property: This alignment alternative has the potential for low property impacts because it either traverses existing transportation right-of-way or through rural land.	Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way in the urban areas. Property: This alignment alternative has the potential for low property impacts because it either traverses existing transportation right-of-way or through rural land.	
Aesthetics and Visual Resources: General impacts and rating.	Includes new transportation corridor between Pacheco Pass and Gustine, elevated crossing of I-5, wetlands crossings, and new transportation corridor connections to UPRR or BNSF in Chowchilla. Overall medium visual impact.	Includes a trench near the San Joaquin National Cemetery, an elevated crossing of I-5, and wetlands crossings. Overall low visual impact.	
Farmlands:[ii] Ac (ha) potentially affected	Farmland: 271 ac (110 ha) Similar farmland impacts as the Henry Miller (UPRR Connection), but have the greatest impact on prime farmland. Impact up to 137 ac (55.4 ha) of prime farmland. Highest potential for farmland severance.	Farmland: 265 ac (107 ha) Less farmland impacts than either the GEA North or Henry Miller (BNSF Connection). Impact up to 128 ac (52 ha) of prime farmland. Generally follows existing roadway, but potential for farmland severance.	Farmland: 295 ac (119 ha) Would have greatest potential impacts on farmlands. Impact up to 130 ac (52.4 ha) of prime farmland. Generally follows existing roadway, but potential for farmland severance.
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 9 known cultural resources. Much of the area along this alignment alternative has seen little development historically. Previously recorded resources include prehistoric archaeological sites and architectural resources.	There are 5 known cultural resources. Much of the area along this alignment alternative has seen little development historically. Previously recorded resources include an archaeological site and architectural resources.	There are 5 known cultural resources. Much of the area along this alignment alternative has seen little development historically. Previously recorded resources include an archaeological site and architectural resources.

Table 7.3-6
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF

	GEA North	Henry Miller (UPRR Connection)	Henry Miller (BNSF Connection)
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains, and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 53.08 ac (21.48 ha) direct/ 158.3 ac (64.04 ha) indirect Streams: 6,771 linear ft (2,063.8 linear m) direct/ 20,436 linear ft (6,228.9 linear m) indirect Lakes/Waterbodies: 2.3 (0.93 ha) direct/ 8.4 ac (3.40 ha) indirect Potentially affect at least 44 unnamed and named water resources, including (i.e., not limited to) California Aqueduct, Mendota Canal, Garzas Creek, Sullivan Extension, Duck Ponds, Mud Slough, San Joaquin River, Cottonwood Creek, Los Banos Creek, Livingston Canal, and the Merced River.	Floodplains: 126.4 ac 51.15(ha) direct/ 469.5 ac (190.01 ha) indirect Streams: 6,697 linear ft (2,041.2 linear m) direct/ 44,458 linear ft (13,550.8 linear m) indirect Lakes/Waterbodies: 2.5 (1.01 ha) direct/ 10.0 ac (4.05 ha) indirect Potentially affect at least 44 unnamed and named water resources, including Tule Lake, California Aqueduct, San Louis Creek, Mendota Canal, Los Banos Creek, San Louis Wasteway, Mud Slough, Delta Canal, San Joaquin River, Chowchilla River, and Berenda Slough. Primarily at-grade and adjacent to Henry Miller Road and elevated through portion of GEA; constructed with culverts under the track to convey anticipated storm flows and to minimize ponding.	Floodplains: 130.4 ac (52.77 ha) direct/ 487.3 ac (197.21 ha) indirect Streams: 6,266 linear ft (1,909.9 linear m) direct/ 43,420 linear ft (13,234.4 linear m) indirect Lakes/Waterbodies: 2.3 (0.93 ha) direct/ 10.6 ac (4.29 ha) indirect Potentially affect same 44 unnamed and named water resources as Henry Miller (UPRR Connection). Primarily at-grade and adjacent to Henry Miller Road and elevated through portion of GEA; constructed with culverts under the track to convey anticipated storm flows and to minimize ponding.

Table 7.3-6
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF

	GEA North	Henry Miller (UPRR Connection)	Henry Miller (BNSF Connection)
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 17.96 ac (7.27 ha) direct/ 1,037.2 ac (419.75 ha) indirect Non-Wetland Waters: 6,771 linear ft (292.0 linear m) Species: 22 special-status plant and 34 special-status wildlife species This alignment alternative would impact the GEA and have potential to directly impact the least non-wetland waters and plant and wildlife species. This alignment alternative would have the potential to impact the most wetlands. Potential species impacts include succulent owl's clover, hairy orcutt grass, valley elderberry longhorn beetle, California tiger salamander, vernal pool tadpole shrimp, least Bell's vireo, riparian (San Joaquin Valley) woodrat, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. This alignment alternative would generally not follow transportation corridors.	Wetlands[v]: 11.61 ac (4.7 ha) direct/ 1,186.0 ac (479.96 ha) indirect Non-Wetland Waters: 10,588 linear ft (3,227.2 linear m) Species: 25 special-status plant and 34 special-status wildlife species This alignment alternative would impact the GEA and have potential to indirectly impact the most wetlands and impact the most non-wetland waters. Alignment alternative would also have the potential to impact the most plant and wildlife species. Potential species impacts include succulent owl's clover, hairy orcutt grass, Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, least Bell's vireo, riparian (San Joaquin Valley) woodrat, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 11.48 ac (4.65 ha) direct/ 1,185.0 ac (479.57 ha) indirect Non-Wetland Waters: 10,312 linear ft (3,143.1 linear m) Species: 25 special-status plant and 34 special-status wildlife species This alignment alternative would impact the GEA and have potential to indirectly impact the most wetlands. Alignment alternative would also have the potential to impact the most plant and wildlife species. Potential species impacts include succulent owl's clover, hairy orcutt grass, Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, least Bell's vireo, riparian (San Joaquin Valley) woodrat, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	Ortigalita (Active) – At Grade Embankment	Ortigalita (Active) – At Grade	Ortigalita (Active) – At Grade
Section 4(f) and 6(f) Resources:[4] Number of resources rated high (potential direct effects)	Public parks, recreation lands, wildlife v waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include the San Luis National Wildlife Refuge, North Grasslands Wildlife Area, and Great Valley Grasslands State Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include the Los Banos Wildlife Area. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	

G. ALTAMONT PASS ALIGNMENT ALTERNATIVES (NILES CANYON TO ALTAMONT PASS)

All information presented is for the area from Niles Canyon to the Altamont Pass. This alternative is shown in Figure 7.3-7 and described in Table 7.3-7.

Table 7.3-7
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass

	I-680/I-580/UPRR	I-580/UPRR	Patterson Pass/UPRR	UPRR
Physical/Operational Characteristics				
Alignment Alternative Description	The I-680/I-580/UPRR alignment alternative would begin at Niles Canyon to Sunol, follow the I-680 Freeway, north and transition to the I-580 Freeway median east to Altamont Pass. Station options considered in this segment include Pleasanton (BART), Livermore (I-580), or Livermore (Greenville/I-580).	The I-580/UPRR alignment alternative would begin at Niles Canyon and would follow UPRR through Pleasanton, travel north to the I-580 and then to Altamont Pass. Station options would be at Pleasanton (I-680/Bernal Rd), or Livermore (I-580), or Livermore (Greenville/I-580).	The Patterson Pass/UPRR alignment alternative would begin at Niles Canyon and would follow the UPRR line to Patters Pass and then to the Central Valley. Station options considered in this segment include Pleasanton (I-680/Bernal Rd), or Livermore (Downtown), or Livermore (Greenville/UPRR).	The UPRR alignment alternative would begin at Niles Canyon and would follow the UPRR line through the Tri-Valley. Station options considered in this segment include Pleasanton (I-680/Bernal Rd), or Livermore (Downtown), or Livermore (Greenville/UPRR).
Length	30.71 mi (49.43 km)	27.32 mi (43.96 km)	25.60 mi (41.19 km)	25.86 mi (41.62 km)
Cost (dollars)	$2.37 billion	$2.0 billion	$1.72 billion	$1.68 billion
Travel Time	22 min	17 min	14 min	14 min
Ridership	Forecast to provide 1.6% less total ridership and 1.4% less total revenue than the UPRR alignment primarily as a result of longer travel times.	Would provide the slightly less ridership potential than alternatives using the UPRR alignment as a result of longer travel times.	Would provide high ridership and revenue potential through the Altamont Pass.	Would provide high ridership and revenue potential through the Altamont Pass.
Constructability	Would require extensive aerial structure along the I-580 and I-680 freeway and rail corridors with major constructability issues. A particularly long and high aerial curve would be	Would require extensive aerial structure along the I-580 freeway and rail corridor. Construction issues through downtown Pleasanton.	Would require extensive earthwork as compared to the UPRR alignment alternative. Construction issues through downtown Livermore and Pleasanton.	Construction issues through downtown Livermore and Pleasanton

Table 7.3-7
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass

	I-680/I-580/UPRR	I-580/UPRR	Patterson Pass/UPRR	UPRR
	required from the I-580 to I-680 alignments.			
Operational Issues	Average speed: 91.1 mph (151.8 kph) Maximum speed: 159 mph (265 kph) HST operations would need to be coordinated and integrated with BART.	Average speed: 97.8 mph (162.9 kph) Maximum speed: 159 mph (265 kph) HST operations would need to be coordinated and integrated with ACE service and UPRR operations.	Average speed: 105.8 mph (176.3 kph) Maximum speed: 171 mph (285 kph) HST operations would need to be coordinated and integrated with ACE service and UPRR operations.	Average speed: 108.3 mph (180.5 kph) Maximum speed: 168 mph (280 kph) HST operations would need to be coordinated and integrated with ACE service and UPRR operations.
Potential Environmental Impacts				
Travel Conditions	This alignment alternative would provide direct HST service to the Tri-Valley area with potential stations at the Pleasanton (BART), Livermore (I-580), or Livermore (Greenville/I-580). This alignment alternative would increase connectivity and accessibility to the I-580 Corridor and Tri-Valley area. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and	This alignment alternative would provide direct HST service to the Tri-Valley area with potential stations at Pleasanton (I-680/Bernal Rd), or Livermore (I-580), or Livermore (Greenville/I-580). This alignment alternative would increase connectivity and accessibility to the I-580 Corridor and Tri-Valley area. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing	These alignment alternatives would provide generally equivalent service to the I-580/UPRR alignment alternative.	

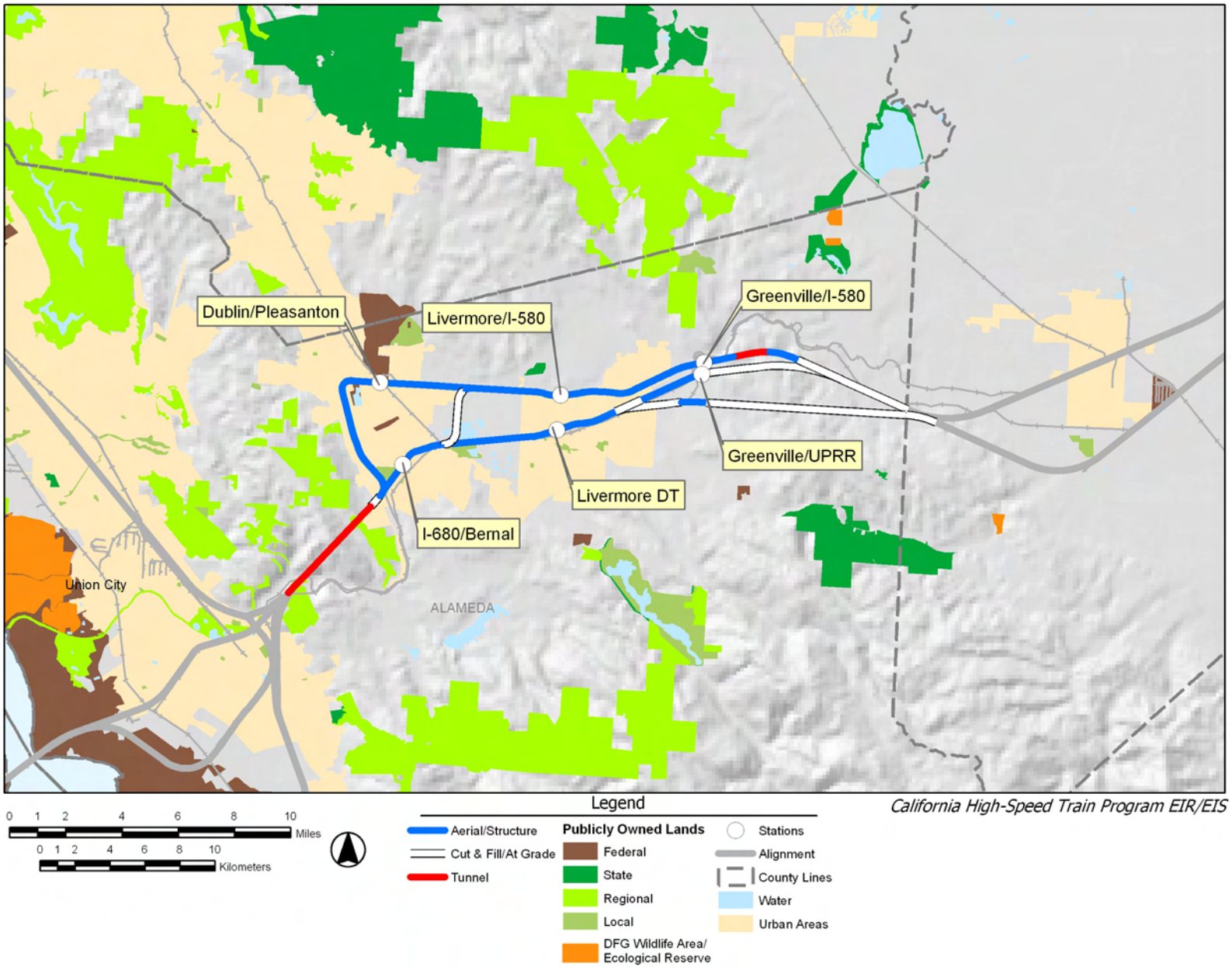

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Figure 7.3-7
HST Alignment Alternatives
Altamont Pass Alignment Alternatives
(Niles Canyon to Altamont Pass)

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Table 7.3-7
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass

	I-680/I-580/UPRR	I-580/UPRR	Patterson Pass/UPRR	UPRR
	reduce existing automobile traffic flow. The alignment alternative would provide connectivity to the BART station in Pleasanton.	automobile traffic flow and reduce air pollution at some existing rail crossings.		
Noise and Vibration:[i] High, medium, and low potential impacts	Low potential of noise impacts. Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	Low potential of noise impacts and low potential of vibration impacts due to proximity of alignment alternative to industrial/commercial land uses. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	Medium potential of noise impacts and a medium potential of vibration impacts due to proximity of residential land use along the Tri-Valley. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	Medium potential of noise impacts and a medium potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. Environmental Justice: This alignment alternative has low environmental justice impact rating.	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. Environmental Justice: This alignment alternative has low environmental justice impact rating.	Compatibility: The majority of these alignment alternatives are compatible (high rating), given that they are within or immediately adjacent to an existing major rail or highway rights-of-way. They exhibit low compatibility where they do not follow a transportation rights-of-way in the Altamont Pass area. Environmental Justice: These alignment alternatives have low environmental justice impact ratings. Community: These alignment alternatives would not affect community cohesion, given that they are mostly within or immediately adjacent to an existing major rail or highway rights-of-way. Property: These alignment alternatives have the potential for low to medium property impacts.	

Table 7.3-7
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass

	I-680/I-580/UPRR	I-580/UPRR	Patterson Pass/UPRR	UPRR
	Community: This alignment alternative would not affect community cohesion, given that it is mostly within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for high property impacts in the Niles to Sunol area, Dublin /Pleasanton areas, where additional property will be required.,	Community: This alignment alternative would not affect community cohesion, given that it is mostly within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for medium property impacts.		
Aesthetics and Visual Resources: General impacts and rating.	Includes a trench alignment from tunnel portal to I-680, an elevated alignment along I-680, an elevated alignment through I-680, I-580 interchange, elevated approaches to station, and an elevated crossing of I-580. Overall medium visual impact.	Include a trench alignment from tunnel portal to east of I-680, an elevated alignment along existing UPRR in Pleasanton, an at-grade alignment along existing UPRR through Livermore, and a deep cut at Altamont Summit. Overall medium visual impact.	Includes an aerial alignment from tunnel portal to east of I-680, an elevated alignment along existing UPRR in Pleasanton, and at-grade alignment along existing UPRR through Livermore, and cut and fill across summit. Overall low visual impact.	Includes a trench alignment from tunnel portal to east of I-680, an elevated alignment along existing UPRR in Pleasanton, an at-grade alignment along existing UPRR through Livermore, and a deep cut and fill across summit. Overall medium visual impact.
Farmlands:[ii] Ac (ha) potentially affected	Farmland: 14 ac (5.5 ha) Would have greatest potential impacts on farmlands. Impact up to 11.7 ac (4.7 ha) of prime farmland.	Farmland: 12 ac (4.9 ha) Similar farmland impacts as the I-680/I-580/UPRR, but have the greatest impact on prime farmland. All farmland impact would be prime farmland.	Farmland: 10 ac (3.9 ha) Less potential for farmland impacts than either the I-680/I-580/UPRR or I-580/UPRR. Impact up to 7.1 ac (2.9 ha) of prime farmland.	Farmland: 7 ac (2.9 ha) Would have least potential impacts on farmlands including prime farmland. All farmland impact would be prime farmland.

Table 7.3-7
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass

	I-680/I-580/UPRR	I-580/UPRR	Patterson Pass/UPRR	UPRR
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 20 known cultural resources. Much of the area has seen recent development. Architectural resources include buildings from the 1890s and residential properties dating from 1910 to 1940.	There are 17 known cultural resources. The Livermore Valley is known to be rich in prehistoric resources, including habitation sites and burials. Previously recorded resources include archaeological sites and architectural resources dating from the 1900s.	There are 6 known cultural resources. There are few previously recorded archaeological sites or architectural resources. This alignment alternative would have a low sensitivity for cultural resources.	There are 6 known cultural resources. There are few previously recorded archaeological sites or architectural resources. This alignment alternative would have a low sensitivity for cultural resources.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains, and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 3.7 ac (1.5 ha) direct/ 18.8 ac (7.61 ha) indirect Streams: 2,582 linear ft (787.3 linear m) direct/ 13,310 linear ft (4,056.9 linear m) indirect Lakes/Waterbodies: 0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect Potentially affect at least 17 unnamed and named water resources, including Alameda Creek, Laurel Creek, Gold Creek, Arroyo Valle, Arroyo De La Laguna, Tassajara Creek, Cottonwood Creek, Arroyo Las Positas, Arroyo Seco, and South Bay Aqueduct. Constructed on aerial structure with the least amount of impact on floodplains.	Floodplains: 8.2 ac (3.32 ha) direct/ 33.7 ac (13.64 ha) indirect Streams: 2,280 linear ft (694.9 linear m) direct/ 9,243 linear ft (2,817.3 linear m) indirect Lakes/Waterbodies: 2.1 ac (0.85 ha) direct/ 7.5 ac (3.04 ha) indirect Potentially affect 15 unnamed and named water resources, including (i.e., not limited to) Arroyo Valle, Arroyo De La Laguna, Cottonwood Creek, Arroyo Las Positas, Arroyo Seco, Arroyo Gravel Pits/Arroyo Mocho, South Bay Aqueduct, and Patterson Run (canal). Constructed at-grade and potentially impact more area of floodplain.	Floodplains: 9.4 ac (3.8 ha) direct/ 20.6 ac (8.34 ha) indirect Streams: 1,861 linear ft (567.2 linear m) direct/ 6,253 linear ft (1905.9 linear m) indirect Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0ha) indirect Potentially affect 9 unnamed and named water resources, including Arroyo Valle, Arroyo De La Laguna, Arroyo Las Positas, Arroyo Seco, Arroyo Gravel Pits/Arroyo Mocho, and South Bay Aqueduct and Patterson Run (canal). Constructed on aerial structure through most of the areas within the 100-year floodplain and would not impede storm flows.	Floodplains: 7 ac (2.83ha) direct/ 16.2 ac (6.56 ha) indirect Streams: 1,957 linear ft (596.5 linear m) direct/ 6,195 linear ft (1,888.2 linear m) indirect Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha)) indirect Potentially affect 12 unnamed and named water resources, including Alameda Creek, Arroyo Valle, Arroyo De La Laguna, Arroyo Las Positas, Arroyo Seco, Arroyo Gravel Pits/Arroyo Mocho, South Bay Aqueduct, and Patterson Run (canal). Many of the watercourses would be crossed at-grade.

Table 7.3-7
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass

	I-680/I-580/UPRR	I-580/UPRR	Patterson Pass/UPRR	UPRR
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 0.66 ac (0.27 ha) direct/ 72.1 ac (29.19 ha) indirect Non-Wetland Waters: 2,380 linear ft (725.4 linear m) Species: 24 special-status plant and 29 special-status wildlife species This alignment alternative would have potential to directly impact the least wetlands, but the most plant and wildlife species. Potential species impacts include palmate-bracted bird's beak, longhorn fairy shrimp, valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 5.17 ac (2.1 ha) direct/ 226.3 ac (91.57 ha) indirect Non-Wetland Waters: 2,612 linear ft (796.1 linear m) Species: 24 special-status plant and 29 special-status wildlife species This alignment alternative would have potential to directly impact the most wetlands, non-wetland waters, and plant and wildlife species. Potential species impacts include palmate-bracted bird's beak, longhorn fairy shrimp, valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 2.59 ac (1.0 ha) direct/ 160.1 ac (64.78 ha) indirect Non-Wetland Waters: 1,371 linear ft (417.9 linear m) Species: 20 special-status plant and 28 special-status wildlife species This alignment alternative would have potential to impact the least plant and wildlife species. Potential species impacts include palmate-bracted bird's beak, valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 3.22 ac (1.3 ha) direct/ 184 ac (74.46 ha) indirect Non-Wetland Waters: 1,152 linear ft (351.1 linear m) Species: 20 special-status plant and 28 special-status wildlife species This alignment alternative would have potential to directly impact the least non-wetland waters and plant and wildlife species. Potential species impacts include valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	Calaveras (Active) – Tunnel Pleasanton (Active) – Above Grade Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade	Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade	Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Corral Hallow (Potentially Active) – At Grade	Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade

Table 7.3-7
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass

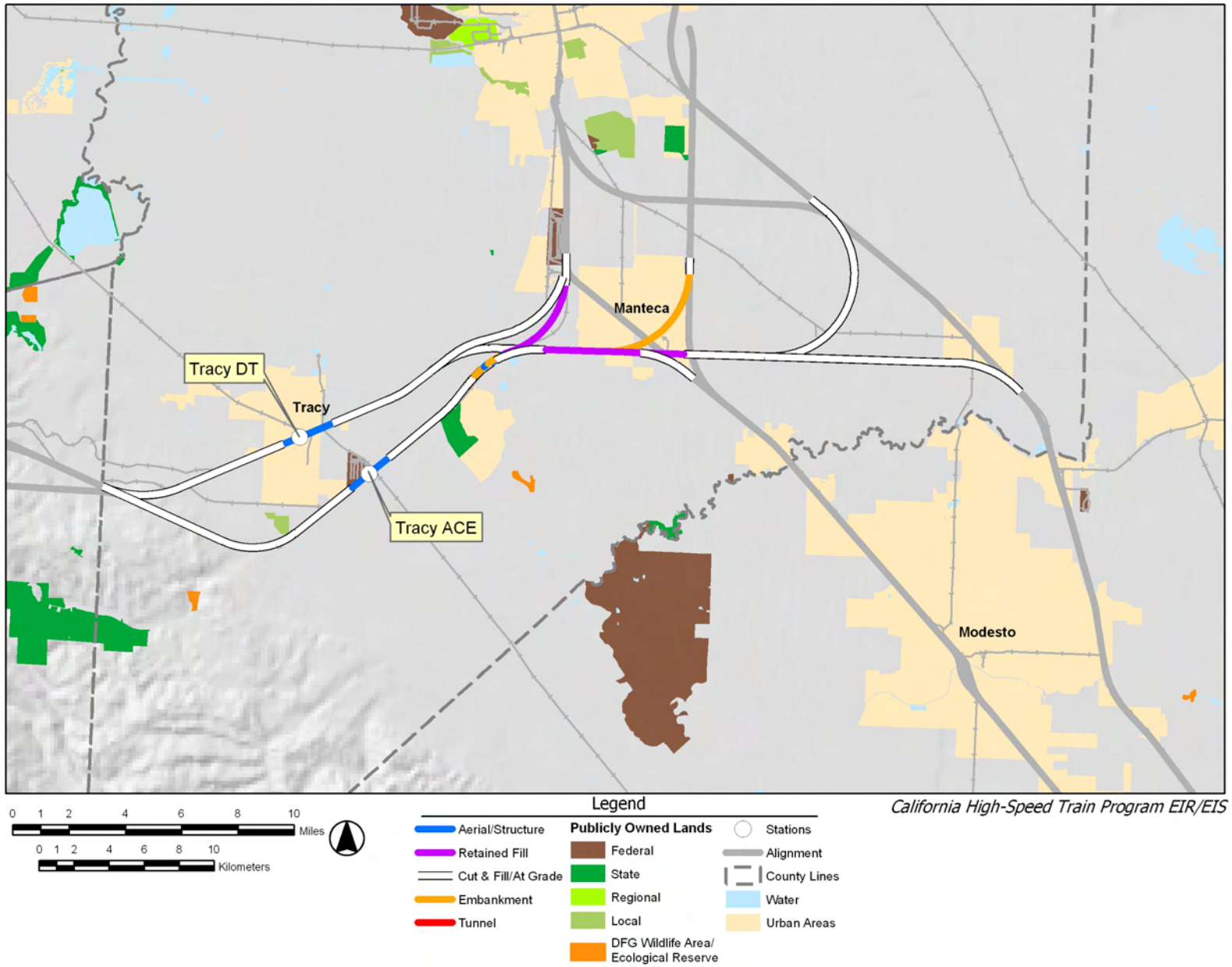
	I-680/I-580/UPRR	I-580/UPRR	Patterson Pass/UPRR	UPRR
Section 4(f) and 6(f) Resources:[4] Number of resources rated high (potential direct effects)	Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Augustin-Bernal Park, (2) Muirwood Park, (3) Dublin Sports Grounds Park, (4) Iron Horse Trail, (5) Vargas Plateau, (6) Bay Ridge Trail, (7) Pleasanton Ridge, and (8) San Joaquin County to Shadow Cliffs Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the alignment alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.	Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Augustin-Bernal Park, (2) Iron Horse Trail, (3) Vargas Plateau, (4) Bay Ridge Trail, (5) Pleasanton Ridge, and (6) San Joaquin County to Shadow Cliffs Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the alignment alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.		

H. ALTAMONT PASS ALIGNMENT ALTERNATIVES (ALTAMONT PASS TO UPRR OR BNSF CONNECTION)

All information presented is for the area from the Altamont Pass to the UPRR or BNSF connection. This alternative is shown in Figure 7.3-8 and described in Table 7.3-8.

Table 7.3-8
Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
Physical/Operational Characteristics				
Alignment Alternative Description	The I-680/I-580/UPRR alignment alternative would begin at the Altamont Pass, traverse the Pass south of I-580, and parallel the UPRR line in Tracy to Downtown, with connections east of Tracy to the BNSF N/S line. The station option considered in this segment is Tracy (Downtown).	The I-680/I-580/UPRR alignment alternative would begin at the Altamont Pass, traverse the Pass south of I-580, and parallel the UPRR line in Tracy to Downtown, with connections east of Tracy to the UPRR N/S line. The station option considered in this segment is Tracy (Downtown).	The Patterson Pass/UPRR alignment alternative would begin at the Altamont Pass and would travel southeast along the southern UPRR line (ACE Line) to the Tracy ACE station, with connections east to the BNSF N/S line. The station option considered in this segment is Tracy (ACE).	The Patterson Pass/UPRR alignment alternative would begin at the Altamont Pass and would travel southeast along the southern UPRR line (ACE Line) to the Tracy ACE station, with connections east to the UPRR N/S line. The station option considered in this segment is Tracy (ACE).
Length	53.58 mi (86.22 km)	36.26 mi (58.36 km)	53.98 mi (86.87 km)	29.78 mi (47.93 km)
Cost (dollars)	$1.84 billion	$1.93 billion	$1.95 billion	$1.75 billion
Travel Time	14 min NB 15 min SB	12 min NB 11 min SB	15 min NB 16 min SB	13 min NB 12 min SB
Ridership	Longer travel times would result in somewhat less ridership potential than the UPRR Alternatives. Tracy Downtown and Tracy ACE alternatives using the BNSF would be about the same.	Would provide high ridership and revenue potential for the Altamont Pass Alternatives. Tracy Downtown and Tracy Ace alternatives using the UPRR would be about the same.	Increased travel times would result in somewhat less ridership potential than UPRR Alternatives.	Would provide high ridership and revenue potential via the Altamont Pass.
Constructability	Primarily at-grade alignment with extensive earthwork at western end.	Primarily at-grade alignment with extensive earthwork at western end.	Primarily at-grade alignment with extensive earthwork at western end.	Primarily at-grade alignment with extensive earthwork at western end.



California High-Speed Train Program EIR/EIS

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Figure 7.3-8
HST Alignment Alternatives
Altamont Pass Alignment Alternatives
(Altamont Pass to UPRR OR BNSF Connection)

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Table 7.3-8
Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
Operational Issues	Northbound Average speed135.5 mph (225.9 kph) Maximum speed: 210 mph (350 kph) Southbound Average speed: 141.9 mph (236.5 kph) Maximum speed: 210 mph (350 kph)	Northbound Average speed: 127.2 mph (212 kph) Maximum speed: 210 mph (350 kph) Southbound Average speed: 125.29 mph (208.7 kph) Maximum speed: 210 mph (350 kph)	Northbound Average speed: 136.1 mph (226.8 kph) Maximum speed: 210 mph (350 kph) Southbound Average speed: 147.7 mph (237.8 kph) Maximum speed: 210 mph (350 kph)	Northbound Average speed: 131.7 mph (219.6 kph) Maximum speed: 210 mph (350 kph) Southbound Average speed: 125.8 mph (209.7 kph) Maximum speed: 210 mph (350 kph)
Potential Environmental Impacts				
Travel Conditions	This alignment alternative would provide direct HST service to downtown Tracy. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at existing rail crossings. The fully grade-separated UPRR rail corridor in the Tracy Area would improve local traffic.		This alignment alternative would provide direct HST service to southern Tracy area at the current ACE Station. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at existing rail crossings.	
Noise and Vibration:[i] High, medium, and low potential impacts	Low potential of noise impacts. Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels	Low potential of noise impacts. Low potential of vibration impacts due to proximity of alignment to industrial/commercial land uses. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due	Medium potential of noise impacts. Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and	Medium potential of noise impacts. Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due

Table 7.3-8
Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
	due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	gate noise from existing services as a result of the grade separations at some existing grade crossings.	to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has a low environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low to medium property impacts.	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has a low environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low to medium property impacts.	Compatibility: The majority of these alignment alternatives are compatible (medium rating), given that they are within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: These alignment alternatives have a low environmental justice impact rating. Community: These alignment alternatives would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: These alignment alternatives have the potential for low to medium property impacts.	

Table 7.3-8
Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
Aesthetics and Visual Resources: General impacts and rating.	Includes a new at-grade corridor from summit to I-580, an elevated crossing of I-580, an at-grade alignment through Tracy, an at-grade alignment in median of SR 120, and a new at-grade corridor from SR 99 to BNSF. Overall low visual impact.	Includes a new at-grade corridor from summit to I-580, and elevated crossing of I-580, an at-grade alignment through Tracy, and an at-grade alignment in median of SR 120. Overall low visual impact.	Includes a new at-grade corridor from summit to I-580, an elevated crossing of I-580, an at-grade alignment along UPRR, an at-grade alignment in median of SR 120, and a new at-grade corridor from SR 99 to BNSF. Overall low visual impact.	Includes a new at-grade corridor from summit to I-580, an elevated crossing of I-580, an at-grade alignment along UPRR, and an at-grade alignment in median of SR 120. Overall low visual impact.
Farmlands:[ii] Ac (ha) potentially affected	Farmland: 446 ac (180.5 ha) Would have greatest potential impacts on farmlands including prime farmland. Impact up to 204 ac (82.4 ha) of prime farmland.	Farmland: 243 ac (98.2 ha) Less potential for farmland impacts than either the Tracy Downtown (BNSF Connection) or Tracy ACE (BNSF Connection). Impact up to 152 ac (61.4 ha) of prime farmland.	Farmland: 442 ac (178.7 ha) Similar farmland impacts as the Tracy Downtown (BNSF Connection). Impact up to 162 ac (65.6 ha) of prime farmland.	Farmland: 182 ac (73.6 ha) Would have least potential impacts on farmlands including prime farmland. Impact up to 87 ac (35.2 ha) of prime farmland.
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 14 known cultural resources. Includes previously recorded archaeological and architectural resources. The majority of the architectural resources are located south of Tracy.	There are 11 known cultural resources. Includes previously recorded archaeological and architectural resources, including a railroad trestle, industrial warehouses, and residential properties. The majority of the architectural resources are located south of Tracy.	There are 15 known cultural resources. Includes previously recorded archaeological and architectural resources. Recorded resources include World War II era buildings. The majority of the architectural resources are located south of Lathrop.	There are 12 known cultural resources. This alignment alternative includes previously recorded archaeological and architectural resources. Recorded resources include World War II era buildings. The majority of the architectural resources are located south of Lathrop

Table 7.3-8
Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains, and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 41.4 ac (16.75 ha) direct/ 136 ac (55.04 ha) indirect Streams: 6,228 linear ft (1,898.3linear m) direct/ 19,257 linear ft (5,869.5 linear m) indirect Lakes/Waterbodies: 2.3 ac (0.93ha) direct/ 7.6 ac (3.08 ha) indirect Potentially affect at least 14 unnamed and named water resources, including California Aqueduct, Delta Mendota Canal, Upper Main Canal, San Joaquin River, Paradise Cut, Tom Paine Slough, Lone Tree Creek, and Avena Drain. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.	Floodplains: 32 ac (12.95 ha) direct/ 99.6 ac (40.31 ha) indirect Streams: 5,384 linear ft (1,641.0 linear m) direct/ 15,605 linear ft (4,756.4 linear m) indirect Lakes/Waterbodies: 2.3 ac (0.93 ha) direct/ 7.6 ac (3.08 ha) indirect Potentially affect at least 9 of the water resources identified in the Tracy Downtown (BNSF Connection) alignment alternative, excluding Lone Tree Creek, Avena Drain, and the Main Drain Canal. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.	Floodplains: 48.9 ac (19.79 ha) direct/ 154.5 ac 962.53 ha) indirect Streams: 7,390 linear ft (2,252.5 linear m) direct/ 24,468 linear ft (7,457.8 linear m) indirect Lakes/Waterbodies: 3 ac (1.2 ha) direct/ 13 ac (5.26 ha) indirect Potentially affect at least 14 unnamed and named water resources, including California Aqueduct, Delta Mendota Canal, Upper Main Canal, San Joaquin River, Paradise Cut, Tom Paine Slough, Lone Tree Creek, and Avena Drain. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.	Floodplains: 29.3 ac (11.86 ha) direct/ 76.8 ac (31.08 ha) indirect Streams: 5,433linear ft (1,656.0 linear m) direct/ 13,161 linear ft (4,011.5 linear m) indirect Lakes/Waterbodies: 2.1 ac (0.85 ha) direct/ 9.2 ac (3.72 ha) indirect Potentially affect at least 9 of the water resources identified in the Tracy ACE Station BNSF alignment alternative, excluding Lone Tree Creek, Avena Drain, and the Main Drain Canal. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.

Table 7.3-8
Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 4.36 ac (1.76 ha) direct/ 158.2 ac (64.02 ha) indirect Non-Wetland Waters: 6,291 linear ft (1,917.5 linear m) Species: 18 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to directly impact the most wetlands. Potential species impacts include valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 4.16 ac (1.68 ha) direct/ 155.4 ac (62.91 ha) indirect Non-Wetland Waters: 7,504 linear ft (2,287.2 linear m) Species: 22 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to impact the most plant species. Potential species impacts include Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 3.63 ac (1.47 ha) direct/ 312.2 ac (126.33 ha) indirect Non-Wetland Waters: 7,678 linear ft (2,340.3 linear m) Species: 21 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to indirectly impact the most wetlands and waters. Potential species impacts include Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands[v]: 2.60 ac (1.0 ha) direct/ 206.0 ac (83.37 ha) indirect Non-Wetland Waters: 5,326 linear ft (1,623.4 linear m) Species: 20 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to directly impact the least wetlands and waters. Potential species impacts include valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
Fault Crossings	Vernalis (Active) – At Grade		Vernalis (Active) – At Grade San Joaquin (Potentially Active) – At Grade	
Section 4(f) and 6(f) Resources:[4] Number of resources rated high (potential direct effects)	No public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative.			

I. TRANS BAY CROSSING: TRANSBAY TUBE (OAKLAND - SAN FRANCISCO)

All information presented is for a potential transbay tube connection Oakland and San Francisco. This alternative is shown in Figure 7.3-9 and described in Table 7.3-9.

Table 7.3-9
Trans Bay Crossings: Oakland to San Francisco

	Tran Bay Crossing – Transbay Transit Center	Trans Bay Crossing – 4th and King
Physical/Operational Characteristics		
Alignment Alternative Description	This alignment alternative would be in a tube under the San Francisco Bay between San Francisco and Oakland. It would connect between Oakland and the Transbay Transit Center.	This alignment alternative would be in a tube under the San Francisco Bay between San Francisco and Oakland. It would connect between Oakland and the potential 4th and King Station in San Francisco.
Length[24]	7.28 mi (11.71 km)	6.87 mi (11.06 km)
Cost[25] **(dollars)**	$5.36 billion	$5.20 billion
Travel Time[26]	6 min	6 min
Ridership	Would have the highest ridership potential for the Trans Bay crossing between San Francisco and Oakland.	Would have less ridership potential than the Transbay – Transbay Transit Center alternative.
Constructability	Difficult and costly construction on Bay floor.	Difficult and costly construction on Bay floor.
Operational Issues	Average speed =66.5 mph (110.9 kph) Maximum speed =100.2 mph (167 kph) .	Average speed = 69.3 mph (115.5 kph) Maximum speed =105 mph (175 kph) .
Potential Environmental Impacts		
Travel Conditions	Travel time for this connection would be about the same as to 4th and King. This alternative would provide the highest connectivity and accessibility with the terminus at the Transbay Transit Center.	Travel time for this connection would be about the same as the Transbay Transit Center.
Noise and Vibration:[i] High, medium, or low potential impacts	Low potential of noise impacts. Low potential of vibration impacts.	Low potential of noise impacts. Low potential of vibration impacts.

[24] Includes West Oakland terminal station.

[25] Includes West Oakland terminal station.

[26] Includes West Oakland terminal station.

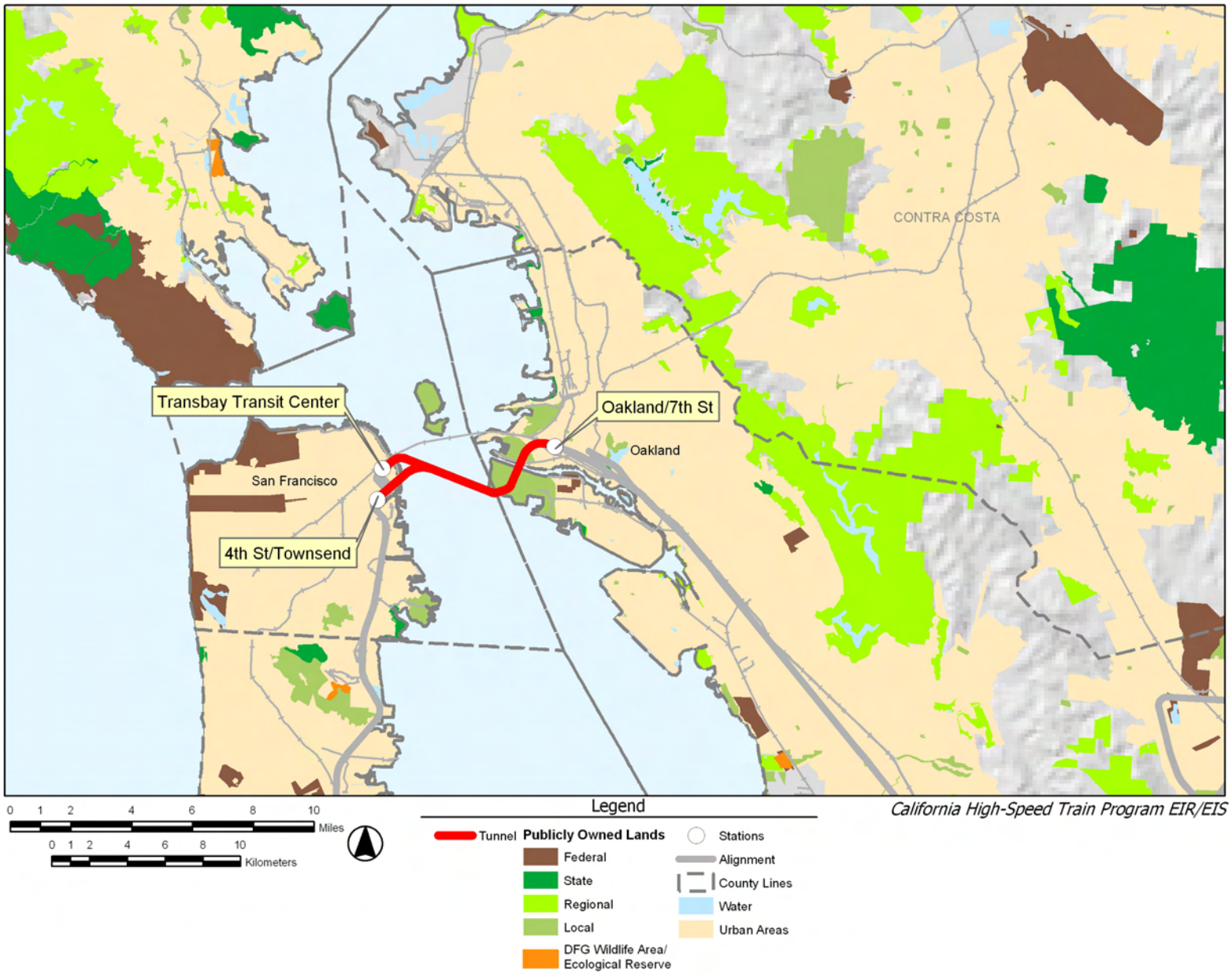

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Figure 7.3-9
HST Alignment Alternatives
Trans Bay Crossing
(Oakland to San Francisco)

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Table 7.3-9
Trans Bay Crossings: Oakland to San Francisco

	Tran Bay Crossing – Transbay Transit Center	Trans Bay Crossing – 4th and King
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail and within industrial land uses. Environmental Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is in tunnel. Property: The potential for property impacts in this alignment alternative would be low to residential and nonresidential properties because it would be below grade.	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail and within industrial land uses. Environmental Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is in tunnel Property: The potential for property impacts in this alignment alternative would be low to residential and nonresidential properties because alignment would be below grade.
Aesthetics and Visual Resources: General impacts and rating.	Underground alignment. No visual impact.	
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 3 known cultural resources. The terrestrial portions are highly sensitive for both historical archaeological deposits and architectural resources. The area likely includes historic artifacts from the Gold Rush period through the 1906 earthquake and fire.	There are no known cultural resources. The terrestrial portions are highly sensitive for both historical archaeological deposits and architectural resources. The area likely includes historic artifacts from the Gold Rush period through the 1906 earthquake and fire.
Hydrology and Water Resources:[iv] Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect Streams: 0.0 linear ft (0.0 m) direct/ 0.0 linear ft (0.0 linear m) indirect Lakes/Waterbodies: 36.5 ac (14.77 h) direct/ 235.5 ac (95.31 ha) indirect Extend from the Oakland Inner Harbor to the city of San Francisco, crossing San Francisco Bay and impacting the most area of the Bay. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act and the California Coastal Commission.	Floodplains: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect Streams: 0.0 linear ft (0.0 m) direct/ 0.0 linear ft (0.0 linear m) indirect Lakes/Waterbodies: 35.4 ac (14.33 h) direct/ 228 ac (92.27 ha) indirect Extend from the Oakland Inner Harbor to the city of San Francisco, crossing San Francisco Bay and impact less area of the Bay. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act and the California Coastal Commission.

Table 7.3-9
Trans Bay Crossings: Oakland to San Francisco

	Tran Bay Crossing – Transbay Transit Center	Trans Bay Crossing – 4th and King
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 22.8 ac (9.24 ha) direct/ 1,366.3 (552.94 ha) indirect Bay Waters: 22.1 ac (8.94 ha) Species: 1 special-status plant species This alignment alternative would have the potential to affect more wetlands, Bay waters, and the sensitive eel grass habitat. Sensitive plant species include the beach layia. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.	Wetlands[v]: 22.0 ac (8.92 ha) direct/ 1,286.5 ac (520.65 ha) indirect Bay Waters: 20.07 ac (8.12 ha) Species: 1 special-status plant species This alignment alternative would have the potential to affect slightly less wetlands and Bay waters. Potential impacts to sensitive eel grass habitat. Sensitive plant species include the beach layia. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.
Fault Crossings	None	
Section 4(f) and 6(f) Resources:[4] Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include South Park. Few direct impacts are anticipated given that the alignment would be in tunnel as it passes South Park.	No public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative.

J. TRANS BAY CROSSING: DUMBARTON BRIDGE OR TUBE

All information presented is for a potential Dumbarton bridge or transbay tube. This alternative is shown in Figure 7.3-10 and described in Table 7.3-10.

Table 7.3-10
Trans Bay Crossing: Dumbarton

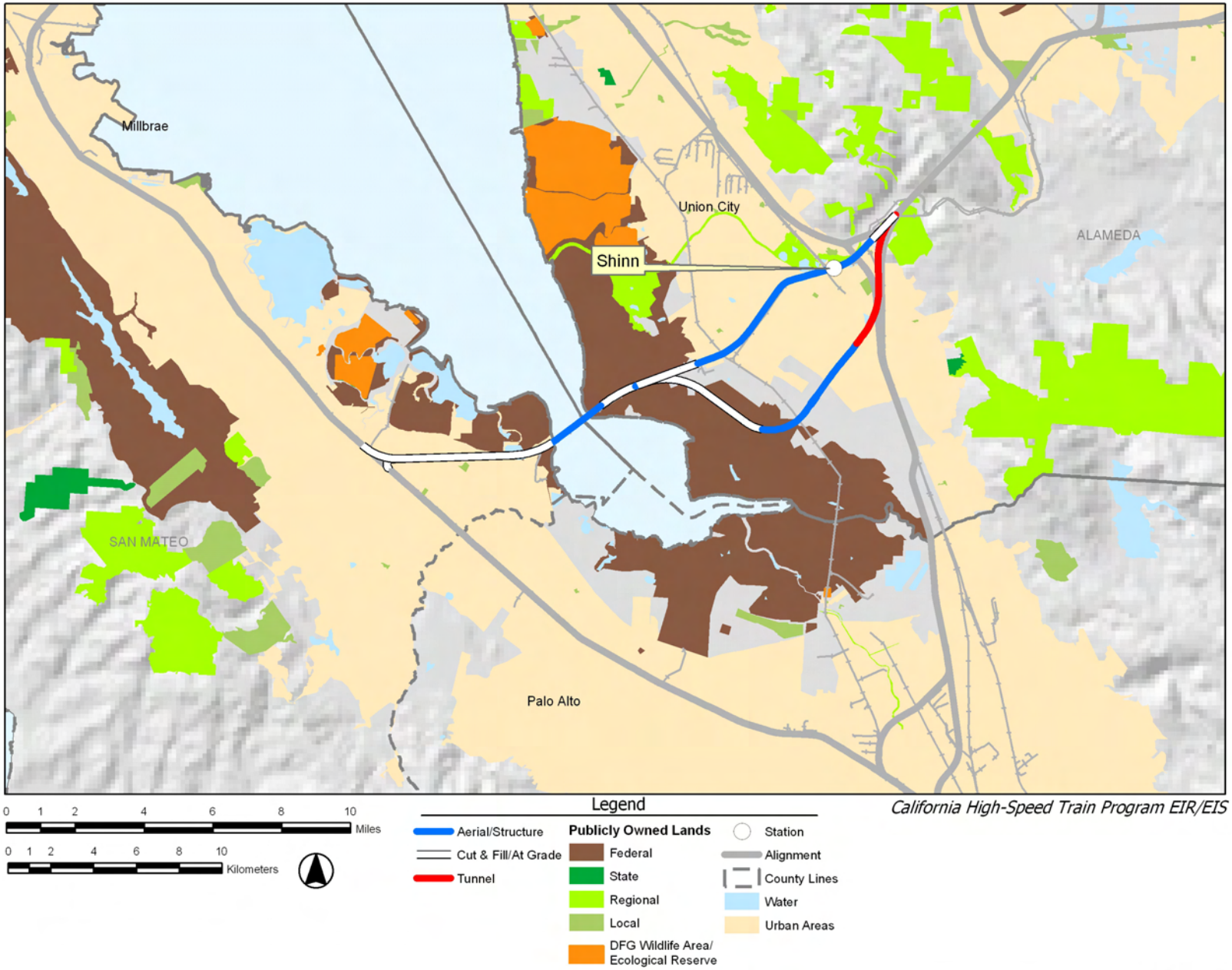
	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
Physical/Operational Characteristics						
Alignment Alternative Description[27]	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with a high bridge over the existing navigational channel. It would travel generally east to the Shinn/Niles area.	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with draw bridges for the existing navigational channel. It would travel generally east to the Shinn/Niles area.	This alignment alternative would cross the San Francisco Bay in a tube in the Dumbarton Corridor. It would travel generally east to the Shinn/Niles area.	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with a high bridge over the existing navigational channel. It would travel south and east through a power easement and then northeast with a tunnel under Stevenson Boulevard to the Niles area.	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with draw bridges for the existing navigational channel. It would travel south and east through a power easement and then northeast with a tunnel under Stevenson Boulevard to the Niles/Shinn area.	This alignment alternative would cross the San Francisco Bay in a tube in the Dumbarton Corridor. It would travel south and east through a power easement and then northeast with a tunnel under Stevenson Boulevard to the Niles area.
Length	19.06 mi (30.67 km)	20.01 mi (32.21 km)	19.06 mi (30.67 km)	20.11 mi (32.36 km)	21.71 mi (34.94 km)	21.71 mi (34.94 km)
Cost[28] (dollars)	$1.93 billion	$1.53 billion	$2.32 billion	$2.73 billion	$2.24 billion	$3.09 billion
Travel Time	11 min (Niles Jct.-Redwood City)	11 min (Niles Jct.-Redwood City)	11 min (Niles Jct.-Redwood City)	11 min (Niles Jct.-Redwood City)	11 min (Niles Jct.-Redwood City)	11min (Niles Jct.-Redwood City)
Ridership	About the same.	About the same.	About the same.	About the same.	About the same.	About the same.

[27] Golden State option ends about 2.5 mi (4.0 km) southeast of Golden State station (at Beale Avenue). Truxton option ends at Truxton station (at Union Avenue).

[28] Segment cost and length begins about 2.5 mi (4.0 km) southeast of Fresno downtown Station (East Jensen Avenue).

Table 7.3-10
Trans Bay Crossing: Dumbarton

	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
Constructability	Considerable construction issues associated with urban construction, including aerial structures through Fremont and a new "high" bridge trans bay crossing at Dumbarton. Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.	Considerable construction issues associated with urban construction, including aerial structures through Fremont and fewer construction issues with a new "low" bridge Trans Bay crossing at Dumbarton. Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.	Considerable construction issues associated with urban construction, including aerial structures through Fremont and greater construction issues with a new "tube" Trans Bay crossing at Dumbarton. Constructing a new tube crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.	Considerable construction issues associated with urban construction, including aerial structures through Fremont, tunneling under Fremont Central Park, and a new "high" bridge Trans Bay crossing at Dumbarton. Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.	Considerable construction issues associated with urban construction, including aerial structures through Fremont, tunneling under Fremont Central Park, and a new "low" bridge Trans Bay crossing at Dumbarton. Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.	Considerable construction issues associated with urban construction, including aerial structures through Fremont, tunneling under Fremont Central Park, and a new "tube" Trans Bay crossing at Dumbarton. Constructing a new tube crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.
Operational Issues	Average speed: 98.9 mph (164.9 kph) Maximum speed: 165 mph (275 kph)	Average speed: 98.9 mph (164.9 kph) Maximum speed: 165 mph (275 kph) With the "low-bridge" bay crossing option, HST service would potentially be interrupted, which would adversely	Average speed: 98.9 mph (164.9 kph) Maximum speed: 165 mph (275 kph)	Average speed: 113.2 mph (188.7 kph) Maximum speed: 165 mph (275 kph)	Average speed: 113.2 mph (188.7 kph) Maximum speed: 165 mph (275 kph) With the "low-bridge" bay crossing option, HST service would potentially be interrupted, which	Average speed: 113.2 mph (188.7 kph) Maximum speed: 165 mph (275 kph)



California High-Speed Train Program EIR/EIS

U.S. Department of Transportation
Federal Railroad Administration

Figure 7.3-10
HST Alignment Alternatives
Trans Bay Crossing
(Dumbarton)

B004885

Table 7.3-10
Trans Bay Crossing: Dumbarton

	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
		impact the reliability of the entire system.			would adversely impact the reliability of the entire system.	
Potential Environmental Impacts						
Travel Conditions	About the same as the Fremont Central Park Alternatives.			About the same as the Dumbarton Bridge or tube alternatives.		
Noise and Vibration:[i] High, medium, and low potential impacts	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	Medium potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont). .
Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. Environmental Justice: This alignment alternative has medium	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. Environmental	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. Environmental	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. Environmental Justice:	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area.	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. Environmental

Table 7.3-10
Trans Bay Crossing: Dumbarton

	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
	environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for medium property impacts.	Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for medium property impacts.	Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for medium property impacts.	This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for high property impacts, given that additional right-of-way would be required.	Environmental Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for high property impacts, given that additional right-of-way would be required..	Justice: This alignment alternative has medium environmental justice impact rating. Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for high property impacts, given that additional right-of-way would be required.
Aesthetics and Visual Resources: General impacts and rating.	Medium visual impact from the bridge, on the Don Edwards San Francisco Bay National Wildlife Refuge and on the Centerville alignment across Fremont.	Low visual impact from bridge and medium impacts on Don Edwards San Francisco Bay National Wildlife Refuge and the Centerville alignment	No visual impact from tube and a medium impact on the Don Edwards San Francisco Bay National Wildlife Refuge and the Centerville alignment	Medium visual impact from bridge and on Don Edwards San Francisco Bay National Wildlife Refuge and through Newark.	Low visual impact from bridge and medium visual impacts on Don Edwards San Francisco Bay National Wildlife Refuge and through	No visual impact from tube and medium visual impacts on Don Edwards San Francisco Bay National Wildlife Refuge and through Newark.

Table 7.3-10
Trans Bay Crossing: Dumbarton

	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
		across Fremont.	across Fremont.		Newark.	
Cultural Resources and Paleontological Resources:[iii] Potential presence of historical resources in area of potential effect	There are 4 known cultural resources. Archaeological resources include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities.	There are 4 known cultural resources. Archaeological resources include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities.	There are 4 known cultural resources. Archaeological resources include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities.	There are no known cultural resources. No recorded resources were identified in the records search.	There are no known cultural resources. No recorded resources were identified in the records search.	Known cultural resources: 0 No recorded resources were identified in the records search.
Hydrology and Water Resources:[iv] Potential impacts and associated linear ft (linear m) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 47.4 ac (19.18 ha) direct/ 162.1 ac (65.60 ha) indirect Streams: 1,028 linear ft (313.3 linear m) direct/ 3,627 linear ft (1,105.5 linear m) indirect Lakes/Waterbodies: 37.3 ac (15.10 ha) direct/ 143.9 ac (58.24 ha) indirect Less water resource impacts compared to Fremont Central Park due primarily to the shorter length. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act and	Floodplains: 47.4 ac (19.18 ha) direct162.1 ac (65.60 ha) indirect Streams: 1,028 linear ft (313.3 linear m) direct/ 3,627 linear ft (1,105.5 linear m) indirect Lakes/Waterbodies: 37.3 ac (15.10 ha) direct/143.9 ac (58.24 ha) indirect Less water resource impacts compared to Fremont Central Park due primarily to the shorter length. Coordination would be required with the USACE under Section 10 of the	Floodplains: 47.ac (19.18ha)direct/ 162.1 ac (65.60 ha) indirect Streams: 1,028 linear ft (313.3 linear m) direct/ 3,627 linear ft (1,105.5 linear m) indirect Lakes/Waterbodies: 37.3 ac (15.10 ha) direct/ 143.9 ac (58.24 ha) indirect Less water resource impacts compared to Fremont Central Park due primarily to the shorter length. Coordination would be required with the USACE under Section 10 of the	Floodplains: 71.7 ac (29.02ha) direct/ 258.7 ac (104.70 ha) indirect Streams: 2,041 linear ft (622.1 linear m) direct/ 8,301 linear ft (2,530.1 linear m) indirect Lakes/Waterbodies: 46.3 ac (18.74 ha) direct/ 179.2 ac (72.52 ha) indirect Longer length results in additional impacts compared to Dumbarton options. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors	Floodplains: 71.7 ac (29.02 ha) direct/ 258.7 ac (104.70 ha) indirect Stream : 2,041 liner ft (622.1 linear m) direct/ 8,301 linear ft (2,530.1 linear m) indirect Lakes/Waterbodies: 46.3 ac (18.74 ha) direct/ 179.2 ac (72.52 ha) indirect Longer length results in additional impacts compared to Dumbarton options. Coordination would be required with the USACE under Section 10 of the	Floodplains: 71.7 ac (29.02 ha) direct/ 258.7 ac (104.70 ha) indirect Streams: 2,041 linear ft (622.1 linear m) direct/ 8,301 linear ft (2,530.1 linear m) indirect Lakes/Waterbodies: 46.3 ac (18.74 ha) direct/ 179.2 ac (72.52 ha) indirect Longer length results in additional impacts compared to Dumbarton options. Coordination would be required with the USACE under Section 10 of the

Table 7.3-10
Trans Bay Crossing: Dumbarton

	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
	the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.	Act and the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.
Biological Resources Including Wetlands Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands[v]: 33.9 ac (13.7 ha) direct/ 1,641.2 ac (664.2 ha) indirect Bay Waters: 2,361 linear ft (719.6 linear m) Species: 15 special-status plant and 21 special-status wildlife species Compared to the Fremont Central Park alignment alternative, this alignment alternative would have the least potential direct impact on wetlands, but the most indirect impacts. Potential species impacts include the San Mateo thorn-mint, white-rayed pentachaeta, brown pelican, California clapper rail, California least tern, and the salt marsh harvest mouse. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.			Wetlands[v]: 55.35 ac (22.4 ha) direct/ 1,191 ac (482 ha) indirect Bay Waters: 3,117 linear ft (950.1 linear m) Species: 16 special-status plant and 23 special-status wildlife species Compared to the Dumbarton alignment alternative options, this alignment alternative would have the most potential direct impact on wetlands, but the least indirect impacts. Potential species impacts include the San Mateo thorn-mint, white-rayed pentachaeta, robust spineflower, vernal pool tadpole shrimp, California tiger salamander, brown pelican, California clapper rail, California least tern, and the salt marsh harvest mouse. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.		
Fault Crossings	Buried Trace of Unnamed Fault (Potentially Active) - At Grade Silver Creek (Potentially Active) - At Grade Hayward (Active) - Above Grade Mission (Potentially Active) - At Grade					
Section 4(f) and 6(f) Resources:[4] Ac (ha) of parkland near HST right-of-way	Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Kelly Park, (2) Don Edwards San Francisco Bay National Wildlife Refuge, (3) Newark Civic Center Park, (4) Vallejo Mill Historical Park, and (5) Alameda Creek Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.			Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Kelly Park, (2) Don Edwards San Francisco Bay National Wildlife Refuge, (3) Blacow Park, (4) Fremont Central Park, (5) Gomes Park and (6) Vallejo Mill Park. As compared to the "Dumbarton" alternatives, more direct impacts are anticipated given that a considerable amount of this alignment alternative requires a new alignment within the Don Edwards San Francisco Bay National Wildlife Refuge.		

revenue forecasts (with less revenue than comparable Pacheco Pass network alternatives) while having considerably higher capital costs ($4.4–6.0 billion more for comparable terminus station locations). Although the Pacheco Pass with Altamont Pass (local service) alternatives would increase connectivity and accessibility by potentially providing direct HST service to additional markets, these alternatives would have higher environmental impacts, construction issues, and logistical constraints than Altamont or Pacheco Pass alternatives. The USEPA concluded that the Pacheco Pass with Altamont Pass (local service) network alternatives are not likely to contain the Least Environmentally Damaging Alternative (LEDPA).

8.3.4 Comparison of Pacheco Pass and Altamont Pass Alternatives

Public Input: There is a wide divergence of opinion for the selection of the alignment between the Bay Area and Central Valley with many favoring the Pacheco Pass, many favoring the Altamont Pass, and many favoring doing both passes (with the Pacheco serving as the north/south HST connection and Altamont primarily serving interregional commuter service between Sacramento/Northern San Joaquin Valley and the Bay Area). San Francisco, Oakland, and San Jose, the three major urban centers of the Bay Area, all want direct HST service. The Central Valley (including Sacramento) and many transportation and environmental organizations strongly prefer the Altamont Pass, whereas much of the Bay Area (MTC, San Francisco, San Jose, San Francisco Peninsula, and Monterey Bay Area) agencies strongly support the Pacheco Pass. Opposition has been raised to potential impacts for both the Pacheco Pass (impacts on the GEA, Pacheco Pass, the Town of Atherton, and Millbrae), and the Altamont Pass (impacts on the San Francisco Bay, Don Edwards San Francisco Bay National Wildlife Refuge, East Bay regional parks, the City of Fremont, City of Livermore, and the City of Pleasanton).

Ridership and Revenue: The HST ridership and revenue forecasts done by MTC in partnership with Authority concluded that both the Pacheco Pass and Altamont Pass network alternatives have high ridership and revenue potential. Distinct differences were found between the Pacheco Pass and Altamont Pass for certain markets, and the sensitivity tests help in the selection of alignment alternatives and station location options within the corridors studied. Nonetheless, while additional forecasts with different assumptions may result in somewhat different results, the bottom-line conclusion is expected to remain the same: both the Pacheco Pass and Altamont Pass have high ridership potential. This overall conclusion is consistent with the previous ridership analysis done for the Authority's Business Plan (June 2000). It is the conclusion of this analysis that both the Pacheco Pass and Altamont Pass alternatives have high ridership potential and that ridership and revenue do not differentiate between these alternatives.

Capital and Operating Costs: Capital and operating costs are not substantially different between the Pacheco Pass and Altamont Pass alternatives that meet the purpose and need of the proposed HST system and serve similar termini stations. It is therefore the conclusion of this analysis that capital and operating costs do not differentiate between the Pacheco Pass and Altamont Pass alternatives.

Travel Times/Travel Conditions: Either the Pacheco Pass or Altamont Pass would provide quick, competitive travel times between northern and southern California. The Pacheco Pass would provide the quickest travel times between the south Bay and southern California (10 minutes less than the Altamont alternatives serving San Jose via the East Bay [I-880], and 28 minutes less than the Altamont San Francisco and San Jose—via San Francisco Peninsula alternative for express service). The Pacheco Pass enables a potential station in southern Santa Clara County (at Gilroy or Morgan Hill), which provides superior connectivity and accessibility to south Santa Clara County and the three Monterey Bay counties and utilizes the entire Caltrain corridor between San Francisco and Gilroy. San Francisco and San Jose would be served with one HST alignment along the Caltrain corridor providing the most frequent service to these destinations, whereas the most promising Altamont Pass alternatives would require splitting HST services (express, suburban express, skip-stop, local, regional) between two branch lines to serve San Jose and either San Francisco or Oakland. The Altamont Pass would provide considerably quicker travel times between Sacramento/Northern San Joaquin Valley and San Francisco or Oakland than the Pacheco

Pass (41 minutes less between San Francisco and Sacramento for express service). The Altamont alternatives using the East Bay to San Jose would have express travel times about 29 minutes less than the Pacheco pass between Sacramento and San Jose, while the Altamont San Francisco and San Jose—via the San Francisco Peninsula alternative would take 15 minutes less than the Pacheco Pass for this market. The Altamont Pass would enable a potential Tri-Valley HST station and a potential Tracy HST station, which provide superior connectivity to the Tri-Valley/Eastern Alameda County, Contra Costa County, and the Tracy area and provide for the opportunity for shared infrastructure with an improved ACE commuter service, although additional infrastructure would be necessary for commuter overlay service with associated impacts. The Altamont Pass would have more potential Central Valley stations served on the Authority's adopted first phase for construction between the Bay Area and Anaheim (Tracy and Modesto). The travel time for direct service and travel conditions would be significantly different between the Altamont Pass alternative to Oakland and San Jose in comparison to the other two promising Altamont alternatives and the preferred Pacheco Pass alternatives (which directly serve San Francisco and San Jose). The Oakland and San Jose alternative would provide superior travel times, connectivity and accessibility to Oakland, Oakland International Airport, and the East Bay, but would not directly serve downtown San Francisco, SFO, or the San Francisco Peninsula/Caltrain Corridor.

Constructability Issues and Logistical Constraints: There are constructability issues and logistical constraints with both the Pacheco and Altamont pass alternatives. However, the construction related issues and logistical constraints associated with the Altamont Pass alternatives are greater than those for the Pacheco Pass. All Altamont Pass alternatives have considerable constructability issues through the right-of-way constrained Tri-Valley area (Livermore and Pleasanton) and tunneling/seismic issues in the Pleasanton Ridge/Niles Canyon area. All Altamont Pass alternatives have tunneling/seismic issues (Calaveras Fault) in the Pleasanton Ridge as well as seismic issues in the East Bay (Hayward Fault). For direct service to San Francisco, the most promising Altamont Pass alternatives require a new Bay Crossing at Dumbarton, which must also go through the Don Edwards San Francisco Bay National Wildlife Refuge and the City of Fremont (which opposes construction of the east-west link through Fremont). For the Altamont Pass alternative serving Oakland, the MTC concluded that "development of an East Bay option with direct service to San Jose and Oakland would include significant right-of-way risk gaining an agreement from UPRR to provide access to Oakland." For the Altamont Pass east bay link to San Jose, Caltrans District 4 has commented that use of the I-880 median would result in significant construction stage impacts between Fremont and San Jose. The Pacheco Pass requires coordination and shared-use on the Caltrain corridor and would have tunneling and environmental issues through the Pacheco Pass, as well as require aerial structures and other design refinements and mitigation measures to minimize or avoid potential impacts on the GEA.

Environmental Impacts: The preferred Pacheco Pass alternative would have greater potential impacts on acres of farmlands than the most promising Altamont Pass alternatives (1,372 ac vs. 758 – 764 ac) and potentially impact more acres of floodplains (521 ac vs. 219-318ac) and more linear feet of streams (20,276 linear ft vs. 16,824–17,660 linear ft). This alternative would also potentially result in impacts on resources within the generally designated GEA and would have the potential to impact wildlife movement. The preferred Pacheco Pass alternative would have somewhat less potential impacts for noise and vibration and would affect a fewer number of 4(f) and 6(f) resources (16 vs. 20–22) than the most promising Altamont Pass alternatives. The differences in the impacts on waterbodies, wetlands, nonwetland waters, species, and cultural resources would vary considerably depending upon the Altamont Pass alternative. The two Altamont Pass alternatives providing direct service to San Francisco would include a new Bay crossing at Dumbarton and would cross areas within the Don Edwards San Francisco Bay National Wildlife Refuge (wetlands and sensitive habitat) and therefore would have considerably higher impacts on waters, wetlands, and 4(f) resources than the Pacheco Pass alternative. In comparison to these Altamont Pass alternatives, the Pacheco Pass alternative would have considerably less potential impacts on waterbodies (3.8 ac vs. 39.6 ac), considerably less potential impacts on wetlands (15.6 ac vs. 44.4–45.9 ac), and fewer potential impacts on nonwetland waters (14,395 linear ft. vs. 15,947–16,773 linear ft), while having relatively similar potential impacts on the number of special

status plant species (58 vs. 56), special status wildlife species (53 vs. 49-50), and cultural resources (165 vs. 149-180). In comparing the Altamont Pass alternative to Oakland and San Jose along the east bay, the Pacheco Pass alternative to San Francisco and San Jose would have slightly more potential impacts on waterbodies (3.8 ac vs. 2.3 ac), wetlands (15.6 ac vs. 12.3 ac), and nonwetland waters (14,395 linear ft vs. 14,032 linear ft), special-status plant species (58 vs. 40), special-status wildlife species (53 vs. 44), and cultural resources (165 vs. 128). The Pacheco Pass Alternative would avoid impacts on the Don Edwards San Francisco Bay National Wildlife Refuge, and it would include mitigation measures to reduce or avoid potential impacts on resources within the GEA and in particular along existing Henry Miller Road (see Section 3.15.5). The program-level analysis of impacts to 4(f)/6(f) resources generally supports the selection of the preferred Pacheco Pass (San Francisco and San Jose Termini) network alternative, although all network alternatives have potential to impact 4(f)/6(f) resources.

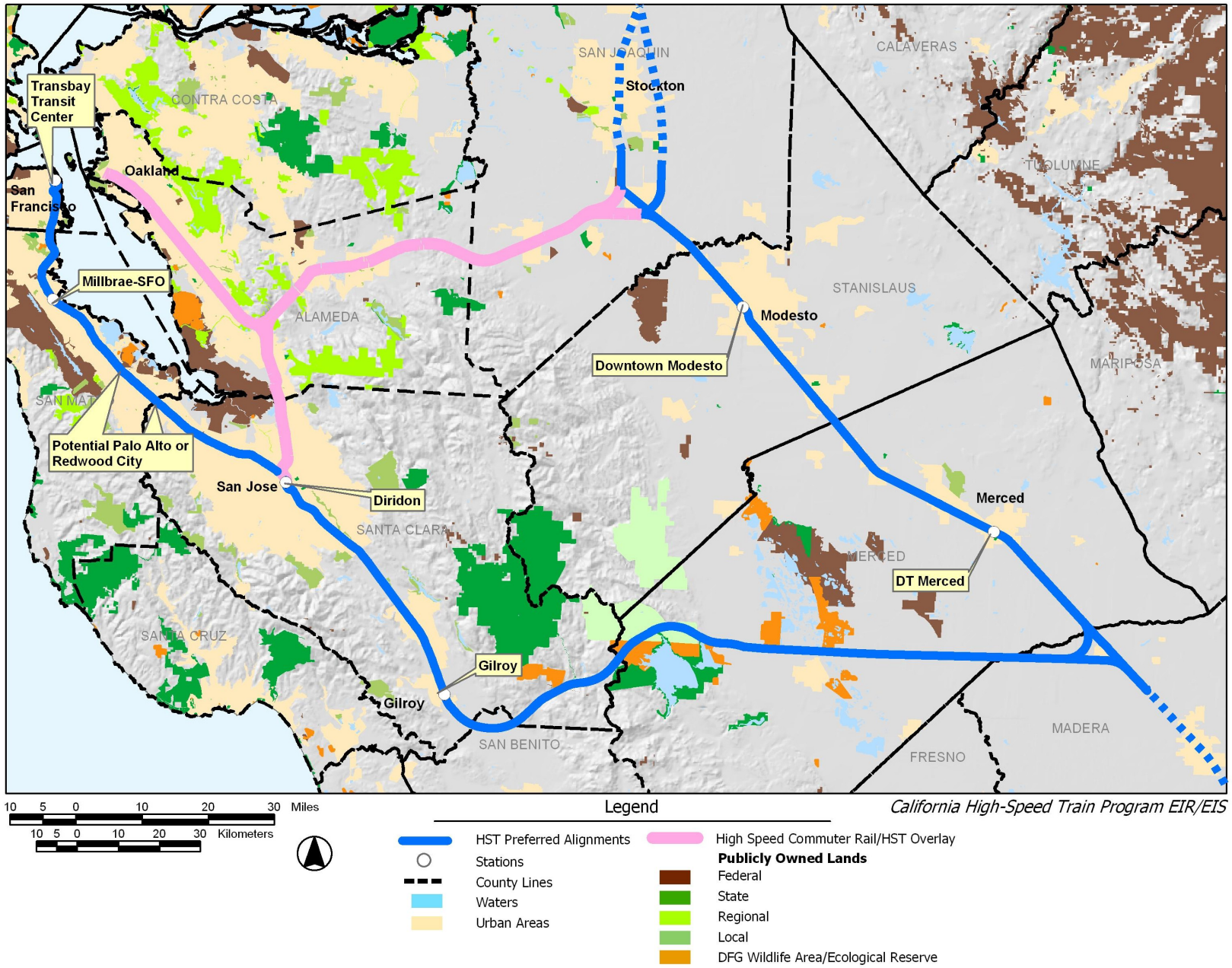
8.4 The MTC's "Regional Rail Plan for the San Francisco Bay Area"

The MTC, BART, Caltrain, and the Authority, along with a coalition of rail passenger and freight operators, prepared a comprehensive "Regional Rail Plan for the San Francisco Bay Area" (Plan) adopted by MTC in September 2007. The Plan establishes a long-range vision to create a Bay Area rail network that addresses the anticipated growth in transportation demand and meets that demand. This Plan examines ways to incorporate expanded passenger train services into existing rail systems, improve connections to other trains and transit, expand the regional rapid transit network, increase rail capacity, coordinate rail investment around transit-friendly communities and businesses, and identify functional and institutional consolidation opportunities. The plan also includes an analysis of potential high-speed rail routes between the Bay Area and the Central Valley. The Plan is separate from the Authority's Final Program EIR/EIS but is accounted for in Section 3.17, "Cumulative Impacts," of the Final Program EIR/EIS. The Plan, which was issued and approved during the Draft Program EIR/EIS comment period, provides useful additional information for consideration as part of the Authority's decision-making process.

As the HST system involves major infrastructure investment, the Plan identifies and evaluates options for providing overlay services (use of the HST infrastructure for regional rail service with additional investments in facilities and compatible rolling stock). Overlay services are considered for each HST Network Alternative. Regional overlay operations on HST lines could provide service to additional local stations along the HST lines. Such local stops typically would be developed as four-track sections with a pair of outside platforms for regional trains and two express tracks (no platforms) in the center. The extent of the four-track sections would depend on the prevailing speed of the line for statewide service as well as the spacing and location of the local stops. The regional overlay services would be operated with compatible equipment, but the average speeds would be lower and the overall travel times would be greater than the HST because of the additional stops. Additional investment would be necessary to provide the infrastructure for such regional overlay services.

The Plan concludes that the Bay Area needs a Regional Rail Network. "As the BART system becomes more of a high-frequency, close stop urban subway system, it needs to be complemented with a larger regional express network serving longer-distance trips" and "High-Speed Rail complements and supports development of regional rail—a statewide high-speed train network would enable the operation of fast, frequent regional services along the high-speed lines and should provide additional and accelerated funding where high-speed and regional lines are present in the same corridor" (MTC, 2007 *Regional Rail Plan*, pg ES-3).

The Plan concludes that "an Altamont alignment would have higher regional ridership (between points located from Merced and north) of 20-million trips in Year 2030 vs. about 16-million trips for a Pacheco alignment—by contrast, a Pacheco alignment would have higher ridership between Northern California and Southern California (between points located from Fresno and south) of 40-million trips in Year 2030 vs. about 34-million trips for an Altamont alignment." In addition, "if either Altamont or Pacheco were



California High-Speed Train Program EIR/EIS

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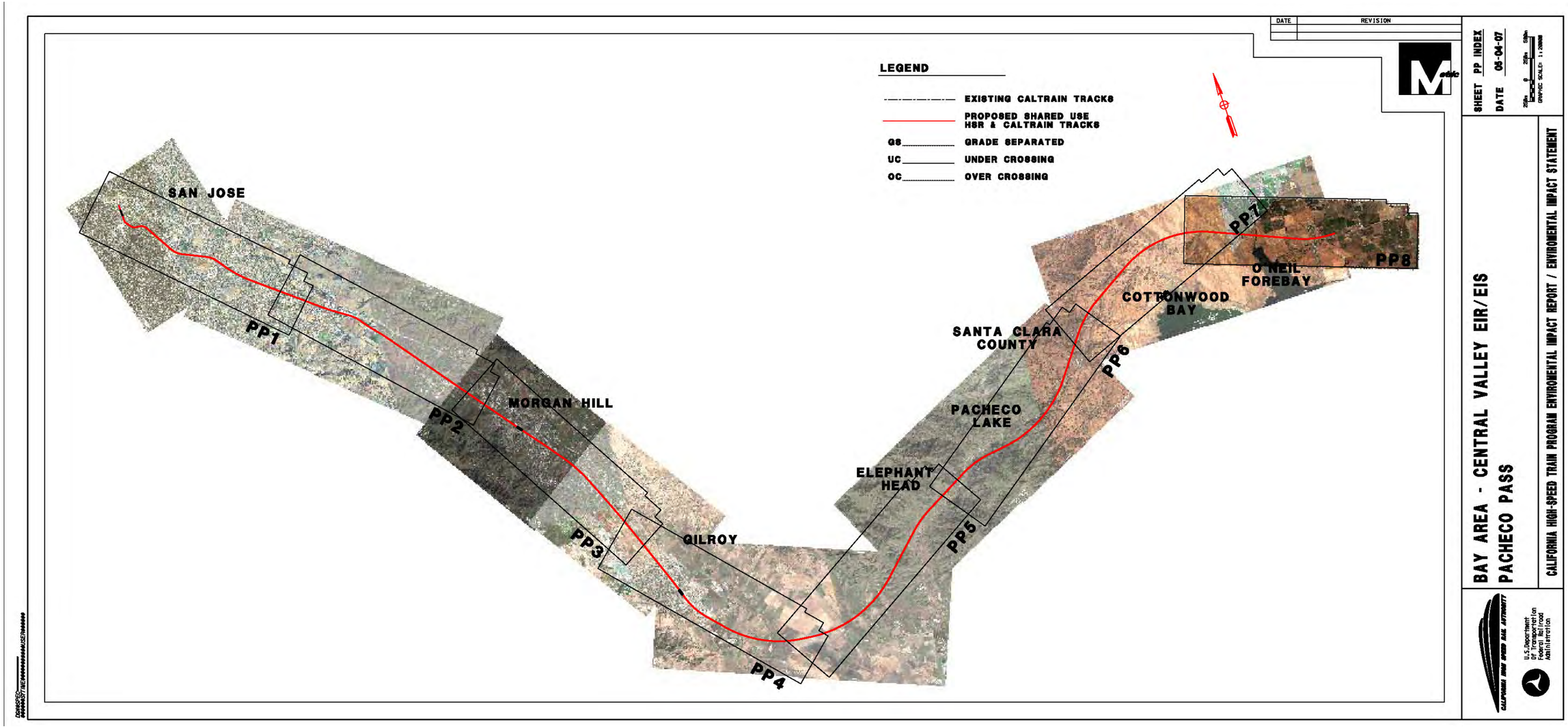
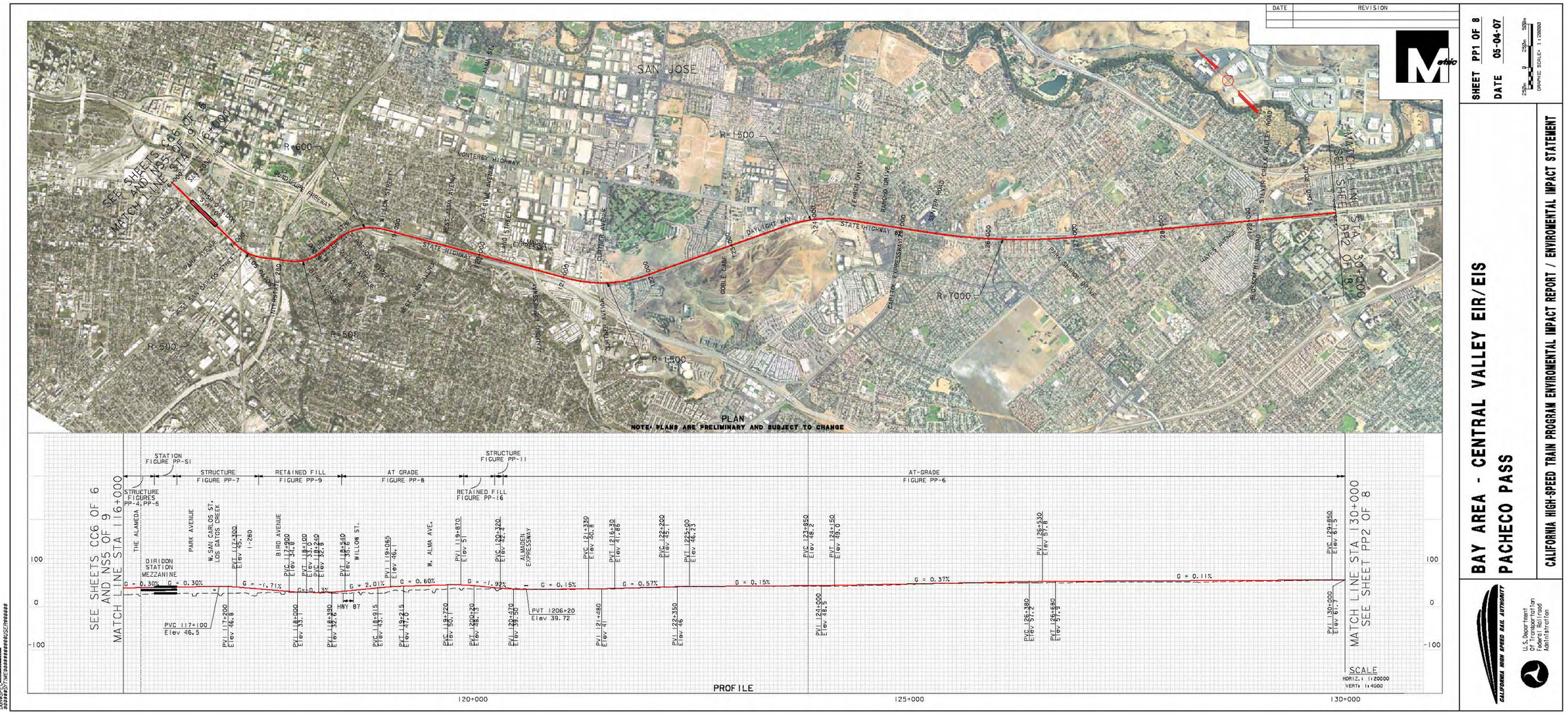
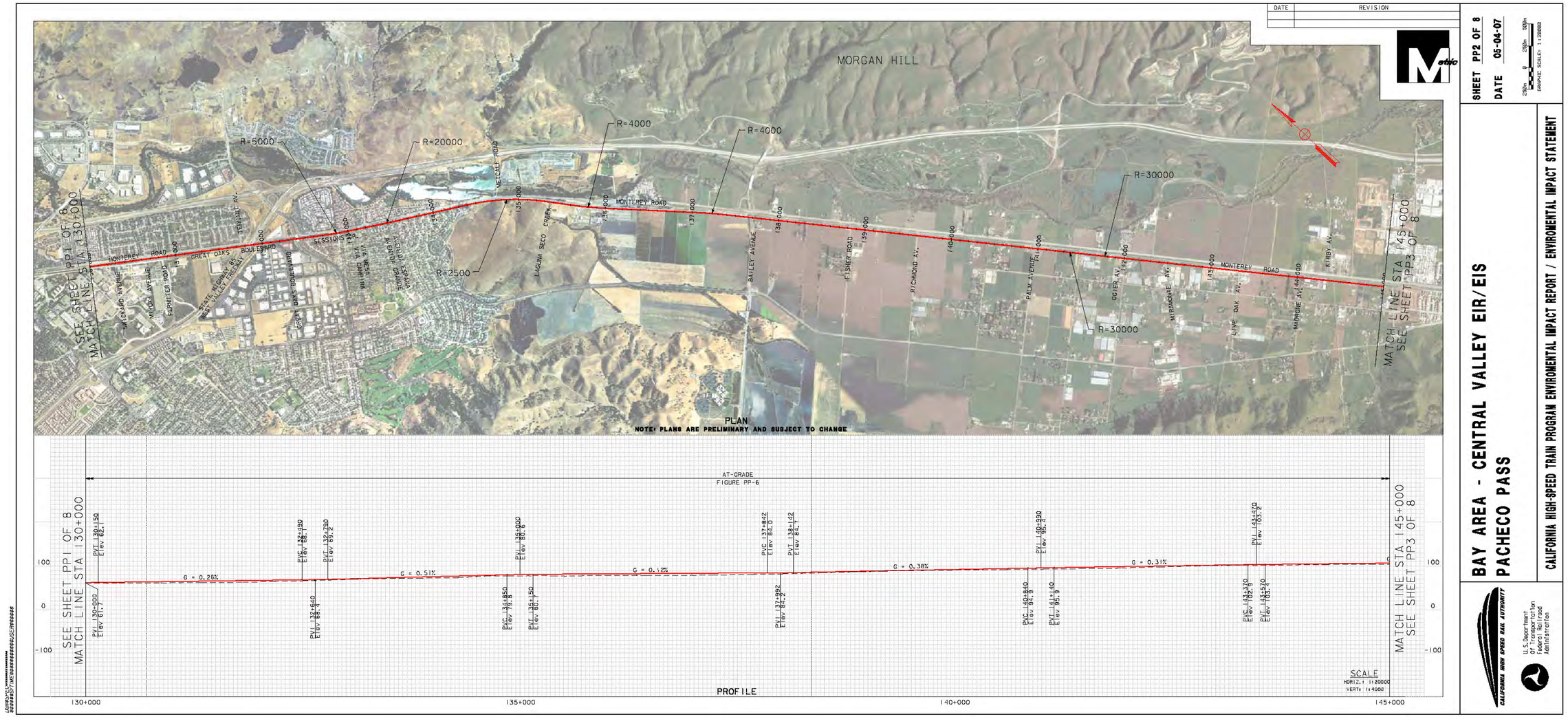
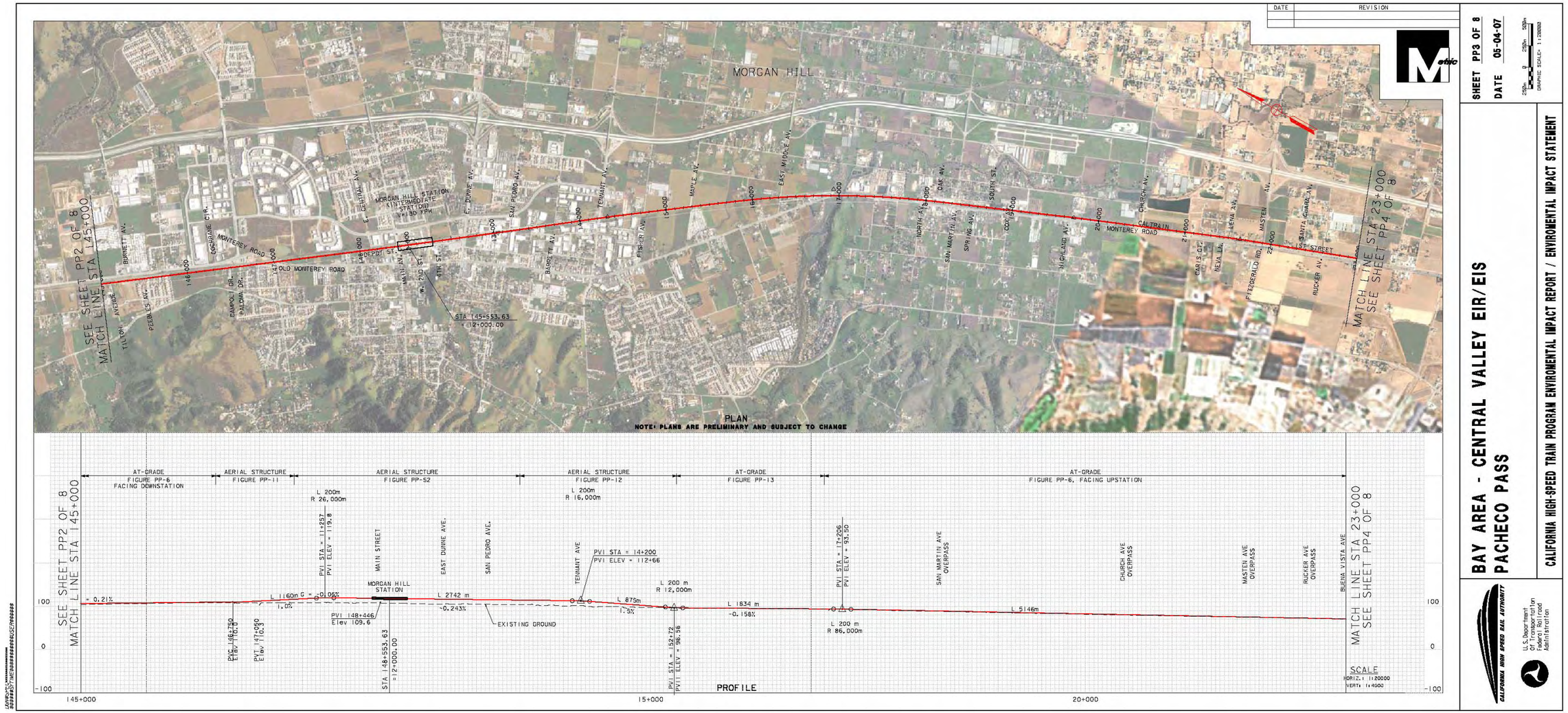
Federal Railroad Administration

Figure 8.5-1
Bay Area to Central Valley HST Preferred Alternative


LEGEND
EXISTING CALTRAIN TRACKS
PROPOSED SHARED USE HSR & CALTRAIN TRACKS
GS GRADE SEPARATED
UC UNDER CROSSING
OC OVER CROSSING
SAN JOSE
PP1
PP2
MORGAN HILL
PP3
GILROY
PP4
ELEPHANT HEAD
PP5
PACHECO LAKE
PP6
SANTA CLARA COUNTY
COTTONWOOD BAY
PP7
O'NEIL FOREBAY
PP8
DATE
REVISION
SHEET PP INDEX
DATE 05-04-07
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIROMENTAL IMPACT REPORT / ENVIROMENTAL IMPACT STATEMENT
U.S. Department of Transportation Federal Railroad Administration


DATE
REVISION
SHEET PP1 OF 8
DATE 05-04-07
GRAPHIC SCALE: 1:2000
SAN JOSE
SEE SHEETS CC6 OF 6 AND NS5 OF 9
MATCH LINE STA 116+000
MATCH LINE STA 130+000
SEE SHEET PP2 OF 8
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
STATION FIGURE PP-S1
STRUCTURE FIGURE PP-7
RETAINED FILL FIGURE PP-9
AT GRADE FIGURE PP-8
STRUCTURE FIGURE PP-11
RETAINED FILL FIGURE PP-16
AT-GRADE FIGURE PP-6
STRUCTURE FIGURES PP-4, PP-5
THE ALAMEDA
PARK AVENUE
W. SAN CARLOS ST.
LOS GATOS CREEK
I-280
BIRD AVENUE
WILLOW ST.
W. ALMA AVE.
ALMADEN EXPRESSWAY
DIRIDON STATION MEZZANINE
HWY 87
PROFILE
120+000
125+000
130+000
SCALE
HORIZ.: 1:20000
VERT.: 1:4000
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIROMENTAL IMPACT REPORT / ENVIROMENTAL IMPACT STATEMENT
CALIFORNIA HIGH SPEED RAIL AUTHORITY
U.S. Department Of Transportation Federal Railroad Administration


DATE
REVISION
SHEET PP2 OF 8
DATE 05-04-07
GRAPHIC SCALE: 1:20000
MORGAN HILL
R=5000
R=20000
R=4000
R=4000
R=30000
R=30000
R=2500
MONTEREY ROAD
GREAT OAKS BOULEVARD
SESSIONS RD.
VIA DEL VALLE
AVENIDA ESPANA
LAGUNA SECO CREEK
BAILEY AVENUE
FISHER ROAD
RICHMOND AV.
PALM AVENUE
OGIER AV.
MURRAYNE AV.
LIVE OAK AV.
MURRONE AV.
KIRBY AV.
SEE SHEET PP1 OF 8
MATCH LINE STA 130+000
MATCH LINE STA 145+000
SEE SHEET PP3 OF 8
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
AT-GRADE
FIGURE PP-6
G = 0.26%
G = 0.51%
G = 0.12%
G = 0.38%
G = 0.31%
PVI 130+000 Elev 81.7
PVT 130+150 Elev 82.1
PVC 132+350 Elev 86.7
PVI 132+640 Elev 88.4
PVT 132+930 Elev 89.2
PVC 134+850 Elev 79.8
PVI 135+000 Elev 80.0
PVT 135+150 Elev 80.7
PVC 137+842 Elev 84.0
PVI 137+992 Elev 84.2
PVT 138+142 Elev 84.7
PVC 140+840 Elev 94.9
PVI 140+990 Elev 95.2
PVT 141+140 Elev 95.9
PVC 143+370 Elev 102.9
PVI 143+520 Elev 103.4
PVT 143+670 Elev 103.2
100
0
-100
130+000
135+000
140+000
145+000
PROFILE
SCALE
HORIZ.: 1:20000
VERT.: 1:4000
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIROMENTAL IMPACT REPORT / ENVIROMENTAL IMPACT STATEMENT
CALIFORNIA HIGH SPEED RAIL AUTHORITY
U.S. Department Of Transportation Federal Railroad Administration


DATE
REVISION
SHEET PP3 OF 8
DATE 05-04-07
GRAPHIC SCALE: 1:20000
MORGAN HILL
SEE SHEET PP2 OF 8
MATCH LINE STA 145+000
MATCH LINE STA 23+000
SEE SHEET PP4 OF 8
TULONI AVENUE
BURNETT AV.
PEBBLES AV.
COCHRANE CIR.
MONTEREY ROAD
CAMPOLI DR.
BALOMA DR.
OLD MONTEREY ROAD
E. DUNNE AV.
MORGAN HILL STATION (INTERMEDIATE STATION) V=80 KPH
DEPOT ST.
MAIN AV.
W. DIO ST.
7TH ST.
SAN PEDRO AV.
BARRETT AV.
TENNANT AV.
FISHER AV.
MAPLE AV.
EAST MAIDLE AV.
NORTH AV.
OAK AV.
SAN MARTIN AV.
SPRING AVE.
SOUTH ST.
CONN ST.
HIGHLAND AV.
CHURCH AV.
CALTRAIN
CARLS CT.
MENA LN.
MENA AV.
FITZGERALD RD.
MASTEN AV.
SANTA CLARA AV.
E. 2nd STREET
RUCKER AV.
STA 145+553.63 = 12+000.00
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
AT-GRADE FIGURE PP-6 FACING DOWNSTATION
AERIAL STRUCTURE FIGURE PP-11
AERIAL STRUCTURE FIGURE PP-S2
AERIAL STRUCTURE FIGURE PP-12
AT-GRADE FIGURE PP-13
AT-GRADE FIGURE PP-6, FACING UPSTATION
L 200m R 26,000m
L 200m R 16,000m
PVI STA = 11+257
PVI ELEV = 119.8
MAIN STREET
EAST DUNNE AVE.
SAN PEDRO AVE.
TENNANT AVE
PVI STA = 14+200
PVI ELEV = 112.66
L 200 m R 12,000m
PVI STA = 17+206
PVI ELEV = 93.50
SAN MARTIN AVE OVERPASS
CHURCH AVE OVERPASS
MASTEN AVE OVERPASS
RUCKER AVE OVERPASS
BUENA VISTA AVE
= 0.21%
L 1160m G = -0.06%
1.0%
MORGAN HILL STATION
PVI 148+446 Elev 109.6
L 2742 m
-0.243%
EXISTING GROUND
L 875m
1.5%
L 1834 m
-0.158%
L 200 m R 86,000m
L 5146m
PVI 146+250 Elev 110.0
PVI 147+950 Elev 110.3
STA 148+553.63 = 12+000.00
PVI STA = 159.72
PVI ELEV = 96.56
PROFILE
SCALE
HORIZ.: 1:20000
VERT.: 1:4000
100
0
-100
145+000
15+000
20+000
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
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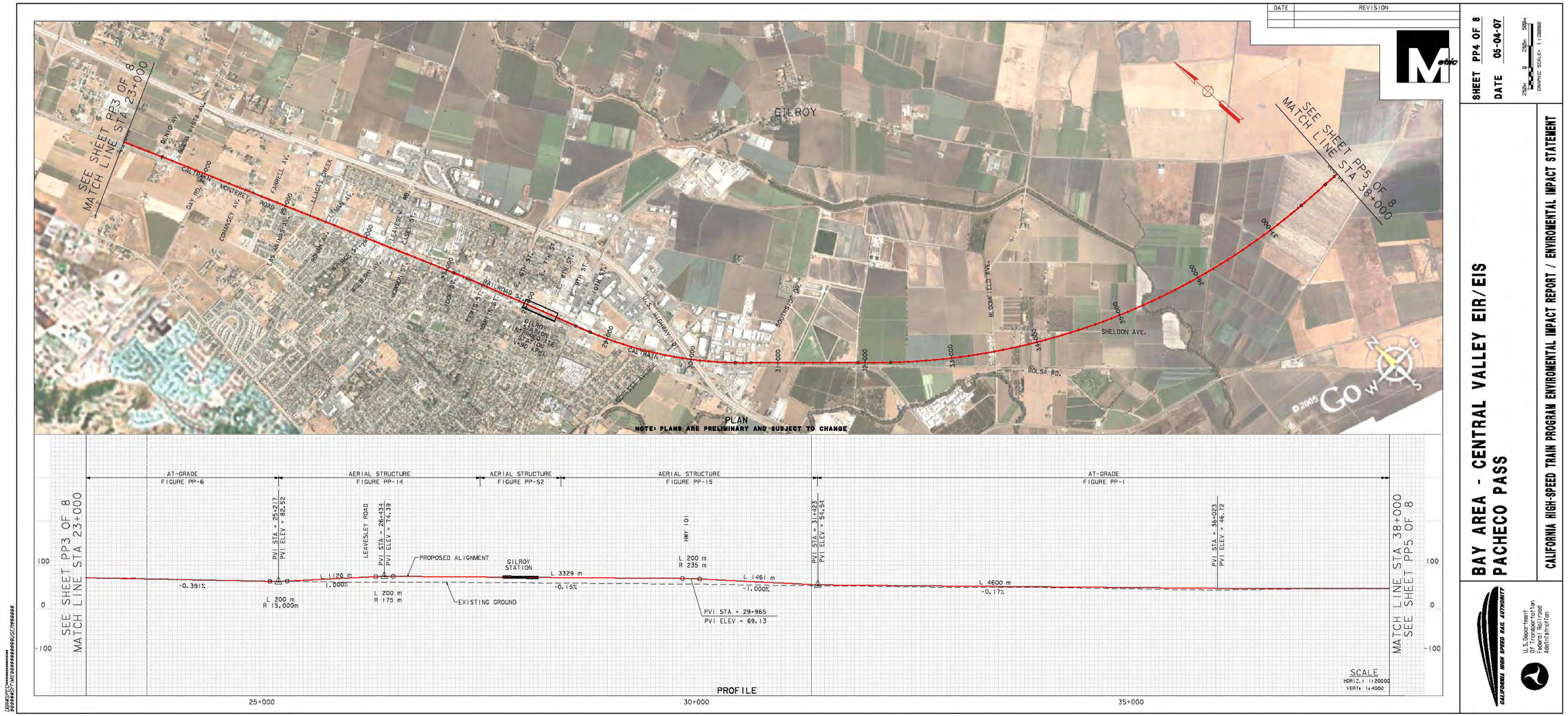
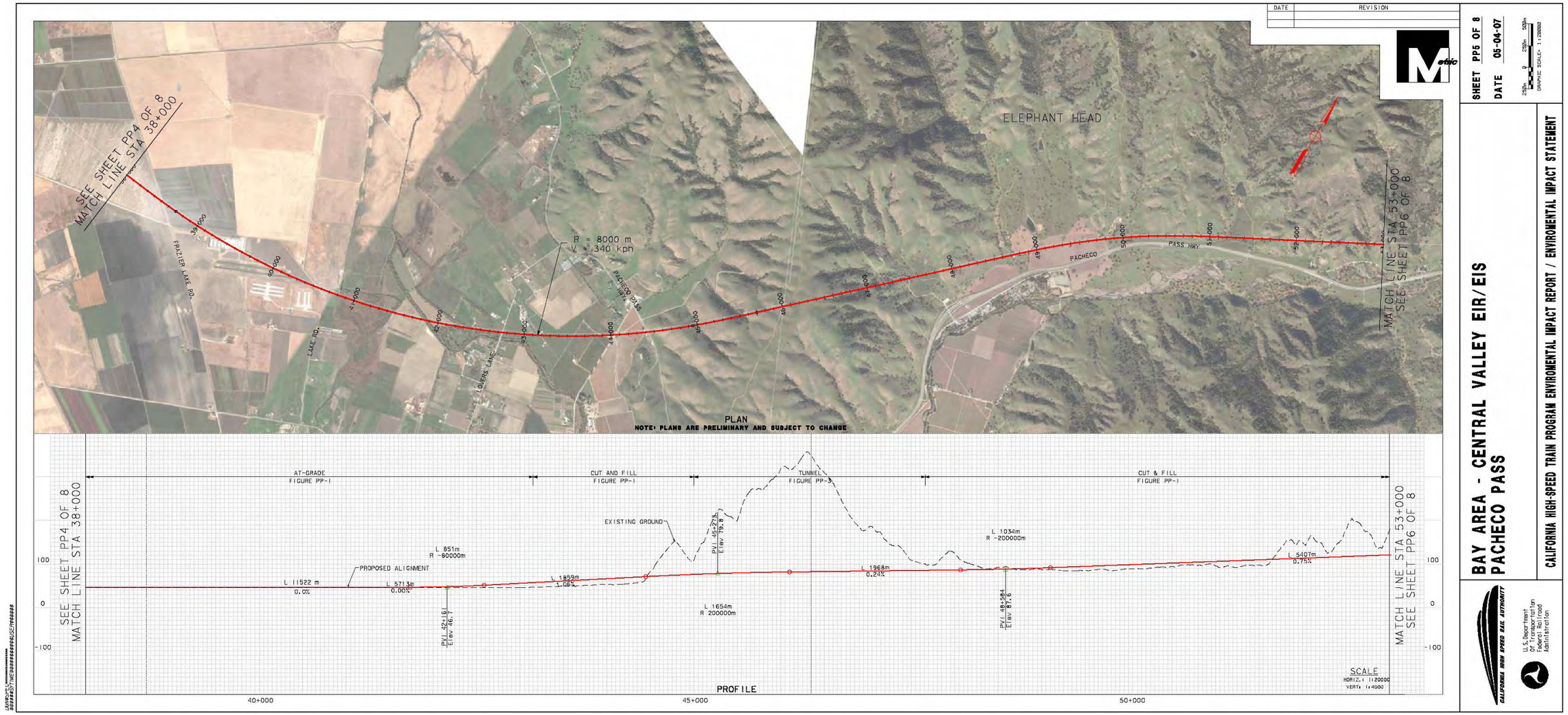
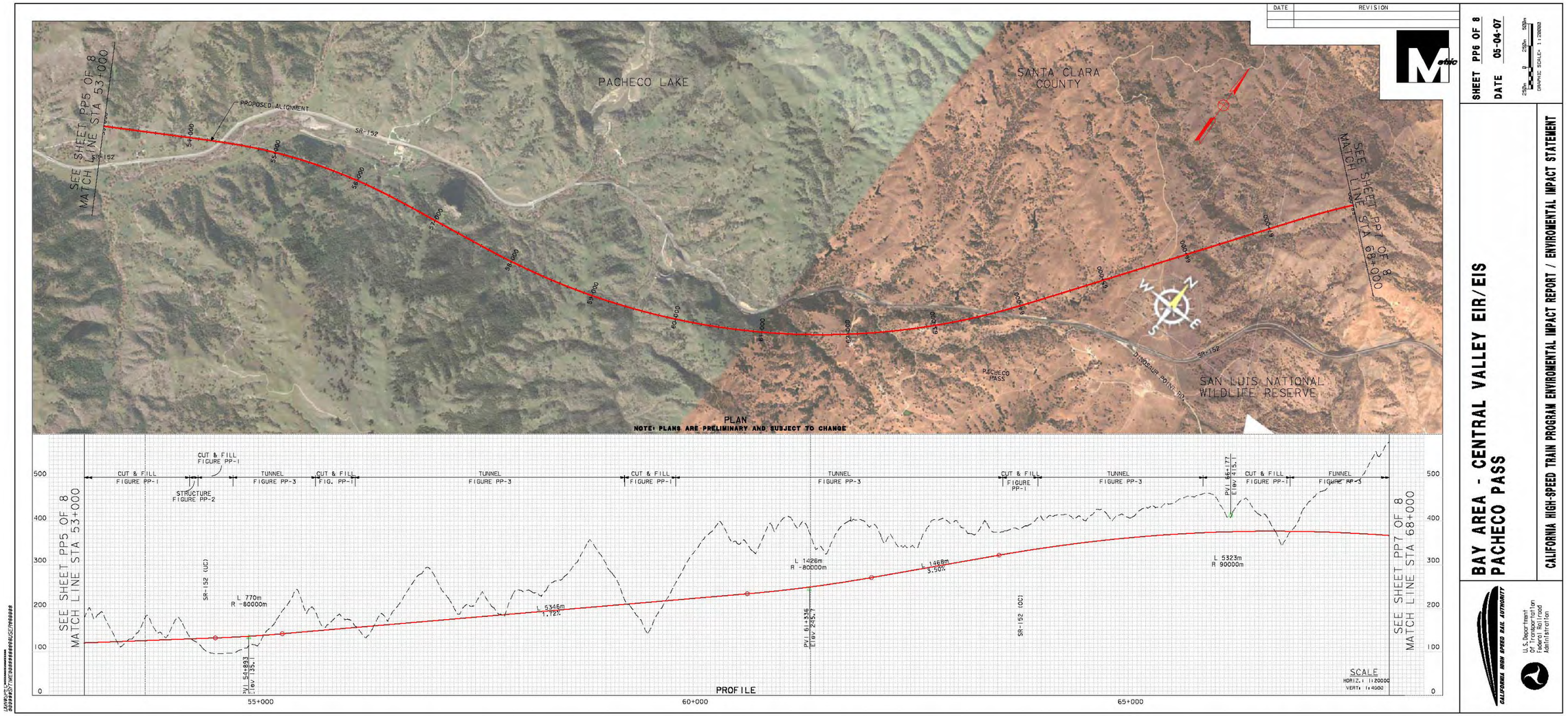
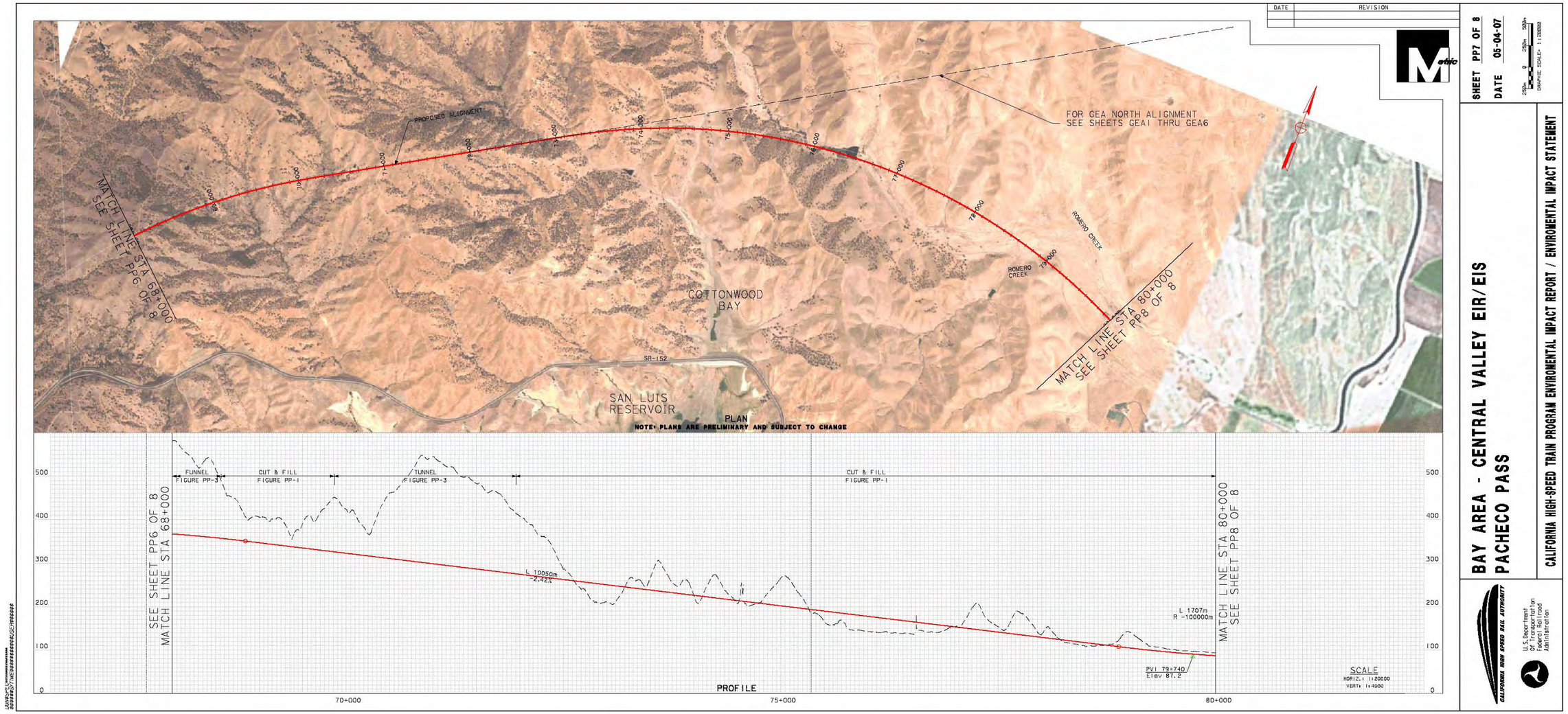
CALIFORNIA HIGH SPEED RAIL AUTHORITY
U.S. Department of Transportation Federal Railroad Administration


DATE
REVISION
SHEET PP4 OF 8
DATE 05-04-07
GRAPHIC SCALE: 1:20000
SEE SHEET PP3 OF 8 MATCH LINE STA 23+000
SEE SHEET PP5 OF 8 MATCH LINE STA 38+000
GILROY
CALTRAIN
U.S. HIGHWAY 101
SHELDON AVE.
BOLSA RD.
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
AT-GRADE FIGURE PP-6
AERIAL STRUCTURE FIGURE PP-14
AERIAL STRUCTURE FIGURE PP-52
AERIAL STRUCTURE FIGURE PP-15
AT-GRADE FIGURE PP-1
PVI STA = 25+217
PVI ELEV = 82.52
PVI STA = 26+434
PVI ELEV = 74.39
PVI STA = 31+023
PVI ELEV = 54.54
PVI STA = 35+023
PVI ELEV = 46.72
PVI STA = 29+965
PVI ELEV = 69.13
LEAVESLEY ROAD
HWY 101
PROPOSED ALIGNMENT
EXISTING GROUND
GILROY STATION
L 200 m R 15,000m
L 120 m
L 200 m R 175 m
L 3329 m
L 200 m R 235 m
L 1461 m
L 4600 m
-0.391%
1.000%
-0.15%
-1.000%
-0.17%
PROFILE
SCALE
HORIZ.: 1:20000
VERT.: 1:4000
25+000
30+000
35+000
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIROMENTAL IMPACT REPORT / ENVIROMENTAL IMPACT STATEMENT
CALIFORNIA HIGH SPEED RAIL AUTHORITY
U.S. Department of Transportation Federal Railroad Administration


SEE SHEET PP4 OF 8
MATCH LINE STA 38+000
FRAZIER LAKE RD.
LAKE RD.
LOVERS LANE
PACHECO 152
R = 8000 m
V = 340 kph
ELEPHANT HEAD
PACHECO
PASS HWY
MATCH LINE STA 53+000
SEE SHEET PP6 OF 8
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
AT-GRADE
FIGURE PP-1
CUT AND FILL
FIGURE PP-1
TUNNEL
FIGURE PP-3
CUT & FILL
FIGURE PP-1
EXISTING GROUND
PROPOSED ALIGNMENT
L 11522 m
0.0%
L 5713m
0.00%
L 851m
R -80000m
PVI 42+16
Elev 46.7
L 1859m
1.06%
PVI 45+273
Elev 79.8
L 1654m
R 200000m
L 1968m
0.24%
L 1034m
R -200000m
PVI 48+584
Elev 87.6
L 5407m
0.75%
SCALE
HORIZ.: 1:20000
VERT.: 1:4000
PROFILE
40+000
45+000
50+000
100
0
-100
DATE
REVISION
SHEET PP5 OF 8
DATE 05-04-07
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIROMENTAL IMPACT REPORT / ENVIROMENTAL IMPACT STATEMENT
CALIFORNIA HIGH SPEED RAIL AUTHORITY
U.S. Department Of Transportation Federal Railroad Administration


PACHECO LAKE
SANTA CLARA COUNTY
SEE SHEET PP5 OF 8 MATCH LINE STA 53+000
SEE SHEET PP7 OF 8 MATCH LINE STA 68+000
PROPOSED ALIGNMENT
SR-152
PACHECO PASS
SAN LUIS NATIONAL WILDLIFE RESERVE
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
CUT & FILL FIGURE PP-1
STRUCTURE FIGURE PP-2
TUNNEL FIGURE PP-3
CUT & FILL FIG. PP-1
SR-152 (UC)
L 770m R -80000m
L 5346m 1.72%
L 1426m R -80000m
L 1468m 3.50%
L 5323m R 90000m
PVI 54+883 Elev 135.1
PVI 61+336 Elev 243.7
PVI 66+177 Elev 415.1
PROFILE
SCALE
HORIZ.: 1:20000
VERT.: 1:4000
55+000
60+000
65+000
SHEET PP6 OF 8
DATE 05-04-07
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIRONMENTAL IMPACT REPORT / ENVIROMENTAL IMPACT STATEMENT
CALIFORNIA HIGH SPEED RAIL AUTHORITY
U.S. Department of Transportation Federal Railroad Administration


DATE
REVISION
SHEET PP7 OF 8
DATE 05-04-07
GRAPHIC SCALE: 1:20000
PROPOSED ALIGNMENT
FOR GEA NORTH ALIGNMENT
SEE SHEETS GEA1 THRU GEA6
MATCH LINE STA 68+000
SEE SHEET PP6 OF 8
MATCH LINE STA 80+000
SEE SHEET PP8 OF 8
COTTONWOOD BAY
SAN LUIS RESERVOIR
SR-152
ROMERO CREEK
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
TUNNEL
FIGURE PP-3
CUT & FILL
FIGURE PP-1
L 10050m
2.42%
L 1707m
R -100000m
PVI 79+740
Elev 87.2
SCALE
HORIZ.: 1:20000
VERT.: 1:4000
PROFILE
70+000
75+000
80+000
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIROMENTAL IMPACT REPORT / ENVIROMENTAL IMPACT STATEMENT
CALIFORNIA HIGH SPEED RAIL AUTHORITY
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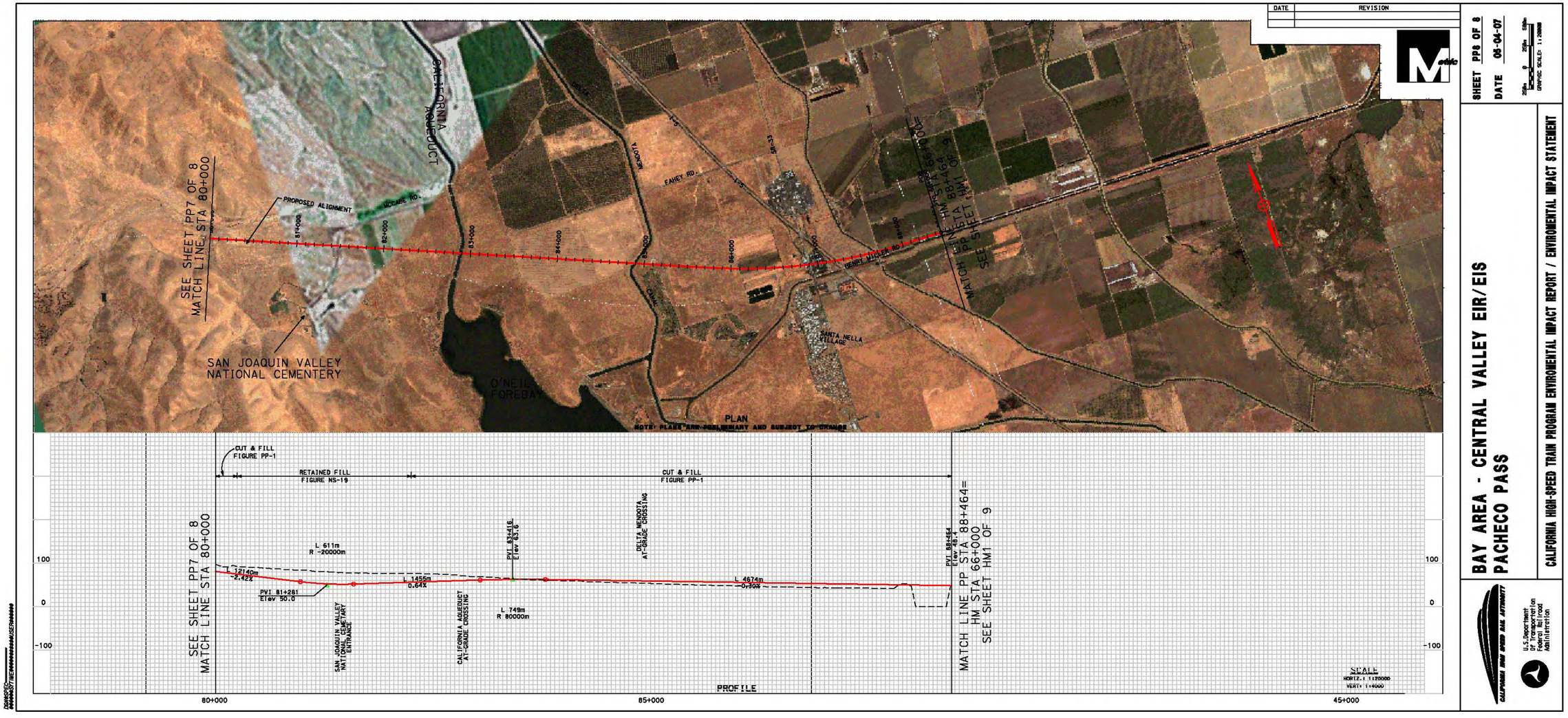
DATE
REVISION
SHEET PP6 OF 8
DATE 05-04-07
GRAPHIC SCALE: 1:20000
BAY AREA - CENTRAL VALLEY EIR/EIS
PACHECO PASS
CALIFORNIA HIGH-SPEED TRAIN PROGRAM ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL IMPACT STATEMENT
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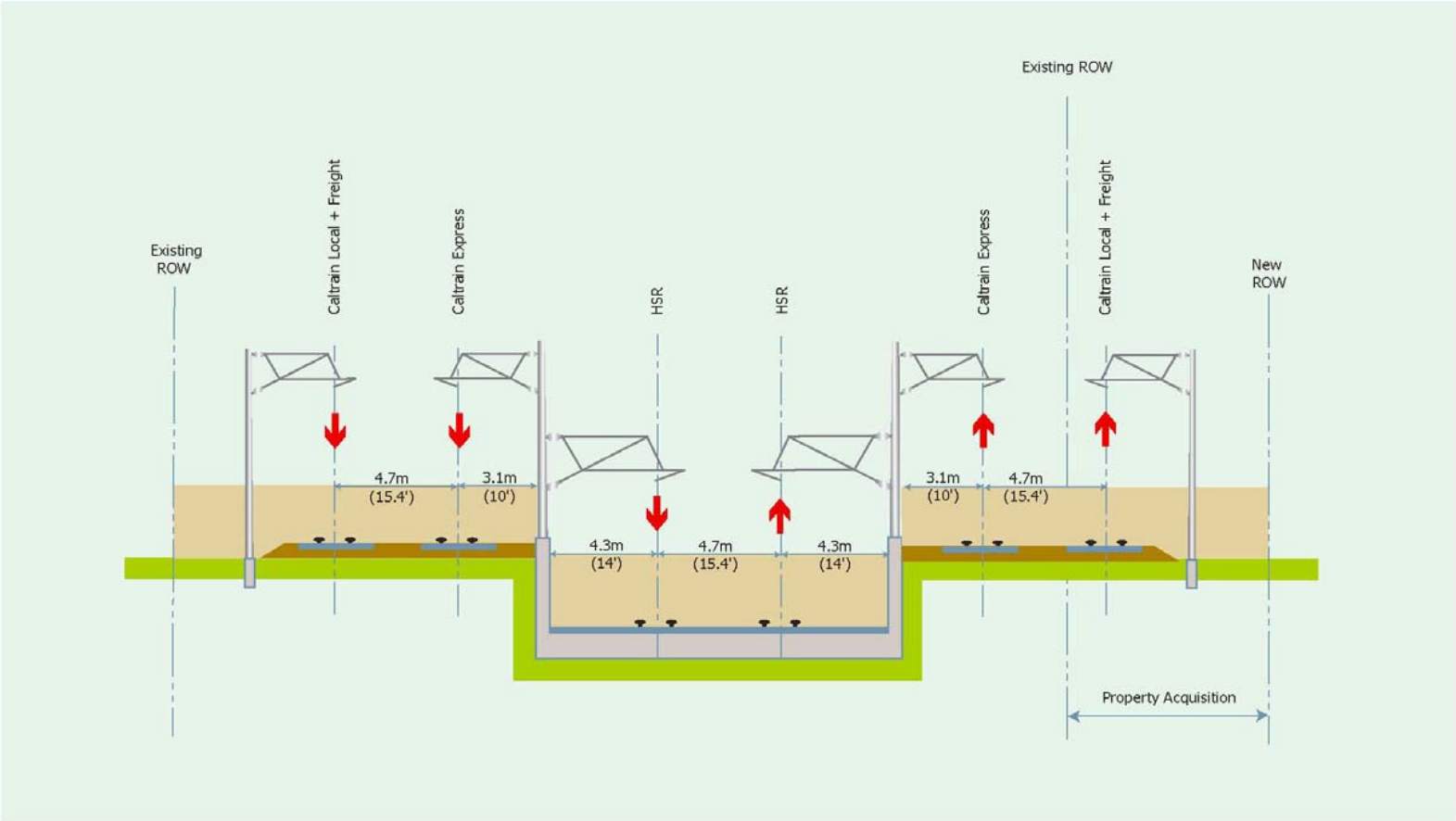
SEE SHEET PP7 OF 8
MATCH LINE STA 80+000
PROPOSED ALIGNMENT
MCCABE RD.
CALIFORNIA AQUEDUCT
SAN JOAQUIN VALLEY NATIONAL CEMENTERY
O'NEILL FOREBAY
FAHEY RD.
BENBY VICKER RD.
SANTA NELLA VILLAGE
MATCH LINE PP STA 88+464= HM STA 66+000
SEE SHEET HM1 OF 9
PLAN
NOTE: PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE
CUT & FILL FIGURE PP-1
RETAINED FILL FIGURE NS-19
CUT & FILL FIGURE PP-1
L 611m
R -20000m
L 2140m
-2.42%
PVI 81+281
Elev 50.0
L 1456m
0.64%
PVI 83+416
Elev 63.6
DELTA MENDOTA AT-GRADE CROSSING
L 749m
R 80000m
L 4674m
-0.30%
PVI 86+454
Elev 48.4
SAN JOAQUIN VALLEY NATIONAL CEMETARY ENTRANCE
CALIFORNIA AQUEDUCT AT-GRADE CROSSING
PROFILE
SCALE
HORIZ. 1:120000
VERTI. 1:14000
80+000
85+000
45+000
100
0
-100

APPENDIX 2-E

CROSS SECTIONS

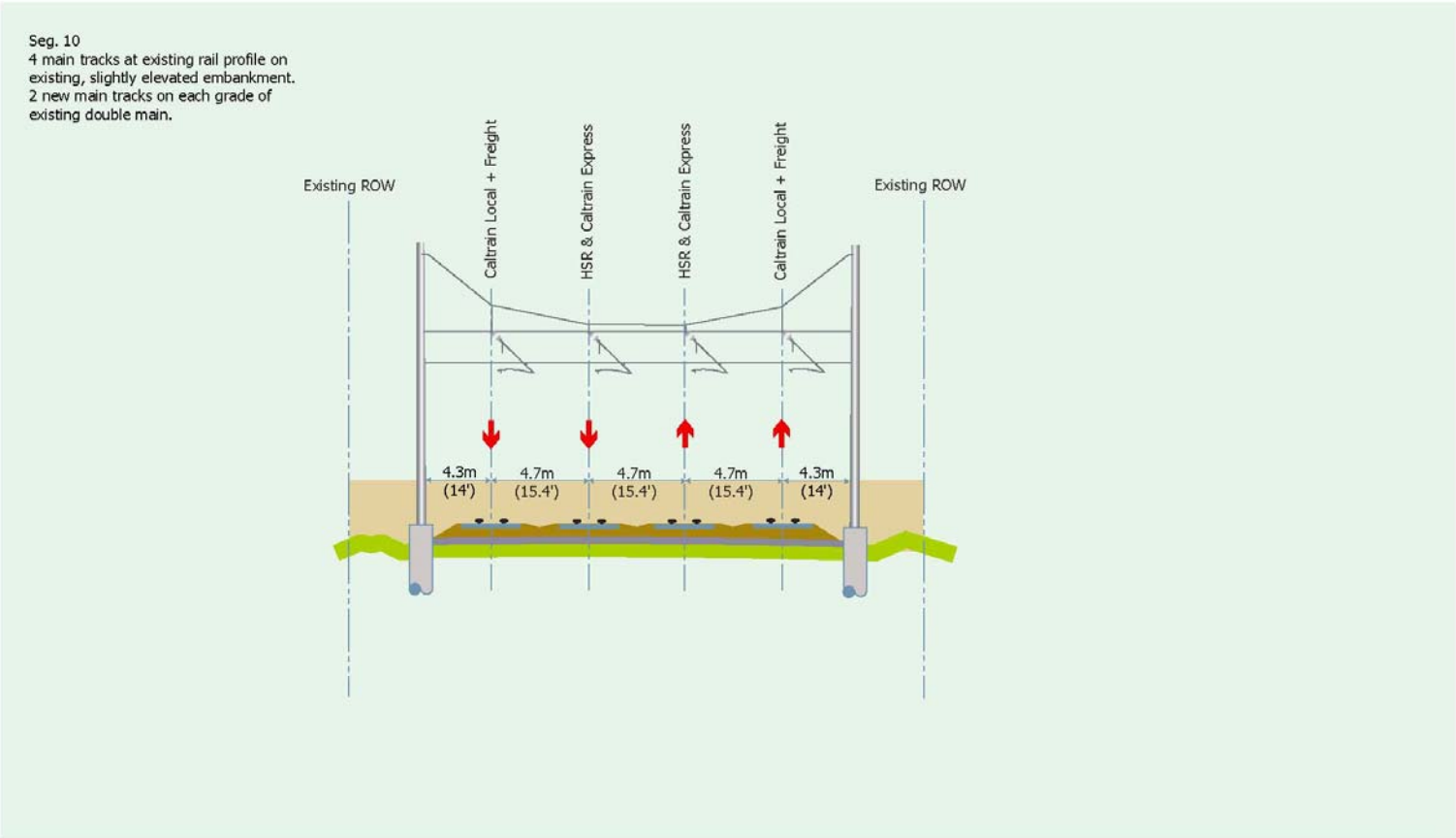
APPENDIX 2-E

CALTRAIN CORRIDOR



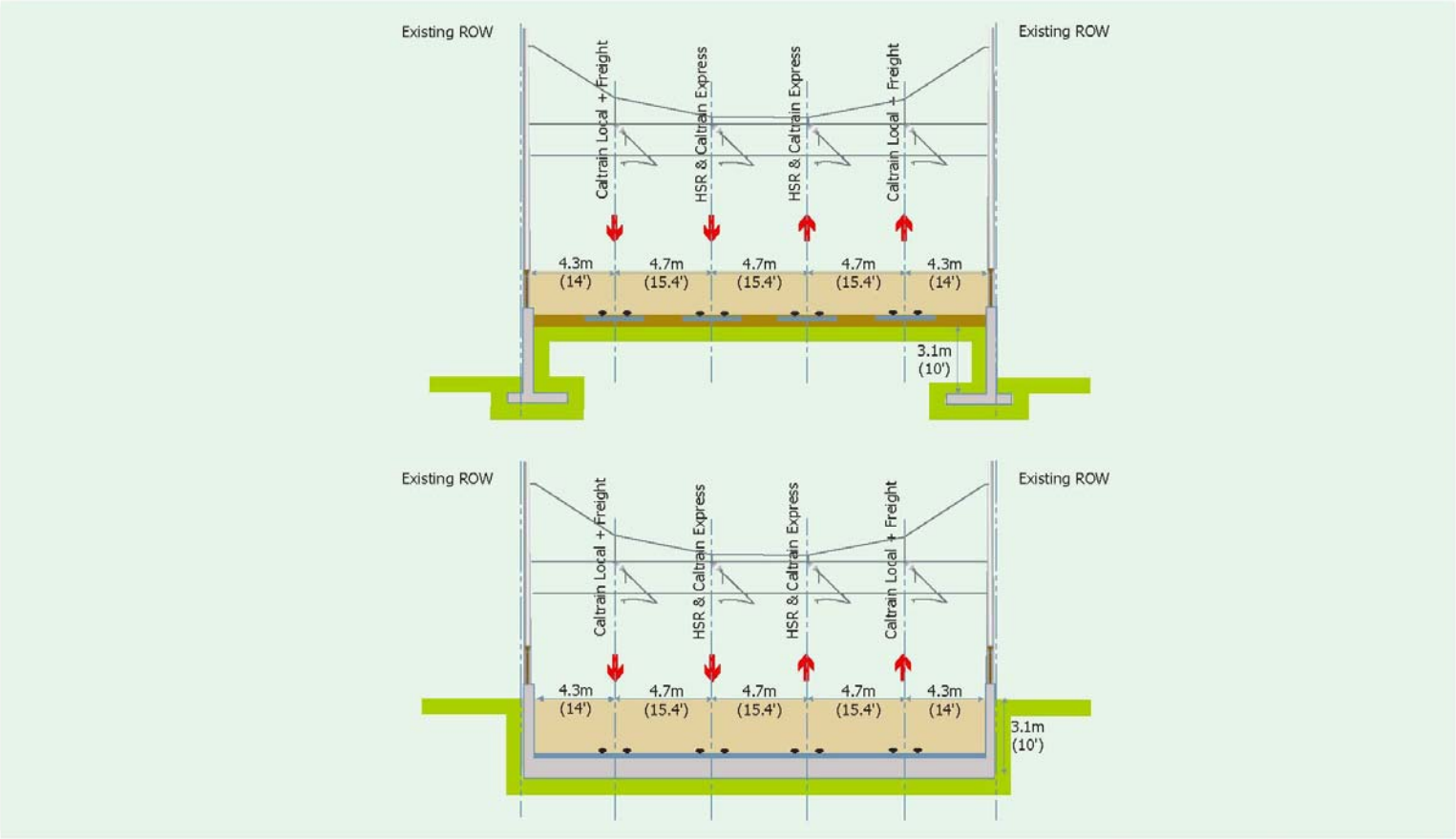
California High-Speed Train Program EIR/EIS

Figure CC-1



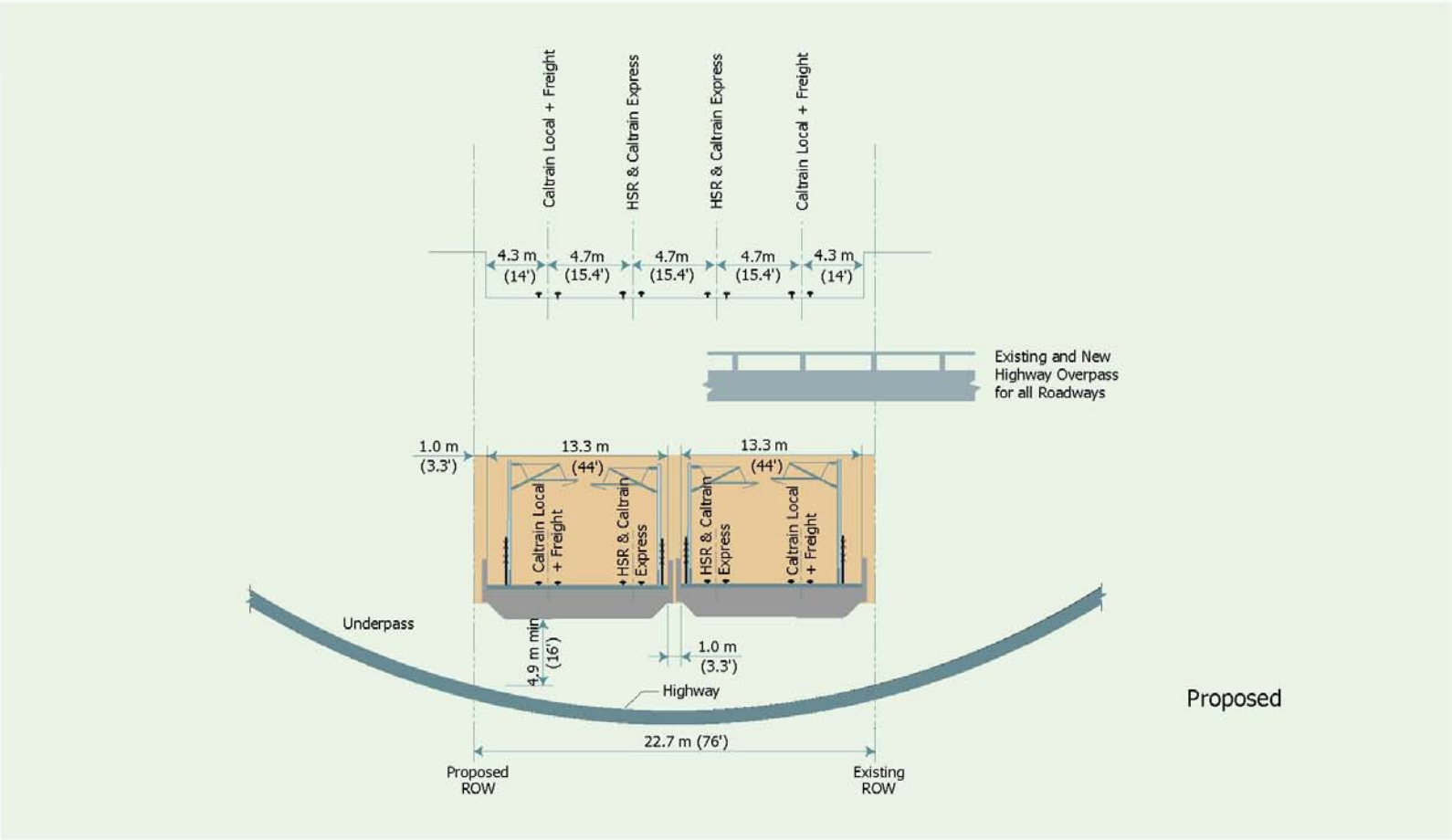
California High-Speed Train Program EIR/EIS

Figure CC-2



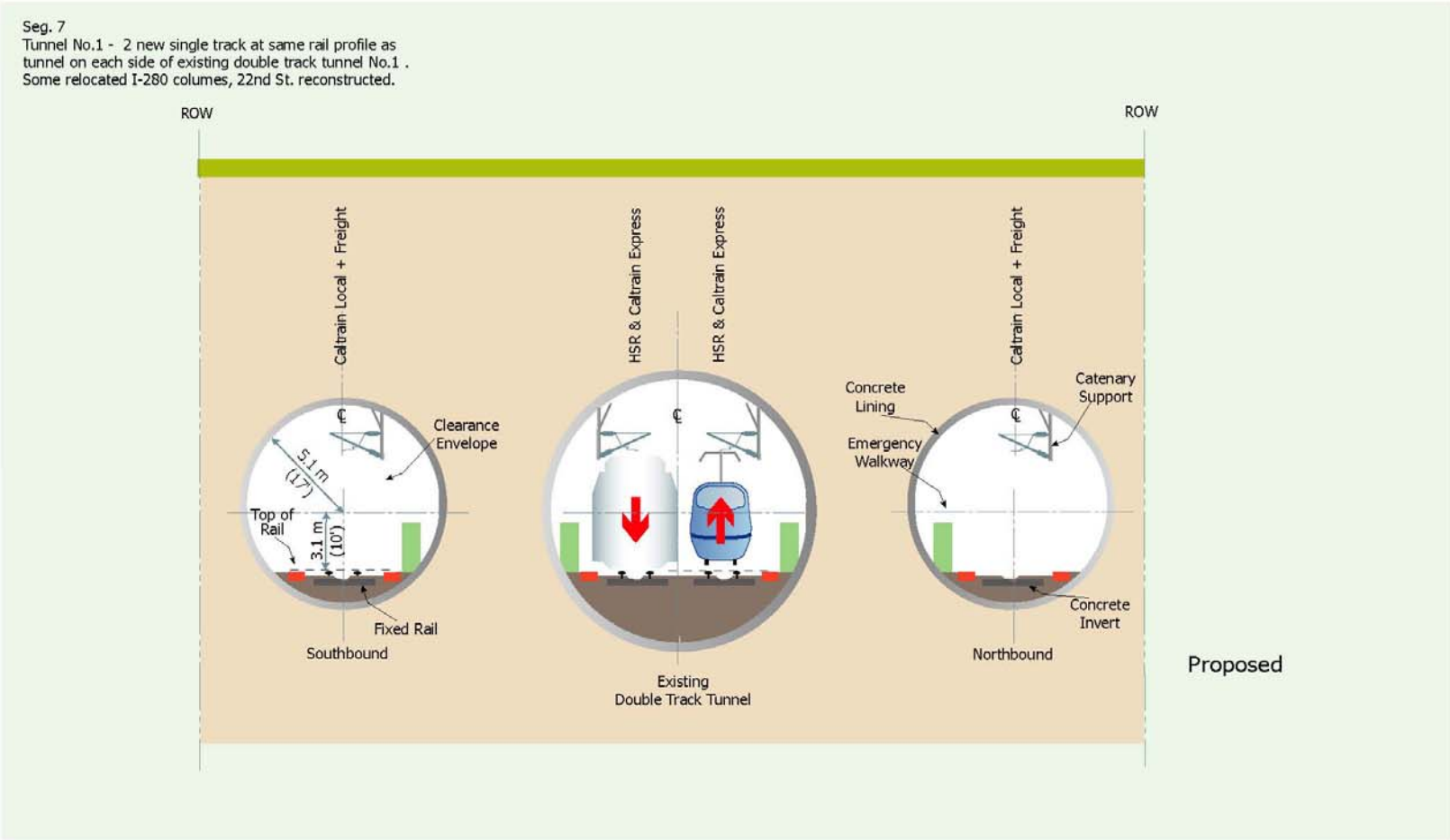
California High-Speed Train Program EIR/EIS

Figure CC-3



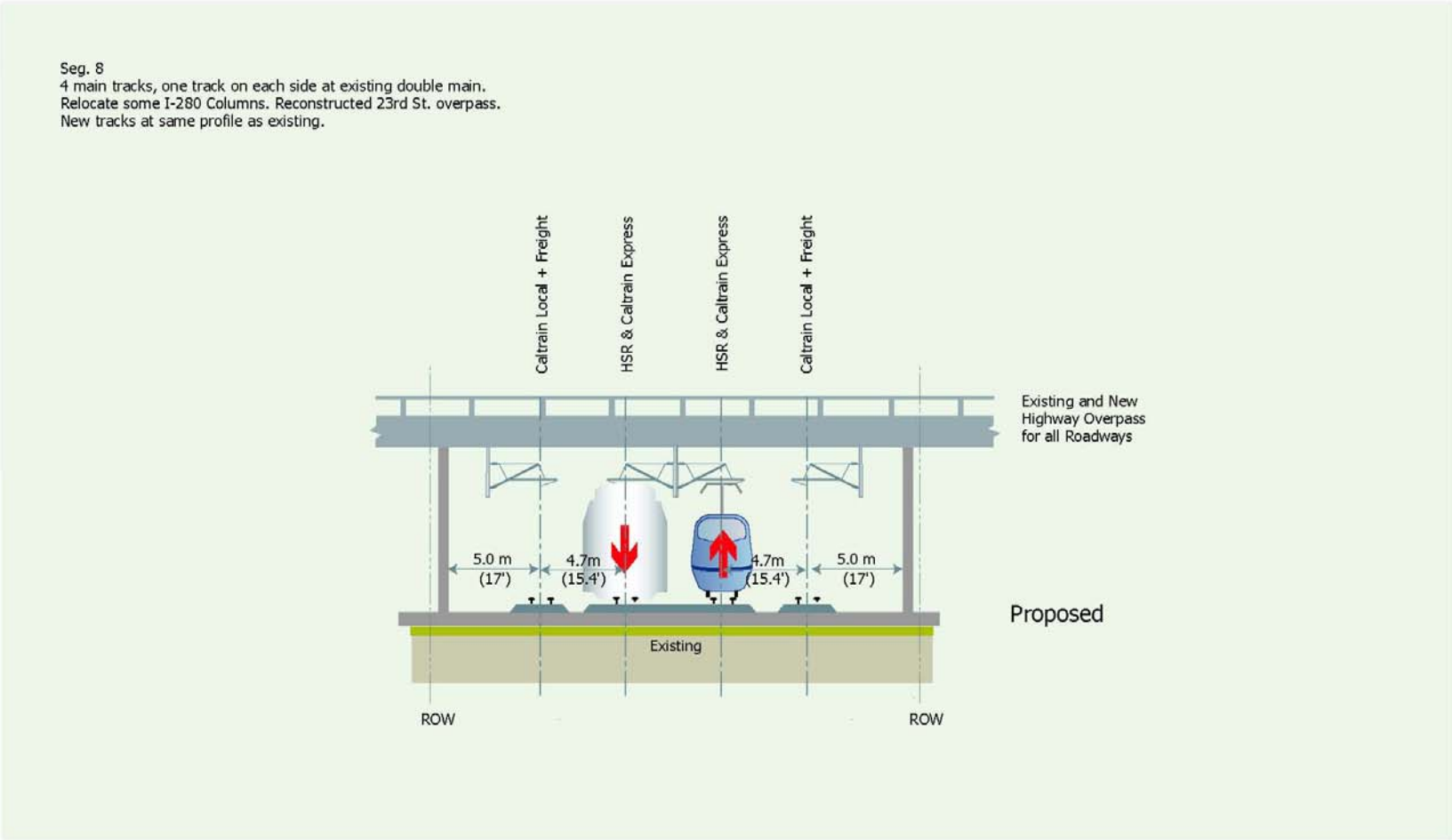
California High-Speed Train Program EIR/EIS

Figure CC-4



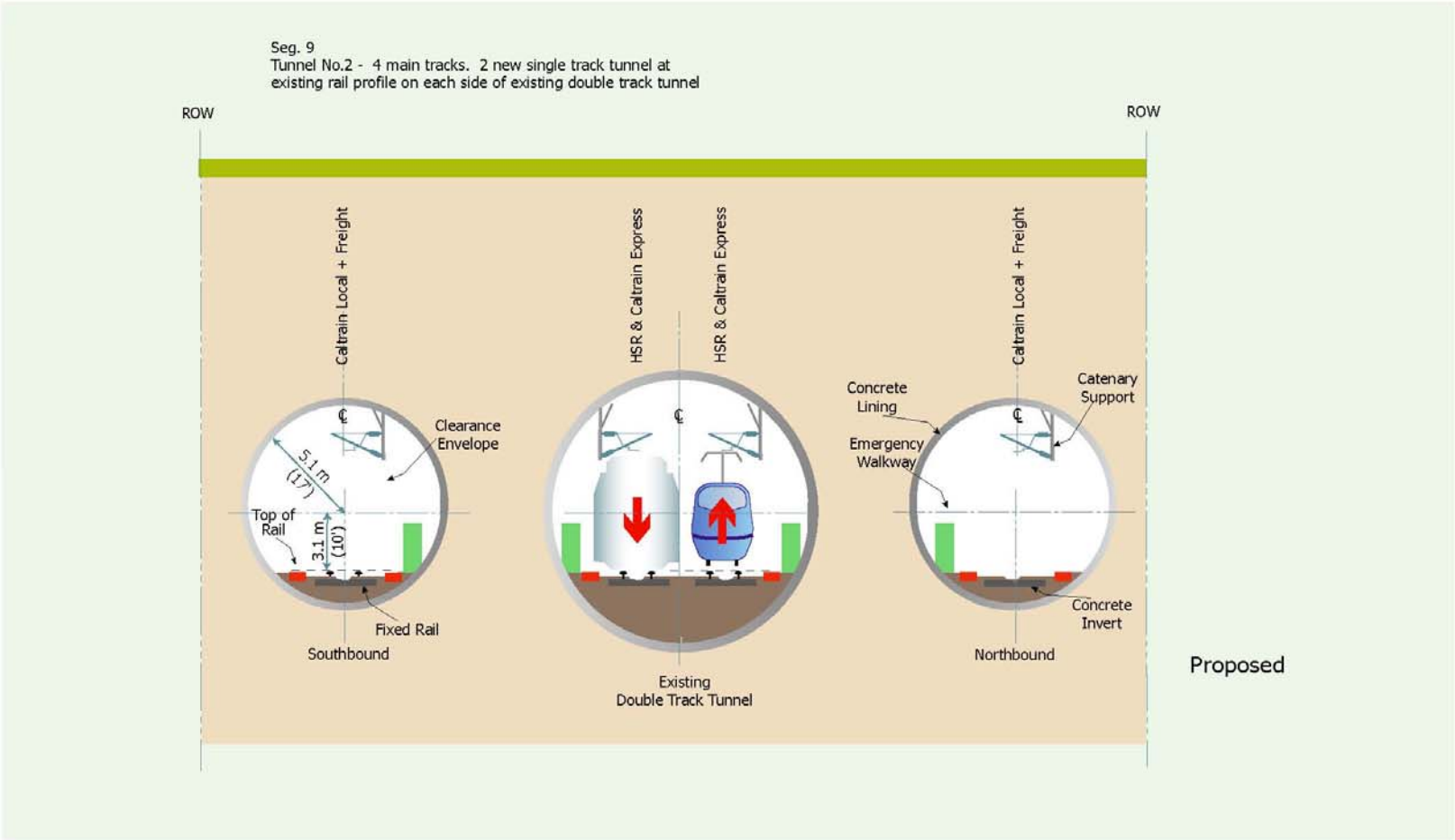
California High-Speed Train Program EIR/EIS

Figure CC-5



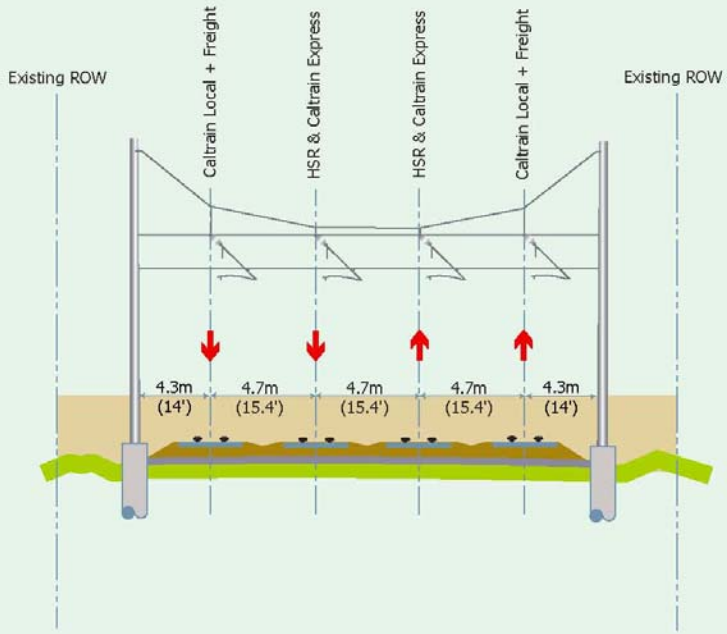
California High-Speed Train Program EIR/EIS

Figure CC-6



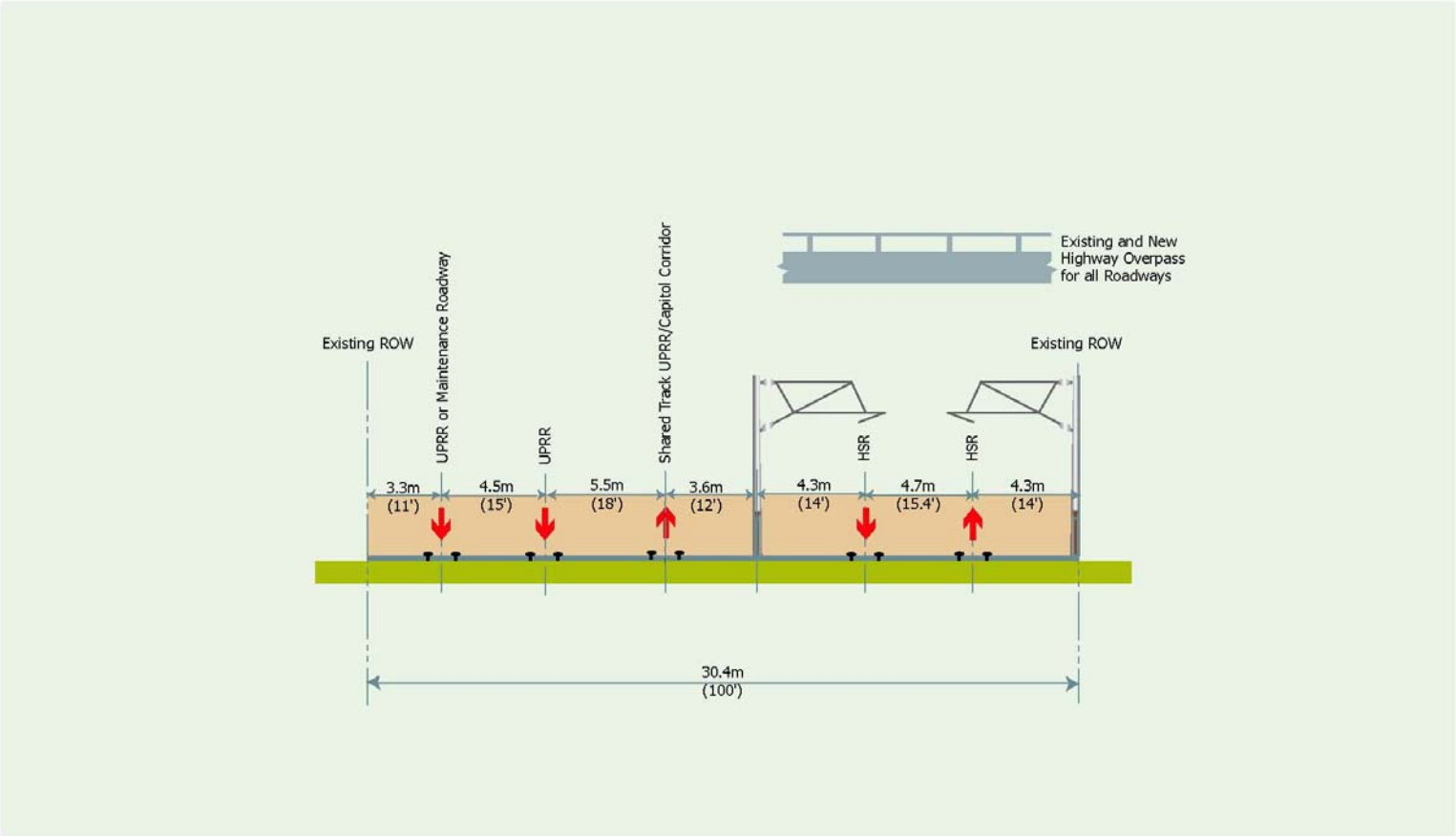
California High-Speed Train Program EIR/EIS

Figure CC-7



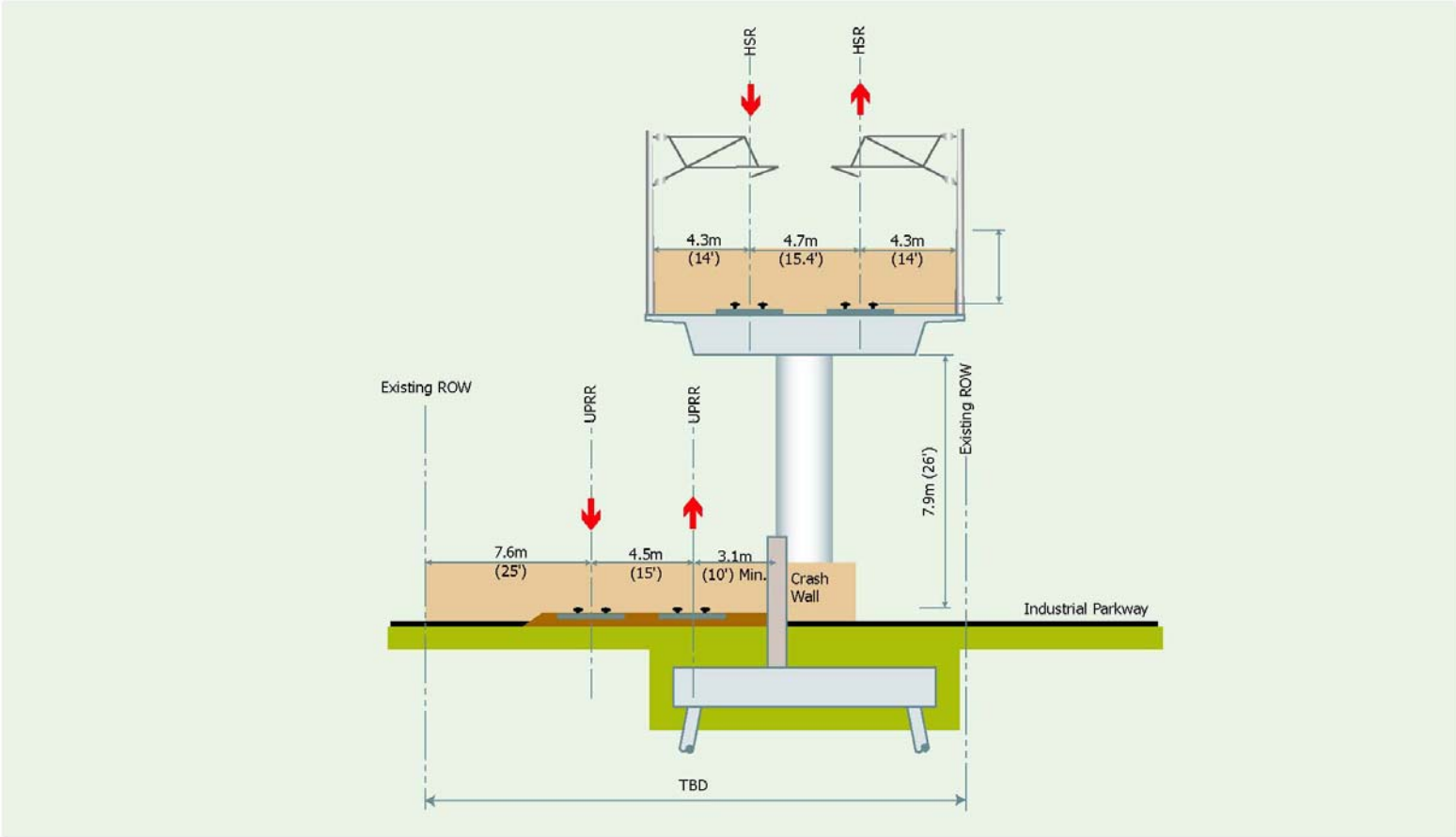
California High-Speed Train Program EIR/EIS

Figure CC-8



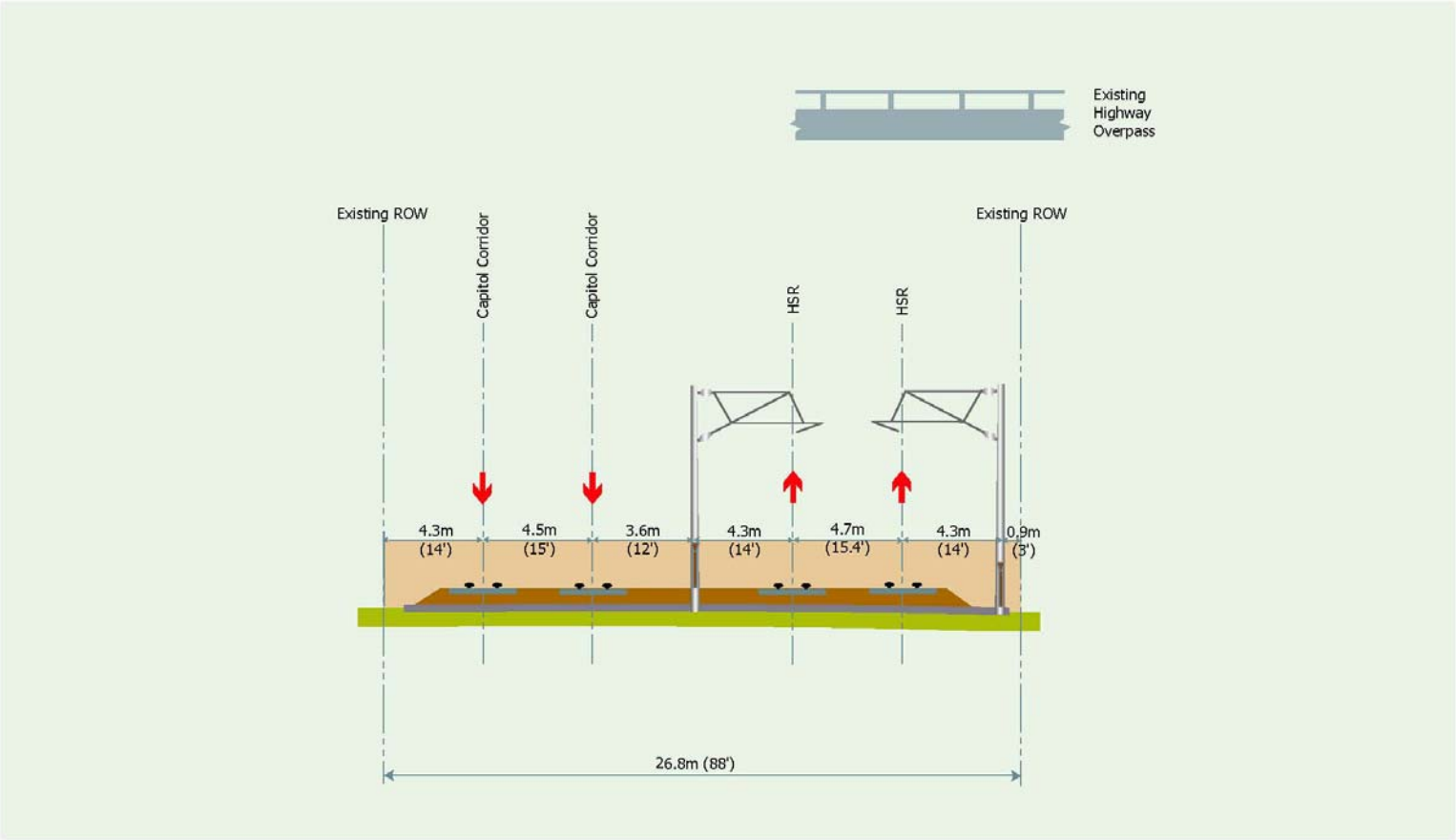
California High-Speed Train Program EIR/EIS

Figure NS-1



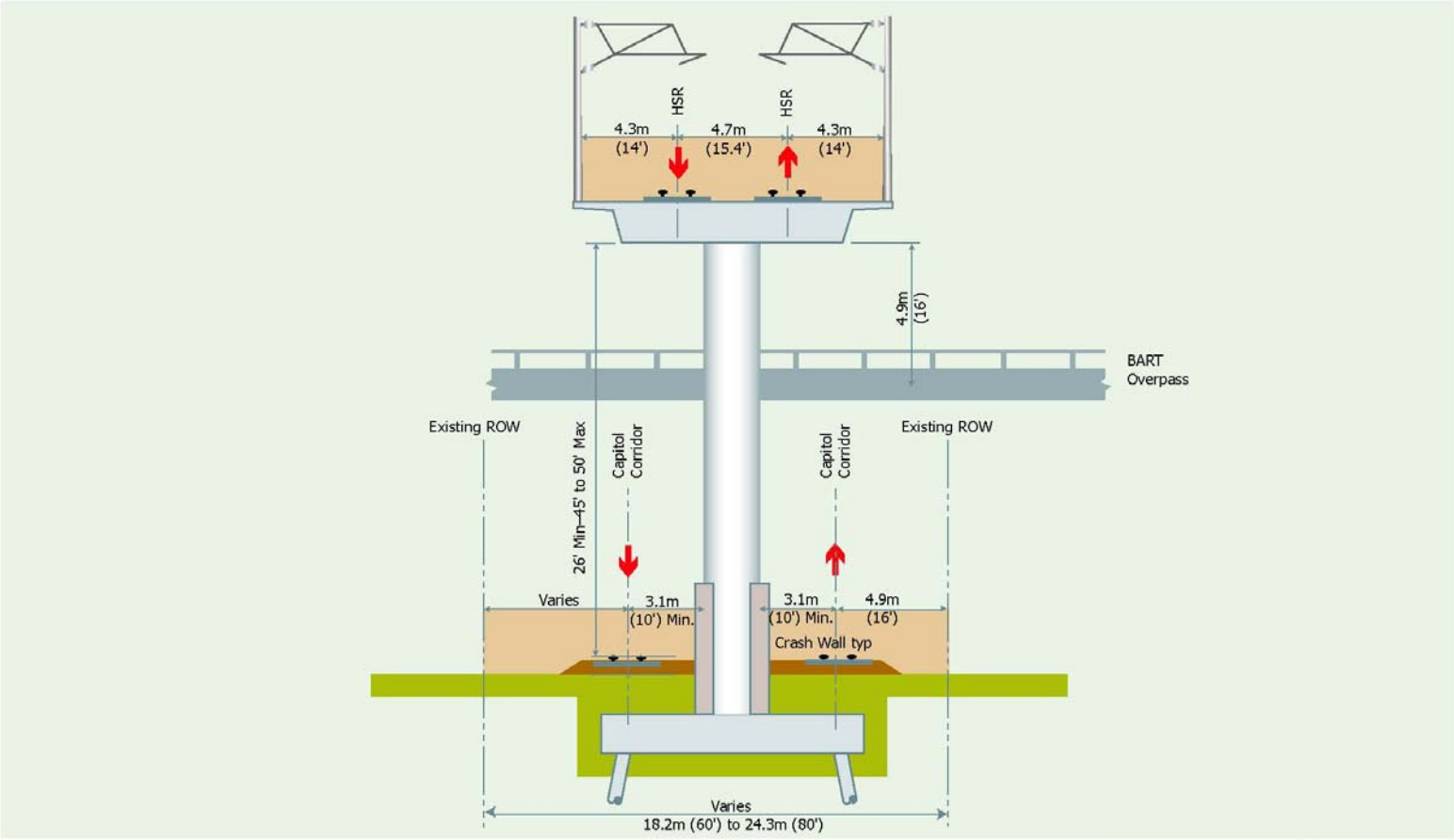
California High-Speed Train Program EIR/EIS

Figure NS-2



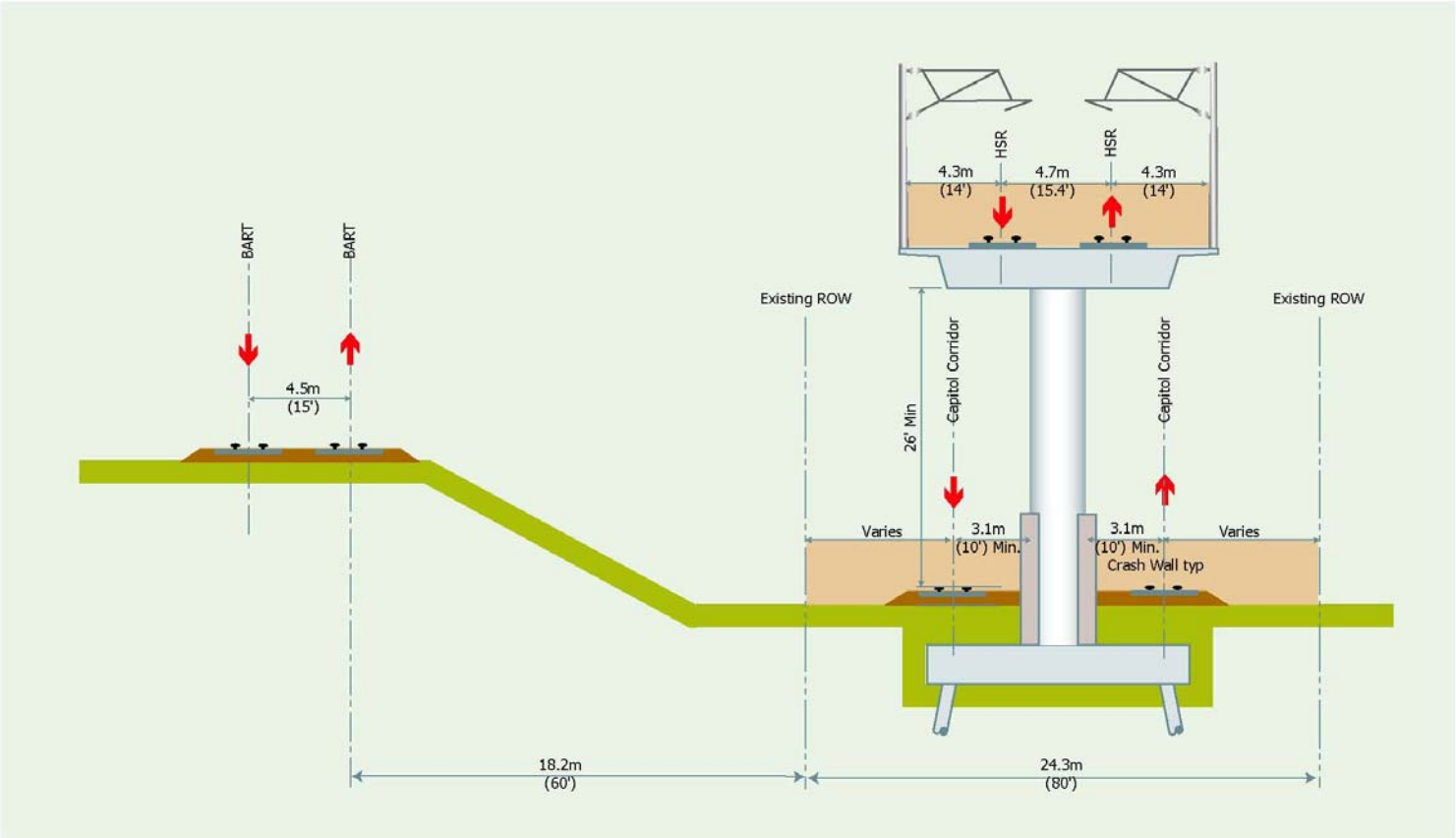
California High-Speed Train Program EIR/EIS

Figure NS-3



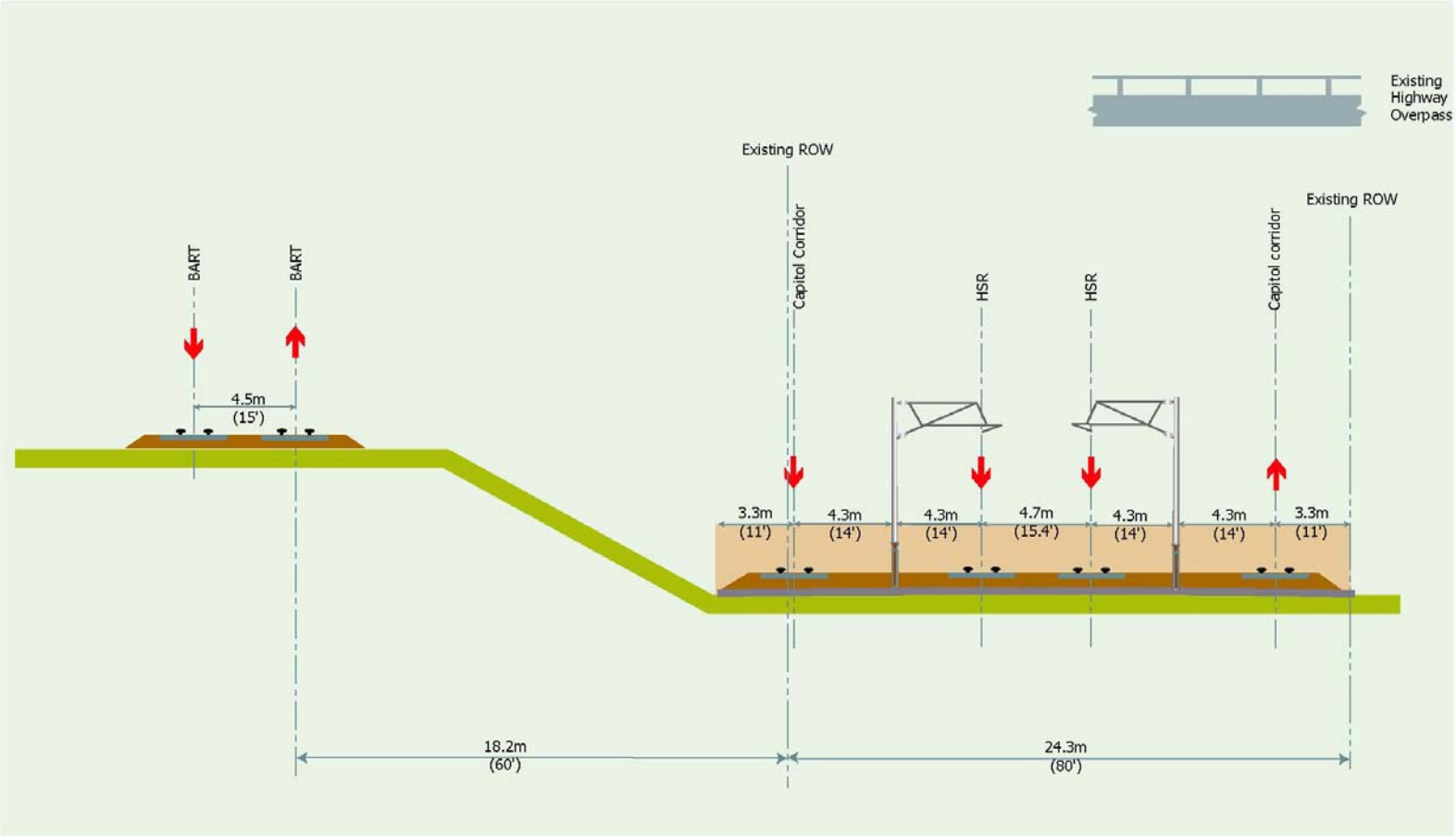
California High-Speed Train Program EIR/EIS

Figure NS-4



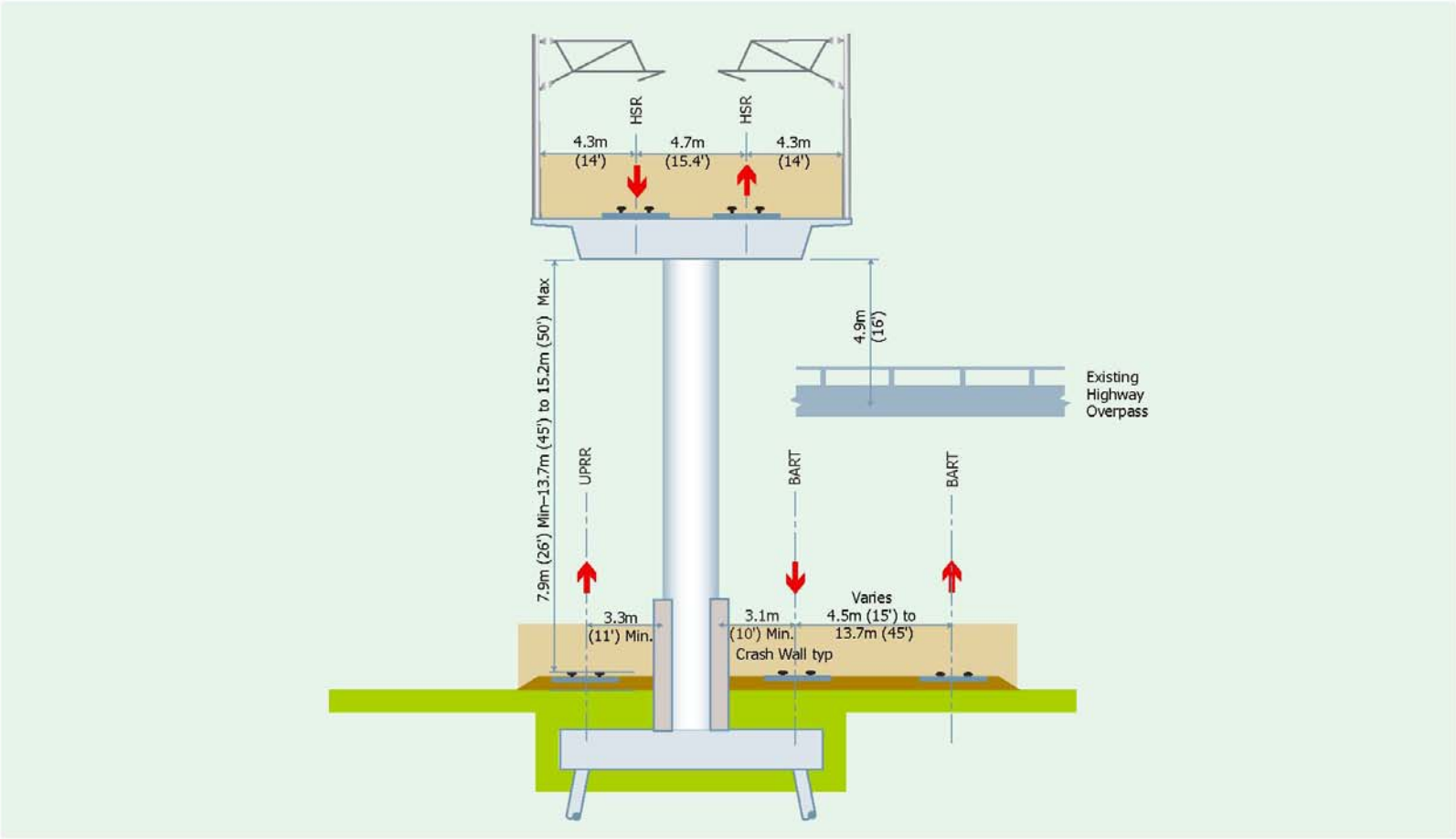
California High-Speed Train Program EIR/EIS

Figure NS-5



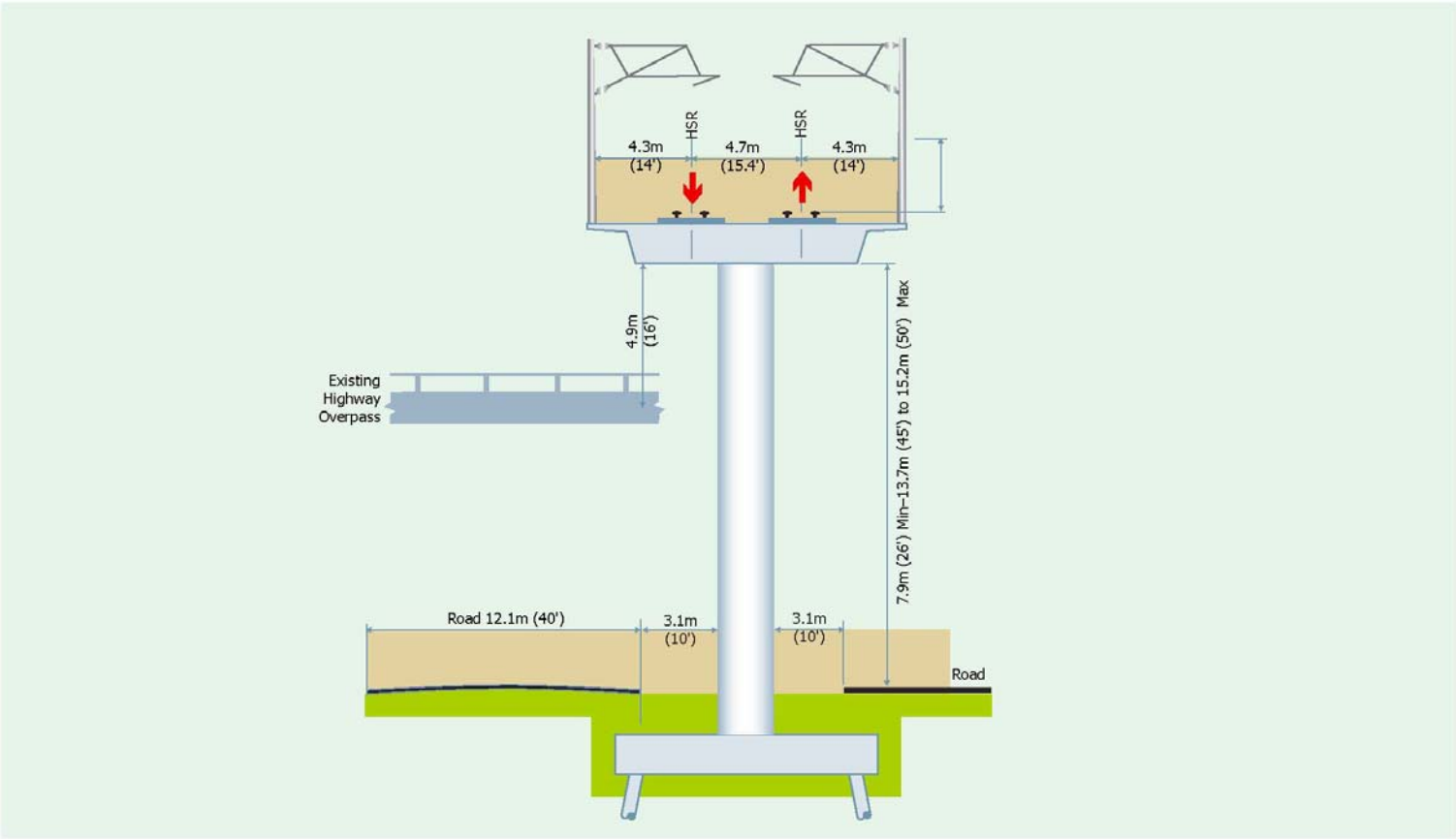
California High-Speed Train Program EIR/EIS

Figure NS-6



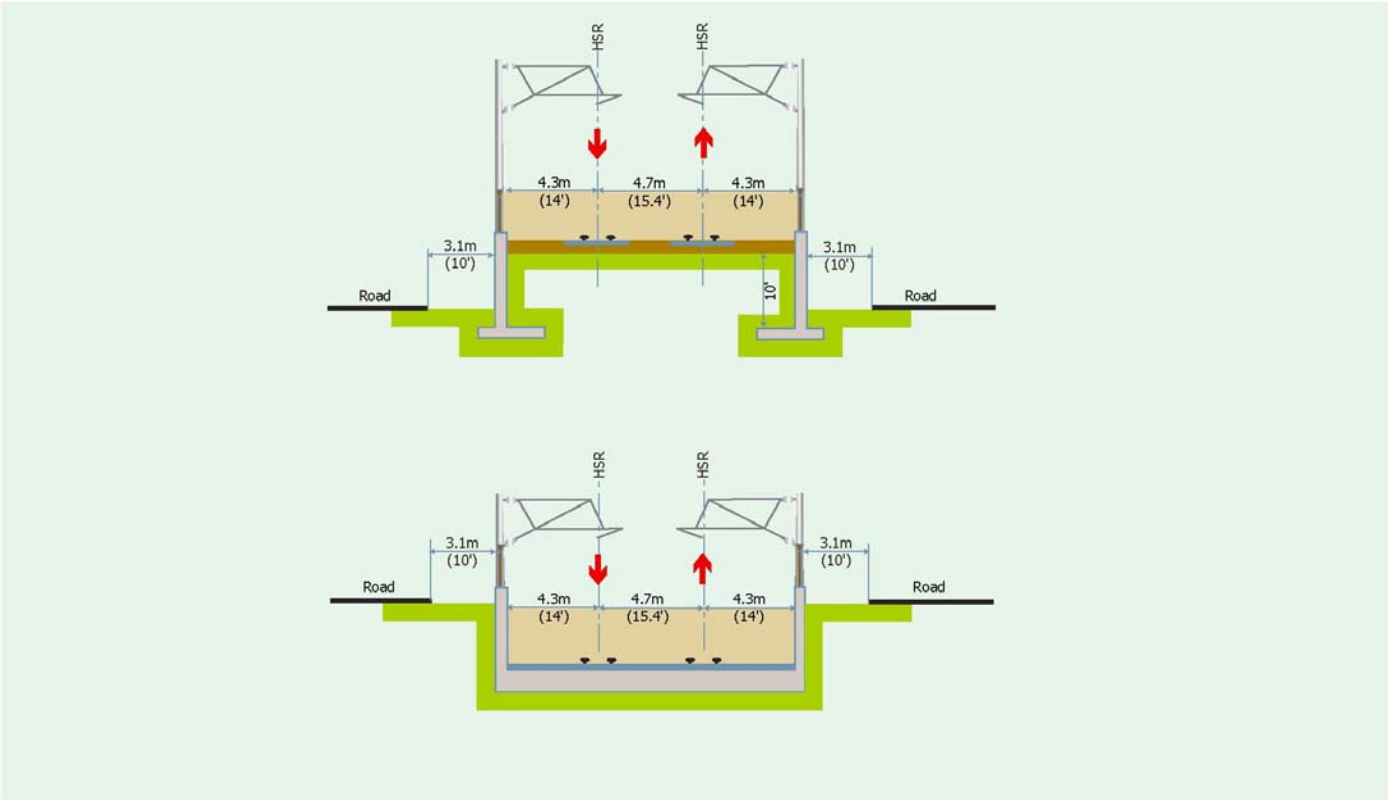
California High-Speed Train Program EIR/EIS

Figure NS-7



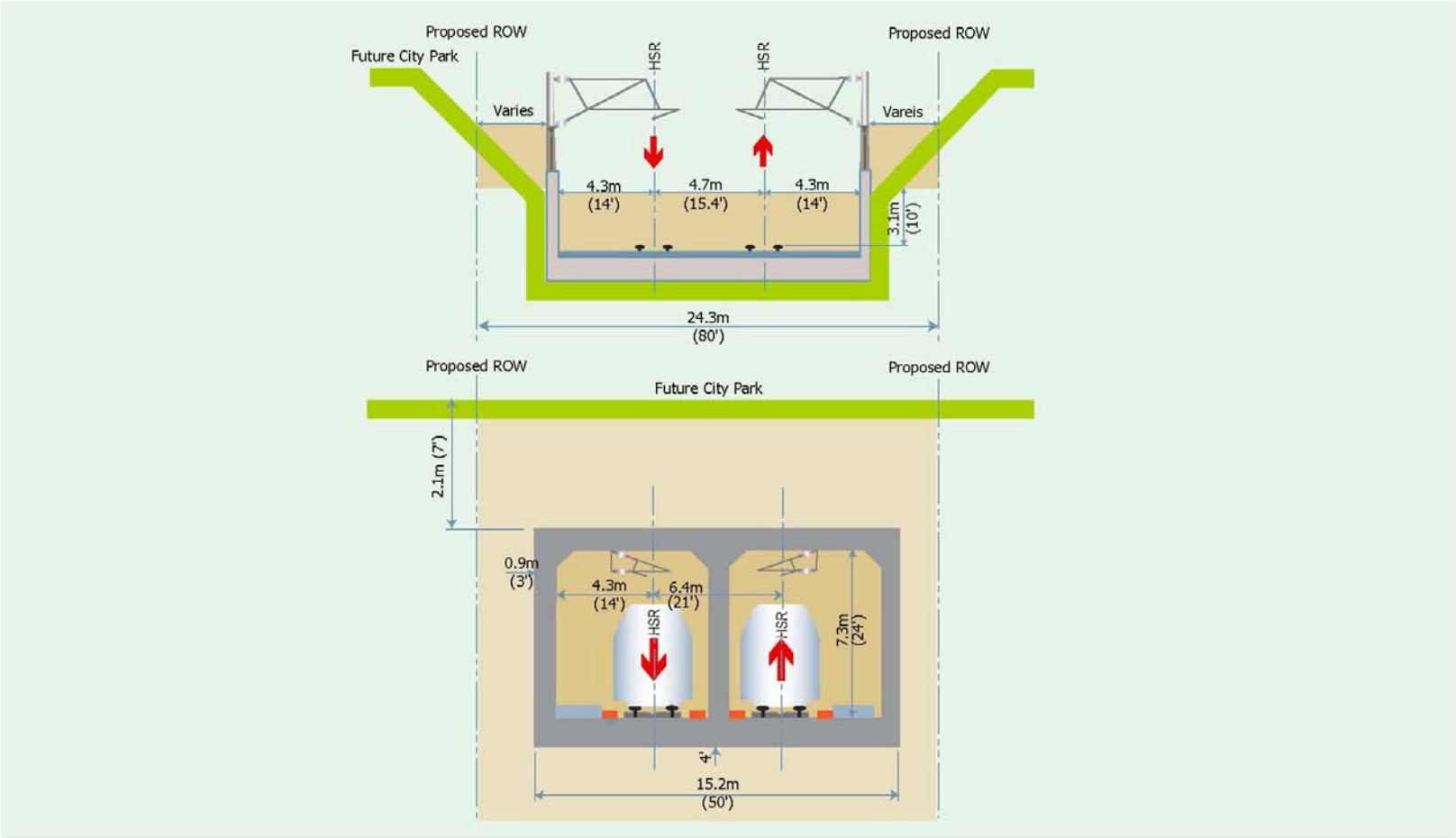
California High-Speed Train Program EIR/EIS

Figure NS-8



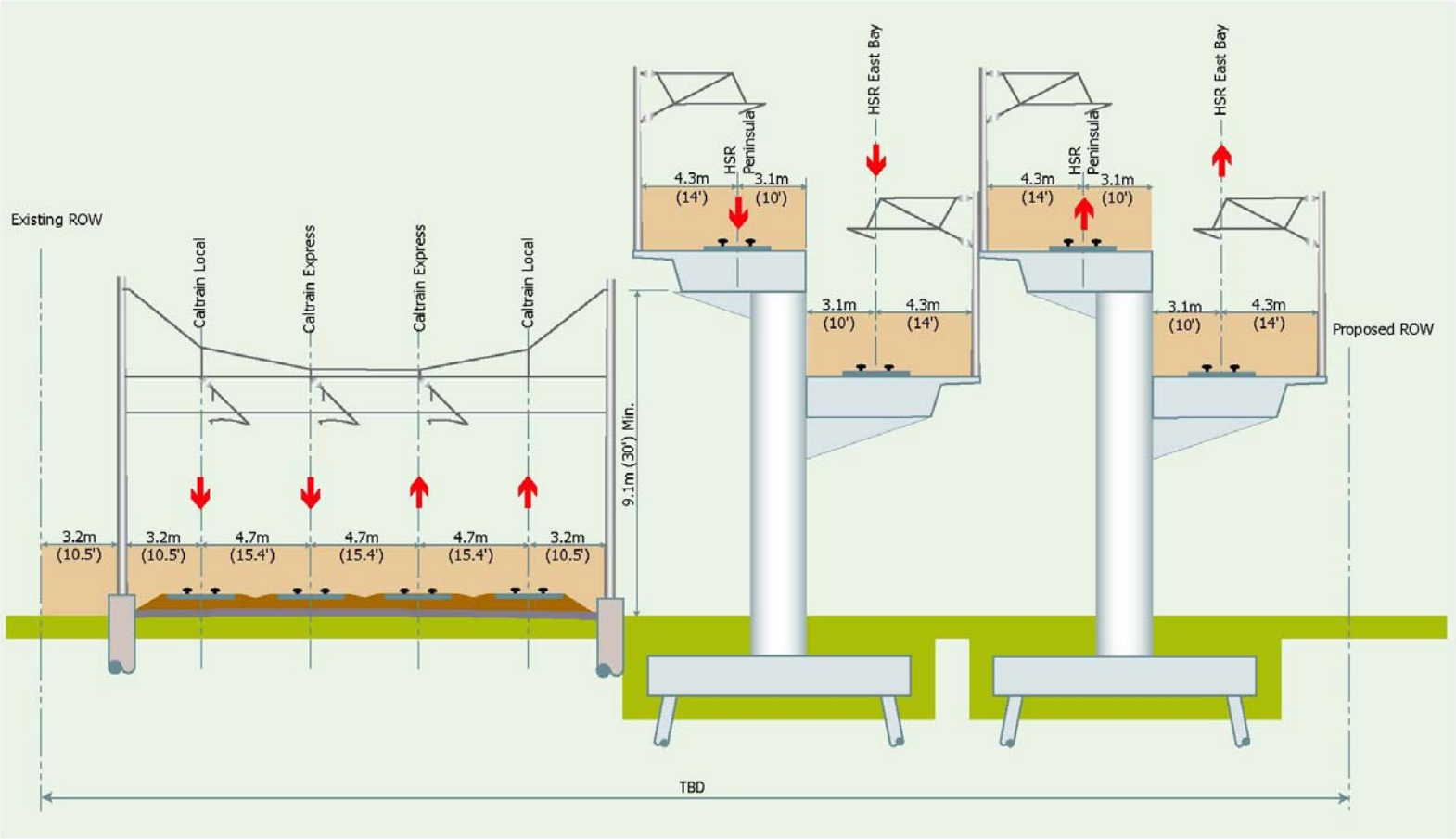
California High-Speed Train Program EIR/EIS

Figure NS-9



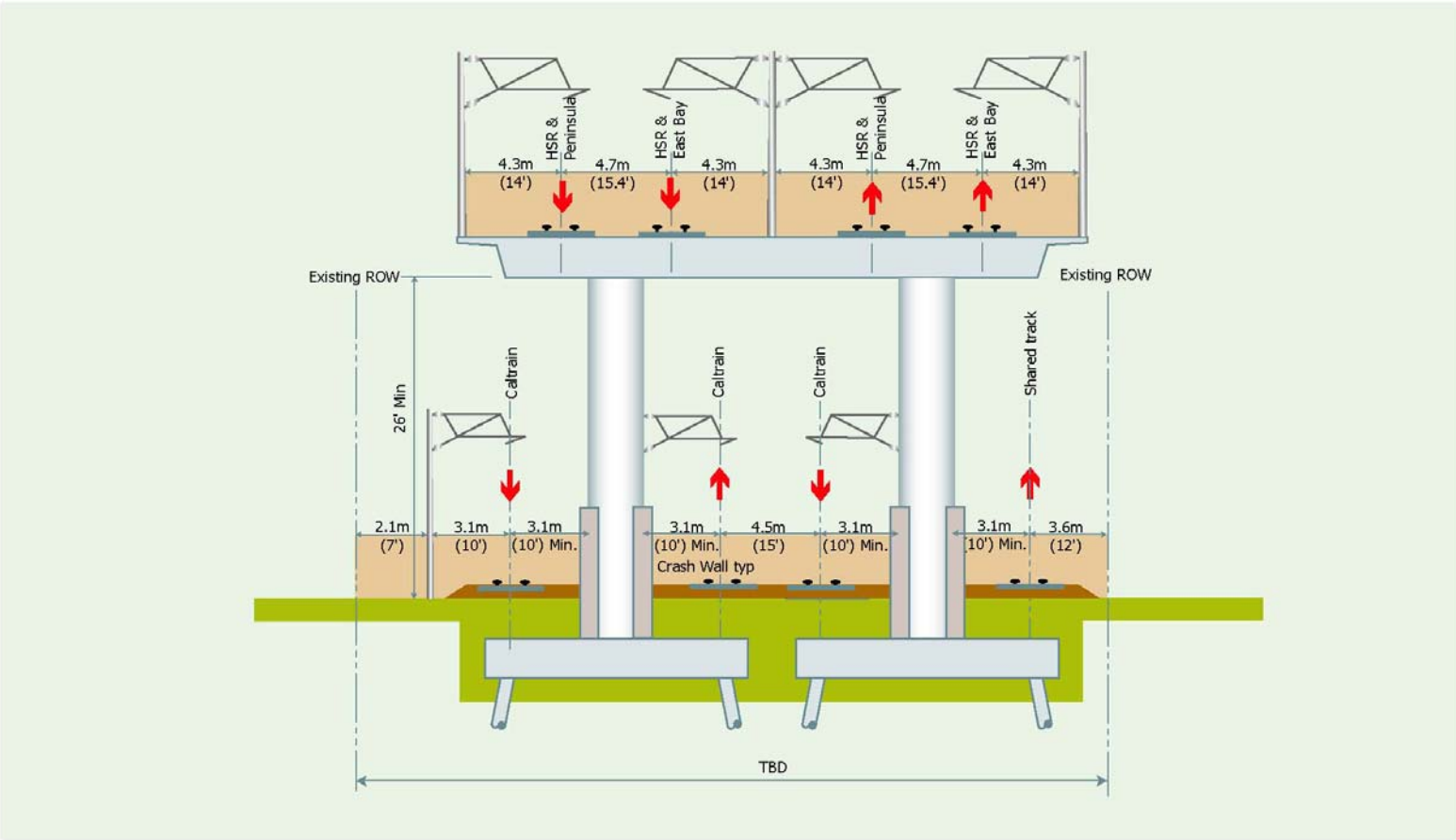
California High-Speed Train Program EIR/EIS

Figure NS-10



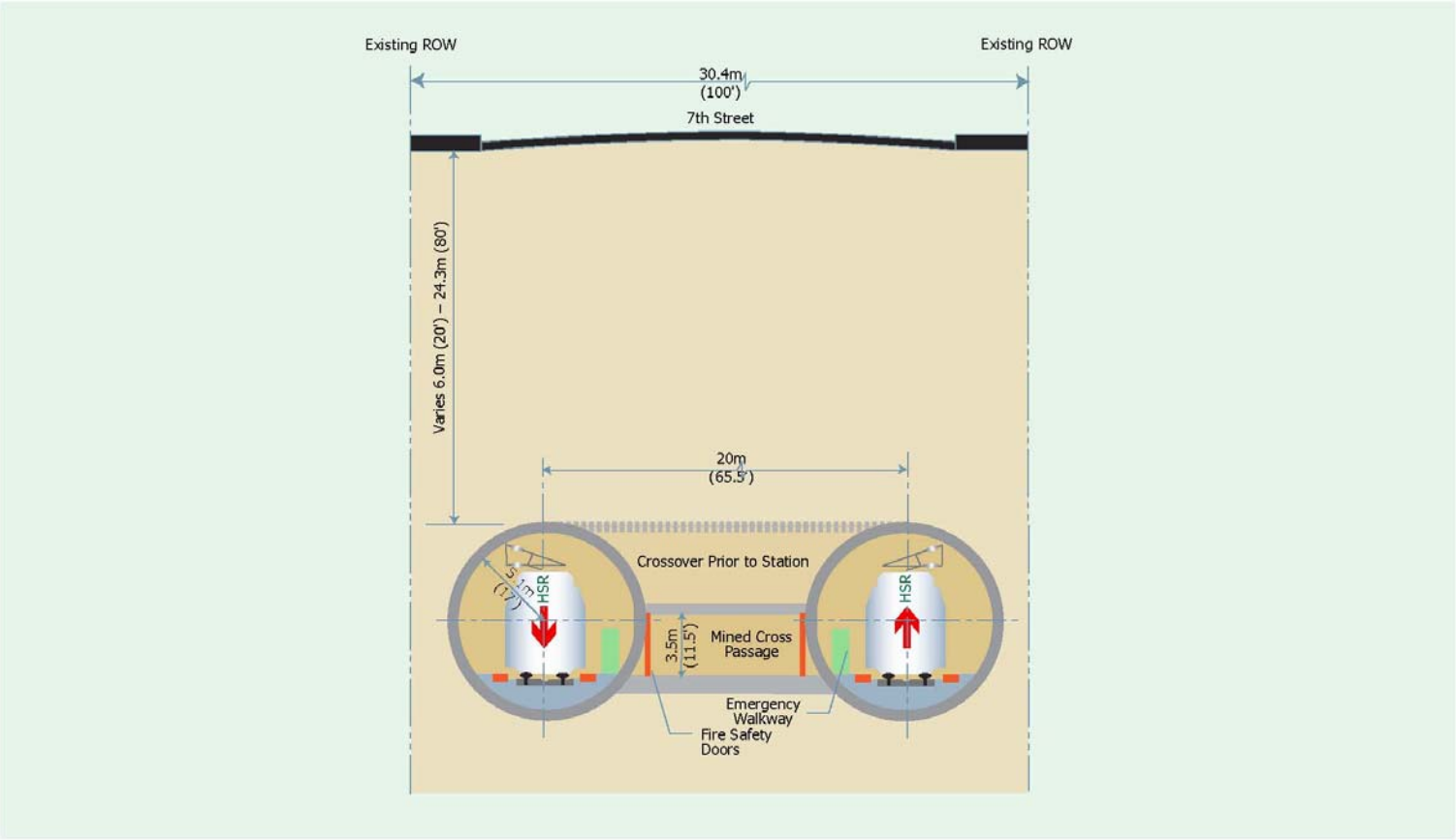
California High-Speed Train Program EIR/EIS

Figure CC-11



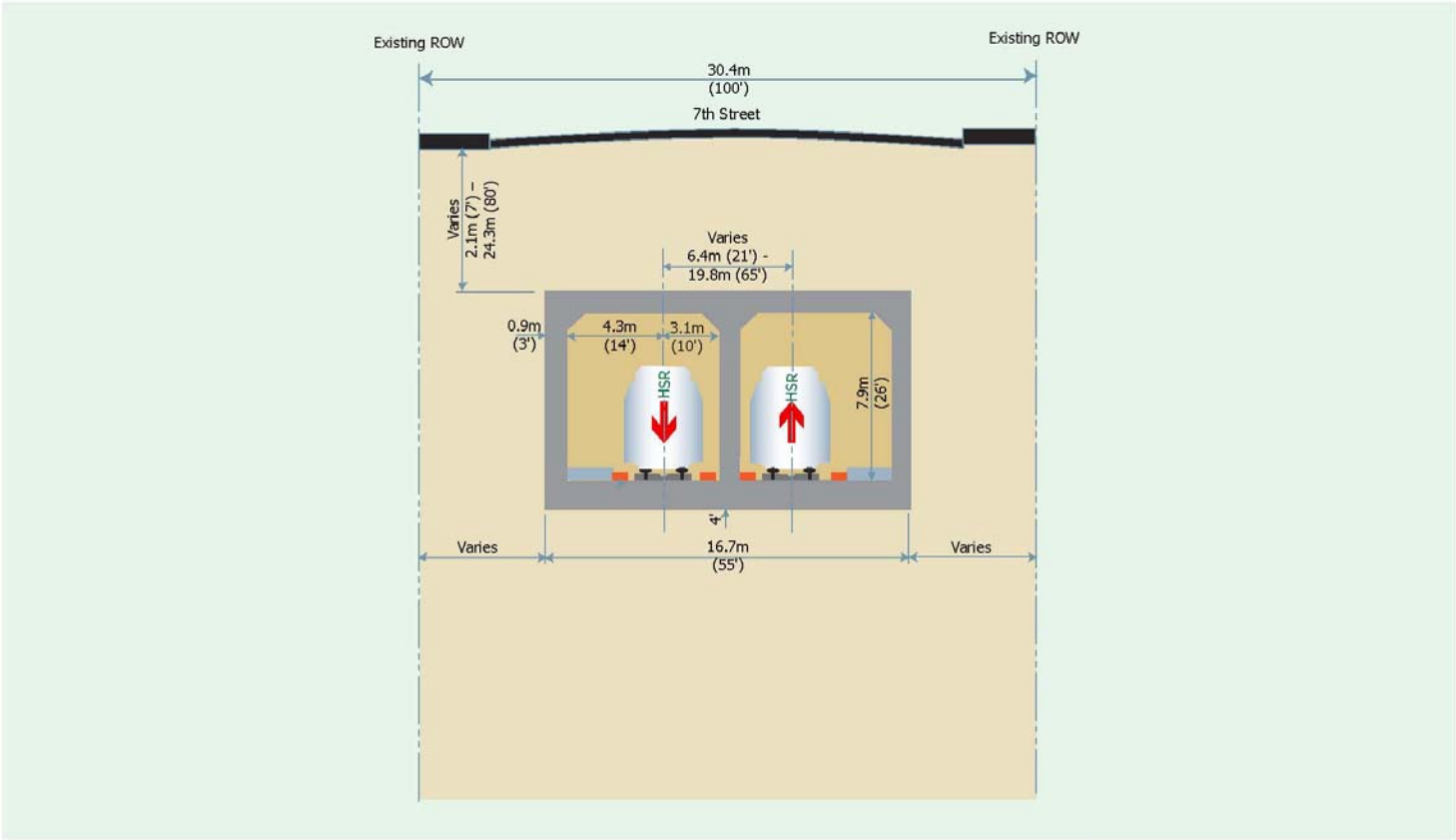
California High-Speed Train Program EIR/EIS

Figure NS-12



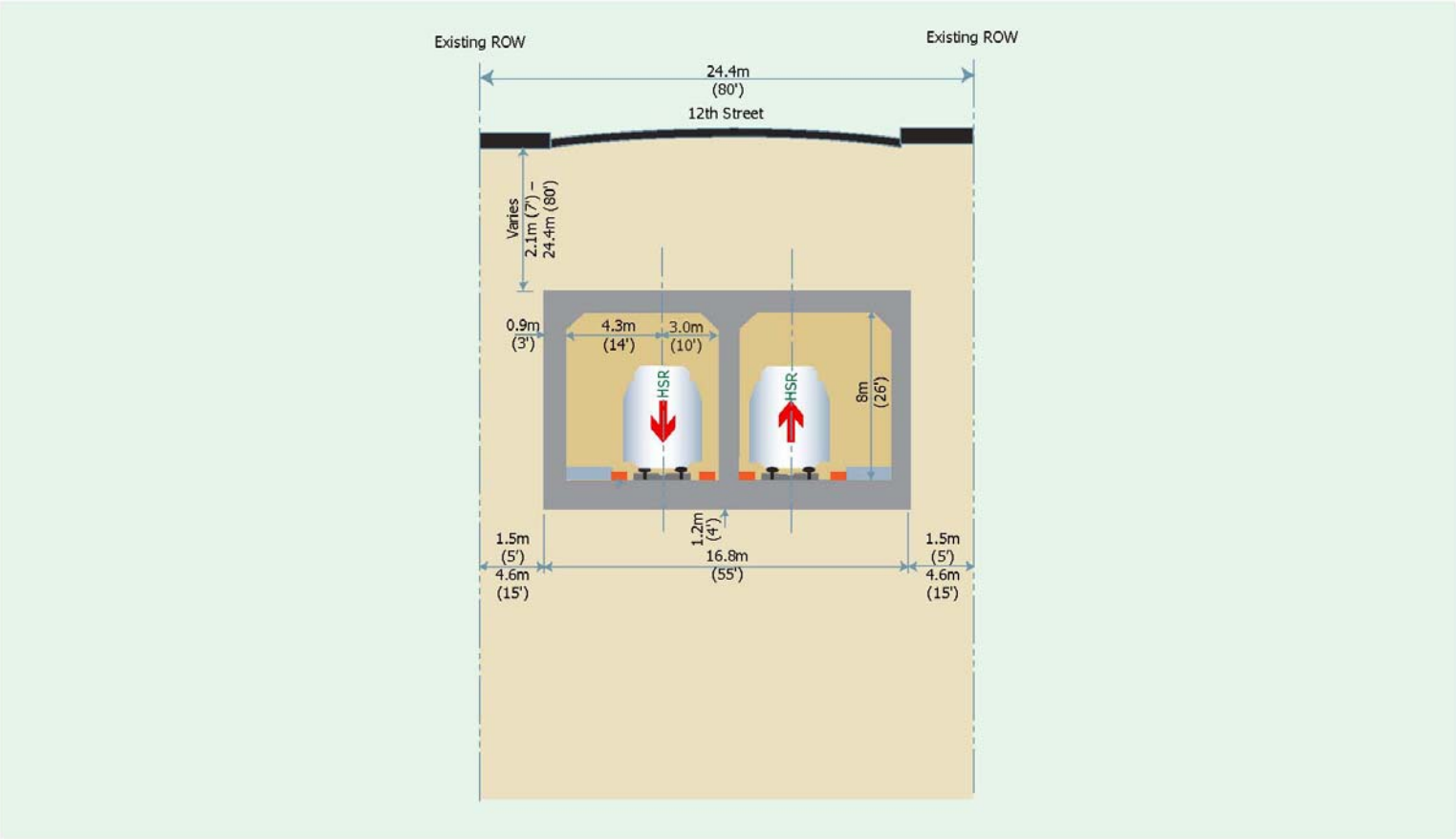
California High-Speed Train Program EIR/EIS

Figure NS-13



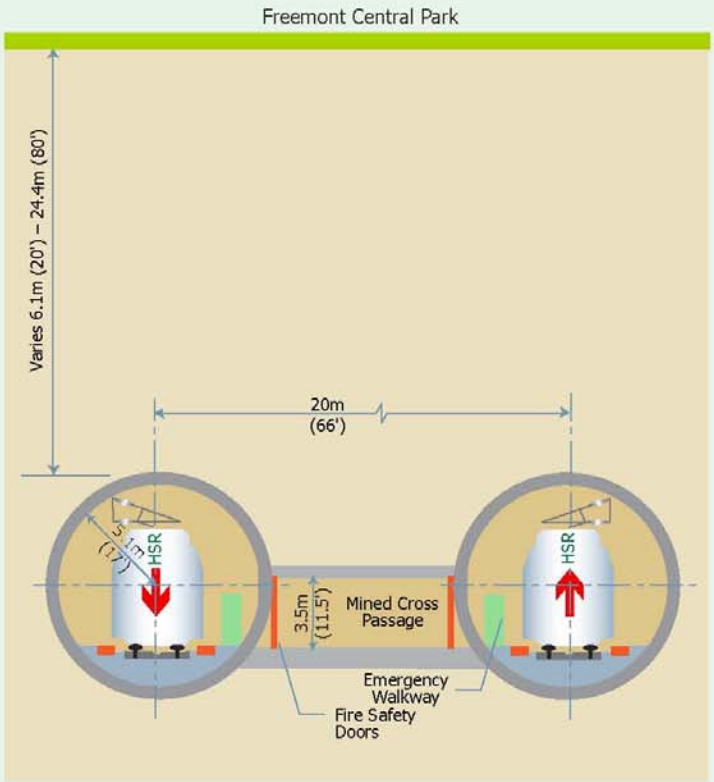
California High-Speed Train Program EIR/EIS

Figure NS-14



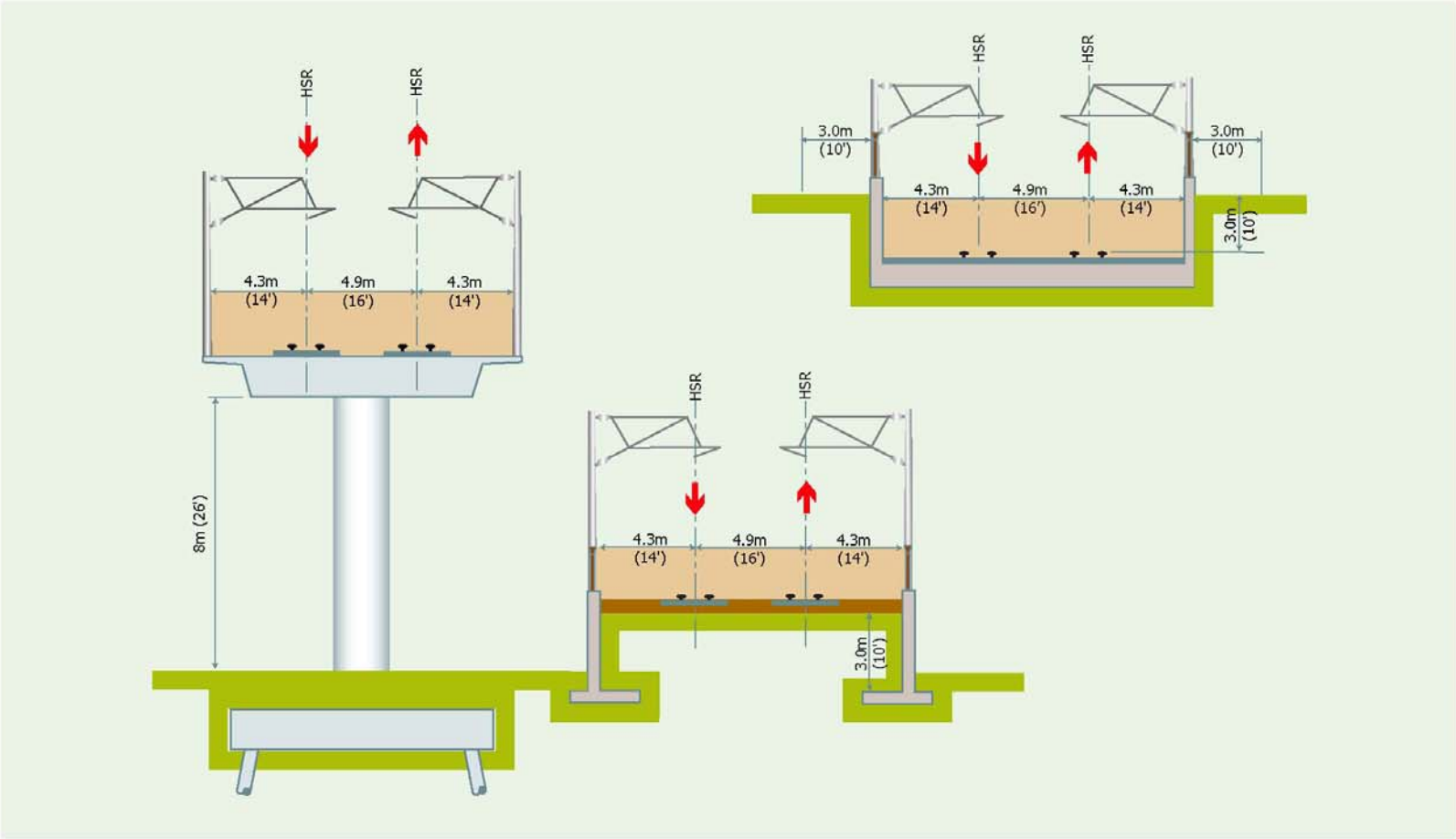
California High-Speed Train Program EIR/EIS

Figure NS-15



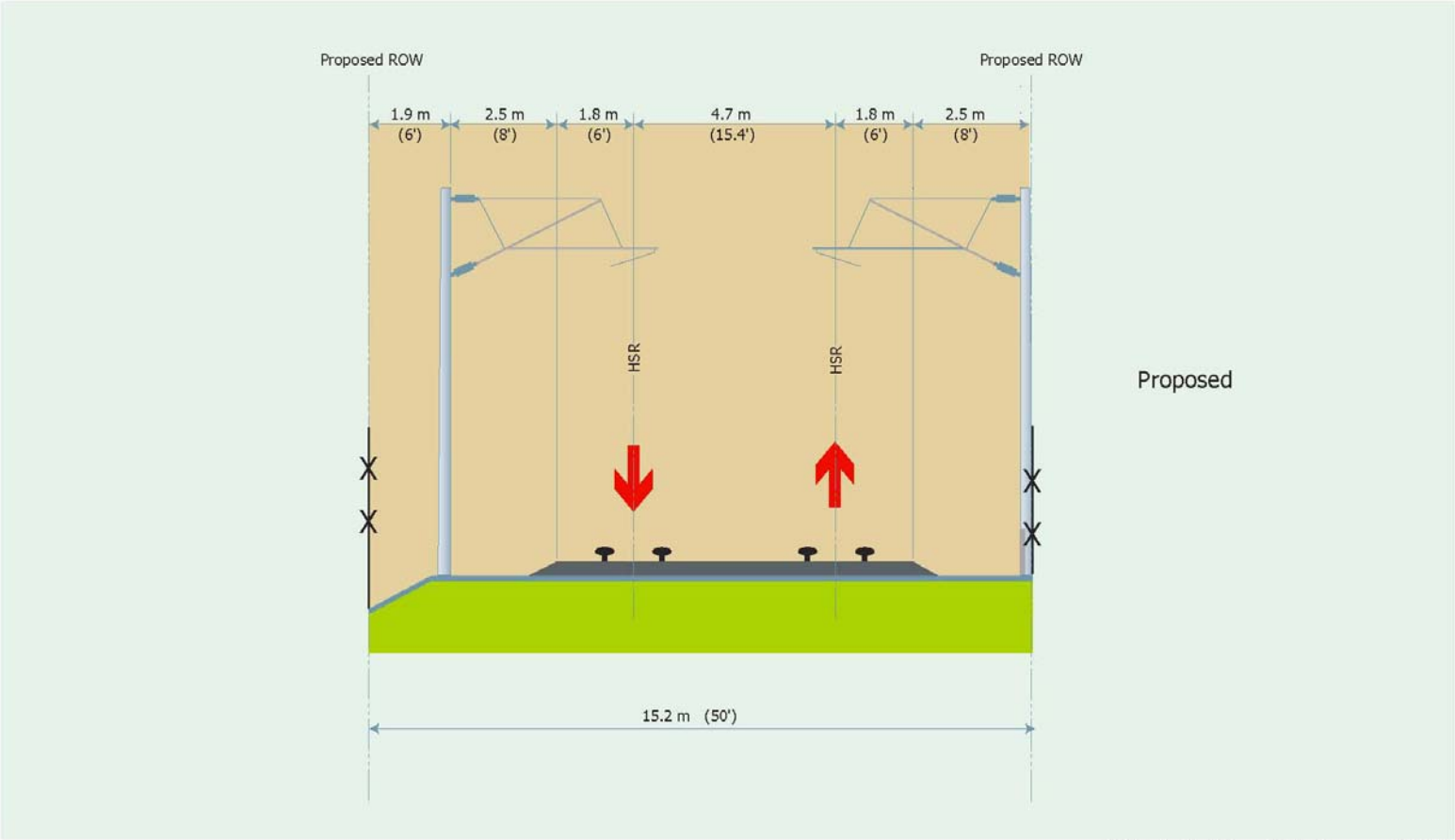
California High-Speed Train Program EIR/EIS

Figure NS-16



California High-Speed Train Program EIR/EIS

Figure NS-17



California High-Speed Train Program EIR/EIS

Figure NS-18

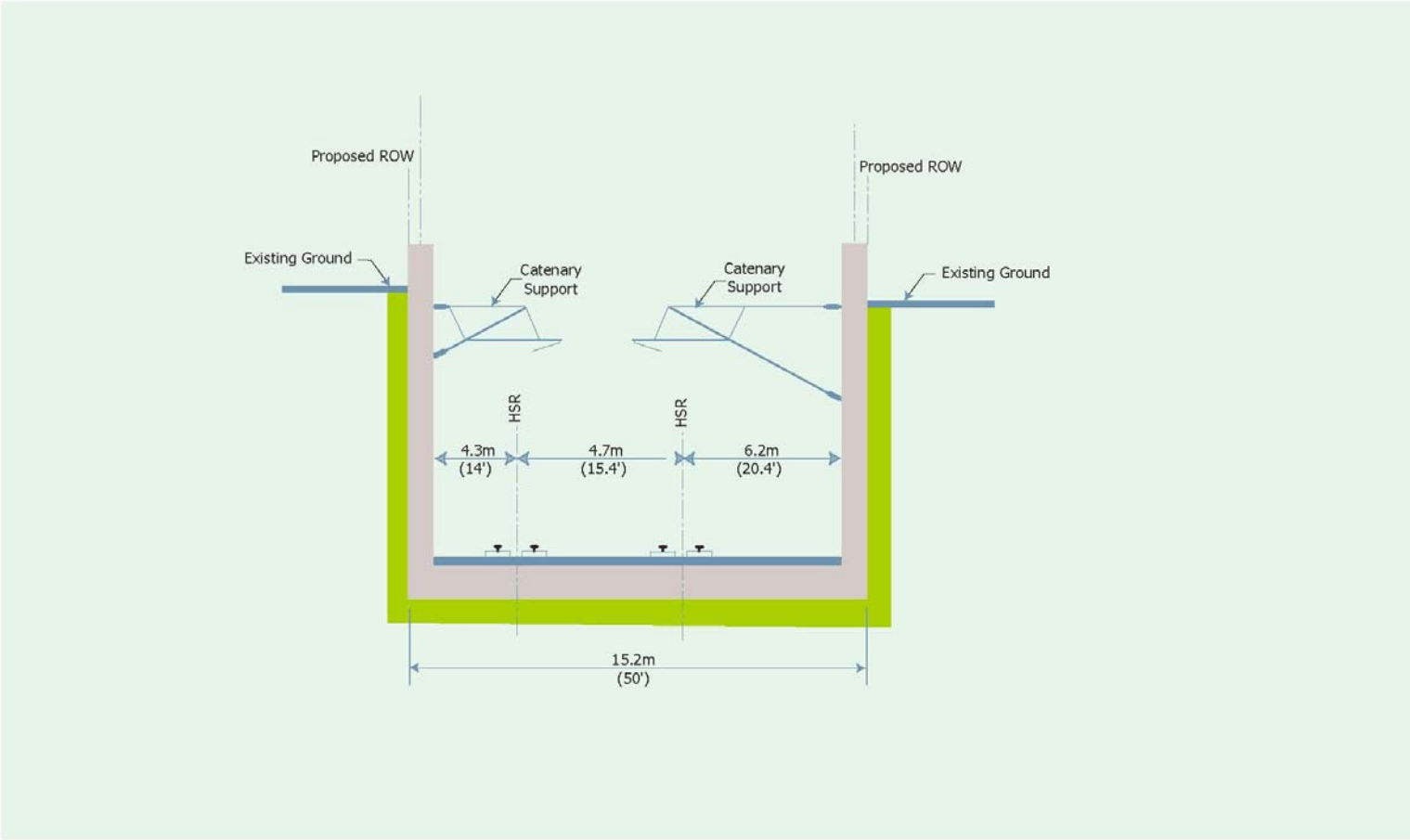
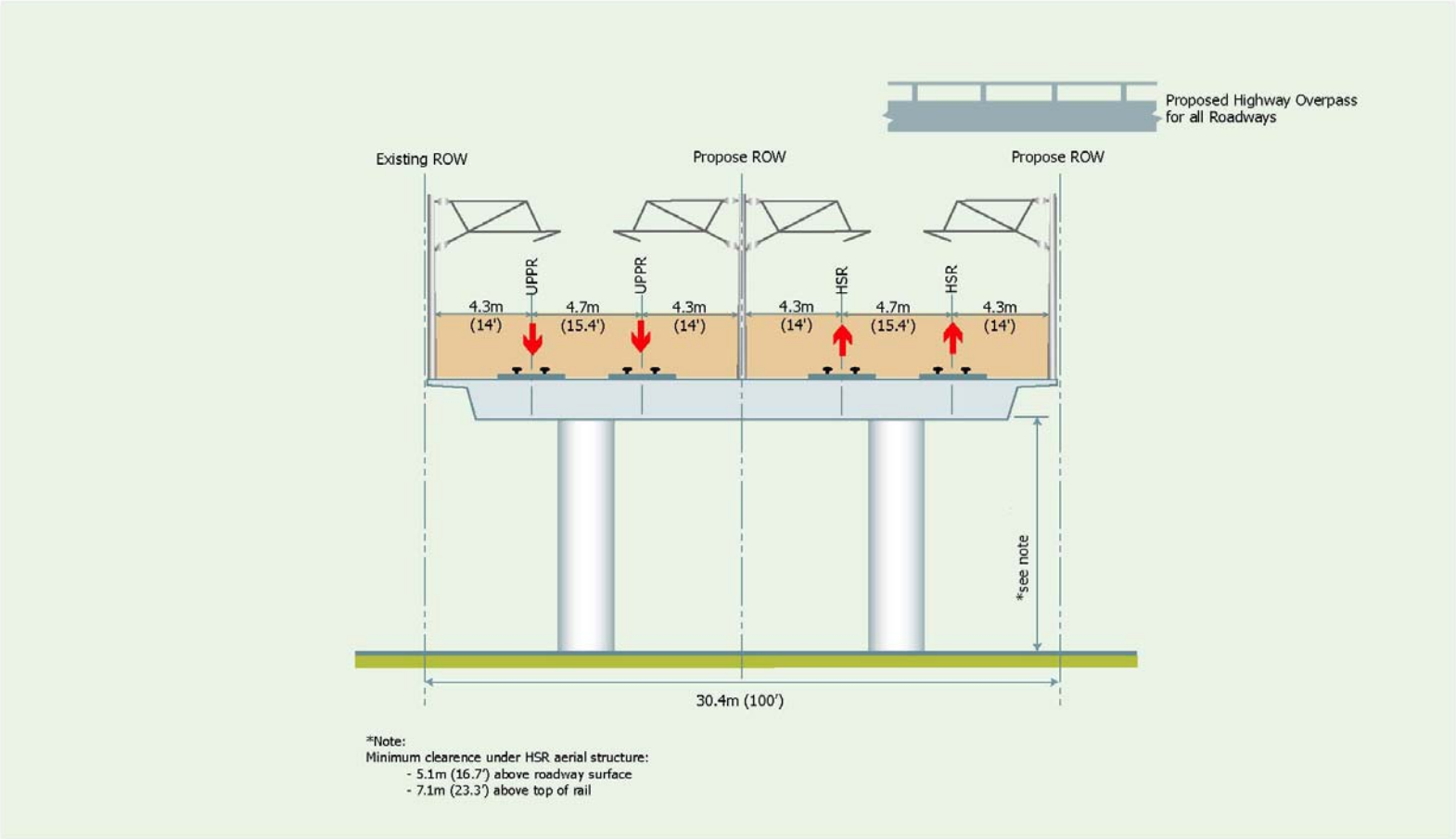
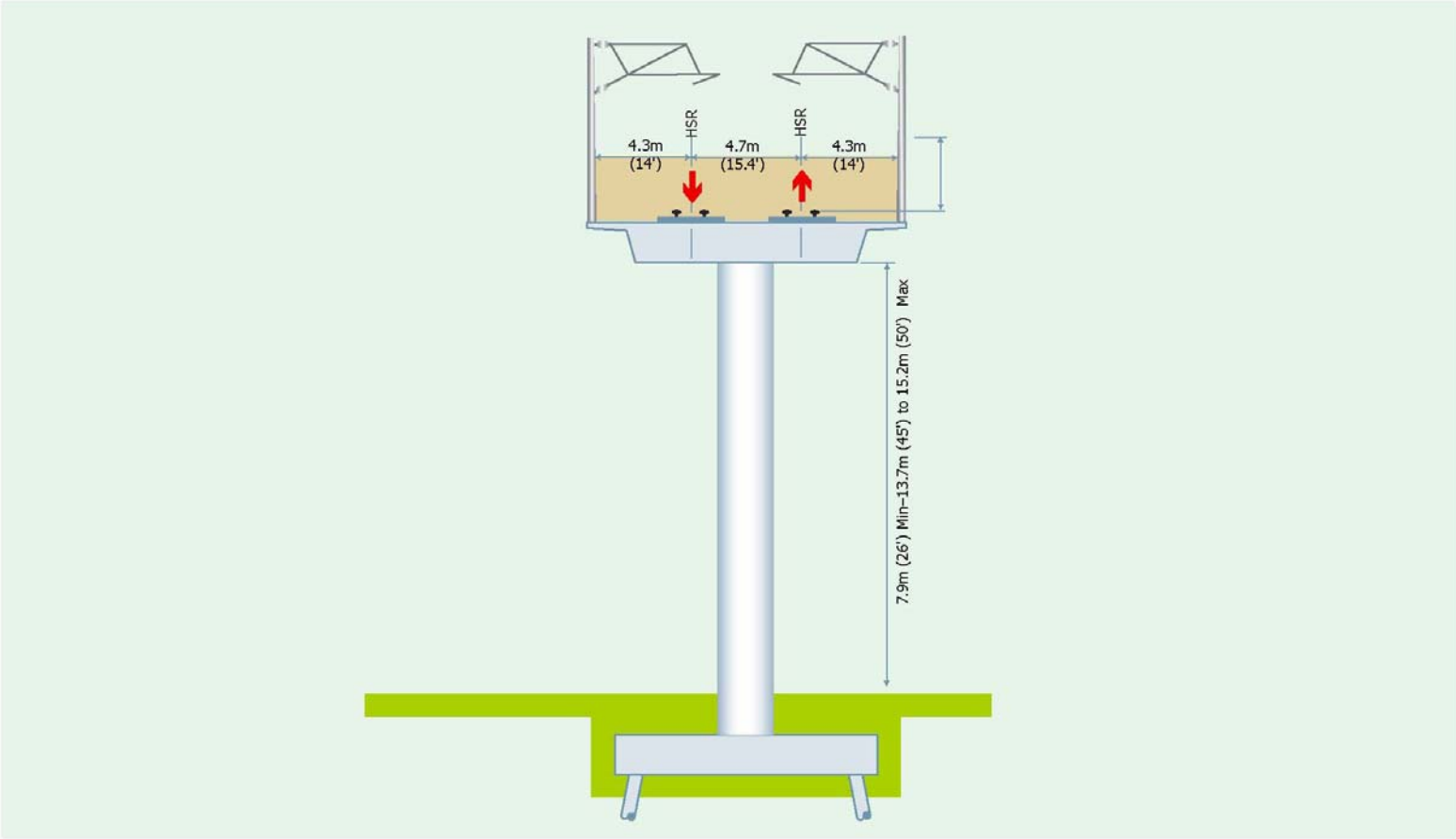

Proposed ROW
Proposed ROW
Existing Ground
Existing Ground
Catenary Support
Catenary Support
HSR
HSR
4.3m (14')
4.7m (15.4')
6.2m (20.4')
15.2m (50')

Figure NS-19



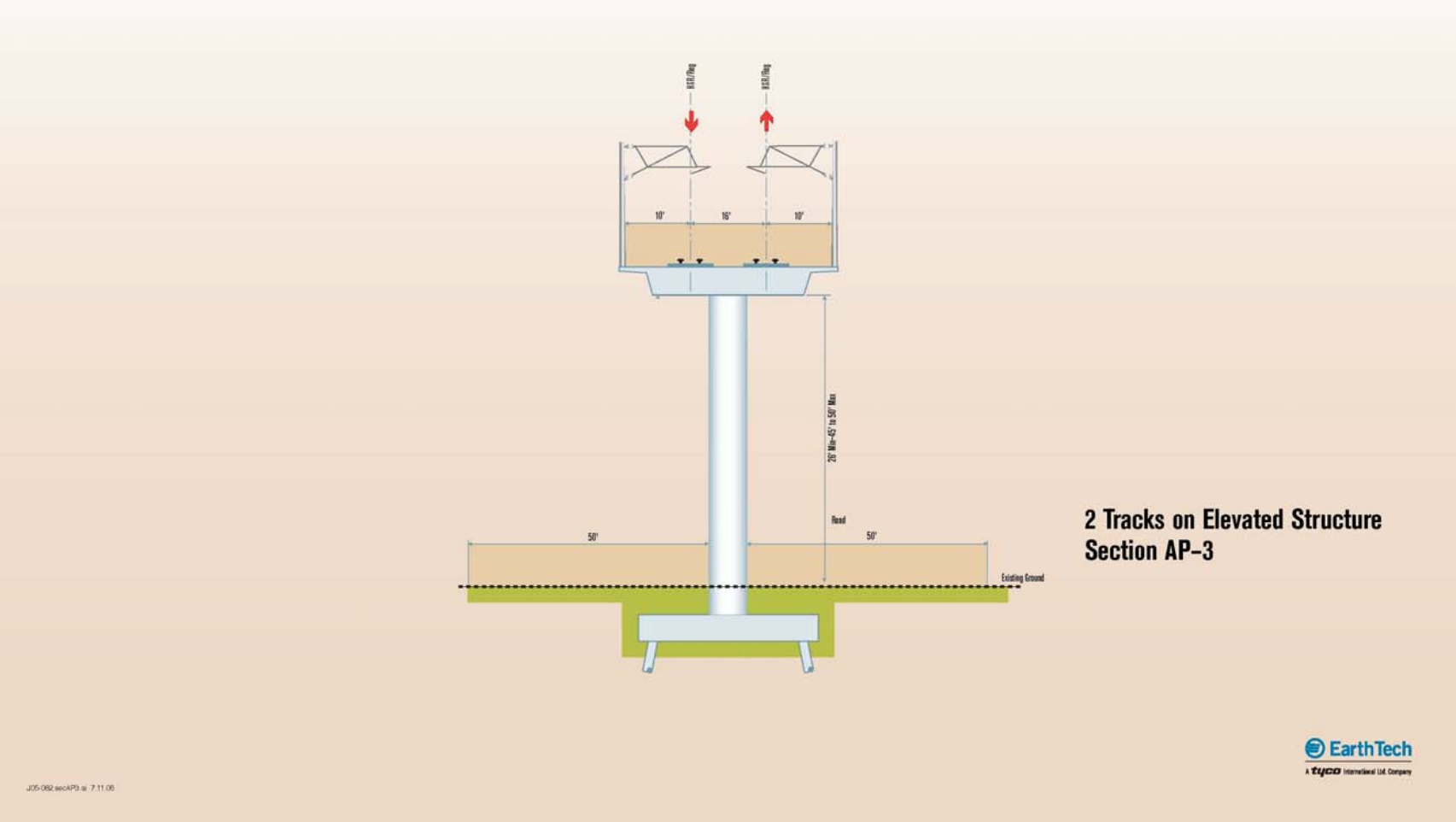
California High-Speed Train Program EIR/EIS

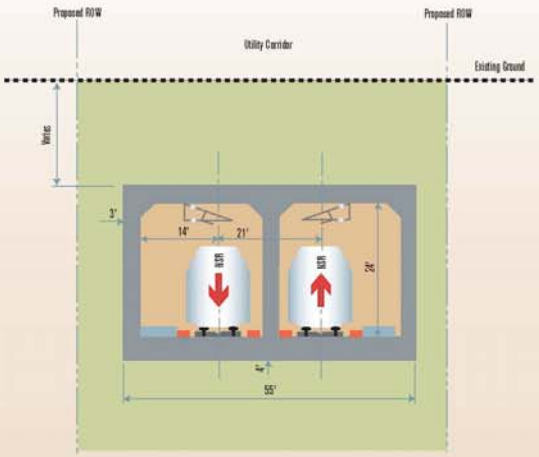
Figure NS-20



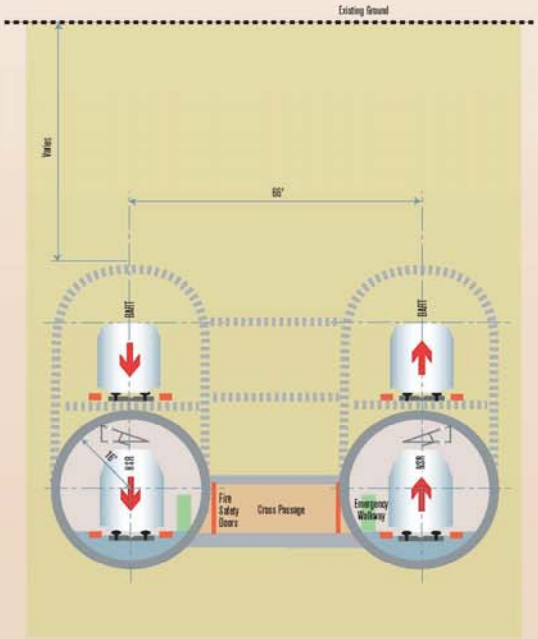
California High-Speed Train Program EIR/EIS

Figure NS-21


10'
16'
10'
50'
50'
Existing Ground
2 Tracks on Elevated Structure
Section AP-3
EarthTech

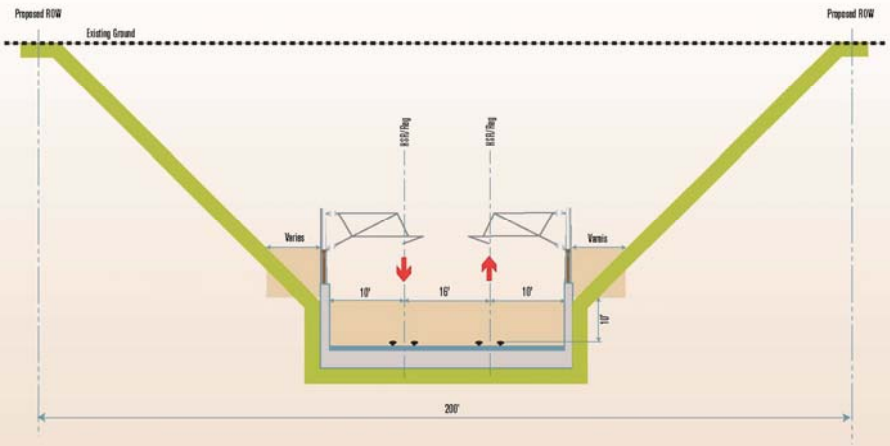


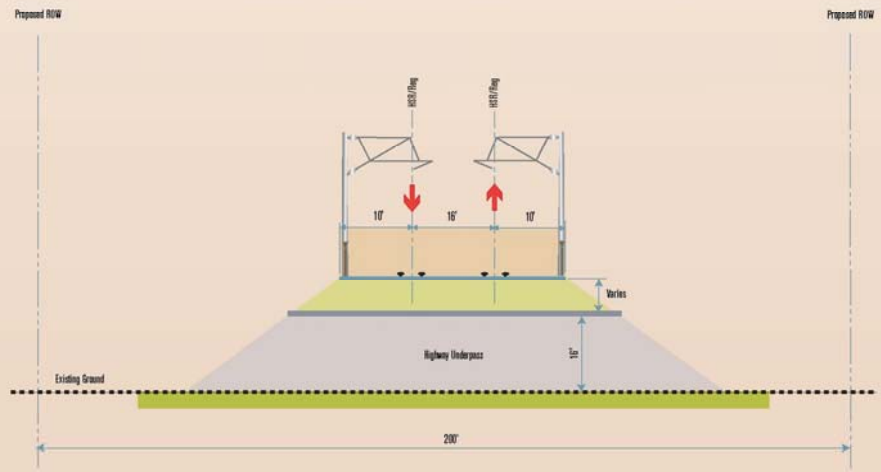
2 Tracks Cut and Cover
Section AP-4



2 Tracks Drilled Tunnel or
Under Water Tube
Section AP-5
4 Tracks Optional

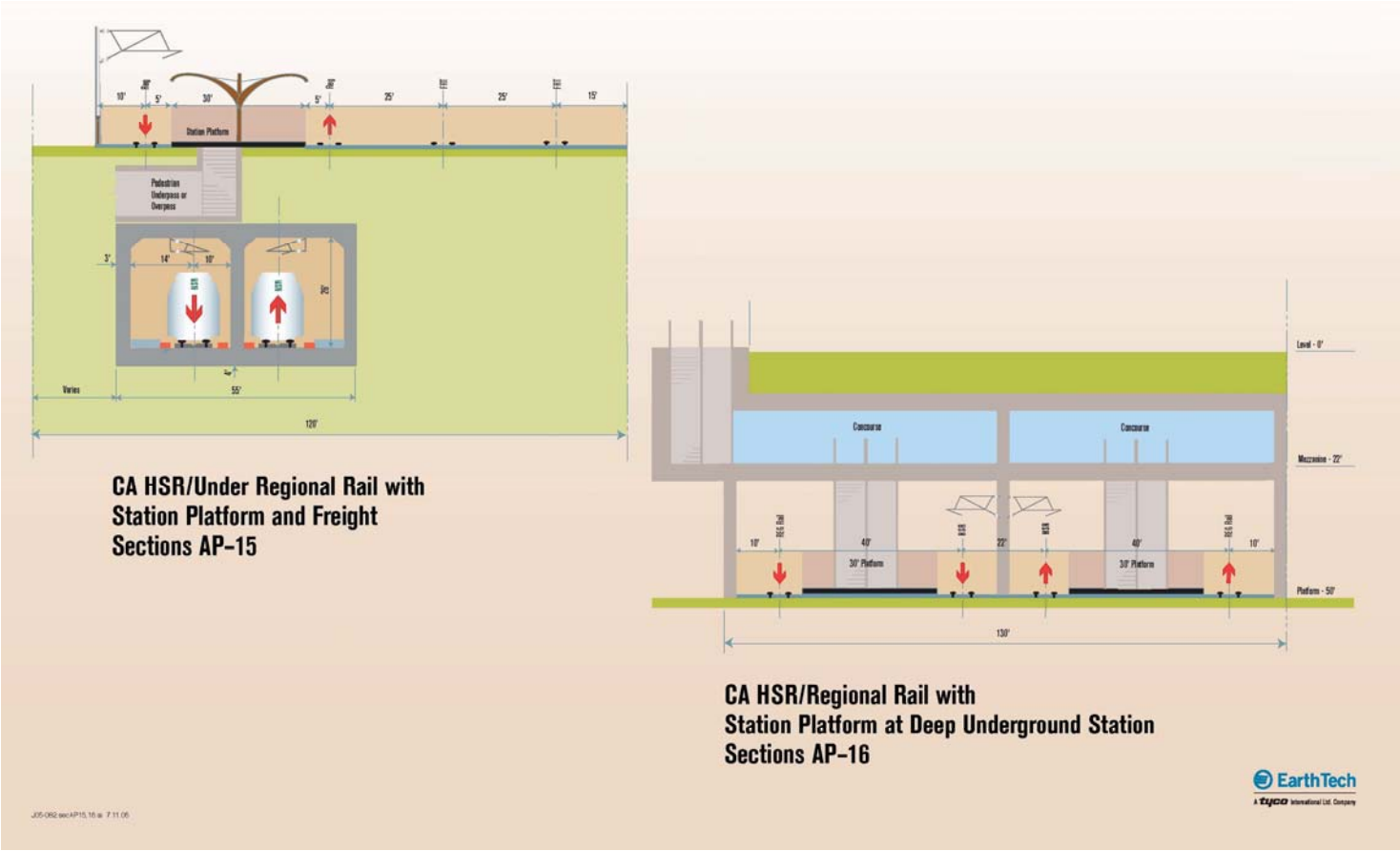
EarthTech
A Tyco International Ltd. Company

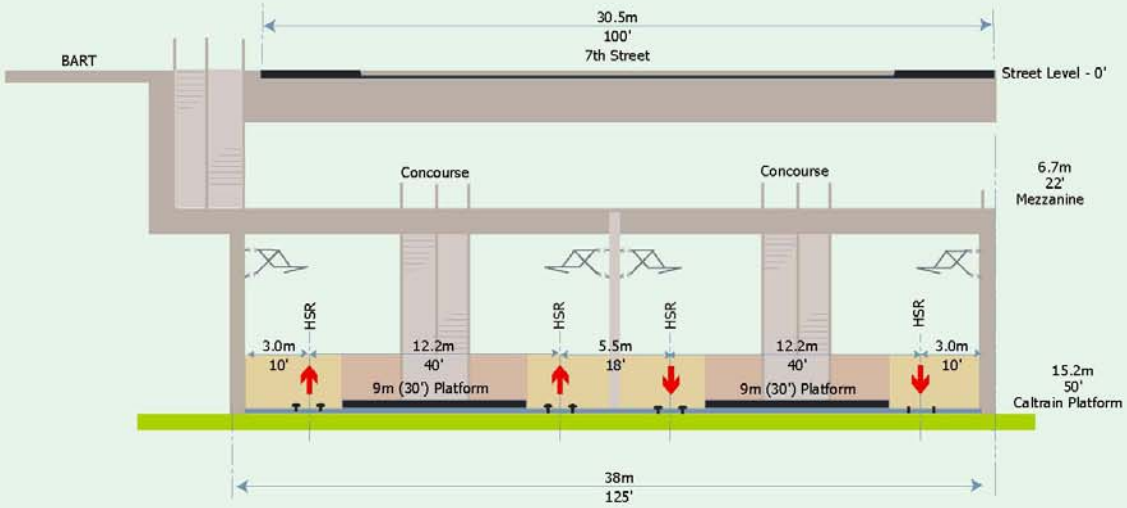




2 Tracks on Balanced Earth Work (Retained Cut or Embankment) Sections AP–9

EarthTech
A tyco International Ltd. Company


CA HSR/Under Regional Rail with
Station Platform and Freight
Sections AP-15
CA HSR/Regional Rail with
Station Platform at Deep Underground Station
Sections AP-16
EarthTech



California High-Speed Train Program EIR/EIS

Figure NS-S1

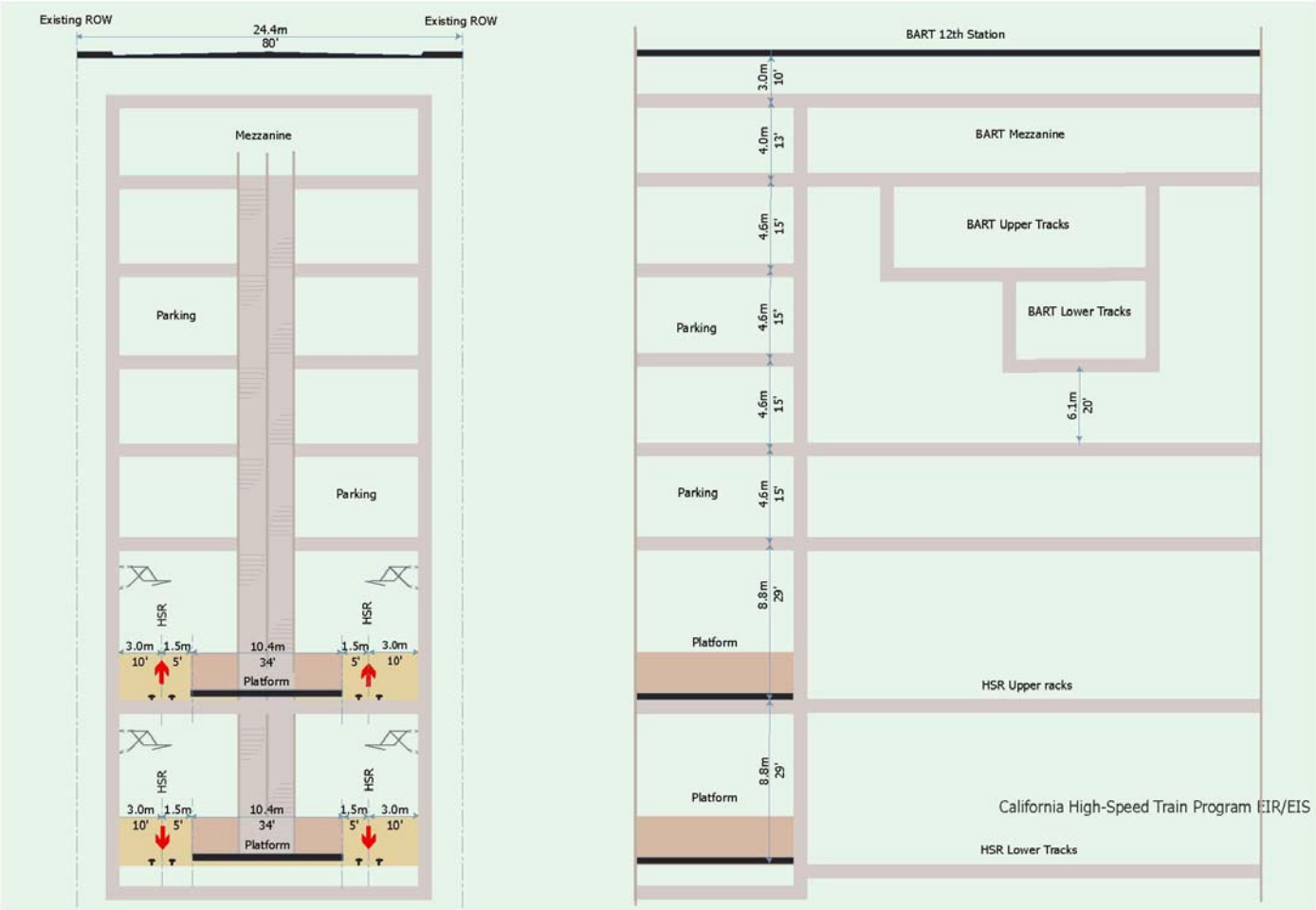
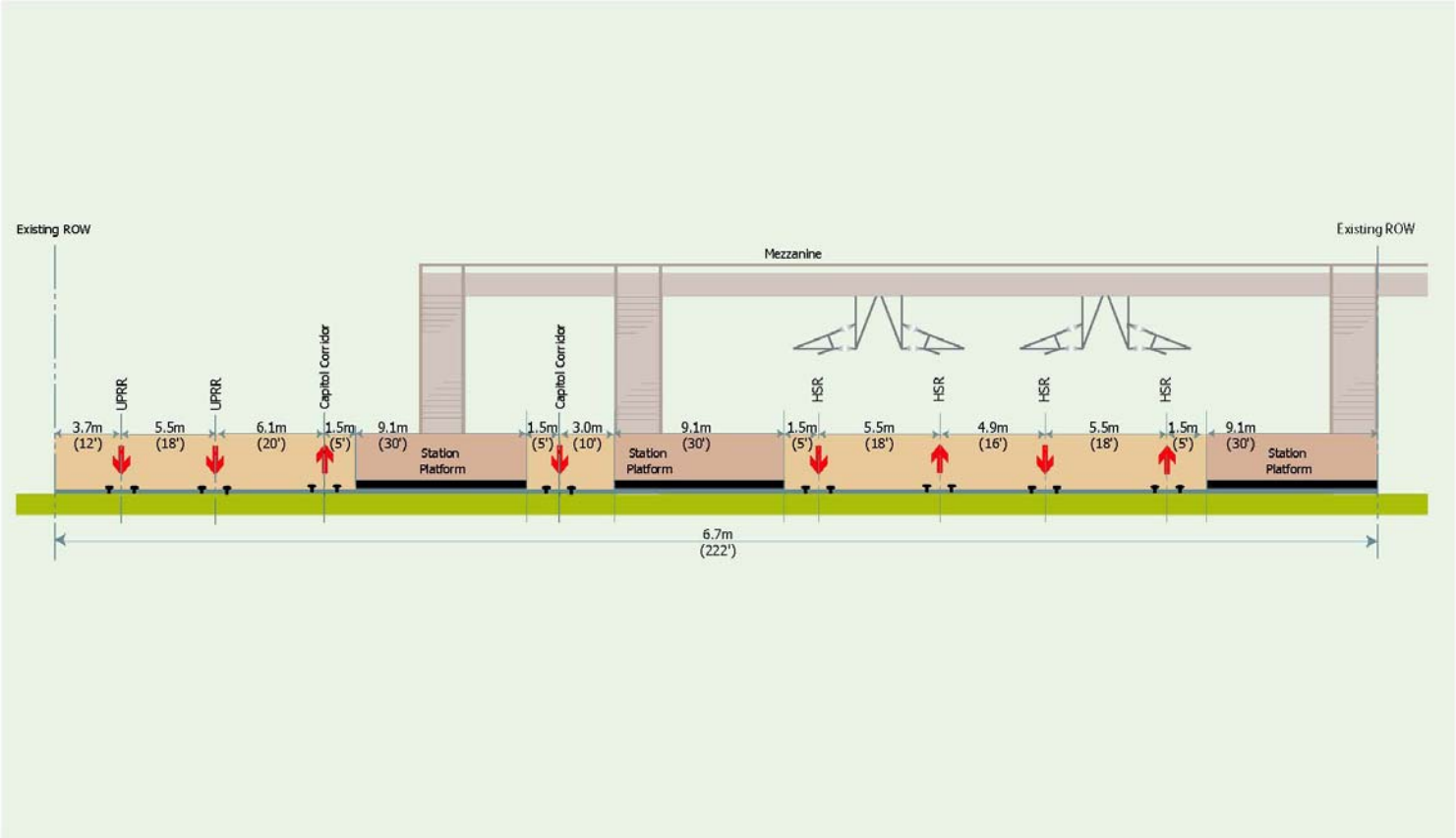
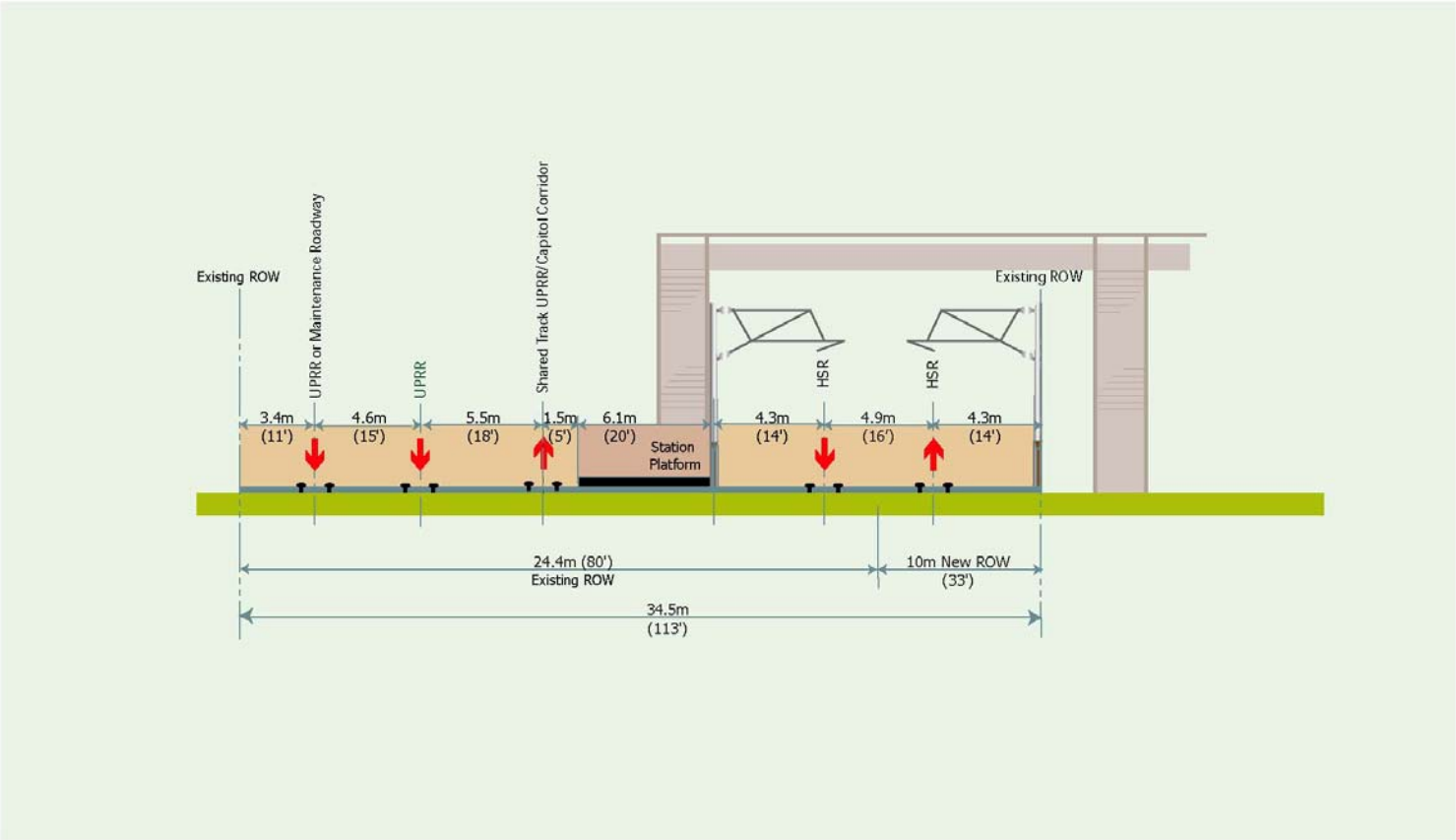

Existing ROW
24.4m
80'
Existing ROW
Mezzanine
Parking
Parking
HSR
HSR
3.0m
10'
1.5m
5'
10.4m
34'
Platform
1.5m
5'
3.0m
10'
HSR
HSR
3.0m
10'
1.5m
5'
10.4m
34'
Platform
1.5m
5'
3.0m
10'
BART 12th Station
3.0m
10'
4.0m
13'
BART Mezzanine
4.6m
15'
BART Upper Tracks
Parking
4.6m
15'
BART Lower Tracks
4.6m
15'
6.1m
20'
Parking
4.6m
15'
8.8m
29'
Platform
HSR Upper racks
8.8m
29'
Platform
California High-Speed Train Program EIR/EIS
HSR Lower Tracks
California High-Speed Train Program EIR/EIS

Figure NS-S2



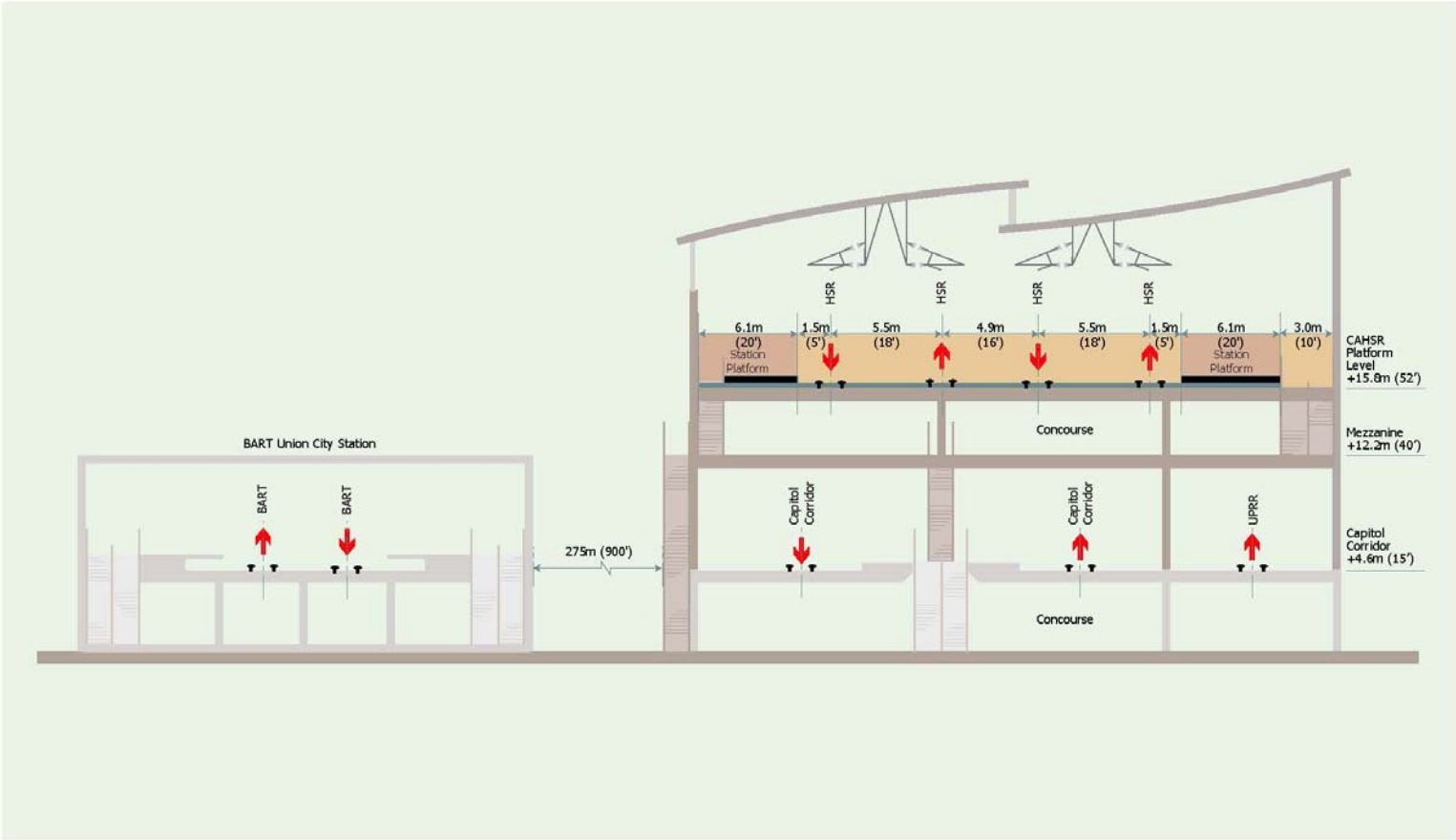
California High-Speed Train Program EIR/EIS

Figure NS-S3



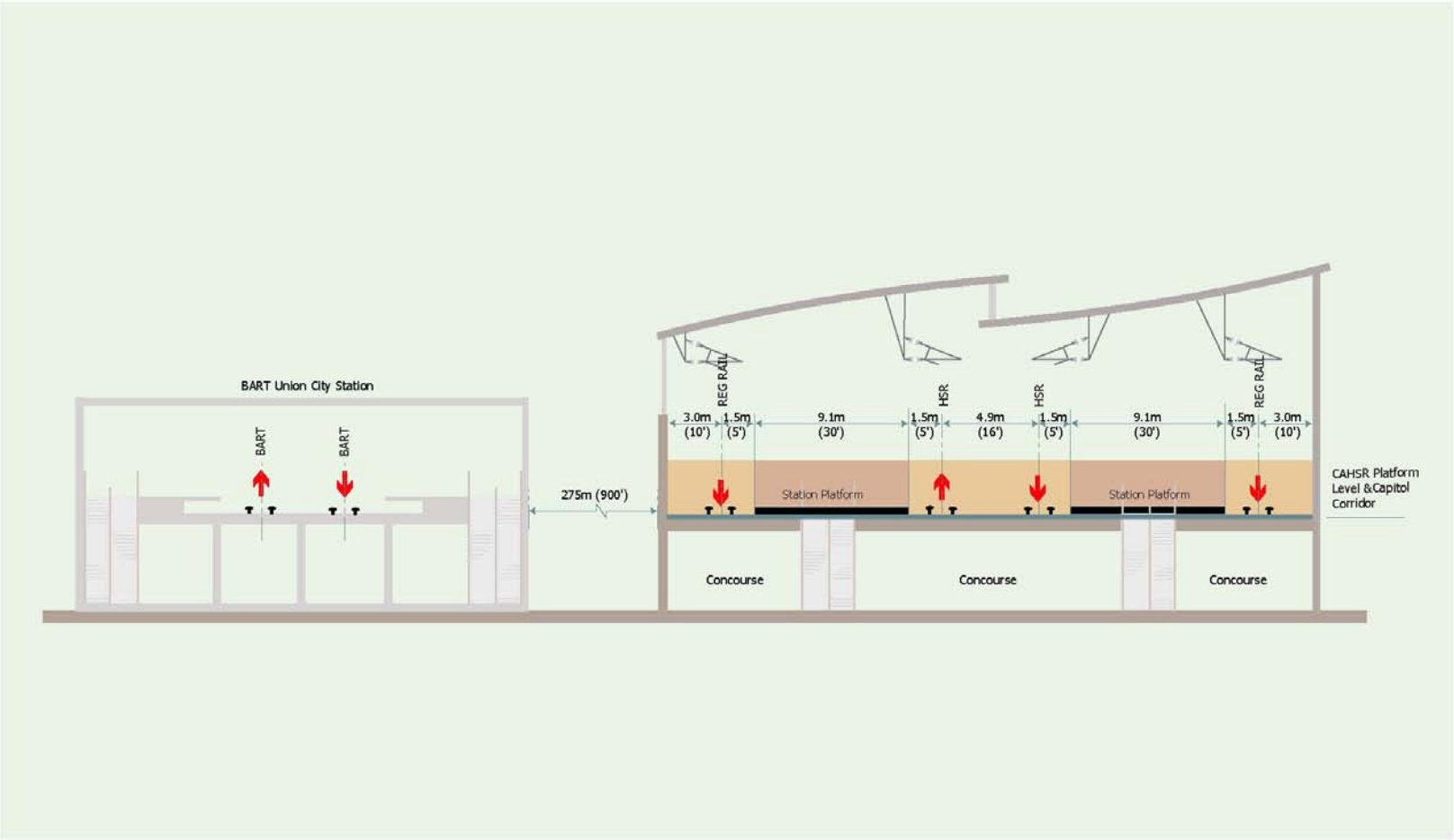
California High-Speed Train Program EIR/EIS

Figure NS-S4



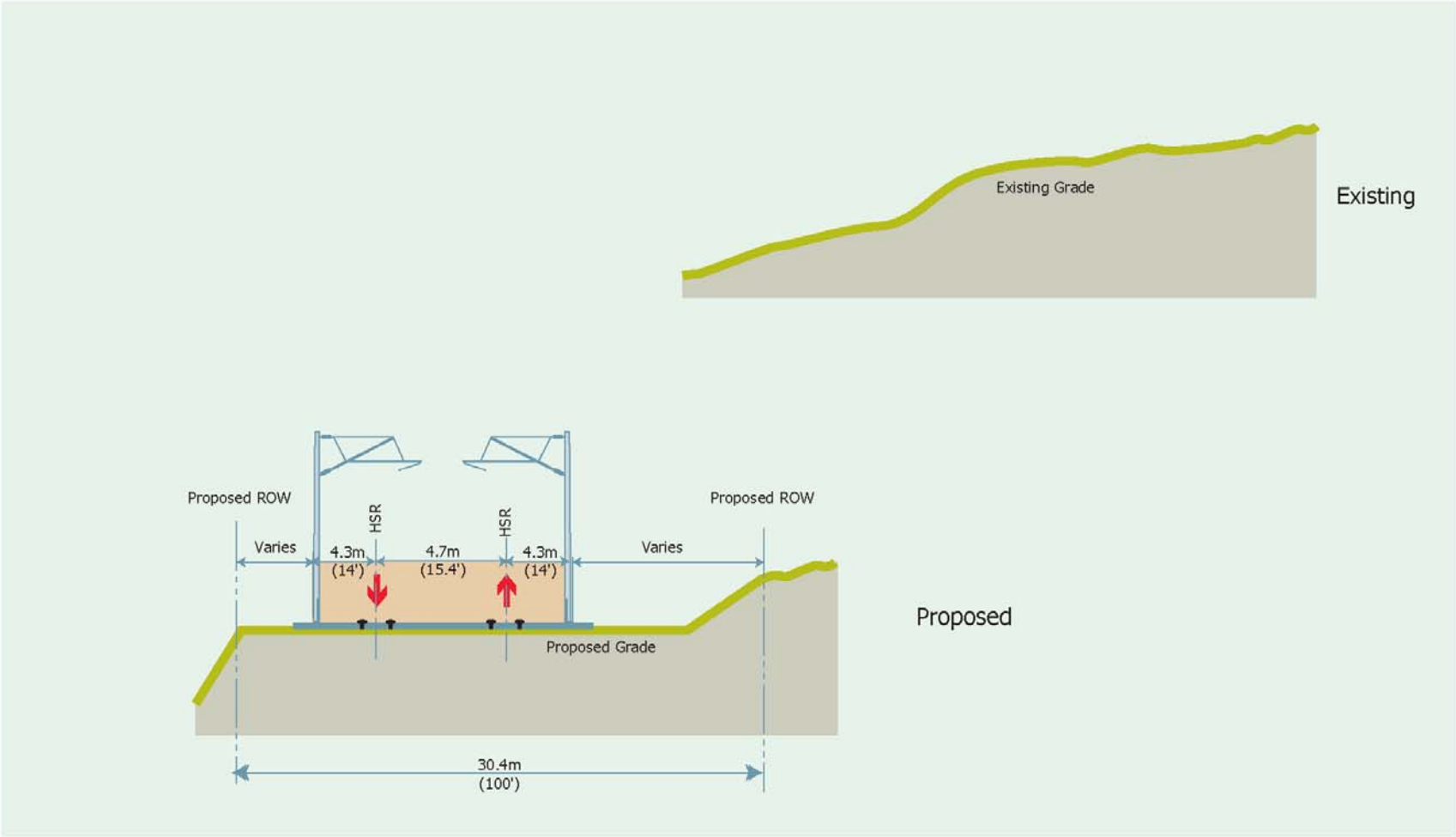
California High-Speed Train Program EIR/EIS

Figure NS-S5



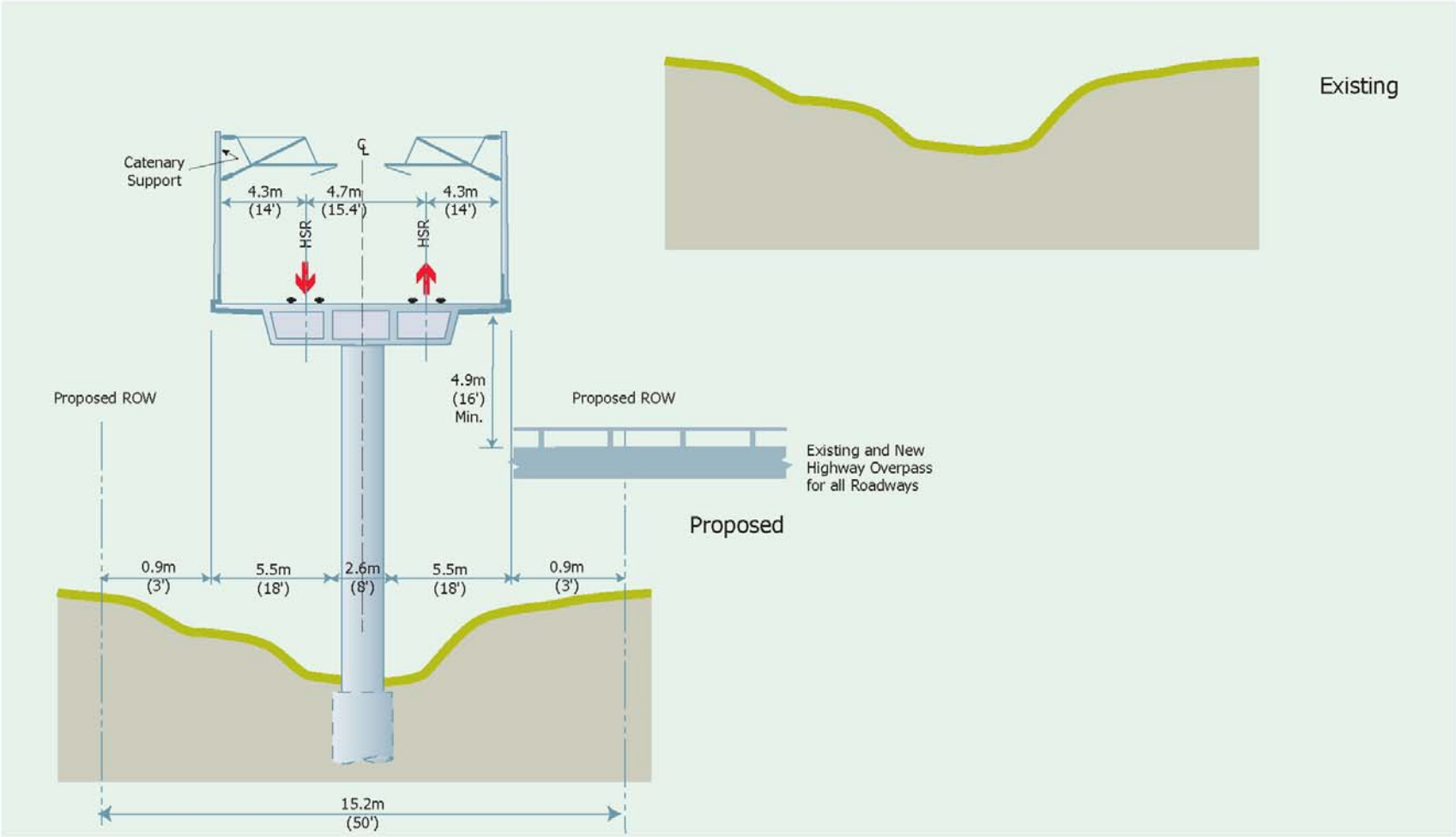
California High-Speed Train Program EIR/EIS

Figure NS-S5.1



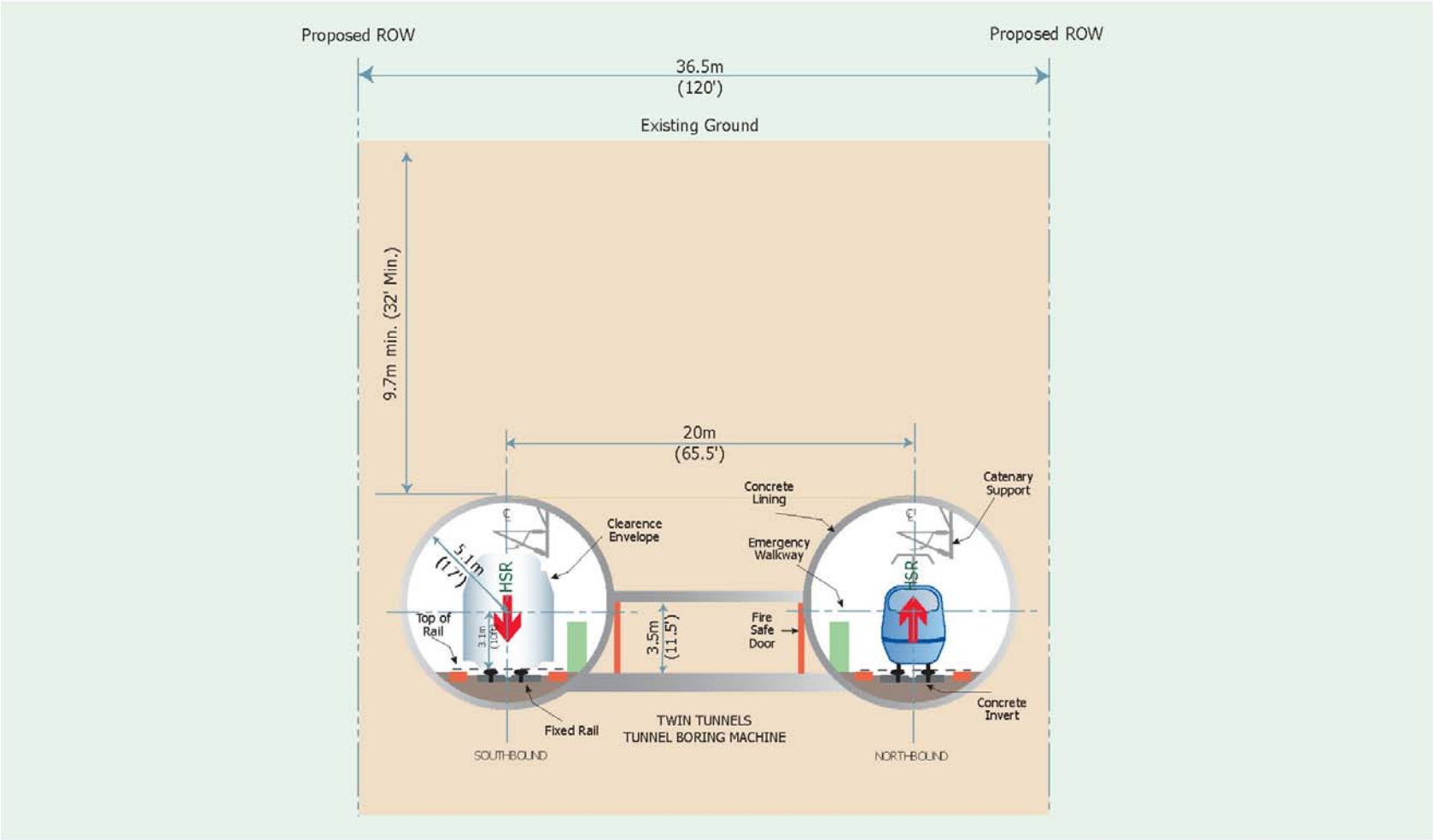
California High-Speed Train Program EIR/EIS

Figure PP-1



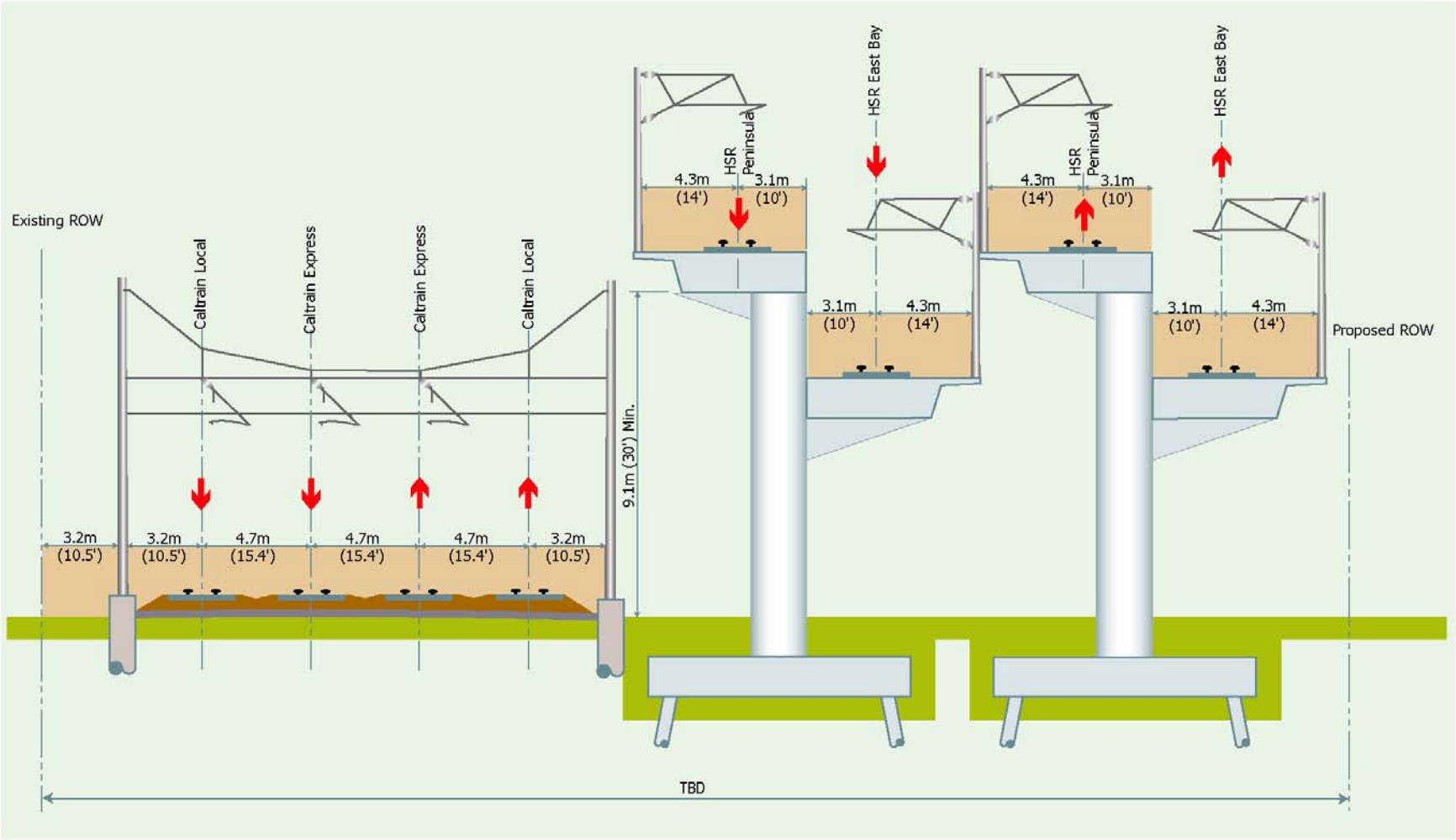
California High-Speed Train Program EIR/EIS

Figure PP-2



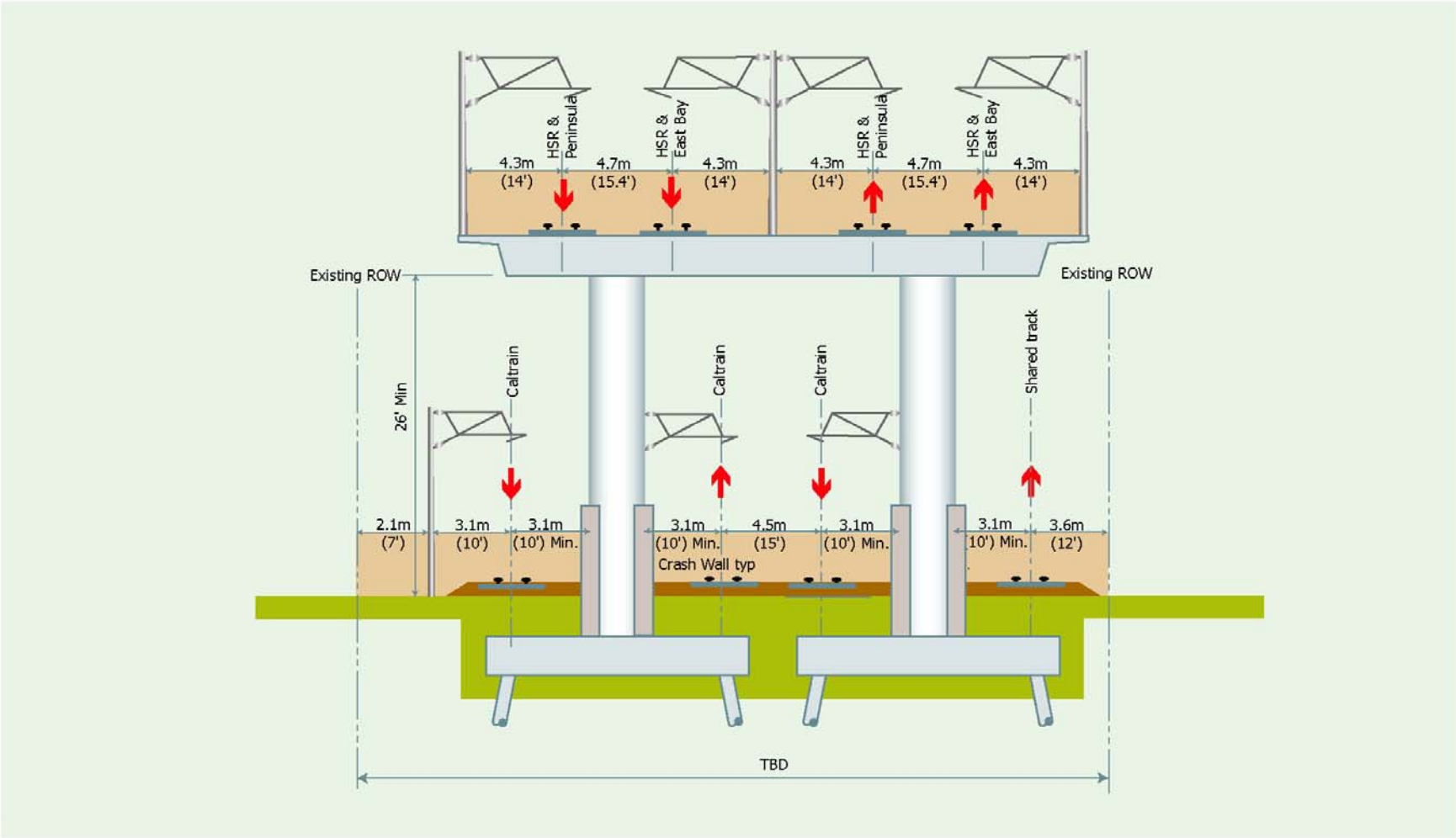
California High-Speed Train Program EIR/EIS

Figure PP-3



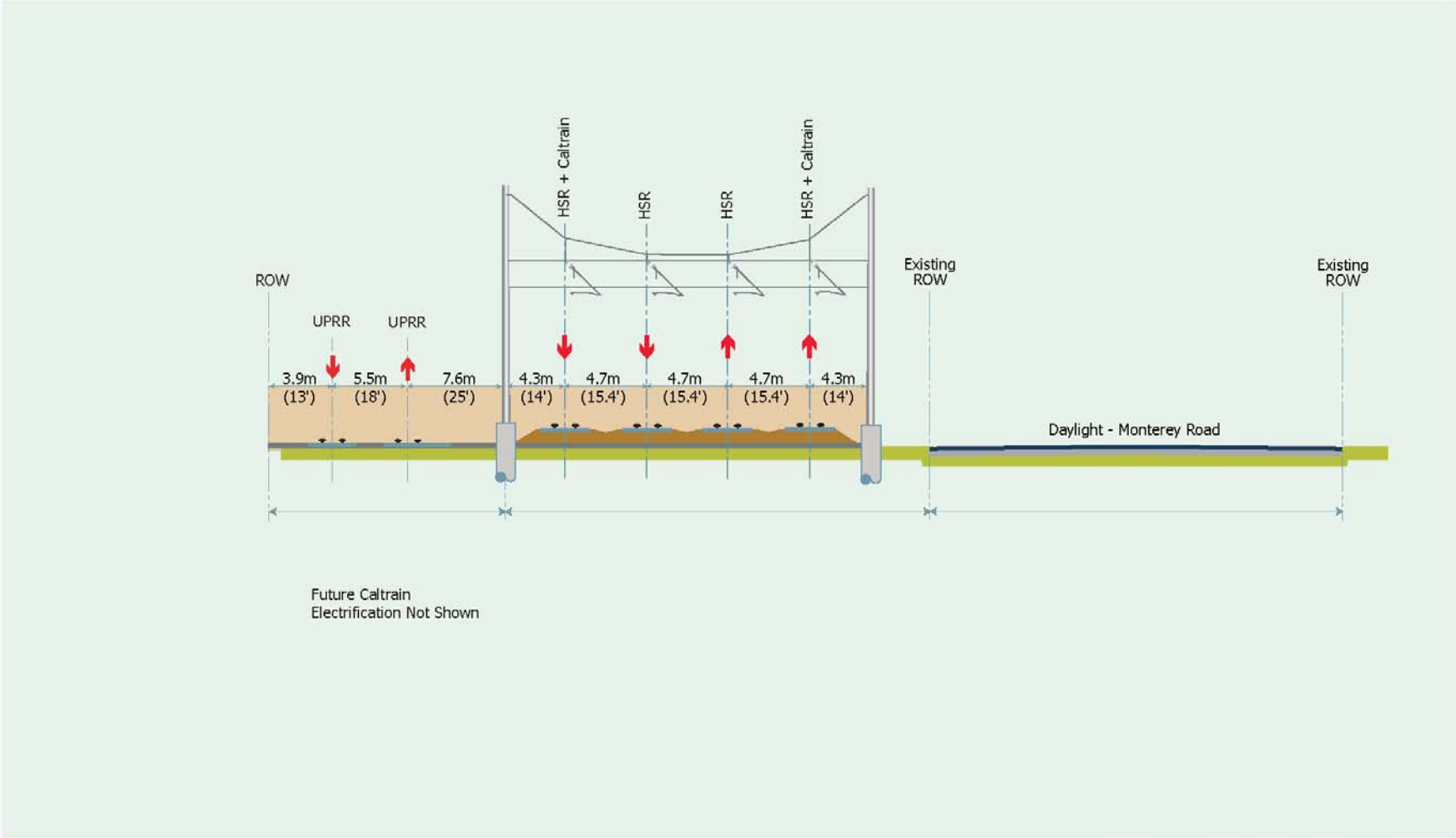
California High-Speed Train Program EIR/EIS

Figure PP-4



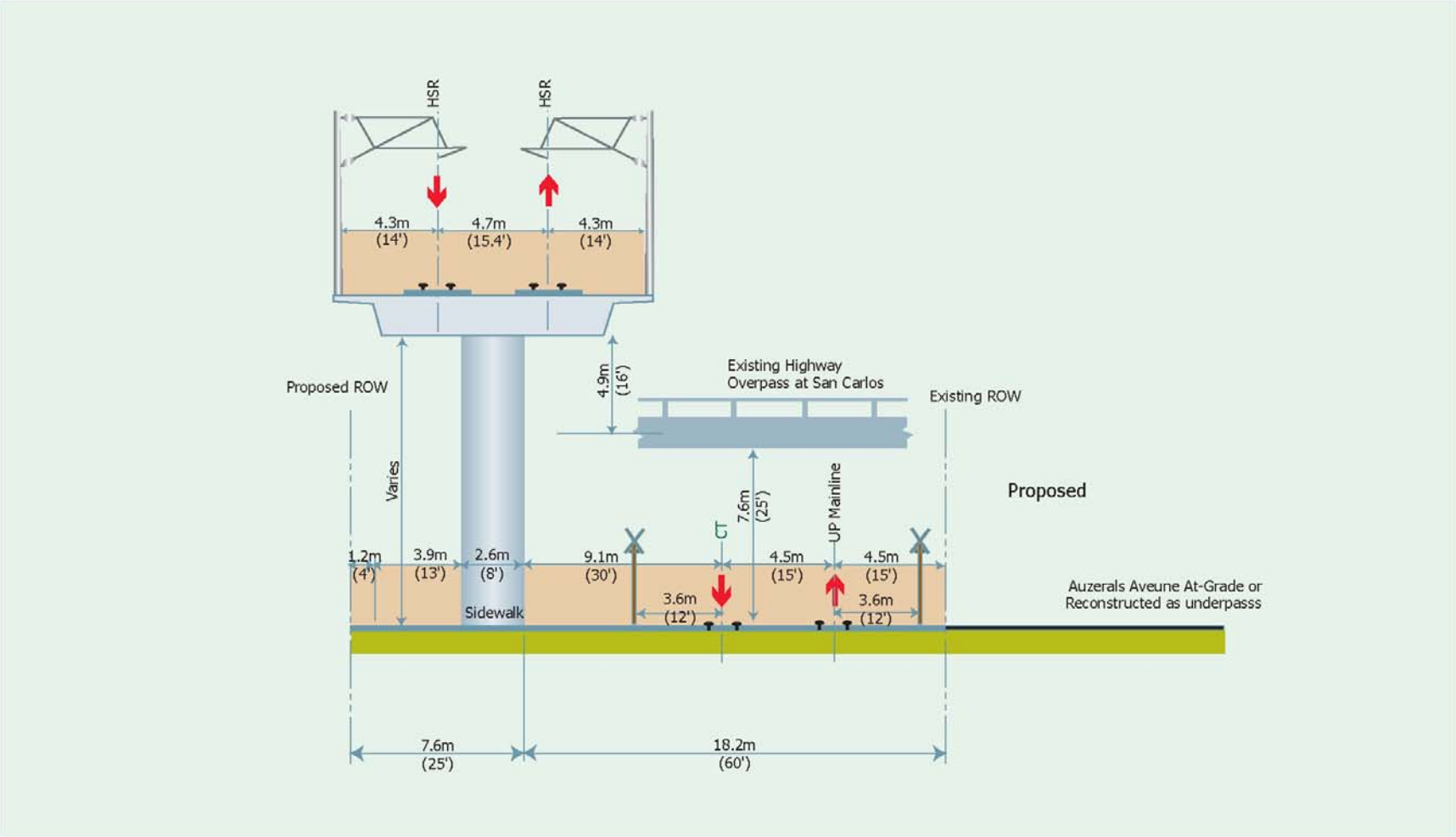
California High-Speed Train Program EIR/EIS

Figure PP-5



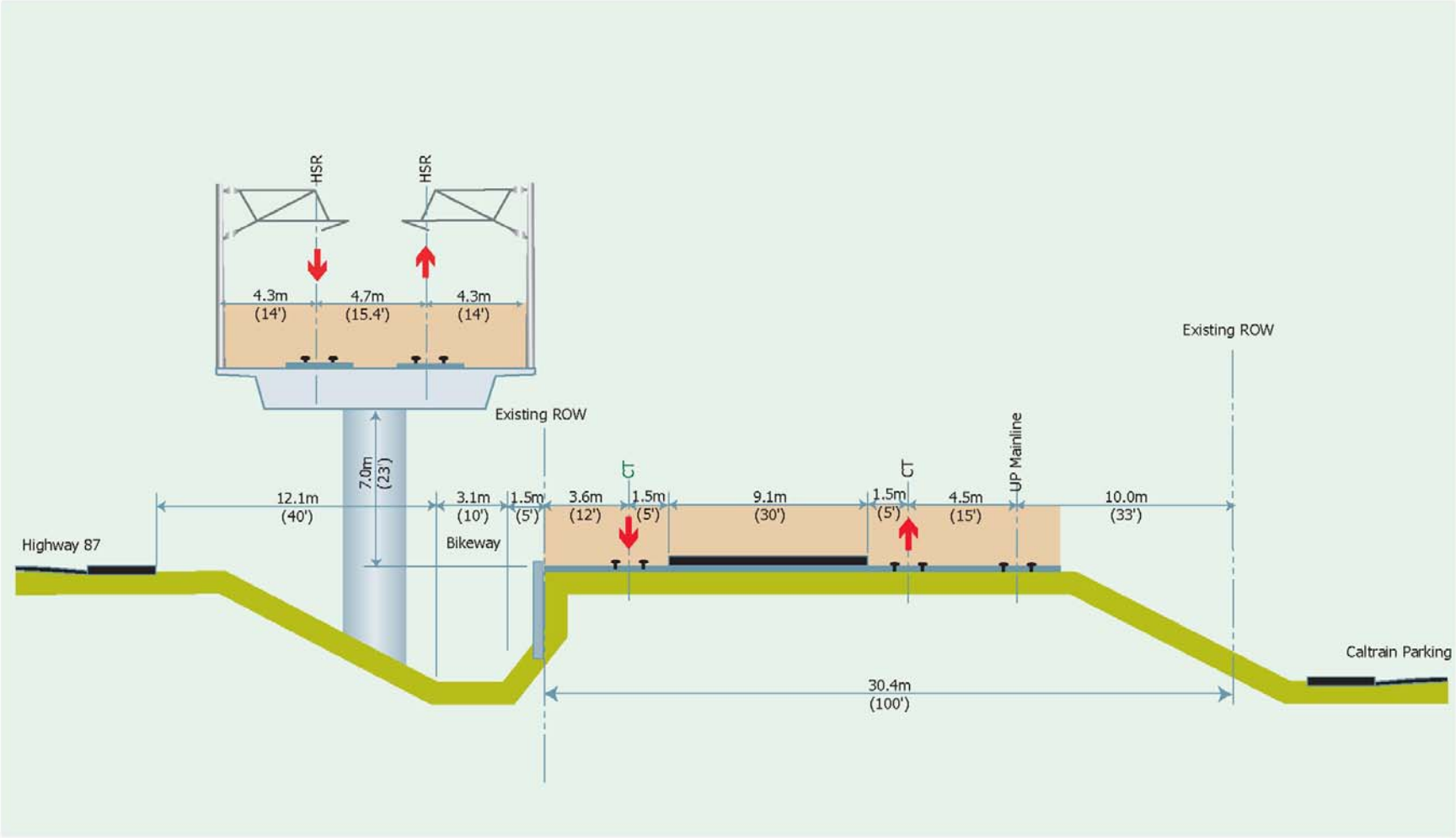
California High-Speed Train Program EIR/EIS

Figure PP-6



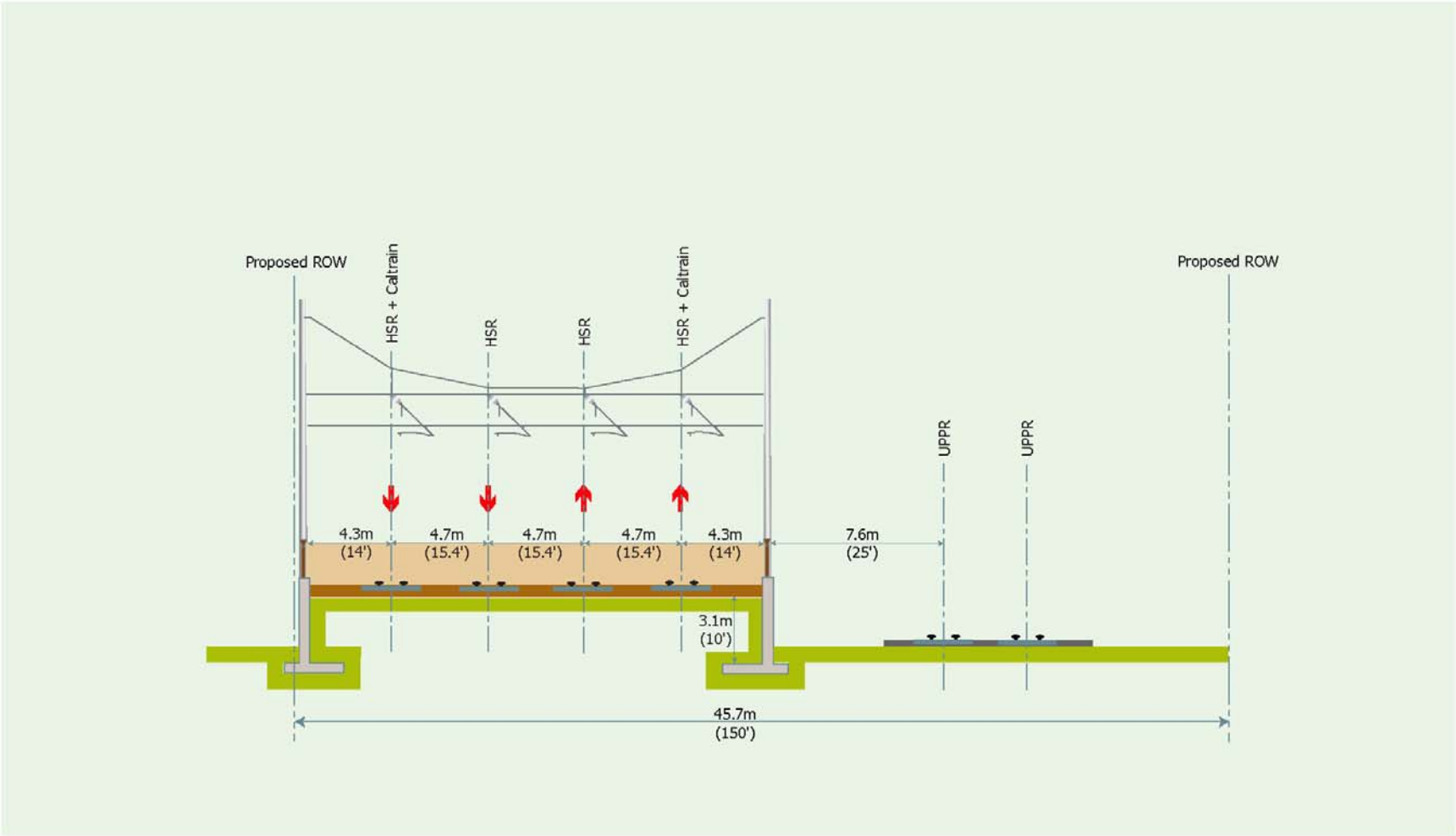
California High-Speed Train Program EIR/EIS

Figure PP-7



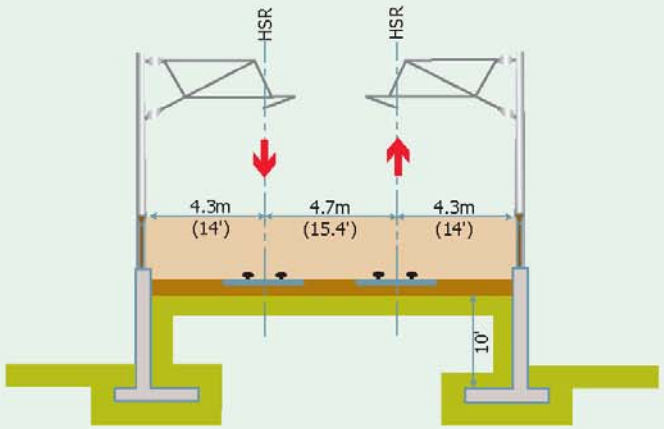
California High-Speed Train Program EIR/EIS

Figure PP-8



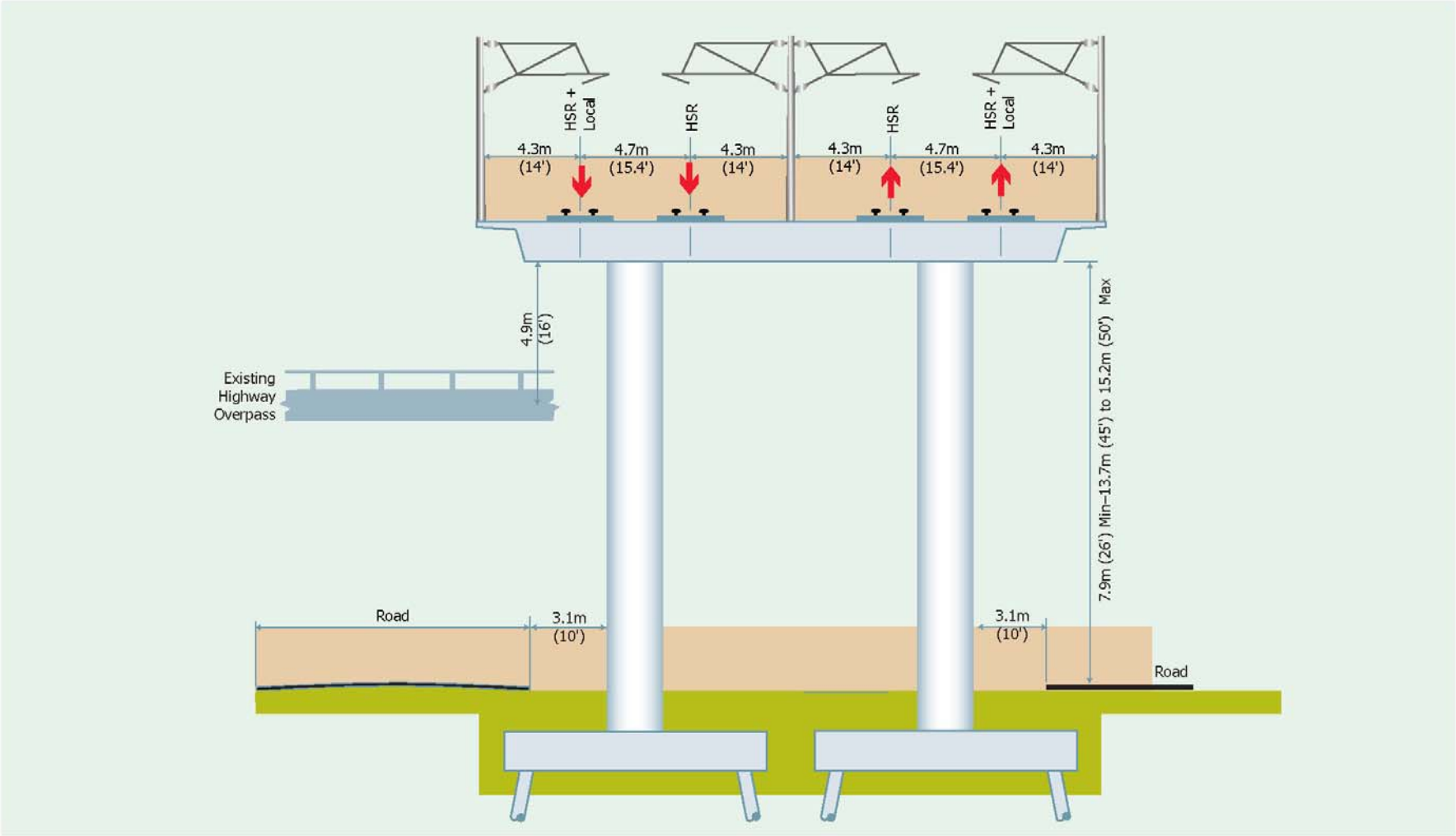
California High-Speed Train Program EIR/EIS

Figure PP-9



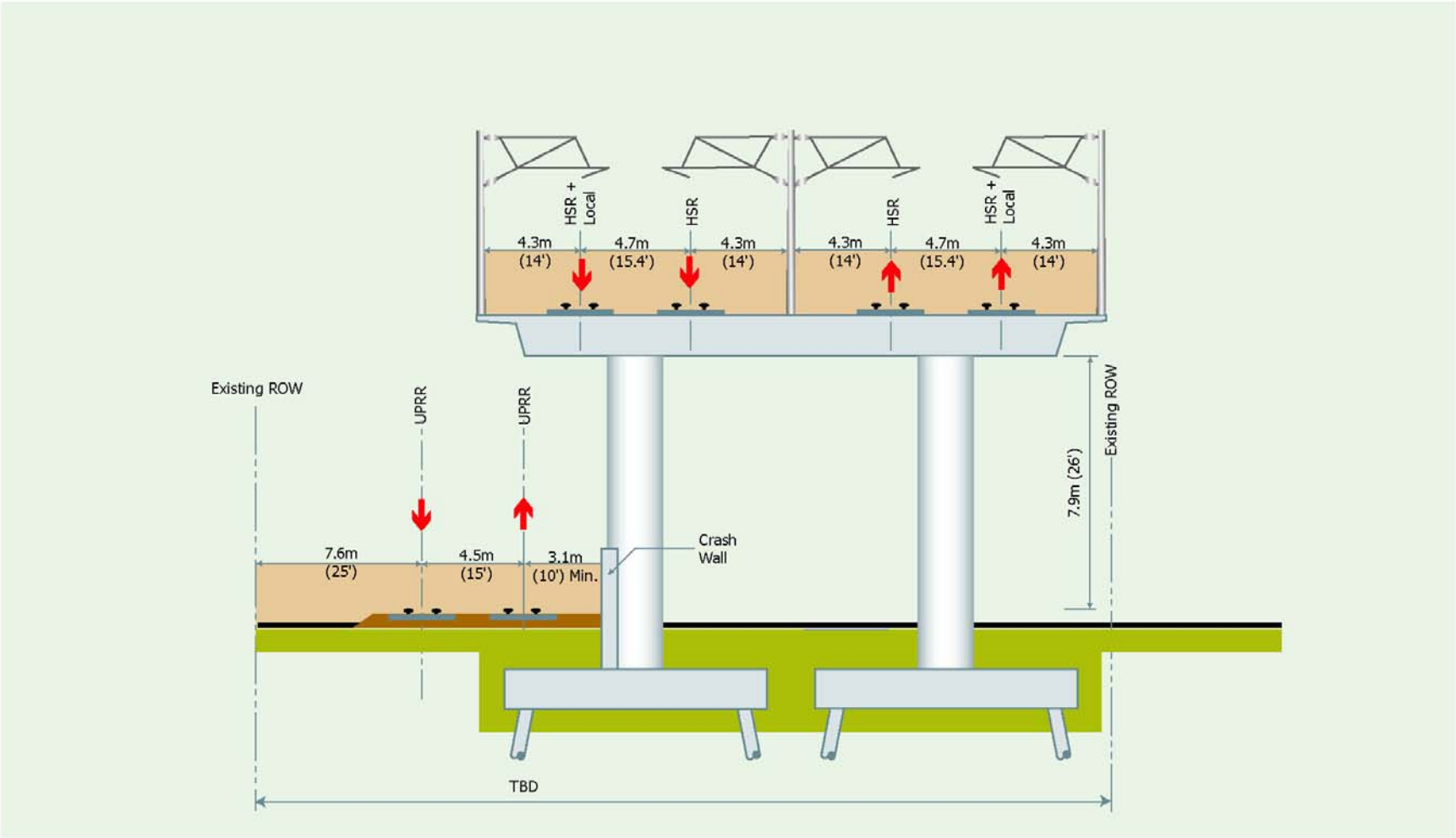
California High-Speed Train Program EIR/EIS

Figure PP-10



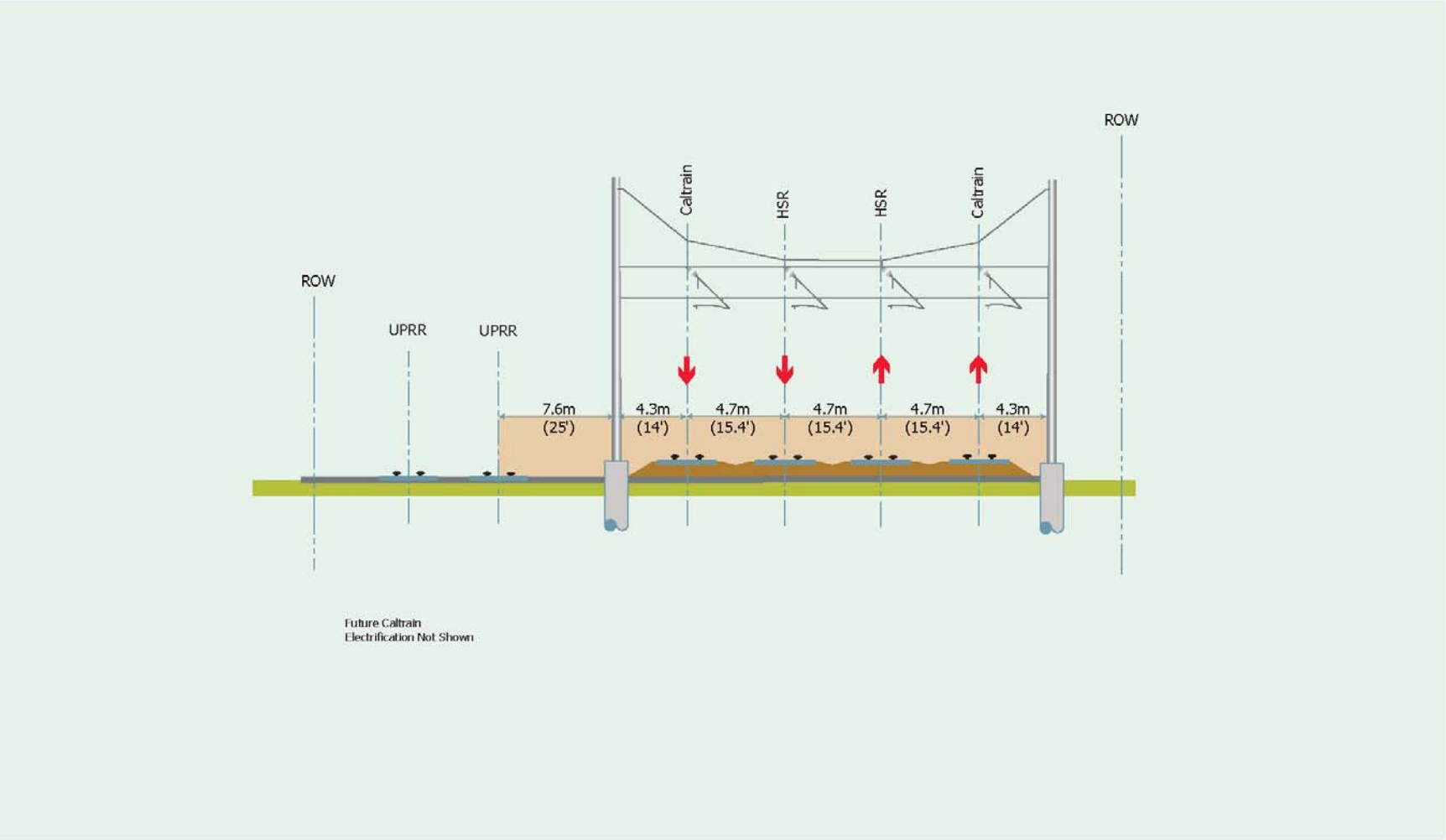
California High-Speed Train Program EIR/EIS

Figure PP-11



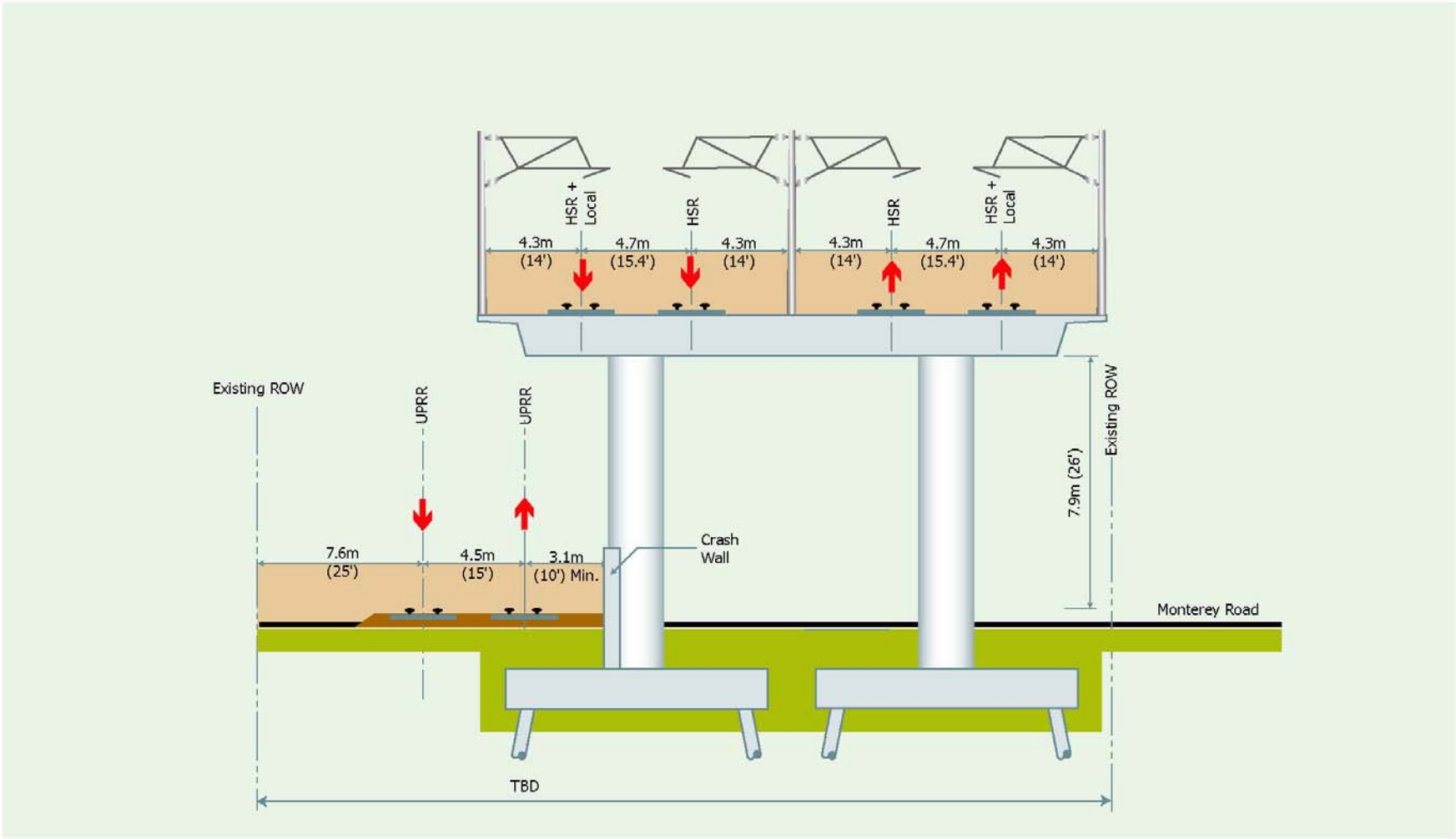
California High-Speed Train Program EIR/EIS

Figure PP-12



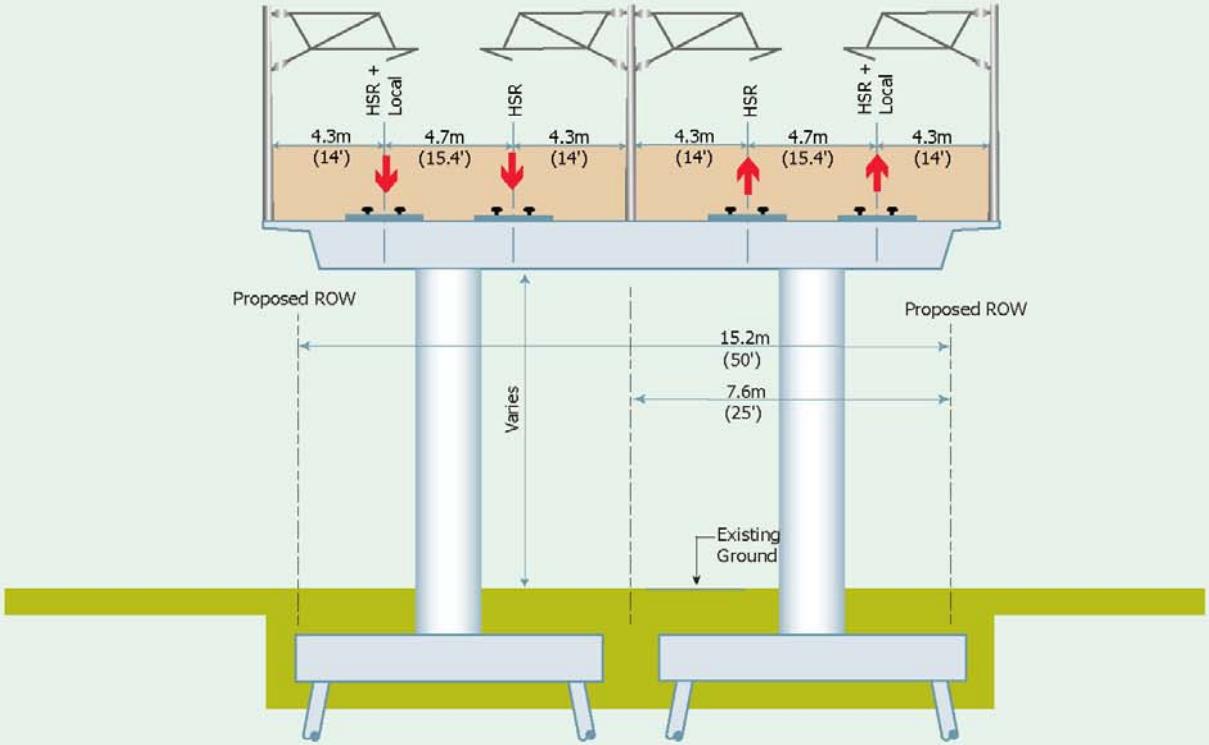
California High-Speed Train Program EIR/EIS

Figure PP-13



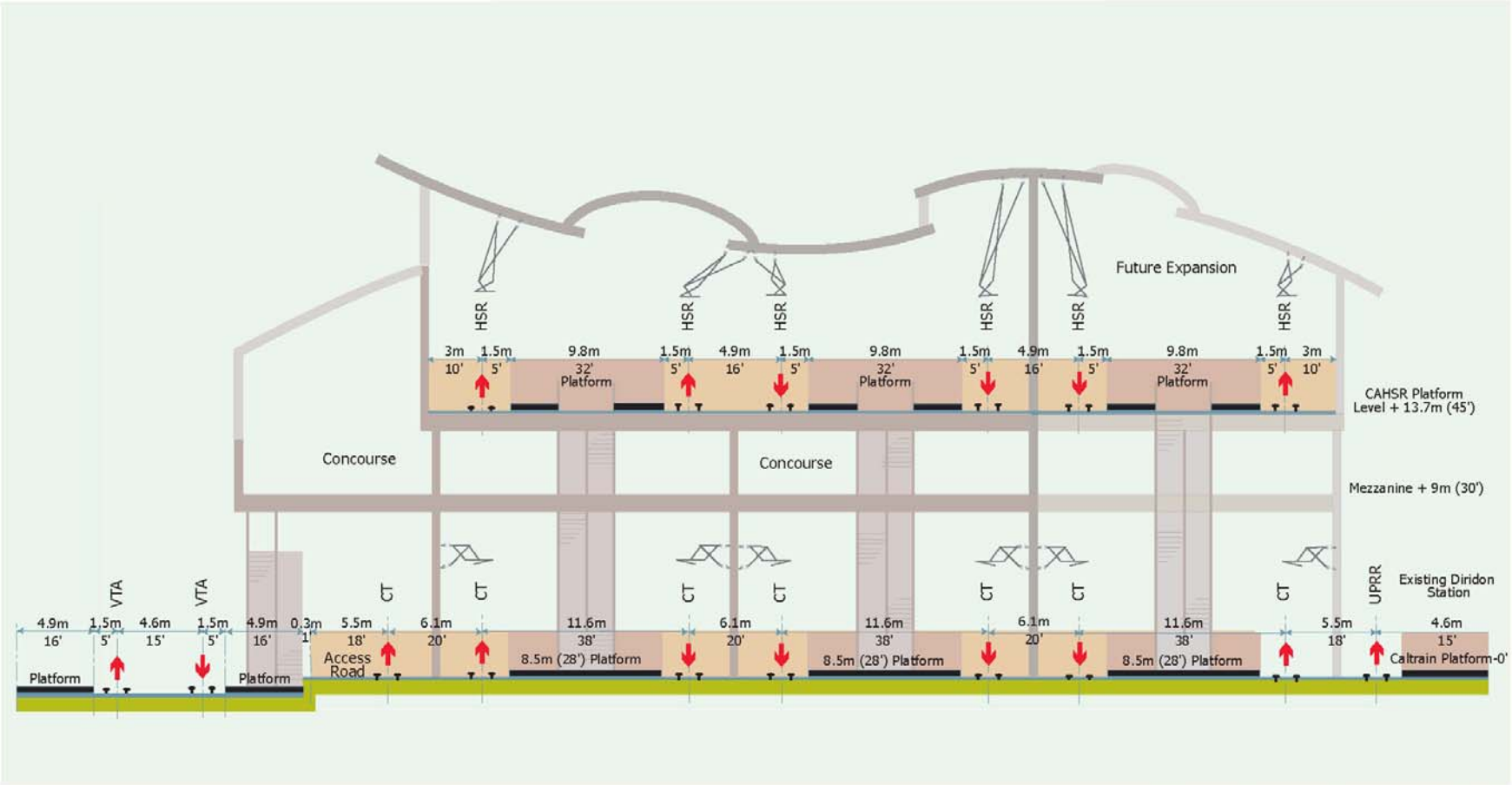
California High-Speed Train Program EIR/EIS

Figure PP-14



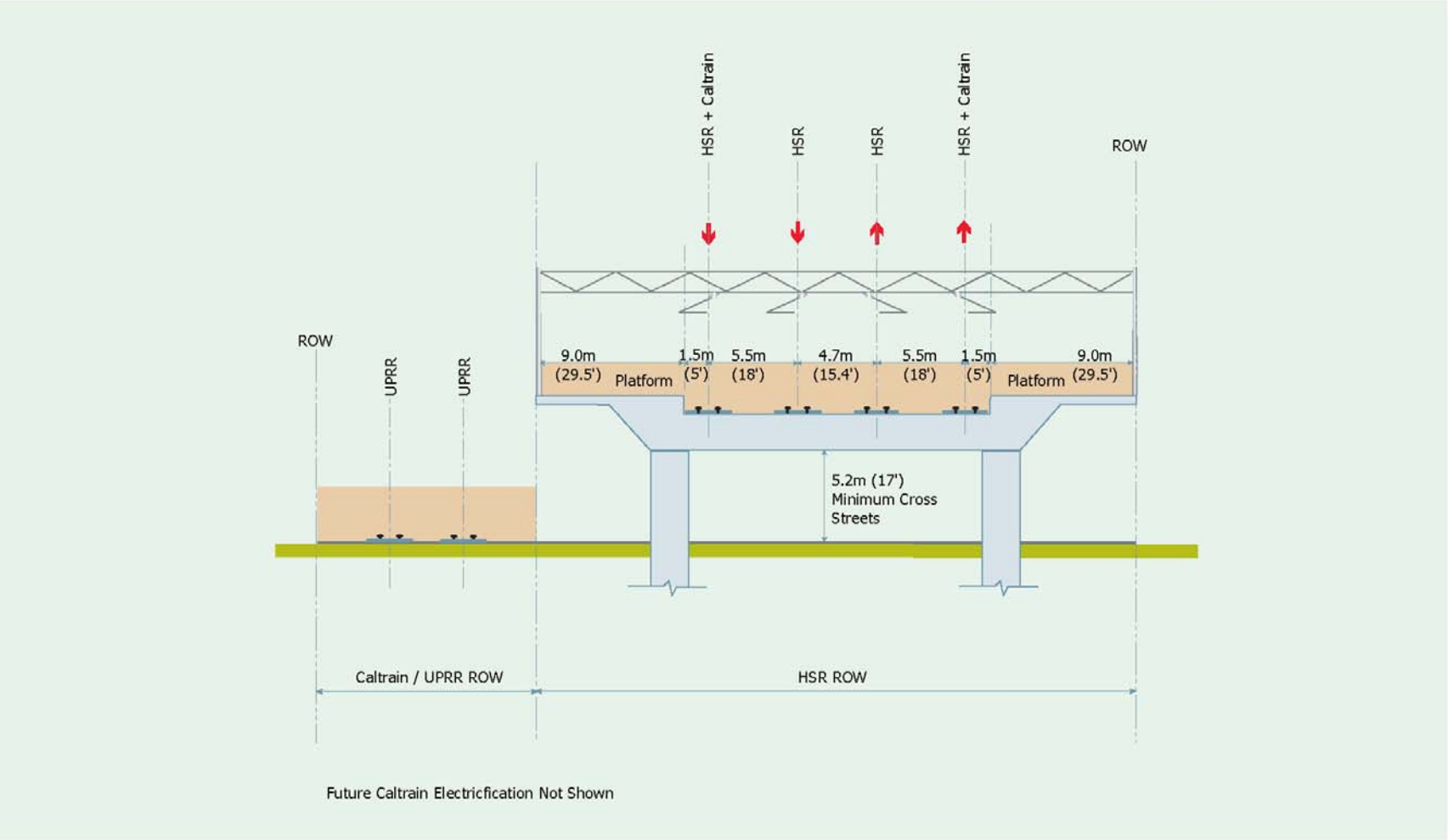
California High-Speed Train Program EIR/EIS

Figure PP-15



California High-Speed Train Program EIR/EIS

Figure PP-S1



California High-Speed Train Program EIR/EIS

Figure PP-S2

APPENDIX 3.15-A

SPECIES TABLES

Appendix 3.15-A-1. Special-Status Plant Species with Potential to Occur in High Speed Train Corridors

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
San Mateo thorn-mint *Acanthomintha duttonii*	E/E/1B	San Mateo	Chaparral, valley and foothill grassland/ serpentinite	April–June	X				X	
Franciscan onion *Allium peninsulare* var. *franciscanum*	--/--/1B	Santa Clara, San Mateo, Sonoma	Cismontane woodland, valley and foothill grassland/ clay, often serpentinite	May–June	X		X		X	
Bent-flowered fiddleneck *Amsinckia lunaris*	–/–/1B	Alameda, Contra Costa, Colusa, Lake, Marin, Napa, Santa Clara, Santa Cruz, Shasta, San Mateo, Sonoma	Coastal bluff scrub, cismontane woodland, valley and foothill grassland	March–June	X	X	X	X	X	
Suisun Marsh aster *Aster lentus*	--/--/1B	Contra Costa, Napa, Sacramento, San Joaquin, Solano	Marshes and swamps (brackish and fresh water)	May–Nov				X		
Coastal marsh milk-vetch *Astralagus pycnostachyus* var. *pycnostachyus*	--/--/1B	Humboldt, Marin, San Mateo	Coastal dunes (mesic), marshes and swamps (coastal salt, streamsides)	April–Oct					X	
Alkali milk-vetch *Astragalus tener* var. *tener*	–/–/1B	Alameda, Contra Costa, Merced, Monterey, Napa, San Benito, Santa Clara, San Francisco, San Joaquin, Solano, Sonoma, Stanislaus, Yolo	Playas, valley and foothill grassland (adobe, clay), vernal pools/alkaline	March–June	X	X	X	X	X	X
Heartscale *Atriplex cordulata*	–/–/1B	Alameda, Contra Costa, Butte, Fresno, Glenn, Kings, Kern, Madera, Merced, San Joaquin, Solano, Stanislaus, Tulare, Yolo	Chenopod scrub, meadows and seeps, valley and foothill grassland (sandy)/saline or alkaline	April–Oct			X	X		X
Brittlescale *Aptriplex depressa*	--/--/1B	Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, Solano, Stanislaus, Tulare, Yolo	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools/alkaline, clay	May–Oct			X	X		X

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
San Joaquin spearscale *Atriplex joaquiniana*	--/--/1B	Alameda, Contra Costa, Colusa, Glenn, Merced, Monterey, Napa, Sacramento, San Benito, Santa Clara, San Joaquin, Solano, Tulare, Yolo	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland/ alkaline	April–Oct			X	X		X
Lesser saltscale *Atriplex minuscule*	--/--/1B	Alameda, Butte, Fresno, Madera, Merced, Stanislaus, Tulare	Chenopod scrub, playas, valley and foothill grassland/ alkaline, sandy	May–Oct			X	X		X
Vernal pool smallscale *Atriplex persistens*	--/--/1B	Glenn, Madera, Merced, Solano, Stanislaus, Tulare	Vernal pools (alkaline)	July–Oct			X			X
Subtle orache *Atriplex subtllis*	--/--/1B	Butte, Fresno, Kings, Kern, Madera, Merced, Tulare	Valley and foothill grassland	Aug–Oct			X			X
Big-scale balsamroot *Balsamorhiza macrolepis* var. *macrolepis*	--/--/1B	Alameda, Butte, Colusa, Lake, Mariposa, Napa, Placer, Santa Clara, Solano, Sonoma, Tehama	Chaparral, cismontane woodland, valley and foothill grassland/ sometimes serpentine	March–June	X	X		X		
Big tarplant *Blepharizonia plumose*	--/--/1B	Alameda, Contra Costa, San Joaquin, Stanislaus, Solano	Valley and foothill grassland	July–Oct		X		X	X	X
Bristly sedge *Carex comosa*	--/--/1B	Contra Costa, Lake, Mendocino, San Bernardino, Santa Cruz, San Francisco, Shasta, San Joaquin, Sonoma; Idaho, Oregon, Washington, and elsewhere	Coastal prairie, marshes and swamps (lake margin), valley and foothill grassland	May–Sept	X				X	
Tiburon Indian paintbrush *Castilleja affinis* ssp. *neglecta*	E/T/1B	Marin, Napa, Santa Clara	Valley and foothill grassland (serpentinite)	April–June	X	X	X			
Succulent owl's-clover *Castilleja campestris* ssp. *succulenta*	T/E/1B	Fresno, Madera, Merced, Mariposa, San Joaquin, Stanislaus	Vernal pools (often acidic)	April–May			X			X

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Pink creamsacs *Castilleja rubicundula* ssp. *rubicundula*	--/--/1B	Butte, Colusa, Lake, Napa, San Benito, Santa Clara	Chaparral (openings), cismontane woodland, meadows and seeps, valley and foothill grassland/ serpentine	April–June			X			
Lemmon's jewelflower *Caulanthus coulteri* var. *lemmonii*	--/--/1B	Alameda, Fresno, Kings, Kern, Merced, Monterey, Santa Barbara, San Benito, San Joaquin, San Luis Obispo, Stanislaus, Ventura	Pinyon and juniper woodland, valley and foothill grassland	March–May			X			
Coyote ceanothus *Ceanothus ferrisiae*	E/--/1B	Santa Clara	Chaparral, coastal scrub, valley and foothill grassland/ serpentinite	Jan–May			X			
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	--/--/1B	Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo Solano	Valley and foothill grasslands (alkaline)	June–Nov	X	X	X	X	X	
Hoover's spurge *Chamaesyce hooveri*	T/--/1B	Butte, Glenn, Merced, Stanislaus, Tehama, Tulare	Vernal pools	July–Aug			X			X
Robust spineflower *Chorizanthe robusta* var. *robusta*	E/--/1B	Alameda, Monterey, San Francisco, Santa Clara, Santa Cruz, San Mateo	Cismontane woodland (openings), coastal dunes, coastal scrub/ sandy or gravelly	April–Sept					X	
Slough thistle *Cirsium crassicaule*	--/--/1B	Kings, Kern, San Joaquin	Chenopod scrub, marshes and swamps (sloughs), riparian scrub	May–Aug				X		
Mt. Hamilton thistle *Cirsium fontinale* var. *campylon*	--/--/1B	Alameda, Santa Clara, Stanislaus	Chaparral, cismontane woodland, valley and foothill grassland/ serpentine seeps	Feb–Oct				X		
Presidio clarkia *Clarkia franciscana*	E/E/1B	Alameda, San Francisco	Coastal scrub, valley and foothill grassland (serpentine)	May–July		X				
San Francisco collinsia *Collinsia multicolor*	--/--/1B	Monterey, Santa Clara, Santa Cruz, San Francisco, San Mateo	Closed-cone coniferous forest, coastal scrub/ sometimes serpentine	March–May	X		X		X	

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Point Reyes bird's-beak *Cordylanthus maritimus* ssp. *palustris*	--/--/1B	Alameda, Humboldt, Marin, Santa Clara, San Mateo, Sonoma, Oregon	Marshes and swamps (coastal salt)	June–Oct	X				X	
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus*	--/--/1B	Alameda, Kern, Merced, Placer, Solano	Meadows and seeps, playas, valley and foothill grassland/ alkaline	June–Sept			X	X		X
Palmate-bracted bird's beak *Cordylanthus palmatus*	E/E/1B	Alameda, Colusa, Fresno, Madera, San Joaquin, Yolo	Chenopod scrub, valley and foothill grassland (alkaline)	May–Oct				X		X
Hoover's cryptantha *Cryptantha hooveri*	--/--/1A	Alameda, Contra Costa, Madera, Merced, San Joaquin, Stanislaus	Valley and foothill grassland (sandy)	April–May			X			X
Livermore tarplant *Deinandra bacigalupii*	--/--/1B	Alameda	Meadows and seeps (alkaline)	June–Oct				X		
Hospital Canyon larkspur *Delphinium californicum* ssp.*iInterius*	--/--/1B	Alameda, Contra Costa, Merced, San Benito, Santa Clara, San Joaquin, San Luis Obispo, Stanislaus	Chaparral (openings), oak woodland (mesic)	April–June			X	X		
Recurved larkspur *Delphinium recurvatum*	--/--/1B	Alameda, Contra Costa, Fresno, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, Tulare	Chenopod scrub, cismontane woodland, valley and foothill grassland/ alkaline	March–May			X	X		X
Dwarf downingia *Downingia pusilla*	--/--/2	Merced, Mariposa, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, Yuba; South America	Valley and foothill grassland (mesic), vernal pools	March–May			X			X
Santa Clara Valley dudleya *Dudleya setchellii*	E/--/1B	Santa Clara	Cismontane woodland, valley and foothill grassland/ serpentinite, rocky	April–June			X			
Four-angled spikerush *Eleocharis quadrangulata*	--/--/2	Butte, Merced, Shasta, Tehama, and elsewhere	Marshes and swamps (freshwater)	May–Sept			X			X
San Mateo woolly sunflower *Eriophyllum latilobum*	E/E/1B	San Mateo	Cismontane woodland (serpentinite, often on roadcuts)	May–June					X	

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Round-leaved filaree *Erodium macrophyllum*	--/--/2	Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Lassen, Los Angeles, Merced, Monterey, Napa, Riverside, Santa Barbara, San Benito, Santa Cruz Island, San Diego, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, Stanislaus	Cismontane woodland, valley and foothill grassland/ clay	March–May			X	X		
Hoover's button-celery *Eryngium aristulatum* var. *hooveri*	--/--/1B	Alameda, San Benito, Santa Clara, San Luis Obispo, San Mateo	Vernal pools	July	X	X	X		X	
Delta button-celery *Eryngium racemosum*	--/E/1B	Merced, San Joaquin, Stanislaus	Riparian scrub (vernally mesic clay depressions)	June–Aug			X	X		X
Diamong-petaled California poppy *Eschscholzia rhombipetala*	--/--/1B	Alameda, Contra Costa, Colusa, San Joaquin, San Luis Obispo, Stanislaus	Valley and foothill grassland (alkaline, clay)	March–April			X	X		
Hillsborough chocolate lily *Fritillaria biflora var. ineziana*	--/--/1B	San Mateo	Cismontane woodland, valley and foothill grassland/ serpentinite	March–April	X				X	
Fragrant frilillary *Fritillaria lillacea*	--/--/1B	Alameda, Contra Costa, Monterey, Marin, San Benito, Santa Clara, San Francisco, San Mateo, Solano, Sonoma	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland/ often serpentine	Feb–April			X			
Boggs Lake hedge-hyssop *Gratiola heterosepala*	--/E/1B	Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Tehama, Oregon	Marshes and swamps (lake margins), vernal pools/ clay	April–Aug						X

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
San Francisco gumplant *Grindelia hirsutula* var. *maritime*	--/--/1B	Monterey, Marin, Santa Cruz, San Francisco, San Luis Obispo, San Mateo	Coastal bluff scrub, coastal scrub, valley and foothill grassland/ sandy or serpentinite	Aug–Sept	X				X	
Diablo helianthella *Helianthella castanea*	--/--/1B	Alameda, Contra Costa, Marin, San Francisco, San Mateo	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland	April–June				X		
Rose-mallow *Hibiscus lasiocarpus*	--/--/2	Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, Yolo; and elsewhere	Marshes and swamps (freshwater)	June–Sept				X		X
Loma Prieta hoita *Hoita strobilina*	--/--/1B	Alameda, Contra Costa, San Benito, Santa Clara, Santa Cruz	Chaparral, cismontane woodland, riparian woodland/ usually serpentine	May–Oct			X			
Contra Costa goldfields *Lasthenia conjugens*	E/--/1B	Alameda, Contra Costa, Mendocino, Monterey, Napa, Santa Barbara, Santa Clara, Solano	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools/mesic	March–June	X	X	X			
Legenere *Legenere limnosa*	--/--/1B	Alameda, Lake, Napa, Placer, Sacramento, Shasta, San Joaquin, San Mateo, Santa Clara, Solano, Sonoma, Stanislaus, Tehama	Vernal pools	April–June				X		X
Crystal Springs lessingia *Lessingia arachnoidea*	--/--/1B	San Mateo, Sonoma	Cismontane woodland, coastal scrub, valley and foothill grassland/ serpentinite, often roadsides	July–Oct	X				X	
Smooth lessingia *Lessingia micradenia var. glabrata*	--/--/1B	Santa Clara	Chaparral, cismontane woodland/ serpentinite, often roadsides	July–Nov			X			

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Showy madia *Madia radiate*	--/--/1B	Contra Costa, Fresno, Kings, Kern, Monterey, Santa Barbara, San Benito, San Joaquin, San Luis Obispo, Stanislaus	Cismontane woodland, valley and foothill grassland	March–May				X		
Marsh microseris *Microseris paludosa*	--/--/1B	Mendocino, Monterey, Marin, Santa Cruz, San Francisco, San Luis Obispo, San Mateo, Sonoma	Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland	April–June	X					
Robust monardella *Monardella villosa* ssp. *globosa*	--/--/1B	Alameda, Contra Costa, Humboldt, Lake, Mendocino, Napa, San Mateo, Santa Clara, Sonoma	Chaparral (openings), cismontane woodland, coastal scrub	June–July			X	X		
Shining navarretia *Navarretia nigelliformis* ssp. *radians*	--/--/1B	Fresno, Merced, Monterey, San Benito, San Luis Obispo	Cismontane woodland, valley and foothill grassland, vernal pools	May–July			X			X
Prostrate navarretia *Navarretia prostrate*	--/--/1B	Alameda, Los Angeles, Merced, Monterey, Orange, Riverside San Bernardino, San Diego	Coastal scrub, valley and foothill grassland (alkaline), vernal pools	April–July			X	X		X
Colusa grass *Neostapfia colusana*	T/E/1B	Colusa, Merced, Solano, Stanislaus, Yolo	Vernal pools (adobe)	May–Aug			X			X
San Joaquin Valley orcutt grass *Orcuttia inaequalis*	T/E/1B	Fresno, Madera, Merced, Stanislaus, Tulare	Vernal pools	April–Sept			X			X
Hairy orcutt grass *Orcuttia pilosa*	E/E/1B	Butte, Glenn, Madera, Merced, Stanislaus, Tehama	Vernal pools	May–Sept			X			X
White-rayed pentachaeta *Pentachaeta bellidiflora*	E/E/1B	Marin, Santa Cruz, San Mateo	Valley and foothill grassland (often serpentinite)	March–May	X				X	
Hairless popcorn flower *Plagiobothrys glaber*	--/--/1A	Alameda, Merced, Marin, San Benito, Santa Clara	Meadows and seeps (alkaline), marshes and swamps (coastal salt)	March–May		X		X		

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Slender-leaved pondweed *Potamogeton filiformis*	--/--/2	Contra Costa, Lassen, Merced, Mono, Santa Clara, San Mateo, Sierra; Arizona, Nevada, Oregon, Washington, and elsewhere	Marshes and swamps (assorted shallow fresh water)	May–July	X	X	X			
San Francisco campion *Silene verecunda* ssp. *verecunda*	--/--/1B	Santa Cruz, San Francisco, San Mateo	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland/ sandy	March–August	X				X	
Santa Cruz microseris *Stebbinsoseris decipiens*	--/--/1B	Monterey, Marin, San Francisco, San Mateo, Santa Cruz	Broadleaved upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland/ open areas, sometimes serpentinite	April–May	X				X	
Metcalf Canyon jewel-flower *Streptanthus albidus* ssp. *albidus*	E/--/1B	Santa Clara	Valley and foothill grassland (serpentinite)	April–July			X			
Most beautiful jewel-flower *Streptanthus albidus* ssp. *peramoenus*	--/--/1B	Alameda, Contra Costa, Monterey, Santa Clara, San Benito	Chaparral, cismontane woodland, valley and foothill grassland/ serpentine	April–June			X	X		
California seablite *Suaeda californica*	E/--/1B	Alameda, Santa Clara, San Luis Obispo	Marshes and swamps (coastal salt)	July–Oct				X	X	
Showy Indian clover *Trifolium amoenum*	E/--/1B	Alameda, Mendocino, Marin, Napa, Santa Clara, San Benito, Solano, Sonoma	Coastal bluff scrub, balley and foothill grassland (sometimes serpentine)	April–June			X			
Saline clover *Trifolium depauperatum* var. *hydrophilum*	--/--/1B	Alameda, Colusa, Monterey, Napa, San Benito, Santa Clara, San Luis Obispo, San Mateo, Solano, Sonoma	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools	April–June	X		X	X	X	

Species	Legal Status[a] Federal/ State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	High Speed Train Corridors					
					San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	--/--/1B	Alameda, Contra Costa, Glenn, Monterey, Santa Clara, San Joaquin, San Mateo	Valley and foothill grassland (alkaline hills)	March–April			X	X		
Greene's tuctoria *Tuctoria greenei*	E/R/1B	Butte, Fresno, Glenn, Madera, Merced, Shasta, San Joaquin, Stanislaus, Tehama, Tulare	Vernal pools	May–Sept			X	X		X

Appendix 3.15-A-7. Special-Status Wildlife Species with Potential to Occur in High-Speed Train Corridors

Common and Scientific Name	Status Federal / State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Invertebrates									
Bay checkerspot butterfly *Euphydryas editha bayensis*	T/--	Vicinity of San Francisco Bay, including San Francisco peninsula in San Mateo County and mountains near San Jose, Santa Clara County	Native grasslands on outcrops of serpentine soil; California plantain and owl's clover are host plants	X		X			
Callippe silverspot *Speyeria callippe callippe*	E/--	San Bruno Mountain, San Mateo County, and a single location in Alameda County	Open hillsides where wild pansy (*Viola pendunculata*) grows; larvae feed on Johnny jump-up plants, whereas adults feed on native mints and nonnative thistles	X		X			
Conservancy fairy shrimp *Branchinecta conservatio*	E/--	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands			X			X
Longhorn fairy shrimp *Branchinecta longiantenna*	E/--	Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County; disjunct population in Madera County	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools			X	X		
Mission blue *Plebejus icarioides missionensis*	E/--	San Bruno Mountain, San Mateo County; Twin Peaks, San Francisco County	Hill and ridgetops, as well as slopes with south exposure with caterpillar food plants, *Lupinus* sp.	X					
San Bruno elfin butterfly *Callophrys mossii bayensis*	E/--	San Bruno Mountain, Montara Mountains, and northern end of Santa Cruz Mountains, San Mateo County	North-facing slopes and ridges facing Pacific Ocean from 600 to 1,100 feet (183 to 335 meters)	X					

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T/--	Streamside habitats below 3,000 feet (914 meters) throughout Central Valley	Riparian and oak savanna habitats with elderberry shrubs; elderberries are host plant			X	X		X
Vernal pool fairy shrimp *Branchinecta lynchi*	T/--	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools			X	X		X
Vernal pool tadpole shrimp *Lepidurus packardi*	E/--	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds		X	X	X		X
Amphibians									
California red-legged frog *Rana aurora draytoni*	T/SSC	Found along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County	Permanent and semi-permanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation. May aestivate in rodent burrows or cracks during dry periods.	X	X	X	X		
California tiger salamander *Ambystoma californiense*	T/SSC	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet (305 meters), and coastal region from Butte County south to northeastern San Luis Obispo County.	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy	X	X	X	X	X	X

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Foothill yellow-legged frog *Rana boylii*	--/SSC	Klamath, Cascade, north Coast, south Coast, Transverse, and Sierra Nevada Ranges up to approximately 6,000 feet (1,829 meters)	Creeks or rivers in woodland, forest, mixed chaparral, and wet meadow habitats with rock and gravel substrate and low overhanging vegetation along edge; usually found near riffles with rocks and sunny banks nearby			X	X		
Western spadefoot *Scaphiopus hammondii*	--/SSC	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California	Shallow streams with riffles and seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands				X		X
Reptiles									
Alameda whipsnake *Masticophis lateralis euryxanthus*	T/T	Restricted to Alameda and Contra Costa Counties; fragmented into five disjunct populations throughout its range	Valleys, foothills, and low mountains associated with northern coastal scrub or chaparral habitat; requires rock outcrops for cover and foraging				X		
Blunt-nosed leopard lizard *Gambelia silus*	E/E	San Joaquin Valley from Stanislaus County through Kern County and along the eastern edges of San Luis Obispo and San Benito Counties	Open habitats with scattered low bushes on alkali flats, and low foothills, canyon floors, plains, washes, and arroyos; substrates may range from sandy or gravelly soils to hardpan			X			

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
California (Coast) horned lizard *Phrynosoma coronatum frontale*	--/SSC	Sacramento Valley, including foothills, south to southern California; Coast Ranges south of Sonoma County; below 4,000 feet (1,219 meters) in northern California	Grasslands, brushlands, woodlands, and open coniferous forest with sandy or loose soil; requires abundant ant colonies for foraging	X	X	X	X		
Giant garter snake *Thamnophis gigas*	T/T	Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; extirpated from areas south of Fresno	Sloughs, canals, low gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter			X	X		X
Northwestern pond turtle *Clemmys marmorata marmorata*	--/SSC	Occurs from Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada	Occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	X	X		X	X	
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	E/E, FP	Northern San Mateo County southward along the coast and the eastern slope of the Santa Cruz Mountains to Santa Clara County line	Favors ponds, lakes, slow-moving streams, and marshy areas containing abundant vegetation, which it uses for cover; nearby upland habitat is important during fall and winter	X					

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
San Joaquin whipsnake *Masticophis flagellum ruddocki*	--/SSC	From Colusa County in the Sacramento Valley southward to the grapevine in the San Joaquin Valley and westward into the inner coast ranges; isolated population occurs at Sutter Buttes; known elevation range from 66 to 2,953 feet (20 to 900 meters)	Occurs in open, dry, vegetative associations with little or no tree cover; occurs in valley grassland and saltbush scrub associations; often occurs in association with mammal burrows			X	X		
Silvery legless lizard *Anniella pulchra pulchra*	--/SSC	Along the Coast, Transverse, and Peninsular Ranges from Contra Costa County to San Diego County, with spotty occurrences in the San Joaquin Valley	Habitats with loose soil for burrowing or thick duff or leaf litter; often forages in leaf litter at plant bases; may be found on beaches, sandy washes, and in woodland, chaparral, and riparian areas			X	X		
Southwestern pond turtle *Clemmys marmorata pallida*	--/SSC	Occurs along the central coast of California east to the Sierra Nevada and along the southern California coast inland to the Mojave and Sonora Deserts; range overlaps with that of the northwestern pond turtle throughout Delta and in Central Valley	Woodlands, grasslands, and open forests; aquatic habitats, such as ponds, marshes, or streams, with rocky or muddy bottoms and vegetation for cover and food			X			X
Birds									
Alameda (South Bay) song sparrow *Melospiza melodia pusillula*	--/SSC	Found only in marshes along southern portion of the San Francisco Bay	Brackish marshes associated with pickleweed; may nest in tall vegetation or among pickleweed	X	X			X	

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
American peregrine falcon *Falco peregrinus anatum*	--/E, FP	Permanent resident along the north and south Coast Ranges. May summer in the Cascade and Klamath Ranges and through the Sierra Nevada to Madera County; winters in Central Valley south through Transverse and Peninsular Ranges and plains east of Cascade Range	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes that support large prey populations			X	X		
Bald eagle *Haliaeetus leucocephalus*	T/E, FP	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin; reintroduced into central coast; winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierra Nevada, and east of the Sierra Nevada south of Mono County	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, reservoir, stream, or the ocean						
Brown Pelican Peliecanus occidentalis	E/E	Breeds on islands off the coast of California	Found in estuarine, tidal, and pelagic waters along the California coast.	X	X			X	

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
California black rail *Laterallus jamaicensis coturniculus*	--/T, FP	Permanent resident in San Francisco Bay and eastward through Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties	Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations	X	X			X	
California clapper rail *Rallus longirostris obsoletus*	E/E, FP	Marshes around San Francisco Bay and east through Delta to Suisun Marsh	Restricted to salt marshes and tidal sloughs; usually associated with heavy growth of pickleweed; feeds on mollusks removed from the mud in sloughs	X	X			X	
California horned lark *Eremophila alpestris actia*	--/SSC	Found throughout much of the state, less common in mountainous areas of the north coast and in coniferous or chaparral habitats	Common to abundant resident in a variety of open habitats, usually where large trees and shrubs are absent; grasslands and deserts to dwarf shrub habitats above tree line	X		X	X		X
California least tern *Sterna antillarum browni* (nesting colony)	E/E, FP	Nests on beaches along San Francisco Bay and along southern California coast from southern San Luis Obispo County south to San Diego County	Nests on sandy, upper ocean beaches, and occasionally uses mudflats; forages on adjacent surf line, estuaries, or open ocean	X	X			X	

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Cooper's hawk *Accipiter cooperii*	--/SSC	Throughout California except high altitudes in the Sierra Nevada; winters in Central Valley, southeastern desert regions, and plains east of Cascade Range	Nests in a wide variety of habitat types, from riparian woodlands and digger pine-oak woodlands through mixed conifer forests	X	X	X	X	X	X
Double-crested cormorant *Phalacrocorax auritus* (rookery site)	--/SSC	Winters along entire California coast and inland over Coast Ranges into Central Valley from Tehama County to Fresno County; permanent resident along the coast from Monterey County to San Diego County, along the Colorado River, Imperial, Riverside, Kern and King Counties, and the islands off San Francisco; breeds in Siskiyou, Modoc, Lassen, Shasta, Plumas, and Mon Counties; also breeds in the San Francisco Bay Area and in Yolo and Sacramento Counties	Rocky coastlines, beaches, inland ponds, and lakes; needs open water for foraging, and nests in riparian forests or on protected islands, usually in snags	X	X			X	
Golden eagle *Aquila chrysaetos*	--/SSC, FP	Foothills and mountains throughout California; uncommon nonbreeding visitor to lowlands such as Central Valley	Nest on cliffs and escarpments or in tall trees overlooking open country; forages in annual grasslands, chaparral, and oak woodlands with plentiful medium and large-sized mammals			X	X		

Common and Scientific Name	Status Federal/ State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Least Bell's vireo *Vireo bellii pusillus*	E/E	Small populations remain in southern Inyo, southern San Bernardino, Riverside, San Diego, Orange, Los Angeles, Ventura, and Santa Barbara Counties	Riparian thickets either near water or in dry portions of river bottoms; nests along margins of bushes and forages low to the ground; may also be found using mesquite and arrow weed in desert canyons			X			
Loggerhead shrike *Lanius ludovicianus*	--/SSC	Resident and winter visitor in lowlands and foothills throughout California; rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	X	X	X	X	X	X
Long-eared owl *Asio otus*	--/SSC	Permanent resident east of the Cascade Range from Placer County north to Oregon border, east of the Sierra Nevada from Alpine County to Inyo County; scattered breeding populations along the coast and in southeastern California; winters throughout Central Valley and southeastern California	Nests in abandoned crow, hawk, or magpie nests, usually in dense riparian stands of willows, cottonwoods, live oaks, or conifers	X	X	X	X	X	
Northern harrier *Circus cyaneus*	--/SSC	Occurs throughout lowland California; recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands	X	X	X	X	X	X

Common and Scientific Name	Status Federal / State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Prairie falcon *Falco mexicanus*	--/SSC	Permanent resident in south Coast, Transverse, Peninsular, and northern Cascade Ranges; southeastern deserts, Inyo-White Mountains; foothills surrounding the Central Valley; and in Sierra Nevada in Modoc, Lassen, and Plumas Counties; winters in Central Valley, along the coast from Santa Barbara County to San Diego County, and in Marin, Sonoma, Humboldt, Del Norte, and Inyo Counties	Nests on cliffs or escarpments, usually overlooking dry, open terrain or uplands			X	X		
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	--/SSC	Found only in San Francisco Bay Area in Marin, Napa, Sonoma, Solano, San Francisco, San Mateo, Santa Clara, and Alameda Counties	Freshwater marshes in summer and salt or brackish marshes in fall and winter; requires tall grasses, tules, and willow thickets for nesting and cover	X	X			X	
Short-eared owl *Asio flammeus*	--/SSC	Permanent resident along coast from Del Norte County to Monterey County although very rare in summer north of San Francisco Bay, in Sierra Nevada north of Nevada County, in plains east of the Cascades, and in Mono County; small, isolated populations	Freshwater and salt marshes, lowland meadows, and irrigated alfalfa fields; needs dense tules or tall grass for nesting and daytime roosts	X	X	X	X	X	X

Common and Scientific Name	Status Federal / State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Swainson's hawk *Buteo swainsoni*	--/T	Lower Sacramento and San Joaquin Valleys, Klamath Basin, and Butte Valley; highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields			X	X		X
Tricolored blackbird *Agelaius tricolor*	--/SSC	Permanent resident in the Central Valley from Butte County to Kern County; breeds at scattered coastal locations from Marin County south to San Diego County and at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grain fields; habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony			X	X		X
Western burrowing owl *Athene cunicularia*	--/SSC	Lowlands throughout California, including Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low stature grassland or desert vegetation with available burrows	X	X	X	X	X	X
White-tailed kite *Elanus leucurus*	--/FP	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging	X	X	X	X	X	X

Common and Scientific Name	Status Federal / State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Willow flycatcher *Empidonax traillii*	--/E	Summers along western Sierra Nevada from El Dorado to Madera County; in Cascade and northern Sierra Nevada in Trinity, Shasta, Tehama, Butte, and Plumas Counties; and along the eastern Sierra Nevada from Lassen to Inyo County	Riparian areas and large wet meadows with abundant willows; usually found in riparian habitats during migration			X			
Yellow-breasted chat *Icteria virens*	--/SSC	Nests locally in coastal mountains and Sierra Nevada foothills, east of the Cascades in northern California, along Colorado river, and very locally inland in southern California	Nests in dense riparian habitats dominated by willows, alders, Oregon ash, tall weeds, blackberry vines, and grapevines			X			
Yellow warbler *Dendroica petechia brewsteri*	--/SSC	Nests over all of California except Central Valley, Mojave Desert region, and high altitudes and eastern side of Sierra Nevada; winters along Colorado River and in parts of Imperial and Riverside Counties; two small permanent populations in San Diego and Santa Barbara Counties	Nests in riparian areas dominated by willows, cottonwoods, sycamores, or alders or in mature chaparral; may also use oaks, conifers, and urban areas near stream courses	X	X	X	X	X	

Common and Scientific Name	Status Federal / State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Mammals									
American badger *Taxidea taxius*	--/SSC	Found throughout most of California except in northern North Coast area; suitable habitat is characterized by herbaceous, shrub, and open stages of most habitats with dry, friable soils.	Dig burrows in friable soils for cover	X	X	X	X	X	X
Pallid bat *Antrozous pallidus*	--/SSC	Occurs throughout California except high Sierra from Shasta to Kern County and northwest coast, primarily at lower and mid elevations	Occurs in a variety of habitats from desert to coniferous forest; most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California; relies heavily on trees for roosts	X	X	X	X	X	X
Riparian (San Joaquin Valley) woodrat *Neotoma fuscipes riparia*	E/SSC	Historical distribution along San Joaquin, Stanislaus, and Tuolumne Rivers, and Caswell State Park in San Joaquin, Stanislaus, and Merced Counties; presently limited to San Joaquin County at Caswell State Park and a possible second population near Vernalis	Riparian habitats with dense shrub cover, willow thickets, and an oak overstory				X		X

Common and Scientific Name	Status Federal / State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Riparian brush rabbit *Sylvilagus bachmani riparius*	E/E	Limited to San Joaquin County at Caswell State Park near the confluence of the Stanislaus and San Joaquin Rivers and Paradise Cut area on Union Pacific right-of-way lands	Native valley riparian habitats with large clumps of dense shrubs, low-growing vines, and some tall shrubs and trees				X		X
Salt marsh harvest mouse *Reithrodontomys raviventris*	E/E, FP	San Francisco, San Pablo, and Suisun Bays; the Delta	Salt marshes with a dense plant cover of pickle-weed and fat hen; adjacent to an upland site	X	X			X	
Salt marsh wandering shrew *Sorex vagrans halicoetes*	--/SSC	Restricted to southern and northwestern San Francisco Bay	Midelevation salt marsh habitats with dense growths of pickleweed; requires driftwood and other objects for nesting cover	X	X			X	
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	--/SSC	West side of Mount Diablo to coast and San Francisco Bay	Present in chaparral habitat and in forest habitats with a moderate understory	X	X			X	
San Joaquin kit fox *Vulpes macrotis mutica*	E/T	Principally occurs in San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, oak, savanna, and freshwater scrub			X	X		X

Common and Scientific Name	Status Federal / State	Geographic Distribution	Habitat Requirements	High-Speed Train Corridors					
				San Francisco to San Jose	Oakland to San Jose	San Jose to Central Valley	East Bay to Central Valley	San Francisco Bay Crossings	Central Valley
Townsend's big-eared bat Corynorhinus townsendii	--/SSC	Coastal regions from Del Norte County south to Santa Barbara County	Roosts in caves, tunnels, mines, and dark attics of abandoned buildings; very sensitive to disturbances and may abandon a roost after one onsite visit	X	X	X	X	X	X

Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.

T = listed as threatened under the federal Endangered Species Act.

PT = proposed for federal listing as threatened under the federal Endangered Species Act.

C = species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance of the proposed rule is precluded.

– = no listing.

State

E = listed as endangered under the California Endangered Species Act.

T = listed as threatened under the California Endangered Species Act.

FP = fully protected under the California Fish and Game Code.

SSC = species of special concern in California.

– = no listing.

APPENDIX 4-A

CAPITAL COST: UNIT COST TABLE

CALTRAIN 1 AND 2							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Transbay Transit Center to 4th/Townsend		4th/Townsend to Millbrae/SFO	
				CALTRAIN 1		CALTRAIN 2	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Double Track Section-Total	km		0.00		16.55	
1	Double Track Section - At Grade	km	993,167	0.00	0	15.45	15,344,428
2	Double Track Section - On Structure	km	1,878,243	0.00	0	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	1.10	2,066,067
	Single Track Section - Total	km		2.50		6.03	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	5.00	4,695,606	12.06	11,325,803
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	3	22	773,238	6,883,074
3	Fill	m3	9	0	0	271,492	2,416,720
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.00	0	19.95	2,029,570
8	Special Drainage Facilities	5% of Earthwork			1		566,468
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	0.00	0
2	High Structure	km	16,480,720	0.00	0	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	6.03	334,451,147
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	2.50	240,618,204	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	1.10	54,635,446
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	2.50	4,828,405	6.03	11,646,114
17	Retaining Walls	km	4,399,945	0.00	0	2.60	11,439,858
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	8.00	143,443,305
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.00	0	0.00	0
7	Major Utility Relocation - Suburban	km	273,407	0.00	0	0.00	0
8	Major Utility Relocation - Undeveloped	km	13,988	0.00	0	0.00	0
Right-of-Way							
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.00	0	0.00	0

CALTRAIN 1 AND 2							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Transbay Transit Center to 4th/Townsend		4th/Townsend to Millbrae/SFO	
				CALTRAIN 1		CALTRAIN 2	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Suburban	hectare	479,081	0.00	0	0.00	0
	Undeveloped	hectare	342,201	0.00	0	0.000	0
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			7,718,078		19,818,578
System Elements							
1	Signaling (ATC)	km	845,654	2.50	2,114,136	22.58	19,094,873
2	Communications (w/Fiber Optic Backbone)	km	699,413	2.50	1,748,533	22.58	15,792,752
3	Wayside Protection System	km	67,144	2.50	167,859	22.58	1,516,104
Electrification Items							
1	Traction Power Supply	km	432,365	2.50	1,080,911	22.58	9,762,792
2	Traction Power Distribution	km	806,233	2.50	2,015,582	22.58	18,204,736
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			67,571,771		173,511,647
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			66,246,835		170,109,458
Total Construction					257,269,261		660,619,255
Total Construction and Right of Way (Includes Environmental Mitigation)					264,987,338		680,437,832
Grand Total					398,805,944		1,024,058,938

CALTRAIN 3 AND 4							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Millbrae/SFO to Redwood City		Redwood City to Caltrain	
				CALTRAIN 3		CALTRAIN 4	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Double Track Section-Total	km		18.75		0.75	
1	Double Track Section - At Grade	km	993,167	18.75	18,621,879	0.75	744,875
2	Double Track Section - On Structure	km	1,878,243	0.00	0	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	171,385	1,525,605	0	0
3	Fill	m3	9	1,109,803	9,879,049	78,315	697,131
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	18.75	1,907,491	0.75	76,300
8	Special Drainage Facilities	5% of Earthwork			665,607		38,672
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.000	0	0.000	0
2	High Structure	km	16,480,720	0.000	0	0.000	0
3	Long Span Structure	km	37,577,568	0.000	0	0.000	0
4	Waterway Crossing – Primary	km	28,876,734	0.000	0	0.000	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.000	0	0.000	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.000	0	0.000	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.000	0	0.000	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.000	0	0.000	0
9	Double Track Drill & Blast	km	83,740,573	0.000	0	0.000	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.000	0	0.000	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.000	0	0.000	0
12	Crossovers	ea	94,803,899	0.000	0	0.000	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.000	0	0.000	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.000	0	0.000	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.000	0	0.000	0
17	Retaining Walls	km	4,399,945	10.150	44,659,445	0.750	3,299,959
18	Containment Walls	km	1,500,559	0.000	0	0.000	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.000	0	0.000	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	18.00	322,747,436	2.00	35,860,826
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.00	0	0.00	0
7	Major Utility Relocation - Suburban	km	273,407	0.00	0	0.00	0
8	Major Utility Relocation - Undeveloped	km	13,988	0.00	0	0.00	0

CALTRAIN 3 AND 4							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Millbrae/SFO to Redwood City		Redwood City to Caltrain	
				CALTRAIN 3		CALTRAIN 4	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
Right-of-Way							
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.00	0	0.00	0
	Suburban	hectare	479,081	0.00	0	0.00	0
	Undeveloped	hectare	342,201	0.00	0	0.00	0
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			13,603,775		1,285,676
System Elements							
1	Signaling (ATC)	km	845,654	18.75	15,856,017	0.75	634,241
2	Communications (w/Fiber Optic Backbone)	km	699,413	18.75	13,113,999	0.75	524,560
3	Wayside Protection System	km	67,144	18.75	1,258,944	0.75	50,358
Electrification Items							
1	Traction Power Supply	km	432,365	18.75	8,106,836	0.75	324,273
2	Traction Power Distribution	km	806,233	18.75	15,116,864	0.75	604,675
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			119,101,051		11,256,094
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			116,765,736		11,035,386
Total Construction					453,459,171		42,855,869
Total Construction and Right of Way (Includes Environmental Mitigation)					467,062,946		44,141,545
Grand Total					702,929,734		66,433,025

CALTRAIN 5 AND 6							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Caltrain Dumbarton Wye		Dumbarton Wye to Palo Alto	
				CALTRAIN 5		CALTRAIN 6	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Double Track Section-Total	km		1.62		5.23	
1	Double Track Section - At Grade	km	993,167	1.62	1,609,923	5.23	5,193,269
2	Double Track Section - On Structure	km	1,878,243	0.00	0	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	32,915	292,997	27,240	242,480
3	Fill	m3	9	20,884	185,902	417,680	3,718,030
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	1.62	164,909	5.23	531,961
8	Special Drainage Facilities	5% of Earthwork			32,190		224,624
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.000	0	0.000	0
2	High Structure	km	16,480,720	0.000	0	0.000	0
3	Long Span Structure	km	37,577,568	0.000	0	0.000	0
4	Waterway Crossing - Primary	km	28,876,734	0.000	0	0.000	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.000	0	0.000	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.000	0	0.000	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.000	0	0.000	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.000	0	0.000	0
9	Double Track Drill & Blast	km	83,740,573	0.000	0	0.000	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.000	0	0.000	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.000	0	0.000	0
12	Crossovers	ea	94,803,899	0.000	0	0.000	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.000	0	0.000	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.000	0	0.000	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.000	0	0.000	0
17	Retaining Walls	km	4,399,945	0.200	879,989	4.000	17,599,781
18	Containment Walls	km	1,500,559	0.000	0	0.000	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.000	0	0.000	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	1.00	17,930,413	7.00	125,512,892
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.00	0	0.00	0
7	Major Utility Relocation - Suburban	km	273,407	0.00	0	0.00	0
8	Major Utility Relocation - Undeveloped	km	13,988	0.00	0	0.00	0

CALTRAIN 5 AND 6							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Caltrain Dumbarton Wye		Dumbarton Wye to Palo Alto	
				CALTRAIN 5		CALTRAIN 6	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
Right-of-Way							
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.00	0	0.00	0
	Suburban	hectare	479,081	0.00	0	0.00	0
	Undeveloped	hectare	342,201	0.00	0	0.00	0
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			771,525		5,037,897
System Elements							
1	Signaling (ATC)	km	845,654	1.62	1,370,806	5.23	4,421,926
2	Communications (w/Fiber Optic Backbone)	km	699,413	1.62	1,133,749	5.23	3,657,232
3	Wayside Protection System	km	67,144	1.62	108,840	5.23	351,094
Electrification Items							
1	Traction Power Supply	km	432,365	1.62	700,863	5.23	2,260,834
2	Traction Power Distribution	km	806,233	1.62	1,306,903	5.23	4,215,791
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			6,754,697		44,106,792
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			6,622,252		43,241,953
Total Construction					25,717,484		167,929,915
Total Construction and Right of Way (Includes Environmental Mitigation)					26,489,009		172,967,813
Grand Total					39,865,958		260,316,558

CALTRAIN 7 AND 8							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Palo Alto to Santa Clara		Santa Clara to Diridon Station	
				CALTRAIN 7		CALTRAIN 8	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		22.55		5.00	
1	Double Track Section - At Grade	km	993,167	20.15	20,012,312	0.15	148,975
2	Double Track Section - On Structure	km	1,878,243	0.00	0	1.00	1,878,243
3	Double Track Section - In Tunnel or Subway	km	1,878,243	1.00	1,878,243	3.70	6,949,497
4	Double Track Section - In Trench	km	1,878,243	1.40	2,629,540	0.15	281,736
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	667,535	5,942,145	373,996	3,329,172
3	Fill	m3	9	626,633	5,578,051	1,143,150	10,175,891
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	21.55	2,192,343	1.35	137,339
8	Special Drainage Facilities	5% of Earthwork			685,627		682,120
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.000	0	0.000	0
2	High Structure	km	16,480,720	0.000	0	1.000	16,480,720
3	Long Span Structure	km	37,577,568	0.000	0	0.000	0
4	Waterway Crossing - Primary	km	28,876,734	0.000	0	0.000	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.000	0	0.000	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.000	0	0.000	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.000	0	0.000	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.000	0	0.000	0
9	Double Track Drill & Blast	km	83,740,573	0.000	0	0.000	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.000	0	0.000	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.000	0	0.000	0
12	Crossovers	ea	94,803,899	0.000	0	0.000	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	1.000	48,123,641	3.700	178,057,471
14	Trench Short	km	49,668,587	1.40	69,536,022	0.15	7,450,288
15	Trench Long	km	39,272,836	0.000	0	0.000	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	1.000	1,931,362	3.700	7,146,040
17	Retaining Walls	km	4,399,945	7.500	32,999,590	0.000	0
18	Containment Walls	km	1,500,559	0.000	0	0.000	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.000	0	0.000	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	3.00	51,502,250
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	7.00	125,512,892	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.00	0	0.00	0
7	Major Utility Relocation - Suburban	km	273,407	0.00	0	0.00	0
8	Major Utility Relocation - Undeveloped	km	13,988	0.00	0	0.00	0

CALTRAIN 7 AND 8							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Palo Alto to Santa Clara		Santa Clara to Diridon Station	
				CALTRAIN 7		CALTRAIN 8	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
Right-of-Way							
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.00	0	0.00	0
	Suburban	hectare	479,081	0.00	0	0.00	0
	Undeveloped	hectare	342,201	0.00	0	0.00	0
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			11,439,225		8,954,214
System Elements							
1	Signaling (ATC)	km	845,654	22.55	19,069,503	5.00	4,228,271
2	Communications (w/Fiber Optic Backbone)	km	699,413	22.55	15,771,769	5.00	3,497,066
3	Wayside Protection System	km	67,144	22.55	1,514,090	5.00	335,718
Electrification Items							
1	Traction Power Supply	km	432,365	22.55	9,749,821	5.00	2,161,823
2	Traction Power Distribution	km	806,233	22.55	18,180,549	5.00	4,031,164
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			100,150,415		78,394,140
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			98,186,681		76,857,000
Total Construction					381,307,499		298,473,786
Total Construction and Right of Way (Includes Environmental Mitigation)					392,746,724		307,427,999
Grand Total					591,083,820		462,679,139

UPRR-1 AND 2A							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Shinn to Niles Canyon		Niles Canyon to Sunol	
				UPRR-1		UPRR-2A	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		4.50		0.52	
1	Double Track Section - At Grade	km	993,167	1.90	1,887,017	0.00	0
2	Double Track Section - On Structure	km	1,878,243	2.60	4,883,431	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.52	976,686
	Single Track Section - Total	km		0.00		0.70	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	1.40	1,314,770
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	1,333,260.00	11,868,179	463,412.00	4,125,119
3	Fill	m3	9	0.00	0	0.00	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	1.90	193,292	0.00	0
8	Special Drainage Facilities	5% of Earthwork			603,074		206,256
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	2.60	35,708,227	0.00	0
2	High Structure	km	16,480,720	0.00	0	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.70	67,373,097
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.70	1,351,953
17	Retaining Walls	km	4,399,945	0.00	0	1.04	4,575,943
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.45	306,152	0.00	0
7	Major Utility Relocation - Suburban	km	273,407	1.76	479,829	0.13	34,586
8	Major Utility Relocation - Undeveloped	km	13,988	1.85	25,808	1.02	14,317
Right-of-Way							

UPRR-1 AND 2A							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Shinn to Niles Canyon		Niles Canyon to Sunol	
				UPRR-1		UPRR-2A	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.69	1,877,452	0.00	0
	Suburban	hectare	479,081	3.02	1,445,867	0.19	92,463
	Undeveloped	hectare	342,201	3.16	1,079,644	1.56	533,833
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			2,063,509		2,503,521
System Elements							
1	Signaling (ATC)	km	845,654	4.500	3,805,444	1.220	1,031,698
2	Communications (w/Fiber Optic Backbone)	km	699,413	4.500	3,147,360	1.220	853,284
3	Wayside Protection System	km	67,144	4.500	302,147	1.220	81,915
Electrification Items							
1	Traction Power Supply	km	432,365	4.500	1,945,641	1.220	527,485
2	Traction Power Distribution	km	806,233	4.500	3,628,047	1.220	983,604
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			19,188,781		22,078,036
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			18,812,530		21,645,133
Total Construction					68,783,647		83,450,714
Total Construction and Right of Way (Includes Environmental Mitigation)					75,250,120		86,580,532
Grand Total					113,251,431		130,303,700

UPRR-2B AND 3							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Niles Canyon to Sunol		Sunol to Pleasanton	
				UPRR-2B		UPRR-3	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		0.00		2.70	
1	Double Track Section - At Grade	km	993,167	0.00	0	1.80	1,790,680
2	Double Track Section - On Structure	km	1,878,243	0.00	0	0.90	1,683,995
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		5.05		0.60	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	10.10	9,485,125	1.20	1,123,659
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	376,269.00	3,349,405	0.00	0
3	Fill	m3	9	0.00	0	0.00	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.00	0	0.00	0
8	Special Drainage Facilities	5% of Earthwork			167,470		0
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	0.77	10,528,159
2	High Structure	km	16,480,720	0.00	0	0.13	2,142,494
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	5.05	280,095,903	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.60	57,748,369
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	5.05	9,753,379	0.60	1,158,817
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	1.00	1,157,211
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.00	0	1.58	1,074,935
7	Major Utility Relocation - Suburban	km	273,407	0.26	71,086	0.73	199,587
8	Major Utility Relocation - Undeveloped	km	13,988	4.80	67,144	0.96	13,429
Right-of-Way							

UPRR-2B AND 3							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Niles Canyon to Sunol		Sunol to Pleasanton	
				UPRR-2B		UPRR-3	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.00	0	2.40	6,570,260
	Suburban	hectare	479,081	0.40	191,633	1.10	526,989
	Undeveloped	hectare	342,201	7.29	2,494,645	1.45	496,191
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			9,521,583		2,640,684
System Elements							
1	Signaling (ATC)	km	845,654	5.050	4,270,554	3.298	2,788,824
2	Communications (w/Fiber Optic Backbone)	km	699,413	5.050	3,532,037	3.298	2,306,546
3	Wayside Protection System	km	67,144	5.050	339,076	3.298	221,428
Electrification Items							
1	Traction Power Supply	km	432,365	5.050	2,183,441	3.298	1,425,865
2	Traction Power Distribution	km	806,233	5.050	4,071,475	3.298	2,658,819
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			84,046,458		25,055,520
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			82,398,489		24,564,235
Total Construction					317,386,094		88,022,815
Total Construction and Right of Way (Includes Environmental Mitigation)					329,593,955		98,256,940
Grand Total					496,038,902		147,876,695

UPRR-4 AND 5							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Pleasanton		El Charo to Livermore	
				UPRR-4		UPRR-5	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		2.59		6.41	
1	Double Track Section - At Grade	km	993,167	0.67	669,951	6.41	6,361,671
2	Double Track Section - On Structure	km	1,878,243	1.92	3,606,226	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	0.00	0	0.00	0
3	Fill	m3	9	0.00	0	0.00	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.00	0	0.00	0
8	Special Drainage Facilities	5% of Earthwork			0		0
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	1.92	26,369,152	0.00	0
2	High Structure	km	16,480,720	0.00	0	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	1.00	1,157,211
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.99	673,535	0.13	88,444
7	Major Utility Relocation - Suburban	km	273,407	1.42	389,468	1.60	437,451
8	Major Utility Relocation - Undeveloped	km	13,988	0.18	2,536	4.68	65,465
Right-of-Way							
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	1.50	4,106,412	0.19	520,146

UPRR-4 AND 5							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Pleasanton		El Charo to Livermore	
				UPRR-4		UPRR-5	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Suburban	hectare	479,081	2.17	1,040,086	2.44	1,168,958
	Undeveloped	hectare	342,201	0.28	94,447	7.11	2,433,049
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			1,173,224		791,128
System Elements							
1	Signaling (ATC)	km	845,654	2.595	2,194,101	6.405	5,416,787
2	Communications (w/Fiber Optic Backbone)	km	699,413	2.595	1,814,670	6.405	4,480,050
3	Wayside Protection System	km	67,144	2.595	174,208	6.405	430,085
Electrification Items							
1	Traction Power Supply	km	432,365	2.595	1,121,796	6.405	2,769,485
2	Traction Power Distribution	km	806,233	2.595	2,091,819	6.405	5,164,276
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			11,608,016		7,977,472
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			11,380,408		7,821,051
Total Construction					39,107,462		26,370,925
Total Construction and Right of Way (Includes Environmental Mitigation)					45,521,631		31,284,206
Grand Total					68,510,055		47,082,729

UPRR-6 AND 7							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Livermore to Patterson Pass cut off		Patterson Pass cut off to Greenville	
				UPRR-6		UPRR-7	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		3.55		2.99	
1	Double Track Section - At Grade	km	993,167	3.40	3,376,767	2.99	2,969,569
2	Double Track Section - On Structure	km	1,878,243	0.15	283,014	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	0.00	0	13,320.00	118,570
3	Fill	m3	9	0.00	0	0.00	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.00	0	1.80	183,119
8	Special Drainage Facilities	5% of Earthwork			0		15,084
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	0.00	0
2	High Structure	km	16,480,720	0.15	2,472,108	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	1.00	17,167,417
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	3.00	20,600,900	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	2.09	1,421,907	1.08	734,765
7	Major Utility Relocation - Suburban	km	273,407	1.07	292,545	0.39	106,629
8	Major Utility Relocation - Undeveloped	km	13,988	0.39	5,455	1.55	21,676
Right-of-Way							
1	Right-of-Way Required for Each Segment						

UPRR-6 AND 7							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Livermore to Patterson Pass cut off		Patterson Pass cut off to Greenville	
				UPRR-6		UPRR-7	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Urban	hectare	2,737,608	3.19	8,732,970	1.63	4,462,301
	Suburban	hectare	479,081	1.62	776,112	0.59	282,658
	Undeveloped	hectare	342,201	0.59	201,899	2.36	807,594
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			1,157,250		895,222
System Elements							
1	Signaling (ATC)	km	845,654	3.551	3,002,648	2.990	2,528,506
2	Communications (w/Fiber Optic Backbone)	km	699,413	3.551	2,483,393	2.990	2,091,246
3	Wayside Protection System	km	67,144	3.551	238,406	2.990	200,760
Electrification Items							
1	Traction Power Supply	km	432,365	3.551	1,535,188	2.990	1,292,770
2	Traction Power Distribution	km	806,233	3.551	2,862,675	2.990	2,410,636
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			12,608,025		9,253,573
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			12,360,809		9,072,131
Total Construction					38,575,006		29,840,747
Total Construction and Right of Way (Includes Environmental Mitigation)					49,443,237		36,288,523
Grand Total					74,412,071		54,614,227

UPRR-8 AND 9							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Greenville to Altamont Pass		Altamont Pass to County Line	
				UPRR-8		UPRR-9	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		11.25		5.26	
1	Double Track Section - At Grade	km	993,167	2.29	2,275,345	4.85	4,816,859
2	Double Track Section - On Structure	km	1,878,243	3.06	5,747,422	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	5.90	11,079,753	0.41	771,958
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	21,091,950.00	187,752,598	391,910.00	3,488,635
3	Fill	m3	9	3,552,290.00	31,621,148	485,180.00	4,318,890
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	8.19	833,192	2.85	289,939
8	Special Drainage Facilities	5% of Earthwork			11,010,347		404,873
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.98	13,459,255	0.00	0
2	High Structure	km	16,480,720	2.08	34,279,898	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	11.80	51,910,555	0.82	3,607,955
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	1.00	1,093,628	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.79	536,719	0.00	0
7	Major Utility Relocation - Suburban	km	273,407	0.00	0	0.00	0
8	Major Utility Relocation - Undeveloped	km	13,988	10.48	146,612	3.50	48,959
Right-of-Way							
1	Right-of-Way Required for Each Segment						

UPRR-8 AND 9							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Greenville to Altamont Pass		Altamont Pass to County Line	
				UPRR-8		UPRR-9	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Urban	hectare	2,737,608	1.20	3,290,605	0.00	0
	Suburban	hectare	479,081	0.00	0	0.00	0
	Undeveloped	hectare	342,201	15.97	5,465,976	5.33	1,825,300
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			11,514,542		982,385
System Elements							
1	Signaling (ATC)	km	845,654	11.250	9,513,610	5.261	4,448,987
2	Communications (w/Fiber Optic Backbone)	km	699,413	11.250	7,868,399	5.261	3,679,613
3	Wayside Protection System	km	67,144	11.250	755,366	5.261	353,243
Electrification Items							
1	Traction Power Supply	km	432,365	11.250	4,864,101	5.261	2,274,670
2	Traction Power Distribution	km	806,233	11.250	9,070,119	5.261	4,241,591
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			103,042,744		9,066,233
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			101,022,298		8,888,464
Total Construction					383,818,069		32,746,171
Total Construction and Right of Way (Includes Environmental Mitigation)					404,089,192		35,553,856
Grand Total					608,154,234		53,508,554

UPRR-10 AND 11							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				County Line to Tracy Downtown		Tracy Downtown to I-205	
				UPRR-10		UPRR-11	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		12.84		7.34	
1	Double Track Section - At Grade	km	993,167	10.99	10,911,924	6.03	5,988,796
2	Double Track Section - On Structure	km	1,878,243	1.85	3,474,749	1.31	2,460,498
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	2,091,950.00	18,621,751	1,442,610.00	12,841,571
3	Fill	m3	9	2,668,260.00	23,751,846	197,600.00	1,758,961
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	10.99	1,117,739	6.03	613,449
8	Special Drainage Facilities	5% of Earthwork			2,174,567		760,699
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	1.15	15,794,023	1.31	17,991,453
2	High Structure	km	16,480,720	0.70	11,536,504	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	2.00	46,238,451	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	2.00	13,733,933	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	3.00	3,471,633	2.00	2,314,422
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.25	168,044	0.26	176,888
7	Major Utility Relocation - Suburban	km	273,407	4.82	1,316,865	5.01	1,369,769
8	Major Utility Relocation - Undeveloped	km	13,988	7.29	101,925	7.57	105,891
Right-of-Way							

UPRR-10 AND 11							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				County Line to Tracy Downtown		Tracy Downtown to I-205	
				UPRR-10		UPRR-11	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.38	1,029,341	0.39	1,067,667
	Suburban	hectare	479,081	7.34	3,516,457	7.61	3,645,809
	Undeveloped	hectare	342,201	11.10	3,799,799	11.51	3,938,733
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			5,670,294		2,019,220
System Elements							
1	Signaling (ATC)	km	845,654	12.837	10,855,663	7.340	6,207,102
2	Communications (w/Fiber Optic Backbone)	km	699,413	12.837	8,978,368	7.340	5,133,693
3	Wayside Protection System	km	67,144	12.837	861,923	7.340	492,835
Electrification Items							
1	Traction Power Supply	km	432,365	12.837	5,550,264	7.340	3,173,556
2	Traction Power Distribution	km	806,233	12.837	10,349,610	7.340	5,917,748
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			51,771,547		19,884,584
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			50,756,419		19,494,690
Total Construction					189,009,784		67,307,332
Total Construction and Right of Way (Includes Environmental Mitigation)					203,025,675		77,978,761
Grand Total					305,553,641		117,358,035

TB-3 AND DUMBARTON 1							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				SF Bay to West Oakland		Dumbarton Bay Crossing to Don Edwards	
				TB-3		DUMBARTON 1 (HIGH BRIDGE)	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		0.00		5.01	
1	Double Track Section - At Grade	km	993,167	0.00	0	2.20	2,184,967
2	Double Track Section - On Structure	km	1,878,243	0.00	0	2.81	5,274,105
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
11	Regional Rail Bay Crossing Estimate	Lump Sum		9.23	3,334,613,307	5.00	486,398,524
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	0	0	0	0
3	Fill	m3	9	0	0	0	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.00	0	5.90	600,224
8	Special Drainage Facilities	5% of Earthwork			0		30,011
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	0.00	0
2	High Structure	km	16,480,720	0.00	0	0.81	13,349,383
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	2.00	57,753,469
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	8.00	143,443,305
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.00	0	4.04	2,748,567
7	Major Utility Relocation - Suburban	km	273,407	0.00	0	1.52	414,212
8	Major Utility Relocation - Undeveloped	km	13,988	0.00	0	4.34	60,751
Right-of-Way							

TB-3 AND DUMBARTON 1							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				SF Bay to West Oakland		Dumbarton Bay Crossing to Don Edwards	
				TB-3		DUMBARTON 1 (HIGH BRIDGE)	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	0.00	0	6.16	16,855,454
	Suburban	hectare	479,081	0.00	0	2.31	1,106,199
	Undeveloped	hectare	342,201	0.00	0	2.31	790,142
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			0		7,204,075
System Elements							
1	Signaling (ATC)	km	845,654	0.00	0	5.01	4,235,036
2	Communications (w/Fiber Optic Backbone)	km	699,413	0.00	0	5.01	3,502,662
3	Wayside Protection System	km	67,144	0.00	0	5.01	336,256
Electrification Items							
1	Traction Power Supply	km	432,365	0.00	0	5.01	2,165,282
2	Traction Power Distribution	km	806,233	0.00	0	5.01	4,037,614
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			0		67,853,387
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			0		66,522,928
Total Construction					0		240,135,843
Total Construction and Right of Way (Includes Environmental Mitigation)					0		266,091,713
Grand Total					3,334,613,307		886,866,552

DUMBARTON 1 (LOW BRIDGE) AND (TUBE)							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Dumbarton Bay Crossing to Don Edwards		Dumbarton Bay Crossing to Don Edwards	
				DUMBARTON 1 (LOW BRIDGE)		DUMBARTON 1 (TUBE)	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		6.55		5.01	
1	Double Track Section - At Grade	km	993,167	6.55	6,505,243	5.01	4,973,780
2	Double Track Section - On Structure	km	1,878,243	0.00	0	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
11	Regional Rail Bay Crossing Estimate	Lump Sum		5.00	322,767,859	5.00	702,953,999
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	0	0	0	0
3	Fill	m3	9	0	0	0	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	6.55	666,350	5.90	600,224
8	Special Drainage Facilities	5% of Earthwork			33,318		30,011
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	0.00	0
2	High Structure	km	16,480,720	0.00	0	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	8.00	143,443,305	8.00	143,443,305
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	4.08	2,775,781	6.04	4,109,244
7	Major Utility Relocation - Suburban	km	273,407	1.53	418,313	2.27	619,267
8	Major Utility Relocation - Undeveloped	km	13,988	4.39	61,353	6.49	90,826
Right-of-Way							

DUMBARTON 1 (LOW BRIDGE) AND (TUBE)							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Dumbarton Bay Crossing to Don Edwards		Dumbarton Bay Crossing to Don Edwards	
				DUMBARTON 1 (LOW BRIDGE)		DUMBARTON 1 (TUBE)	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	6.22	17,022,448	9.21	25,199,684
	Suburban	hectare	479,081	2.33	1,117,218	3.45	1,653,789
	Undeveloped	hectare	342,201	2.33	798,013	3.45	1,181,278
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			5,177,294		5,044,305
System Elements							
1	Signaling (ATC)	km	845,654	6.55	5,539,035	5.01	4,235,036
2	Communications (w/Fiber Optic Backbone)	km	699,413	6.55	4,581,157	5.01	3,502,662
3	Wayside Protection System	km	67,144	6.55	439,791	5.01	336,256
Electrification Items							
1	Traction Power Supply	km	432,365	6.55	2,831,988	5.01	2,165,282
2	Traction Power Distribution	km	806,233	6.55	5,280,825	5.01	4,037,614
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			50,156,314		51,311,753
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			49,172,857		50,305,640
Total Construction					172,576,457		168,143,505
Total Construction and Right of Way (Includes Environmental Mitigation)					196,691,429		201,222,560
Grand Total					618,788,460		1,005,793,953

DUMBARTON 2 (HIGH BRIDGE) AND DUMBARTON XN							
COST ELEMENTS				QUANTITIES			
Alignment Cost		UNIT	UNIT PRICE ($)	Dumbarton Bay Crossing to Don Edwards		Dumbarton Wye North to Caltrain	
				DUMBARTON 2 (HIGH BRIDGE)		DUMBARTON XN	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		8.00		2.20	
1	Double Track Section - At Grade	km	993,167	0.00	0	2.20	2,184,967
2	Double Track Section - On Structure	km	1,878,243	8.00	15,025,941	0.00	0
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.00	0
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
11	Regional Rail Bay Crossing Estimate	Lump Sum		5.00	486,398,524	0.00	0
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	0	0	16,280	144,918
3	Fill	m3	9	107,820	959,773	0	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.00	0	2.20	223,812
8	Special Drainage Facilities	5% of Earthwork			47,989		18,437
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	0.00	0
2	High Structure	km	16,480,720	8.00	131,845,761	0.00	0
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	5.00	89,652,066
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	3.50	2,381,388	1.19	808,242
7	Major Utility Relocation - Suburban	km	273,407	6.28	1,716,012	0.01	3,281
8	Major Utility Relocation - Undeveloped	km	13,988	1.21	16,884	0.00	0
Right-of-Way							
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	5.33	14,602,402	1.81	4,941,383

DUMBARTON 2 (HIGH BRIDGE) AND DUMBARTON XN							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Dumbarton Bay Crossing to Don Edwards		Dumbarton Wye North to Caltrain	
				DUMBARTON 2 (HIGH BRIDGE)		DUMBARTON XN	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Suburban	hectare	479,081	11.22	5,375,772	0.02	11,498
	Undeveloped	hectare	342,201	1.84	629,479	0.00	0
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			5,244,006		2,979,225
System Elements							
1	Signaling (ATC)	km	845,654	8.00	6,765,234	2.20	1,860,439
2	Communications (w/Fiber Optic Backbone)	km	699,413	8.00	5,595,306	2.20	1,538,709
3	Wayside Protection System	km	67,144	8.00	537,149	2.20	147,716
Electrification Items							
1	Traction Power Supply	km	432,365	8.00	3,458,917	2.20	951,202
2	Traction Power Distribution	km	806,233	8.00	6,449,862	2.20	1,773,712
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			51,166,228		27,346,100
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			50,162,969		26,809,902
Total Construction					174,800,215		99,307,501
Total Construction and Right of Way (Includes Environmental Mitigation)					200,651,875		107,239,607
Grand Total					788,379,595		161,395,609

DUMBARTON XS AND FREMONT CP							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Dumbarton Wye South to Caltrain		Fremont Central Park	
				DUMBARTON XS		FREMONT CP (HIGH BRIDGE)	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		0.96		12.69	
1	Double Track Section - At Grade	km	993,167	0.96	953,440	1.18	1,171,937
2	Double Track Section - On Structure	km	1,878,243	0.00	0	6.04	11,344,585
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	4.69	8,808,958
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.78	1,465,029
	Single Track Section - Total	km		0.00		1.50	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	3.00	2,817,364
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
11	Regional Rail Bay Crossing Estimate	Lump Sum		0.00	0	5.00	486,398,524
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	5,920	52,698	0	0
3	Fill	m3	9	0	0	0	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.96	97,664	5.06	514,768
8	Special Drainage Facilities	5% of Earthwork			7,518		25,738
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	2.45	33,648,137
2	High Structure	km	16,480,720	0.00	0	3.49	57,517,713
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.10	2,311,923
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	1.50	83,196,803
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	4.69	225,699,876
14	Trench Short	km	49,668,587	0.00	0	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	6.19	11,955,132
17	Retaining Walls	km	4,399,945	0.00	0	1.16	5,103,937
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	4.00	68,669,667
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	9.00	161,373,718
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	0.88	600,875	5.90	4,013,656
7	Major Utility Relocation - Suburban	km	273,407	0.08	20,998	4.59	1,254,528
8	Major Utility Relocation - Undeveloped	km	13,988	0.00	0	5.46	76,411
Right-of-Way							

DUMBARTON XS AND FREMONT CP							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Dumbarton Wye South to Caltrain		Fremont Central Park	
				DUMBARTON XS		FREMONT CP (HIGH BRIDGE)	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	1.35	3,684,821	13.32	36,464,942
	Suburban	hectare	479,081	0.12	56,053	9.32	4,466,954
	Undeveloped	hectare	342,201	0.00	0	10.66	3,646,493
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			134,099		21,642,686
System Elements							
1	Signaling (ATC)	km	845,654	0.96	811,828	14.19	11,999,834
2	Communications (w/Fiber Optic Backbone)	km	699,413	0.96	671,437	14.19	9,924,674
3	Wayside Protection System	km	67,144	0.96	64,458	14.19	952,769
Electrification Items							
1	Traction Power Supply	km	432,365	0.96	415,070	14.19	6,135,253
2	Traction Power Distribution	km	806,233	0.96	773,983	14.19	11,440,443
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			2,127,960		200,849,201
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			2,086,235		196,910,982
Total Construction					4,469,968		721,422,852
Total Construction and Right of Way (Includes Environmental Mitigation)					8,344,940		787,643,927
Grand Total					12,559,135		1,671,802,634

FREMONT CP (LOW BRIDGE) AND (TUBE)							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Fremont Central Park		Fremont Central Park	
				FREMONT CP (LOW BRIDGE)		FREMONT CP (TUBE)	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Double Track Section-Total	km		13.73		15.27	
1	Double Track Section - At Grade	km	993,167	7.11	7,061,416	3.55	3,525,742
2	Double Track Section - On Structure	km	1,878,243	1.15	2,159,979	6.25	11,739,016
3	Double Track Section - In Tunnel or Subway	km	1,878,243	4.69	8,808,958	4.69	8,808,958
4	Double Track Section - In Trench	km	1,878,243	0.78	1,465,029	0.78	1,465,029
	Single Track Section - Total	km		1.50		1.50	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	3.00	2,817,364	3.00	2,817,364
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
11	Regional Rail Bay Crossing Estimate	Lump Sum		5.00	322,767,859	5.00	702,953,999
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	0	0	0	0
3	Fill	m3	9	0	0	0	0
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	8.41	855,573	5.06	514,768
8	Special Drainage Facilities	5% of Earthwork			42,779		25,738
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	1.05	14,420,630	2.55	35,021,530
2	High Structure	km	16,480,720	0.10	1,648,072	3.70	60,978,665
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.00	0
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.10	2,311,923	0.10	2,311,923
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	1.50	83,196,803	1.50	83,196,803
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	4.69	225,699,876	4.69	225,699,876
14	Trench Short	km	49,668,587	0.78	38,741,498	0.00	0
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	6.19	11,955,132	6.19	11,955,132
17	Retaining Walls	km	4,399,945	1.16	5,103,937	1.56	6,863,915
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	4.00	68,669,667	4.00	68,669,667
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	9.00	161,373,718	9.00	161,373,718
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	5.91	4,022,841	5.90	4,013,656
7	Major Utility Relocation - Suburban	km	273,407	4.60	1,257,399	4.59	1,254,528
8	Major Utility Relocation - Undeveloped	km	13,988	5.48	76,586	5.46	76,411
Right-of-Way							
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	13.35	36,547,070	13.32	36,464,942

FREMONT CP (LOW BRIDGE) AND (TUBE)							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Fremont Central Park		Fremont Central Park	
				FREMONT CP (LOW BRIDGE)		FREMONT CP (TUBE)	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
	Suburban	hectare	479,081	9.35	4,477,015	9.32	4,466,954
	Undeveloped	hectare	342,201	10.68	3,654,706	10.66	3,646,493
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			20,553,210		22,143,615
System Elements							
1	Signaling (ATC)	km	845,654	15.23	12,879,314	16.77	14,181,622
2	Communications (w/Fiber Optic Backbone)	km	699,413	15.23	10,652,064	16.77	11,729,161
3	Wayside Protection System	km	67,144	15.23	1,022,598	16.77	1,125,999
Electrification Items							
1	Traction Power Supply	km	432,365	15.23	6,584,912	16.77	7,250,754
2	Traction Power Distribution	km	806,233	15.23	12,278,925	16.77	13,520,523
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			191,336,443		205,234,838
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			187,584,748		201,210,625
Total Construction					685,106,991		738,120,497
Total Construction and Right of Way (Includes Environmental Mitigation)					750,338,992		804,842,501
Grand Total					1,452,028,043		1,914,241,964

DUMBARTON 2 (LOW BRIDGE) AND (TUBE)							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Dumbarton Bay Crossing to Don Edwards		Dumbarton Bay Crossing to Don Edwards	
				DUMBARTON 2 (LOW BRIDGE)		DUMBARTON 2 (TUBE)	
Track				Quantities	Item Cost ($)	Quantities	Item Cost ($)
	Double Track Section-Total	km		8.00		8.00	
1	Double Track Section - At Grade	km	993,167	0.00	0	0.52	516,447
2	Double Track Section - On Structure	km	1,878,243	8.00	15,025,941	6.65	12,490,313
3	Double Track Section - In Tunnel or Subway	km	1,878,243	0.00	0	0.00	0
4	Double Track Section - In Trench	km	1,878,243	0.00	0	0.83	1,558,941
	Single Track Section - Total	km		0.00		0.00	
5	Single Track Section - At Grade	km	496,583	0.00	0	0.00	0
6	Single Track Section - On Structure	km	939,121	0.00	0	0.00	0
7	Single Track Section - In Tunnel or Subway	km	939,121	0.00	0	0.00	0
8	Single Track Section - In Trench	km	939,121	0.00	0	0.00	0
9	Freight Double Track - At Grade	km	993,167	0.00	0	0.00	0
10	Freight Single Track - At Grade	km	496,583	0.00	0	0.00	0
11	Regional Rail Bay Crossing Estimate	Lump Sum		5.00	322,767,859	5.00	702,953,999
Earthwork and Related Items							
1	Site Preparation - Undeveloped	hectare	12,081	0.00	0	0.00	0
2	Cut	m3	9	0	0	0	0
3	Fill	m3	9	107,820	959,773	137,820	1,226,822
4	Borrow	m3	13.35	0.00	0	0.00	0
5	Spoil	m3	0.00	0.00	0	0.00	0
6	Cut/Fill Slopes (Landscaping/Erosion Control)	hectare	8,075	0.00	0	0.00	0
7	Fencing (Both Sides of R/W)	km	101,733	0.00	0	1.30	132,253
8	Special Drainage Facilities	5% of Earthwork			47,989		67,954
Structures/Tunnels/Walls							
1	Standard Structure	km	13,733,933	0.00	0	1.20	16,480,720
2	High Structure	km	16,480,720	8.00	131,845,761	5.35	88,171,853
3	Long Span Structure	km	37,577,568	0.00	0	0.00	0
4	Waterway Crossing - Primary	km	28,876,734	0.00	0	0.10	2,887,673
5	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	km	23,119,226	0.00	0	0.00	0
6	Twin Single Track Drill & Blast (<6 Miles)	km	75,040,254	0.00	0	0.00	0
7	Twin Single Track TBM (<6 Miles)	km	55,464,535	0.00	0	0.00	0
8	Twin Single Track TBM w/3rd Tube (>6 Miles)	km	78,846,643	0.00	0	0.00	0
9	Double Track Drill & Blast	km	83,740,573	0.00	0	0.00	0
10	Double Track Mined (Soft Soil)	km	96,247,282	0.00	0	0.00	0
11	Seismic Chamber (Drill & Blast/Mined)	ea	94,803,899	0.00	0	0.00	0
12	Crossovers	ea	94,803,899	0.00	0	0.00	0
13	Cut & Cover Double Track Tunnel	km	48,123,641	0.00	0	0.00	0
14	Trench Short	km	49,668,587	0.00	0	0.83	41,224,927
15	Trench Long	km	39,272,836	0.00	0	0.00	0
16	Mechanical & Electrical for Tunnels	km	1,931,362	0.00	0	0.00	0
17	Retaining Walls	km	4,399,945	0.00	0	0.00	0
18	Containment Walls	km	1,500,559	0.00	0	0.00	0
19	Single Track Cut and Cover Subway	km	30,077,276	0.00	0	0.00	0
Grade Separations							
1	Street Overcrossing HSR - Urban	EA	17,167,417	0.00	0	0.00	0
2	Street Overcrossing HSR - Suburban	EA	6,485,469	0.00	0	0.00	0
3	Street Overcrossing HSR - Undeveloped	EA	1,093,628	0.00	0	0.00	0
4	Street Undercrossing HSR - Urban	EA	17,930,413	0.00	0	0.00	0
5	Street Undercrossing HSR - Suburban	EA	6,866,967	0.00	0	0.00	0
6	Street Undercrossing HSR - Undeveloped	EA	1,157,211	0.00	0	0.00	0
7	Street Bridging HSR Trench	EA	0	0.00	0	0.00	0
8	Minor crossing closure	EA	178,032	0.00	0	0.00	0
Rail and Utility Relocation							
1	Single Track Relocation (temporary)	km	1,271,661	0.00	0	0.00	0
2	Single Track Relocation (permanent)	km	1,271,661	0.00	0	0.00	0
3	Single Track Removal	km	63,372	0.00	0	0.00	0
5	Major Utility Relocation - Urban	km	680,338	3.50	2,381,388	3.50	2,381,388
7	Major Utility Relocation - Suburban	km	273,407	6.28	1,716,012	6.28	1,716,012
8	Major Utility Relocation - Undeveloped	km	13,988	1.21	16,884	1.21	16,884
Right-of-Way							

DUMBARTON 2 (LOW BRIDGE) AND (TUBE)							
COST ELEMENTS		UNIT	UNIT PRICE ($)	QUANTITIES			
Alignment Cost				Dumbarton Bay Crossing to Don Edwards		Dumbarton Bay Crossing to Don Edwards	
				DUMBARTON 2 (LOW BRIDGE)		DUMBARTON 2 (TUBE)	
Track				**Quantities**	**Item Cost ($)**	**Quantities**	**Item Cost ($)**
1	Right-of-Way Required for Each Segment						
	Urban	hectare	2,737,608	5.33	14,602,402	5.33	14,602,402
	Suburban	hectare	479,081	11.22	5,375,772	11.22	5,375,772
	Undeveloped	hectare	342,201	1.84	629,479	1.84	629,479
Environmental Mitigation							
	Environmental Mitigation	3% of Line Cost			5,244,006		5,750,360
System Elements							
1	Signaling (ATC)	km	845,654	8.00	6,765,234	8.00	6,765,234
2	Communications (w/Fiber Optic Backbone)	km	699,413	8.00	5,595,306	8.00	5,595,306
3	Wayside Protection System	km	67,144	8.00	537,149	8.00	537,149
Electrification Items							
1	Traction Power Supply	km	432,365	8.00	3,458,917	8.00	3,458,917
2	Traction Power Distribution	km	806,233	8.00	6,449,862	8.00	6,449,862
Program Implementation Costs (PER SCREENING)							
	Program Implementation Costs	25.5% of Total Cost & Procurement			51,166,228		55,599,350
Contingencies (PER SCREENING)							
	Contingencies	25% of Total Construction Cost			50,162,969		54,509,167
Total Construction					174,800,215		191,678,655
Total Construction and Right of Way (Includes Environmental Mitigation)					200,651,875		218,036,667
Grand Total					624,748,930		1,031,099,183

The MTC's "Regional Rail Plan for the San Francisco Bay Area"

The MTC, BART, Caltrain, and the Authority, along with a coalition of rail passenger and freight operators, prepared a comprehensive "Regional Rail Plan for the San Francisco Bay Area" (Plan) adopted by MTC in September 2007. The Plan establishes a long-range vision to create a Bay Area rail network that addresses the anticipated growth in transportation demand and meets that demand. This Plan examines ways to incorporate expanded passenger train services into existing rail systems, improve connections to other trains and transit, expand the regional rapid transit network, increase rail capacity, coordinate rail investment around transit-friendly communities and businesses, and identify functional and institutional consolidation opportunities. The plan also includes an analysis of potential high-speed rail routes between the Bay Area and the Central Valley. The Plan is separate from the Authority's Draft Program EIR/EIS but was accounted for in the "Cumulative Impacts" (Section 3.17) of the Draft Program EIR/EIS. The Plan issued and approved during the Draft Program EIR/EIS comment period provides useful additional information that should be considered during the Authority's decision-making process.

As the HST system involves major infrastructure investment, the Plan identifies and evaluates options for providing overlay services (use of the HST infrastructure for regional rail service with additional investments in facilities and compatible rolling stock). Overlay services are considered for each HST Network Alternative. Regional overlay operations on HST lines could provide service to additional local stations along the HST lines. Such local stops typically would be developed as four-track sections with a pair of outside platforms for regional trains and two express tracks (no platforms) in the center. The extent of the four-track sections would depend on the prevailing speed of the line for statewide service as well as the spacing and location of the local stops. The regional overlay services would be operated with compatible equipment, but the average speeds would be lower and the overall travel times would be greater than the HST because of the additional stops. Additional investment would be necessary to provide the infrastructure for such regional overlay services.

The Plan concludes that the Bay Area needs a Regional Rail Network. "As the BART system becomes more of a high-frequency, close stop urban subway system, it needs to be complemented with a larger regional express network serving longer-distance trips" and that "High-Speed Rail complements and supports development of regional rail—a statewide high-speed train network would enable the operation of fast, frequent regional services along the high-speed lines and should provide additional and accelerated funding where high-speed and regional lines are present in the same corridor" (MTC, 2007 *Regional Rail Plan*, pg ES-3).

The Plan concludes that "an Altamont alignment would have higher regional ridership (between points located from Merced and north) of 20-million trips in Year 2030 vs. about 16-million trips for a Pacheco alignment—by contrast, a Pacheco alignment would have higher ridership between Northern California and Southern California (between points located from Fresno and south) of 40-million trips in Year 2030 vs. about 34-million trips for an Altamont alignment". In addition, "if either Altamont or Pacheco were selected as the sole option, 4-track sections would be needed at regional stations as well as approaching and departing regional stops. These four-track sections would be required along the Altamont route between Fremont and Tracy and along the Pacheco route between San Jose and Gilroy. By contrast, with an Altamont + Pacheco option, two-track sections would suffice from San Jose to Gilroy and from Fremont to Tracy; additionally, a lower-cost bridge connection at the Dumbarton crossing could be developed thereby reducing the cost of a combination alternative by as much as $1 billion compared to simply building both of the alignments separately" (MTC, 2007, *Regional Rail Plan*, pg ES-17). The Plan also concludes that, "Regardless of which Altamont or Pacheco options would be developed, an initial phase of investment in the Peninsula alignment between San Jose and San Francisco would help make Caltrain, with an express/limited stop ridership potential of 6.3 million riders per year in 2030 'high speed rail ready'" (MTC 2007, *Regional Rail Plan*, pg. ES-18).

Recommendation for Preferred HST Network Alternative

The Staff recommends as the preferred alternative:

- **Pacheco Pass to San Francisco (via San Jose) for the proposed HST system and pursue "Regional Rail" commuter and HST service via the Altamont Pass between Sacramento/Northern San Joaquin Valley and Oakland/San Jose in partnership with local and regional agencies and transit providers.**

This preferred alternative (see Figure 1) is consistent with the recommendations of the MTC, Capitol JPB, Alameda County Congestion Management Agency, Alameda County Supervisor Scott Haggerty, and the Tri-Valley PAC.

Pacheco Pass

The Pacheco Pass alternative serving San Francisco and San Jose termini best meets the purpose and need for the proposed HST system. Key reasons include:

1) The Pacheco Pass minimizes impacts on wetlands, waterbodies, and the environment.

The statewide HST system should provide direct service to Northern California's major hub airport at SFO and major transit, business, and tourism center at downtown San Francisco. The Pacheco Pass alternative serving San Francisco and San Jose termini has the least potential environmental impacts overall while providing direct HST service to downtown San Francisco, SFO, and the San Francisco Peninsula (Caltrain Corridor) and minimizes construction issues which can lead to delay and cost escalation.

The Pacheco Pass enables San Francisco, SFO, and the San Francisco Peninsula to be directly served without a crossing of the San Francisco Bay. Altamont Pass alternatives requiring a San Francisco Bay crossing would have the greatest potential impacts on the San Francisco Bay and have high capital costs and constructability issues. The Dumbarton Crossing would also have the greatest potential impacts on wetlands and the Don Edwards San Francisco Bay National Wildlife Refuge. To implement these alternatives, extensive coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act and the California Coastal Commission and the Bay crossing would be subject to the USACE, CDFG, and BCDC permit process. A number of agencies, organizations, and individuals have raised concerns regarding to the construction of a HST crossing of the San Francisco Bay. These include the MTC, BCDC, USEPA, USFWS, Congress members Zoe Lofgren, Michael Honda, Anna Eshoo, and Tom Lantos, State Senators Elaine Alquist and Abel Maldonado, and Assembly member Jim Beale as well as Santa Clara County, San Mateo County Transit District (SamTrans), San Mateo County Transportation Authority (TA), Peninsula Corridor (Caltrain) Joint Powers Board (JPB), San Francisco Bay Trail Project, San Jose Chamber of Commerce, the City of San Jose, the City of Oakland, and Don Edwards (Member of Congress, 1963-1995).

While a considerable number of comments have raised concerns about potential environmental impacts for Pacheco Pass alternatives (in particular relating to potential impacts on the GEA), HST via the Pacheco Pass is feasible and preferred because the various measures that are available to avoid, minimize, and/or mitigate those environmental impacts on the extent feasible would offer opportunities for environmental improvements along the HST right of way and could be accomplished during project design, construction, and operation. This contrasts with the more uncertain regulatory approvals that would be needed for crossings of San Francisco Bay and the Don Edwards San Francisco Bay National Wildlife Refuge. Identification of a preferred alternative in the Final Program EIR/EIS is required for NEPA compliance. Since the recommended preferred alternative would have the least environmental impacts, it is also recommended as the environmentally superior alternative for CEQA compliance.

2) The Pacheco Pass best serves the connection between the Northern and Southern California.

Operational benefits result in greater frequency and capacity:
San Francisco and San Jose would be served with one HST alignment along the Caltrain corridor providing the most frequent service to these destinations, whereas the most promising Altamont Pass alternatives would split HST services (express, suburban express, skip-stop, local, regional) between two branch lines to serve San Jose and either San Francisco or Oakland—reducing the total capacity of the system to these markets. The proposed HST system already has two locations where there are branch splits (north of Fresno—to Sacramento and the Bay Area, and south of Los Angeles Union Station—to Orange County and the Inland Empire). Avoiding additional branch splits in the HST alignment would benefit train operations and service.

Provides a superior connection between the South Bay and Southern California
The Pacheco Pass enables the shortest, least expensive connection to be constructed between the South Bay and Southern California with the quickest travel times between these markets. A southern Santa Clara County HST station increases connectivity and accessibility for the South Bay and the three county Monterey Bay area.

Fewer stations between the Major Metropolitan Areas
The core purpose of the HST system is to serve passenger trips between the major metropolitan areas of California. There is a critical tradeoff between the accessibility of the system to potential passengers that is provided by multiple stations and stops, and the resulting HST travel times. Additional or more closely spaced stations (even with limited service) would lengthen travel times, reduce frequency of service, and the ability to operate both express and local services. The Pacheco Pass has the advantage of fewer stops through the high-speed trunk of the system between San Francisco or San Jose and Southern California, the most populated regions of the state.

Between Merced and Gilroy, the high-speed trains will be maintaining speeds well over 200 mph. The fact that there is no population between Merced and Gilroy along the Pacheco Pass is a positive attribute since there are fewer communities and hence less community impacts. Moreover, there will be no station between Gilroy and Merced. As a result, the Pacheco Pass minimizes the potential for sprawl inducement as compared with the Altamont Pass. Additionally, the Authority should reiterate its determination that there will be no HST stations between Merced and Gilroy. Should some future entity desire to consider proposing an added station in this segment it would require a substantial commitment of time and resources to reopen this issue and to conduct the extensive additional environmental review that would be needed.

3) The Pacheco Pass best utilizes the Caltrain corridor and is consistent with the Authority's adopted phasing strategy.

The Pacheco Pass alternative would enable the early, incremental implementation of the entire Caltrain Corridor section between San Francisco, San Jose, and Gilroy. The Authority's phasing plan identifies the Caltrain Corridor (between San Francisco and San Jose) as allowing the Authority to maximize the use of local and regional funds dedicated to train service improvements, and thereby helping to reduce the need for state funds.

4) The Pacheco Pass is strongly supported by the Bay Area region, cities, agencies, and organizations.

Much of the Bay Area local and regional governments, transportation agencies, and business organizations strongly support the Pacheco Pass alternative to San Francisco via San Jose and the Caltrain Corridor. Supporters of this Pacheco Pass alternative include: the Metropolitan Transportation Commission (MTC), the cities of San Francisco, San Jose, Redwood City, Fremont, Morgan Hill, Cupertino, Sunnyvale, Gilroy, and Salinas, the counties of San Francisco, Santa Clara,

San Mateo, and Monterey, Congress members Lofgren, Honda, Eshoo, and Lantos, Assembly member Beale, State Senators Alquist and Maldanado, the San Francisco County Transportation Agency, the Santa Clara Valley Transportation Authority (VTA), Peninsula Corridor (Caltrain) Joint Powers Board (JPB), San Mateo County Transit District (SamTrans), San Mateo County Transportation Authority (TA), Monterey County Transportation Agency, Alameda County Congestion Management Agency, Alameda County Supervisor Scott Haggerty, San Jose Chamber of Commerce, Redwood City Chamber of Commerce, San Mateo County Chamber of Commerce, the Silicon Valley Leadership Group, and a number of members of the public representing themselves. There is strong local and regional government support along the Pacheco Pass alignment throughout the Bay Area. This support is critical towards implementing this major infrastructure project through the heavily urbanized Bay Area linking San Francisco, San Jose and Gilroy.

The Central Valley (including Sacramento) and many transportation and environmental organizations are united in strongly preferring the Altamont Pass. However, to reach the major markets in the Bay Area, the Altamont Pass alternatives must go through Alameda County, including Livermore and Pleasanton in the Tri-Valley and Fremont. The Tri-Valley PAC (a partnership that includes the cities of Dublin, Livermore, Pleasanton, Danville, San Ramon, and Tracy along with transportation providers LAVTA, ACE, and BART) has raised serious concerns regarding right-of-way constraints and the need for aerial structures through the Tri-Valley. The Tri-Valley PAC supports HST service through the Pacheco Pass and "regional overlay service provided through the Altamont pass." They believe that this option may present the best way of addressing their concerns and delivering optimal HST service to the region as a whole. The Alameda County Congestion Management Agency and Alameda County Supervisor Scott Haggerty both support the MTC recommendation for the Pacheco alignment via the San Francisco Peninsula as the main HST express line between Northern and Southern California while also supporting upgraded interregional services between the Bay Area—Sacramento and the San Joaquin Valley via the Altamont Pass. The City of Fremont opposes the Altamont Pass alternative as does the City of Pleasanton although Pleasanton remains "open" to terminating Altamont alternatives in Livermore. The concerns through Alameda County are significant enough that the MTC, Alameda County Congestion Management Agency, and Alameda County Supervisor Scott Haggerty have requested that "the CHSRA also evaluate an alternative in the Altamont Corridor that terminates HSR at a proposed BART Livermore station"—even with the main HST express line using the Pacheco Pass.

Altamont Pass

The Altamont Pass provides superior travel times between Sacramento/Northern San Joaquin Valley and the Bay Area and is strongly supported by the Central Valley. Many of the comments received in support of the Altamont Pass are related to its great potential for serving long-distance commuters between the Central Valley and the Bay Area. As indicated by the comments received by the Tri-Valley PAC, many of the negative impacts associated with construction of HST through the Tri-Valley might be considerably reduced by the elimination of the additional tracks needed for HST express services.

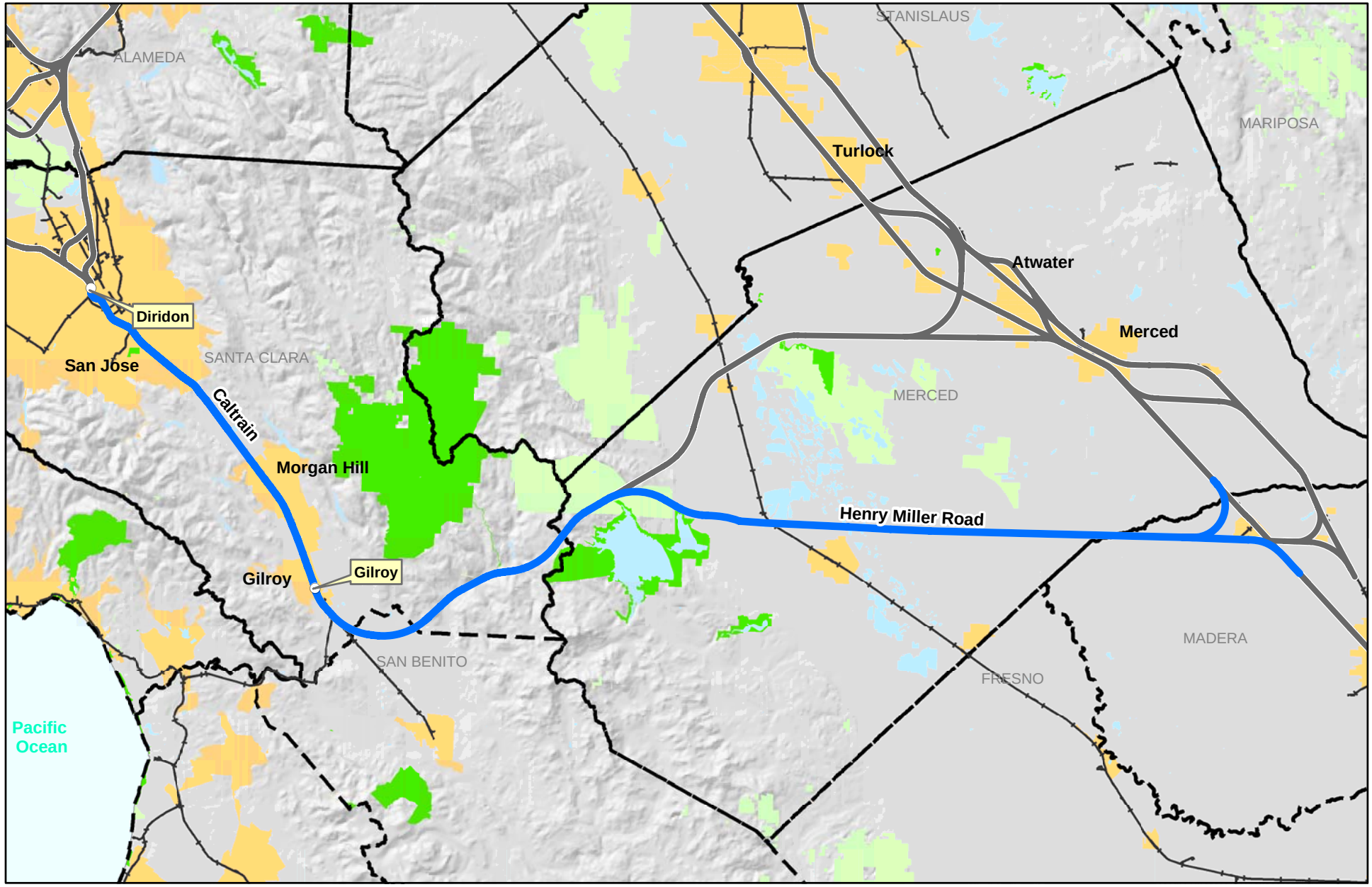
The staff recommends that the Authority pursue a partnership with "local and regional agencies and transit providers" to propose and develop a joint-use ("Regional Rail" and HST) infrastructure project in the Altamont Pass corridor—as advocated in MTC's recently approved "Regional Rail Plan for the San Francisco Bay Area". Regionally provided commuter overlay services would require regional investment for additional infrastructure needs and potentially need operational subsidies. The Authority cannot unilaterally plan for regionally operated commuter services.

Under the staff recommendation, the Altamont Pass corridor would be pursued as an independent though related project with a different purpose and need from the proposed HST system. The Authority's pursuit of improved regional commuter rail service in the Altamont Pass corridor should be dependent upon forming a partnership with the region for the joint-use infrastructure. After a

partnership is established, the Authority should spearhead [or some combination of lead, collaborate and coordinate] future project-level environmental studies and efforts to secure local, state, federal, and private funding to develop a joint-use infrastructure project in the Altamont corridor, including recommending that this corridor be part of a HST funding package.

The Authority's analysis suggests that Altamont HST overlay service might terminate in Oakland and/or San Jose via the East Bay, whereas the Regional Rail Plan recommends it cross the Bay at Dumbarton. MTC also recommends future study of terminating this service in Livermore. As a part of future studies, the Authority would need to work with MTC and other agencies to define the appropriate alternatives to be investigated for "Regional Rail"/HST in the Altamont Pass to serve long-distance inter-regional commuters. Staff recommends pursuing potential joint-use Altamont Corridor "Regional Rail"/HST services and identifying alternatives for further evaluation including: direct service to Oakland and/or San Jose or potentially terminating this corridor at Livermore (connecting to an extended BART system). Providing connectivity and accessibility to Oakland and Oakland International Airport would be a crucial objective for this project.

To lay the groundwork for a future "Regional Rail"/HST Altamont Pass project, the Authority should work with ACE, SJRRC, San Joaquin County Council of Governments, the Tri-Valley Pac, Alameda County, Santa Clara County, and others to get the Altamont "Regional Rail"/HST project identified in the update to the 2035 Regional Transportation Plan (RTP) and funds programmed in the 2035 RTP and RTIP. Once the Bay Area to Central Valley HST Program EIR/EIS is certified, the Authority should lead a Altamont "Regional Rail"/HST project study that addresses the Altamont Pass, the East Bay connections and stations in partnership with MTC and the agencies and transit providers along the Altamont corridor, which will provide the information necessary to undertake a project-level environmental document for this project.



10 5 0 10 20 30 Miles

10 5 0 10 20 30 Kilometers

CALIFORNIA HIGH SPEED RAIL AUTHORITY

Legend

- Stations
- Pacheco Pass HST Preferred Alignment
- Studied Alignments
- State Parks
- Federal Parks and Refuges
- Lakes
- Urban Areas
- County Lines

California High-Speed Train Program EIR/EIS

Preferred HST Alignment: San Jose to Central Valley

Figure 3

B006293

Comment Letter F005 (Kim Forrest, U.S. Department of the Interior, Fish and Wildlife Service, September 27, 2007)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

San Luis National Wildlife Refuge Complex
Post Office Box 2176
Los Banos, California 93635

F005

RECEIVED
SEP 27 2007
BY:

25 September 2007

VIA FACSIMILE AND U.S. MAIL
Mr. Mehdi Morshed, Executive Director
California High-Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814

Re: HSRA Should Study Only Alignments that Avoid the Grasslands Ecological Area

Dear Mr. Morshed:

I am writing on behalf of the San Luis National Wildlife Refuge Complex, in order to reiterate our natural resource concerns regarding the high-speed rail alignments through or adjacent to the Grasslands Ecological Area (GEA).

The importance of the ecosystem that the GEA protects is increasingly recognized both nationally and internationally. Encompassing approximately 180,000 acres, the GEA is the largest fresh water wetland complex in California and contains the largest block of contiguous wetlands remaining in California. Less than five percent of the original four million acres of Central Valley wetlands remain.

The GEA provides critical wintering habitat for the migratory waterfowl and shorebirds of the Pacific Flyway, including 20% of the Pacific Flyway waterfowl population. Waterfowl populations average a half-million, with peak numbers up to one million. Hundreds of thousands of shorebirds migrate through the area. The GEA provides habitat for more than 550 species of plants and animals, including 47 species that are endangered, threatened, or candidate species under state or federal law. As one of the largest remaining vernal pool complexes, the GEA is home to many rare species associated with this disappearing habitat. San Joaquin kit fox, Aleutian Canada [cackling] geese, sandhill cranes, Swainson's hawks, and tri-colored blackbirds are also very dependent upon the area.

The GEA consists of diverse habitats, including seasonally flooded wetlands, semi-permanent marsh, woody riparian habitat, wet meadows, vernal pools, native uplands, grasslands, and native brush land. The GEA was recognized in1991 by the Western Hemisphere Shorebird Reserve Network as one of only 15 internationally significant shorebird habitats. In addition, it was recognized in 1999 by the American Bird Conservancy as a *Globally Important Bird Area.* Most recently, it was designated a *Wetland of International Importance* under the Ramsar Convention due to its importance to a variety of wildlife, including several rare and endangered species, it critical role as wintering habitat for Pacific Flyway waterfowl, and its status as the largest remaining block of wetlands in what was once a vast Central Valley ecosystem. The Ramsar Convention is an international agreement dedicated to the worldwide protection of ecosystems that span member nation's borders. The GEA is one of only 22 sites in the United States and four in California that have received this status. F005-1
In recognition of the rich and critically important natural resources of the Grasslands, conservation agencies and groups have focused more attention and funding on this area than most areas of the State. There are two U. S. Fish and Wildlife Service national wildlife areas encompassing approximately 36,500 acres, a U. S. Fish and Wildlife Service conservation easement program that encompasses 75,000 acres on 180 separate private properties, six units of the California Department of Fish and Game wildlife areas encompassing approximately 25,000 acres, a California Department of Parks and Recreation state park, and an extremely active Natural Resources Conservation Service program. This area has garnered numerous habitat restoration and enhancement grants totaling millions of dollars, and is one of the most active areas for conservation group involvement. F005-1 cont.

The Bay Area to Central Valley Environmental Impact Report/Environmental Impact Statement (EIR/S) for the California High Speed Train System, completed by the High Speed Rail Authority (HSRA), continues to propose a Pacheco Pass alignment that bisects the GEA along Henry Miller Avenue or else runs immediately adjacent to it along its northern boundary along Highway 140 and fragments a portion of the GEA. Our prior comments have provided extensive documentation of the fragility and importance of this area and the likely harm that would result from even an elevated rail alignment though this area. Both of these Pacheco Pass alignments would cause unrecognized damage to the GEA.

The GEA is a small remnant of the once vast historic Central Valley wetlands. Yet, the HSRA proposes to further degrade this priceless area of the California landscape. The Henry Miller Avenue alignment bisects the GEA through its most vulnerable middle. A Highway 140 alignment would isolate the California Department of Fish and Game's China Island Unit of the North Grasslands Wildlife Area from the rest of the GEA. Both alignments may cross both California Department of Fish and Game wildlife areas and U. S. Fish and Wildlife Service refuges, in addition to lands protected by federal and state conservation easements; regardless, simply aligning immediately adjacent to these protected lands in this locale would be equally harmful. Bisection of -- or routes immediately adjacent to -- the GEA will interfere with critical wildlife corridors, further aggravate the isolation of wildlife populations, interfere with waterfowl/waterbird nesting and breeding, and increase wildlife mortality. The physical description of a typical track layout – with a 50- to 100-foot right-of-way ("comparable to a six-land highway"), 8-foot chain-link fencing on both sides of the tracks, 26-foot tall catenary supports every 30 feet, and 12-foot to 16-foot soundwalls where proposed – would create a profound barrier. F005-2

In addition, any alignment through or adjacent to the GEA leaves open the possibility that a Los Banos/Gustine/Santa Nella area station may be added in the future. Continued population growth may create a situation where a station becomes economically viable – particularly with added political pressure. Much land in the Santa Nella, Los Banos, and the Highway 140 area is already being purchased and/or planned for development by developers.

The EIS/R identifies a proposed site for a fleet storage/service and inspection/light maintenance facility to support the Pacheco Pass alignments immediately west of the SR-165 and Henry Miller Avenue intersection. This is *immediately* adjacent to the GEA. Development of this facility – not to mention additional development pressures that would surely follow -- would have a profound impact on the GEA. This would increase the attractiveness of the area for sprawl and population increases adjacent to the GEA. The EIR/S recognizes the potential threats of urban sprawl; yet, I do not believe that the discrepancy in housing costs between the Central Valley and the San Francisco Bay Area is fully recognized. It has already caused massive urban growth in the Central Valley; and the potential for an extremely convenient commute would increase that growth by an order of magnitude. F005-3

Clearly, a high-speed train is growth-inducing. The impact of growth relative to the existing population, open space, lifestyles, and community type needs to be considered. For example, an increase of 50,000 people may be negligible to a community of nearly a million (San Jose), but it would be devastating to the way of life and habitat linkages of a town the size of Los Banos (less than 40,000). Social impacts and growth-inducing impacts to small towns and urban sprawl could very well be the most damaging negative impact of this high-speed train. F005-4

Bisection of the GEA conflicts with the private-public partnership that has long protected this unique resource. There is very little recognition of these conservation protections in the EIR/S, and no mention whatsoever of the largest category of conservation protection – USFWS conservation easements on private property. Clearly, the environmental review is still inadequate, considering that there is very F005-5

Comment Letter F005 - Continued

little mention of either the privately-owned wildlife habitat or the lands management by the State of California (both the California Department of Fish and Game and the California Department of Parks and Recreation), and the EIS/R contains such unsupported conclusions as: "The Henry Miller alignment alternatives would not impact the GEA." F005-5 cont.

The Pacheco Pass alignment would result in an estimated 10 minute reduction in travel time between Los Angeles and San Jose or San Francisco over the Altamont Pass alignment. This surely cannot be valid justification for the great environmental damage done to this area of the Diablo Range and the GEA and its environs. And, the Altamont Pass alignment may very well better serve and provide more options for ***intra***-Bay Area transportation needs (an area well-known for its traffic jams), not to mention the obvious benefits to the Sacramento/Stockton/Tracey communities. F005-6

When one looks at the travel needs and deficits of the State in a logical and economical manner, it appears that a blend of options would work best. According to the latest data, San Francisco Bay Area commuters are second only to Los Angeles commuters in time spent stuck in traffic. The HSRA needs to consider such options as improved air travel for the long distances between major metropolitan areas and high-speed rail within the metropolitan areas (San Francisco/San Jose/East Bay, Los Angeles/San Diego, and Sacramento/East Bay). Consolidation of transportation infrastructure that contains sprawl rather than inducing it has the potential to substantially benefit wildlife. Not only would this better focus transportation efforts where they are clearly needed the most, in addition it would eliminate costly and unnecessary expenses, move people off of the highway system, decrease wear and tear on the highway -- and thus operations and maintenance expenses, improve safety, and vastly reduce negative environmental and social impacts across the entire landscape of California. F005-7

There is wide agreement among agencies, environmental groups, and train-rider associations that an Altamont Pass alignment would best minimize environmental impacts and maximize ridership potential. The Altamont Pass alignment would add additional transportation options along an existing disrupted and congested corridor and encourage population growth in already established areas. This is an area of rapid growth; the HSRA should focus their efforts after the European model, which looks to "densification" of existing cities, rather than encouraging urban sprawl and damaging the character of small rural communities. We support the selection of this route as the environmentally preferable alternative over any Pacheco Pass route. F005-8

Due to the importance of the resources of the GEA -- and the amount of public and private focus, energy, and funds that have been invested in its protection -- we strongly urge the HSRA to eliminate any high-speed train alignments that cross through or adjacent to the GEA. F005-9

Thank you for considering these comments.

Sincerely,

Kim Forrest
Wildlife Refuge Manager

Cc: Dan Walsworth, Refuge Supervisor; FWS/CNO
Susan Jones, Branch Chief; FWS/Endangered Species Program
Maryann Owens, Biologist; U. S. Fish and Wildlife Service
Dave Widell, General Manager; Grassland Water District
Julie Vance, Senior Environmental Scientist; California Department of Fish and Game
Bill Cook, Wildlife Habitat Supervisor II; California Department of Fish and Game
Malia Ortiz, District Conservationist; USDA/NRCS
Dr. Frederic Reid, Director of Conservation Planning; Ducks Unlimited, Inc.
Chris Hildebrandt, Regional Biologist; Ducks Unlimited, Inc.
Diana Westmorland Pedrozo, Executive Director; Merced County Farm Bureau
Rod Webster; Merced Sierra Club
Marsh Pitman/Ken Gosting; Transportation Involves Everyone

United States Department of the Interior

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FAX TRANSMITTAL

Date 5 Sept 07

No. of pages 4
(Including cover sheet)

To: Mr. Mehdi Morshed
916/322-0827

From: U.S. Fish and Wildlife Service
San Luis National Wildlife Refuge Complex

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Comments:

TAKE PRIDE IN AMERICA

Response to Letter F005 (Kim Forrest, U.S. Department of the Interior, Fish and Wildlife Service, September 27, 2007)

F005-1

Comment acknowledged.

F005-2

The Preferred Alternative identified in this Final Program EIR/EIS is the Pacheco Pass Network Alternative, San Francisco and San Jose Termini, which includes the Henry Miller alignment alternative and therefore would not affect the San Luis National Wildlife Refuge Complex. The Preferred Alternative (Chapter 8) does not include a station in the Los Banos/Gustine/Santa Nella area.

The discussions of biological and wetlands impacts and mitigation strategies are found in Section 3.15, as are design practices that have been incorporated into the project to avoid, minimize, and/or mitigate any potential impacts. As noted in Section 2.3.2, design practices include co-locating the HST with other transportation corridors, culverts, and passageway constructed at appropriate intervals to allow the movement of wildlife species, and placement of the trackway on bridges or elevated structures across wetlands, water bodies, or sensitive natural communities. Additionally, the HST right-of-way width could be reduced in constrained areas to minimize impacts on biological resources.

The program EIR/EIS analyzed two Pacheco Pass alignment alternatives that would cross the area designated as the GEA. These included the GEA North alignment alternative and the Henry Miller alignment alternative.

The GEA North alignment would extend through the northwest portion of the GEA, including the California Department of Fish and Game– (CDFG-) managed North Grasslands Wildlife Management Area (WMA), San Luis National Wildlife Refuge, and the Great Valley Grasslands State Park. State Route 140 also extends through the GEA just south of the GEA North alignment alternative. Other development in this area of the GEA includes roads (Santa Fe Grade, Preston Road), canals, farm operations, and agriculture. This alignment alternative would result in a potentially significant impact because it would not be co-located with an existing transportation or utility corridor, it would bisect and fragment the North Grasslands WMA, and it would result in impacts on the refuge and the state park in addition to biological resources and wetlands as identified in Section 3.15. These impacts played an important part in the identification of the Preferred Alternative, which does not include the GEA North alignment.

The Henry Miller alignment alternative would extend through two southern portions of the generally designated GEA area and would be immediately adjacent to the roadway where it crosses areas now managed by public agencies. This alignment alternative would be adjacent to the existing Henry Miller Road and would avoid or minimize potential impacts on biological resources. The western portion crossed by the alignment alternative closest to Los Banos would extend adjacent to Henry Miller Road and the San Luis Wasteway and cross Ingomar Road ½ mile south of the Volta Wildlife Area. This area of the GEA currently is bisected by transportation and infrastructure facilities, including rail and roadways, and also includes housing development, farm operations, and land under active agricultural production. The other area of the GEA crossed by the alignment along Henry Miller Road is south of the CDFG Los Banos Wildlife Area parking lot and 2 miles south of the San Luis National Wildlife Refuge. This segment would be immediately adjacent to the roadway by the wildlife area and would not extend into the Refuge. As shown on the current conceptual plans, the alignment would extend approximately 3.3 miles on elevated structure, through the GEA area along Henry Miller Road. This area of the GEA is bisected by Henry Miller Road, State Route 165, Baker Road, Delta Road, Santa Fe Grade, Criswell Avenue, and a number of human-made canals and includes housing development, farm operations, and land under active agricultural production.

Use of the Henry Miller alignment alternative would not be expected to result in further fragmentation of habitat in the GEA because the alignment is adjacent to Henry Miller Road, an existing entity, and would be elevated for almost half the distance through the GEA. Both the general area designation of the GEA and the establishment of the USFWS Grasslands WMA occurred well after roads, utilities, farms, and residences were well established, and the Henry Miller alignment alternative would not result in additional fragmentation. The boundaries for the GEA and the WMA may change. Expanding the WMA does not mean that all properties within it are, or would be, under conservation easements. An Environmental Assessment prepared in 2005 by the USFWS supported its decision to expand the general area by an additional 46,400 acres. The USFWS and other agencies may seek to acquire easements, lands, or interests in lands from willing sellers, as funds allow, but landowners are not required to participate and their lands have no regulatory restrictions placed on them as a result of the 2005 review by the USFWS.

The program-level environmental analysis provided in Section 3.15 identifies potential impacts that the alignment alternatives and station location options may have on wildlife corridors, special-status wildlife and plant species, wetlands, conservation plans, special management areas and vegetation communities. Broad program mitigation strategies also are identified in Section 3.15.5. The HST system would include fencing, catenary supports, and soundwalls (where needed to mitigate noise impacts). Impacts of these elements on biological resources will be fully evaluated at the project level when more details of these elements have been identified. It should be noted there are a number of existing canals, electrical lines and power poles, substantial berms, and fences along Henry Miller Road.

The analysis in Section 3.15 also identifies the need for field reconnaissance–level surveys to be conducted as part of the future Tier 2 project-level environmental analysis. These future surveys will determine specific habitat conditions and impacts along the entire preferred HST network alternative, including Henry Miller Road, and surrounding areas. This detailed analysis will identify specifically where there are construction and operation impacts, including noise and vibration, on critical wildlife corridors, wetlands, sensitive habitat, and special-status species, and the project's potential to affect waterfowl/waterbird nesting and breeding and mortality. The Henry Miller alignment and other alignments using Pacheco Pass will be further designed at the project level to avoid or minimize potential impacts. Mitigation strategies identified at the program level will be refined and applied at the project level to mitigate significant impacts. The Authority and FRA will continue coordination with all agencies and organizations involved to identify specific issues and develop solutions that avoid, minimize, and mitigate potential biological impacts. The Authority and FRA also have committed to investigating site-specific location and design alternatives for the preferred alignment alternative and station location options, including avoidance and minimization alternatives, during the Tier 2, project-level environmental review. This includes evaluating design alternatives to the north and south of the current proposed Henry Miller alignment alternative. See also Section 3.15.5 regarding the Authority's commitment to acquire agricultural, conservation, and/or open space easements for potential impacts in and around the GEA.

There is no site for a station in the vicinity of the Los Banos, Gustine, or Santa Nella area in the Final Program EIR/EIS. The Authority has determined that a station in any of these areas should not be pursued in any subsequent environmental analysis.

F005-3

The Final Program EIR/EIS does not identify, and the Preferred Alternative does not include, any site for a fleet storage/service and inspection/light maintenance facility along the Henry Miller Road section of the proposed alignment in the vicinity of Los Banos.

F005-4

Please see Standard Response 4 regarding growth inducement.

F005-5

The GEA is discussed and described in Section 3.15. Additional discussion of the USFWS conservation easements has been included

in this Final Program EIR/EIS. The text has been revised to clarify that the Henry Miller alignment alternative would not affect the San Luis National Wildlife Refuge Complex within the area identified as the GEA.

F005-6

Please see Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative.

F005-7

The Preferred Alternative presented in this Final Program EIR/EIS is the Pacheco Pass Network Alternative, San Francisco and San Jose Termini. To improve connectivity and passenger rail service in the region, the Authority is working with the region's transit providers and planning agencies to assist in identifying regional rail improvements in the Altamont Corridor. These improvements would not meet the purpose of and need for the HST system but rather are an opportunity for the region to improve mobility and access in this corridor and provide connectivity to the HST system. These improvements would need to undergo their own environmental review and would be subject to California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements and regulations to the extent federal agency actions are involved. Please see Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative.

F005-8

Please see Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative.

F005-9

The Preferred Alternative presented in this Final Program EIR/EIS is most likely to yield the Least Environmentally Damaging Practicable Alternative (LEDPA). Additionally, the Authority and FRA have identified design modifications and mitigation measures to reduce impacts on waters of the United States, wildlife corridors, and species habitat. The Preferred Alternative identified in this Final Program EIR/EIS is the Pacheco Pass Network Alternative, with San Francisco and San Jose Termini, which includes the Henry Miller alignment alternative. Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass as the Preferred Alternative. This alternative would not directly affect the San Luis National Wildlife Refuge Complex, existing wildlife management areas, state parks, or established wildlife protection areas in the area generally identified as the GEA. Future project-level analyses would include focused surveys for species state- or federally listed as threatened and endangered and detailed identification of habitat, wildlife movement/migration corridors, and wetlands and water resources to further identify impacts and develop site-specific mitigation measures. In addition, engineering design refinements would be undertaken to avoid and/or minimize environmental impacts. The Authority and FRA will continue to work with the USFWS and the CDFG to identify conservation measures to further enhance resource protections within the GEA. See also Section 3.15.5 regarding the Authority's commitment to acquire agricultural, conservation, and/or open space easements for potential impacts in and around the GEA.

Comment Letter F007 (Nova Blazej, U.S. Environmental Protection Agency, October 26, 2007)

F 007

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

October 26, 2007

Mark Yachmetz
Associate Administrator of Railroad Development
Federal Railroad Administration
1120 Vermont Avenue, NW, MS 20
Washington, D.C. 20590

Subject: Bay Area to Central Valley California High Speed Train System Draft Programmatic Environmental Impact Report/Environmental Impact Statement (CEQ# 20070303)

Dear Mr. Yachmetz:

The Environmental Protection Agency (EPA) has reviewed the Draft Programmatic Environmental Impact Report/Environmental Impact Statement (Draft PEIS) for the Bay Area to Central Valley California High Speed Train System. Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act. Our detailed comments on the entire Draft PEIS are enclosed. F007-1

EPA requested to be a cooperating agency in this "Tier 1", or programmatic environmental review NEPA process and has been working with Federal Railroad Administration (FRA) and California High Speed Rail Authority (CHSRA) to address the potential environmental impacts of the project as outlined in a June 12, 2006 Interagency Memorandum of Understanding (MOU). The Tier 1 process is expected to eliminate broad corridor alternatives from further consideration. Future "Tier 2", or project-level analyses, will address site-specific environmental impacts of the high speed train system. The MOU outlines a process for integrating the requirements of NEPA and Clean Water Act (CWA) Section 404 in Tier 1 to streamline the environmental review and permitting process in Tier 2. A federal permit from the Army Corps of Engineers under CWA Section 404 will be required for this project at Tier 2 due to anticipated fill of waters of the United States. The MOU seeks to ensure that the alignments advanced to Tier 2 are most likely to contain the "least environmentally damaging practicable alternative," a determination that is required for a CWA Section 404 permit.

EPA commends FRA and CHSRA's commitment to analyze a full range of alternatives connecting the Bay Area to the Central Valley in this separate PEIS, which includes Altamont Pass alternatives, and excludes alternatives that bysect Henry Coe State Park, as recommended by our agency and multiple additional stakeholders. While we are supportive of a high speed train system for California, and connecting Bay Area to the Central Valley, we have rated this project as Environmental Concerns – Insufficient Information (EC-2) based on impacts to F007-2

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aquatic resources and the indirect and cumulative impacts analyses. A "*Summary of Rating Definitions*" for further details on EPA's rating system is enclosed. F007-2 Cont.

EPA's comments focus on issues we would like addressed before a Tier 1 Record of Decision is signed. We seek to alert FRA to the potential consequences of these decisions on future Tier 2 analyses. We have three major areas of concern for this Tier 1 project: 1) selection of the alternative corridors most likely to contain the LEDPA, 2) growth-related impacts, and 3) cumulative impacts to resources of concern. F007-3

As a cooperating agency, we look forward to meeting with you to discuss how this information can be addressed in the Final Tier 1 PEIS. This will help to ensure that the alignment moved forward for future Tier 2 project-level study is most likely to contain the least environmentally damaging practicable alternative, the only alternative that can be permitted under CWA Section 404, connecting the Bay Area to the Central Valley. We look forward to working with FRA and CHSRA to identify ways to address these issues and the other concerns identified in the enclosed detailed comments. F007-4

The enclosure further describes the above-listed comments and the additional environmental concerns that EPA identified following our review of the Draft PEIS. We appreciate the opportunity to review the Draft PEIS and believe that a well-planned high speed train system can offer great economic and environmental benefits for California's future. We look forward to continuing our coordination with FRA and CHSRA and are available to discuss the issues addressed in this letter during upcoming interagency meetings. If you have any questions, please feel free to contact Connell Dunning (415-947-4161) or Erin Foresman (916-557-5253), the lead reviewers for this project. F007-5

Sincerely,

Connell Dunning
for Nova Blazej, Manager
Environmental Review Office

Enclosures: EPA's Detailed Comments
Summary of Rating Definitions

cc: Mehdi Morshed, California High Speed Rail Authority
Jane Hicks, Army Corps of Engineers
Mark Littlefield, U.S. Fish and Wildlife Service

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Comment Letter F007 - Continued

EPA DETAILED COMMENTS ON THE BAY AREA TO CENTRAL VALLEY CALIFORNIA HIGH SPEED TRAIN SYSTEM DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT, OCTOBER 26, 2007

Integration of Clean Water Act and National Environmental Policy Act Requirements F007-6

The Federal Railroad Administration (FRA) and California High Speed Rail Authority (CHSRA) are using a tiered process for the National Environmental Policy Act (NEPA) analysis of the proposed project. The goal for this Tier 1 (programmatic) Environmental Impact Statement (EIS) is to identify a corridor for future Bay Area to Central Valley rail. The Tier 2 (project-level) EIS will analyze specific alignment options for the rail within the corridor(s) identified in Tier 1. After Tier 2 project approval, but before project construction, the project proponent will need to obtain a Clean Water Act (CWA) Section 404 individual permit from the U.S. Army Corps of Engineers (Corps).

The CWA Section 404(b)(1) Guidelines (Guidelines) are binding, substantive regulations that restrict CWA Section 404 permits to the "least environmentally damaging practicable alternative (LEDPA)." The Corps cannot grant a CWA Section 404 permit to a preferred project-level alternative that is not the LEDPA; therefore, it is critical that the LEDPA is not prematurely eliminated during the Tier 1 NEPA review.

FRA, CHSRA, Corps, and U.S. EPA Region IX agreed to follow a NEPA/CWA Section 404 Integration Process Memorandum of Understanding (NEPA/404 MOU) for Tier 1 decision making as the framework to guide the environmental review of the programmatic, Tier 1 project. The goal of the modified NEPA/404 MOU process is to ensure that Tier 1 decisions reflect careful consideration of the Guidelines. The Guidelines should be addressed as early as possible in the Tier 1 NEPA evaluation to eliminate the need to revisit decisions at the Tier 2 project-level that might otherwise conflict with CWA 404 permit requirements.

EPA has agreed with the first three checkpoints in the NEPA/404 MOU process – the purpose and need, criteria for selecting the range of alternatives, and the range of alternatives. The next steps in the process are: 1) to select the corridor(s) most likely to contain the LEDPA and 2) to determine the mitigation framework for the project.

Corridor(s) most likely to contain the LEDPA

Multiple Mountain Crossings F007-7

On January 22, 2007, EPA concurred with the range of alternatives to be analyzed in the Programmatic Draft EIS. EPA concurred on multiple alternatives to be analyzed, including Altamont Pass options and Pacheco Pass options, with potential bridge crossings. EPA did not, however, concur with the potential scenario of a high speed train system with *both* an Altamont Pass and a Pacheco Pass alignment. In follow up discussion with CHSRA and FRA, we have voiced a concern regarding potential doubling of impacts that would result from crossing at both the Altamont Pass and Pacheco Pass.

Recommendations:
In order to be consistent with the Guidelines, EPA recommends eliminating from further consideration a high speed rail alternative connecting Bay Area to Central Valley that includes both an Altamont Pass alignment and a Pacheco Pass alignment, termed

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"*Pacheco Pass with Local Service*" in the Draft PEIS. This scenario would effectively result in twice the habitat fragmentation, noise, and indirect impacts to aquatic resources. This alternative would likely result in CWA Section 404 permitting challenges because it is difficult to demonstrate that mountain crossings at both Pacheco and Altamont Passes represent the LEDPA given the increased indirect and direct impacts to aquatic resources and habitat fragmentation associated with this alternative. F007-7 Cont.

Indirect Impacts

The Guidelines call for an analysis that compares the total impact – direct and secondary (indirect) – for each alternative. However, the Draft PEIS only includes direct impacts in the comparison of alternatives in some comparison matrices (e.g., Table S.5-1). It is important to include indirect, including growth-inducing impacts, in the alternatives analysis comparison, because an alternative with greater direct impacts, but fewer indirect impacts (including growth-related impacts) may be identified as the LEDPA if another alternative with greater indirect impacts is also being analyzed.[1] F007-8

Recommendation:
In order to be consistent with the Guidelines and determine which corridor is most likely to contain the LEDPA, the alternatives analysis should compare and present the alternatives using both direct and indirect impacts to environmental resources of concern.

Pacheco Pass and Altamont Alignments

As disclosed in the Draft PEIS, and as identified in the previously completed statewide High Speed Rail Programmatic DEIS, the Pacheco Pass alignments may result in substantial impacts to wetlands and other waters and may result in substantial impacts to jurisdictional waters. The Altamont Pass alignments also result in a large number of impacts to aquatic resources. The significant loss of aquatic resources associated with Pacheco Pass and Altamont alignments, as well as the impacts to wildlife corridors and habitat fragmentation, are not consistent with the substantive binding requirements of CWA Section 404(b)(1) Guidelines to avoid and minimize impacts to the maximum extent practicable (40 CFR 230.10 (a) and (d)). Specifically, the magnitude of impacts to bay waters and special aquatic sites may cause or contribute to significant degradation of waters of the United States (40 CFR 230.10(c)) and design modifications and commitments are needed to reduce impacts to resources. F007-9

Recommendations:
If the FRA and CHSRA choose to advance the Pacheco Pass alignments or Altamont Pass alignments for high speed rail to Tier 2 (or request the agencies concur that either alignment is the alternative most likely to contain the LEDPA), substantial alignment and design modifications would be important to reduce impacts consistent with the Guidelines.

Bay Crossings

The loss of waters associated with all Bay Crossings analyzed are not consistent with the substantive binding requirements of CWA Section 404(b)(1) Guidelines (40 CFR 230.10 (a) and F007-10

[1] Chapter 2.3, Guidance for Preparers of Growth-related, Indirect Impact Analyses. http://www.dot.ca.gov/ser/Growth-related_IndirectImpactAnalysis/gri_guidance.htm#cwadef

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Comment Letter F007 - Continued

(c)). Specifically, the magnitude of impacts to bay waters and special aquatic sites may cause or contribute to significant degradation of waters of the United States (40 CFR 230.10(c)). All opportunities for reducing impacts should be clearly identified in order to determine if a route that includes a Bay Crossing is most likely to to contain the least environmentally damaging practicable alternative. F007-10 Cont.

Recommendations:
In order for an alternative to be considered as the LEDPA, all feasible (in terms of logistics, cost, technology, availability, etc.) design modifications to reduce impacts to waters should be incorporated. If FRA chooses to advance alignment options with Bay Crossing options, all design modifications, and more accurate estimates of potential impacts should be presented in the Final PEIS. This would inform decision-makers about the potential opportunities for reducing impacts to waters from the project.

Growth-related Impacts Analysis

Chapter 5, Economic Growth, provides an estimate of urbanization associated with the high speed train system and notes that specific station sites may lead to greater induced growth /urbanization than other station sites. For example, page 5-30 states the following: F007-11

In Stanislaus County, the Amtrak Briggsmore station could lead to the urbanization of 1,000 more acres in the county than the SP Downtown site, leading to additional indirect impacts; this difference between station sites accounts for about 35% of the difference in urbanized area size between the Altamont and Pacheco Network alternatives noted in Table 5.3-6 for Stanislaus County.

The information regarding potential induced growth impacts due to specific station sites is informative for decision-makers and should be highlighted to better inform ultimate choice of station locations. In addition, because urbanization estimates attributed to some station sites has such a large impact on the projected urbanization values (35% of all impacts in the above scenario), the Final PEIS should present a range of potential impacts, by resource, to each county, identifying low- and high-end estimates of potential urbanization.

Recommendations:

- Include a table of all proposed station sites with estimates of acres of induced growth/urbanization impacts associated with each location.
- Include a map of all proposed station sites showing the estimated area of induced growth/urbanization impacts associated with each location.
- Clearly delineate on the table what station sites would have the least projected acreage of induced urbanization and which station sites would have the greatest projected urbanization.
- Revise all values of impacts in tables in Chapter 5 to provide range of potential acreage/mileage impacts, including an "upper" and "lower" value. For example, for urbanization impacts to Stanislaus County, the acreage of urbanization should clearly reflect that, depending upon the choice of station, the impacts vary by 1,000 acres.

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Chapter 5 concludes that Merced and Madera counties are likely to experience the greatest magnitude of secondary impacts. F007-12

Recommendation:

- In Chapter 5, include specific mitigation measures to address and offset high growth-inducing impacts to Merced and Madera counties, and other counties that will be most affected by potential growth-inducement from high speed train.
- Specifically, the Final PEIS should include a Growth Mitigation Plan to create a strategy for addressing, planning for, and mitigating growth-related impacts in counties that will be most affected. The Plan should include:
  - an outlined process for coordination with agencies that have land-use planning authority in the affected counties and location near the high speed train
  - a list of growth limiting and management measures, including changes in the General Plan designations, zoning, conservation easements, purchase of land
  - a suggested timeframe for coordinating with land-use planners, including who will initiate discussions, how the public will be involved, etc.
  - references to the transit-oriented principles that FRA and CHSRA have developed for the high speed train system.

Cumulative Impacts Analysis

While NEPA provides for the option of cumulative impacts analyses to be limited through the use of tiering, as stated on page 3.17-2, it is important to note that the scope of this PEIS is not the same as the scope of the analysis for the Bay Area to Central Valley portion of the previously completed statewide high speed rail document. Therefore, tiering from the previously completed document would not have included information related to cumulative impacts resulting from the Altamont Pass project. In addition, EPA provided multiple recommendations to FRA and CHSRA for improving upon the Cumulative Impacts Analysis protocol that was used for the previously completed statewide PEIS, so EPA does not support any tiering from the conclusions provided in that document for this project. F007-13

EPA completed a preliminary review of the draft Cumulative Impacts Analysis in March 2007 and provided feedback through a memo from our agency to FRA and CHRSA. While some of our feedback was considered (as indicated below), several points were not incorporated. We provide the following recommendations for updating the cumulative impacts analysis and including it in the Final EIS as a follow up to recommendations already provided: F007-14

- As proposed by EPA through previous interagency correspondence, the following is a suggestion for steps in a cumulative impact assessment with recommendations accompanying specific steps. See the Caltrans Cumulative Impact assessment Guidance, which is applicable to non-highway projects: (http://www.dot.ca.gov/ser/cumulative_guidance/purpose.htm

Steps for Cumulative Impacts Analysis

1) Identify resources to consider in the impact analysis. F007-15
This is included in Section 3.17.4. EPA has no further recommendations regarding this step.

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Comment Letter F007 - Continued

2) Define the study area for each resource. F007-16
This is not defined in the Draft PEIS Cumulative Impacts Section.

Recommendation: The Draft PEIS should include a description of the study area examined for each resource.

3) *Describe the current health and historical context for each resource.* F007-17
This is generally described in Section 3.17.4 for each resource area. EPA has no further recommendations regarding this step.

4) *Identify direct and indirect impacts of the proposed project that might contribute to a cumulative impact.* F007-18

Recommendation: Clarify in Section 3.17.4 what potential indirect and direct effects are substantial enough, when considering impacts from other projects, to contribute to significant cumulative impacts.

5) Identify other reasonably foreseeable actions that affect each resource. F007-19
Appendix 3.17.A includes a list of foreseeable projects, however the impacts from those projects to specific resource areas are not included.

Recommendation: Clarify in Section 3.17.4 what potential indirect and direct effects are substantial enough, when considering impacts from other projects, to contribute to significant cumulative impacts.

6) *Assess potential cumulative impacts.* F007-20
Cumulative impacts are assessed in Section 3.17.4. EPA has no further recommendations regarding this step.

7) *Report the results.* F007-21
Results are reported in Section 3.17.4. EPA has no further recommendations regarding this step.

8) *Assess the need for mitigation.* F007-22
While multiple mitigation measures are described for the project level, it is unclear what process will be used to ensure that the future project-level environmental documents will incorporate the mitigation measures identified.

Recommendation:

- Include in Section 3.17.4 of the Final PEIS and the ROD a listing of all proposed mitigation proposed for project-level, so that all deferred mitigation is identified in one place and is easy to transfer to consultants, project managers, others, etc. who will be contributing to future project-level analyses.
- Figure 3.17-1 depicting locations and titles for projects considered in the cumulative impact analysis is unreadable. Expand the size of the map or provide the same information in several larger formats.

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Design, Mitigation, and Coordination Measures Deferred to Future Project-Level Analyses F007-23

As noted above in our comments on the Cumulative Impacts Section, there are multiple measures that are deferred until future project-level analyses. Each resource-specific section states multiple measures that are deferred until project-level analyses. For example, the Biological Resources Section (page 3.15-65-68) states:

> *"The following mitigation strategies would be applied at the project level for potential impacts on biological resources, when such strategies are appropriate and feasible, as determined by project-level analysis.*
>
> *....Biological resource management plans will contain the following information:*
> *....d) sources of plant materials and methods of propagation.*
>
> *....During project-level review, where the agencies determine that mitigation is required to address site-specific impacts from the HST system, one strategy may be to purchase easements to preserve habitat for sensitive biological species."*

EPA is highly supportive of the multiple measures that CHSRA and FRA have identified as important for future project-level analyses. However, as currently written, mitigation measures are interspersed throughout the document, making it difficult to track commitments, considerations, and guidance for future project level analysis. Because the future success of the high speed train system is based on the ability of the project to be planned, constructed, operated, and maintained in a manner that avoids impacts to environmental resources to highest extent, EPA recommends that this information be compiled into a stand alone separately identified into a document.

Recommendations:
Include in the Final PEIS and the ROD a listing of all identified potential mitigation measures and design guidance, by resource area, for future project-level analyses. Provide this information in a stand-alone format so that it can easily be shared with future consulting teams and staff responsible for site-specific analyses. This will insure that all deferred possible mitigation and design measures are identified in one place and will be easy to transfer to consultants, project managers, others, etc. who will be contributing to future project-level analyses.

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Comment Letter F007 - Continued

SUMMARY OF EPA RATING DEFINITIONS

This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

Response to Letter F007 (Nova Blazej, U.S. Environmental Protection Agency, October 26, 2007)

F007-1

The process outlined in the June 12, 2006, MOU for integrating the requirements of NEPA and Section 404 of the Clean Water Act is being implemented in this Program EIR/EIS and will be further implemented in the Tier 2 project-level document. The alignments and stations included in the Preferred Alternative are most likely to yield the LEDPA.

F007-2

The Authority and FRA acknowledge the Environmental Protection Agency's (EPA's) rating of the project as Environmental Concerns—Insufficient Information (EC-2). See the Final Program EIR/EIS and these responses to comments for additional information on how EPA's issues have been addressed.

F007-3

Comment acknowledged. This Final Program EIR/EIS has taken into consideration the concerns of EPA, including identification of the alternative corridor(s) most likely to yield the LEDPA, growth-related impacts, and cumulative impacts on resources of concern. The EPA and the U.S. Army Corps of Engineers concurred that the Pacheco Pass Network Alternative, San Francisco and San Jose Termini, would be most likely to yield the LEDPA.

F007-4

Comment acknowledged. The Authority and FRA met with EPA on January 30, 2008, to discuss Section 404(b)(1) issues and comments on the 2007 Draft Program EIR/EIS.

F007-5

Comment acknowledged.

F007-6

The Authority and FRA consulted with EPA to assist in identifying the corridor(s) most likely to yield the LEDPA. The EPA concurred that the Pacheco Pass Network Alternative, San Francisco and San Jose Termini, would be most likely to yield the LEDPA. The Tier 2 EIS will analyze specific alignment and station location options in the corridor of the Pacheco Pass Network Alternative, San Francisco and San Jose Termini. The Authority and FRA will continue to work with the EPA, U.S. Army Corps of Engineers, and other agencies to determine specific mitigation measures to further minimize impacts on aquatic and biological resources.

F007-7

The network alternatives that include both Pacheco and Altamont Passes were not identified as preferred. See Chapter 8 of the Final Program EIR/EIS for a discussion of the Preferred Alternative, the Pacheco Pass Network Alternative, San Francisco and San Jose Termini. The EPA concurred that the preferred Pacheco Pass Network Alternative, San Francisco and San Jose Termini, would be most likely to yield the LEDPA.

Please see Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative.

F007-8

The analysis described in the Program EIR/EIS took into consideration the direct and indirect impacts on aquatic and biological resources as well as other environmental concerns. The alternatives analysis discussed in the Summary has been updated to include both the direct and indirect impacts on resources of concern.

F007-9

The Authority and FRA disagree that the Pacheco Pass alignments need substantial design modifications. Several design elements have been employed at the program level to minimize or avoid direct and

indirect impacts on resources of concern, including tunneling, elevated alignments, and alignments adjacent to existing transportation rights-of-way. Direct and indirect impacts of the Preferred Alternative identified in this Final Program EIR/EIS will be further minimized through project design features. The Pacheco Pass Network Alternative, San Francisco and San Jose Termini, would include tunnels and elevated structures to minimize impacts on streams, water bodies, wetlands, wildlife movement corridors, and sensitive species and habitat. As shown on the current conceptual plans, the alignment along Henry Miller Road, for example, would extend approximately 3.3 miles on elevated structure, which could potentially reduce total direct impacts on wetlands by approximately 3.25 acres and indirect impacts by 421 acres. More detail both in project refinement and specific on-the-ground information would be developed in the Tier 2 process that would allow for greater avoidance.

F007-10

The Authority and FRA considered purpose and need, logistics, cost, technology, and availability, as well as impacts on aquatic resources and environmental impacts, in identifying the alternative most likely to yield the LEDPA. Because of substantial impacts on San Francisco Bay and the Don Edwards San Francisco Bay National Wildlife Refuge, those network alternatives that included a Dumbarton Crossing were not identified as preferred. In addition, those network alternatives that included a new transbay tube were not identified as preferred; they were identified to be impracticable because of the logistics of constructing the tube in San Francisco Bay and the high cost.

F007-11

See Standard Response 4 regarding growth inducement.

It is not possible to associate specific levels of population/employment growth, urbanization, and indirect impacts with individual stations. The reason for this lack of association is that counties served as the primary geographic boundary for the growth inducement and secondary impact analysis, and it is not possible to associate individual stations with a county, even if there is only one station in a county. Individual stations draw ridership from, and hence influence growth patterns within, catchment areas around each station. The shape and size of these catchment areas do not necessarily follow political boundaries, and catchment areas for a given station vary based on the network, alignment, station, and operational features of a given alternative. Because of the complex interaction among travel modes, HST station options, and the millions of origin-destination pairs in the study area, it is not possible to state that any given station leads to a specific amount of growth.

While it may be possible to create an iterative analysis process that successively adds and subtracts stations to each network and alignment alternative, such a process would be time consuming and costly. Further results from such an effort would be unlikely to show reliable and meaningful differences given that (a) changes in station location are relatively small in the context of the entire Bay Area to Central Valley study area, and (b) a county-level study frame was used for forecasting population, employment, and urbanization impacts.

The basic relationships that drive differences in growth-related impacts between stations sites are described in Section 5.5 of the Draft Program EIR/EIS. The underlying analysis was performed in a multi-tiered fashion by looking at macroscale economic effects, associating these effects with county-level population and employment changes, and then allocating these changes to development changes within individual hectare grids in each county. Indirect impacts for many resource categories were assessed within the hectare grids, and remaining resource categories were assessed around individual stations or within each county as appropriate.

The commenter also requested that urbanization and indirect impacts be presented as a range (not a single value) for each county. Point estimates of these estimates were prepared for a single representative network alternative for both Altamont and Pacheco. The point estimates of growth inducement for population, employment, and urbanization rely heavily on forecasts of future base conditions prepared by third parties (e.g. California Department

of Finance, metropolitan planning organizations, etc.), and statistical models that produce deterministic rather than stochastic results. Therefore, it is not possible to independently produce high and low estimates of growth inducement without making speculative and unsubstantiated assumptions regarding changes to input variables or statistical models.

Given the above, the information that would be needed to populate the tables and maps requested by the commenter is not currently available and cannot be reliably produced through reasonable efforts.

F007-12

See Standard Response 4 regarding growth inducement.

F007-13

As noted on page 3.17-2, the cumulative impacts analysis conducted for this project analyzed cumulative impacts for the Bay Area to Central Valley HST project, including Pacheco Pass and Altamont Pass network alternatives and station location options. Text has been added in this Final Program EIR/EIS specifically stating that this cumulative analysis is not tiered off the previous statewide document as it relates to the Bay Area to Central Valley study area.

F007-14

The Caltrans Cumulative Impact Assessment Guidance has been reviewed and was considered in the development of the cumulative impacts analysis. The cumulative impacts of the HST system and other identifiable projects were addressed following the stated guidance. The cumulative impacts analysis was prepared at a level commensurate with the analysis of other environmental impacts in the document. Because the timing and order of implementation of individual segments of the HST system have not been determined, the ability to conduct further analysis is limited at the program level, as is the ability to identify projects whose impacts would accumulate with the HST impacts in the future. Also the level of detail for the segments and many other projects has not been developed to the point where further analysis can occur at the program level.

F007-15

Comment acknowledged. No further changes required.

F007-16

The study area used for each resource has been identified and is described in this Final Program EIR/EIS.

F007-17

Comment acknowledged. No further changes required.

F007-18

The direct and indirect impacts of the proposed project were evaluated as part of the cumulative impact analysis. Text has been added to Section 3.17 that describes the direct and indirect impacts that might contribute to a significant cumulative impact.

F007-19

See Response to Comment F007-14. Additional detail has been added to Appendix 3.17.A regarding the types of potential impacts that may result from the list of projects. Text has been added to Section 3.17 that describes the direct and indirect impacts of other projects that might contribute to a significant cumulative impact. Additional analysis of cumulative impacts will be presented in project-level environmental documents.

F007-20

Comment acknowledged. No further changes required.

F007-21

Comment acknowledged. No further changes required.

F007-22

Proposed program mitigation strategies have been added to Section 3.17 so that all mitigation for cumulative impacts is listed in one location. The figure has been revised to better depict locations and titles for cumulative projects. A Mitigation Monitoring and Reporting

Plan will be prepared to ensure implementation of adopted mitigation strategies in project-level reviews.

F007-23

Proposed program mitigation strategies have been added to Section 3.17 so that all mitigation is listed in one location. In addition, the program mitigation strategies and design guidance that are adopted by the Authority and FRA as part of the approved project will be included in the Mitigation Monitoring and Reporting Plan prepared for CEQA compliance, as well as in the FRA Record of Decision.

Comment Letter F008 (G. Mendel Stewart, U.S. Department of the Interior, Fish and Wildlife Service, October 22, 2007)

F008

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay National Wildlife Refuge Complex
9500 Thornton Avenue
Newark, California 94560

RECEIVED
OCT 24 2007
BY: OCT 22 2007

Mr. Mehdi Morshed
Executive Director
California High-Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814

SUBJECT: Comments regarding the Draft Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS

Dear Ms. Morshed:

The Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) appreciates the opportunity to comment on the High Speed Rail Project. As a property owner adjacent to the proposed rail corridor, we are extremely concerned about the wildlife and habitat impacts associated with this project. We are also concerned with effects to listed species from the proposed project. Based on a review of the draft environmental document, we would like to relay the initial comments below concerning the proposed transbay crossing in South San Francisco Bay and the Oakland to San Jose corridor that passes through the Refuge. F008-1

- *Noise, vibration and human disturbance to wildlife during construction and operation.* The proposed rail lines mentioned above are located in wetland habitat that supports the endangered California clapper rail, salt marsh harvest mouse, California tiger salamander, vernal pool tadpole shrimp, as well as numerous migratory birds. These species rely on this environment for breeding, nesting, foraging and roosting. We are concerned that construction and operation activities may displace these species temporarily and/or permanently from this area. In addition, construction activities should not occur during sensitive breeding and nesting periods for these species. F008-2

- *Habitat disturbance.* We are concerned about the project's anticipated siting of new track and access needs to existing rail line during the construction and operation phase. It is unclear in the EIR/EIS how wetlands and other habitats on the Refuge will be adversely impacted. Any activities, including construction access, must be assessed for its compatibility with the overall purposes of the Refuge. In order to meet its congressionally mandated requirements, it is unlikely that the Refuge would allow work to be conducted on its property adjacent to the rail line. We are also concerned with the potential for impact to species listed as threatened or endangered since the rail line is surrounded on both sides by habitat containing protected species. Both train service and maintenance activities have the potential of violating the protection of these species. F008-3

USFWS, Page 2

- *Facilitating a predator corridor.* The current rail infrastructure facilitates the movement of predators including foxes and feral cats that prey upon the California clapper rail and the salt marsh harvest mouse. We are concerned that adding to the existing infrastructure will continue to exacerbate predator access to sensitive wildlife habitats on the Refuge. We recommend the proposed HST Program include a measure in their alternatives that would reduce predator movement along the rail line. F008-4

- *Coordination with the Dumbarton Rail Corridor Project and freight service.* We are aware that the Dumbarton Rail Project is looking into alternatives for siting a San Francisco Bay rail line crossing at or near the same location. We recommend that you coordinate the project's plan with the Dumbarton Rail Authority to assess the cumulative effect of both rail service activities across the South Bay. In addition, it is unclear if the corridor will be used for freight service and if so, what will be the added impact of that rail service? F008-5

- *Derailment potential on the Refuge.* We are concerned about the possibility of derailment on the Refuge and what measures will be taken to reduce this risk. In addition, the operation plan should also include a response plan specific to the Refuge habitat in the event of a derailment. F008-6

Based on the requirement for any proposed use on a National Wildlife Refuge to be appropriate and compatible with the Refuge's purposes and the purposes of the National Wildlife Refuge System (National Wildlife Refuge System Improvement Act of 1997), along with the requirements in the Endangered Species Act (Endangered Species Act of 1973 as amended) it is doubtful that rail service through the Refuge would be feasible. It is recommended that, like the proposed new crossing on the Bay by the Hetch Hetchy pipeline in the same location, the HST Program be placed underground below the Bay and the Refuge. If the crossing would have to be above the ground, it should be placed on a high causeway, remove the existing dirt berm of the historic Dumbarton Rail line and improve the hydrologic connection in the Dumbarton Marsh to enhance endangered species habitat. F008-7

Thank you for including our comments during your comment period. We would like to request a meeting with HST Project representatives to find out more about the project and process. Because of the potential impact to endangered species and Refuge lands coordination with the Endangered Species Division of the Sacramento Fish and Wildlife Office and the Don Edwards San Francisco Bay NWR should be facilitated. If you have questions, please contact Clyde Morris, Manager Don Edwards San Francisco Bay NWR, at 510-792-0222, x 25 or Cay C. Goude, Assistant Field Supervisor (for endangered species), at 916-414-6600. F008-8

Sincerely,

for G. Mendel Stewart
Manager, San Francisco Bay
National Wildlife Refuge Complex

Cc: Cay Goude USFWS, Sacramento, CA

Response to Letter F008 (G. Mendel Stewart, U.S. Department of the Interior, Fish and Wildlife Service, October 22, 2007)

F008-1

See Standard Response 3 and Chapter 8 regarding identification of the Pacheco Pass as the Preferred Alternative.

Impacts on the Don Edwards San Francisco Bay National Wildlife Refuge are discussed in the Program EIR/EIS. Section 3.15 acknowledges the refuge and the potential impacts of the alignment alternatives on biological resources and wetlands. Chapter 7 also acknowledges the refuge and the potential impacts resulting from operation and construction of the network alternatives. The Preferred Alternative identified in this Final Program EIR/EIS is the Pacheco Pass Network Alternative, San Francisco and San Jose Termini, which includes the Henry Miller Road alignment alternative and would not require a bay crossing or impact the refuge.

F008-2

Refer to Response to Comment F008-1 regarding potential impacts on the Don Edwards San Francisco Bay National Wildlife Refuge. Detailed noise and vibration analyses and focused surveys would be conducted and specific temporary and permanent impacts and mitigation would be identified as part of the Tier 2 project-level environmental analysis. Mitigation strategies are identified in Section 3.15 and include habitat replacement and revegetation, protection during construction, performance (growth) standards, maintenance criteria, and monitoring requirements. In addition, construction could be phased around the breeding season for sensitive wildlife species. For sensitive areas crossed by the proposed project alternatives, specific mitigation measures, including timing of construction, would be identified as part of the Tier 2 project-level environmental analysis.

F008-3

Refer to Response to Comment F008-1 regarding potential impacts on the Don Edwards San Francisco Bay National Wildlife Refuge. As noted in Section 3.15, the Dumbarton crossing was estimated to result in potential direct impacts on 34 acres of wetlands through the refuge. To mitigate impacts on sensitive areas and habitat (as defined at the project level), in-line construction (i.e., use new rail infrastructure as it is built) will be used to transport equipment to/from the construction site and to transport excavated material away from the construction site to appropriate reuse or disposal sites. Threatened and endangered species that may be affected are noted in Section 3.15 and listed in Appendix 3.15-A. At the program level it was concluded that impacts on biological resources from construction, operation, and maintenance would remain significant, even with the application of mitigation strategies.

F008-4

Refer to Response to Comment F008-1 regarding potential impacts on the Don Edwards San Francisco Bay National Wildlife Refuge. Predator access issue mitigation measures would be identified as part of the Tier 2 project-level environmental analysis when more detailed design is available and field surveys have been conducted.

F008-5

Refer to Response to Comment F008-1 regarding potential impacts on the Don Edwards San Francisco Bay National Wildlife Refuge. The cumulative impact analysis discussed in Section 3.17 includes the Dumbarton Rail Crossing project. The potential for freight service is discussed in Chapter 2. If the Authority decides to move forward with this service, additional analysis would be required as part of the Tier 2 project-level environmental analyses to assess specific impacts.

F008-6

Refer to Response to Comment F008-1 regarding potential impacts on the Don Edwards San Francisco Bay National Wildlife Refuge. The HST would be designed to have fully grade-separated tracks

with state-of-the-art safety, signaling, and automated train control systems to minimize the potential for derailment. The Authority would build upon the extensive experience of HST operations in other countries. Future HST Operations Plans will include emergency response measures. FRA regulations also address safety concerns, and this system would comply with those regulations.

F008-7

Refer to Response to Comment F008-1 regarding potential impacts on the Don Edwards San Francisco Bay National Wildlife Refuge. The construction cost associated with this crossing is estimated at from $1.5 billion (low bridge) to more than $3 billion (tube). Constructing a new bridge or tube crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat, requiring special construction methods and mitigation.

If a new crossing were constructed for the HST, it would not remove the need for the Dumbarton Rail Crossing project. As noted in Chapter 2, the approval of Regional Measure 2 (RM2) in March 2004 included funding to reconstruct the out-of-service Dumbarton Rail line between southern Alameda County and the San Francisco Peninsula. The reconstructed rail bridge across the bay includes embankment, trestle structure, and two swing bridges; most of the segment is single track with limited passing sidings. The Dumbarton Rail project would conflict with the proposed HST system. The HST system planned for 2030 includes at least two tracks for all of the system and does not include a single track as planned for the Dumbarton Bridge, which would not accommodate HST service. The HST system also would conflict with the Caltrain Joint Powers Board (JPB) electric multiple unit (EMU) option, which would not be compatible with HSTs currently in service around the world, nor with the similar EMUs proposed for use by the JPB. If high-density regional rail service is developed in the future along this route, a double-track bridge across the bay would be necessary and likely would result in significant impacts on San Francisco Bay, Don Edwards San Francisco Bay National Wildlife Refuge, aquatic resources, and sensitive plant and wildlife species.

F008-8

Comment acknowledged.

Comment Letter S001 (Jim Beall, Jr., Assembly California Legislature, September 18, 2007)

09/18/2007 15:17 FAX 408 282 8927 ASSEMBLYMEMBER JIM BEALL 002/003

S001

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Assembly
California Legislature

JIM BEALL JR.
ASSEMBLYMEMBER, TWENTY-FOURTH DISTRICT

COMMITTEES:
CHAIR, HUMAN SERVICES
BUDGET
BUDGET SUBCOMMITTEE 1 ON HEALTH AND HUMAN SERVICES
HIGHER EDUCATION
VETERANS AFFAIRS
SELECT COMMITTEES:
CHAIR, ALCOHOL AND DRUG ABUSE
FOSTER CARE

September 18, 2007

Quentin L. Kopp
Chairperson
California High Speed Rail Authority
925 L Street Suite 1425
Sacramento, CA 95814

Dear Chairperson Kopp:

I am writing to express my support of the Pacheco Pass alignment. The Pacheco Pass alignment provides better connectivity to existing rail systems, directly connects the major population centers quickly and cost effectively, and is the most compatible approach with current regional plans and global warming goals. S001-1

I have over 20 years experience in transportation planning. During my 26 years of local service, I served on several transportation agencies board of directors including the Caltrain, Santa Clara County Traffic Authority, Valley Transportation Agency, and the Metropolitan Transportation Commission to name a few. During my local tenure I spearheaded many rail transportation projects including serving on the Guadalupe Corridor Joint Powers Board which was responsible for the development of the light rail system in Santa Clara County. I was also appointed to the Governor's Transportation Summit Working Group which drafted the legislation which became Propositions 108/111 and 116. S001-2

My vision for the high speed rail project is large urban areas being connected at multi-modal transit centers to provide an alternative to air and auto traffic between northern and southern California. I believe that the most important element to consider in the alternative analysis is the connectivity between the High Speed Rail and our transit systems in California. This inter-relationship will not only be positive for High Speed Rail, it will also benefit our transit systems and California's global warming goals. S001-3

The Pacheco Pass alignment establishes the best framework for California's transportation development overall and is the most compatible with the regional transit plans in both the Bay Area and Monterey Bay including Metropolitan Transportation Commission Regional Rail Plan. The Pacheco alignment would also result in the highest

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09/18/2007 15:17 FAX 408 282 8927 ASSEMBLYMEMBER JIM BEALL 003/003

number of statewide trains stopping at all destinations in the Bay Area and is the most direct north/south connection. An Altamont alignment will cause a burdensome and costly 3 way split to reach San Jose, Oakland and San Francisco - with less trains to each. The Altamont Route offers a low speed trip, better served by BART and ACE extensions and upgrades.

It is important to build High Speed Rail in a way that most directly connects the major population centers as quickly and cost effectively as possible. The Pacheco alignment is the only alternative that does this. Travelers will be able to reach High Speed Rail terminals easily and quickly via public transit, reducing the need to accommodate automobiles and their impact on the environment. Do we want to establish a transit only framework or build a High Speed Rail with large parking areas surrounding the stations?

Residents in the San Mateo, Santa Clara and Monterey counties will benefit greatly from the Pacheco alignment. Planning for High Speed Rail connection in Gilroy has already started with the Caltrain extension to Salinas, the Del Monte Express to Castroville and the addition of the Amtrak Coast Day Light Service. The Gilroy Terminal would serve close to 1 million people. S001-3 cont.

The transit emphasis is being completed in the Bay Area in accordance with long standing plans emphasizing multimodal transit terminals. In addition, San Mateo, Santa Clara and Alameda all tax themselves for transportation improvements which demonstrate their stake in the Pacheco alignment, as well as their commitment to fund essential transit projects through the ballot box. A transit terminal approach should be the basis for connecting transit systems. The Pacheco alignment is the most compatible approach with the current regional plan and global warming goals. I urge your support of the Pacheco alignment.

Sincerely,

Jim Beall

Assemblymember Jim Beall, Jr.
24th District

Response to Letter S001 (Jim Beall, Jr., Assembly California Legislature, September 18, 2007)

S001-1

The Preferred Alternative identified in this Final Program Environmental Impact Report/Environmental Impact Statement (Final Program EIR/EIS) is the Pacheco Pass Network Alternative, San Francisco and San Jose Termini.

See Standard Response 3 and Chapter 8 regarding identification of the Pacheco Pass as the Preferred Alternative.

S001-2

The California High- Speed Rail Authority (Authority) and Federal Railroad Administration (FRA) acknowledge the background information provided by Assembly Member Jim Beal, Jr.

S001-3

The Pacheco Pass Network Alternative has been identified as the Preferred Alternative in this Final Program EIR/EIS. The statements made in support of this alternative in Assembly Member Jim Beal's letter were among the reasons for identifying the Pacheco Pass Network Alternative as the Preferred Alternative. These reasons include direct connection between northern and southern California population centers; connectivity to other transit connections; service to the Salinas and Monterey Bay area via Gilroy; transit connection plans for the Santa Clara, San Mateo, and Alameda County areas; and the need to respond to the global warming issue. During the project-level engineering and environmental review, decisions regarding the provision of parking facilities at high-speed train (HST) stations will take into account the level of existing or planned transit connectivity to that station.

Comment Letter L011 (Don Marcus, County of San Benito, Board of Supervisors, September 26, 2007)

COUNTY OF SAN BENITO
BOARD OF SUPERVISORS

L 011

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Don Marcus, District No. 1
Anthony Botelho, District No. 2
Pat Loe, District No. 3
Reb Monaco, District No. 4
Jaime De La Cruz, District No. 5

RECEIVED
OCT 0 1 2007
BY:

September 26, 2007

California High-Speed Train
California High-Speed Rail Authority
Draft Program ERI/EIS Comments
925 L Street Suite 1425
Sacramento, CA 95814

Subject: Comments regarding the Draft Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS

To Whom It May Concern:

Thank you for the opportunity to review and comment on the proposed California High-Speed Train project. On behalf of the San Benito County Board of Supervisors, we wish to express significant concerns regarding the DEIR/DEIS for the proposed project and question the overall necessity of the project.

The proposed California High-Speed Train project would link the Bay Area, Central Valley, Sacramento, and southern California. As we understand it, the study region is bounded by the following: Pacheco Pass to the south, the Altamont Pass to the north, the Burlington Northern Santa Fe (BNSF) Railroad Company to the east, and the Caltrain Corridor to the west. The two preferred alternatives are San Jose to Central Valley via Pacheco Pass, and East Bay to Central Valley via Altamont Pass. L011-1

Potential Environmental Impacts to San Benito County:

Proximity to San Felipe Lake (Soap Lake) and other properties

- *If the Pacheco Pass alternative is chosen, the route would lie approximately parallel to Highway 152, with San Felipe Lake lying between the proposed route and the County line. This area is mapped as lying entirely within the Flood Plain. Furthermore, the potential impacts to the Pajaro River need to be considered.* L011-2

Sensitive Habitat Area(s)

- *Portions of the proposed project have been identified as lying within critical habitat of the California Tiger Salamander, as listed in the Department of the Interior Fish and Wildlife Service Federal Register. (Please refer attached map)* L011-3

Traffic Increase

- *The proposed High-Speed Train project has the potential to create a substantial amount of vehicle traffic originating from the Monterey County area. Highways 101, 152, 25, and 156 are currently under tremendous capacity strain. The proposed rail project has the potential to substantially increase these strains. Analysis should be provided to determine the potential for increased traffic within our County for this project.* L011-4

Air pollution

- *San Benito County is under the jurisdiction of the Monterey Bay Unified Air Pollution Control District. The proposed project is located in the North Central Coast Air Basin, which consists of Monterey, Santa Cruz, and San Benito counties. The North Central Coast Air Basin is currently classified as "in attainment/unclassified" for all current federal air quality standards. San Benito County is classified "Attainment" for State ambient air quality standards, fine particulate matter. It is classified "Non-attainment" for ozone and respirable particulate matter, and "Unclassified" for carbon monoxide. Consideration should be given to the potential for lower air quality and attainment status within our County due to increased traffic to the proposed Gilroy station by populations to the South of San Benito County.* L011-5

Farmland Impacts

- *The proposed project could convert Prime Farmland, Farmland of Statewide Importance, and Farmland of Local Importance, as shown on California Department of Conservation, Division of Land Resource Protection maps. Consideration should be given to the conversion of this Farmland to non-agricultural use.* L011-6

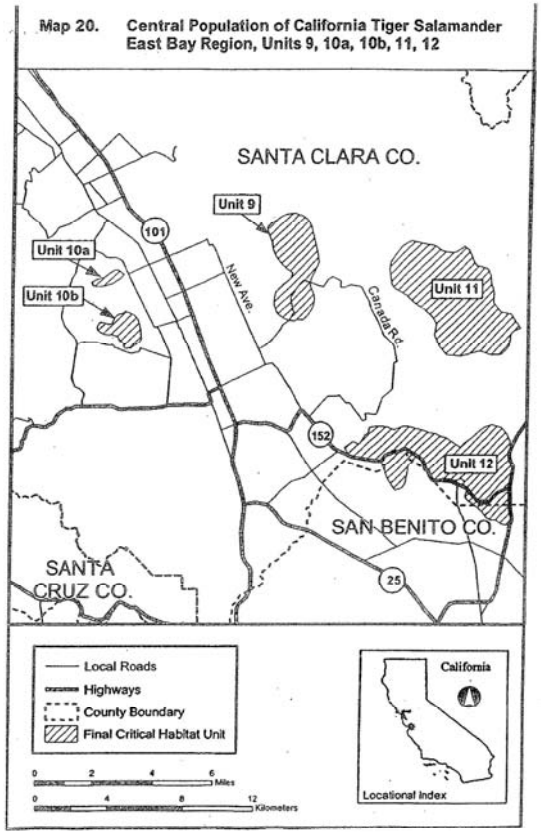
Potential Financial Impacts to San Benito County:
Our Board has significant concerns about the financial cost of this project. We are opposed to any diversion of State tax dollars away from badly needed community items, such as local transportation projects and homeless shelters. L011-7

Respectfully,

Don Marcus, Chair
San Benito County Board of Supervisors

Cc: Board of Supervisors
CAO
Association of Monterey Bay Governments (AMBAG)
Monterey Bay Unified Air Pollution Control District

Comment Letter L011 – Continued



Response to Letter L011 (Don Marcus, County of San Benito, Board of Supervisors, September 26, 2007)

L011-1

Chapter 1 of the Draft Program EIR/EIS, "Purpose and Need and Objectives," discusses the purpose of and need for a High Speed Rail system in the Bay Area to Central Valley and statewide. The proposed project would link the Bay Area, Central Valley, Sacramento, and southern California.

As established by the Authority Board, the study region is bounded by Pacheco Pass to the south, Altamont Pass to the north, the BNSF Railroad to the east, and the Caltrain Corridor to the west. HST alignment and 21 network alternatives are described and evaluated in the Draft Program EIR/EIS.

L011-2

As noted in Section 3.14 of the Final Program EIR/EIS, the Pacheco alignment alternative extends at-grade or on aerial structure through the 100-year floodplain. As noted in the comment, the largest area of floodplain being crossed is between Gilroy and the Diablo Range. The HST would restore the floodplain to its prior operation by constructing culverts under the tracks to convey anticipated storm flows and to minimize ponding. Impacts on the floodplain from aerial structures would be limited to column footings. Future Tier 2 project-level environmental analyses will be coordinated with detailed engineering to further refine the HST alignments and station locations and avoid or minimize impacts to the greatest extent practicable.

L011-3

The proposed Pacheco Pass alignment alternative would be in tunnel through the potential California tiger salamander habitat shown in the illustration provided by the commenter. Future Tier 2 project-level analyses would include focused surveys for state and federal threatened and endangered species and detailed identification of habitat, wildlife movement/migration corridors, and wetlands and water resources to further identify impacts and develop site specific mitigation measures. In addition, engineering design refinements would be undertaken to avoid and/or minimize environmental impacts. Design practices incorporated into the project include underpasses or overpasses or other appropriate passageways that would be designed to avoid, minimize, and/or mitigate any potential impacts on wildlife movement, including the tiger salamander.

L011-4

The expected effect of either the Pacheco or Altamont Pass HST alternatives would be to decrease traffic on most intercity highways while increasing it locally on streets in station areas. Table 3.1-2 in Section 3.1, Traffic, Transit, Circulation, and Parking, shows that traffic is expected to decrease on State Route (SR) 152 by 4.2% under the Pacheco Pass alternative and increase by 0.6% under the Altamont Pass alternative. On US 101, peak period traffic between San Jose and Gilroy is expected to decrease by 4% under the Pacheco Pass alternative and by 1.6% under the Altamont Pass alternative. SR 25 and SR 156 were not analyzed because no impact was expected.

L011-5

The air quality analysis for the program-level document was conducted at a regional level. If the project is to move forward, the project-level air quality analysis will take the different air quality basins into consideration in the analysis.

Microscale impacts at station location options will be examined in the project-level analyses currently being conducted.

L011-6

The California Farmland Mapping and Monitoring Program (FMMP) was used to identify potential farmland impacts. This included evaluating the study area impacts of the alignment alternatives and station location options on Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. These are described in Section 3.8, Agricultural Lands, along with

potential impacts of severance, as well as potential conflicts with farmland programs and policies.

L011-7

The Authority is charged to develop a proposed HST network that is fully coordinated with other public transportation systems (California Public Utility Code Section 185030 et seq.). Coordination with public transit agencies will be continued in future project-specific studies and planning for stations along HST alignments. It is not the intention of the system to divert funding from existing transit systems or other programs.

Comment Letter L014 (Kathi Hamilton, Town of Atherton, Office of the City Clerk, September 28, 2007)

L 014

Town of Atherton
Office of the City Clerk

91 Ashfield Road
Atherton, California 94027
650-752-0529
Fax 650-688-6528

September 28, 2007

California High-Speed Rail Authority, EIR/EIS Comments
925 L Street, Suite 1425
Sacramento, CA 95814

Enclosed please find a true and correct copy of Resolution No. 07-26 adopted by the City Council of the Town of Atherton on September 19, 2007. The Resolution includes comments regarding the EIR/EIS for the Bay Area to Central Valley High Speed Train.

Sincerely,

Kathi Hamilton
Acting City Clerk

RECEIVED
OCT 01 2007
BY:

Enclosure

RESOLUTION 07-26

A RESOLUTION OF THE CITY COUNCIL OF THE TOWN OF ATHERTON REGARDING THE DRAFT PROGRAM ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT FOR BAY AREA TO CENTRAL VALLEY HIGH SPEED TRAIN

The City Council of the Town of Atherton hereby resolves as follows:

RESOLVED, that the town of Atherton provide comments to the California High-Speed Rail Authority regarding the Draft Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS, with the following points:

1. The Town of Atherton opposes high-speed rail on the Peninsula and within the Caltrain Railway Corridor.

   a. High-speed rail would not directly benefit the Peninsula because express high-speed trains would not stop on the Peninsula, requiring Peninsula travelers to Southern California to transfer, either in San Francisco or San Jose, to the express train in order to benefit from express service. L014-1

   b. Construction of high-speed rail along the Caltrain Corridor would be devastating to the long-established and heavily developed communities through which the corridor passes. Construction and operation of high-speed trains along this corridor would have a significant adverse environmental affect on the communities.

2. For the reasons stated above, we support the Altamont alignment for high-speed rail, with access to San Jose along the Capital Corridor (East Bay) route, and with access directly to Oakland via Altamont, with a new TransBay Tunnel connecting Oakland with San Francisco.

3. If the Pacheco alignment is ultimately chosen with a Peninsula route for high-speed rail, the preferred routing should be along Highway 280 or 101, in order to avoid the disastrous consequences of construction within established communities. As stated above, high-speed rail on the Peninsula will not provide easier access to express trains to Southern California. Accordingly, the Peninsula should rely upon existing Caltrain service to access either San Francisco or San Jose as starting off points, from which express trains to Southern California would depart. L014-2

4. In all events, if a Caltrain Corridor route is ultimately chosen for high-speed rail alignment, the HST should run in a tunnel or a trench in order to minimize environmental impacts and to maximize the availability of surface land for positive redevelopment. L014-3

Resolution No. 07-26
Adopted September 19, 2007
Page 1 of 2

Comment Letter L014 – Continued

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the Town of Atherton that this Resolution shall be effective immediately upon adoption.

* * * * * * * * * * *

I hereby certify that the foregoing Resolution was duly and regularly passed and adopted by the City Council of the Town of Atherton at a regular meeting thereof held on the 19th day of September 2007, by the following vote.

AYES:	*5*	*Council Members: Janz, J.Carlson, Marsala, A.Carlson, McKeithen*
NOES:	*0*	*Counci Members:*
ABSENT:	*0*	*Council Members:*
ABSTAIN:	*0*	*Council Members:*

Alan B. Carlson, MAYOR
Town of Atherton

ATTEST:

Kathi Hamilton, Acting City Clerk

APPROVED AS TO FORM:

Marc Hynes, City Attorney

I HEREBY CERTIFY THAT THE FOREGOING DOCUMENT IS A TRUE AND CORRECT COPY ON FILE AT 91 ASHFIELD ROAD ATHERTON, CA
DATE Sept. 28, 2007
SIGNED BY Kathi Hamilton
Acting City Clerk

Resolution No. 07-26
Adopted September 19, 2007
Page 2 of 2

Response to Letter L014 (Kathi Hamilton, Town of Atherton, Office of the City Clerk, September 28, 2007)

L014-1

The Authority and FRA acknowledge the Town of Atherton's opposition to the HST system in the Caltrain Corridor and its support for the Altamont Pass alternative with a transbay tube between Oakland and San Francisco.

The Authority and FRA note that the Caltrain commuter rail service would be complementary service to the HST system by taking train riders from the more local stations to the HST stations. This rail feeder service approach has been shown to be highly effective for other HST systems in Europe and Japan. The Preferred Alternative identified in this Final Program EIR/EIS would include HST stations not only in San Jose but also in Palo Alto or Redwood City and in Millbrae.

Environmental impacts of the HST along the Caltrain Corridor on the peninsula are reviewed in the Draft Program EIR/EIS.

Please also refer to Standard Response 3 and Chapter 8 regarding the identification of the Pacheco Pass as the Preferred Alternative.

L014-2

As noted in Table 2.5-4 of the Draft Program EIR/EIS (page 2-43), both the I-280 and US 101 options were rejected from further consideration. As shown in the table, principal reasons for rejection of these alignments included construction, right-of-way, and environmental concerns, particularly visual and land use (right-of-way acquisition) impacts. Please also see Appendix 2-G1.1 for a discussion of alignment alternatives and station location options eliminated from further consideration. Please also see Response to Comment L014-1.

L014-3

The Preferred Alternative identified in this Final Program EIR/EIS is the Pacheco Pass alignment using the Caltrain Corridor. The precise alignment and profile options for the HST system in the Caltrain Corridor will be further evaluated and refined as part of the preliminary engineering and project-level environmental review and could include trench and/or tunnel concepts. Available right-of-way, impacts on adjacent communities and costs will be among the key factors considered as part of this review.

The Authority and FRA are keenly aware of the sensitive land uses adjoining the Caltrain Corridor in the Town of Atherton, and impacts on these residences and neighborhoods will be carefully considered as the proposed plan/profiles are developed during the preliminary engineering phase.

Comment Letter L025 (Alan B. Carlson, Mayor, Town of Atherton, October 25, 2007)

L 025

RECEIVED
OCT 25 2007
BY:

Town of Atherton

91 Ashfield Road
Atherton, California 94027
650-752-0500
Fax 650-688-6528

October 25, 2007

California High-Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814

Subject: Comments on California High-Speed Train (HST) Draft Program EIR/EIS Bay Area to Central Valley

Ladies and Gentlemen:

The Town of Atherton has reviewed the Bay Area to Central Valley HST Draft Program EIR/EIS for the Proposed California High-Speed Train System. An Atherton City Council Resolution stating the Town's position is attached. Our staff, our Rail Committee, and our City Council have the following comments: L025-1

ALIGNMENT

Altamont Pass Alignment

For the reasons discussed below, high speed rail along the Caltrain corridor is not necessary or desirable. In fact, the devastation which would be wreaked upon Peninsula cities by construction of a high-speed rail line through the narrow Caltrain corridor would be immeasurable. L025-2

The Altamont Pass Alternative has the unique benefit that it could avoid the Town of Atherton completely. This is not just parochial. The impacts of High-Speed Rail to every Peninsula city will be as great, if not greater, than the impacts to Atherton. Caltrain already provides Baby Bullet service on the Peninsula, so providing a redundant service on the Peninsula is inferior to providing a new express rail service in the East Bay (BART and Amtrak do not provide express service in the East Bay). L025-3

We strongly support the proposal in the Metropolitan Transportation Commission's (MTC) Regional Plan for an additional tube under the Bay between San Francisco and Oakland to provide additional capacity for BART and to service high-speed and other rail L025-4

lines. The proposal to bring high-speed rail across the Dumbarton Bridge, south to San Jose, and north to San Francisco with an under-bay connection to Oakland is illogical in that it runs the trains significantly farther, crossing the bay twice, to reach San Francisco and Oakland. A far better proposal would be to bring a high-speed line through Altamont directly to San Jose on the east side of the San Francisco Bay, with another high-speed line heading north from the Altamont Pass to Oakland and through the new trans-bay tube to San Francisco.

At best, if the HST were in the Caltrain corridor, the Peninsula would be served only by the "local" version of high-speed rail. Any passenger on the Peninsula desiring to reach Southern California by express high-speed rail service would have to transfer at San Jose. Instead, the Peninsula should rely upon Caltrain as the means for Peninsula riders to reach either San Francisco or San Jose as a starting point for express travel to Southern California. L025-4 Cont.

If a new trans-bay tube is not included, the High-Speed Train line can cross the Bay on the Dumbarton rail line and enter the Caltrain corridor at Redwood City, serving San Francisco only on the west side of the Bay north from Redwood City. Train service through Atherton would be only the Caltrain service, which would provide connecting service to a High-Speed Rail station. At least half of the Peninsula cities would be avoided under this scenario.

The Atherton City Council, by unanimous vote, strongly recommends that the Altamont Pass Alternative be selected, with service to San Francisco via an additional tube under the Bay between San Francisco and Oakland, and that the Peninsula Caltrain Corridor not be used for High-Speed Rail. If the Altamont Pass Alternative is selected without the additional tube, then the Authority should reconsider a three-way train split in the East Bay with service to Oakland, San Francisco and San Jose from the East Bay junction.

SHARED CALTRAIN TRACKS

Schedule Conflicts

All alternatives involving the Caltrain Corridor assume that High-Speed Trains share tracks with Caltrain commuter trains. This assumption is fundamental to the costs and environmental impacts of Caltrain Corridor alternatives. However the validity of this assumption does not appear to be substantiated by analysis or simulations of operational feasibility. Caltrain and HST are two separate autonomous entities serving different markets. Caltrain and HST would each want and need control over scheduling and dispatching of their own trains in order to best serve the needs of their riders. Sharing tracks would involve inevitable basic scheduling and dispatching conflicts plus frequent L025-5

Comment Letter L025 - Continued

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problems when determining priorities in response to emergencies, breakdowns and other train delays of either entity.

The Caltrain Strategic Plan Build-Out Scenario for 2023 calls for 138 daily weekday trains, including 87 express and limited trains, many of which would probably be competing for space on the same tracks as HST trains if tracks were shared. The HST Business Plan Timetable Example for 2020 shows 116 weekday trains to and from San Francisco. Caltrain future plans include providing capacity for 10 trains per hour in each direction during the weekday 3-hour morning and evening peaks. The HST Timetable Example shows 7 weekday trains per hour in each direction during morning and evening peaks. There does not appear to be any analysis showing whether the number and frequency of Caltrain and HST trains can be accommodated on shared tracks, or how they might be scheduled and dispatched. How could multiple Caltrain Baby Bullet or Limited trains with 4 to 8 station stops between San Francisco and San Jose share a track with multiple 120 mph non-stop HST train between San Francisco and San Jose? These multiple trains would be departing at frequent intervals during each peak hour.

Dedicated Tracks

Shared tracks appear to be completely infeasible. The best possible way to avoid the many potential conflicts would be for HST to have its own completely dedicated tracks. The need for dedicated tracks has been the HST position for many years and forcefully articulated by board member Diridon at HST board meetings and other public meetings. It is surprising that the Draft EIR/EIS now assumes HST tracks shared with Caltrain tracks without supporting analysis or explanation. L025-5 Cont.

Caltrain now has at least two tracks along its right of way between San Francisco and San Jose. Some segments have 3 or 4 tracks to provide for needs such as Baby Bullets passing other slower (mostly local) trains. Caltrain's Footprint Study has indicated a future need for 3 or 4 tracks throughout much of its right of way. If HST shared right of way (but not tracks) with Caltrain it would need at least two of its own dedicated tracks. Therefore, the future right of way would need to accommodate a total of 5 or 6 tracks, possibly more in some segments, between San Francisco and San Jose. The right of way would have to be widened significantly throughout much of its length, requiring extensive high value land acquisition. The Draft EIR/EIS states that the HST corridor from San Francisco to San Jose would be built mostly within the existing Caltrain corridor. This statement would be incorrect with dedicated HST tracks.

Dedicated Platforms

Dedicated tracks would also require dedicated boarding platforms at all stations served by both HST and Caltrain. This would require further high value land acquisition at common station sites. Most if not all of these station would be grade separated, requiring L025-6

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expensive accessibility provision for the added platforms, since obviously at-grade pedestrian crossings of any track would be unacceptable. L025-6 Cont.

Impacts Not Evaluated

Since the Draft EIS/EIR does not consider dedicated HST tracks it does not include the significant associated costs and environmental impacts of alternatives involving the Caltrain right-of-way. Additional considerations must include:

- Land acquisition for wider right-of-way and dedicated boarding platforms
- Additional track age including temporary "shoo-fly" tracks
- Wider tunnels where required
- Wider trenches where required
- Additional costs to elevate or depress tracks
- Grade separations spanning additional tracks
- Additional electrification system costs
- Additional signal system costs
- Additional station costs for more tracks and boarding platforms
- More tree removal
- More adverse visual and community impact
- Additional construction disruption

L025-7

These impacts should be addressed before reaching a decision on the preferred route since their consideration could affect the outcome. The analysis of dedicated track impacts should not be deferred to a subsequent project level environmental and cost analysis since its results could then indicate that the prior selection of a preferred alternative was wrong.

IMPACTS

Even without the dedicated tracks and platforms issues, the following impacts of HST on the Peninsula are inadequately addressed in the EIR/EIS in evaluating the alternative alignments for the HST. Correctly addressing these impacts would require an analysis of appropriate avoidance alternatives or mitigation. It should be noted that in an environmental setting, alternatives to avoid environmental impacts should be addressed before mitigation is considered. L025-8

Visual and Noise

The two most extreme impacts of a High Speed Rail system on the Peninsula will be noise and visual impacts from an elevated electrified 120 mph train. The project proposes steel wheel steel rail technology. Regardless of how well constructed the project, the trains will make considerable noise as they pass through residential communities within L025-9

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yards of people's bedrooms. And so long as the train is proposed to be elevated on retaining walls or berms, noise will propagate farther. Elevated electrified tracks will be a visual blight on the area, certainly not a "Low" impact as shown on Table 3.9.1. However, should noise walls above already elevated tracks be considered as mitigation for the noise, they would be an extremely significant permanent and oppressive visual presence 24 hours per day, seven days per week. If HST on the Peninsula is selected, a trench alternative, discussed below, would avoid impacts rather than attempting to mitigate them with features that themselves cause additional impacts. L025-9 Cont.

It should be noted also that in Section 3.4.1B the HST is attempting to take credit for eliminating horn noise at grade separations to offset the noise of the HST on the Caltrain Corridor from San Francisco to San Jose. However, most cities on the Peninsula, in cooperation with the current Caltrain grade crossing safety project, will create quiet zones under the new Federal Railroad Administration (FRA) regulations to eliminate the sounding of train horns at all crossings. The designs for the supplemental safety measures needed for a quiet zone in several Peninsula cities are currently at the 65% level and expected to be constructed next summer. Therefore, when HST begins project level environmental review, train horns will have already been eliminated. This adjustment for existing train horn noise should be removed from the screening criteria on the Peninsula corridor, and should be reconsidered statewide as more and more cities are implementing quiet zones. L025-10

Likewise Caltrain is already well underway with plans to electrify their system on the Peninsula corridor. HST should therefore not adjust noise impacts for reduction of diesel locomotive noise that will be eliminated before HST is a reality. L025-11

Quiet zones and electrification should be included in the No Project alternative, and impacts evaluated based on comparison of the No Project alternative to the project alternatives. This will show that the noise impacts of HST, especially on elevated tracks, should be rated as having a high level of potential noise impacts, not a medium level, and those impacts will be significant unless avoided or mitigated. L025-12

The combined visual blight of noise walls to mitigate noise and electrification catenaries could be overwhelmingly significant, unless measures are taken to avoid the impacts. Choosing a lower impact alignment, such as a different corridor, is most effective. If the Peninsula Caltrain corridor continues to be considered, noise walls can be eliminated by the trench alternative, mentioned below. There is also an opportunity, with grade separations, to eliminate the visual impacts of the electrification catenaries. L025-13

Catenary Visual Impact

The High-Speed Train system is proposed to be an electrified system with overhead catenaries. These wires and their supporting poles will be a significant visual impact on L025-14

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the entire Peninsula rail corridor and particularly on the Town of Atherton where there are a significant number of residential properties abutting and near the tracks. Considerable funds have been expended in this Town and in many Cities along the corridor to underground overhead utility wires to rid the cities of the blight created by the proliferation of overhead wires and poles. Adding electrification wires for the High-Speed Train System would be a major step backwards from a visual aesthetics standpoint. To state that "their primary visual impact is low, much like power poles along a highway" is entirely missing the point of the extensive Rule 20 program undertaken by the California Public Utilities Commission and the power companies to underground the power poles along the highways of the state. L025-14 Cont.

Alternatives to avoid this impact should be discussed at the program level. Advanced track and train technologies should be considered that would allow the trains to operate with a third rail through urban areas where the visual impacts would be severe. **A grade separated rail system through the Peninsula corridor would allow the use of a third rail, avoiding the visual and tree impacts that an overhead system would cause.** These impacts are significant and are applicable throughout the Peninsula corridor; therefore, it should be addressed at the program level. L025-15

Heritage or Significant Trees

The Caltrain electrification EIR and arborist report determined that approximately 80 trees in Atherton would need to be removed. On the Caltrain corridor, 1,727 trees would need to be removed for electrification alone. The High-Speed Train system would have considerably more impact to trees in the Peninsula urban area than the Caltrain electrification project. There are a considerable number of mature and heritage trees along the corridor, especially in the Town of Atherton, that will be impacted by the project. Replanting cannot possibly mitigate for the loss of trees that have been growing for hundreds of years. These impacts should be avoided where possible by evaluating alternative alignments that do not use the Caltrain Corridor. L025-16

Right of Way Impacts

Property on the Peninsula is some of the most valuable property in the country. Some condemnation of property is unavoidable to construct the HST system, possibly considerably more than indicated in the EIR/EIS (see discussion of Shared Caltrain Tracks, above). The costs of this acquisition need to be accurately estimated. More critical are the impacts to the residents and businesses that must continue on the remainder properties after the project is constructed. L025-17

These properties will need to live forever with increased noise and visual impacts, without the mature trees that have grown up over the past decades to screen the tracks. The remainder damages to pay for these impacts could easily be in excess of the value of

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the entire property. The Authority needs to realize that the project will be responsible for these damages, and understand the rule of law that does not allow condemnation of the remainder unless it is needed for the project. Condemnation to limit the remainder damages is not sufficient to support the taking. Considering that every property on the Peninsula bordering the tracks may require a strip taking (see discussion of Shared Caltrain Tracks above), these right-of-way costs could exceed the cost of constructing the project. The Authority needs to take a close hard look at what a Peninsula project will cost, and the EIR/EIS needs to adequately reflect the impacts and hardships that will be visited on Peninsula homes and businesses by the project. L025-17 Cont.

Cultural (Historic) Resources and 4(f) (Park) Resources

The addition of widened tracks, retaining walls and catenary poles immediately adjacent to the historic Atherton train station would have a direct and adverse impact on the historic train station and its site. Note that the station was restored in 1913, but the original station was constructed in 1866. The Atherton station was omitted from the listing of historic buildings in section 3.9, and the discussion relative to station buildings dominating the vista is inapplicable to Atherton. The test is not whether the structure itself must be modified, and not whether the existing structure (or tree in the case of El Palo Alto) dominates the vista, but whether the site and context is modified. The test is also not whether it is adverse, but whether the adverse impact is significant. Impact on historic stations, buildings and landscapes will be a significant issue throughout the Peninsula. **Historic Station impacts need to be appropriately addressed, with significance determined in accordance with standard historical guidelines.** L025-18

The widened tracks, retaining walls, poles and wires, and the removal and trimming of screening trees will have a significant impact on Holbrook-Palmer Park, which abuts the project right-of-way. Not only is the park a public recreation area, it is also a cultural resource, containing several historic buildings. The entire park property is the site context for the historic buildings. **Impacts to Holbrook-Palmer Park, both as a 4(f) resource and as a cultural (historic) resource need to be appropriately addressed.** L025-19

The EIR/EIS states that mitigation can include alignment shifts to miss resources, relocation of resources including replacement parkland, noise barriers and visual screening. However, it states that shifts to miss one resource may impact another and that noise barriers can create adverse visual impacts. In such cases, mitigation may include cut and cover (similar to the trench discussed later in this letter, but with the track covered through the sensitive areas). In Atherton all these concerns apply. Additionally, the grade separations required to raise or lower the roadways would impact the cultural and 4(f) (Park) resources within Atherton as well as many adjacent properties. **The High-Speed Train project should identify and consider avoidance or mitigation options through the Atherton station historic area and the Holbrook-Palmer Park area.** L025-20

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Public Services

This element of CEQA is not discussed in the EIR/EIS. An evaluation of impacts to public services, such as the Atherton Police Department, City Hall, Post Office, Library, Permit Center, and Public Works Corporation Yard should be included. These impacts may be relevant in evaluating alignment alternatives and should be quantified. **The EIR/EIS should include these Town of Atherton facilities, and similar facilities in other Peninsula cities, address the impact thereon, and discuss alternatives to avoid or mitigate these impacts.** L025-21

Potential Interference with Resident's Electronics

While this element has adequately discussed in this EIR/EIS and the previous EIR/EIS, this is just another impact present on the Caltrain Corridor alignment that could be avoided or minimized by alternative alignments, as discussed below. L025-22

ALTERNATIVES

The EIR/EIS should address alternatives that have been considered to avoid, minimize or mitigate the anticipated significant impacts as noted above and in the report. Design of the project to reduce or eliminate impacts is avoidance or minimization, and is to be preferred over mitigation. L025-23

Peninsula Alignment using I-280/380 or 101 Corridors

While we support the Altamont alignment for high speed rail, if the southerly Pacheco route is ultimately chosen for high-speed rail, an analysis should be made of continuing the high-speed rail line from San Jose to San Francisco either via the East Bay and a new trans-bay tube (for the reasons stated above) or along the I-280/380 or 101 Corridors. These alternatives have the potential to avoid considerable significant impacts to the Peninsula. L025-24

The I-280 corridor offers innumerable advantages over the Caltrain corridor in terms of right-of-way needs, construction costs, ease of construction, and the fact that a journey along the I-280 corridor would be a far more pleasant experience for the passenger than the Caltrain corridor. The 101 corridor also has many of these benefits over the Caltrain corridor. Either alignment avoids the dramatic impacts to the established residential communities and commercial establishments along the Peninsula Caltrain corridor.

The I-280 alignment was improperly eliminated from further consideration (as described in Appendix A to the EIR/EIS). Failure to fully evaluate this less intrusive alternative is a significant deficiency in the EIR/EIS. The reasons stated for elimination of the I-280 alternative are either wrong, or relate to problems that would be even more difficult to

Comment Letter L025 - Continued

deal with along the Caltrain corridor. For example, Appendix A states that "connecting the [I-280] alignment to Diridon Station in San Jose would require a guideway passing through developed portions of downtown San Jose." In fact, the Caltrain corridor south of Diridon Station crosses under the I-280 Freeway and provides an easy connection. Presumably, this same connection would be used for any HSR link coming into San Jose from the south. Appendix A states further that crossing interchanges with other freeways would be difficult and expensive. This analysis fails to reflect the fact that the number of grade crossings necessary along the I-280 alignment is an order of magnitude less than the number of grade crossings required along the Caltrain corridor. In addition, of course, construction along the I-280 corridor would have no impact upon Peninsula towns, could be easily accomplished while maintaining freeway traffic, and would have no impact upon Caltrain operations. It would not be nearly as difficult as attempting to construct additional tracks, overhead catenaries and grade separations in the Caltrain corridor while maintaining Caltrain operations. Further, the EIR/EIS completely fails to address the possibility of an alignment from San Jose along I-280 to I-380, at which point HSR could connect with SFO, and reconnect with the Caltrain corridor to enter San Francisco. L025-24 Cont.

Trench Through Atherton and Menlo Park

If an alignment is selected using the Caltrain corridor through Atherton and Menlo Park, one alternative that could considerably avoid or reduce many of the impacts to the cities would be a Trench Corridor Treatment. The Atherton Rail Committee reviewed the Alameda Corridor in Los Angeles, where an upgraded freight line from the Port of Long Beach was constructed in a trench for its entire length to avoid impacts to surface streets and properties.

Atherton engineering staff reviewed the proposed profile for the Peninsula High-Speed Rail and determined that, with grades even less than the 3% shown for the raised profile, a trench profile between 5th Avenue in Redwood City and San Francisquito Creek in Palo Alto is entirely feasible. The profile would meet the existing grade at 5th Avenue where there is an existing street undercrossing, and it would meet the existing grade at San Francisquito Creek, where it could continue up to an elevated section, or crest and return to a below grade system through Palo Alto. The profile would pass under the Atherton Channel, a relatively shallow drainage channel, and under all of the streets in Atherton and Menlo Park. Leaving those streets at their existing grade would minimize the permanent disruption of residences and businesses along the corridor and along each street. L025-25

Concern has been expressed that the trench option would encounter difficulties crossing local creeks and streams. Town staff notes that conventional hydraulic design options exist for the Atherton Channel creek crossing, either by an aqueduct over the tracks, by an adequately sized siphon under the tracks, or by a pump station with redundant pump

capacity exceeding the 100-year flow in the channel (to be operated and maintained by the High-Speed Train operator). Floodwalls may be required to reduce the potential for flooding of the rail line.

Safety should be another important consideration favoring a trench configuration rather than at-grade or above-grade tracks in populated residential areas. A 100 to 124 mph derailment in a populated area, either accidental or through sabotage, would cause considerably less damage and loss of life if constrained by a trench.

Adjacent to park and civic centers, the trench could be covered and those areas expanded over the tracks. This would reduce noise and visual impacts even further, further enhance safety , and allow portions of the community that have been divided by the at-grade tracks to once again be connected. In areas adjacent to commercial enterprises, air rights over the tracks can be leased or sold, adding value to the system and providing opportunities to offset the additional cost of the trench. L025-25 Cont.

The Atherton City Council strongly urges the High-Speed Rail Authority, if the Peninsula Caltrain corridor is selected, to study during the project design process the potential of placing the High-Speed Rail system in a trench through Atherton and Menlo Park. This design option will avoid significant impacts to cultural and 4(f) resources (historic Atherton train station and Holbrook-Palmer Park), to protected biological resources (heritage and significant trees), and to adjacent properties, reducing the monetary damages that would need to be paid to remainder properties. It will also reduce the division between portions of the community instead of enhancing the division by the placement of linear walls or embankment to support a raised track bed. And finally, and extremely important, it will reduce the visual and noise impacts of the High-Speed Train system on the surrounding community.

CONCLUSION

The Bay Area to Central Valley HST Draft Program EIR/EIS for the Proposed California High-Speed Train System does not adequately address the potential environmental impacts to the San Francisco Peninsula that could be avoided or minimized by use of appropriate alternatives. The Authority needs to revisit the alignments being considered, including several that have been previously suggested, and are suggested again here, but were not considered, and select those that avoid significant impacts to the maximum extent possible. Only then can the Least Environmentally Damaging Preferred Alternative (LEDPA) be selected. **Following such analysis, if impacts can be neither avoided, minimized, nor mitigated, the Authority is required to make a finding of overriding considerations before proceeding with the project.** L025-26

Please address the above comments directly to us, and in your Final EIR/EIS, and advise us of what action you propose to avoid or mitigate the dramatic environmental and right- L025-27

Comment Letter L025 - Continued

California High-Speed Train
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of-way impacts to the Town of Atherton and other Peninsula cities. Town staff welcomes the opportunity to meet with you to discuss these comments if needed. L025-27 Cont.

Thank you for your consideration.

Sincerely,

Alan B. Carlson, Mayor
Town of Atherton

Attached: Atherton City Council Resolution 07-26

RESOLUTION 07-26

A RESOLUTION OF THE CITY COUNCIL OF THE TOWN OF ATHERTON REGARDING THE DRAFT PROGRAM ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT FOR BAY AREA TO CENTRAL VALLEY HIGH SPEED TRAIN

The City Council of the Town of Atherton hereby resolves as follows:

RESOLVED, that the town of Atherton provide comments to the California High-Speed Rail Authority regarding the Draft Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS, with the following points:

1. The Town of Atherton opposes high-speed rail on the Peninsula and within the Caltrain Railway Corridor.

   a. High-speed rail would not directly benefit the Peninsula because express high-speed trains would not stop on the Peninsula, requiring Peninsula travelers to Southern California to transfer, either in San Francisco or San Jose, to the express train in order to benefit from express service.

   b. Construction of high-speed rail along the Caltrain Corridor would be devastating to the long-established and heavily developed communities through which the corridor passes. Construction and operation of high-speed trains along this corridor would have a significant adverse environmental affect on the communities.

2. For the reasons stated above, we support the Altamont alignment for high-speed rail, with access to San Jose along the Capital Corridor (East Bay) route, and with access directly to Oakland via Altamont, with a new TransBay Tunnel connecting Oakland with San Francisco.

3. If the Pacheco alignment is ultimately chosen with a Peninsula route for high-speed rail, the preferred routing should be along Highway 280 or 101, in order to avoid the disastrous consequences of construction within established communities. As stated above, high-speed rail on the Peninsula will not provide easier access to express trains to Southern California. Accordingly, the Peninsula should rely upon existing Caltrain service to access either San Francisco or San Jose as starting off points, from which express trains to Southern California would depart.

4. In all events, if a Caltrain Corridor route is ultimately chosen for high-speed rail alignment, the HST should run in a tunnel or a trench in order to minimize environmental impacts and to maximize the availability of surface land for positive redevelopment.

Resolution No. 07-26
Adopted September 19, 2007
Page 1 of 2

Comment Letter L025 - Continued

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the Town of Atherton that this Resolution shall be effective immediately upon adoption.

* * * * * * * * * * *

I hereby certify that the foregoing Resolution was duly and regularly passed and adopted by the City Council of the Town of Atherton at a regular meeting thereof held on the 19th day of September 2007, by the following vote.

AYES:	*5*	*Council Members: Janz, J.Carlson, Marsala, A.Carlson, McKeithen*
NOES:	*0*	*Counci Members:*
ABSENT:	*0*	*Council Members:*
ABSTAIN:	*0*	*Council Members:*

Alan B. Carlson, MAYOR
Town of Atherton

ATTEST:

Kathi Hamilton, Acting City Clerk

APPROVED AS TO FORM:

Marc Hynes, City Attorney

I HEREBY CERTIFY THAT THE FOREGOING DOCUMENT IS A TRUE AND CORRECT COPY ON FILE AT: 91 ASHFIELD ROAD ATHERTON, CA
DATE Oct. 23, 2007
SIGNED BY Kathi Hamilton
Acting City Clerk

Resolution No. 07-26
Adopted September 19, 2007
Page 2 of 2

Response to Letter L025 (Alan B. Carlson, Mayor, Town of Atherton, October 25, 2007)

L025-1

The Authority and FRA acknowledge receipt of the Town of Atherton's comments and adopted city council resolution.

L025-2

Responses to the City's reasons for opposition to the proposed HST system are provided below. The purpose of and need for the HST system are described in Chapter 1, and the impacts of various alignments, including the Caltrain alignment, are reviewed in Chapters 3, 5, 7, and 9. Please refer to Standard Response 3 regarding the identification of the Pacheco Pass as the Preferred Alternative.

L025-3

The Authority and FRA acknowledge that different HST alignments and network alternatives would pass through different communities and correspondingly result in differing impacts for these communities, as described in the Draft Program EIR/EIS. As a point of clarification, please note that two Altamont Pass network alternatives would pass through Atherton (Figures 7.2-8 and Figure 7.2.9).

The Authority and FRA recognize that Caltrain is providing Baby Bullet service today. Please note that provision of HST service along the peninsula would provide complementary service, with Caltrain service providing the more local or intermediate service feeding the more limited stop HST service that would connect not only to key stations along the peninsula (San Jose and Redwood City or Palo Alto, Millbrae (SFO), and downtown San Francisco) but also to the destinations across the entire state. This type of complementary train service (local, regional, and statewide) has been found to be highly effective for the European and Japanese HST systems.

L025-4

The Preferred Alternative identified in this Final Program EIS/EIR does not include a Bay crossing, which would have high potential environmental impacts and considerable construction issues. These Bay crossing alternatives would have more than 36 acres of potential direct impacts on the San Francisco Bay. They would have 38.8 acres of potential impacts on water bodies (lakes + San Francisco Bay), whereas the Oakland and San Jose Termini Altamont Pass network alternative would have only 2.3 acres of potential direct impacts.

The cost of the additional 8.8-mile HST segment needed to implement a new transbay tube is estimated at about $4.6 billion—more than $500 million per mile. Moreover, there is only slightly higher ridership and revenue potential (less than 2% higher ridership, or 1.0–1.6 million passengers, per year by 2030) when comparing the transbay tube alternative via the East Bay versus the related Altamont Pass network alternative that terminates in Oakland.

To implement alternatives that included a new transbay tube, coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act, USFWS, and the California Coastal Commission. Crossing the Bay would also be subject to the USACE, CDFG, and BCDC permit process.

For these and other reasons, the Network Alternative that would cross the San Francisco Bay twice was not identified as the Preferred Alternative in this Final Program EIR/EIS. In fact, the Preferred Alternative does not include any crossing of the Bay.

Please see Response to Comment L025-3 regarding complementary commuter and HST service along the Caltrain Corridor. Please note that transfers between the more local Caltrain service and the HST service could occur not only at San Jose but also at Redwood City or Palo Alto or at Millbrae.

The Authority and FRA acknowledge the Town of Atherton's City Council unanimous support for the specified Altamont Pass alternative.

L025-5

Please note that the Caltrain JPB supports the use of the Caltrain Corridor for HST service—see Comment Letter L026. The Authority and Caltrain have signed a Memorandum of Understanding to establish, among other items, a complementary train service plan to effectively serve the local, regional, and statewide markets. Such a plan would optimize the service levels to meet these various markets, again as is done in the European and Japanese markets.

Please also note that a grade-separated, four-track system with train control, as proposed for the Caltrain Corridor and addressed in the Draft Program EIR/EIS, would allow for HST, express, and local trains to operate efficiently using all four tracks, with high levels of service for each of the train rider markets. Given this, more than four tracks along the peninsula are not anticipated, except at the San Jose and San Francisco stations. The Authority expects to work with Caltrain further but finds, based on preliminary analysis, that shared tracks are expected to be feasible in this area.

L025-6

As noted in Response to Comment L025-5, the Preferred Alternative includes a fully grade-separated, four-track system with train control along the Caltrain Corridor. The San Jose station and San Francisco Transbay Transit Center would involve more than four tracks and platforms for service to Caltrain and the HST trains. Four tracks and four platforms are currently included at the Redwood City or Palo Alto and the Millbrae stations, and this configuration is currently included in the land acquisition cost estimates. Pedestrian access to these station platforms would be grade separated, which is also included in the cost estimates.

L025-7

The cost estimates for the Caltrain segment of the HST system are found in Appendix 4A page 4-A-1. Typical sections for the Caltrain Corridor are found in Appendix 2-E. The cost estimate for the Caltrain segment of the railroad is at a conceptual level, and many of the items listed in the comment would be covered by contingency of 25% of the total costs. The project-level analysis of the Caltrain Corridor will provide a more detailed analysis of the cost elements. It is important to note that Caltrain is also developing separate cost estimates for its corridor electrification. A careful examination of the cost elements of the two projects will lead to a more detailed and comprehensive understanding of the separate cost elements of the HST project.

L025-8

Discussion of the impacts identified in the letter is provided below. Please note that the Authority and FRA did review avoidance alternatives to the extent possible in the development of the conceptual alignments and station location options. Please also refer to Standard Responses 1 and 2.

L025-9

An electric locomotive or trainset's noise level would be less at 120 miles per hour than the typical diesel locomotive and would not require additional sound mitigation beyond what is already in place for the existing Caltrain service.

The provision of noise walls along the Caltrain Corridor is deemed by the Authority and FRA as a "low" visual impact given that these walls would not only mitigate noise from the system but also remove views of the train tracks. Please also see discussion of the trench option in Response to Comment L025-25.

L025-10

It is recognized that the implementation of quiet zones would serve to reduce the amount of train horn noise along the peninsula; however, it would not completely remove the use of train horns at at-grade crossings. Even with quiet zones, the engineers retain the right to use the horn if they see a potential hazard on the tracks (e.g., pedestrian, vehicle, animal). In addition, the grade-crossing protection devices still emit sound from warning bells. This noise will

not be eliminated with the quiet zone. Finally, the establishment of new quiet zones is subject to local political processes, dependent on grade-crossing improvements, and not reasonably foreseeable for this program-level analysis. The HST system will need to be completely grade separated on the peninsula corridor, eliminating both the train horn noise and the bell noise from the grade-crossing protection devices.

L025-11

It is recognized that the plans for Caltrain's electrification are well under way. The further progress of the Caltrain electrification project will be taken into account in future project-level environmental reviews for the HST project in this corridor.

L025-12

As noted in Response to Comments L025-10 and L025-11, quiet zones and electrification are not included in the No-build for the reason that it is not appropriate to include them at this time.

L025-13

The Authority anticipates working with the various communities on the design of noise walls proposed within their jurisdictions. Please also see discussion of the trench option in Response to Comment L025-25.

Comment acknowledged. A trench alternative would reduce the visual impacts of the catenary as mentioned in Response to Comment L025-9, and the noise impacts would not be significant.

L025-14

The Authority and FRA are aware of the attractive residential visual setting in the Town of Atherton.

The HST project assumes an overhead electrification system as does the Caltrain electrification program. The Authority and FRA note that noise walls would reduce the visual impacts associated with the overhead electrification system.

L025-15

A third rail electric propulsion technology would be incompatible with the planned electrification of the Caltrain system. As noted in Response to Comment L025-11, the Caltrain electrification is well under way. It would be expensive and redundant to have two separate power-distribution systems.

L025-16

Please see Response to Comment L025-24. A more detailed review of the impacts on local vegetation, including loss of mature and heritage tress and associated effects along the Caltrain Corridor will be performed during the preliminary engineering and project-level environmental review. Possible avoidance or minimization of impacts on the mature and heritage trees will be reviewed in detail, and mitigation for the loss of trees will be developed.

L025-17

Please see Response to Comment L025-5 regarding shared Caltrain tracks. The Authority and FRA understand their obligation to mitigate environmental impacts and compensate property owners as required under federal and state laws and regulations.

L025-18

As noted in Section 3.12, the study area for identifying historic resources for the Program EIR/EIS was identified to be 100 ft on either side of the centerline for routes along existing highways and railroads, where very little additional right-of-way would be needed. A study area for cultural resources at this program level of analysis was developed based on review of the records searches from the California Historical Resources Information System (CHRIS) Information Centers, as well as the cultural resource specialists' knowledge and experience in regional history and prehistory. It is important to note that the study area was specifically designed to aid in the program-level analysis, which provides a general comparison of the alternatives without new identification surveys. The Tier 2 project-level environmental analysis will include surveys within a defined APE to further identify eligible historic resources, such as the

Atherton train station, in proximity to proposed HST system features.

The Atherton Caltrain Shelter is not a designated state or federal historic, and new determinations of eligibility for sites/resources adjacent to or near alignments were not part of the scope of this program-level EIR/EIS. Consistent with the methodology, the Authority and FRA made use of existing state and federal designations for both the cultural and the 4(f)/6(f) analyses.

As noted in the Draft Program EIR/EIS, Burlingame and Menlo Park Caltrain stations are designated state sites, and both are on the National Register of Historic Places, as are the San Carlos and Millbrae Caltrain stations. The Millbrae station was moved 200 ft south in 1980 to accommodate the widening of Millbrae Avenue, 2 years after it was designated a federal landmark.

L025-19

As noted in Response to Comment L025-18, the Tier 2 project-level environmental analysis will include surveys to further identify eligible historic resources, such as the Holbrook-Palmer Park.

The conceptual plan/profiles in the Draft Program EIR/EIS show the alignment through Atherton as "retained fill." The preliminary engineering and project-level review will refine the alignment and profile. For instance, the design of road/rail grade separations will be analyzed and determined during this phase.

Retained fill does not mean that the height of the fill will by definition be significant. In some locations in Atherton, the elevation of the rails is a few feet higher than the existing land. Please note that a constrained four- track right of way can be accommodated in a 50-ft cross section. Also see response S008-5. The right-of-way through Atherton is generally the same width, with some wider portions, as is the right of way in Redwood City, which is currently four-tracked.

To accommodate the addition of two tracks in Atherton, for instance, it is possible that a 2–3 ft retaining wall may be sufficient along the side of the tracks in some locations to keep added fill from falling outside the existing right-of-way. Moreover, it appears that the grade at the existing Atherton Caltrain station could accommodate four tracks without additional fill, which would not cause a significant visual impact at the station. This preliminary plan/profile formed the basis for the visual assessment in the Draft Program EIR/EIS.

The poles and wires associated with the electrification would also not pose a significant visual impact. If any, the visual impact would be no more than "low," because the poles and wires of electrification would reinforce the linear form of the railway corridor.

The screening effect of the trees along the right-of-way in Atherton limits the visual impact of activity along the Caltrain line, including Holbrook-Palmer Park. Based on a preliminary review, no trees need to be removed to add two tracks to the existing line. Any trimming would be minimal and limited to branches protruding over the tracks, not perpendicular to the tracks, and therefore would not affect the screening effect of the trees.

Visual impacts could occur at locations where road/rail grade separations are planned, depending on the type of separation planned. This level of detail will be analyzed in the subsequent project-level EIR/EIS.

L025-20

Once the project design has advanced to the appropriate level, the Tier 2 project-level environmental analysis will analyze the project's potential impacts, such as grade separations, on historic resources and provide more detailed design review and mitigation measures to avoid or minimize such impacts.

Mitigation can and will include alignment shifts to miss resources to the extent feasible and practicable. Please also see discussion of the trench option in Response to Comment L025-25. The Authority and FRA understand that the grade separations may affect 4(f) resources, and the potential effects on (use of) these resources will be reviewed at the project level as part of the detailed 4(f) finding.

L025-21

The potential impacts on public facilities near or adjacent to the proposed corridor will be examined in further detail during the project-level environmental analysis.

L025-22

Comment acknowledged.

L025-23

The Authority reviewed avoidance alternatives (including East Bay alternatives) to the extent feasible in the development of the conceptual alignments and station location options. Please see Response to Comment L014-2.

L025-24

The Authority and FRA find that the reasons for rejecting the I-280 and US 101 are still valid. The Caltrain Corridor offers more benefits and a lower level of impacts than these other alternative, as described in Appendix A. Please note that a connection to the Diridon station would need to be made from the south and then travel to the west to gain access to the I-280 corridor, thus requiring a guideway to pass though developed portions of downtown San Jose.

The Authority and FRA also note that Caltrain is an established rail corridor serving population centers along the peninsula, and this corridor offers the opportunity for complementary local, commuter, and statewide rail services to be fully integrated. The Caltrain JPB views the HST system as an opportunity to upgrade its services and improve this rail corridor. Please see Comment Letter L026.

L025-25

As part of the preliminary engineering and project-level EIR/EIS, the Authority and FRA will review the costs and benefits of detailed design options and variations along the entire selected alignment alternative, and this would include the Caltrain Corridor if the Preferred Alternative is selected. This review will include an evaluation of aerial, trench, or tunnel options for those portions of the alignment where insufficient right-or-way exists or where a change in profile could cost-effectively reduce impacts on adjoining land uses.

Subject to further more detailed study, use of a trench through Atherton and Menlo Park or other portions of the Preferred Alternative alignment, if it is selected, may prove to be a cost-effective approach and will therefore be evaluated during the next phase of the HST project. The Authority and FRA are aware of the various design and construction techniques that can be applied for development of a trench.

L025-26

The Authority and FRA find that the Draft Program EIR/EIS has adequately addressed the potential impacts along all of the alignment alternatives and station location options evaluated in the document. The Preferred Alternative identified in this Final Program EIR/EIS would avoid significant impacts to the maximum extent feasible, as discussed and described in Chapter 8. The Authority and FRA will specify in their decision-making documents on this Program EIR/EIS, and in the Mitigation Monitoring and Reporting Program, the mitigation strategies required to be included in future project-level analyses for the development of the HST system. The EPA and USACE concurred that the Pacheco Pass Network Alternative, San Francisco and San Jose Termini, would most likely yield the LEDPA.

L025-27

The Authority and FRA appreciate the offer to meet with the Town of Atherton.

Responses to Letter L029 (Letter 1: Thomas Enslow, Adams Broadwell Joseph & Cardozo, October 25, 2007; and Letter 2: Rich Wright, Grassland Water District, October 25, 2007)

L029-1

The Authority and FRA acknowledge receipt of the comments on the Draft Program EIR/EIS from Adams Broadwell Joseph & Cardoza, representing the Grassland Water District, the Grassland Resource Conservation District, Grassland Conservation, Education and Legal Defense Fund.

L029-2

Comment acknowledged.

L029-3

Comment acknowledged.

L029-4

Comment acknowledged. The proposed Henry Miller alignment alternative would not run through the Los Banos Wildlife Area Interpretive Marsh but would be adjacent to Henry Miller Road. The preferred alignment alternative and station location options are identified in Chapter 8 of this Final Program EIR/EIS, including avoidance and minimization alternatives. After the completion of this environmental review process, site specific locations and design variations for the selected alignment alternative and station locations will be fully investigated during the Tier 2, project-level environmental review. This will include evaluating design alternatives to the north and south of the current proposed Henry Miller alignment alternative (between the Central Valley and the Pacheco Pass), if this is the selected or approved alternative. See also Section 3.15.5 regarding the Authority's commitment to acquire agricultural, conservation, and/or open space easements for potential impacts in and around the GEA.

L029-5

The Authority and FRA acknowledge the GWD's, CRDC's, and GCELDF's opposition to the Pacheco Pass alignment alternatives. As shown in various comment letters in this Final Program EIR/EIS, there is opposition and support from numerous organizations and individuals for the Pacheco Pass and Altamont Pass alternatives. See Response to Comment L001-3 regarding supporters of Altamont Pass and Pacheco Pass network alternatives. See also Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative.

There are a number of reasons supporters give for preferring the Altamont Pass including: 1) has quicker travel times between Sacramento/northern San Joaquin Valley and the Bay Area, 2) best serves the Central Valley, 3) serves more Northern San Joaquin markets on the Authority's adopted first phase of construction between the Bay Area and Anaheim, 4) has higher ridership potential, 5) has less potential for environmental impacts, 6) avoids impacts on wildlife and sensitive habitat through Pacheco Pass and the GEA, 7) serves a greater population/more population along the alignment, 8) best serves ACE corridor and reduces traffic along I-580, 9) provides better service between the Bay Area and southern California (either reduced frequency is needed on shared Caltrain alignment or HST trains can be split), 10) best serves San Jose because it would be a terminus station and with much faster travel times to commuter markets in the northern San Joaquin Valley, and 11) is less sprawl inducing.

There are a considerable number of organizations, agencies, and individuals who have expressed concern regarding potential impacts on the San Francisco Bay and Don Edwards San Francisco Bay National Wildlife Refuge by HST alternatives via the Altamont Pass using a Dumbarton Crossing. These include the MTC; BCDC; USEPA; USFWS; Don Edwards San Francisco Bay National Wildlife Refuge; Congress members Zoe Lofgren, Michael Honda, Anna Eshoo, and

Tom Lantos; State Senators Elaine Alquist and Abel Maldanado; Assembly member Jim Beale; Santa Clara County; SamTrans; TA; Caltrain JPB; San Francisco Bay Trail Project; San Jose Chamber of Commerce; the City of San Jose; the City of Oakland; and Don Edwards (Member of Congress, 1963–1995). The East Bay Regional Park District has raised concerns in regards to potential impacts on nine regional parks, in particular the Pleasanton Ridge and Vargas Plateau regional parks, and the Alameda Creek Regional Train between Pleasanton and Niles Junction for Altamont Pass alternatives. In addition, the City of Fremont opposes the Altamont Pass, and the City of Pleasanton does not support the Altamont Pass but remains "open" to terminating Altamont alternatives in Livermore. The MTC and Alameda County Supervisor Scott Haggerty also support the investigation of Altamont Pass alternatives terminating in Livermore.

There are a number of reasons supporters give for preferring the Pacheco Pass, including: 1) provides quicker travel times between San Jose/Silicon Valley and Southern California, 2) has more frequent/better service between Bay Area and southern California, 3) has higher ridership potential, 4) has fewer potential environmental impacts, 5) avoids impacts on wildlife and sensitive habitat through Don Edwards San Francisco Bay National Wildlife Refuge, 6) best serves the Caltrain Corridor (San Francisco to Gilroy), 7) provides good HST access for the three-county Monterey Bay area with a south Santa Clara HST station, 8) can serve San Francisco, Oakland, and San Jose without a new crossing of the Bay, 9) provides all service through San Jose/best serves south Bay, and 10) costs less for first phase of system between the Bay Area and Anaheim.

The Preferred Alternative identified in this Final Program EIR/EIS is the Pacheco Pass, Henry Miller alignment alternative. The Authority and FRA note that this alignment has been located next to an existing transportation facility to minimize impacts of the HST system.

The Authority and FRA note that the portion of the HST alignment that would pass through existing wetland areas would be placed on a structure to allow for the continued flow of water in these areas, and that the system would be designed to avoid or minimize impacts on canals or waterways.

Please see Standard Response 4 regarding growth.

Analysis at the program level determined that the Pacheco Pass network alternatives would potentially result in significant environmental impacts, even with mitigation strategies incorporated. The Pacheco Pass network alternatives, including the alignment along Henry Miller Road, are within areas that have undergone human change, either through the development of buildings and transportation facilities or through ranching, farming, or other agricultural activities. The alignments were located to minimize impacts on both the built and natural environments. The alignment would be adjacent to and along Henry Miller Road.

The use of tunnels and elevated sections of the HST system have been included to minimize impacts on the Diablo Range and through the GEA. Mitigation strategies to minimize impacts on sensitive species and habitat and wildlife movement corridors, such as underpasses, bridges, large culverts, and aerial structures have been included in this Program EIR/EIS. The design of these features will be further delineated during the project-level environmental review and documentation to ensure that their designs and specifications would be sufficient to establish permeability and functional corridors to facilitate wildlife movement and habitat connectivity. These designs would be developed in consultation with the resource agencies.

The Henry Miller alignment alternative would extend through two southern portions of the broadly defined GEA and between, but not across, areas now managed by public agencies. This alignment alternative would be adjacent to the existing Henry Miller Road and would avoid or minimize potential impacts on biological resources. The western portion crossed by the alignment alternative closest to Los Banos would extend adjacent to Henry Miller Road and the San Luis Wasteway and cross Ingomar Road south of the Volta Wildlife Area. This area of the GEA is already bisected by transportation and infrastructure facilities including rail and roadways, and also includes housing development, farm operations, and land under active

agricultural production. The other area of the GEA crossed by the alignment is just south of the CDFG Los Banos Wildlife Area. The alignment would extend approximately 3.3 miles on elevated structure along Henry Miller Road. This area of the GEA is bisected by Henry Miller Avenue/Road, SR 165, Baker Road, Delta Road, Santa Fe Grade, Criswell Avenue, and a number of human-made canals and also includes housing development, farm operations, and land under active agricultural production.

Use of the Henry Miller alignment alternative would not be expected to result in further fragmentation within the GEA because the alignment would be adjacent to Henry Miller Road, an existing facility, and would be elevated for almost half the distance through the GEA. The general area designation of the GEA occurred well after roads, utilities, farms, and residences were already well established, and the HST alignment would follow the existing layout of Henry Miller Road.

The Authority and FRA have not determined the number of wildlife underpasses that would be included as part of this alignment. This will be reviewed in more detail during the preliminary engineering and project-level EIR/EIS phase, if this alignment is selected. The Authority and FRA note, however, that it is premature to conclude that there would only “a few” of these underpasses or that they would be “insufficient.” Future project-level analyses would include focused surveys for state and federal threatened and endangered species and detailed identification of habitat, wildlife movement/migration corridors, potential for noise and collision impacts, and wetlands and water resources (including water quality) to further identify impacts and develop site specific mitigation measures for the selected alignment. In addition, engineering design refinements would be undertaken to avoid and/or minimize environmental impacts. This would include evaluating design alternatives to the north and south of the proposed Henry Miller alignment alternative (between the Central Valley and the Pacheco Pass), if the Pacheco alignment is selected. See Section 3.15.5 regarding the Authority’s commitment to acquire agricultural, conservation, and/or open space easements for potential impacts in and around the GEA.

The proposed HST system would not be expected to induce growth in the GEA or the Los Banos area because no station or maintenance facility would be located in this area. The closest proposed stations would be in Merced and Gilroy.

L029-6

Contrary to the comments in this letter, the Authority and FRA consider the Draft Program EIR/EIS to be adequate to meet the requirements of NEPA and CEQA and find that recirculation is not warranted. Please see Standard Responses 1 and 2.

L029-7

Comments contained in the attachments are responded to in this Final Program EIR/EIS.

L029-8

Comment acknowledged.

L029-9

Analysis of the GEA was conducted at the program level and will continue in the future Tier 2 analysis, if the Pacheco alignment is selected. See Response to Comment L029-5.

L029-10

The Draft Program EIR/EIS was prepared and circulated to inform the public and public agencies about potential significant environmental effects before decisions were to be made. The Authority and FRA are aware of the CEQA requirements concerning the consideration of alternatives and mitigation measures to reduce significant effects, as well as requirements for findings and a statement of overriding considerations for remaining unavoidable adverse impacts, where appropriate.

L029-11

The Authority and FRA do not agree with the assertion that the Draft Program EIR/EIS is inadequate. The GEA is identified in the Draft Program EIR/EIS in Section 3.15. Additional information regarding

Comment Letter L035 (Mike McKeever, Sacramento Area Council of Governments, October 26, 2007)

Sacramento Area Council of Governments

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OCT 26 2007
BY:

SACOG

October 26, 2007 L035-1

Mr. Quentin Kopp
California High Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814

Re: Comments by the Sacramento Area Council of Governments (SACOG) on the Draft Program EIR/EIS for the Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS.

Dear Chair Kopp:

Thank you for the opportunity to supplement our original comments provided on August 30, 2004, on the overall program level EIR/EIS for the overall HST system (attached for your convenience). Our comments today focus primarily on the Bay Area access issue (Pacheco vs. Altamont alignments), but also raise again an issue that we do not believe has received sufficient attention from the California High Speed Rail Authority (CHSRA). L035-1

First, with respect to the Bay Area access issue, we believe that draft document may be flawed in its projections of the Altamont ridership numbers. We would pose this question: How can ridership be greater via the Pacheco Pass alignment, which traverses areas of very low population densities, when compared to the Altamont alignment, which goes through Modesto, Stockton, Tracy, and Livermore? The Altamont alignment also lends itself much more readily to a future build out that would connect Sacramento and the Bay Area. It would seem that the CHRSA's consultant definitely needs to go back to the drawing boards in the ridership area before the document is finalized. L035-2

In addition to ridership, we would make the following observations: the travel times to Southern California are virtually the same (with the Altamont alignment slightly faster); the wetland/grassland and other environmental issues associated with the Pacheco alignment are highly problematic and will ultimately be more difficult to resolve than the Altamont environmental issues; and the costs to build a future Sacramento leg via the Altamont alignment are significantly less (i.e., a Sacramento-Stockton segment will be considerably cheaper to construct than a Sacramento-Chowchilla segment). L035-3 L035-4 L035-5

All of this, we believe, argues for the CHRSA to give very careful consideration to the Altamont alignment in its upcoming deliberations. L035-6

Auburn
Citrus Heights
Colfax
Davis
El Dorado County
Elk Grove
Folsom
Galt
Isleton
Lincoln
Live Oak
Loomis
Marysville
Placer County
Placerville
Rancho Cordova
Rocklin
Roseville
Sacramento
Sacramento County
Sutter County
West Sacramento
Wheatland
Winters
Woodland
Yolo County
Yuba City
Yuba County

There is another issue, however, which the Sacramento Area Council of Governments (SACOG) feels most strongly about and which we would like to reemphasize to the CHRSA regardless of which Bay Area alignment is selected. In our August 30, 2004, letter, SACOG pointed out our concerns about the potential for the High Speed Train (HST) to create sprawl, particularly in the San Joaquin Valley. We believe that the measures the CHRSA has developed to date to deal with sprawl are inadequate. While the intentions of the CHRSA in this area are admirable, SACOG believes that the Authority has not examined sufficiently the unintended consequences of the project with respect to sprawl.

There is virtually no difference between the freeway system and an HST system with the sprawling effect that such a project can create. One need look no further than New York City and Chicago after World War II to see the massive low density development that occurred in Connecticut and Northern Illinois by commuter trains. When a wage earner can buy a much less expensive home in Fresno and commute to work in the Bay Area in less than one hour, why would that individual not do so? Look what is happening in Tracy and Modesto, and the commutes are much greater than one hour. The CHRSA needs to address this issue in a much more in depth manner than it has to date. L035-7

The Europeans and the Japanese have dealt with this issue with very strict land use controls. We do not suggest that land use controls are the only to deal with this issue. While the Coastal Commission has been very effective, as an example, in preserving the California coastline, land use controls have not been generally very popular with the residents of this State. There may be incentives which the CHRSA could explore that would address the issue of sprawl in a more proactive way. The main point here is that the CHRSA has not really addressed in a thoroughgoing manner the issue of the potential of the project to create additional sprawl throughout the State. This unintended consequence of the project could very well defeat very problem the project was proposed to solve. We encourage the CHRSA to take up this issue immediately, and SACOG stands ready to offer its assistance in any way that would be helpful. We believe that our experience with the Blueprint project and the PLACE^{3}S methodology could be very useful to the Authority.

Thank you and pleas feel free to call me if you have any comments or questions. L035-8

Sincerely,

Mike McKeever
Executive Director

MM:OW:gg
Attachment

S:\Projects 07-08\0405-Pass Rail\CHSRA Ltr to Quentin Kopp 10-26-07.doc

Response to Letter L035 (Mike McKeever, Sacramento Area Council of Governments, October 26, 2007)

L035-1

The Authority and FRA acknowledge receipt of comments from the Sacramento Area Council of Governments.

L035-2

All Altamont and Pacheco Pass network alternatives provide HST station location options in the same communities throughout the Central Valley and southern California. The only substantial difference outside of the Bay Area is that Altamont provides the opportunity for an additional HST station in Tracy, which is near other HST stations in Stockton and Modesto. Within the Bay Area, the only potential station differences are in southern Santa Clara County and eastern Alameda County. Therefore, statewide access to an HST station is relatively equal when similar Altamont and Pacheco network alternatives are compared.

Ridership differences arise due to differences in travel time, travel cost, and service frequency between individual station pairs for Altamont and Pacheco, as well as HST's competitive position relative to auto and air travel in certain markets. Most notably, the Altamont Pass alternative includes an HST service split in the East Bay, which greatly reduces HST frequency (compared to Pacheco Pass) to San Jose and San Francisco under the base network alternative. The ridership and revenue forecasts assumed about 50 trains per day per direction between Los Angeles and San Francisco/San Jose in the Pacheco Pass alternative. Due to the HST service split, the Altamont Pass alternative has 33 trains per day from Los Angeles to San Francisco and 17 trains per day from Los Angeles to San Jose (for the same total of 50 between Los Angeles and the Bay Area). This allocation of trains to the two destinations means that everyone traveling to these destinations has lower frequency of trains in the Altamont alternative compared to the Pacheco Pass alternative. This lower frequency leads to about 6 million fewer annual systemwide passengers in the base Altamont Pass alternative compared to the base Pacheco Pass alternative.

Although the Altamont Pass alternative has the potential to achieve higher ridership between the Bay Area and northern Central Valley (Merced northward), Pacheco Pass alternative achieves higher ridership between the Bay Area and areas from Fresno southward (including Los Angeles and San Diego regions). Due to its proximity to the Central Coast region (through a potential Gilroy station), the Pacheco Pass alternative also creates a sizable HST market to/from the Monterrey Bay area; this market is virtually untapped with the Altamont Pass alternative.

L035-3

Comment acknowledged.

L035-4

Please see Response to Comment S009-8.

L035-5

Comment acknowledged.

L035-6

Identification of a Preferred Alternative for this Final Program EIR/EIS was a deliberative and difficult process. As noted throughout this Program EIS/EIR, each of the alternative alignments presents differing impacts and benefits, and a review of the public comments illustrates the strong positions that have been taken for Altamont Pass or for Pacheco Pass. Please see Standard Response 3 regarding the identification of the Pacheco Pass as the Preferred Alternative.

The underlying reasons for the identified Preferred Alternative are presented in Chapter 8 of this Final Program EIR/EIS.

L035-7

The Authority and FRA do not agree with the assertion that there is very little difference between the freeway system and a new HST system. Freeways have many interchanges and exacerbate sprawl, whereas HST systems, such as the proposed California HST system, have limited station stops. Please refer to Standard Response 4 regarding growth. Please also see Chapter 5 in regards to "Economic Growth and Related Impacts" and Chapter 6 in regards to "Station Area Development." Chapter 6 includes the Authority's adopted policies requiring transit-oriented development around stations and commitments toward developing smart growth principles in the vicinity of HST stations.

L035-8

The Authority and FRA appreciate receipt of the Sacramento Area Council of Government's comments on the Draft Program EIR/EIS and the contact information.

Comment Letter O001 (Gary A. Patton, Planning and Conservation League, July 27, 2007)

O001

PLANNING AND CONSERVATION LEAGUE
F O U N D A T I O N

RECEIVED
AUG 1 2007
BY:

July 27, 2007

California High-Speed Rail Authority, EIR/EIS Comments
925 L Street, Suite 1425
Sacramento, CA 95814

RE: Preliminary Comments - Bay Area to Central Valley High-Speed Train Program EIR/EIS

Dear Ladies and Gentlemen:

I have an immediate, preliminary comment on the Bay Area to Central Valley High-Speed Train Program EIR/EIS. The study recently released for public comment outlines the various alternatives for the Altamont and Pacheco alignments, but does not include an analysis of regional rail ridership for the Sacramento-Stockton-Pleasanton-San Francisco-San Jose corridor. This is a fatal deficiency, and must be corrected. Failure to include these data (and an analysis of these data) makes the EIR/EIS document inadequate.

Analyzing commuter/regional rail ridership in the Sacramento-San Jose/San Francisco corridor is essential to this study, because there would likely be on the order of millions of annual riders in the corridor utilizing commuter rail options. Increasing commuter rail in the corridor can lead to a significant reduction in traffic congestion and air pollution. The impacts of commuter rail MUST be analyzed and taken into account as a High Speed Train alignment is selected. O001-1

As it turns out, MTC is in the process of developing the data needed. If they weren't (or if for some reason they don't), the High Speed Rail Authority would have to develop the data independently, to prepare an environmental document that would comply with the requirements of CEQA and NEPA. The bottom line is that the EIR/EIS for the Bay Area to Central Valley High-Speed Train Program must include a review and analysis of the data on potential commuter rail ridership.

This letter is our official request that you withdraw the current draft, and then reissue an amended draft, for public review and comment, when the appropriate data are included and analyzed as part of the environmental analysis that CEQA and NEPA require. O001-2

Thank you for your attention to this serious concern.

Very truly yours,

Gary A. Patton, Executive Director
Planning and Conservation League

cc: Interested Persons

1107 9th Street, Suite 360, Sacramento, CA 95814 Phone: 916-444-8726 Fax: 916-448-1789
Website: www.pcl.org Email: pclmail@pcl.org A member of Earth Share California

Response to Letter O001 (Gary A. Patton, Planning and Conservation League, July 27, 2007)

O001-1

The California High-Speed Rail Authority (Authority) and the Federal Railroad Administration (FRA) find the information regarding potential impacts, benefits, costs, ridership, and operations of the high-speed train (HST) system to be fully consistent with the requirements of National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) and adequate to identify key differences among the alignments and station location options. The Authority and FRA find that recirculation of the document is not warranted.

O001-2

Comment acknowledged. Please see Response to Comment O006-3 and Standard Responses 1 and 2.

Comment Letter O006 (David Schonbrunn, Transportation Solutions Defense and Education Fund, October 25, 2007)

O 006

Transportation Solutions Defense and Education Fund

P.O. Box 151439 San Rafael, CA 94915 415-460-5260

October 25, 2007
By E-mail and U.S. Mail

Hon. Quentin Kopp, Chairman
California High-Speed Rail Authority
EIR/EIS Comments
925 L Street, Suite 1425
Sacramento, CA 95814

Re: Bay Area to Central Valley DPEIR/S

Dear Chairman Kopp:

The Transportation Solutions Defense and Education Fund (TRANSDEF) is a Bay Area environmental organization advocating the regional planning of transportation, land use and air quality. We are especially focused these days on policies that are responsive to the challenge of climate change. We strongly support High Speed Rail (HSR) and see it as likely to become the State's most far-reaching (literally as well as figuratively) climate change mitigation project. O006-1

The long list of capital projects that need to be built to provide a low-carbon way of life places tremendous pressure on your Authority to economize with this project. Cost-effectiveness in achieving an integrated California High Speed and intercity rail system will be key. That is why the "hybrid" recommendation that MTC adopted yesterday is a total non-starter. Because of its $5 billion dollars of additional cost, we urge you to discard it from further review as an option, due to its financial infeasibility. O006-2

TRANSDEF finds this environmental document profoundly unsatisfactory. Major new work will be necessary to make the Bay Area to Central Valley Draft Program Environmental Impact Report/Statement (DPEIR/S) a valid basis for the important decision of selecting an HSR alignment to connect the Bay Area with the rest of California. O006-3

It is nothing short of inconceivable that an environmental document whose sole purpose is to inform the choice between two competing alignments is silent on the issue of the relative merits of those alignments. In its present form, the DPEIR/S offer no guidance on this weighty question, and doesn't offer even a summary table of benefits and impacts of the two alignments. Hundreds of pages go by without this issue being addressed. Did the EIR preparers think we would be so overwhelmed by the data as to miss this glaring absence? This flaw is so profound as to require revision and recirculation, without ever getting to the substance of our comments.

Comprehensive Rail Network

The capacity of HST facilities is so great that their unused capacity can be used to provide regional and interregional mobility solutions without building additional infrastructure. The Altamont alignment offers the opportunity to provide quality service to three travel markets (Bay Area to L.A., Bay Area to Sacramento, and Bay Area to Central Valley), where the Pacheco alignment only can serve one well. Piggybacking additional services on the same infrastructure enables dramatic capital cost savings. O006-4

Building an HST line over the Altamont pass will cover most of the capital cost of providing fast, reliable ACE regional and interregional service. If the DPEIR/S cumulative impact analysis were to assume that ACE's future expansion funds were used to purchase rolling stock and operations, ACE would then be able to provide top notch service to Silicon Valley. This in turn would catalyze transit-oriented development in the Central Valley and in Silicon Valley that might otherwise not occur. The cumulative impacts analysis of such a scenario would note the difference between these results and the sprawl development that would occur in Santa Clara, Merced and San Benito Counties if the Pacheco alignment were built-out.

The operating plan assumptions used in the DPEIR/S were silly. The Base Case for the Altamont alignment assumes that only a fraction of the trains from southern California would connect with San Francisco, with the rest going to San Jose. DPEIR/S at S-12. The model then produces a lower ridership estimate for the Altamont alignment, because travel demand models project less ridership when less train service is available. That assumption is the product of a flawed mindset that sees HSR in isolation. HSR needs to be recognized as the backbone of an extensive regional and interregional rail network. Despite the hope that planning would produce a vision for a comprehensive system, TRANSDEF is profoundly disappointed at MTC's mismanagement of the Regional Rail Plan, and its asinine HSR recommendations and final conclusions. O006-5

Nonetheless, the HSR project cannot be meaningfully evaluated on its own. It is only through the synergistic effects of the regional rail network on the HSR system that HSR will achieve maximal environmental benefits. Modelling HSR without the regional rail network will result in ridership calculations that completely ignore the further objective of HSR: "to relieve capacity constraints of the existing transportation system in a manner sensitive to and protective of the Bay Area to Central Valley region's and California's unique natural resources." DPEIR/S at 1-4.

Because the level of Bay Area congestion on Highways 80 and 580 is very high, far outstripping conditions in southern Santa Clara County, the Altamont alignment does far more to serve this objective. Ridership calculations done without adding in the regional riders that use the HSR infrastructure are therefore worthless for purposes of determining which alignment produces the maximal social benefits (which should be the determining factor).

The goal should be to build a regional rail network that provides frequent BART-level service around the region, using the excess capacity of the HSR infrastructure.

Comment Letter O006 – Continued

TRANSDEF 10/25/07 Page 3

Under such a scenario, a train from the southland would be met in Fremont by a train to San Jose, so that, with a platform-to-platform transfer, every train would access San Jose and San Francisco. With regional service assumed like this (or by coupling and uncoupling trainsets), the two alignments will have the same frequency of service. This then will result in meaningful ridership calculations, in which Altamont is sure to have more total riders. O006-5 Cont.

Growth Inducement

We contend the findings of the growth inducement analysis fail to pass the common sense test, and are simply not credible. Peak hour highway conditions between the Bay Area and outlying counties are miserable now and heading towards becoming much worse in 2030. These conditions are represented in the DPEIR/S as the No Project Alternative. They will prevent any kind of substantial expansion of commuting into the Bay Area. Under the Network Alternatives, one would expect Central Valley employment, Table 5.3-2, to drop below the No Project Alternative as Central Valley residents stream onto HSR in search of the Bay Area's higher wages. But it doesn't. Similarly, one would expect Bay Area employment with the Network Alternatives in Table 5.3-2 to increase sharply in relation to the No Project Alternative, as a large pool of lower-cost-of-living employees becomes accessible. O006-6

The fact that the growth inducement analysis fails to show a substantial change in employment between the No Project and Network Alternatives indicates that the model considers the travel connection between the Bay Area and the Central Valley to be convenient enough. That finding clashes with everyday traffic reports that always have problems. Given how bad the traffic is now, it is especially egregious that the DPEIR/S concludes that adding HSR does little to change travel patterns, i.e., induce growth. This whole section needs to be redone, starting with accurate traffic counts now and into the future.

Statewide Growth

With urbanized land in the core study area projected to increase by an astonishing 40% between 2000 and 2030 (at 5-12), it is clear that HST and a comprehensive Smart Growth mitigation package could play a dramatic role in reducing the environmental impacts of a projected tremendous increase in population and jobs. In the absence of a State growth management regime, a statewide project EIR serves as a de facto state plan. O006-7

The DPEIR/S must propose mitigations for this massive projected increase in sprawl. Mitigations are tested by studying how the alternatives compare to the 2005 baseline, as well as to the No Project Alternative. Mitigations that should be evaluated:

- Drop the planned and funded transportation highway improvements that are assumed in the No Project Alternative. Use the funding to instead build a network of intrarregional trains that connect with the HSR network.[1] O006-7 Cont.
- Assume that voters authorize a shift in Proposition 1B Transportation Bond funds from highways to HSR. Calculate the reduction in GHG emissions resulting from building out the HSR system sooner.
- Propose a Blueprint for 2030 for the Project core study area minus the 9 Bay Area counties (which already have a Smart Growth Plan), modelled on SACOG's Blueprint, with higher densities outside and much less conversion of vacant land.
- Propose Indirect Source Mitigation Fees similar to those in place in the San Joaquin Valley, but increase the cost high enough to restrain the growth of large lot subdivisions.
- Assume a $1.00 increase in the gas tax, with revenues used to fund bus and shuttle operations, following a Constitutional Amendment by voters to authorize transit use of gas tax receipts.

TRANSDEF 10/25/07 Page 4

Conclusion

TRANSDEF was very involved in preparing the extensive comments submitted by our attorney, Stuart Flashman. We appreciate this opportunity to provide additional comments to the CAHSRA. We hope that the agency will seriously consider what we have said here, and decide to work on behalf of the people of the State of California to provide the greatest benefit to the greatest number. O006-8

Sincerely,

/s/ DAVID SCHONBRUNN

David Schonbrunn,
President

[1] For an off-the-shelf set of assumptions to model this scenario, see the TRANSDEF Smart Growth RTP Alternative in MTC's 2005 RTP FEIR, Appendix D.1. All highway funds were transferred to transit projects. Many new bus lines were initiated. HSR was built. The transit network definition files are available from MTC.

Response to Letter O006 (David Schonbrunn, Transportation Solutions Defense and Education Fund, October 25, 2007)

O006-1

The Authority and FRA acknowledge receipt of comments from Transportation Solutions Defense and Education Fund (TRANSDEF), appreciate TRANSDEF's support for the State's HST system, and agree that the HST system can provide mitigation for climate change by reducing greenhouse gas (GHG) emissions.

O006-2

The Authority and FRA agree that cost-effectiveness must be a major consideration for the overall HST system. The Authority and FRA agree with MTC's position that rail improvements are needed throughout the region to serve differing markets and diverse regional geographic areas. The Pacheco Pass Network Alternative has been identified as the preferred alternative, and the Authority is working with the regional partners on a separate project to improve commuter service in the Altamont Corridor. Please note that this approach would require less right-of-way for the Altamont Corridor improvements, reducing the impacts as compared to identifying this corridor for the proposed HST system.

O006-3

The Authority and FRA find the information regarding potential impacts, benefits, costs, ridership, and operations of the HST system to be fully consistent with the requirements of NEPA and CEQA and adequate to identify key differences among the alignments and station location options. The Authority and FRA find the information provided is sufficient for the identification of a Preferred Alternative. Please see Standard Responses 1 and 2 and Chapter 8 of this Final Program EIR/EIS.

Relative merits of the alignment and network alternatives are described in Chapter 7. The network benefits and impacts are then compared in the Summary of the Program EIR/EIS. Please also see Summary Table S.8-1.

The Authority and FRA find that recirculation of the Draft Program EIR/EIS is not necessary.

O006-4

Please see Response to Comment O006-2. By design, the HST alignments are proposed to be adjacent to or within existing transportation right-of-way to the extent feasible. At times, however, the rights-of-way are not wide enough to accommodate the number of HST (and at times freight) tracks that are required in the corridor. For example, four HST tracks would be required at station locations. In some locations (e.g., along the Union Pacific Railroad [UPRR] Altamont Alignment), six tracks (four HST and two freight) would be required at the stations. For these locations, additional right-of-way would be required or some of the tracks would need to be placed in tunnel or on an aerial structure.

The land use and aesthetic impacts associated with this circumstance were recognized by representatives of cities along the Altamont Pass alignment (e.g., Fremont, and the Tri-Valley area – Livermore and Pleasanton), which expressed major concerns regarding the impacts of a HST through their jurisdictions. As a result, Tri-Valley communities, represented by the Tri-Valley Policy Working Group and Technical Advisory Committee (i.e., the Tri-Valley PAC—a partnership that includes the cities of Dublin, Livermore, Pleasanton, Danville, San Ramon, and Tracy along with transportation providers Livermore Amador Valley Transit Authority [LAVTA], Altamont Commuter Express [ACE], and BART) supported a concept of improving commuter rail services in the Altamont Corridor in concert with a Pacheco Pass HST alternative.

In addition, should the Altamont Pass alternative serve San Francisco, a new San Francisco Bay crossing would be required, with

associated impacts on the San Francisco Bay and to the Don Edwards Wildlife Refuge. By comparison, for the Pacheco Pass alternative, the HST system can share tracks and right-of-way along the Caltrain Corridor and can be placed immediately adjacent to Henry Miller Road in the Central Valley.

Please see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative and Standard Response 4 regarding growth inducement.

The Pacheco Pass alternative would not induce additional "sprawl" development in Santa Clara, Merced, or San Benito Counties because the HST system would not provide substantially faster door-to-door travel times than auto travel between these counties and employment centers in the Bay Area. Please see Response to Comment F005-4 for further explanation. Please also see Standard Response 4 (subsection "HST's Influence on Station Areas and Local Jurisdiction's Growth") for information on the Authority's interests and efforts in influencing station-area development patterns and limiting sprawl development.

O006-5

See Response to Comment O007-46.

The base operating plan for the Altamont Pass alternative, which includes a service split in the East Bay, is reasonable. The operational planning assumptions used as inputs for the ridership and revenue forecasts were based on well-established HST operational practices.

As acknowledged in the Program EIR/EIS, some HST systems physically separate trainsets ("splitting and joining trains") at some point on the route. However, the percentage of HST trains actually using this practice worldwide is very small. In France, about 10% of the TGV trainsets are physically split, whereas in Japan the percentage is even smaller. HST trainsets generally are not split during peak hours or at peak traffic points. For example, the TGV trainsets that split in southwest France have already served the major Paris-Bordeaux market and do not add time to the passengers on this critical city-pair. The Paris-Bordeaux passengers in the other direction also do not lose time waiting for the trains to be combined into one because they board after consolidation. The mini-Shinkansen that splits to Yamagata does so after the major stations at Fukushima and Sendai. The Thalys HST does not split until after Brussels passengers get off. The HST splits are generally done in places where the traffic demands are low—not on the main trunk line between the major markets.

The HST ridership and revenue forecasts done by MTC in partnership with the Authority concluded that both the Pacheco Pass and Altamont Pass network alternatives have high ridership and revenue potential. While additional forecasts with different assumptions may result in somewhat different results, the bottom-line conclusion is expected to remain the same and therefore ridership is not a major factor in differentiating between the Altamont and Pacheco Pass alternatives.

O006-6

Comment acknowledged. Please see Standard Response 4 regarding growth. The Authority does not agree with your assessment.

The Authority and FRA respectfully disagree with the assertions that the growth-inducement analysis is not credible and that highway congestion "will prevent any kind of substantial expansion of commuting into the Bay Area." The 2030 employment and population projections shown in Tables 5.3-1, 5.3-2, and 5.3-5 for the No Project Alternative in the Program EIR/EIS illustrate that Central Valley counties will experience higher population growth rates than employment growth rates, as well as higher population growth rates than Bay Area counties. Both results, which are based on official forecasts from the Department of Finance and regional planning agencies, strongly support a conclusion that commuting from the Central Valley into the Bay Area will continue into the future in the absence of HST.

It is true that people are willing to commute long distances via car and that population and employment forecasts show people continuing to expand their commute and to populate the Central

Valley. However, neither the employment nor population trends would be substantially affected by the introduction of HST because HST does not provide faster door-to-door travel times than auto in most short to medium distance travel markets between the Central Valley and Bay Area.

Furthermore, part of this time/cost factor for potential commuting via HST involves travel between the HST station and the actual employment location. The HST system will have a very limited number of stations in the Bay Area, requiring that users transfer to another transit mode or private shuttle to access a destination that is beyond walking distance from an HST station. For many Bay Area commute trips, a local transit option is not available. An analysis prepared for the Interstate 580 (I-580) BART to Livermore Study[1] showed that only 30% of job destinations for Central Valley to Bay Area commuters would be accessible via BART and local transit (with only 4% within walking distance of a BART station). Lacking access to a transit egress mode, many prospective commuters on HST would need to drive or take taxi to their final destination, adding to the cost associated with the trip.

Even assuming transit is available, the cost of the HST would be significantly greater than the cost of driving for short- to medium-distance trips, making it unlikely to be preferred by commuters. For example the full cost of taking HST from Merced to Mountain View (HST fare, access, egress and station parking) is more than $40 one way, as compared to about $25 one-way for an automobile trip. HST would provide neither a time nor cost advantage compared to auto travel for commute trips between the Central Valley and Bay Area. Given that the HST connection between the Central Valley and Bay Area would be designed to serve primarily intercity travel, rather than regional commuters, it is quite logical that population, employment, and commute travel patterns would not substantially change with the introduction of HST.

O006-7

Please see Standard Response 4 regarding growth and Chapter 5 (Economic Growth and Impacts). Please also see Chapter 6 (Station Area Development), which includes the Authority's adopted policies requiring transit-oriented development (TOD) at HST stations and station area plans in the Central Valley.

The "tremendous increase in population and jobs" noted by the commenter are a feature of the No Project Alternative and also serve as the foundation of the HST alternatives. This increase is not due to the HST alternatives, and therefore does not require mitigation.

Results presented in Section 5 of the Program EIR/EIS do not identify any significant impacts from the indirect effects of growth inducement at the program level of analysis. Therefore, it is not necessary to analyze or adopt specific mitigation strategies for indirect effects of growth inducement in the Final Program EIR/EIS.

Please also see Standard Response 4 (subsection "HST's Influence on Station Areas and Local Jurisdiction's Growth") for further information on the Authority's efforts in influencing station area development patterns. Furthermore, the Authority has identified downtown areas within the Central Valley as the preferred locations for HST stations (see Chapter 6 and Chapter 8, Section 8.6.4 of this Final Program EIR/EIS and Chapter 6A of the California High-Speed Train Final Program EIR/EIS, 2005), which is consistent with the overall desire to avoid or minimize impacts.

The additional mitigation measures suggested by the comment for evaluation by the Authority are outside the scope of this Program EIR/EIS and beyond the purview of the Authority and FRA to accomplish (e.g., redirecting state highway funding, seeking redirection of transportation funds approved by ballot initiation, preparing local land use plans, seeking local development fees, and raising the state gas tax).

[1] I-580 Bart to Livermore Study – Final Report; Cambridge Systematics, Inc.; July 2002; pages 6–8.

O006-8

Please see Responses to Comments Letter O007. The Authority and FRA are pursuing a transportation solution that would truly benefit the people of the State of California. The Authority and FRA appreciate the comments provided by TRANSDEF on the Draft Program EIR/EIS.

Comment Letter O007 (Stuart M. Flashman, October 25, 2007)

O 007

Law Offices of
Stuart M. Flashman
5626 Ocean View Drive
Oakland, CA 94618-1533
(510) 652-5373 (voice & FAX)
e-mail: stu@stuflash.com

10-25-07

Chairman Kopp and
Members of the High Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814
Attn: California High-Speed Train
Draft Bay Area to Central Valley Program EIR/EIS Comments

Re: Comments on Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/S) for the Proposed Bay Area to Central Valley High-Speed Train Program

Dear Chairman Kopp and Members of the Authority:

These comments are submitted on behalf of the following groups:

BayRail Alliance
California Rail Foundation ("CRF")
California State Parks Foundation ("CSPF")
Defenders of Wildlife
Grasslands Water District
Planning & Conservation League ("PCL")
Regional Alliance for Transit ("RAFT")
Sierra Club
Train Riders Association of California ("TRAC")
Transportation Solutions Defense and Education Fund ("TRANSDEF") O007-1

The purpose of this letter is to provide comments on the Draft Program Environmental Impact Report/Draft Environmental Impact Statement ("DPEIR/S") for the proposed Bay Area to Central Valley High-Speed Train program (hereinafter "Project") and to inform the Authority that the document fails to comply with the requirements of the California Environmental Quality Act ("CEQA"), Public Resources Code Section 21000 et seq. and the CEQA Guidelines, California Code of Regulations, title 14, section 15000 et seq. ("CEQA Guidelines" or "Guidelines") and the National Environmental Policy Act ("NEPA") 42 U.S.C 4321; 40 C.F.R. 1500.1. The commenting groups are environmental and transportation advocacy organizations concerned about the choices made in building high-speed rail in California. Many of the groups submitting this comment letter also submitted significant comments on the prior programmatic EIR/S for HST Statewide.[1] O007-2

(See, Letter from Stuart Flashman (TRAC/CRF) dated 8/31/2004; Letter from David Schonbrunn (TRANSDEF) dated 8/31/2004; Letter from Michael Kiesling (RAFT) dated 8/28/2004; Letter from Kim Delfino (Defenders of Wildlife) dated 8/30/2004 and in letter with other conservation groups (Comment Letter O049 dated 8/31/04); Letter from Fred Keeley (PCL and other associated groups) dated August 31, 2004; Letter from Margaret Okuzumi (BayRail Alliance) dated 8/31/2004; Letter of Kenneth Ryan (Sierra Club) dated 8/22/2004; and Letters of Thomas Enslow (Grasslands Water District) dated 8/31/2004, all of which letters and associated exhibits and attachments are already present in CHSRA files and are incorporated herein by this reference.) Major concerns were raised at that time concerning the importance of fully analyzing and retaining Altamont as an alignment choice, and concerns were expressed about some of the assumptions made in the choice of alternatives and methods of analysis used. All these concerns remain unaddressed in the present DPEIR/S. O007-3

The Bay Area to Central Valley DPEIR/S was published, partly in response to the many objections that had been raised to the Statewide HST EIR/EIS, for the purpose of analyzing northern route choices from the Central Valley to major cities of the Bay Area. The main choices analyzed in the DPEIR/S are Pacheco Pass (near Highway 152) and an alignment through the Altamont Pass (near Highway 580). While we appreciate the effort to provide the analysis requested, it appears that the haste to get this document out for public comments has resulted in omitting information that is critical to the DPEIR/S's adequacy as well as information necessary to support informed decision-making by the Board. In addition, the current DPEIR/S, despite the many comments received on the prior EIR/EIS, appears to have repeated some of the same methodological mistakes that were present in the Statewide HST EIR/EIS. As a result, the DPEIR/S fails to include a complete, accurate and objective analysis of regional rail ridership for the Sacramento-Stockton-Pleasanton-San Francisco/San Jose Corridor and for the Merced-Tracy-Pleasanton-San Francisco/San Jose Corridor. The document's failure to provide this information renders its analysis of the effects of the Program Alternatives on the environment, as well as the social and economic impacts of the Alternatives, (and resulting secondary physical environmental impacts) inadequate. Under NEPA and CEQA Guidelines, the omission of this information from the DPEIR/S circulated for public review and comment is a fatal deficiency. In addition, the DPEIR/S contains numerous erroneous assumptions that skew the resulting analysis. For these reasons, as well as many others to be described below, the DPEIR/S is fatally inadequate and must be revised and re-circulated before it can be relied upon to support CAHSRA and other agency decisions, particularly on matters as important as a HSR Bay Area access alignment. O007-4

A summary of the major defects and omissions in the DPEIR/S includes, but is not limited to, the following:

- The DPEIR/S fails to adequately and completely describe the HST project alignment, station and network alternatives. O007-5
- The DPEIR/S lacks an adequate summary section. O007-6

[1] There were also letters submitted commenting on the Final Statewide EIR/S, e.g., letter from CSPF dated 10/31/05.

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- The DPEIR/S fails to analyze impacts and improperly defers analysis until the project-level EIR/S. O007-7
- The DPEIR/S uses operational assumptions inconsistent with projected future statewide demand to compare the performance of Altamont and Pacheco corridor alternatives. O007-8
- The limited analysis of alignment alternatives included in the DPEIR/S is based on flawed assumptions and incomplete analysis concerning regional rail ridership for trips within the Sacramento – San Joaquin Valley – San Francisco Bay Area. O007-9
- The DPEIR/S includes flawed descriptions of project components and operational constraints that artificially narrow the range of alternatives open to consideration. O007-10
- The DPEIR/S fails to adequately identify and describe the significance of the project-related and cumulative impacts of the various Program Alternatives before and after mitigation. Conclusions regarding these impacts in the DPEIR/S are in many cases based on inadequate and misleading information (e.g. growth inducement, impacts to agricultural land, biological resources, etc.). The Summary Table compares the impacts of HST only to the No Project Alternative. O007-11
- To determine level of impact, the HST Project Alternatives are improperly compared with the No Project Alternative instead of baseline conditions for many environmental topic areas including, but not limited to: traffic, transit, circulation, air quality and biological resources. O007-12
- Mitigation "strategies" consist of vague and unenforceable suggestions and for the most part are improperly deferred until the project-level review. Some of the suggested strategies would create new impacts that have not been identified or evaluated (e.g., intersection and roadway improvements to serve HST stations, which would themselves potentially create traffic and safety impacts; elevation of railway structures to maintain wildlife corridors, which may exacerbate noise and vibration impacts; erection of soundwalls, berms, and other noise abatement structures, which may have visual and hydrologic impacts; etc.) O007-13
- The DPEIR/S fails to identify the environmentally superior HST alignments and station locations. O007-14
- The DPEIR/S fails to accurately describe the growth-inducing potential of the Pacheco alignment. O007-15
- The DPEIR/S postpones identification of the environmentally superior alternative. O007-16

With respect to both of CEQA's basic purposes – informing the public and decision makers of the environmental consequences of their actions before they are made and avoiding or reducing environmental damage to the extent feasible – this DPEIR/S fails. Because of the many flaws in the DPEIR/S, it is not surprising that such conclusions as it reaches are equally flawed. O007-17

Consideration of accurate information on project impacts related to the various project choices presented in the DPEIR/S, in combination with basic logic, would force the selection of the Altamont alignment as the environmentally-, financially-, and logistically-superior alignment. O007-18

- The Altamont alignment results in a more highly integrated and efficient High Speed Rail system and would serve a significantly larger market than does the Pacheco alignment. Even the DPEIR/S's inadequate analysis of travel times shows that the Altamont alignment gives roughly equivalent travel times between Northern and Southern California as Pacheco, but a far superior travel time between the Bay Area and the northern San Joaquin Valley. For example, travel time between Sacramento and San Francisco via Pacheco is 1 hour and 47 minutes, while via Altamont it is 1 hour and 6 minutes. O007-19
- The Altamont alignment will better serve the Bay Area's urban population centers and expected growth (see DPEIR/S at Figure 1.2-6). Once south of San Jose, the Pacheco alignment travels primarily through rural agricultural areas and wetlands, while the Altamont alignment would provide convenient access to three major Tri-Valley population centers, Dublin, Pleasanton, and Livermore2, as well as Sacramento, Stockton, Tracy, Modesto, Merced and many other nearby communities. If it were not for the flaws permeating the ridership analysis contained in the DPEIR/S, the ridership figures would have shown the clear superiority of the Altamont alignment. O007-20
- While both alignments may appear, according to the DPEIR/S' analysis, roughly similar in meeting the Project purpose of linking San Francisco and Los Angeles by a high speed train line, the Altamont alignment far better fulfills a major element of the HST Purpose and Need: "to relieve capacity constraints of the existing transportation system in a manner sensitive to and protective of the Bay Area to Central Valley region's and California's unique natural resources." (DPEIR/S at 1-4.) Levels of congestion on Highways I-80 I-580, I-680, and I-238 and SR92 are very high and represent a major constraint on the Bay Area's overall transportation system, far outstripping the levels of problematic traffic conditions in southern Santa Clara County.3 The Altamont alignment could provide major relief for these corridors by allowing fast convenient access between the Bay Area and Sacramento and other Central and Northern San Joaquin Valley destinations. The Pacheco alignment provides no comparable benefit. O007-21
- While both alignments would involve crossing wetlands areas, the Altamont alignment could, in the short term, use the already-planned Dumbarton Rail O007-22

[2] Tri-Valley stations would also be easily accessible from San Ramon, Danville, and Castro Valley.
[3] In June, 2007, Caltrans released its rankings of the Top Ten Congested Bay Area Freeways for 2006. Number one (at 12,230 weekday vehicle hours of delay) was Interstate 80 westbound during morning commute hours; #2 and 3 (at 6,720 and 5,320 hours of delay, respectively) was Interstate 580 in Eastern Alameda County during morning and evening commute hours; #6 was Route 92 eastbound during the evening commute; #8 (at 2,760 weekday vehicle hours of delay) was Interstate 80 westbound during the evening commute. *None* of the top ten was located in the south bay or on the peninsula south of San Francisco. The same was also true in 2005. See http://www.mtc.ca.gov/news/press_releases/rel407.htm

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> Bridge/Dumbarton Rail Project alignment with minimal additional project capital costs, thereby reducing net impact on wetlands and, through project-associated bridge improvements such as installing raised railbeds and wildlife undercrossings and removing existing impediments to tidal flows and Bay currents, actually improve existing wildlife habitat. By contrast, not only would the Pacheco alignment not offer this potential for beneficial impacts, it would sever the connectivity of a large wildlife area and impact thousands of acres of extremely important wetland and wildlife habitat, including the Grasslands Ecological Area of Merced County, California which has been designated a Wetlands of International Importance under The Convention on Wetlands of International Importance. Secondary impacts from growth induced by the Pacheco alignment would cause yet further damage to this important wetlands resource; damage that cannot be mitigated, given the unique importance of the wetlands involved.

O007-22 Cont.

Alternatively, and certainly in the long term, the current Dumbarton Rail Bridge could be replaced by a tunnel or high bridge, either of which would further decrease the Project's long-term wetlands impacts. While a tunnel could potentially fully avoid wetlands impacts for either Altamont or Pacheco alignment, such a tunnel option would involve much shorter distances and less challenging terrain in the Altamont than the Pacheco alignment.

Given the multiple inadequacies described in this letter, this DPEIR/S, even with the addition of accurate information, cannot properly form the basis of a final PEIR/S. CEQA and the CEQA Guidelines require recirculation of a draft EIR where, as here, the document is so fundamentally inadequate in nature that meaningful public review and comment are precluded. See CEQA Guidelines § 15088.5. We have prepared the detailed comments below with the assistance of technical experts, including Mike White, Conservation Biology Institute, and Terrell Watt, Terrell Watt Planning Consultants. Resumes of these experts are attached hereto as Exhibit A.

O007-23

I. THE DPEIR/S DOES NOT COMPLY WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT AND THE NATIONAL ENVIRONMENTAL POLICY ACT

A. Use of a Program DPEIR/S Does Not Excuse Inadequate Analysis

O007-24

As discussed more fully below under the individual impacts, the DPEIR/S repeatedly fails to adequately describe the project, analyze project impacts, and mitigate its host of associated impacts with specific, enforceable mitigation measures. As apparent justification for the DPEIR/S's repeated deferral of adequate analysis of project impacts and mitigation measures, the DPEIR/S points to the fact that it is a programmatic document. However, the mere fact that the DPEIR/S is programmatic is not a carte

blanche to omit analysis and discussion of the project that is currently feasible.[4] An agency "must use its best efforts to find out and disclose all that it reasonably can." CEQA Guidelines § 15144. Where an EIR is a program EIR, it must be sufficiently detailed to provide a full analysis of the potential environmental impacts of any discretionary decisions that would be made in reliance on the EIR, but may defer to a later study full analysis of the potential environmental impacts of actions or decisions that would not be taken until after further environmental study. 14 Cal Code Regs section 1512(b); Stanislaus Natural Heritage Project v. County of Stanislaus (1996) 48 Cal.App. 4th 182. In this case, the DPEIR/S states that its intended use is to choose a preferred alignment between the Bay Area and the Central Valley.

> "The Program EIR/EIS will enable the Authority and FRA to evaluate the potential impacts of proposed HST system alignment and station locations in the Bay Area to Central Valley corridor, select preferred alignments and station locations, and define general mitigation strategies to address any potentially significant adverse impacts." DPEIR/S at 1-2.
>
> "After considering public and agency comment, the Authority and FRA will identify preferred alignment alternatives, station location options, and a preferred network alternative." DPEIR/S at S-17.

O007-24 Cont.

In order to make such choices, the DPEIR/S must first fully analyze, to the extent currently feasible, all the potential impacts that may arise if a particular alignment is chosen and it must identify feasible and enforceable mitigation measures to address these impacts. Here, the DPEIR/S's failure to describe and analyze the project extends well beyond the exact location alignments and stations. The DPEIR/S's vague and noncommittal analysis of numerous project elements, as well as its flawed description of potential project components, including regional rail opportunities, operational constraints, environmental impacts, cumulative impacts and mitigation measures, precludes both proper analysis of project alternatives and an informed choice of a Bay Area access alignment.

Another significant flaw of the DPEIR/S is that, in violation of CEQA guidelines that prohibit deferring analysis under the guise of "tiering", it repeatedly claims that project impacts would not be significant, based solely on unsupported assumptions about future conditions. In contrast to the approach taken in the DPEIR/S, CEQA Guidelines encourage consideration of environmental consequences at the "earliest possible stage, even though more detailed environmental review may be necessary later." McQueen v. Board of Directors, 202 Cal.App.3d 1136, 1147 (1988). Similarly, NEPA requires agencies to integrate the NEPA process into their activities at the earliest possible time. 40 C.F.R. 1501.1; 1501.2. Regardless of an intention to undertake site-specific environmental review for future project phases, the use of "tiering" in a program EIR/S is

O007-25

[4] The prior statewide PEIR/S likewise deferred discussion of numerous impacts to *this* PEIR/S. The buck has to stop somewhere! This PEIR/S will serve as the basis for a critical choice of alignment. That choice cannot properly be made until a full analysis of all pertinent impacts has been properly completed in this PEIR/S.

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not an acceptable device for deferring the identification of significant environmental impacts. Stanislaus Nat'l Heritage Project v. County of Stanislaus, 48 Cal.App.4th 182, 199 (1996), especially where, as here, consideration of those impacts is necessary to make informed choices at the programmatic level.

The DPEIR/S attempts to present a choice between two preferred alignments and their associated general station locations:

> "After considering public and agency comment, the Authority and FRA will identify preferred alignment alternatives, station location options, and a preferred network alternative." DPEIR/S at S-17.

O007-25 Cont.

Accordingly, the DPEIR/S must include a sufficient level of detail on each feasible alignment alternative and its related impacts and mitigation to allow the HSRA to make an informed alignment choice. In the absence of sufficient information to make precise impact predictions, the PEIR/S must consider a "worst-case scenario" of impacts for each of the alignment option, including the related level of development and associated impacts, as well as specific information about each alternative to the extent it can be forecast and analyzed. By failing to provide sufficient detail about project elements and about their environmental impacts, the DPEIR/S fails to provide an adequate basis for an informed choice of HST Bay Area access alignment. The DPEIR/S's deferral of more detailed project description elements such as station locations and characteristics and right of way and track characteristics, analysis of impacts *and* mitigation measures is particularly egregious here because project approvals include alignment and station locations and commit the Authority to a course of action. See Rio Vista Farm Bureau v. County of Solano, 5 Cal.App.4th at 351, 371 (1992). One specific criticism is that the maps provided in the DPEIR/S lack sufficient detail to allow even people familiar with the geographic areas in question to readily determine whether or not state and federal parks and/or lands, or other parcels targeted for conservation or designated as buffer zones, would be significantly affected (or even traversed) by the various proposed alignment alternatives. One particularly significant DPEIR/S omission is the total absence of a description of the regional rail benefits that could be integrated with a Altamont HST alignment but not with a Pacheco HST alignment (i.e., the ability of the Altamont alignment option to be integrated with a regional rail system, under the auspices of Caltrain or other regional authority, serving the Bay Area and Northern San Joaquin Valley).

O007-26

O007-27

As part of its flawed approach, the DPEIR/S impermissibly and repeatedly concludes that the majority of all of the HST project's environmental impacts are either less than significant or will be rendered less than significant by mitigation, while at the same time deferring the necessary analysis of impacts as well as mitigation measures. Under CEQA, an EIR may conclude that impacts are insignificant only if it provides an adequate analysis of the magnitude of the impacts and the degree to which they will be mitigated. See Sundstrom, 202 Cal.App.3d at 306-07. A conclusion about the significance of an impact or the feasibility of a mitigation measure must be based on substantial evidence, not mere speculation about the possible results of future study.

O007-28

Thus, if an agency fails to investigate a potential impact, its finding of insignificance simply will not stand. Id. Further, CEQA generally requires that all mitigation measures be adopted simultaneously with, or prior to, project approval. Here the proposed mitigation measures are not measures at all. Rather, they consist of vague strategy suggestions, the details of which are deferred until project-level review. An agency may defer preparation of a plan for mitigation only when the potential mitigation measures are clearly feasible and capable of mitigating impact to a level of insignificance, or alternatively when the agency commits itself and/or the project proponent to satisfying specified performance standards that will ensure the avoidance of any significant effects. In the present case, the DPEIR/S violates CEQA by deferring critical analyses of project impacts and feasible mitigation while at the same time assuming either that the impact will be insignificant or that it can be fully mitigated.

O007-29

The following is a non-exhaustive list of examples of mitigation strategies that are vague, unenforceable and details of which are deferred to a later date:

Transportation (see pages 3.1-38 to 40)

O007-30

- Major intersection improvements.
- Provide additional parking.
- Widen roadways.
- Designate one-way street patterns.

Air Quality (see page 3.3-20 to 21)

- Increase use of alternative-fueled vehicles
- Increasing parking for alternative transportation modes
- Construction mitigation to be determined after more detailed project plans are available.

O007-31

Specific mitigation measures, including identified funding for them sufficient to demonstrate their feasibility, must be developed at this time, well before project-level environmental review, and based on complete project information and impact analyses. Identifying specific, enforceable, and feasible mitigation now is also important because some potential mitigation measures may, in themselves, create significant secondary environmental impacts (e.g., measures such as roadway widening, intersection signalization, construction of soundwalls, etc.). Such secondary impacts must also be considered, analyzed and, if possible mitigated. However, this cannot be done properly if full consideration of such measures is put off to a later time. Project-related and cumulative impacts determined to be significant and unavoidable must also be identified and listed as such. These include, but are not limited to the following[5]:

O007-32

[5] The DPEIR/S is so poorly drafted that it is difficult to determine what impacts are significant before and after mitigation. The individual topic chapters fail to clearly identify significant impacts and demonstrate how mitigation reduces significant impacts to less than significant. The closest the DPEIR/S comes to identifying this *required information* is Table 9.3-1, which falls well short of CEQA/NEPA requirements for identification of significant impacts before and after mitigation. Instead, it only identifies the impacts as

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- Traffic and circulation
- Land use compatibility
- Hydrology
- Noise
- Biological impacts related to changes in hydrology and noise
- Biological impacts related to habitat fragmentation and wildlife corridors
- Growth inducement

O007-32 Cont.

The DPEIR/S's failure to adequately identify and analyze the potentially significant effects of the project, and to design proper mitigation measures prior to project approval, renders the document legally inadequate, particularly as it applies to choosing between potential high-speed rail alignments. With the DPEIR/S in its current form, decision-makers, the public and permitting agencies cannot evaluate the advisability of project approval even at the level of basic alignment and station choice. A revised DPEIR/S that provides adequate information about project alternatives, project-related, secondary, and cumulative impacts and mitigation measures must be completed and circulated before decisions are made concerning the HST project, and specifically a choice of project alignment. O007-33

B. The DPEIR/S Lacks an Adequate Summary Section

This project is one of the largest infrastructure projects ever contemplated in California history and therefore one of the most complex projects ever considered. As such, it is critical that the document relied on to inform decision-making concerning the proposed project be well organized, clear and readable. Environmental documents are designed for many different readers and different sections are at times directed to different audiences. That makes it very important for the summary section to present information to readers interested in a getting a quick understanding of the proposed action and its consequences. Typically, EIR and EIS summary sections include a matrix or table that allows comparison of all alternatives in terms of their respective environmental impacts and includes conclusions regarding the significance of impacts before and after mitigation. Great care should be taken to ensure that after reviewing the summary section, readers have a clear understanding of the proposed project, project alternatives and how they compare to one another. This DPEIR/S fails to provide a clear, complete and therefore adequate summary section. Moreover, it is virtually impossible to determine the HST alignment choices given the excessive number of sub-alignment and network choices, many of which are given obscure names that only further obfuscate the presentation of choices to the document's readers. Moreover the environmental impacts of the various alignments and sub-alignments are not clearly described and delineated. The PEIR/S needs to be revised to include clear, complete, and accurate descriptions of the various alignment choices under consideration, including maps showing sufficient detail to indicate the relationship of the various alignment options to significant geographic O007-34 O007-35

"potential". Table 7.2-20 also does not provide the required information pursuant to CEQA and NEPA and instead characterizes impacts as high, medium or low.

features, cities, and regional areas of concern, including specifically public parklands and other areas subject to Sections 4(f) and 6(f). O007-35 Cont.

The alternatives section describes HST Network Alternatives, which represent different ways to combine HST Alignment Alternatives and station location options as well as the HST Alignment Alternatives themselves. According to the DPEIR/S:

> "Although HST Alignment Alternatives and station location options were screened and evaluated to identify those that are likely to be reasonable and practicable and to meet the project's purpose and need, the representative network alternatives have not yet been so evaluated. The network alternatives were developed to enable an evaluation and comparison of how various combinations of alignment alternatives would meet the project's purpose and need and how each would perform as a HST network (e.g. travel times between various stations, anticipated ridership, operating and maintenance costs, energy consumption, and auto trip diversions). The different system characteristics, as well as environmental factors of the network alternatives, present complex choices that will be better supported and informed following public review and comment on this document." DPEIR/S at 2-22.

O007-36

Essentially, the document appears to be saying that the information is too complicated to make any sense until after the environmental review has become final. If the information provided in the DPEIR/S is incomplete, the document should specifically identify the gaps in the information and discuss how informed decisions can be reached without that information. If reaching a decision is not possible without the information, the document should be withdrawn and not republished until the missing information can be provided. It is inappropriate to circulate an environmental document for public review and comment with the knowledge and expectation that the version being circulated is not yet complete.

The comparison table (Table 7.3-2) fails to clearly characterize as significant or insignificant the impacts of each alternative. Moreover, the body of the DPEIR/S does not include clear information about the level of significance of project-related impacts. Only Table 9.3-1 indicates the potential significance of HST-related impacts before and after mitigation, but only for the HST network as a whole. No such information is provided comparing the Pacheco and Altamont alternatives. After all, one of the major purposes of the PEIR/S is to provide the information required to make an informed choice between the two alignment alternatives. Without a clear and complete set of underlying facts, making an informed choice, as CEQA requires, is impossible. This is a major flaw in the DPEIR/S, which must be corrected in a recirculated draft. O007-37

Once again, this DPEIR/S is being relied on to select Bay Area – Central Valley HST alignments and station locations. If the document is to be used for this choice, a revised summary table or matrix must be developed that clearly characterizes the significance of impacts before and after mitigation and presents the information in a manner that allows

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meaningful comparison of both the modal alternatives and project components (alignments/station locations, etc.). O007-37 Cont.

Further complicating the utility of the DPEIR/S for informed decision-making, the document refers to a massive list of related programs and studies including, but not limited to the following:

- San Francisco Bay Area Regional Rail Plan (at 2-14)
- Capitol Corridor Rail Service (at 2-16) O007-38
- Caltrain Corridor Commuter Rail Service (at 2-16)
- Altamont Commuter Express Service (page 2-17)
- Dumbarton Rail Project (2-17)

These related reports are not adequately summarized in the DPEIR/S and in some cases, present very different alternatives from those analyzed in the DPEIR/S for the Bay Area to Central Valley alignments and stations (e.g. the alternatives analyzed for Altamont in the SF Bay Area Regional Rail Plan are not consistent with those analyzed in the instant DPEIR/S). This approach is both confusing and misleading. A revised DPEIR/S must provide a summary that:

- Clearly describes all alternative alignment, stations and network choices, in sufficient detail to allow for informed decision-making; O007-39
- Clearly and comprehensively characterizes the environmental, operational and other impacts of all alignment and stations alternatives and choices before and after mitigation;
- Clearly describes and summarizes relevant information in all related reports and attachments relied upon by the DPEIR/S.

C. The Project, as Defined in the DPEIR/S Fails to Adequately Achieve the Purpose and Need.

While the statement of purpose and need admirably notes the need for both statewide and regional transit improvement, the Project, as proposed in the DPEIR/S fails to meet that purpose and need.

As both this DPEIR/S and the prior Statewide Programmatic EIR/S make clear, the purpose of the statewide HST system project is to enhance statewide passenger mobility within California and remove or reduce constraints on passenger transportation present within California's existing transportation infrastructure. (See, FPEIR/S for Proposed California HST System at 1.2.1.) In particular, the statewide HST system intends to facilitate rapid passenger transportation between California's major population, governmental, and business centers, notably San Diego, Los Angeles, San Jose, Oakland, O007-40

San Francisco, and Sacramento. (See Statewide HST FPEIR/S, Fig. 1.2-2 and legend.) In addition, however, the system is also intended to help reduce congestion due to regional and subregional trips, which interfere with overall mobility. (Statewide FPEIR/S at 1-7.)

Because the statewide HST system would link California's major cities and population centers, it could provide both statewide and regional/subregional service. For example, although the system centers on providing service between San Francisco and Los Angeles, it could also provide regional and subregional service between the various cities included in the Northern tier of the statewide HST system. This would help meet the Project's purpose of alleviating congestion caused by regional and subregional trips, particularly automotive trips.

This DPEIR/S, which is intended to tier off of the prior DPEIR/S, presumably also intends to meet the same purposes and needs as the statewide project. It also would meet the more specific purpose of providing access between the statewide HST system and cities in the San Francisco Bay Area. The DPEIR/S states its purpose as follows: O007-40 Cont.

> "The purpose of the Bay Area HST is to provide a reliable high-speed electrified train system that links the major Bay Area cities to the Central Valley, Sacramento, and Southern California, and that delivers predictable and consistent travel times. Further objectives are to provide interfaces between the HST system and major commercial airports, mass transit and the highway network and to relieve capacity constraints of the existing transportation system in a manner sensitive to and protective of the Bay Area to Central Valley region's and California's unique natural resources." (DPEIR/S at 1-4.)

This statement acknowledges that a major project purpose is to "relieve capacity constraints of the existing transportation system," but the project described and analyzed in the DPEIR/S fails to acknowledge that this can involve reducing regional and subregional automotive trips that currently congest the Bay Area's highway system. While the DPEIR/S acknowledges a regional need for transportation improvement (DPEIR/S at 1-14 to 1-15), it fails to acknowledge that the HST system can also assist in addressing that regional and subregional need.

As a consequence of these deficiencies, the DPEIR/S fails to consider the ways in which the proposed Bay Area to Central Valley component of the state HST system can function synergistically with other existing, proposed, and potential rail systems to promote regional and subregional mobility and reduce regional and subregional auto-dependency.

In particular, the DPEIR/S fails to adequately discuss how the construction of HST right-of-way and facilities as part of the Bay Area to Central Valley HST Project could promote use of the HST system for regional and subregional trips, and perhaps even more importantly, how it might facilitate the improvement of the existing regional and

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subregional passenger rail system and actually promote the institution of new and improved subregional passenger rail service. Such synergistic effects are part of the very purpose of the HST system, both statewide and in the region covered by this Project. The DPEIR/S must therefore be revised to consider this important component and how it will be affected by the alignment choices inherent in this Project. O007-40 Cont.

D. The DPEIR/S Fails to Adequately and Accurately Describe the Proposed Project

The DPEIR/S's incomplete and inaccurate project description omits critical details of the project, including, but not limited to significant construction activities, engineering and operations aspects of the project, including energy sources. As a result of the DPEIR/S's failure to discuss key project components, potentially significant environmental impacts are not adequately described, analyzed or addressed.

Under both CEQA and NEPA, the DPEIR/S must contain a clear and comprehensive project description. The CEQA Guidelines define "project" as "the whole of an action, which has a potential for resulting in a physical change in the environment, directly or ultimately…" CEQA Guidelines Section 15378. Among other components, an EIR's project description must contain a "general description of the project's technical, economic, and environmental characteristics, considering the principal engineering proposals if any and supporting public service facilities." CEQA Guidelines Section 15124(c). Similarly NEPA provides that the lead agency must ensure that the description of the project action includes "connected actions" that are currently proposed or will be proposed in the foreseeable future. The lead agency must determine the proposed action's full extent, including all components, segments, and future phases. An agency may not divide a proposed action into smaller segments to avoid disclosure and analysis of the full environmental effects. If the EIS excludes arguably related actions, it must include the following: O007-41

- A description of the related actions and how they relate to the proposed action;
- A brief discussion of the impacts of the related actions to the extent they are known;
- An explanation of why it is not required or possible to evaluate the actions in detail at this time; and
- An explanation of when, and in what type of NEPA document, the related actions are being or will be evaluated (e.g. a second Tier EIS).

1. The DPEIR/S's Description of the Project is Not Adequate

Under both CEQA and NEPA, the DPEIR/S must contain a clear and comprehensive project description. Because this DPEIR/S will be relied on for Bay Area alignments and station locations for HST, the project description must accurately, completely and clearly describe all of the following: O007-42

- Key features of each proposed alignment, station location and other features of HST in sufficient detail to allow comparison of environmental impacts, and other considerations at a programmatic level (e.g. construction, operations, related facilities, elevated or not and why; etc.); and O007-43
- Projected total ridership, including local and regional ridership data for the alternative alignments. This information is critical to determining the financial viability of the alternatives and what amount of capital expense could reasonably be justified based in the projected ridership.[6] O007-44
- Source of and methodology used to obtain projected ridership
- Portion of the projected local and regional ridership ascribed to each of the HSR alignment options that would occur anyway, even if there were no HSR. O007-45
- Total cost, over and above the costs of developing the high speed rail service itself, of developing said local and regional ridership and likely source(s) of the extra funding needed to develop said ridership. O007-46

Instead of providing a clear and comprehensive project description early in the DPEIR/S, the reader must "assemble" the project descriptions for each alternative choice by sifting through not only the DPEIR/S, but all of its appendices, illustrations and in some cases, related studies. Furthermore, the descriptions and presentation of the alternatives such as listed in DPEIR/S Table 2.5-1 (for example, "San Francisco and San Jose Termini" or "Oakland and San Jose Termini") do not correspond to the list of accompanying figures in DPEIR/S chapter 2.5, and the presentation of content within those figures is inconsistent with the description of alternatives. This approach contravenes both CEQA and NEPA. All information necessary to accurately and thoroughly describe the proposed project or action – and in this case, actions – should be presented in the DPEIR/S in a readily comprehensible form. A revised DPEIR/S must be completed which includes all information about the proposed modal alternatives necessary to support informed decision-making. O007-47

In addition, the project description fails to allow the identification of a single environmentally superior alternative, as required under CEQA; nor does it easily accommodate the requirement under §404 of the Clean Water Act to identify a Least Environmentally Damaging Practicable Alternative ("LEDPA"). While CEQA does not require that the lead agency choose the environmentally superior alternative, the Clean Water Act does require that, if an agency project requires deposition of fill material in waters of the United States, the LEDPA be chosen. Federal agencies will be relying on the PEIR/S in evaluating this project under the Clean Water Act. It is therefore essential O007-48

[6] According to the DPEIR/S, "Ridership forecasts for the Pacheco Pass (terminating in San Francisco) and the Altamont Pass (terminating in San Francisco and San Jose) have been used as the *representative demand* for defining intercity travel need for the HST Alignment Alternatives in this Program EIR/EIR." DPEIR/S at 2-6. As is discussed further below, the ridership analysis conducted for the DPEIR/S is plagued by incorrect and improper operational assumptions. A new ridership study is needed. (See below.)

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that it accurately identify and justify the LEDPA to guide those agencies' decision making.

O007-48 Cont.

On way of addressing this deficiency would be for the PEIR/S to identify an environmentally superior alternative for both the Altamont and Pacheco alternatives, and then, comparing the two, identify the better of the two to be both the environmentally superior alternative and the LEDPA.

2. In Comparing the Performance of the Altamont and Pacheco corridor alternatives, the DPEIR/S Makes Improper Ridership and Operational Assumptions.

O007-49

The DPEIR/S includes a number of inaccuracies about the various project alternatives. For example, on Page 2-17 to 2-18, the DPEIR/S described the Dumbarton Rail Corridor ("DRC") Project being undertaken by Caltrain and the Peninsula Joint Powers Board. According to the DPEIR/S, the refurbishment of the Dumbarton rail bridge being undertaken as part of this project, "conflicts with the proposed HST system and the JPB's Caltrain Corridor EMU option." However, the DPEIR/S fails to indicate in what precise respects the systems conflict.[7] While use of the DRC's refurbished bridge may not be optimal for high-speed rail, there is nothing basically incompatible between the bridge improvements currently proposed for the DRC and the requirements for high-speed rail use. In fact, at the statewide level, the High Speed Rail Authority plans to use part of the Southern California Metrolink system as part of the high-speed rail system. (See, e.g., CHSRA Statewide EIR/S, Section 6.4.2 [Sylmar to Los Angeles alignment options].) That system, like the DRC, would use a combination of diesel powered and electrified cars. While it is true that the current single-track bridge is less than ideal for joint use by the DRC and high-speed rail, appropriate scheduling would allow sufficient service for both systems, especially during the initial start-up phase of the high-speed rail system. Since the currently-planned DRC bridge is intended to allow speeds of up to 130 km/hour, trains would traverse the roughly seven kilometer distance across the span in less than four minutes. This would not significantly affect the overall travel time for the route. Replacement or improvement (e.g., to a full double-tracked high bridge, or a tunnel) could, if desired, occur at a later time, and without disrupting operations significantly.

Failing to acknowledge the feasibility of using the expected DRC improvements as part of the Altamont network distorts the DPEIR/S' analysis of the feasibility and operational characteristics of the Altamont alignment alternative.

[7] The DPEIR/S states that the DRC currently proposes to use a mixture of conventional diesel trains and EMUs that would be incompatible with HST. However, no final decision has been reached on this question. As the DPEIR/S acknowledges, Caltrain is strongly considering an upgrade to EMUs compatible with the HST system. Such an upgrade would be essential for Caltrain and HST to share track on the peninsula. There is no reason why the DRC would not also consider an analogous upgrade. Indeed, since the DRC would expect to integrate with Caltrain, there is every reason to expect the DRC to be implemented using compatible EMUs. Thus incompatible equipment is not a valid basis for rejecting use of the DRC bridge.

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O007-50

In a similar vein, the DPEIR/S as well as a ridership study conducted in tandem, makes the unwarranted assumption that it is impractical to split or join train segments entering or leaving the Bay Area so that they can have different final destinations/origins (DPEIR/S at p. 4-20 and 7-12, fn.9.)[8] This ignores the reality of current HST operations in other countries, such as France and Germany, where it is routine for different cars on the same train to be routed to different destinations. Contrary to the assertion of the DPEIR/S, this is neither non-aerodynamic, confusing to passengers, nor particularly time-consuming to accomplish[9]. The two component trains can be quickly uncoupled, each set with its own locomotives (or with the cars themselves being EMUs[10]). The coupling can be designed so that aerodynamic efficiency is maintained, and passengers are clearly directed by station signs as to which cars are destined for which direction.[11] This fallacious assertion distorts the project description for the Altamont alternatives and, in particular, fatally distorts the scheduling assumptions that underlie the ridership modeling used in the DPEIR/S.[12] As a result, the ridership analysis is fundamentally flawed and fails to provide an accurate comparison of the Altamont and Pacheco alternatives. The ridership analysis must be reconsidered taking into account the ability to split trains and the consequent ability to run trains that will access both San Jose and San Francisco, and conversely to join trains originating in San Jose and San Francisco prior to continuing on to the ultimate destination.[13]

The DPEIR/S then goes on to assume, based on its prior assumptions about train splitting, that service through Altamont to/from Los Angeles must be divided between San Jose trains and San Francisco trains, and thus there will be fewer trains going to/from each of these two terminals. (DPEIR/S, Chapter 4 and S-12). As a consequence, the projected ridership and revenue from a representative Pacheco alternative appear roughly equivalent to those for the representative Altamont alternative. As already discussed, the assumption that the splitting and joining of HST sets is impractical is incorrect. In point of fact, the HST systems of both France and Germany, including the Thalys, TGV, and ICE HST networks, routinely split and join HST sets when there is insufficient demand to

[8] Cambridge Systematics, Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study Ridership and Revenue Forecasts (draft report, August 2007). It should be noted that this study is apparently only a draft, and was apparently not released until a month after the release of the DPEIR/S. If the DPEIR/S intended to rely on the report, the comment period should have been restarted from the report's publication.

[9] A quick reference to schedules for European train routes involving train splitting shows that it is commonly expected to be accomplished in 3-4 minutes. (See, Exhibit C attached hereto.)

[10] All relevant European equipment is modular.

[11] To be sure, passengers would need to be made aware of the need to check destination signs, but this is already the case where trains to several different destinations leave from the same platform. Again, European passengers seem to cope with this "problem" easily.

[12] Based on its mistaken presumption, the DPEIR/S presumes that trips to/from Southern California using an Altamont alignment must be divided between trains going to/from San Francisco and those going to/from San Jose, and assigns each origin/destination half the number of trains used for the Pacheco alignment. Ridership would obviously be greatly reduced by this error, as train frequency greatly affects ridership.

[13] While in the past train coupling confronted logistical problems in coordinating trains and schedules, current real-time capabilities, including accurate GPS location of trainsets and reliable communications both between trainsets and with the central dispatcher make trainset coordination eminently feasible. Indeed, it is done routinely with systems such as BART.

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operate a full trainset between two points. The trainsets have been designed as modular units that can be coupled together as pairs.[14]

For example, Thalys runs a high speed Paris-Köln-Amsterdam network that splits at Brussels. At peak hours, double sets run Paris–Köln or Paris–Amsterdam. However, at off-peak hours, when a double set cannot be justified, mixed-destination trains join and divide in Brussels. Thus, midday trains 9333 and 9433 depart Paris Gare du Nord coupled at 12:55pm, with one module running as 9333 to Amsterdam and the other as 9444 to Köln. Likewise, trains 9345 and 9445 leave Paris at 3:55pm and split in Brussels. This arrangement maintains frequencies on both branches despite a split in the route.

Similarly, the French tend to use splitting trains on their extensively-branched TGV network at the beginning and end of the day when loads are lighter. For example, weekday trains 6751 and 6781 leave Paris Gare de Lyon together at 7:14am and split at Dijon, with 6751 proceeding straight to Besançon and 6781 turning south to Chalon-sur-Saône. On the TGV Atlantique service, trains 8603 and 8705 leave Paris Montparnasse at 7:05am and split at Rennes, with 8603 running up Brittany's northern side to Brest and 8705 taking the southern side to Quimper. O007-50 Cont.

The most systematic practice of splitting high-speed trains appears to be on the German ICE network between Berlin and Düsseldorf and Köln in the Ruhr district. The dispersed Ruhr cannot effectively be served by a single ICE route, so for 13 hours straight every day, the Deutsche Bahn runs hourly modular high-speed trains coupled east of Hamm, last Ruhr district stop. At Hamm, trains split or join, one module serving the northern tier of Ruhr cities, the other the southern. (The above examples are further documented in the attached schedules included herein as Exhibit C.)

If the ridership analysis had properly allowed for train splitting and joining, it is self-evident that the Altamont alternative would have much greater ridership (and also cost-effectiveness).

According to the Final PEIR/S for the statewide HST system, "Travel between Sacramento and San Francisco represents the third-largest intercity travel market in the state..." The largest number of intercity trips is projected to be between the Central Valley and major metropolitan areas, and the second-largest geographic market is between the Los Angeles and San Diego regions. (Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed California High-Speed Train System, Page 1-6; see also DPEIR/S at p. 1-6.). By all rights, ridership between Los Angeles and the Bay Area should be roughly similar under either Altamont or Pacheco alignments.[15] When one also takes into account the added expected ridership O007-51

[14] See pictures included in Exhibit C, showing the linked trainsets used for such splitting/joining. This same point was made in the TRAC/CRF comment letter on the statewide HST EIR/EIS (Flashman letter, supra, at pp.7-8 and Attachments A-C thereto. The point was never responded to.)

[15] In fact, taking regional and sub-regional ridership into account, Altamont ridership would be expected to be somewhat higher, because the line would also draw upon the active ridership communities of the Northern San Joaquin Valley and the Tri-Valley Region of the East Bay, which would be excluded from a Pacheco alignment.

between Sacramento, the northern San Joaquin Valley, and the Bay Area, ridership that would be almost nonexistent under the Pacheco alignment scenario[16], it is clear that total system ridership, including regional and subregional trips, should be considerably higher under an Altamont alignment than for a Pacheco alignment. O007-51 Cont.

The improper refusal of the ridership study associated with the DPEIR/S to accept the feasibility of coupling and uncoupling HST trainsets leads to an incorrect and biased set of ridership results that improperly and unfairly penalizes Altamont alignment ridership. In essence, the DPEIR/S analysis artificially constrains the model to produce lower ridership and revenue for the Altamont alternative than would be the case if operated under a service model that was consistent with projected statewide demand for intercity trips and the reality of modern HST operational parameters. The ridership studies need to be redone using accurate operational assumptions and the corresponding sections of the DPEIR/S also need to be appropriately rewritten to properly reflect the relative feasibility and financial viability of the two major alignments. O007-52

In addition to a revised, current, transparent and accurate ridership study, the following questions concerning ridership assumptions underlying the DPEIR/S must be answered in a revised DPEIR/S: O007-53

- How did growth projections along the two alignments (Altamont and Pacheco) factor into ridership assumptions? How much of this growth is induced by the prospect of HST stations in currently undeveloped areas along the Pacheco route? O007-54
- What assumptions underlie the huge recreation/other ridership on Pacheco? What is the documentation for these assumptions? How accurate are they? O007-55
- The boardings by station illustrated in Tables 2.3 and 2.4 of the Cambridge Systematics Ridership/Revenue Study need to be disaggregated so that intraregional trips are segregated from inter-regional and other trips. This is a first step to making the data clear and understandable. O007-56
- Given the large investment the HST system would make in upgrading rail infrastructure, it would appear reasonable, and indeed only prudent, to supplement statewide HST service with high-quality regional rail service, thereby providing an additional passenger rail alternative for access among points along this system. Why didn't the DPEIR/S consider and discuss the feasibility of such an "add-on" system and its relative effectiveness under the Altamont and Pacheco alignment alternatives? O007-57

[16] See attached Exhibit D showing population and distance for the two alignments. According to California Dept. of Finance figures, in 2006 there were over two million more Californians in bordering counties that would be directly served by the Altamont Alignment than the Pacheco Alignment. Moreover, selection of the Pacheco alignment would increase the travel time for a Sacramento to San Francisco trip by more than 50% compared to using the Altamont alignment (1hr 40 min [Pacheco] vs. 1 hr 3 min [Altamont]). Indeed, the San Francisco – Sacramento travel time via the Pacheco alignment is barely competitive with automotive or bus travel. If the Pacheco alignment is chosen, there would essentially be NO Sacramento to San Francisco HST ridership.

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- There are ways to build bridges, especially rail bridges, so as to cause minimal disruption to their surroundings.[17] Why were alternative ways of constructing the Dumbarton Rail Bridge and various ways of mitigating any resulting environmental impact not discussed in the DPEIR/S? O007-58
- The DPEIR/S discounts the ability to use the renovated Dumbarton rail bridge proposed as part of the DRC for HST service across the Bay. While the DPEIR/S asserts that HST trainsets will be incompatible with Caltrain trainsets, the CHSRA is proposing to use the Southern California Metrolink system as part of the high-speed rail system. That system, like the DRC, would use a combination of diesel powered and electrified cars. Especially given the strong likelihood that all Caltrain trainsets, including the DRC, will move to using compatible electrified EMUs to reduce the system's global warming impact, why would it not be feasible to single-track HST traffic over the DRC bridge, at least during the HST service's initial phase? O007-59

3. The DPEIR/S Fails to Adequately Describe Station Locations

According to the DPEIR/S:

> "Again, the ultimate locations and configurations of stations cannot be determined until the project-level environmental process has been completed." At 2-29.

While the current programmatic level of analysis may not have sufficient information to provide detailed analyses of station locations, configurations, and their impacts, the PEIR/S must provide such information and associated analysis of impacts as is currently available. In some cases, the proposed station locations are obvious and already fixed. These include the stations (terminals) in San Francisco, San Jose, Sacramento, and Los Angeles. In other cases, there may be alternative locations possible. To the extent these possible station sites are currently known, they should also be identified and described, together with their potential associated impacts, including potential traffic and parking, air pollution, construction and growth-inducing impacts. O007-60

4. The DPEIR/S Fails to Adequately Describe Other Key Features of the Project Alternatives

According to the DPEIR/S, the Authority and FRA will rely on this document to select a preferred HST corridor/alignment, station locations, and recommended mitigation strategies based on the DPEIR/S. The lack of an adequate and complete project description does not support informed decision-making concerning the HST O007-61

[17] Examples of this can be found in the recent modifications to the eastern end of the San Mateo Bridge, the recently completed Benicia Bridge and MTC's currently proposed Dumbarton rail bridge.

corridor/alignment and station locations. Specifically, the DPEIR/S fails to provide consistent and complete information concerning proposed HST alignment and station choices. Information that is provided is difficult to verify because the assumptions underlying the information are not provided or are located in documents not readily available or properly summarized in the DPEIR/S. (E.g. Why are certain previously-identified and apparently contemplated stations, such as the Los Banos Station, omitted? Is it contemplated that they could be added back into the system at a future date? If so, that option and its potential impacts should be discussed. Why are some HST features – stations and rail – specifically identified as being elevated or at grade? Wouldn't it make more sense to leave such specific design considerations for a project level analysis? What is the single environmentally superior alignment under each of the Altamont and Pacheco alignment alternatives? How do those two alternatives compare? Couldn't the Dumbarton Rail Corridor improvement project also be used by HST to reduce impacts to the Bay? etc.) O007-61 Cont.

Specific examples of the types of information missing from the project description of the HST options include, but are not limited to the following[18]:

- Potential for Freight Service. According to the DPEIR/S: "Although the Authority recognizes the potential for overnight medium-weight freight service on the proposed high-speed tracks, it has not been included in this analysis. Discussions with potential high-speed freight operators could be initiated as part of subsequent project development with appropriate analysis." DPEIR/S at 2-7. O007-62
- Potential revenue from regional services such as the Altamont Commuter Express, which has been investigating the possibility of obtaining its own separate right-of-way rather than continuing to negotiate service on Union Pacific-owned tracks, thereby providing the ability to speed up the trains and avoid on-time performance problems frequently caused by Union Pacific operations. Such revenue from third parties can help lower bond costs and should be considered. O007-63

In the absence of information of this type, it is impossible to render informed decisions regarding a preferred alignment and the locations and configurations of stations. Such choices cannot and should not be made until adequate information and associated analysis of impacts have been provided. A revised and recirculated PEIR/S must include this information and accordingly revised impact analyses. O007-64

E. The DPEIR/S Fails to Adequately Analyze the Project's Significant Impacts

O007-65

The analysis of environmental impacts in the DPEIR/S fails to provide the necessary facts and analysis to allow the Authority, responsible agencies and the public to make an informed decision concerning the project alternatives (modal and HST related) and mitigation measures. CEQA requires that an EIR be detailed, complete, and reflect a

[18] Many of these project features were also the subject of comments on the 2004 statewide HST EIR/EIS.

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good faith effort at full disclosure. CEQA Guidelines section 15151. A fundamental purpose of an EIR is to "inform the public and responsible officials of the environmental consequences of their decisions before they are made." Laurel Heights Improvement Assn. V. Regents of the University of California, 6 Cal.4th 1112, 1123 (1988). To do so, an EIR must contain facts and analysis, not just an agency's conclusions. See Citizens of Goleta Valley v. Board of Supervisors, 52 Cal.3d 553, 568 (1990). Not only does the DPEIR/S fail to provide supporting evidence for its conclusions concerning the significance of project-related and cumulative impacts, in most cases, it is not possible to tell from the DPEIR/S whether an impact is considered significant, less than significant or reduced to less than significant after mitigation. Many discussions simply omit this basic information. O007-65 Cont.

The treatment of mitigation measures in the DPEIR/S is similarly deficient. Mitigation measures must be identified and analyzed. This DPEIR/S refers to the mitigation measures as mitigation "strategies." The term "mitigation strategy" is not recognized or defined by CEQA or NEPA. In most cases the suggested "strategies" are so vague that it is not possible to determine their efficacy in reducing significant impacts to less than significant. Many of these so-called "mitigation strategies" consist of suggested actions, the details of which are deferred until after project actions are taken that commit the Authority to a specific course (e.g. specific HST alignment and station locations). This approach makes it impossible to evaluate the effectiveness of strategies to reduce impacts, and perhaps even more important, to compare the significant impacts after mitigation between the two major alignment options. In addition, CEQA cautions that "public agencies should not approve projects as proposed if there are…feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects. . ." Pub. Res. Code section 21002. NEPA contains similar requirements. Here the DPEIR/S simply fails to identify feasible mitigation measures capable of mitigating the significant environmental impacts of the project alternatives and cumulative impacts. O007-66

Moreover, "mitigation strategies" are simply listed at the end of each section. Specific measures are not called out for the purpose of mitigating specific alignment or station choices. This approach results in the document's failure to identify the best choices in terms of matching potential mitigation measures and potential impacts. An EIR is not a Chinese restaurant menu where one can simply choose three from column A and three from column B. Decision makers need to understand beforehand what mitigation measures will be most effective for each potential impact, and whether that impact, after mitigation, will still be significant or not. With the current DPEIR/S, it is impossible to know any of this. O007-67

This approach does not keep the DPEIR/S from concluding that potentially significant impacts can be mitigated. Numerous significant impacts are deemed by the DPEIR/S to be less than significant after vague and non-committal "mitigation strategies" are imposed (e.g. traffic and circulation). This approach violates CEQA and NEPA. A revised DPEIR/S must include specific feasible mitigation measures to address specific significant project-related and cumulative impacts, and indicate for each impact and O007-68

mitigation measure combination whether the impact is expected to be significant after mitigation. O007-68 Cont.

Finally, the DPEIR/S improperly bases its analysis of the impacts associated with the HST Alternatives on a comparison with the No Project Alternative, rather than with existing baseline conditions. This approach is improper under both CEQA and NEPA, both of which require the analysis of impacts to be based on existing physical environmental conditions in the affected area at the time the notice of preparation is published. CEQA Guidelines section 15126.2. A revised DPEIR/S must include an analysis of the impacts of these alternatives with both the existing environmental conditions (at the time the NOP was issued) and with the No Project alternative. O007-69

1. The DPEIR/S Fails to Address Adequately Traffic, Transit, Circulation and Parking Impacts

The analysis of traffic, transit, circulation and parking in the DPEIR/S is flawed for a number of reasons: O007-70

First, potential impacts are improperly compared to the No Project Alternative instead of to existing environmental conditions. According to the DPEIR/S:

> "The traffic, transit, circulation, and parking analyses focus on a broad comparison of potential impacts on traffic, transit, circulation, and parking along stations for the HST Alignment Alternatives and station location options. **Potential impacts are compared to the No Project Alternative."** [Emphasis added.] DPEIR/S at 3.1-1.

CEQA generally defines a significant effect on the environment as a substantial or potentially substantial adverse change in the physical environment. Guidelines section 15358. "Environment" as used in this definition means, "the physical conditions that exist within the area affected by a proposed project, including, but not limited to, land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance." Guidelines section 15360. The Guidelines go on to clarify:

> "In assessing the impacts of a proposed project, the Lead Agency should normally limit its examination to changes in the existing physical conditions in the affected area as they exist at the time the NOP is published, or where no notice of preparation is published, at the time environmental analysis was commenced. Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects. The discussion should include relevant specifics of the area, the resources involved, physical changes, alterations to the ecological systems, and changes induced in population, distribution, population concentration, the human use of the land (including commercial and residential development), health and safety O007-71

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> problems caused by the physical changes, and other aspects of the resource base such as water, historical resources, scenic quality, and public services. The EIR shall also analyze any significant environmental effects the project might cause by bringing development and people into the area affected." CEQA Guidelines section 15126.2.

O007-71 Cont.

NEPA similarly defines the baseline against which to compare the impacts of a proposed action as the pre-project environmental conditions. Many lead agencies use the time of the NOI as the baseline.

Here, the impacts are compared with the No Project Alternative and not existing environmental conditions. According to the DPEIR/S, the No Project Alternative includes existing conditions and future conditions projected to occur as of 2030 (e.g. funded and committed improvements based on Regional Transportation Plans ("RTPs")):

- "The No Project Alternative would include programmed and funded transportation improvements to the existing transportation system that will be implemented and operational by 2030. The primary differences between existing conditions and the No Project Alternative are the increased level of travel demand on local roads that lead to the stations and the implementation of new infrastructure." DPEIR/S at 3.1-24.
- "The No Project Alternative describes the study region without implementation of the HST system and is the basis for comparison of the HST Alignment Alternatives. The No Project Alternative represents the state's transportation system (highway, air, and conventional rail) as it is currently and as it would be after implementation of programs or projects that are currently projected in RTPs, have identified funds for implementation, and are expected to be in place by 2030. This financially constrained level of infrastructure improvement (based on the expected federal, state, regional, and local funding) was analyzed in consideration of the considerable growth in population and transportation demand that is projected to occur by 2030. The No Project Alternative addresses the geographic area that serves the major destination markets for intercity travel that would be served by the proposed HST system in the study region. This area extends generally from the San Francisco Bay Area and Sacramento through the Central Valley." At 2-19.

O007-72

- "The No Project Alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed. The No Project Alternative includes the existing and future statewide intercity transportation system based on programmed and funded improvements through 2030, according to the following sources...". at 2-19-20
- "The No Project Alternative includes this existing highway system, as well as funded and programmed improvements on the intercity highway network based on financially constrained RTPs developed by regional transportation funding agencies." At 2-20. emphasis added.

O007-72 Cont.

While the DPEIR/S implies that the analysis compared the HST project alternatives to both the existing environmental conditions (2005) and to the No-Project Alternative (2030 No-Build), in fact, the project alternatives are only compared to the No-Project "future" scenario. There is no analysis comparing "2005" existing conditions plus HST project alternatives with "2005" existing conditions.[19] Examples of this flawed approach to the impact analysis occur throughout the section and include, but are not limited to the following:

> "Based on travel forecasts with and without HST alternatives, overall intercity highway conditions would improve with HST." DPEIR/S at 3.1-25.
>
> "In the case of the Altamont Pass alternatives, the V/C for the US 101 link between San Francisco to San Francisco Airport would decrease by about 3% as compared to the No Project alternative." DPEIR/S at 3.1-16.

O007-73

This approach results in confusing, obscuring and very likely minimizing the "true" impacts of introducing HST service to traffic, transit, circulation, parking as well as many other potentially significant impacts including, but not limited to biological resources, impacts to parks, impacts on agriculture, growth inducement and population and housing, among other impacts. See Tables 3.1-2 and 3.1-3 which include 2005 conditions as information, but only analyzes HST project alternatives with the 2030 No Build conditions). Such an analysis would also shed light on how the introduction of HST service might change whether, how and where circulation, parking, transit and other transportation improvements are made over the next 20+ years. For example, if the Pacheco alignment, which would serve an area currently much less populated than that for the Altamont alignment, is selected, would additional non-HST transportation infrastructure need to be built beyond what is currently contemplated, in order to serve the growth induced by the introduction of HST? A revised analysis must be developed that analyzes the HST project alternatives compared to the environment as it exists. Without this analysis, the DPEIR/S is fatally flawed. Questions that we request be addressed in either the response to comments or a revised DPEIR/S concerning this issue include:

- What are the impacts of the HST project alternatives (without programmed and funded improvements beyond existing conditions) on existing traffic, transit, circulation and parking conditions? See e.g. CEQA Significance Criteria bullet one at page 3.1-3: "An increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in the number of vehicle trips, the V/C, or congestion at intersections)."

O007-74

[19] We understand the model limitations. However, this information can be generated by manipulating the model or by manual calculations if necessary to comply with CEQA and NEPA requirements for analyzing the proposed project compared to existing conditions.

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- What transportation system needs, and associated projects (roads, parking, other types of transit) not currently programmed, funded or even contemplated, would be "induced" (e.g. new roads, road widening, etc.) in the alternative project areas if HST is introduced and in turn induces new growth? O007-75

- What are the impacts if a more traditional approach is taken and instead of using the "sum of the AM and PM 3-hr peak periods," the traffic analysis is based on the peak period (AM or PM) to determine the impacts of the introduction of HST project alternative on Existing Conditions and on No-Build (No Project Alternative)? The model should be re-run to determine these impacts.[20] O007-76

- In the DPEIR/S description of the difference between existing conditions and the No Project; ["The primary differences between existing conditions and the No Project Alternative are the increased level of travel demand on local roads that lead to the stations and the implementation of new infrastructure." DPEIR/S at 3.1-24]; the text implies that under future conditions there would be more trips to the stations. This further implies that the No Project alternative is already altered by the introduction of the HST project alternatives. Please clarify the differences between existing conditions and No Project and whether the No Project includes HST stations in the analysis. If it does, the HST analysis needs to be revised so that the analysis is clearly No Project 2030 conditions with and without any HST project features including HST station locations. O007-77

- Explain how the introduction of HST to the Pacheco area would not result in inducing new roadways and highway improvements to serve new growth induced by HST above and beyond the programmed and funded circulation system projects included in the No Project 2030 scenario. O007-78

Second, omitted and inadequate project description information makes it impossible to adequately evaluate project related impacts on traffic and circulation. Examples of omitted or inadequate project description elements that result in an underestimation of traffic impacts include, but are not limited to: construction activities including construction haul routes, construction related trips, current and adequate information about ridership on the different modes, consistent assumptions concerning catchment areas (i.e. the distance people will travel to ride HST), information about all potential uses (e.g. freight) of HST as well as other information. In addition, the inclusion of programmed and funded circulation improvements in the No Project Alternative serves to reduce certain impacts that could be greater under the comparison of current baseline conditions to baseline plus HST only.[21] As a result, the DPEIR/S likely significantly underestimates impacts to traffic and circulation because the project description omits O007-79

[20] It seems obvious that such a summation could mask a significant traffic impact. If, for example, the project resulted in shifting some traffic on a road segment from the AM peak to the PM peak, the AM+PM sum would be constant, but the PM peak could be elevated to the point of having a significant impact.
[21] Just because a highway improvement has been programmed and funded does not mean that it will necessarily be built. Project funding can be reprogrammed to other, more urgent, projects, leaving the improvement unimplemented.

adequate and complete information about the true extent of project-related impacts and fails to adequately analyze impacts. O007-79 Cont.

Third, the DPEIR/S analysis of HST impacts to intercity highway conditions focuses solely on the trips that would be diverted on the future circulation system with the introduction of HST and fails to analyze how/what circulation system improvements would be induced by the introduction of HST. Such an analysis must also include the potential environmental, social and economic impacts of these new facilities and improvements. See e.g. DPEIR/S at 3.1-15. This omits much of the required analysis. Like the parking analysis, which refers to new parking being provided to support HST stations where needed, the analysis of circulation and transit systems must identify additional circulation and transit facilities that will be required because of the introduction of HST. The improvements could include, but are not limited to: new roads/road or highway improvements to serve stations and/or induced growth; feeder buses and new stops; other supportive facilities (e.g. maintenance/repair yards/corp type yards etc.). The analysis must not only identify these facilities and improvements, but also analyze their impacts. While some of these could be considered "mitigation" (see e.g. page 3.1-38), many of these facilities and improvements are just as likely to occur to deal with new growth and demand. In either case, impacts related to mitigation measures must also be considered in the EIR/S. O007-80

Fourth, the DPEIR/S fails to analyze impacts to operations of existing transit lines and the impacts to neighborhoods of additional infrastructure that will be required to maintain mobility. For example, the DPEIR/S fails to consider that the Caltrain line is already saturated with eight trains in each direction per hour, and yet for both current and future increased levels of service there is no need to quadruple-track the entire Caltrain line between Redwood City and Santa Clara in the absence of high-speed rail. Quadruple-tracking this segment for HSR under the Pacheco alternative, provides no additional mobility or benefits to local service to those neighborhoods but only unnecessary impacts. These impacts could be avoided under the Altamont alignment alternative. On the other hand, Caltrain does require passing tracks to be constructed between Redwood City, San Mateo and Millbrae in order to be able to operate at a moderately greater frequency than it does today. This section of the Caltrain line would obtain mutual gain with reconstruction for HSR under either the Altamont and Pacheco alternatives. Similarly, construction of an Altamont alignment for HSR would facilitate the introduction of regional rail services between the San Joaquin valley and the Peninsula/San Jose at frequencies ten-fold greater than possible today. The DPEIR/S fails to consider the constrained capacity of the planned San Francisco Transbay Terminal to serve as the endpoint of all trains. It makes the highly implausible assumption that an 8-track second story could be built 30 feet above the existing San Jose Diridon station to provide needed capacity while maintaining this station as a working station with ongoing operations, and all this for only $185 million. (DPEIR/S at 4-4 [Table 4.2-1]; 4-13 [Table 4.2-2].) It should be noted that the San Jose Diridon station is already the busiest in California because of the confluence of freight and several passenger operations there. O007-81

Comment Letter O007 – Continued

Fifth, the DPEIR/S improperly defers mitigation measures that could potentially reduce impacts to traffic and transit. According to the DPEIR/S:

> "The Authority would expect to participate in developing potential construction and operational mitigation measures in consultation with state, federal, regional, and local governments and affected transit agencies during project-level reviews." DPEIR/S at 3.1-38.

> "Program-level mitigation strategies would be further refined, and specific measures would be considered during project-level environmental reviews where impacts are found to be significant at the project level. Potential mitigation strategies to be considered during project-level environmental reviews would include the following, listed below by regional and local applications." DPEIR/S at 3.1-39.

O007-82

The list of mitigation strategies includes a number of facility and infrastructure improvements such as providing additional parking, widening roadways, improving street capacities, and the like.

> "The above mitigation strategies would be refined and applied at the project level and are expected to substantially avoid or lessen impacts around station areas to a less-than-significant level in most circumstances." Id. at 3.1-40.

In some cases, for example in the Downtown Fremont and Tracy areas, mitigation measures could make the difference in the environmental superiority of an alignment or station choice. It is only at this early stage that the Authority can design wide-ranging measures to mitigate environmental impacts. *See* Guidelines § 15168(b)(4) (programmatic EIR "[a]llows the lead agency to consider broad policy alternatives and program wide mitigation measures at an early time when the agency has greater flexibility. . . ."). Failing to evaluate mitigation measure and/or deferring the evaluation to the future thus violates CEQA [and NEPA].

Feasible mitigation measures must be identified and in the case of more detailed decisions concerning HST alignments and stations, additional details concerning these project descriptions needs to be provided. It is not appropriate to make station and alignment choices based on the possibility that significant impacts to traffic and circulation "might" be avoided by as yet undetermined mitigation measures or that people may be encouraged in greater numbers than ever before to choose transit over their single occupancy vehicle. In particular, it is inappropriate to assume potential impacts will be mitigated in the absence of substantial evidence that mitigation is feasible or a commitment to achieving standards that will assure an absence of significant impacts.

Finally, a number of mitigation measures will in turn have significant impacts that are not analyzed in the DPEIR/S. For example, major transportation improvements are identified as potential mitigation to alleviate congestion. A revised DPEIR/S must analyze the

O007-83

indirect or secondary impacts of these measures. In addition, the feasibility of acquiring rights-of-way to accommodate proposed HST alignments and stations must also be addressed in terms of feasibility, cost and other factors. A map or maps showing major ownerships of property not already in the Authority's control must be produced with supporting text indicating the feasibility and estimated cost of acquiring key properties and parcels. This same information should be used for a revised growth-inducing section.

O007-83 Cont.

The DPEIR/S fails altogether to analyze the physical environmental impacts of the mitigation measures including, but not limited to: local spot widening of curves, major intersection improvements, acquisition to accommodate widening projects, and provision of additional parking. DPEIR/S at 3.1-38. Impacts associated with mitigation measures where they could be significant must be analyzed in a revised EIR/S.

Remarkably, after identifying numerous significant impacts of HST on traffic and circulation, the DPEIR/S concludes that all potentially significant traffic and circulation impacts of the HST alternative will be reduced to less than significant *with* mitigation. Mitigation consists of deferred "strategies" including "encouraging" the use of transit and working with transit providers to improve station connections, among other deferred strategies. However, such "strategies" are not adequate mitigation unless they are accompanied by 1) substantial evidence showing that they will reduce impacts to a level of insignificant or, 2) at the least, a commitment to reach defined standards that will assure that no significant impacts will result. For example, a standard requiring that transit ridership will be increased by a certain percentage, along with feasible strategies to achieve this standard (e.g., subsidized transit passes, transit promotion agreements with municipalities and major employers, local parking pricing and/or road pricing programs implemented by municipalities, etc.) could demonstrate that levels of transit use will be achieved that will reduce potential impacts to a level of insignificance. Such standards and evidence have not, however, been included in the DPEIR/S. This, along with other statements in this section of the DPEIR/S underscore the reasons why this document is not adequate to support informed decision-making concerning Bay Area – Central Valley HST alignments and stations.

O007-84

Lastly, the DPEIR/S fails to reach conclusions supported by evidence concerning the significance of traffic impacts for any of the alternatives. A revised DPEIR/S must identify the significant impacts of each alternative before and after mitigation.

2. The DPEIR/S Fails to Address Adequately Travel Condition Impacts

O007-85

Like the transportation section, potential impacts to travel conditions are improperly compared to the No Project Alternative instead of to existing environmental conditions. According to the DPEIR/S:

> "The No Project Alternative includes programmed and funded transportation improvements to the existing transportation system that will be implemented and operational by 2030." At 3.2-6.

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"This section presents expected travel conditions for the HST alternatives and compares relative differences between No Project and the HST." At 3.2-8. See also Table 3.2-6 which provides existing conditions, but only compares the 2030 Air Mode travel times with and without HST. See also Table 3.2-12 and 3.2-13 comparing 2030 intercity trips for auto, air, Amtrak rail and HST under base case and high end 2030 trip shares.

O007-85 Cont.

The fatal flaw with this approach is that there is no dissection of the impacts to travel conditions induced by the introduction of HST from the changes induced from programmed and funded circulation improvements [and growth]. Only with an analysis of HST against existing baseline conditions with and without HST and future conditions with and without HST can the true extent of project-related impacts be known, disclosed and mitigated.

3. The DPEIR/S Fails to Adequately Analyze Air Quality Impacts

The DPEIR/S fails to adequately and accurately evaluate the potentially significant air quality impacts of HST as a result of faulty methodology. Again, the DPEIR/S fails to analyze the HST project alternatives compared to existing conditions. The approach taken in the Air Quality analysis is:

"A comparison of the 2005 conditions to the 2030 No Project conditions illustrates the expected trends in air quality. Currently, CARB has not released 2030 emission inventory information. For the purposes of this analysis, emission burdens were projected to 2030, based on CARB emission burden data from 2005-2020. The potential impacts from proposed alternatives were then added to the 2030 conditions. Changes in VMT from on-road mobile sources (vehicles) and for off-road mobile sources (number of plane operations and train movements) were estimated for each of the alternatives. Changes in emissions of stationary sources (electrical power generators) were also addressed." DPEIR/S at 3.3-5.

O007-86

"To determine if the project has significant air quality impacts as defined by CEQA, the relevance of the potential emission changes was assessed from a total pollutant burden and percentage change compared to the No Project Alternative in the affected air basins and statewide." DPEIR/S at 3.3-6

"The assessment is based on the total pollutant burden of an area under the No Project Alternative and the change in emissions estimated under a proposed alternative." DPEIR/S at 3.3-7.

While the section compares existing conditions to the No Project Alternative [concluding that with respect to CO, NOx and TOG, emissions will be lower; PM10 higher than 2005 conditions] the section again only compares the HST Alternatives to No Project Alternatives and fails to compare the HST Alternatives to existing conditions:

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"Roadways: The proposed HST Alignment Alternatives could potentially result in a daily reduction of 32.691 million VMT compared to the No Project Alternative...". 3.3-13

"Air Travel: The air-travel component is based on 43,865 daily trips (1 trip = 1 takeoff and 1 landing), or 433 statewide, being shifted from the airplane component of No Project future conditions to the proposed HST Alignment Alternatives...". 3.3-13.

O007-86 Cont.

"Summary of Pollutants: Table 3.3-7 summarizes the combined sources categories for existing conditions and the No Project Alternative and the HST Alignment Alternatives. Compared to the No Project Alternative, the proposed HST Alignment Alternatives are projected to result in a decrease in the amount of pollutants statewide and in all basins analyzed." 3.3-14. See Table 3.3-4 which summarizes the No Project and HST Alignment Alternatives for On-Road Mobile Source Regional Emissions.

Second, the DPEIR/S fails to adequately analyze the project's contribution to greenhouse gas emissions or to give any consideration to likely changes in weather patterns and climate as a result of global warming. The Attorney General's office has made it clear that projects such as HST must analyze and mitigate impacts associated with global climate change. See Exhibit E hereto. While the DPEIR/S briefly refers to global warming and contains limited analysis, the document's approach is inadequate. According to the DPEIR/S.

"Changes in the amounts of CO2 (which is a major component of greenhouse gases) as a result of the project alternatives were estimated on a statewide basis. These results are provided to indicate how changes in CO2 emissions, as a result of the HST Alignment Alternatives, might affect global warming. These estimates were based on the estimated changes in fuel use and electrical energy production associated with the HST Alignment Alternatives." At 3.3-7. See also 3.3-10.

O007-87

"Year 2005 CO2 emissions were estimated at 1.280 million tons/day." 3.3-13.

"CO2 calculations for the alignment alternatives reflect only emissions from electrical power stations, planes, and on-road VMT." 3.3-14.

The DPEIR/S fails to include thorough discussion, analysis or mitigation for the project and cumulative project contribution to global warming impacts. The technical planning and scientific tools to assess global warming impact and feasible mitigation already exist.

A report by the Association of Environmental Professionals (AEP) includes the following recognition of the importance of climate change:

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"In California, global climate change is a growing concern that must be addressed in CEQA documents."

The Report includes a recommended approach for assessing a project's contribution to global climate change. The approach is based on two key components: first, provide an inventory of greenhouse gas emissions; and second, include mitigation strategies identified in the California Climate Action Team (CCAT) Report. The CCAT mitigation was developed to provide sufficient greenhouse gas reductions necessary to meet the Governor's greenhouse gas reduction targets (targets are discussed further below).

A project-specific inventory of greenhouse gases can be quantified based on existing emissions models. Specifically, CARB has released the EMFAC 2007 emissions model to quantify on-road vehicle emissions; this model is used extensively for a broad range of applications by a wide variety of agencies, and produces estimates of vehicle-related CO2 emissions. CEQA's primary interest in comprehensively estimating a project's environmental impacts dictates that those greenhouse gas emissions must be quantified, discussed, and mitigated using all reasonable, feasible means. Operational CO2 emissions derived from URBEMIS modeling have, in a number of CEQA cases, been multiplied by 100 as an analogue to predict a project's lifetime CO2 increment. This calculation is relevant to the construction period and vehicle trips related to ridership and operations of HST. It is vitally important that the PEIR/S quantify, to the extent feasible, the overall CO2 contributions each of the various alternative alignments would make, including not only direct contributions from the Project and project-related vehicle trips (e.g., passenger trips to/from stations), but also indirect effects related to the Project's growth-inducing impacts. O007-87 Cont.

Other contributors to greenhouse gas emissions include electricity, burning of natural gas and loss of lands that currently sequester carbon. HST will rely on some source of electricity to operate the trains.

"Electricity as energy is given detailed consideration in this analysis because of the projected use of electric energy to power the proposed HST system." DPEIR/S at 3.5-6

"This analysis is concerned with the adequacy of the generation and transmission infrastructure to accommodate the inclusion of the HST system in the state's electricity grid; distribution issues are not considered at this program level of analysis." Id.

"Emission changes from power generation can therefore be predicted on a statewide level only. In addition, because of the state requirement that an increasing fraction of electricity generated for the state's power portfolio come from renewable energy sources, the emissions generated from the HST system are expected to be lower in the future as compared to emissions generated based on the state's current power portfolio." At 3.3-6.

Electricity generation accounts for approximately 21 percent of GHG emissions in California. The EIR states that HST operations would annually consume approximately 386 million barrels of oil and increase the load on statewide electric power by an

estimated 794 MW during the peak period in 2030. During construction, energy consumption for the HST system is estimated to be approximately 128 MMBTU's or 22 million barrels of oil. DPEIR/S at 9-1. While this may be a reduction over the No Project Alternative, it is still an increase in energy use. The amount of carbon emissions resulting from this demand is easily calculated: According to the Energy Star Program, a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, one kilowatt hour consumed equates to 1.55 pounds of CO_2 emissions.[22] The EIR should have included this calculation for the various alignment options included in the DPEIR/S. O007-87 Cont.

Even as various human processes send carbon into the atmosphere, trees take up and store carbon in a process known as carbon sequestration. Climate Action Team Report at 48-49. Agricultural lands similarly take up carbon as do other open space lands.[23] Carbon that is sequestered is not free in the atmosphere and thus does not contribute to the greenhouse effect. The loss of large amounts of trees and agricultural land results in less carbon sequestration, which in turn exacerbates the effects of global climate change. Therefore, any EIR prepared for a project, like this one, that will affect large forested and agricultural areas must analyze the effects of deforestation and conversion of land to nonagricultural uses on global climate change.

The second component of any global warming emissions approach stresses inclusion of mitigation strategies identified in the CCAT Report. According to AEP, the mitigation strategies in the CCAT Report "are the most appropriate to use at this time because the report 'proposes a path to achieve the Governor's targets that will build on voluntary actions of California businesses, local government, and community actions, and State incentive and regulatory programs."[24] Many of the CCAT mitigation measures noted below should have been thoroughly evaluated for mitigation instead of deferred as the DPEIR/S currently does: O007-88

- Vehicle trip reduction strategies (paid parking, parking cash-out, etc.);
- Providing multi-modal transportation options;
- Increasing energy efficiency beyond Title 24 requirements;
- Increasing recycling; and
- Incorporating green building technology.

In the opinion of AEP, if a project complies with applicable measures noted above, the project could be considered to have a less than significant cumulative impact to global

[22] It is important to note that the Authority, not the public, bears the responsibility for choosing or developing a methodology for determining impacts. We offer these suggested formulae to help the guide the EIR's preparers in the necessary revisions, and to demonstrate that these calculations are not arcane but are actually quite easily performed.
[23] Of course, such sequestration is rarely permanent. For farmlands, some of the sequested CO2 will be re-released as food is consumed and other agricultural products used up or biodegraded. However, there will usually be a net sequestration which, depending on the crop involved, can be highly significant.
[24] AEP White Paper on Global Climate Change, p. 10.

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climate change.[25] Without these mitigation measures, the project is considered to contribute significantly to global climate change, an environmental process relevant to CEQA. O007-88 Cont.

The DPEIR/S as currently drafted fails to incorporate feasible climate change mitigation and fails any attempt to estimate its impact to climate change. Such impacts must include increased CO2 production related to the growth induced by the introduction of HST to currently undeveloped areas, particularly along the Pacheco alignment. HST will cause such cumulative emissions increases and therefore must analyze them. O007-89

The State of California has also acknowledged the environmental impacts of greenhouse gas emissions on climate change. According to Governor Schwarzenegger's June 1, 2005 Executive Order, global warming, left unchecked, will accelerate coastal erosion, degrade air quality, increase wildfires, reduce water supplies, and intensify heat waves – all concerns to the State and its citizens. (See California Climate Change Center, Our Changing Climate: Assessing the Risk to California; Executive Order S-3-05.) The Governor's Executive Order established the following greenhouse gas reduction targets:

By 2010, Reduce to 2000 Emission Levels
By 2020, Reduce to 1990 Emission Levels
By 2050, Reduce to 80 percent Below 1990 Levels

O007-90

If these targets are not achieved, the State of California and its resource agencies believe California will suffer serious and significant degradation of its natural environment, causing widespread environmental damage along with disproportionate harm to those with low incomes and those living in the already congested Bay Area air basin. Nothing in the DPEIR/S's treatment of CO2 emissions demonstrates leadership by the High Speed Rail Authority in characterizing and reducing global warming impacts, and this approach is both inconsistent and contradictory to actions taken by the Governor's office and the State's Attorney General's office in the last twelve months.

Increasingly over the last one to two years, the State's former and current Attorneys General have urged Lead Agencies to include analysis of global warming impacts in their environmental documents because *it is a requirement of CEQA.*[26] The basis for requiring an environmental review to disclose and analyze this impact is essential CEQA— the California Environmental Quality Act requires government agencies to disclose and analyze all of a project's potentially significant environmental impacts and to make every reasonable effort to avoid, diminish, or mitigate those harmful effects. CEQA defines significant impacts broadly and inclusively and its definition includes not only the direct environmental consequences of implementing the project, but any indirect

[25] Ibid, p. 2

[26] In August of this year, the California Attorney General, Jerry Brown, reached settlement with San Bernardino County over its approval of a General Plan update that violated the California Environmental Quality Act by not fully evaluating and addressing foreseeable effects on global temperatures, air quality and natural resources. The settlement requires the county to take specific actions to reduce its global warming impacts. The PEIR/S should consider the applicability of the settlement agreement's provisions to this statewide energy-intensive project.

effects that may follow from the project's direct physical environmental consequences. (CEQA Guidelines section 15064(d)(2).)

Rather than taking the issue on forthrightly the DPEIR/S is largely silent on the issue, giving the appearance that the HSRA wishes to have HST excused from its CEQA responsibilities to estimate and then mitigate project-specific CO2 emissions. At minimum, a revised DPEIR/S must be drafted to correct these omissions and then re-circulated to allow public review of the following:

1. A revised regional setting discussion which includes background information on global warming and climate change, State, regional and local targets and the status of any regional inventory;
2. An inventory of all the greenhouse gas emissions (i.e. carbon dioxide, methane, nitrous oxide, other) generated by the various project alternatives (both during construction and operation) and cumulative and growth inducement elements;
3. Discussion and incorporation of all feasible mitigation as identified by CCAT.

O007-90 Cont.

Among the feasible mitigation measures alluded to in the DPEIR/S are to run the trains on 100% clean, zero carbon emissions electricity. Such an approach should be a mandatory mitigation requirement of HST:

Insufficient re: Electrical Power...see 3.3-14. "if it is decided that the project would be run on 100% clean, zero-carbon emissions electricity, there would be no predicted increase in CO2 levels due to the project's increased electrical requirements." 3.3-14.

In addition, like other transit agencies including but not limited to AC Transit, all HST associated facilities (e.g. stations, maintenance yards, fleets, etc.) should be carbon neutral. In describing how carbon neutrality will be achieved, a revised EIR/S should indicate whether this is simply a shift in clean power to HST or achieved as a total reduction of polluting energy sources statewide. O007-91

Third, the DPEIR/S improperly defers mitigation measures that could potentially reduce construction period and operation-related air quality impacts. According to the DPEIR/S:

"The program-level analysis in this document reviews the potential statewide air quality impacts of a proposed HST system, and the analysis would support determination of conformity for the proposed HST system. At the project level, potential mitigation strategies should be explored to address potential localized impacts." DPEIR/S at 3.3-19. O007-92

Deferred measures include: increased use of public transit, increased use of alternative-fueled vehicles; increased parking for carpools, bicycles and other modes of transportation. In addition, the DPEIR/S states: "Potential construction impacts, which should be analyzed once more detailed project plans are available, can be mitigated by following local and state guidelines." DPEIR/S at 3.3-20. A general list of typical construction-period measures is provided, including replanting vegetation, minimizing equipment idling and the like. While in some cases deferral of identifying specific

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mitigation measures may be appropriate, where, for example, specific station locations or construction technique application may call for specific measures, some operational and construction-related mitigation measures can be identified even at the programmatic level. These include, for example, the use of electric-powered, as opposed to diesel-powered construction equipment where feasible, and the use of low emission diesel equipment where diesel equipment must be used. The PEIR/S should be modified to explicitly identify those measures that can, even at this stage, be committed to, and discuss the potential of these measures to fully or partially mitigate project impacts. O007-92 Cont.

Finally, feasible mitigation measures to address the potentially significant and unavoidable air quality impacts of all alternatives must be included in a revised DPEIR/S. Such measures include, but are not limited to measures that require cleaner construction vehicles, 100 percent clean energy, urban forestry, green building standards, and most importantly, directing these transportation improvements and all state transportation funding to occur in urban areas, rather than in undeveloped areas where they will promote sprawl, with its associated increased auto use and air quality and CO2 emission impacts (as is particularly the case with many of the proposed segment and station alternatives included within the Pacheco alignment options).

4. The DPEIR/S Fails to Adequately Analyze Agricultural Impacts

The DPEIR/S's approach to analyzing impacts to agricultural land is flawed for a number of reasons. Like the other topic areas, impacts to agricultural land are improperly evaluated against the No Project Alternative future condition rather than existing conditions:

> "The No Project Alternative assumes that, in addition to existing conditions, additional transportation improvements would be developed and operational by 2030...It was not possible as part of this study to identify or quantify the amount of farmland that might be affected by the transportation improvements in the No Project Alternative." DPEIR/S at 3.8-5. O007-93

This approach results in underestimating the true extent of growth-inducing impacts associated with the introduction of HST to currently undeveloped agricultural lands along the Pacheco alignment especially.

In addition, the approach taken to calculating impacts to farmland is flawed. For HST impacts on agricultural lands, the study area was determined to be 100 feet from the rail right of way or rail centerline in the case of the HST being located off an existing rail line. According to the DPEIR/S, this is a conservative study area, because it would be possible to fit the HST line within a 50 foot right-of-way in constrained areas. DPEIR/S at 3.8-4. This approach grossly underestimates the impacts of these alternatives on agriculture and farmland. For example, where the HST right of way divides an agricultural field, unless provisions are made to allow frequent undercrossings of farm equipment, the alignment will effectively sever the property, making it significantly more difficult and expensive to keep it in production. Indeed, where the HST line severs

a small portion of land, that land will almost certainly be taken out of production, and will more than likely be sold off for non-agricultural use. In addition to the agricultural impacts, such land conversions will likely contribute to the project's growth-inducing impacts.

The analysis also fails to analyze impacts to agricultural infrastructure necessary to sustain ongoing agriculture. The analysis only considers potential "severance" of farmland or loss of farmland acres. DPEIR/S at 3.8-10. Because the project description is lacking, these discussions fail to disclose the significance of these impacts. Also according to the DPEIR/S:

> "Parcel-specific information was not considered in this program-level analysis. Project-level farmland severance impacts would be addressed in subsequent project-level documents." DPEIR/S at 3.8-10.

Deferral of this analysis is improper under both CEQA and NEPA and will result in depriving decision-makers at this key point of alignment selection from information concerning comparative impacts to agricultural land. A revised PEIR/S must provide this information in association with the Pacheco and Altamont alignments and station location choices. Questions that must be answered include but are not limited to the following: O007-93 Cont.

- How much agricultural land must be acquired for each alternative?
- What is the estimated cost?
- How much more agricultural land will be lost due to fragmentation and severance impacts of the respective alternatives?
- What is the total estimated value of the agricultural production lost under each alternative?

Moreover, the DPEIR/S overlooks the impacts of the project on grazing. This impact is simply deferred until a later analysis. The DPEIR/S ignores the spillover effects of residential development on farming operations. As will be discussed further below, unless specific measures are taken to avoid or mitigate growth-inducing impacts, the HST project can be expected to induce significant amounts of new residential growth along its right of way and especially where train stations are placed. Such residential development will predictably interfere with continued grazing operations. According to a review by the American Farmland Trust, these spillover effects could affect 2 to 3 times as much farmland as is actually converted as a result of new residential uses conflicting with farmland uses.[27]

Mitigation strategies for agricultural impacts are also improperly deferred. While the DPEIR/S identifies appropriate strategies, they would be considered in the future at a project-level. Of course the most significant "mitigation measure" the Authority could implement is the selection of the Altamont Alignment which would be clearly superior with respect to protecting agricultural land. Specific mitigation measures that must be

[27] See the page 7 of the comment letter from American Farmland Trust dated 8/5/2004, HSR Final Statewide EIR/S page 5-236

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included in a revised and recirculated DPEIR/S include but are not limited to purchase of agricultural easements to protect farmland before HST is introduced, urban growth boundaries and smart growth zoning in communities served by HST. In addition, a revised DPEIR/S must provide evidence that proposed mitigation measures will actually reduce or eliminate the significant conversion of farmland. O007-93 Cont.

5. The DPEIR/S Fails to Adequately Analyze Biological Resource Impacts.

Once the presence of biological resources in a project site have been identified and described, a DPEIR/S must then analyze how the direct and indirect impacts of the project and cumulative projects would affect resources. As set forth in the CEQA Guidelines Section 15126(a): O007-94

> Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both short-term and long-term effects. The discussion should include relevant specifics of the area, the resources involved, physical changes, alterations to the ecological systems, and . . . .

The DPEIR/S does not disclose the Project's (including all alternatives) impact to the physical environment and its corresponding effect on biological resources as required under CEQA and NEPA for a number of reasons including, but not limited to the lack of adequate and complete setting information, inadequate analysis of impacts and failure to identify feasible mitigation measures. Our summary of the significant flaws and omissions in the DPEIR/S with respect to biological resources follows.

In general, the discussion of the Regulatory Requirements and Methods of Evaluation is misleading and does not meet the intent or standards for CEQA significance determinations. The description in the Affected Environment lacks crucial information necessary to allow a complete assessment of impacts, and thus the Environmental Consequences of the project are not fully assessed and are under-represented. Furthermore, a lack of information and analysis raises the question of bias in the document. Because two of the major alignment alternatives – Altamont Pass and Pacheco Pass differ with respect to many of the resources that were not adequately described or assessed, the conclusions regarding the relative impacts of these two alternatives are potentially misleading. O007-95

An overarching problem with the analysis is that there is no real synthesis or interpretation of the biological resources information available for the project alignments. The document essentially presents raw data on biological resources and impacts (numbers of species, acres of wetlands, etc.) but these data are never meaningfully discussed or interpreted. The purpose of the EIR/EIS is to present technical information in a meaningful and understandable way, so that the public and decision-makers can be adequately informed and do not have to synthesize and interpret raw data themselves. The mere presentation of data, without sufficient analysis for the public and decision makers to evaluate the impacts represented by the data and their relative significance, O007-96

does not satisfy CEQA's mandate of providing decision makers with the information they need to make a decision that is fully informed by the environmental impacts that decision will have. For example, the EIR/EIS should discuss the quality and regional importance of the biological resources in the various alignment segments and describe the nature and magnitude of the impacts to these resources, rather than just list the resources present and impacted. While the DPEIR/S provides various tables listing biological resources, it does not provide an analysis of the relative significance of different resources and impacts on resources. In particular, it is crucial to explain clearly the relative significance of impacts on biological resources from choosing the Altamont vs the Pacheco alignment. That information is not adequately provided in the DPEIR/S, and in its absence the DPEIR/S is inadequate. Other specific issues and examples are discussed further below.

The discussion in the DPEIR/EIS on the Regulatory Requirements and Methods of Evaluation seems to ignore a central purpose of CEQA: to disclose when projects may have significant effects on the environment. Significant effects are defined as substantial, or potentially substantial, adverse change in any of the physical conditions with the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic and aesthetic significance. The significance criteria defined for the HST evaluation are largely focused on "sensitive" resources (e.g., special status species and their habitats) or those protected by specific regulations or policies (e.g., wetlands, HCP or NCCP plans). This does not meet the CEQA's requirement to disclose <u>any</u> of the potentially significant impacts to the flora and fauna of California, not just impacts to those with regulatory status. The analysis must assess the potential impacts of the project alternatives within a broader biological context – where are existing biological resources, regardless of their regulatory status, likely to be significantly affected by the project and what are the nature and magnitude of those impacts? This specifically needs to include consideration of cumulative impacts, including ecosystem impacts and impacts on clusters of ecosystems. This is particularly important for a project such a HST, which has the potential to physically divide land areas and create relatively impassible barriers.[28] The document's significance criteria should be expanded to include impacts that would degrade or sever high quality and intact habitats, functional watersheds and wetland systems, regional functions of existing conserved natural areas, etc. – i.e., should assess impacts to high priority conservation targets for public agencies and conservation organizations in California. O007-96 Cont.

The discussion of the Affected Environment is presented in a piecemeal fashion and does not describe the overall resource values within the project area. The Affected Environment discussion is critical to the analysis of impacts and to allow the nature of the impacts to be placed into their appropriate biological context. The document lists the species, habitats, water resources, wildlife corridors, and management plans that are present in each HST corridor. However, there is no context provided or interpretation of this information that allows the quality, integrity, value, or importance of these resources to be assessed and how they would be impacted by each of the alternatives. The

[28] While the tracks themselves may be relatively easily crossed, the additional fencing that will be needed to keep people and animals away from the tracks to prevent accidents will make the HST right-of-way an obstacle every bit as ecologically damaging as an eight-lane freeway.

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document states that, "At this programmatic level of analysis, it is not possible to know precisely the location, extent, and particular characteristics of biological resources that would be affected or the precise impacts on those resources. The impacts are therefore considered significant for each alignment alternative and all but 12 of the station location options." (DPEIR/S at 3.15-65). While it may not be possible to know with absolute precision the impacts of a specific alignment at this stage, the omission of this contextual information (as well as deficiencies in analysis of Section 4(f) and 6(f) issues as discussed below) obscures the true likelihood and differences in magnitude of the impacts to sensitive biological resources posed by each of the alternatives.. The document should answer, for each of the alignment options, questions such as:

- How much potential special status species habitat is present, and of what quality?
- Are the communities and habitats in small, fragmented patches or part of a larger intact area?
- Are the existing communities and habitats degraded by urban edge effects or other stressors?
- Do unique soils exist that may support unique assemblages of plants and animals?
- Are portions of the HST corridor in protected status or targeted for protection by public agencies or private conservation organizations?
- What other pending or proposed projects might contribute to a cumulative impact on biological resources?
- What would be the cumulative impact on biological resources of the project plus development related to the project's growth-inducing impacts?

O007-96 Cont.

Only by characterizing biological resources with respect to these and other issues, rather than merely presenting a list of species and habitats with no context or interpretation, can the impacts to biological resources be meaningfully assessed.

The information used to describe wildlife corridors in the Affected Environment section is taken out of context and does not provide a true description of areas important for wildlife movement and habitat connectivity in the study area. In fact, restricting the focus to "wildlife corridors" rather than assessing habitat connectivity more generally, misses an important biological value that can be significantly degraded by the project. The Missing Linkages report (California Wilderness Coalition 2000, referenced in the DPEIR/S at p. 3.15-16) discusses linkages and corridors *identified by participants* at the conference in 2000. These were high priority corridors and linkages, which themselves have varying levels of existing functionality not discussed by the DPEIR/S. However, that an area was not identified by the Missing Linkages project does not imply that habitat connectivity is not an issue. On the contrary, landscape scale habitat connectivity through an area such as the Diablo Range is relatively secure in comparison to more urbanized areas such as the Altamont Hills, which may explain why it was not identified in the Missing Linkages report. The Missing Linkages report is one source of information, but regardless of what it reported, the HST DPEIR/S must characterize the true biological values and ecosystem functions of land that may be affected by the project. Only with this in mind can the significance of impacts on various different resources and habitats be meaningfully compared. Further, only with such information

O007-97

firmly in hand can the feasibility of impact mitigation be accurately evaluated. This was not done adequately for habitat connectivity as well as other habitat functions and values, such as watershed processes, ecosystem integrity, fire regimes, etc.

O007-97 Cont.

Fundamental to national wetlands policies is the protection of wetland "functions and values," not just wetland acreage. Wetlands are listed by Cowardin class in the Affected Environment discussion; however, no characterization of their functions or values is provided.[29] For example, the DPEIR/S provides no information about the relative importance of the different Cowardin class and subclass wetlands that may be affected by the HST system to the overall ecosystem health of the state or region. Nor does the DPEIR/S discuss the availability of replacement wetlands that might be offered as mitigation to replace the impacted wetlands' function in the regional or statewide context. Without this information, the wetland impact acreages presented in the Environmental Consequences section cannot be meaningfully interpreted, alternatives cannot be meaningfully compared, and the potential and feasibility of adequately mitigating lost functions and values as a result of the project cannot be assessed.

O007-98

The DPEIR/S does not provide a discussion of the status and regional contributions of conservation areas (i.e., public and private lands protected and managed for natural resources values) in the study area. Substantial investments of public and private funds have been made to acquire and manage lands to protect natural resources, and they support essential regional natural resources functions. The DPEIR/S must assess the potential for the project to degrade and reduce the quality of these areas from a biological resources standpoint. To do this adequately, the DPEIR/S must assess the conservation contributions and regional natural resources functions of these protected areas in the Affected Environment section.

O007-99

Figures 3.15-1 to 3.15-3 do not adequately characterize the biological resources in the various alignments, and thus, give a false impression as to the magnitudes of their impacts. The figures do not depict the distribution of habitats and rely solely on sensitive species, wetlands, and wildlife corridors to visually depict environmental consequences of the project. At a minimum, figures showing the distribution of vegetation communities, urban, agricultural land, and other infrastructure such as roads should be provided. In addition, it should also be clarified that the special status species information reported was not collected for this project and does not provide a

O007-100

[29] See, .e.g, http://www.water.ncsu.edu/watershedss/info/wetlands/values.html for a general discussion of various wetlands values. These include water quality improvement, water supply, flood control, erosion control, fish & wildlife habitat, recreational, cultural, aesthetic, and scientific value, and commercial value. Various protocols for wetlands evaluation exist, including the Wetlands Evaluation Technique (WET), used by FHWA, The Environmental Monitoring Assessment Program—Wetlands, developed by USEPA, and the Hydrogeomorphic Approach developed by the U.S. Army Corps of Engineers. (See, http://water.usgs.gov/nwsum/WSP2425/functions.html) While these approaches differ in their emphases, they all provide methodologies for evaluating wetlands. Unfortunately, the DPEIR/S uses none of these approaches and evaluates none of these values for the potentially impacted wetlands. A revised PEIR/S needs to apply and justify an evaluation of wetlands values to wetlands that may be impacted by the various alignment alternatives.

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comprehensive description of special status species distributions across all parts of the study area. O007-100 Cont.

The Environmental Consequences section of the DPEIR/S is fundamentally flawed in that alternatives are not evaluated at an equal level of detail. For example, the DPEIR/S states in Section 3.1.5.A (p.3-24): "It was not possible as part of this study to identify or quantify impacts on biological resources that would occur as a result of transportation improvements in the No Project Alternative. For existing transportation facilities to be improved, impacts on biological resources have previously been addressed, and only small additional or increased impacts are expected from the future transportation improvements in the No Project Alternative. In some cases, widening of existing corridors or similar improvements could result in additional impacts on biological resources." If impacts of transportation improvements associated with the No Project Alternative have "previously been addressed," then a summary of these impacts should be available for inclusion in the HST DPEIR/S. Furthermore, impacts due to widening existing transportation corridors as part of the No Project Alternative could be assessed in the same way that impacts for HST alignment alternatives were assessed – by making assumptions regarding direct and indirect impact buffers around the existing transportation corridors. Not presenting information that is readily available not only demonstrates a significant bias in the analysis of impacts, it leads one to wonder what other information may not be adequately disclosed in the EIR/EIS. O007-101

The presentation of potential impacts of the project in the Environmental Consequences section of the DPEIR/S is inadequate and misleading. The analysis of impacts is presented as a list of impact acreages and potentially affected species, without any interpretation of the significance of these impacts. In the case of special status species, the analysis relies on available species data, which does not include areas that have not been surveyed in the past, and thus is a potentially misleading assessment of impact to special status species. The analysis must interpret the numbers and lists presented in the document so that the public and decision-makers can understand the implications of these numbers and lists and be adequately informed. Furthermore, the summary tables presenting biological resources impacts (e.g., Table 3.15-1 and Summary Table S.5-1) only list numbers of special status species potentially affected, wildlife corridors identified by the Missing Linkages Project, linear feet of non-wetland waters, acres of wetlands, and presence/absence of anadromous fish. The failure to indicate, analyze, and discuss the relative values of the different resources makes it impossible for decision makers or the public to accurately gauge the significance of the impacts that would be caused by different alignment alternatives. The acreages and relative values of impact to terrestrial vegetation communities, particularly those considered sensitive by governmental agencies and non-governmental organizations, should also be listed in these or other summary tables. Furthermore, the length of each alignment segment appears to vary substantially, thus the potential for impacts varies considerably. It is virtually impossible from the presentation of biological impacts for a reader to assess the overall magnitude of impacts from major alignment alternatives. The impacts across segments for major alternatives, including an evaluation of values beyond mere raw

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acreage involved, should be totaled and presented to provide a comparable assessment of impacts. O007-101 Cont.

While the acreage of impacts to terrestrial vegetation communities is presented in the text for each alignment segment, there are several problems with this presentation. First, many communities listed as impacted under each segment are not presented under the heading "Sensitive Vegetation Communities" and should be. For example, grasslands are not considered sensitive communities in the DPEIR/S; however, large expanses of grasslands in California are increasingly rare and those that support special status species, such as San Joaquin kit fox, are certainly considered sensitive by the California Resources Agency and the U.S. Fish and Wildlife Service. The southern alignment alternatives (e.g., Pacheco Pass, Henry Miller UPRR, Henry Miller, BNSF, and GEA North) would each adversely affect thousands of acres of grasslands, but this impact is never specifically discussed -- notwithstanding the submittal of detailed information about these resources in the Prior DEIR/S[30] -- except for presenting a single acreage number buried in a long list of other acreages for each alignment segment. Furthermore, the likely direct impacts of construction on these biological resources must be discussed. Construction in areas located in close proximity to existing access roads will have a lesser impact on biological resources than construction in areas where such access roads do not exist and would need to be built to transport the equipment used in construction. While detailed analysis may need to wait for project-level analysis, the programmatic analysis can and must include general consideration of the relative impact of locating Project facilities on an alignment running near or along existing roadways, compared to one without nearby road access. O007-102

The impact analysis does include an indirect impact buffer zone, but it does not acknowledge or provide any discussion of indirect or cumulative impacts that may occur as a result of the project outside of this zone. For example, construction of the HST can be expected to induce residential growth in the vicinity of the alignment. This residential growth is likely to produce impacts to biological resources outside of the assumed indirect impact corridor for the HST project. Furthermore, these growth-inducing impacts would have different magnitudes of effect in different parts of the study area, such as the relatively undeveloped areas along the Pacheco Pass corridor versus the relatively more developed Altamont Pass corridor. Growth-inducing effects on biological resources requires a much more thorough analysis, including consideration of the cumulative impacts from the project plus the growth it induces.

The discussion of impacts to Special Management Areas is completely inadequate. There is no assessment of the nature or magnitude of impacts to these areas. Public parks and other conserved lands serve as the backbone of functional biological open space. These areas are refugia for flora and fauna in the face of ongoing land uses changes that degrade habitat quality. When parks and private conservation areas are part of a larger system of relatively unfragmented open space, they serve as core areas managed for natural resources values within larger landscapes. Thus, indirect impacts, including growth- O007-103

[30] See e.g. Letters on Prior Statewide HST DPEIR/S submitted by the Grasslands Water District and referenced earlier herein.

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inducing impacts, to Special Management Areas can be quite significant and merit special attention. Given the resources that have been invested in these areas and their importance to maintaining regional biological functions in light of ongoing land use and climate changes, impact to these special management areas are potentially very significant impacts that merit much more evaluation and discussion in the DPEIR/S. The comments of the Grasslands Water District and of the California Department of Fish & Game regarding impacts of the proposed Pacheco alignment on the Grasslands Ecological Area are of particular significance. In particular, impacts on the San Joaquin Kit Fox, a federally and California listed endangered species, and its habitat appear highly significant. The PEIR/S needs to be revised to address these impacts and the feasibility of mitigation by way of requiring elevation of the HST right-of-way through this sensitive area. In addition, the issues of wildlife impacts from project-associated noise and vibration need to be addressed more thoroughly.[31] O007-103 Cont.

The mitigation measures presented in the Mitigation Strategies and CEQA Significance Conclusions provide no meaningful assurance that impacts from any project alignment would be fully mitigated. The current discussion in the DPEIR/S relies on a formulaic presentation of mitigation considerations but presents no concrete information upon which to base an assessment of whether potential impacts can or will be adequately mitigated. While selection of specific mitigation measures may not be appropriate at this time, at a minimum, an assessment of the availability of adequate mitigation land and the ability to mitigate particular impacts (e.g., landscape scale fragmentation impacts), as well as the ability to adopt clear and enforceable standards must be realistically assessed. O007-104

A revised analysis of project-related and cumulative impacts to biological resources must be completed as part of a revised and recirculated DPEIR/S and, at a minimum, must include the following:

- Consistency with local natural resources related planning elements and policies for each jurisdiction the alignment traverses;
- Conflicts with NCCP or HCP plans;
- Conflicts with existing protected areas and parklands;
- Quantification of all direct, indirect, and cumulative impacts to natural resources, both permanent and temporary;
- Assessment of adverse impacts to wildlife movement corridors and opportunities to enhance the function of these corridors;
- Assessment of anticipated mitigation measures and permitting requirements, and the probability of successfully mitigating specific impacts; O007-105

[31] The DPEIR/S seems to assume that noise will not affect wildlife. This is not true. Noise can significantly affect and interfere with normal wildlife behavior. (See, e.g., Quest for quiet - efforts to reduce noise pollution in wilderness areas, by Bill O'Brien, Sierra Magazine, July-August, 1992. See also comments made by Tejon Ranch on the prior programmatic EIR/S for HST Statewide, especially page 3 of pdf at http://www.cahighspeedrail.ca.gov/eir_final/pdf/vol_2/ch_5/ch-5_pg385-392.pdf). This issue needs to be addressed in the PEIR/S, especially in regard to the areas where the Project may go through or near sensitive wildlife areas.

- Assessment of any growth-inducing impacts to natural resources (see Planning/Land Use Study Terms below).
- Characterization with documentation of the significant impacts of the HST alternatives (alignments and stations) on biological resources compared with the existing environment and before and after mitigation. O007-105 Cont.

It is simply not appropriate to make choices concerning HST alignments and stations without this information being developed and circulated for public review and comment in a revised EIR/S.

6. The DPEIR/S Fails to Adequately Analyze Significant Land Use and Planning Impacts

The DPEIR/S analysis of land use impacts with respect to HST alignments and station choices is inadequate and incomplete. There is insufficient information provided concerning existing and planned land uses in the areas affected by the alternative alignments and stations to support an adequate analysis. Moreover, the section fails to identify impacts associated with the alignments and station choices.

Specifically, such an analysis must include analysis of the following aspects of the project:

- Compatibility with existing and planned land uses;
- Consistency with local plans and policies for each jurisdiction the alignment traverses;
- Consistency with applicable regulations of permitting agencies, where relevant. O007-106
- Potential to promote sprawl residential and commercial development in California

For the analysis to be meaningful, alternative alignments and stations should be overlaid on layers of aerial photos indicating all of the following:

- Current parcels and parcel size under common ownership;
- Current land uses;
- Current General Planning;
- Current Zoning;
- Key land use and environmental constraints (e.g. wetlands, agricultural lands, geologic hazards, etc.)

In contrast, the DPEIR/S specifically states, "Because this analysis was conducted at the county level, it does not explicitly reflect potential land designation or policy constraints that are included in each jurisdiction's general plan." (Id. at p. 5-7, footnote 5).

Because the DPEIR/S fails to present this necessary information, the conclusions it reaches concerning land use impacts are simply unsupported. The DPEIR/S fails to analyze and disclose the project's (including all alternatives') impact to the physical

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environment and its corresponding effect on land uses as required under CEQA and NEPA for a number of reasons, including its lack of adequate and complete setting information and study areas, its lack of information about existing and planned land uses and policies, and its inadequate analysis of impacts and failure to identify feasible mitigation measures. O007-106 Cont.

Unlike the other sections of the DPEIR/S, the land use analysis only looked at one Network Alternative for each alignment choice. Having identified a wide range of network alternatives for each alignment choice, the PEIR/S needed to either evaluate the relative land use impacts of the various options or explain why some options had been eliminated from consideration. The DPEIR/S seems to assume that any one network alternative will adequately exemplify the land use impacts of other alternatives for that general alignment choice. It fails, however, to present any evidence to support this assumption. If the PEIR is to rely on only one network alternative for each alignment option, it needs to provide substantial evidence to support the implied claim that the chosen network alternative's land use impacts are representative of the other network alternatives that were not examined. O007-107

First, omitted and inadequate project description information makes it impossible to adequately evaluate Project-related impacts on land use. Examples of omitted or inadequate project description elements that result in an underestimation of land use impacts include, but are not limited to the extent of new and expanded infrastructure and public services needed for HST, general plan and zoning amendments that will be needed for the alignments, stations and related facilities and the like. Absent a description of the whole project, land use impacts cannot be fully disclosed or analyzed. O007-108

Second, the description of the affected environment discussion in the Land Use Section has numerous omissions and inconsistencies that make the section inadequate for choosing a preferred modal alternative, let alone HST alignment and station alternatives. For example, the DPEIR/S suggests that general plans were considered using an economic and growth inducement model prepared by Cambridge Systematics, Inc. However, the land use section provides no evidence that general plans, zoning, and existing land uses were actually considered[32]. Moreover, the affected environment discussion does not provide an adequate description of the setting for areas affected by the project alternatives. The study area for land use is inadequate. These limited study areas result in a gross underestimation of the land use compatibility impacts that could occur as the result of these projects being constructed. The study areas must be expanded to address the true effects of a train going by at 200 miles per hour and the growth-inducing impacts of the HST that may completely alter existing neighborhoods and areas well beyond them. Revised analyses of project-related and cumulative land use impacts must be completed based on a complete description of the project and project setting. O007-109

The DPEIR/S fails to identify feasible mitigation measures for significant land use impacts. Mitigation "strategies" proposed for land use impacts are vague and deferred. O007-110

[32] Indeed, as already noted, the DPEIR/S appears to indicate that local land use plans and their associated policies were not considered in the DPEIR/S's land use analysis.

While identification of detailed mitigation measures may not always be feasible at a programmatic level, it is certainly possible, and indeed necessary, to consider and discuss the feasibility of various alternative mitigation strategies, and it is not only feasible but necessary for the PEIR/S to commit to achieving defined and demonstrably achievable standards in order for it to conclude that adequate mitigation will occur. The DPEIR/S' approach to mitigation is simply inadequate for either modal alternative selection or more detailed alignment and station location selection for HST. Feasible mitigation measures must be identified and, in the case of more detailed decisions concerning HST alignments and stations, additional details concerning these project descriptions must be provided. It is not appropriate to make an alignment choice based on the possibility that significant impacts to land use and environmental justice "might" be avoided by as yet undetermined mitigation measures.

For example, with respect to land use impacts, the DPEIR/S should have specified mitigation requirements for land use and growth-inducing impacts including:

- "Requirements" for agreements with cities/counties the route traverses for "smart growth" policies (e.g. in downtowns around stations specific programming for higher densities, reduction or elimination of minimum parking requirements, market-based parking pricing policies, etc.; in rural areas specific policies for farmland protection, etc.). If "smart growth" policies are not in place prior to HST being constructed, the sprawl inducing impacts should be assumed to be significant;
- Limitations on the amount of station parking provided, along with pricing and other policies to encourage users of commuter rail services (i.e., station area residents) to use public transit or non-motorized means for station access and discourage the use of HST stations as "park and ride" lots to service sprawl development projects on converted agricultural lands;
- Up-front purchase of conservation and agricultural easements to either side of the tracks;
- Fees (such as an ongoing portion of ticket revenues) for additional purchase and stewardship of conservation, recreational and agricultural lands; and
- Permanent restrictions on the addition of future stations, or, in the alternative, analysis of each potential future station's growth-inducing impact and identification of mitigation measures to address that impact.[33]

O007-110 Cont.

In addition to identifying feasible alignments and restricting station locations to existing urbanized areas to minimize conversion of agricultural and habitat lands to urban uses, these measures, put into place early, would further improve the chances that HST would result in beneficial impacts.

[33] For example, there is currently no station proposed on DMB Associates' approximately 20,000+/- acre holding between Gilroy and Los Banos. A station located on this currently undeveloped land could be tremendously growth-inducing. Similarly, if a station is located in Los Banos in the future, growth-inducing impacts on habitat and agricultural lands would be significant. Unless the PEIR/S can identify a means of assuring that such stations will not be built, the assumption must be that they will eventually be added, and their growth-inducing impacts must therefore be assessed in the PEIR/S and appropriate mitigation measures proposed.

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Last, it is not clear from the DPEIR/S what the significant land use impacts are before and after mitigation. A revised and recirculated EIR/S must include clear statements of significance and demonstrate how mitigation measures will in fact reduce potentially significant impacts to less than significant. O007-111

7. The DPEIR/S Fails to Adequately Analyze the Growth-inducing Potential of the Alternatives.

The DPEIR/S fails to provide any meaningful analysis of the growth-inducing potential of the proposed HST alternative alignments and stations. Based on inadequate and contradictory information, the DPEIR/S concludes that the growth potential with HST is "potentially beneficial" with mitigation strategies. Indeed, there is already a considerable amount of existing literature documenting the potential land use impacts of HST service on growth rates and distribution of growth. This literature is not even mentioned. This and other conclusions reached in the DPEIR/S are not supported by adequate and transparent analysis or substantial evidence.

CEQA requires that an EIR contain an analysis of a project's growth-inducing impacts. Growth-inducing impacts are those that encourage or facilitate other activities or projects that could significantly affect the environment. The "detailed statement" setting forth the growth-inducing aspects of a project must "[d]iscuss the ways in which the proposed project could foster economic growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." CEQA Guidelines Section 15126.2(d). It must also discuss how a project may "encourage or facilitate other activities that could significantly affect the environment, either individually or cumulatively" or remove obstacles to population growth. Population growth in turn may impose new burdens on existing or planned community services. Similarly, NEPA requires that agencies consider the indirect effects of a proposed action, such as growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate. 40 CFR 1508(b). While the CEQA Guidelines note that additional growth should not be assumed to be either detrimental or beneficial, significant impacts related to growth induced by a project must be identified and, if adverse, mitigation proposed. O007-112

The general analysis of growth inducement that is included in the DPEIR/S fails to accurately analyze and document the likely growth that could be induced and erroneously concludes that growth induced by HST will be beneficial after mitigation strategies are imposed. Lead agencies must not assume growth induced in an area is beneficial or of little consequence until it has completed a comprehensive and objective analysis. CEQA Guidelines section 15126.2, subd.(d). Here the DPEIR/S conclusions concerning growth inducement are not supported by substantial evidence (e.g. that the Altamont Alternative will result in the consumption of more land through growth-inducement than Pacheco). The exercise of analyzing growth inducement is technically feasible and must be included in a revised DPEIR/S. Major flaws in the DPEIR/S approach to growth inducement include but are not limited to the following:

First, while the DPEIR/S states that professional experience was used in determining growth impacts (DPEIR/S at 5-4), it is clear that the professionals did not evaluate aerial photos and property ownership maps along the two alignments. This information is missing from the list of information and key steps taken to estimate the growth-inducing effects of the alternatives. See DPEIR/S at 5-6. Had the consultant team taken this basic step, the analysis would be far superior to the "modeling" outputs presented. Specifically, there are numerous consolidated large land holdings of vacant/undeveloped agricultural and open space lands along the Pacheco route between San Jose and Merced.

Reference to the history in California of similar situations (e.g., development of the San Fernando Valley in the 1940s and 50s, development of Central Contra Costa County in the 1970s and 1980s) indicates that introduction of HST into low density areas dominated by large and speculative real estate holdings can be predicted to induce the type of growth destined to increase sprawl and therefore worsen California's air quality and global warming condition. Yet, the DPEIR/S fails to identify this likely scenario, and instead suggests that somehow history will not repeat itself and that areas along the Pacheco route will either develop as dense urban areas or stay undeveloped. Again, the history of California development strongly indicates that the only way that sprawl will be prevented in whatever areas are opened up to development by HST service is by requiring implementation of strong land use regulatory controls. O007-113

Such controls, including mandatory urban growth boundaries, mandatory high density mixed use areas surrounding each HST station, and mandatory development of a complementary local public transit system need to be made prerequisites for the building and opening of HST stations or, where stations already exist, making that station a stop on the HST line. In addition, the CHSRA needs to commit itself to not opening stations except where there is already an existing significant population center. Otherwise, it must be assumed that the HST service will induce conventional suburban growth in station vicinities, with predictably associated traffic, air quality, water quality, and other adverse impacts, all of which would need to be studied in the PEIR/S.

Moreover, the DPEIR/S fails to provide any analysis of the growth-inducing potential of the proposed alternatives and in particular of the HST alignment and rail stations in specific areas where stations will be located. Without a station-by-station analysis, it is not possible to evaluate which combinations of stations along a potential alignment would be environmentally superior. Furthermore some mitigation measures for growth inducement and other impacts will likely be specific to individual stations. Therefore, mitigation measures cannot be properly evaluated if individual station impacts are left unanalyzed. Both of these points are shown by the discussion of the Modesto station location on page 5-30 of the DPEIR/S: O007-114

> "In Stanislaus County, the Amtrak Briggsmore station could lead to the urbanization of 1,000 more acres in the county than the SP Downtown station site 9, leading to additional indirect impacts; this difference between station sites accounts for about 35% of the difference in

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urbanized area size between the Altamont and Pacheco network alternatives noted in Table 5.3-6 for Stanislaus County."

A large impact that significantly affects the Altamont HST alternative could be mitigated by selecting the environmentally superior station in Modesto. The DPEIR/S does not disclose this in Table 5.3-6 or anywhere else in the document, leaving the reader to figure out how to plug the 35% into the numbers in Table 5.3-6 and attempt to recreate the calculations needed to understand how this would affect the overall comparison of HST alternatives. For other station locations, the reader is not given any quantification of how various station locations, or their addition or removal, would affect the different alternatives. O007-114 Cont.

While the DPEIR/S fails to analyze growth-inducing impacts of specific alignments and station locations, it does provide general information concerning potential economic and housing growth inducement by region. Notwithstanding the overwhelming empirical evidence that applying this approach to remote areas like those that the Pacheco and Diablo alignments would traverse, would exert tremendous pressure for growth induction, the DPEIR/S concludes that:

> "Overall, the system alternatives exhibit very similar levels of growth-inducing effects in terms of population, employment, and urbanization patterns."

This conclusion is simply not supported by the evidence in the DPEIR/S. To the contrary, elsewhere in California, recent growth patterns demonstrate that accessibility to major employment centers has triggered tremendous new growth.[34] The introduction of HST to the rural and undeveloped areas along the Pacheco routes will make it possible for Bay Area employees to easily commute to and from affordable suburban and rural housing in and around the Grasslands area and create significant pressure for growth of housing and new services in this area. Additional growth in the rural areas poses significant indirect threats as a result of increased population and pressure on farmlands, wildlife habitat, and open space. The applicable county general plans for these rural areas currently call for a predominance of low density and rural residential uses. The relative affordability of homes and property in these areas as compared with the Bay Area will be a tremendous draw for Bay Area workers to move to the area as they did during the "dot com" boom of the late 1990's, when workers moved to areas such as Salinas and Vacaville/Fairfield that were outside of the Bay Area's traditional suburban areas and where housing was much more affordable than in the central Bay Area. A revised DPEIR/S must disclose and analyze the likely growth-inducing impact of HST on such rural areas, including how introduction of a HST station is likely to accelerate growth and O007-115

[34] Examples include the Auburn corridor, as major new employers moved to the Sacramento region and north, and the Truckee area, which is approximately 1 hour from the major new job growth in the Auburn Corridor and Reno. Historical growth patterns in California clearly demonstrate that the close proximity of a major job center inevitably leads to growth inducement for housing within commute range. HST will render the Grasslands area within close commute range to major job centers in the Bay Area. While the DPEIR/S should review relevant studies on growth inducement related to major transportation infrastructure, please see Exhibit F for a Land Use and Economics Study of the Grasslands Ecological Area.

increase demand for subdivisions and development. Land conversion estimates should be developed for each rural area served by HST, as well as analysis and discussion of the significance of likely impacts on farmland, wildlife habitat, ecosystems, and open space.[35] O007-115 Cont.

The methodology behind the projections in Table 5.3-5 and all subsequent tables is unexplained and the results are suspect. Alameda County, with additional stations under the Altamont alternative, is projected to have less employment under this alternative than under the Pacheco alignment. Contra Costa County is also projected to have less employment and population under the Altamont alignment alternative, despite having better access to HST stations under this alternative. San Francisco would have reduced travel times to both Southern California and the Central Valley under the Altamont alternative, at the cost of reduced access to Gilroy and Morgan Hill, yet again the DPEIR/S indicates that it would have more employment and population growth under the Pacheco alternative. Is access to southern Santa Clara County more important to San Francisco's growth than access to the rest of the HSR network combined? That is what the model results appear to state; and is not believable. Conversely, Santa Clara County's population is shown as growing faster under the Altamont alternative than under the Pacheco alternative. Thus, Table 5.3-5 indicates that shifting HSR access from southern Santa Clara County to Altamont would increase growth rates for the county. Again, the result is counterintuitive, and, at the very least, requires explanation. These results indicating that removing stations from Alameda or Santa Clara Counties increases employment or residential growth while adding more stations reduces growth do not make sense. They strongly suggest that the models used are fatally flawed, or that the two models used different data sets and/or assumptions, making comparisons between the models invalid. O007-116

Since results were not broken down by station and a list of which stations where included in each alternative is not provided, it is impossible to verify how the county level numbers were arrived at. Further, since the methodology behind the model is not disclosed in the DPEIR/S, the accuracy of its assumptions cannot be verified. Because the model projections in Table 5-3.5 are the basis for all other tables and discussions on the relative growth-inducing and economic impacts of the two alternatives, all the projection numbers used to determine impacts are suspect. The entire analysis needs to be O007-117

[35] In the statewide HST PEIR/S, similar comments were raised. The response in the Final EIR/S was to argue that the cumulative commute time would make long distance commutes from the Central Valley to the Bay Area infeasible. However, this response overlooks several salient points: 1) Especially if the Pacheco alignment is chosen, points in the Los Banos to Merced portion of the alignment will easily be within an hour's ride of San Jose. 2) Further, San Jose development has tended to sprawl southward, and there are numerous proposals for major commercial development in the Coyote Valley south of San Jose. This area would be even closer and more susceptible to growth-inducing impacts, both as a residential "feeder" for San Jose and as a commercial center receiving commuters from the Central Valley, if HST service is introduced on the Pacheco alignment. The DPEIR/S needs to evaluate both these highly foreseeable outcomes and their effects on the Pacheco alignment's growth-inducing impacts. 3) Commute times in the Bay Area have continued to increase along with traffic congestion and the expansion of the commute areas to affordable housing. Four hour per day commutes are no longer considered unthinkable. Expected Central Valley to Bay Area commute times need to be compared to actual commute times of current Bay Area commuters to determine what level of commute time is considered acceptable.

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redone and republished, based on a model that is accurate and whose methodology, assumptions, and supporting data are disclosed and explained. O007-117 Cont.

Second, as with the other impact sections, it is clear that the section "analyzes" some growth impacts, such as employment only in relationship to future conditions. See Table 5.3-5 and 5.3-6. This approach results in an underestimation of the growth that will be induced by the introduction of HST, particularly into undeveloped areas underserved by roads and transit. O007-118

Third, the DPEIR/S concludes that HST will lead to more efficient use of the land and higher densities. These conclusions are simply not supported by the general plans or by the evidence presented in the DPEIR/S. Incredibly, the DPEIR/S concludes that the HST Alternative will result in significantly improved land use efficiencies over the No Project Alternative:

> "The results indicate that the Pacheco network alternative is the most efficient of the alternatives, providing an incremental development density that is 1.3% more efficient than the No Project Alternative, while the Altamont network alternative is 0.8% more efficient than the No Project Alternative." DPEIR/S at 5-17. O007-119

However, the DPEIR/S provides no data, evidence, or research citations to support this conclusion. While, after decades of research on the growth impacts of high speed rail, studies have shown that HSR service concentrates commercial growth around stations[36], other studies have shown that HSR is correlated to higher overall growth rates[37] along with the dispersion of residential populations and induced long-distance commuting[38]. It is impossible to verify the basis of the DPEIR/S conclusion when no evidence or even citation to supporting studies or data is presented. Further, the DPEIR/S provides no evidence to support its claim that development induced along the Pacheco route would be more compact or energy efficient than that along the Altamont route. Even if the open space development induced by the Pacheco route were denser than infill Altamont development[39], one has to look at where that development would be. Altamont infill

[36] Sands, Brian D. The Development Effects of High-Speed Rail Stations and Implications for California. Berkeley, CA: Institute of Urban and Regional Development University of California at Berkeley, 1993.

Rietveld, P., F.R. Bruinsma, H.T. van Delft, and B. Ubbels. Economic Impacts of High Speed Trains. Experiences in Japan and France: Expectations in the Netherlands. Amsterdam: Vrije Universiteit Amsterdam, 2001.

[37] Haynes, Kingsley E. "Labor Markets and Regional Transportation Improvements: The Case of High-Speed Trains an Introduction and Review." Annals of Regional Science 31, no. 1 (1997): 19.

[38] Rietveld, P., F.R. Bruinsma, H.T. van Delft, and B. Ubbels. Economic Impacts of High Speed Trains. Experiences in Japan and France: Expectations in the Netherlands. Amsterdam: Vrije Universiteit Amsterdam, 2001.

[39] This seems a highly questionable assumption. Certainly there appears, based on examination of city and county general plans, significantly more awareness of the need for compact growth and clustered development in the general plans of, for example, Livermore, Pleasanton, Dublin and Alameda County [all of these jurisdictions have adopted urban limit lines or otherwise expressed a preference for infill, clustered

development in the middle of Livermore or Tracy, even if it were, theoretically, to be less clustered than in the open spaces near Los Banos, would still contribute less in new sprawl and therefore less in energy consumption, less in air pollution and less in global warming than the type of development that would occur if Pacheco is selected. In any case, the DPEIR/S's assumptions and conclusions are unsubstantiated. What is needed is a direct comparison, both at the general plan level and in terms of the on-the-ground built environment, of the efficiency of development policies and practices in the areas along the two alternative alignments, including a breakdown of the data for the different station location options. This analysis needs to be included in the revised DPEIR/S.

The DPEIR/S's claimed result appears to be tied in major part to the assumption that: "Much of the potential incremental growth associated with each alternative is likely to focus around HST stations...". DPEIR/S at 5-18. While the document cites to "[r]ecent trends among local jurisdictions" showing a growing consideration of land use policies that are intended to encourage high-density, mixed-use development in downtowns, no information on plans for station locations or alignments is provided to support this claimed trend. DPEIR/S at 5-20. Further, policies promoting high-density mixed-use development around rail stations, as opposed to the more typical suburban sprawl, do not materialize out of nowhere. Absent regulatory intervention, new development in an area would be constrained to follow the existing low-density and auto dependent zoning, leading to continuation of the same growth patterns as those of existing development. Areas where sprawl is endemic and allowed, encouraged or required by the current zoning and related land use regulations tend to produce more sprawl; while areas where high-density compact development predominates because it is allowed, encouraged, or required by the current zoning and land use regulations, tend to produce more of the same. The PEIR/S' analysis of induced growth needs to apply this principle in assessing the impacts on, and in designing mitigation for, the areas where HST may induce additional development. O007-119 Cont.

The type of result posited in the DPEIR/S is not likely to occur in areas planned and zoned for very low densities, such as those along the Pacheco route. The DPEIR/S, in Table 5.3-7 on Page 5-17, shows Pacheco as using land more intensively than Altamont. However, this supposed fact is due primarily to errors in using the statistical data involved. The chart was produced by taking total land consumption forecasts and dividing by total population and employment increases. In short, it is only a broad average figure across a large area. More precise and focused figures are needed before conclusions about relative development density can be taken seriously. The DPEIR/S also does not explain where these various figures come from and how they were derived. Thus, for example, does "land consumption" mean agricultural land taken out of production for any reason? Does it include land taken out of production for park dedication? If so, the figures are deceptive, because land placed in parks is NOT being developed and should not be considered in determining land use efficiency. Without much more information on the meaning of the figures and how they were derived, the table is effectively meaningless. In any event, the impingement of growth induction in

development, and smart growth]. By comparison, jurisdictions along the Pacheco route have shown little recognition of the need to promote compact, infill "smart growth", rather than sprawl development.

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the remote areas that would become accessible if the Pacheco route were adopted would undoubtedly result in more sprawl than would occur along the already built-up Altamont route. O007-119 Cont.

The DPEIR/S fails altogether to analyze the HST's role in inducing low-density suburban and rural residential development. This is among the document's major flaws. The DPEIR/S ignores the "ranchette phenomenon," which is one of the highest impact types of sprawl.[40] Census figures make it possible to separate rural and urban populations. The DPEIR/S simply fails to consider the high demand for this type of sprawl development and therefore fails to identify and analyze the additional significant impacts related to that growth (assuming mitigation in the form of growth-control policies is not implemented) including increased traffic, increased pollution, increased demand for services and infrastructure, accelerated and increased loss of open space, agricultural and habitat land. New transportation facilities are classic for inducing and accelerating growth, particularly in rural and undeveloped areas. Examples abound, including the "streetcar suburbs" of Eastern U.S. cities and the growth in the East Bay associated with the expansion of the "Key" streetcar system.[41] A revised DPEIR/S must analyze likely new and accelerated growth based on existing general plans and the likelihood that HST will prompt general plan and zoning amendments for additional growth and accelerate both urban and rural development. O007-120

Without any analysis of facts the DPEIR/S concludes that HST will minimize a variety of impacts normally associated with growth due to its inherent incentives for directing urban growth:

> "In short, either HST Alternative provides a strong incentive for directing urban growth and minimizing a variety of impacts that are frequently associated with growth. This outcome would be seen in results for resource topics such as farmland, hydrology, and wetlands, where the indirect effects of the HST Alternative are less than the No Project Alternative, even with more population and employment expected with the HST Alternative." DPEIR/S at 5-32 O007-121

This conclusion is utterly unsupported by any factual evidence or citation to supporting literature. In fact, the history of past expansions of transportation infrastructure is rife with evidence that unless mechanisms are put in place to control how growth occurs, rampant sprawl is likely to result. One need look no further than the expansion of the BART system into the East Bay, with the associated construction of large park-and-ride

[40] The analysis completed by the American Farmland Trust (see comment letter submitted by AFT on the Prior DEIR/S), suggests that between 300,000 and 700,00 additional acres of land could be converted to rural ranchettes based on population projections, current ranchette development trends and assuming an average of 5 acres per dwelling and 2.8 persons per household. This trend will accelerate the subdivision of open space lands for ranchette development where HST removes the barrier of accessibility to jobs.

[41] Even these past examples of growth underestimate the degree of sprawl induction that could result from HST station placement. Those previous examples occurred at times when cars were far less prevalent and roadways far less extensive and well-developed. In those days, most people walked to the trolley stop. With HST service, most people can be expected to drive to/from the HST station unless strong incentives and disincentives are combined to counteract the modern tendency to drive.

lots, to see where expanded rail infrastructure has promoted sprawl development in places such as Pittsburg and Antioch. Conversely, the more recent transition of some of these areas (e.g., Fruitvale and del Norte stations) to more compact "smart growth" development has required the active intervention of the local jurisdiction's planning policies. If the DPEIR/S proposes to claim that addition of HST will, in itself, induce compact urban growth, it must support this claim with evidence based on past situations where, under comparable circumstances, construction of HST, or at least rail infrastructure, has promoted dense, focused urban development, as opposed to suburban sprawl. Further, these situations would need to involve comparable situations, planning policies, and cultural norms to those that exist along the proposed HST alignments[42]. Comparison with HST construction in Europe or Japan is not possible without taking into account the cultural differences, local and regional environmental, development, and land use policies in place at the time HST was implemented, and other relevant differences from the current situation in Northern California. O007-121 Cont.

Fourth, the DPEIR/S fails to disclose the likely increase in demand in areas served by HST for second homes. For example, the Sierra Foothills along the Central Valley will become very accessible to the major population of LA, Sacramento and the Bay Area. The spectacular open space setting in the Sierras already make them highly attractive as a second home market. With HST bringing these areas within an hour of major population centers, the likely increase in second home demand is likely to be significant. The DPEIR/S is silent on this potential growth-inducing impact and its secondary impacts. A revised DPEIR/S must include analysis of this potentially significant impact on rural areas proposed to be served by HST. O007-122

Fifth, stations proposed for rural areas are likely to require major new infrastructure and services. The DPEIR/S fails to reveal the extent of these facilities nor does it analyze the growth-inducing impact these new facilities will have in the immediate areas surrounding the stations. A revised analysis must include information about the types of services and infrastructure needed for these stations and analyze how the extension of those facilities will remove an existing barrier to growth in these formerly unserved and relatively remote areas. Specifically, the DPEIR/S should describe the current general plan and zoning of each proposed station site and surrounding areas; the existing status of services and infrastructure; services and infrastructure that will be provided to serve each new station; and the likely growth-inducing effect of the station and those facilities on adjacent lands. O007-123

Sixth, the DPEIR/S discussion of economic and growth inducement suggests that the introduction of HST to the Central Valley will change the types of jobs in the region and lead to personal income growth. Yet, the DPEIR/S fails to analyze the likely results of this dramatic change, including, but not limited to increased demand for larger, high-end homes, increased demand for services and overall increased growth and development to serve the very different demands of higher income individuals and families. O007-124

[42] E.g., it is clear that many parts of California have cultures acclimated to extensive private auto use, as opposed to long-established urban areas such as New York, Boston, Chicago, or many parts of Europe and Japan, where public transit use is the norm.

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Seventh, the assertion in Section 5.5.16 that there are no growth-induced impacts on 4(f) and 6(f) resources is utterly unsubstantiated, and must be deleted. The indirect impacts of developing a Pacheco HST Alignment were identified in comments from the U.S. Fish and Wildlife Service, amongst others. See below. O007-125

Eighth, the growth inducement analysis entirely ignored Monterey and San Benito counties. These counties cannot be found on any of the tables accompanying the growth inducement analysis, despite their proximity to one of the alignment alternatives. The AMBAG counties are projected to have a 75% increase in population between 2000 and 2030 (Table 3.2, Bay Area/California High-Speed Ridership and Revenue Forecasting Study, Draft Final Report; CAHSR, 2007). An increase of that magnitude needs to be explained, especially as to whether the potential for HST played a role in enlarging that projection. The growth inducement analysis needs to be redone, with attention paid specifically to these neighboring counties of the Pacheco alignment. O007-126

Ninth, the land use efficiencies for the two alternatives differ only in the third decimal place. (Table 5.3-7) Nothing in the growth inducement analysis identified the margin of error for the econometric model, or whether this difference lies outside it. There was no statement that the difference is significant. O007-127

Finally, the mitigation "strategies" proposed for dealing with growth-induced impacts are not sufficient. While increased development density around HST stations in downtown locations has the potential to avoid or minimize some impacts, the opposite is likely to be the case where stations are located in rural areas. The Cambridge Systematics study suggests that regulatory efforts to encourage increased density of land uses near rail stations have been effective. DPEIR/S at 5-32. The inclusion of Section 6, HST Station Area Development, in the DPEIR/S is of interest in this regard. However, the DPEIR/S proposes no mechanism to ensure that such principles will be applied in the placement of HST stations. If the policies proposed on page 5-32 are to be effective in mitigating growth-inducing impacts, they must be mandatory prerequisites for the location of any station. Again, the document fails to analyze the gap between these principles and the existing general plans for the proposed stations along each route. Such an analysis would likely favor the Altamont route as having stations in locations where the local jurisdiction has enacted "smarter" planning and zoning. Such an analysis must be included in a revised DPEIR/S. O007-128

Specific mitigation measures, such as urban growth boundaries, transit-oriented development district planning and zoning, housing density and affordability requirements, incentives to reduce auto ownership and use, and the like, directed at avoiding sprawl, must be in place prior to HST station development if adverse impacts associated with growth inducement are to be avoided or minimized. Such measures include:

- Requirements for agreements with cities/counties the route traverses for "smart growth" policies (e.g. in downtowns around stations specific programming for higher densities, etc.; in rural areas specific policies for farmland protection, etc.)[43]. One mechanism to pursue these agreements might be allocating funding in return for smart growth provisions in General Plans and zoning; and
- Conditioning the actual construction and opening of HSR stations upon the local jurisdictions' adoption of "smart growth" policies encouraging locating transit-focused development in the station vicinity and discouraging the proposal or approval of sprawl development. O007-128 Cont.
- Up-front purchase of conservation and agricultural easements to either side of the tracks and stations where located in undeveloped areas outside of cities.
- Urban growth boundaries;
- Limits on subdivisions outside of urban growth boundaries and the like.

Other questions concerning the DPEIR/S section on Economic Growth and Related Impacts include, but are not limited to the following:

- The section states that "in order to better simulate the population and employment growth effects for each system alternative," they were kept as separate economic modeling regions. DPEIR/S at 5-3. If this was the approach, rather than using a single interactive model, how was it possible to model the growth-inducing effects of the different alignments on the two regions together? Was any model available that could verify the outputs of the separate models? If so, was it utilized for such a validation exercise? If not, how can the results be validated? O007-129

  It is a basic axiom of modeling systems that modeling results need to be validated against real world data to confirm the validity of the model before the results can be used with any confidence. The DPEIR/S needs to indicate that such validation occurred and provide evidence of the degree of confidence that can be placed in the model used, based on the results of the validation test.

- According to the DPEIR/S, the land consumption for both HST Network Alternatives is projected to be about the same magnitude because of the predominant effect of population growth. DPEIR/S at 5-13. In the 11 core area counties, the Altamont network is projected to consume an additional 5,000 acres of land for urbanized densities compared to the Pacheco network alternative. This outcome is counter-intuitive. On the preceding page, the statement is made that a reduction in the availability of land for development in some Bay Area counties creates market forces for higher density and slight increases in infill and redevelopment potential. Real estate and transportation experts should be retained to validate this modeling result based on existing development along the O007-130

[43] Studies on whether introduction of transit stations result in higher density, so called "smart growth" development, have shown that these benefits are not automatic. Rather, land use and zoning changes must be put in place in order to achieve these outcomes. The Metropolitan Transportation Commission has launched a study to better ascertain the relationship of transit stations, land use and ridership. A revised PEIR/S should consider this and other studies when formulating effective mitigation measures to ensure a beneficial land use outcome from the placement of HST stations.

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two alignments using basic tools including aerial photographs, parcel and property ownership data, etc. O007-130 Cont.

- The undefined "expected densification trends over time" on page 5-7 are strongly undercut by Footnote 5, which discloses the expectation that future land use will be mostly like present land use. "The densities that are allowed under zoning and general plan designations are implicitly included in the analysis to the extent that existing development patterns and market forces have been influenced by past zoning and general plan decisions." For the most part, in the areas involved, this is not going to be Smart Growth. The footnote indicates the lack of evidence for later findings that expect future densification. O007-131

- It makes no sense that the Altamont alignment would cause more population growth in Santa Clara County than the Pacheco alignment (Table 5.3-1). Common sense dictates that that result would be reversed (especially considering that the modeling assumed Pacheco would provide higher levels of service). This counterintuitive result casts doubt on the entire modeling exercise. It requires further explanation. O007-132

Even with these measures identified in a revised DPEIR/S, additional evidence must be provided that they would actually have the desired effects in rural areas. Revised analyses of these likely significant and adverse growth-inducing impacts of HST must be completed. O007-133

8. The DPEIR/S Fails to Analyze Adequately Section 4(f) and 6(f) Issues and Impacts.

The discussion of the issue of parks, open space, wildlife refuges and otherwise "protected" areas in the DPEIR/S, is inadequate for numerous reasons including lack of adequate information about the proposed project alternatives, lack of setting information, inadequate impacts analysis and failure to identify feasible mitigation measures.

The DPEIR/S begins with the following disclosure:

> "At this stage, it is not practical to study or measure the severity of each potential impact identified. No fieldwork was conducted as part of this analysis. In subsequent project-level analysis, Section 4(f) and 6(f) resources, potential uses and impacts, and appropriate mitigation measures would be evaluated in detail and determinations made." DPEIR/S at 3.16-2. O007-134

This approach to such a critical topic is simply indefensible. Alignment and station choices will be made following the release of the FPEIR/S. These are crucial decisions in terms of the potential Section 4(f) and 6(f) resources. Additional study at a later date will not undo the damage done by premature and ill-informed choices. Additional information, analysis and mitigation for HST alignment impacts to Section 4(f) and 6(f) resources must be included in a revised EIR/S at this level before such choices are made.

Other flaws in the document's treatment of this topic include, but are not limited to the following: The DPEIR/S fails to adequately characterize the project setting with respect to Section 4(f) and 6(f) resources. In enacting Section 4(f) as part of the Department of Transportation Act of 1996, Congress declared that "special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands." 49 U.S.C. Section 303. As a means of implementing these goals, Congress specified two fundamental mandates: 1) prohibiting federal agencies from approving transportation projects that require use of a public park or recreation area unless there is no feasible and prudent alternative to using the parkland; and 2) requiring transportation projects which use a public park or recreation area to include all possible planning to minimize harm to the parkland. U.S.C. Section 303c. Authoritative interpretation of federal agencies' duties under this provision was established and continues to be provided by the 1971 Supreme Court decision in Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402. In that case, the Supreme Court overturned the Secretary of Transportation's approval of a six-lane highway through a park in Memphis. In reaching its decision, the court held that "only the most unusual situations are exempted" from the Section 4(f) mandate. The court further clarified that such situations would include only "unique problems" such as extreme financial costs or community disruption of "extraordinary magnitudes." Id. at 411, 413. O007-135

Based on this and other cases, it is clear that choosing an alignment or station alternative that requires use of a public park or recreation area simply because it is the least expensive or most efficient choice does not meet the mandate of Section 4(f). In the case of HST, there appear to be feasible alternatives that avoid impacting public parks, recreation areas, nature preserves, and refuges. Our summary of flaws in the DPEIR/S analysis of these impacts is as follows[44]:

The DPEIR/S lists the significant Section 4(f) and 6(f) resources in each region. DPEIR/S at 3.16-4.[45] However, it is important that the reader have an understanding of the locations of these valuable resources in relation to the alignments under consideration. The PEIR/S needs to include a map identifying and showing the locations of all Section 4(f)and 6(f) resources, and specifically all state parks, in relation to the alternative alignments under consideration in the PEIR/S. O007-136

First, the DPEIR/S defers meaningful analysis of impacts to these resources. The DPEIR/S contains a table, Table 3.16-3 and text which briefly summarize general direct and indirect impacts to these resources. The table and text suggest there will be numerous significant direct and indirect impacts to these resources depending on alignment, station and network, but provide information that is so vague as to be of little analytical use. Without a more specific impact analysis, it is impossible to know what O007-137

[44] See also letters submitted by the California State Parks Foundation, Defense of Place and the Natural Resources Defense Council.

[45] It should be noted that the State Department of Parks and Recreation, in a letter dated 10/28/05, identified nine state parks in the Bay Area/Central Valley area that could potentially be affected by the HST project but were not referenced in the Statewide PEIR. This PEIR should comment on the completeness of its listing of Section 4(f) and 6(f) resources compared to the list in that letter.

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impacts will result from different possible alignments and to what extent mitigation measures would reduce or eliminate those impacts. Under the requirements of federal law, and because protected areas are such a high priority for Californians, simply deferring discussion and analysis on the specific impacts to Section 4(f) and 6(f) resources to the project level EIR is unacceptable. These resources provide amenities including: important recreation opportunities, barriers to and buffers from urban sprawl, an experience of areas with unique qualities, wildlife habitat and migration corridors, an escape from the urban environment, as well as serving as a valuable resource for both humans and wildlife. These resources are the reason why Section 4(f) and 6(f) set these areas aside for future generations. The negative impacts on both the Section 4(f) and 6(f) resources themselves and the amenities they provided should have been considered in more detail in the DPEIR/S. Indeed, the DPEIR/S approach to these resource impacts fails to reflect the "special effort" or assessment of "prudent and feasible alternatives" that Section 4(f) requires. Section 4(f) makes it clear that preservation of parkland is of paramount importance; more so than costs, directness of route, or community disruption. See *Citizens to Preserve Overton Park v. Volpe* (1971) 401 U.S. 402, 412-13. A revised and recirculated EIR/S must include a thorough analysis of these impacts. O007-137 Cont.

Section 3.16 of the DPEIR/S compared the number of Section 4(f) and 6(f) resources that would be impacted by the HSR versus No Project alternatives, which includes future transportation improvements. The section fails to disaggregate the impacts of future conditions from the impacts of HST on these resources. A simple tally of the impacts on Section 4(f) and 6(f) resources between the different alternatives deprives the DPEIR/S of any meaningful information about the nature of these impacts to these resources for each choice. Further, a mere numeric listing of resources affected by different alternatives is not an adequate analysis of the relative impact of different alternatives. The analysis must include analysis of the relative extent and severity of each impact, as well as the extent of feasible mitigation possible and the relative extents and severity of impacts before and after mitigation. It is of particular importance to compare the relative extent and severity of impacts on Section 4(f) and 6(f) resources between the Altamont and Pacheco alignment alternatives.[46] O007-138

Parks, open space, wilderness, and wildlife refuges are clearly spending priorities for Californians, based on the billions of dollars that have been allocated for acquisition of such places in voter approval of several recent ballot initiatives. Extensive discussion of the HSR impact on these protected areas should have been a higher priority in the DPEIR/S. A revised EIR/S must quantify the potential impacts to significant public investments made to both publicly owned and privately owned conservation areas[47].

Third, as in other environmental impact sections of the DPEIR/S, the "mitigation strategies" for 4(f) and 6(f) issues are vague and improperly deferred. Yet, based on O007-139

[46] It appears that at least Pacheco State Park and San Luis Reservoir State Recreation Area would be directly impacted by the Pacheco alignment alternative. In addition, the PEIR/S needs to identify other park-related impacts, including noise and impacts on the ease of park access.
[47] See, for instance, the comment letter submitted by the The Nature Conservancy concerning significant properties that were purchased with public funding and whose biodiversity will be impacted by HST.

these "strategies", a number of potentially significant impacts to these resources are concluded to be potentially less than significant after mitigation. A revised EIR/S must not only include the required analysis of these issues, but identify feasible mitigation measures, including annual operation and maintenance costs that are automatically incurred with a project of this scope. A revised PEIR/S must demonstrate and document, based on substantial evidence, how each measure actually reduces potentially significant impact to less than significant. O007-139 Cont.

Section 4(f) requires analysis of alternatives be conducted and specific mitigation measures identified before an alignment choice is made. A revised and recirculated DPEIR/S must include this information. Avoiding the impacts on Section 4(f) and 6(f) resources should be a major priority for evaluating all possible Bay Area – Central Valley routes in the revised environmental document. If these areas are ultimately to be impacted, a revised evaluation must demonstrate that there was no other option and meet the high bar set by the courts for impacting these precious resources.

9. The DPEIR/S Fails to Adequately Analyze Cumulative Impacts.

CEQA and NEPA require that cumulative impacts be analyzed. The CEQA Guidelines define cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." CEQA Guidelines Section 15355(a). "[I]ndividual effects may be changes resulting from a single project or a number of separate projects." Id. Federal Regulations implementing the National Environmental Policy Act (NEPA) also require that the cumulative impacts of the proposed action be assessed. Cumulative impact is defined by the Council on Environmental Quality as an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." 40 CFR 1508.7.

A legally adequate cumulative impacts analysis views a particular project over time and must consider the impacts of the project combined with other projects causing related impacts, including past, present, and probable future projects. CEQA Guidelines 15130(b)(1). Projects currently under environmental review unequivocally qualify as reasonably probable future projects to be considered in a cumulative impacts analysis. See San Franciscans' for Reasonable Growth v. City and County of San Francisco, 151 Cal.App.3d 61, 74 & n. 13 (1984). In addition, projects anticipated beyond the near future should be analyzed for their cumulative effect if they are reasonably foreseeable. See Bozung v. Local Agency Formation Comm'n, 13 Cal3d 263, 284 (1975). Alternatively, an EIR may utilize: O007-140

> A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or areawide conditions contributing to the cumulative impact.

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CEQA Guidelines Section 15130(b)(1)(B). Any such planning document shall be referenced and made available to the public at a location specified by the lead agency. Id.

The discussion of cumulative impacts must include a summary of the expected environmental effects to be produced by those projects, a reasonable analysis of the cumulative impacts, and full consideration of all feasible mitigation measures that could reduce or avoid any significant cumulative effects of a proposed project. See CEQA Guidelines Sections 15126.4(a)(1) and 15130(b)(3). O007-140 Cont.

This DPEIR/S fails altogether to meet these requirements and instead only discusses present and future projects within the immediate area that the HST would traverse. Moreover, by including some future (programmed and funded) transportation projects in the No Project Alternative, the section likely understates many significant cumulative impacts. O007-141

Key transportation and other projects are omitted from the discussion and analysis (e.g. http://www.dmbinc.com/communities/ A 4,500 acre planned community in San Benito county adjacent to the Gilroy HST station; major development proposed in the vicinity of the San Francisco Transbay Terminal HSR station; "transit village" for Union City transit hub; proposed major development at/near Sacramento Amtrak Station). As a result of this approach, the cumulative impact analysis is improperly narrow in scope and therefore underestimates and omits cumulative impacts. O007-142

The cumulative impact analysis also fails to specify mitigation measures for cumulative impacts, as required under CEQA and NEPA.

F. The DPEIR/S Fails to Identify Feasible Mitigation Measures

Both CEQA and NEPA require that mitigation measures be identified and analyzed. The Supreme Court has described the mitigation and alternatives sections of the EIR as the "core" of the document. Citizens of Goleta Valley v. Board of Supervisors, 52 CAL.3d 553 (1990). As explained below, the DPEIR/S identification and analysis of mitigation measures, like its analysis throughout, is thoroughly inadequate. O007-143

An EIR is inadequate if it fails to suggest mitigation measures, or if its suggested mitigation measures are so undefined that is it impossible to evaluate their effectiveness. In the instant case, the DPEIR/S defers the description of meaningful mitigation measures and instead relies on vague and "future" mitigation "strategies" to suggest that potentially significant impacts will be reduced to less than significant. Improperly deferred details of mitigation measures include, but are not limited to the following:

- Traffic and Circulation: Encourage use of transit to stations. Work with transit providers to improve station connections. Note that the feasibility of this mitigation is dramatically affected by alignment choice, yet the DPEIR/S does not take this into account. O007-144

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- Land Use: "Continued coordination with local agencies. Explore opportunities for joint and mixed-use development at stations. Relocation assistance during future project-level review." Note that alignment choice and station locations would have a large impact on the feasibility of this proposed mitigation. O007-145
- Growth Potential: "Work with local communities to encourage higher density development around stations." Note that the potential for higher density development around stations can vary considerably depending on alignment and station location. O007-146
- placing bridges on piers to minimize impact on wetlands
- trading wetland sites if necessary O008-147
- creating incentives for using transit systems such as replacing free parking with free or discounted transit passes O007-148
- providing for free shuttle services between regional rail stations and major employment centers
- providing sound walls where necessary O007-149
- ensuring that connections between trunk line rail services and feeder lines are fast, efficient and reliable O007-150

All of the recommended mitigation "strategies" adhere to a backward standard that is analogous to closing the barn door after the horses have already escaped. By deferring the need for mitigation until project-level environmental review, the DPEIR/S ignores critical mitigation issues that must be addressed before alignment decisions are made and before growth-induced ongoing impacts occur. O007-151

Again, a revised EIR/S must include adequate and feasible mitigation measures to address both project-related and cumulative impacts based on the "whole" project and a complete list of cumulative projects. Mitigation measures must be accurately presented in terms of their feasibility, including costs.

G. The DPEIR/S Fails to Characterize the Significance of All Potential HST Alignment and Station Alternatives

The DPEIR/S fails to clearly and properly identify the impacts of each HST alternative alignment and station before and after mitigation as compared with the existing environment. The DPEIR/S identifies the following impacts of the HST "system," (as compared with the No Project Alternative), as follows: O007-152

- Potentially increase the load on the statewide electric power system by an estimated 794 MW during the peak period in 2030;
- Impact biological resources including wetlands and habitat for threatened and endangered species;
- Impact agricultural lands;

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- Impacts on 4(f) and 6(f) resources.

This list and the related Table (9.3-1) are defective for a number of reasons. First, they only characterize the impacts of the HST "network" in comparison with the No Project Alternative and fail to characterize the differences between Pacheco and Altamont alignments. Second, the information to support this list is inadequate. The DPEIR/S restates that "Only general statements of potential impacts can be made at this program level of review because detailed field studies were not conducted...". DPEIR/S at 9-2. Moreover, the document states that potential impacts would need to be further studied and clarified in the next stage of project design when more specific information would be available on the amount and location of right-of-way needed for the alignments and stations. DPEIR/S at 9-2. The fact remains that, based on the PEIR/S, decisions will be made that will determine alignments and, at least generally, station locations. At least to that extent, the discussion of impacts may not be put off for future study. Rather, sufficient information about potential impacts must be provided in this PEIR/S so that the impacts of the alternative alignments and stations can be usefully compared.

Finally, the DPEIR/S creates its own unauthorized categorization scheme when it concludes that many of the impacts are "Potentially less than significant." DPEIR/S at 9-8. There is no such category available for CEQA documents. Impacts are either Significant and Unavoidable, Potentially significant, Less than Significant with Mitigation, or Less than Significant. The DPEIR/S impermissibly attempts to finesse its lack of required information through vagueness and creativity. Under CEQA, however, the impacts must be categorized on the basis of information in the record, using approved categories. Decision makers, and the public, need to know whether an impact can be mitigated or not. Calling an impact "potentially less than significant" does not satisfy that need. If mitigation is clearly feasible and will clearly suffice to reduce the impact to a level of insignificance, it should be so stated and the mitigation specified as required. Otherwise, the impact needs to be treated as significant. For these reasons – that more information and study is needed; along with the lack of evidence to support the DPEIR/S's assertion that so-called "deferred" "mitigation strategies" will suffice to reduce the Project's potentially significant impacts on water quality and hydrology, geology, and a myriad of other areas to less than significant – this list is without merit. O007-152 Cont.

Table 9.3-1 provides a summary of Key Environmental Impact/Benefits of Alternatives, but only for HST as compared with No Project. No such summary is provided to compare the two key alternatives – Pacheco and Altamont. This table can reasonably be expected to be the main, if not only source of such information for the public and decision makers unless they review each section of the DPEIR/S in detail. The omission of a summary comparison between the key alternatives, along with the DPEIR/S' deficient and non-conforming analysis, make this document inadequate to guide the CHSRA in selecting a Bay Area – Central Valley HST alignment and associated station locations.

As stated above, the Table's conclusions that numerous significant impacts will be less than significant with "deferred" mitigation or beneficial before mitigation are

unsupported by evidence including, but not limited to: Traffic and Circulation, Energy Use, land use, visual quality, noise, hydrology and water resources, growth potential, public utilities and services, geology, and hazardous materials. A revised PEIR/S must clearly characterize the significance of impacts for each alignment and station alternative by environmental topic before and after mitigation. Facts and evidence must be provided to support conclusions that impacts will either be beneficial or less than significant after mitigation. O007-152 Cont.

H. The DPEIR/S Fails to Analyze Alternatives Adequately

The DPEIR/S fails to adequately analyze the included alternatives and inappropriately eliminates other alternatives from consideration without justification. Here are some examples: O007-153

Route segments listed in **Table 2.5-4** as having been eliminated from further consideration include the option of routing the line from Fremont Central Park to the Great Mall in Milpitas along the WPRR rail line, using among others a segment of the former WPRR between Warm Springs and San Jose (DPEIR/S page 2-43). The DPEIR/S eliminates this alignment alternative for reasons of "constructability" and "Right-of-Way" without presenting any evidence that these problems exist to any greater degree in the WPRR alternative than in the alternative carried forward, which would place the HSR line in the median of I-880. O007-154

Furthermore, the entire segment is eliminated because of stated problems with the section south of Hwy 101, even though a reasonable alternative could use the section north of Hwy 101 (DPEIR/S, Appendix G, page 2-G-5).

Additionally, the DPEIR/S improperly assumes that the BART extension between Warm Springs and San Jose will be built in that segment, even though that BART project not only has not been built, but has significant funding shortfalls and has not even received a federal record of decision (DPEIR/S, Appendix G, page 2-G-4). The PEIR/S should be revised to discuss how the configuration of this HSR alignment will be modified if this BART extension is not built. O007-155

The stations in the Fremont area proposed for the Altamont alternative are located without a single station on a direct line to both San Jose and San Francisco. (Such a station is specifically proposed in the BayRail Alliance "Caltrain Metro East" proposal as presented on public display boards by MTC and CAHSRA staff at the joint Bay Area to Central Valley HST PEIR Scoping Meetings/Regional Rail Plan Community Workshops in November and December 2005.) Instead, the DPEIR/S inflates the cost and reduces connectivity and performance of the Altamont alternatives by proposing three separate stations (Union City, Shinn, and Warm Springs) on three separate branches within 10 miles of each other while ignoring the downtown Fremont area. This portion of the Altamont alignment option needs to be reconfigured so that 1) it connects downtown Fremont to both the San Jose and San Francisco main lines and 2) reduces the number of suburban stops by eliminating at least one of the three current stops. Any remaining O007-156

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recirculation of a draft EIR/S where, as here, the document is so fundamentally inadequate in nature that meaningful public review and comment are precluded. See CEQA Guidelines § 15088.5. O007-160 Cont.

CONCLUDING COMMENTS

Again, we appreciate the opportunity to comment on the DPEIR/S. Please keep the following individuals listed below informed of any and all upcoming matters related to the HSR project. O007-161

Sincerely,

Stuart M. Flashman

Stuart M. Flashman
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ATTACHMENTS:

Exhibit A - Resumes of experts consulted
Exhibit B - Testimony of Dr. Michael White, Senior Ecologist, Conservation Biology Institute
Exhibit C - Photos and Schedules for HSR lines that split trains in France and Germany
Exhibit D - Population and distance for the two alignments
Exhibit E - Memos from California Attorney Generals on CO2 analysis requirement in CEQA
Exhibit F - Grasslands Ecological Area Land Use and Economic Study

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Response to Letter O007 (Stuart M. Flashman, October 25, 2007)

O007-1

The Authority and FRA acknowledge receipt of comments from Stuart M. Flashman and the groups that Mr. Flashman is representing in his letter, including Bay Rail Alliance, California Rail Foundation, California State Parks Foundation, Defenders of Wildlife, Grassland Water District, Planning & Conservation League, Regional Alliance for Transit, Sierra Club, Train Riders Association of California, and TRANSDEF.

O007-2

The Authority and FRA do not agree with the contention that the Draft Program EIS/EIS fails to comply with CEQA and NEPA. Please see responses to comments below. The Authority and FRA acknowledge receipt of comments on the prior statewide draft Program EIR/EIS from the groups identified in Mr. Flashman's letter. Please see Standard Responses 1 and 2.

O007-3

Please see Response to Comment O007-2. The Authority and FRA have fully analyzed multiple alignment and network alternatives and station location options, consistent with the Authority Board directive to perform such an analysis. The comprehensive evaluation is presented in the Draft Program EIR/EIS.

The Altamont Pass alternative is not identified in this document as the Preferred Alternative for the reasons provided in Chapter 8 of this Final Program EIR/EIS. Concerns regarding assumptions made in the choice of alternatives and the methods used in the analysis are discussed below. Please see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative. Responses to your previous comments were included in the final program EIR/EIS that was certified in November 2005.

O007-4

The Authority and FRA do not agree with the contention that the Draft Program EIR/EIS was released in haste. Rather, the document was developed in a deliberative and comprehensive manner and was released once it was completed. Information was not omitted. Please see Standard Responses 1 and 2.

The Authority and FRA do not agree that the rail ridership and impact analyses presented in the Draft EIR/EIS are deficient. Revision to the Draft Program EIR/EIS with a recirculation is not necessary. Please see response to comments below, especially Response to Comment O007-46.

O007-5

The Authority and FRA disagree with this statement. Each of the alleged defects and omissions of the Draft Program EIR/EIS are responded to below. The Draft Program EIR/EIS appropriately describes the HST project alignment, station, and network alternatives in Chapters 2 and 7 and the plans/profiles and station concepts are provided in the appendices.

O007-6

The Authority and FRA disagree with this statement. The Summary in the Draft Program EIR/EIS presents a concise summary of the HST purpose and need, project alternatives, and associated impacts and compares the major differences of the alternatives.

O007-7

The Authority and FRA disagree with this statement. Please see Response to Comment S009-17 and also see Standard Responses 1 and 2.

O007-8

The Authority and FRA disagree with this statement. Ridership forecasts for the Pacheco Pass (with termini in San Jose and San Francisco) and the Altamont Pass (with termini in San Jose and San Francisco) have been used as the *representative demand* for defining the intercity travel need for the HST alignment alternatives in this Program EIR/EIS.

The projected HST travel times account for alignment, train performance characteristics, acceleration and deceleration capabilities, and passenger comfort criteria. HST system operators and manufacturers of HST equipment were consulted in the development of the travel times and design criteria for the proposed HST system.

Ridership for the HST system is now estimated to be between 88 million and 117 million passengers for 2030, with a potential for further ridership growth beyond 2030. These new ridership forecasts are higher than those analyzed in the previous program EIR/EIS for the HST system; however, this analysis is consistent with that provided in the previous document because the infrastructure and facility footprints analyzed in that document would accommodate the new ridership forecasts. The purpose of and need for this project is to meet a part of California's future intercity travel demand in 2030 and beyond. Although the HST system would have the capacity to carry many more passengers than indicated in the high-ridership forecast, by using longer trains, double-decker cars, or more frequent service (e.g., the Shinkansen system in Japan carries more than 300 million passengers annually), it is reasonable to assess the HST alternatives using forecast ridership rather than theoretical capacity.

O007-9

The Authority and FRA disagree with this statement. Please see Response to Comment O007-46.

HST ridership (including commuters and non-commuters) in the corridor between Sacramento, the San Joaquin Valley and the San Francisco Bay Area was fully analyzed and considered in the Program EIR/EIS, contrary to the assertion in the comment. The HST ridership and revenue model is the most complete, accurate, and up-to-date tool for forecasting travel demand across California. It was specifically designed, developed, and calibrated to assess travel demand between regions of the state, such as the corridor between Sacramento, the San Joaquin Valley, and the San Francisco Bay Area. The forecasting process and results have been completely documented in a series of technical reports that are posted on the California High-Speed Rail Authority web site at http://www.cahighspeedrail.ca.gov/ridership/.

These reports have been available at this location throughout the public comment period for the Draft Program EIR/EIS.

O007-10

The FRA and Authority disagree with this statement. The Draft Program EIR/EIS evaluates an appropriate range of alternatives. Please see responses to comments below.

O007-11

The Authority and FRA disagree that the analysis and the supporting information in the Draft Program EIR/EIS are inadequate. Please see responses to comments below.

O007-12

The Authority and FRA disagree with this statement. Please see responses to comments below.

O007-13

The Authority and FRA disagree with this statement. Please see Standard Response 5 regarding mitigation strategies.

O007-14

Please see Response to Comment L029-70, which notes that the environmentally superior alternative is identified in Chapter 8 and the Summary of this Final Program EIR/EIS.

O007-15

The Authority and FRA disagree with this statement. Please see Standard Response 4 regarding growth and Chapter 5.

Contrary to the assertion in the comment, the Program EIR/EIS fully analyzes, describes, and compares the growth-inducing effects and secondary impacts of all alternatives, including No Project, Altamont Pass, and Pacheco Pass. This analysis included all network, alignment, and station location options for the Altamont Pass and Pacheco Pass alternatives. Sections 4.2 and 5.2 of the technical report on economic growth effects[2] provide a detailed review of growth-inducing differences between the alternatives, and these differences are fully disclosed in summary fashion in Section 5.3.

The impact assessment methodology used for economic growth and related impacts followed a multi-tiered analytic process. The methodology first used the Authority's intercity travel demand model to estimate benefits (e.g., reduced travel time and/or cost) of each system alternative for air, highway, or conventional rail systems. In this analysis, the quantification of travel time, cost, accessibility, and societal (pollution or accident reduction) benefits reflects the mobility enhancement provided by each system and allows the HST ridership and revenue model to estimate user, nonuser, and accessibility benefits from the introduction of HST.

The second step used a regional econometric model (TREDIS-REDYN) to forecast population and industry-specific employment growth due to the introduction of an HST system. The Transportation and Economic Development Impact System (TREDIS) is an integrated modeling framework that combines a business attraction model and an economic model for the California economy and subregions. The economic model combines input-output, cost/response, and trend-forecasting elements to assess direct economic impacts and their potential to create additional multiplier effects on the regional and statewide economies of California.

Third, output from TREDIS was input into a spatial allocation model, the California Urbanization and Biodiversity Analysis (CURBA) model. CURBA is a spatial-decision support system developed within the ESRI ArcGIS software package by the University of California at Berkeley's Institute of Urban and Regional Development. CURBA takes employment and population growth information and uses a number of historically calibrated spatial statistical models to assign residential growth to various locations in and around California's urban areas. By spatially allocating population and employment throughout each county, infill potential and magnitude of currently undeveloped land needed to accommodate growth for each alternative was determined. This assessment of likely urbanization patterns was driven by three key pieces of information: local land use, zoning, and employment date; national and international experience with station area development trends related to HST and fixed guideway transit; and county-level industry employment and population estimates.

This analytic framework for approaching the evaluation of economic and related impacts is accepted and well documented in professional literature[3]. Within this body of literature, there is also recognition that the application of regional econometric and spatial allocation models for project economic impact evaluation is currently serving as a best practice for estimating the indirect effects of transportation projects. Both TREDIS and CURBA have been independently validated to current conditions, have been used for other projects in the state, and are regarded as state-of-the-practice forecasting tools for California.

[2] Economic Growth Effects Analysis for the Bay Area to Central Valley Program-Level Environmental Impact Report and Tier 1 Environmental Impact Statement – Final Report; Cambridge Systematics, Inc.; July 2007.

[3] See, for example: Avin, Uri, R. Cervero, T. Moore, and C. Dorney; Forecasting Indirect Land Use Effects of Transportation Projects, NCHRP 25-25, Task 22, National Cooperative Highway Research Program, Transportation Research Board, 2007; and The Louis Berger Group, Inc; Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects, Transportation Research Board – NCHRP Report 466, 2002; and Parsons Brinckerhoff Quade and Douglas, Inc.; Land Use Impacts of Transportation: A Guidebook, National Cooperative Highway Research Program, Transportation Research Board, 1998.

O007-16

Please see Response to Comment L029-70, which notes that the environmentally superior alternative is identified in Chapter 8 and the Summary of this Final Program EIR/EIS.

O007-17

The Authority and FRA disagree with this statement. See Standard Response 1. The Draft Program EIR/EIS provided for public review and comment on the analysis of the environmental consequences of the alignment and network alternatives and station location options. The Preferred Alternative identified in this Final Program EIR/EIS would meet the purpose and need of the project and avoid and reduce environmental damage, as described in Standard Response 3 and Chapter 8.

O007-18

The Authority and FRA do not agree with Mr. Flashman's suggestion that the findings would force selection of the Altamont alignment. The underlying reasons for identifying the Pacheco Pass as the Preferred Alternative are presented in Chapter 8 of this Final Program EIR/EIS, which explains that identification of the Preferred Alternative is based on a review of the purpose of and need for the HST system and the environmental effects of the various alternatives. Please see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative.

O007-19

See Response to Comment L019-9.

As noted in Chapter 8 of this Final Program EIR/EIS, the Preferred Pacheco Pass Alternative is no less integrated and efficient than the Altamont Alternative. For example, it would not require splitting train service or reducing the frequency of trains to serve the largest population centers in the Bay Area, namely San Jose and San Francisco. It would allow for an integrated HST and commuter service along the Caltrain Corridor and provide service to the growing areas in the Salinas and Monterey Bay area.

Travel times between northern and southern California for Altamont Pass and Pacheco Pass are roughly equivalent, and travel times between the northern San Joaquin Valley and San Francisco are less for the Altamont Pass alternative. These factors are clearly noted in the Draft Program EIR/EIS and in the discussion of the Preferred Alternative provided in Chapter 8. Chapter 8 notes that there are a number of important trade-offs among the alignment alternatives and station location options, all of which were considered in the course of identifying a Preferred Alternative. Please see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative.

O007-20

The Authority and FRA disagree with this statement. The ridership evaluation was performed with the best information and tools available and at an appropriate level of detail for the decisions to be made on this document. The ridership analysis concluded that both the Altamont and Pacheco Pass alternatives would have substantial and generally equivalent ridership. Please see Response to Comment L035-2 for a discussion of access differences to HST as well as factors that underlie differences in ridership and revenue-generation potential between Altamont Pass and Pacheco Pass alternatives.

O007-21

The reductions in highway vehicle miles traveled (VMT)—congestion relief—on the specific freeway/highway segments varies, depending on the alignment. Please see Table 3.1-2. As shown, both the Altamont and Pacheco Pass alternatives result in congestion relief across the region, with peak period trip diversions ranging 0.6 to 20.2% for various roadway sections. Where a freeway segment is in the vicinity of a proposed HST station, there can be an increase in traffic of about 0.5% due to additional trips going to and from the station. Please also note that the diversions are apparent for virtually all roadway/highway segments, regardless of the alignment, with relatively larger diversions apparent on roadways parallel to an alignment. Thus, both the Pacheco and Altamont Pass alternatives

do meet this portion of the project purpose and need, but the differences among the alternatives were not substantial. Each provided this benefit, but the Pacheco Pass alternative was slightly higher.

As a result, the identification of the Preferred Alternative did not isolate this one project purpose but rather took into account the full range of HST purposes and needs and the key differences among the alternatives. Please see Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative.

O007-22

Removing impediments to San Francisco Bay tidal flows and currents and wildlife connectivity would require removal of the existing Dumbarton rail corridor across the Bay and replacing it with a crossing that would work for both HST and the Caltrain Electrical Mechanical Unit (EMU) technology and number of tracks being proposed as part of the Dumbarton Rail project.

As noted in Chapter 2, the approval of Regional Measure 2 (RM2) in March 2004 included funding to reconstruct the out-of-service Dumbarton Rail line between southern Alameda County and the San Francisco Peninsula. The reconstructed rail bridge across the Bay would be the key component in the establishment of the commuter rail service between the Union City BART station and the Caltrain line on the peninsula. Rail equipment comparable to current Caltrain rolling stock is expected to be employed. The reconstructed Dumbarton segment includes embankment, trestle structure, and two swing bridges; most of the segment is single track with limited passing sidings. The project is currently being considered for phased implementation due to funding constraints and the inability to reach a track-sharing agreement with the UPRR. On March 26th, 2008, a presentation was given to the Dumbarton Policy Advisory Committee on the status of the Dumbarton and Newark Bridges. While the conclusions are not final regarding the structural condition of the bridges, the structures are very deteriorated and realistically not capable of supporting a HST system.

The Dumbarton Rail project might be able to be completed prior to implementation of the HST system, but it would conflict with the proposed HST system. The HST system planned for 2030 includes at least two tracks for all of the system and does not include a single track as planned for the Dumbarton Bridge, which would not accommodate HST service. The HST system would also conflict with the Caltrain JPB EMU option. A retrofitted Dumbarton rail crossing does not meet the criteria of the HST system of full grade separation, speed, reliability and safety criteria due to the use of swing bridges. If high-density regional rail service is developed in the future along this route, a double track bridge across the bay would be necessary and would likely result in significant impacts on San Francisco Bay, Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), aquatic resources, and sensitive plant and wildlife species. This would also hold true for adding HST service across the Bay.

The HST alignments that cross the Bay along the Dumbarton corridor would have a significant impact on the bay and its aquatic resources, including wetlands and sensitive plant and wildlife species in addition to the Refuge. Much of the area surrounding the bay is already protected and there are challenges for developing substantial mitigation strategies. The preferred Pacheco Pass network alternative identified by the Authority would not require a bay crossing, would not affect any established Refuge, and would result in fewer impacts on wetlands and aquatic resources than the Altamont Pass network alternatives. The Pacheco Pass network alternative, although it would pass through the area identified as the GEA, would have less impact than would crossing the Bay and the Refuge. The magnitude of impacts on biological resources of the Bay crossing would be greater than the impacts along the Pacheco alignment. In the area along Henry Miller Road and through the Diablo Range, the Authority would work with stakeholders in developing mitigation that would benefit the GEA and surrounding area. In addition, engineering design refinements would be undertaken to avoid and/or minimize environmental impacts. This will include evaluating design alternatives to the north and south of

the current proposed Henry Miller alignment (between the Central Valley and the Pacheco Pass).

The potential to induce growth within the GEA or the Los Banos area would be limited because no station or maintenance facility would be located in this area. The closest proposed stations are located in Merced and Gilroy. Growth-inducing impacts are discussed in Chapter 5.

As noted above, the HST system would not be compatible with the Dumbarton Rail service technology and would require more tracks. A tunnel or high bridge across the Bay to replace the current Dumbarton rail bridge would require a larger tunnel or bridge and have larger potential impacts on the Bay and the Don Edwards Refuge and result in higher costs. A tunnel would not necessarily remove all impacts on the bay or refuge.

The Authority received comments signed by five members of Congress and four members of the California Legislature stating that any alternative requiring construction through the refuge with additional impacts on the Bay and Palo Alto shore of the Bay should be rejected. The City of Fremont opposes the Dumbarton alternatives because of the potential impacts on Fremont neighborhoods. Please see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative and Chapter 8 for more detail.

O007-23

The Authority and FRA do not concur and find the Draft Program EIR/EIS to be adequate. The Authority and FRA find that recirculation of the draft document is not warranted.

The Authority and FRA acknowledge receipt of comments from Mr. White and Ms. Watt and their resumes. Please see Standard Responses 1 and 2.

O007-24

Please see Standard Responses 1, 2, and 5. The Authority and FRA believe that the Draft Program EIR/EIS does adequately analyze, to the extent currently feasible, all potential impacts that may arise from the alternatives described in Chapter 2. Extensive data and information were collected and analyzed and are presented in a comprehensive and systematic manner for numerous subject areas for all of the Bay Area to Central Valley alignment alternatives and station location options.

Chapter 3 lists mitigation strategies for each type of impact. Please see Standard Response 5 regarding mitigation strategies.

O007-25

The Draft Program EIR/EIS describes impacts as potentially significant or insignificant. It is common practice to use information from planning and transportation funding documents to describe a foreseeable future condition, and this is the approach taken in the Draft Program EIR/EIS. The assumptions are therefore supported by state, regional, and local planning and transportation funding plans.

This Program EIR/EIS appropriately evaluates the environmental effects of the proposed HST system at the earliest possible stage and identifies potentially significant impacts and mitigation strategies to address such impacts.

The Draft Program EIR/EIS presents the impacts for all alignment alternatives and station location options. A comparison is then made of the impacts and benefits of all alignment alternatives and 21 representative network alternatives—not two alternatives – in Chapter 7. The 21 network alternatives are also compared in the Summary. The network alternatives are not described as “preferred” but rather as “representative.” Please also see Standard Responses 1 and 2.

O007-26

Alignment maps in the appendices are overlain on aerial photography, and the proposed alignment profile is provided (surface, aerial, trench, tunnel) for purposes of performing the environmental analysis. The scale is sufficient to generally identify adjoining land uses, and Section 3.16 identifies the parklands and

other 4(f) and 6(f) resources that are within specified distances (e.g., 1–150 feet) from the alignments. This represents a conservative approach for identifying potential impacts on resources in the defined study areas. More detailed analysis of impacts will be provided in Tier 2 project-level environmental documents when more detail will be available for system engineering, system design features, the location of facility footprints, and variations in the selected alignment. Please also see Response L029-57 regarding the Section 4(f) process.

O007-27

See Response to Comment O007-46.

O007-28

Significance levels in this Program EIR/EIS have been determined based on similar projects in similar settings, which is appropriate for this analysis. These determinations are not speculative but rather are based on appropriate evaluation techniques for a program-level EIR/EIS. See also response to comment O007-25.

O007-29

The Authority and FRA disagree with this statement. Extensive data and information were collected and analyzed and potential environmental consequences are presented in a comprehensive and systematic manner throughout the Draft Program EIR/EIS for numerous subject areas for all of the Bay Area to Central Valley alignment alternatives and station location options.

During the EIR certification process, a mitigation monitoring plan will be adopted as part of the project approval. Please see Standard Response 5 regarding mitigation strategies. Please also see Response to Comment O007-28 regarding determinations of significance.

O007-30

Please see Standard Responses 1, 2, and 5. Intersection, physical, and operational street improvements, and parking facility locations and sizes are standard mitigation for traffic and parking impacts associated with rail transit stations. The parking analysis in Section 3.1.3 does describe, based on the current conceptual facility planning, the number and general location of necessary additional parking spaces for each HST station. Detail is given by the station fact sheets in Appendix 2F. Note that these demand numbers are based on a probable worst-case parking demand. The station traffic impact analyses were also based on link analyses of specific streets under a probable worst-case HST traffic demand. These results are summarized by the screenline results reported in Table 3.1-3, Impacts to Traffic, Transit, and Parking from HST Station Location Options, and the individual streets examined are illustrated by the screenline diagrams in Appendix 3.1-A, Station Location Street Maps.

Specific intersection, physical, and operational street improvements and other specific mitigations cannot be defined until the project-level environmental review and preliminary engineering phase of a project.

O007-31

Please see Standard Responses 1, 2, and 5.

O007-32

See Standard Response 5 regarding mitigation strategies. The construction costs for the network alternatives included mitigation costs as well as contingency costs. Costs are discussed in Chapter 4. Future project-level Tier 2 environmental documents will further refine these costs when specific details are known.

Broad mitigation strategies were identified at the program level for potential significant impacts. Analyzing secondary impacts requires a level of specificity that will be available as the design progresses and will be analyzed as part of the Tier 2 project-level environmental analysis.

Chapter 9 discusses unavoidable adverse environmental impacts and identifies significance before and after mitigation is applied. Section 3.17 discusses cumulative impacts and significance. Mitigation

strategies throughout the document would be applied to cumulative impacts.

O007-33

The Authority and FRA do not agree that the identification and analysis of potentially significant effects and the provision of mitigation strategies and measures in the Draft Program EIR/EIS are inadequate. As evidenced by the numerous comments on the Draft Program EIR/EIS, agencies, organizations, elected officials, and citizens have established strong positions regarding the best alignment using information contained in the document, citing effects and benefits shown in the draft document.

The Authority will make a determination regarding project approval, and the adequacy of this Final Program EIR/EIS to take such action, following release of this Final Program EIR/EIS. The Authority and FRA find that recirculation of the Draft Program EIR/EIS is not necessary. See Standard Responses 1, 2, and 5.

O007-34

The Authority and FRA agree that the environmental document should be well organized, clear, readable, and useful and understandable to differing audiences, and worked to ensure that the Draft Program EIR/EIS met these objectives.

As noted in the letter, the HST Program is one of the largest infrastructure projects ever contemplated for California. Thus, a broad range of alternatives are evaluated in the Draft Program EIR/EIS. A clear and concise set of network alternatives were therefore reviewed and evaluated in Chapter 7 and in the Summary. The network alternatives are made up of various combinations of alignments, providing services to differing terminal stations.

The environmental consequences and transportation characteristics of each of the alignment alternatives and 21 network alternatives are comprehensively presented in Chapter 7 and are summarized in a clear and consistent format in the Summary. Major differences among these alternatives are discussed, and the reader can objectively compare key aspects, including environmental effects, of each of the 21 network alternatives (Table S.8-1).

The Authority and FRA reviewed a reasonable range of alternatives for the Bay Area to Central Valley study area, consistent with the Authority Board directive and the requirements of CEQA and NEPA. The Authority and FRA disagree with the letter's contention that there are an "excessive" number of alternatives in the document. Please note that, by design, each of the network alternatives discussed in the Summary constitute a complete alignment linking the Bay Area to the Central Valley for the HST system. They are not subalignments but rather full HST networks serving different termini, thus allowing for a clear choice among these alternatives. Understandable maps for each network alternative are provided in Chapter 7 and referenced in Table S.8-1 of the Summary, providing the reader with a clear indication of the stations and alignments included in each network alternative. Rather than obfuscate, the Table S.8-1 and the corresponding discussion provide concise, objective, and uniform comparison of the key differences among a reasonable range of alternatives.

O007-35

The environmental impacts listed on the second page of Table S.8-1 are clear, complete, and accurate. As shown, this table includes information on farmland, prime farmland, floodplains, streams, water bodies, wetlands, nonwetland water, special-status plants, special-status wildlife, cultural resources, fault crossings, and 4(f) and 6(f) properties. As noted in the Summary, these alignment impacts were arrayed in the table given that there were clear differences for these effects. While not shown on the maps, the number of 4(f) and 6(f) properties within 150 feet of the alignment is enumerated in Table S.8-1.

O007-36

This paragraph is referring to the complex choice to be made to identify a Preferred Alternative—not to the adequacy of the information. See Standard Responses 1 and 3 regarding

programmatic decision and identification of Pacheco Pass as the Preferred Alternative.

O007-37

This combined program-level environmental document complies with NEPA requirements for the preparation of an EIS and with CEQA requirements for an EIR. Use of the term "significant" differs under these two laws. While CEQA requires that a determination of significant impacts be stated in an EIR, NEPA does not require such a determination in an EIS. Under NEPA, significance is used to determine whether an EIS or some other level of documentation is required, and once a decision to prepare an EIS is made, the EIS reports all impacts and proposes mitigation wherever it is feasible to do so.

For this reason, CEQA significance determinations are focused in the sections entitled "Mitigation Strategies and CEQA significance Conclusions" for each section of Chapter 3, "Affected Environment, Environmental Consequences, and Mitigation Strategies," and summarized in Chapter 9.

As stated in Chapter 9,

> *Only general statements of potential impacts can be made at this program level of review because detailed field studies were not conducted and the study areas used for some of the analysis was many times larger than the actual right-of-way (direct impact areas) for the network alternatives under consideration in most instances. Potential impacts would need to be further studied and clarified in the next stage of project design and environmental review, when more specific information would be available on the right-of-way needed for proposed HST Network Alternatives alignments and station location options and on the specific properties potentially affected. The objective at the project-specific stage of analysis would be to identify design options (plans and profiles) that would avoid these sensitive resources to the extent feasible.*

Similarly, mitigation strategies have been identified in this Program EIR/EIS for expected impact areas, and they will be refined and applied in future project-level documents.

Given these factors, Chapter 7 does report environmental impacts prior to mitigation, which enables a meaningful comparison of the alignment and network alternatives and station location options.

The identification of mitigation indicates expected impacts that may be significant under CEQA. NEPA anticipates that mitigation will be provided for the impacts of a project where it is feasible to do so. For this reason, some mitigation measures described in this document and in this section would be appropriate under NEPA, although the impacts they address may not be considered significant under CEQA.

O007-38

The Authority and FRA disagree with this statement. These reports were referenced and evaluated adequately and are discussed in Appendix 3.17-A and Chapter 2.

O007-39

The Authority has worked collaboratively with MTC, Caltrain, Capitol Corridor, BART, ACE, and many other transit, planning, and funding agencies and transit providers to understand, coordinate, and integrate HST alternatives with other rail planning efforts. Authority staff were participants in the Regional Rail Plan, serving on the plan's management committee along with MTC, BART, and SamTrans. This participation provided the Authority with the opportunity to coordinate with the Regional Rail planning process and work directly with such major rail agencies in the region. In fact, most of the HST alignment conceptual drawings were produced in collaboration with and as part of MTC's Regional Rail Plan. The conceptual plans developed as part of the Regional Rail Plan are provided in the appendices. Additionally, the Program EIR/EIS scoping meetings were conducted collaboratively with the initial round of Regional Rail public meetings.

The Authority reviewed these various planning documents and participated in the regional rail planning process, to determine how best to integrate an HST system into regional transit network. But the Authority and FRA do not agree that a summary of these other

plans is a necessary or useful addition to the Program EIR/EIS Summary, particularly since these plans were developed to serve different purposes than the HST Bay Area to Central Valley alignment and environmental review. Please also see Response to Comment O007-34.

O007-40

The Draft Program EIR/EIS does report reductions in regional and subregional automotive trips that currently congest the Bay Area highway system. As noted in Response to Comment O007-21, vehicle mile reductions along the regional freeways and roadways are provided in Table 3.1-2. The commenter's suggestion that this is a deficiency is therefore not correct.

The Authority and FRA are aware of the synergy between statewide, regional, and commuter rail services and the opportunity to locate local regional rail stations (with at least four tracks) along HST alignments. Given the existing Caltrain Corridor, the Preferred Alternative identified in this Final Program EIR/EIS would take advantage of the opportunity to integrate these services, for instance. Please also see Response to Comments O007-39 and O007-46.

The ridership and revenue model used for the Program EIR/EIS explicitly includes and analyzes a variety of trips described by the commenter including, but not limited to, trips between counties in the Central Valley, trips between the Central Valley and the Bay Area, and trips wholly within the Bay Area (including "regional" and "subregional" trips). The Program EIR/EIS and supporting technical reports on HST ridership and revenue explicitly identify the potential for HST alternatives to serve both interregional and intraregional (i.e., regional and subregional) travel. The ridership and revenue model also explicitly analyzes the interaction between the HST system and other regional and intercity rail services, such as Amtrak, BART, Caltrain, ACE, Muni. The ridership and revenue model analyzes this interaction as both a synergistic system (e.g., regional rail services provide access to and egress from the HST system) and as modal competitors (e.g., HST and Caltrain serving the same markets along the peninsula).

O007-41

The proposed HST system is adequately described in Chapter 2 for this program level analysis. Section 3.5, "Energy," provides an analysis of the electricity demand and generation capacity outlook, as well as impacts associated with use of this energy. Additionally, Section 3.18, "Construction Methods and Impacts," describes construction methods and associated construction impacts. See also Response to Comment O007-42.

O007-42

The full extent, including all components, segments, and future phases as currently known by the Authority and FRA, are disclosed in the Draft Program EIR/EIS. Please see Standard Response 2. The proposed Bay Area to Central Valley portion of the HST system has not been divided into smaller segments to avoid disclosure and analysis of the full environmental effects, and the Draft Program EIR/EIS includes related actions.

O007-43

Key features of each proposed alignment are provided in the Draft Program EIR/EIS. The appendices provide plans and profiles for each alignment and concept drawings for each station location option. Text, tables, and maps of the alignments are provided in Chapter 2. The maps in Chapter 2 and the plan/profile drawings show what portions of the alignments are trench, tunnel, embankment, cut and fill, retained fill, or aerial. A description of HST system operations is also provided in Chapter 2. Construction methods are described in Section 3.18.

O007-44

It is not possible to convey all ridership results in the body of the Draft Program EIR/EIS. Key comparative ridership information that identifies substantive differences between network alternatives,

alignment alternatives, and station location options is fully disclosed in the Summary and Chapters 2 and 7. Remaining ridership results and full documentation of the methodology used to obtain projected ridership have been completely documented in a series of technical reports that are posted on the Authority website at http://www.cahighspeedrail.ca.gov/ridership/. These reports have been available at this location throughout the public comment period for the Draft Program EIR/EIS.

The ridership and revenue analysis correctly reflect the operational assumptions that were made for each network alternatives, alignment alternatives, and station location options.

O007-45

Please see Response to Comment L018-7 for information related to the source of projected HST ridership. As noted in that response, about 98% of the HST system's ridership would be made by other travel options if there were no HST. The sources of HST ridership are nearly identical for Altamont Pass and Pacheco Pass alternatives.

O007-46

Table 4.3-2 outlines the costs associated with the operation of the HST system. Included in those costs is a marketing and reservation cost that would account for ridership development. The Program EIR/EIS defines the proposed project (the HST system). Please refer to the "Purpose and Need" (Chapter 1) and "Project Description" (Chapter 2). The ridership forecasts include both interregional and intraregional passengers that would use the proposed HST system. The ridership and revenue forecasts include both inter-regional and intra-regional passengers that would use the proposed HST system; see Response to Comment O007-40 for further explanation. The Program EIR/EIS does **not** include the additional ridership or the cost of additional infrastructure (stations, tracks, or other infrastructure) in order to provide potential regionally operated commuter services that might share infrastructure with the HST system. These potential services are not the responsibility of the Authority and not part of the HST system. The MTC's Regional Rail Plan is identified and described in Chapter 2 as a related project and is included as part of the cumulative impacts analysis (Section 3.17). The analysis and conclusions of the Bay Area Regional Rail Plan were considered in the identification of the Preferred Alternative (Chapter 8). The Authority believes the Preferred Alternative identified in this Final Program EIR/EIS is consistent with the findings of the Regional Rail Plan and the comments submitted by the MTC.

Table 4.3-2 outlines the costs associated with the operation of the High-Speed Train system. Included in those costs is a marketing and reservation cost that would account for ridership development. The Program EIR/EIS defines the proposed project (the HST system). Please refer to the "Purpose and Need" (Chapter 1) and "Project Description" (Chapter 2) in the Program EIR/EIS. The ridership and revenue forecasts include both inter-regional and intra-regional passengers that would use the proposed HST system; see Response to Comment O007-40 for further explanation.O007-47

Chapter 2, "Alternatives," of the Draft Program EIR/EIS provides a comprehensive description of the alignment alternatives and station location options under consideration, refers the reader to appropriate maps and drawings, and explains the identification of alternatives following the selection of the HST system, based on the statewide final program EIR/EIS certified in 2005, which considered modal alternatives. Reference to applicable drawings is appropriate.

Maps of the alternatives described in Table 2.5-1 are available in Chapter 7, and the identification of the preferred alignment is addressed in Chapter 8.

O007-48

The environmentally superior alternative is identified in Chapter 8 of this Final Program EIR/EIS. Please see Response to Comment Letter F007 discussing the U.S. Environmental Protection Agency's (EPA's) concurrence that the Preferred Alternative identified in this Final Program EIR/EIS is most likely to yield the Least Environmentally Damaging Practicable Alternative (LEDPA).

O007-49

See Response to Comment LO007-22.

O007-50

The operational planning assumptions used as inputs for the ridership and revenue forecasts were based on well-established HST operational practices.

As acknowledged in the Draft Program EIR/EIS, some HST systems physically separate trainsets ("splitting and joining trains") at some point on the route. However, the percentage of HST trains actually using this practice worldwide is very small. In France, about 10% of the TGV trainsets are physically split, whereas in Japan the percentage is even smaller. HST trainsets generally are not split during peak hours or at peak traffic points. For example, the TGVs that split in southwest France have already served the major Paris-Bordeaux market, and do not add time to the passengers on this critical city-pair. The Paris-Bordeaux passengers in the other direction also do not lose time waiting for the trains to be combined into one, since they board after consolidation. The mini-Shinkansen that splits to Yamagata does so after the major stations at Fukushima and Sendai. The Thalys HST does not split until after Brussels passengers get off. The HST splits are generally done in places where the traffic demands are low—not on the main trunk line between the major markets.

The Program EIR/EIS notes that it is unlikely that the application of splitting and joining trains would benefit one alignment alternative over the other. Practically, only one such train split could be accomplished for each scheduled train operation. Limited and appropriate splitting of trainsets could be used for either the Altamont Pass or Pacheco Pass alternatives (at Fresno or Los Angeles for example). As stated in the Staff Recommendations (Appendix 8-A), a key operational benefit of the Pacheco Pass is that it minimizes the number of HST network branches and splits.

The HST ridership and revenue forecasts done by MTC in partnership with the Authority concluded that both the Pacheco Pass and Altamont Pass network alternatives have high ridership and revenue potential. While additional forecasts with different assumptions may result in somewhat different results, the bottom-line conclusion is expected to remain the same, and therefore ridership is not a major factor in differentiating between the Altamont Pass and Pacheco Pass alternatives.

O007-51

The ranking of markets noted by the commenter is based on total trips irrespective of travel mode. The commenter correctly notes that trips to, from, and within the Central Valley represent a large portion of the raw market potential for interregional travel in California. However, raw potential market size is but one issue to consider; market capture potential is a more critical issue, with this potential dependent on relative competitiveness of travel options.

HST is most competitive in intermediate to long-distance California markets where it offers:

- Much faster travel times than the lower cost and more convenient auto mode, particularly for people traveling in groups;
- Much faster travel times and higher frequencies than the lower cost conventional rail mode; and
- Equivalent door-to-door travel times and frequencies as the more expensive air mode.

For example, more than one-third of the trips between the Los Angeles Basin and Bay Area choose HST because it takes approximately the same door-to-door time as air but costs about half as much. For trips between the Bay Area and Central Valley, HST is most competitive for trips that begin or end in the southern Central Valley between Fresno and Bakersfield; in this submarket, HST has a 33% mode share for Pacheco and 27% for Altamont. The submarket between the Bay Area and northern Central Valley is dominated by the auto mode (about 95% mode share), which is about an hour (or less) slower than HST but costs about half as

much; the HST mode share for this market is 4% for the Altamont scenario and 2% for Pacheco. HST is also not as competitive as auto for travel within the Central Valley, with HST capturing 4% of the market for the Altamont scenario and 3% for Pacheco.

On a statewide basis, Altamont Pass and Pacheco Pass provide similar service levels for trips to, from, and within the Central Valley. The only substantial service-level difference between Altamont and Pacheco is between the Bay Area and Central Valley areas north of Merced; Altamont provides faster travel times in this submarket compared to Pacheco. About two-thirds of all trips between the Bay Area and Central Valley begin or end in the area between Merced and the greater Sacramento region. Even with this large raw market potential, HST is not able to capture a substantial share of the submarket between the Bay Area and northern Central Valley for either Altamont or Pacheco due to the competitive advantage enjoyed by auto travel.

Contrary to the commenter's assertion, ridership between southern California and the Bay Area is not similar for the Altamont Pass and Pacheco Pass alternatives— nor should it be. Ridership differences arise due to differences in travel time, travel cost, and service frequency between individual station pairs for Altamont and Pacheco, as well as HST's competitive position relative to auto and air travel in certain markets. Most notably, the Altamont Pass base alternative includes an HST service split in the East Bay, which greatly reduces HST frequency (compared to Pacheco Pass) to San Jose and San Francisco under the base network alternative. The ridership and revenue forecasts assumed about 50 trains per day per direction between Los Angeles and San Francisco/San Jose in the Pacheco Pass base alternative. Due to the HST service split, the Altamont Pass base alternative has 33 trains per day from Los Angeles to San Francisco and 17 trains per day from Los Angeles to San Jose (for the same total of 50 between Los Angeles and the Bay Area). This allocation of trains to the two destinations means that everyone traveling to these destinations has lower frequency of trains in the base Altamont network alternative (San Francisco and San Jose) compared to the base Pacheco network alternative (San Francisco and San Jose). This lower frequency contributes to about 6 million fewer annual systemwide passengers in the Altamont Pass base alternative compared to the Pacheco Pass base alternative. The ridership and revenue forecasts accurately represent the effect of this operating assumption.

Although Altamont has the potential to achieve higher ridership between the Bay Area and northern Central Valley (Merced northward), Pacheco achieves higher ridership between the Bay Area and areas from Fresno southward (including Los Angeles and San Diego regions). Due to its proximity to the Central Coast region (through a potential Gilroy station), the Pacheco Pass alternative also creates a sizable HST market to/from the Monterey Bay area; this market is virtually untapped with the Altamont Pass alternative.

The travel times noted in the commenter's footnote (#16) are in-vehicle times between stations. HST's time advantage over auto, and Altamont's time advantage relative to Pacheco, are greatly reduced when comparisons are more accurately made on a door-to-door basis. HST's overall competitive position relative to auto in the Sacramento to Bay Area market is further degraded by higher costs for HST relative to auto and by the fact that the entire Sacramento region is served by one HST station located in Downtown Sacramento. Given these factors, HST's mode share between Sacramento and the Bay Area is about 5.2% for Altamont and 3.6% for Pacheco.

O007-52

Please see Response to Comment O007-50.

O007-53

The Authority and FRA disagree with the comment. The ridership and revenue forecasts and underlying methodology used for the Draft Program EIR/EIS are current, transparent and accurate. No revisions are necessary. Please see Response to Comment O007-44 for availability of detailed, transparent information regarding the ridership and revenue model.

O007-54

The core drivers of demand for interregional travel in California are the socioeconomic characteristics of Californians and the state's economic and employment picture. The relevant sources of current year data and 2030 socioeconomic projections are:

- Decennial Census data products, specifically the Census Transportation Planning Package (CTPP) and the Summary Tape File (STF) 1;
- Local agency socioeconomic estimates and projections, such as those developed and updated by the Association of Bay Area Governments, Southern California Association of Governments, San Diego Association of Governments, and Sacramento Area Council of Governments; and
- State Department of Finance and Caltrans projections.

To the extent that commercial sources and state employment data are used to develop the local agency socioeconomic estimates and projections, they were included, but these were not evaluated and incorporated separately for this study because there is a desire to remain consistent with current local agency forecasts.

These growth projections were documented in the model validation report that has been posted on the Authority website (at http://www.cahighspeedrail.ca.gov/ridership/) throughout the public comment period for the Draft Program EIR/S.

Population and employment growth potentially induced by the HST service was not included in the socioeconomic forecasts used for the ridership and revenue forecasts. A separate analysis of growth-inducement potential was undertaken and fully documented in Section 5.

O007-55

For interregional trips, which make up about 75% of total HST trip making, the recreation/other ridership is relatively similar between Pacheco Pass (67% of interregional trips) and Altamont Pass (62% of interregional trips) alternatives. The difference between Pacheco and Altamont is due primarily to Altamont's ability to attract relatively more business and commute trips than Pacheco at stations between Merced and Sacramento. Compared to Pacheco, Altamont draws 1.5 million more business/commute trips and 0.4 million fewer recreation/other trips. Hence, the percentage differences between Pacheco and Altamont in this regard are due to Altamont's ability to attract relatively more business/commute trips in the northern San Joaquin Valley, not to an inherent ability for Pacheco to attract proportionately more recreation/other trips.

For intraregional trips, there are no substantive differences between Altamont and Pacheco in their ability to attract recreation/other trips in southern California. Within the Bay Area, the Altamont base alternative is projected to attract about 330,000 more annual intraregional trips than the Pacheco base alternative. This total, however, masks larger differences in the composition of the trips: Altamont attracts about 1.5 million more business/commute trips and 1.1 million fewer recreation/other trips than Pacheco.

There is substantial intraregional trip making in the corridor between Santa Clara County and San Francisco. Pacheco's ability to draw more "recreational and other" trips is due primarily to the directness of service that Pacheco provides in the entire Santa Clara County to San Francisco corridor rather than the inclusion of a Gilroy station. The HST would substitute for some Caltrain and auto travel in this corridor across all trip purposes. HST is at a relative disadvantage to Caltrain for commute and business travelers since, during peak commute hours, Caltrain runs at similar frequencies to HST with lower fares and many more stations. However, HST is at a competitive advantage to Caltrain for recreation and other trips since most of these trips occur during off-peak hours; in the off-peak, HST's travel time and frequency advantage outweigh Caltrain's lower cost. Hence, HST would be able to capture recreation and other riders at a higher rate than business and commute riders in the corridor between Santa Clara County and San Francisco.

From a ridership and revenue standpoint, one of the main differences between the base Altamont and Pacheco scenarios involves the splitting of train service between San Jose and San

Francisco in the Altamont scenario. This split eliminates a direct HST connection between San Jose and San Francisco and significantly reduces the frequency of train service to either destination. The effects of an Altamont operational split are not obvious for business and commute travelers since, during peak commute hours, HST would provide high frequency service to both San Jose and San Francisco and the alternative transit options (BART to San Francisco and ACE to San Jose) provide substantially slower travel times. The effects are much more obvious for recreation and other travelers because:

- Overall HST frequencies would be lower during off-peak hours when most recreation and other trips occur. With the operational split, frequencies would be further reduced to San Jose and San Francisco, putting HST at a strong disadvantage to the auto for recreation and other trips.
- In spite of its slower travel time, BART is a relatively more attractive transit option for recreation and other travelers between the East Bay and San Francisco due to its lower cost and much higher off-peak frequency.
- The loss of direct service between Santa Clara County and San Francisco means that HST is capturing very few recreation/other trips in this corridor.

Hence, the base Altamont scenario is able to capture business and commute riders at a much higher rate than recreation and other riders for trips to and from the East Bay.

Full documentation of the methodology used to obtain projected ridership has been completely documented in a series of technical reports, which are posted on the Authority website at http://www.cahighspeedrail.ca.gov/ridership/. These reports have been available at this location throughout the public comment period for the Draft Program EIR/EIS.

The underlying source of the intraregional travel market definitions for the Bay Area used in the HST study was developed by the MTC and is documented on their website: http://www.mtc.ca.gov/maps_and_data/datamart/forecast/.

These forecasts are used by the MTC for planning purposes and are validated using available observed data sources. These validation reports are also provided on the MTC website.

O007-56

All of the information requested by the commenter was available during the Program EIR/EIS circulation period in Appendix A of the "Ridership and Revenue Forecasts" report (Draft Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study, Ridership and Revenue Forecasts, Cambridge Systematics, 2007) described by the commenter and posted to the Authority's website. The information requested by the commenter is further provided in the tables below.

Station Boardings for Base Pacheco Alternative (P1)

Station Name	Annual Boardings	Percent Intraregional	Percent Interregional
San Francisco – Transbay	11,699,200	12	88
Millbrae	1,180,700	52	48
Redwood City	2,014,000	28	72
San Jose	5,338,000	25	75
Morgan Hill	363,000	74	26
Gilroy	1,767,000	11	89
Sacramento	7,019,000	0	100
Stockton	1,711,000	0	100
Modesto Briggsmore	1,290,000	0	100
Merced	641,000	0	100
Fresno	2,573,000	0	100
Bakersfield	3,210,800	0	100
Palmdale	4,355,500	46	54
Sylmar	5,681,200	38	62
Burbank	1,698,900	43	57
LA – Union Station	8,125,200	36	64
Norwalk	590,100	71	29

Station Name	Annual Boardings	Percent Intraregional	Percent Interregional
Anaheim	3,102,600	35	65
Irvine	2,926,700	41	59
City of Industry	3,619,600	61	39
Ontario	3,584,700	52	48
Riverside	6,012,700	39	61
Temecula	3,075,300	42	58
Escondido	3,382,800	4	96
University City	2,279,800	4	96
San Diego	6,649,500	3	97
Total Ridership	93,890,000	25	75

HST Station Boardings for Base Altamont Alternative (A1)

Station Name	Annual Boardings	Percent Intraregional	Percent Interregional
San Francisco – Transbay	8,642,500	14	86
Millbrae	1,070,600	56	44
Redwood City	1,229,900	42	58
Warm Springs	474,000	63	37
San Jose	3,052,300	41	59
Bernal	4,042,400	16	84
Sacramento	7,653,200	0	100
Stockton	1,251,800	0	100
Tracy Downtown	818,000	0	100
Modesto Downtown	1,618,000	0	100
Merced	683,300	0	100
Fresno	2,573,000	0	100
Bakersfield	2,797,000	0	100
Palmdale	4,025,100	50	50
Sylmar	5,279,800	40	60
Burbank	1,633,600	44	56
LA – Union Station	7,700,800	38	62
Norwalk	538,000	77	23
Anaheim	2,958,100	37	63
Irvine	2,771,600	43	57
City of Industry	3,483,900	63	37
Ontario	3,403,400	54	46
Riverside	5,610,600	42	58
Temecula	2,884,400	45	55
Escondido	3,224,000	5	95
University City	2,158,400	5	95
San Diego	6,336,800	3	97
Total Ridership	87,910,000	27	73

O007-57

The Draft Program EIR/EIS discussed the Bay Area Regional Rail Plan that was under development when the Draft Program EIR/EIS was released. Please see Standard Response 3 regarding the consideration of regional rail service in evaluating the network alternatives. The Authority has carefully considered how best to capture riders from interregional travel and long-distance commuters. The HST service is most competitive in the intermediate to long-distance California markets where it offers:

- Much faster travel times than the lower cost and more convenient auto mode, particularly for people traveling in groups;
- Much faster travel times and higher frequencies than the lower cost conventional rail model; and
- Equivalent door-to-door travel times and frequencies as the more expensive air mode.

A competitive service for long-distance commuters requires more frequent station stops so that travel times for the commuters from the origin to the ultimate destination is competitive with the automobile.

A system with HSTs that includes a commuter-oriented overlay service would require more closely spaced stations and two additional express tracks so that HSTs could pass through the stations without stopping, as would be the case for the Caltrain Corridor. Without these express tracks, HST travel times would be

compromised and the ability to capture interregional passengers would be reduced.

In short, a combined HST and commuter rail overlay in the Altamont Corridor would involve more stations, each with four tracks. Additionally, the Altamont alignment requires provision for two freight tracks, so six tracks would need to be provided for the Altamont stations and station areas. The transition from two to four HST tracks requires some distance on either side of the stations, and for very closely spaced stations, this transition would not occur (i.e., there would be four tracks between the stations). Please also see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative and Chapter 8 of this Final Program EIR/EIS and Response to Comment O007-46.

O007-58

In Table 7.2-8 of the Draft Program EIR/EIS it is noted as part of the constructability analysis that:

> *Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.*

Given that this is a program-level document, this acknowledgement that a bridge would require "special construction methods and mitigations" is sufficient. Please also see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative and Chapter 8 of this Final Program EIR/EIS.

O007-59

For the reasons stated in Response to Comment O007-22, it is not feasible to use the Dumbarton rail bridge for the HST system. However, the Authority recognizes that increased and enhanced conventional rail service could benefit greatly from the access to the midpeninsula that a rehabilitated Dumbarton bridge would provide.

O007-60

The Draft Program EIR/EIS provided station information and associated analysis of impacts as is currently available. Station location options for each of the alignment alternatives are provided in Chapter 2 (Table 2.5-3). Station fact sheets are provided in Appendix 2-F, including concept drawings. Further review of station concepts and configurations will be provided in Tier 2 project-level environmental documents, when more detailed engineering and design information is available for the HST system. Traffic, transit, circulation, and parking impacts of the stations are described in Chapter 3, Section 3.1. Individual streets examined in this section are illustrated by the screenline diagrams in Appendix 3.1-A, Station Location Street Maps. Construction impacts are evaluated in Section 3.18. Growth inducement associated with the stations is reviewed in Section 5.5.

O007-61

The Authority and FRA find that the Draft Program EIR/EIS provides consistent and complete information regarding the description of and impacts associated with multiple HST alignments and station location options in the Bay Area to Central Valley. Please see Standard Responses 1 and 2.

As noted in Table 2.5-4, the primary reasons for elimination of the Los Banos Station are revenue/ridership and environmental factors. Environmental factors listed in this table include "Water resources, threatened and endangered species, growth related impacts" (page 2-44). Appendix 2-G, "Alignment Alternatives and Station Location Options Eliminated from Further Consideration," states the following regarding the elimination of the Los Banos Station:

> *Los Banos: A HST station location option at Los Banos (Western Merced County) would have low intercity ridership, limited connectivity and accessibility, and potential impacts to water resources and threatened and endangered species. Although the City of Los Banos supports the Pacheco Pass alignment alternative with a potential station location option at Los Banos, considerable public and agency opposition has been expressed about this station location option because of its perceived potential to result in*

> *growth related impacts. This station location option (as well as the Visalia/Hanford station location option) has low ridership potential compared to other potential station location options investigated by the Authority. In 2020, this station location option is forecast to serve a population of only about 88,000 (forecast to only have between 155,000 and 190,000 annual total intercity boardings and alightings by 2020). This station location option would have poor connectivity and accessibility and, with potential for environmental impacts, would not meet the basic program objectives.* (Page 2-G-8)

This Final Program EIR/EIS has no Los Banos station, and the Authority has reiterated and expanded its commitment that there will be no station and no maintenance facility between Gilroy and Merced. See Chapter 8.6.2 of this Final Program EIR/EIS regarding further mitigation to avoid potential HST impacts. See also Section 3.15.5 regarding the Authority's commitment to acquire agricultural, conservation, and/or open space easements for potential impacts in and around the GEA.

As noted in Chapter 2, "Alternatives," "Conceptual designs are based on engineering criteria (California High-Speed Rail Authority and Federal Railroad Administration 2004)" (page 2-38). These criteria have been and are available for public review on the Authority's website and at the Authority's offices.

The environmentally superior alternative is identified in this Final Program EIR/EIS in the Summary and in Chapter 8. CEQA does not require, nor does the Authority believe that it would be appropriate to identify an environmentally superior alternative for both Altamont and Pacheco alternatives. Rather, the Authority and FRA have identified the environmentally superior alternative from among all alternatives for both Pacheco and Altamont Passes. Please see Response to Comment O007-22 regarding the Dumbarton Bridge.

O007-62

The development of potential freight service on the HST system is not proposed as part of this project; therefore, it would be both beyond the scope of this analysis and speculative. It may or may not be proposed during future HST system implementation.

O007-63

The Authority and FRA acknowledged that regional and local governments could be funding partners for commuter improvements in the ACE corridor. Please refer to the description of findings from MTC's Regional Rail plan provided in Section 3.17. It must be noted that commuter services such as ACE typically operate at a revenue deficit. Please refer to Standard Response 3 in regards to the identification of the Pacheco Pass as the Preferred Alternative.

O007-64

Please see Standard Response 1, 2, and 3, as well as Response to Comment O006-3.

The Authority and FRA disagree that recirculation of the Draft Program EIR/EIS is necessary.

O007-65

Please see Response to Comment O007-37 and Standard Response 2.

O007-66

Please see Standard Response 5 regarding mitigation strategies.

O007-67

Please see Standard Response 5 and Responses to Comments L029-61, O007-25, O007-28, O007-37, and O007-61.

O007-68

Please see Standard Responses 2 and 5, as well as Response to Comment O007-67.

O007-69

Impact analyses throughout the Draft Program EIR/EIS appropriately take into account both current and future conditions.

The alternative alignments are shown on current aerial photography. In some cases, current conditions formed the basis for the analysis,

given that these conditions are not likely to change in the future. These include geology and soils, hydrology and water resources. In other cases, current conditions were used for analysis, given that future conditions are not easily foreseeable. These include hazardous, agricultural, water resources, EMF, visual setting, public utilities, cultural/ paleontology, and 4(f) and 6(f) resources. Where appropriate, current conditions are used as the baseline and future (2030) conditions are evaluated based on existing plans, programs, and current projections. These include traffic and parking, land use, energy, air quality and air emissions, biological resources and wetland, and travel conditions (ridership).

O007-70

The Authority and the FRA disagree with this comment. Comparisons to existing traffic conditions are provided. Because of expected background growth in traffic, horizon year comparisons between build and no build conditions are typically more relevant for determining potential project effects.

Please see Response to Comment O007-69. The Draft Program EIR/EIS provides information regarding current (2005) V/C ratios and levels of service (LOS) and anticipated changes between 2005 and 2030.

The HST system was not evaluated as if it exists on the ground today. Given that such a condition cannot exist, this is not a reasonable alternative.

O007-71

Please see Response to Comments O007-69 and O007-70.

O007-72

Please see Response to Comments O007-69 and O007-70.

O007-73

The Authority and FRA disagree that recirculation of the Draft Program EIR/EIS is necessary. Far from confusing or obscuring true impacts, the approach applied in the Draft Program EIR/EIS provides an appropriate evaluation of the impacts. Please see Response to Comments O007-69 and O007-70.

The Authority and FRA disagree that the approach used in the Draft Program EIR/EIS would likely understate the impacts. Congestion levels on the regions roadways will typically increase between 2005 and 2030, so traffic impacts from associated with the HST project should appropriately be evaluated with these more congested roadways. The impacts will be more severe, requiring more mitigation.

In addition, the approach taken in the Program EIR/EIS takes into account population growth that will occur in the Bay Area to Central Valley region and in the state. Ridership levels are based on this assumed growth, and these ridership projections form the basis for the parking demand and traffic that would be generated at the HST stations, thus leading to the identification of true levels of impact.

O007-74

Please see Response to Comment O007-73. The increase in traffic from the HST system has been compared against the true traffic load and capacity that would exist when the HST system is developed and operating – not against the lower traffic levels present today. Moreover, the traffic generated by the HST stations is based on ridership projections that appropriately assume projected population growth in the Bay Area to Central Valley and in the state.

O007-75

The comment asks for overly detailed analysis of unforeseeable growth that would be speculative and inappropriate for this programmatic analysis. Please see Standard Responses 1 and 2, as well as Standard Response 4 and Chapter 5.

The analysis of direct transportation impacts in Section 3.1, indirect transportation impacts in Section 5.4.1, and cumulative transportation impacts in Section 3.17.4 demonstrate that no transportation system needs would be “induced ...if HST is introduced and in turn induces new growth.”

O007-76

Because traffic saturation leads to long peak periods on the intercity highways, as described in Table 3.1-2, the results of using an individual peak hour would yield very similar results to that of using the total peak periods. Also see Response to Comment O007-73.

Please see Response to Comments O007-69 through O007-75.

O007-77

The No Project alternative does not include facilities of the proposed HST project. The referenced text is describing a dynamic transportation environment responding to projected demographic growth. Please see page 3.1-24, Section 3.1.3, Environmental Consequences. This section explains, in detail, the differences between existing conditions and the No Project Alternative. Although the No Project Alternative analyzed some of the existing stations that would also act as HST stations, this alternative does not take into account the new HST stations as the HST alternative has been treated and analyzed independently.

The new infrastructure referred to in this text is at existing stations and does not include the HST project. The text appropriately states that travel demand on the local roads surrounding the station location options would increase, absent the HST project. Please see Responses to Comments O007-69 through O007-75.

O007-78

Because there will be no station between Gilroy and Merced, and because the HST tracks would not attract development, the HST would not induce growth in the Pacheco area as the comment describes. Please see Standard Response 3 and Response to Comment O007-75.

Please see Section 5.4.1 for a discussion of the indirect transportation impacts associated with induced growth.

Either of the HST alignments, Pacheco or Altamont, would REDUCE pressure for a highway and associated infrastructure through the Diablo Range. The most pressure would arise under the No Project Alternative. Table 3.1-2 in the Program EIR/EIS shows that year 2030 peak-period traffic volumes across the Diablo Range (SR-152 and I-580) would be reduced by 6,937 for the Pacheco Pass alternative and 6,566 for the Altamont Pass alternative. These reductions represent about 5% of peak period traffic across the Diablo Range.

Further, Table 5.3-5 shows that the Pacheco alternative could induce up to 1.2% population growth in the northern Central Valley (Sacramento County to Fresno County), while the Altamont HST alternative could induce up to 1.9% population growth in that area. This growth inducement (1.2 to 1.9%) is less than the reduction in auto travel due to modal diversion, indicating that either HST alternative will result in less traffic over the Diablo Range than the No Project Alternative.

The net conclusion is that HST would reduce the pressure for a new highway and associated infrastructure across the Diablo Range, and Pacheco would result in a greater reduction than Altamont.

O007-79

The comment asks for more specific information than is known or reasonable to expect at the program level of analysis. Please see Standard Responses 1 and 2.

A review of detailed construction impacts and haul routes at the program level is neither practical (in terms of the extensive time and effort) nor necessary. Identification of the Preferred Alternative, including station locations, enables a detailed evaluation of construction impacts for both the alignment and station locations (e.g., identification of construction haul routes and trips). Such an approach is consistent with typical project planning and environmental review requirements.

Please see Response to Comment O007-62 regarding HST freight. Please also see Response to Comments O007-69 through O007-77 regarding treatment of current conditions and the No Project Alternative. See also Response to Comment O007-74 regarding traffic impact analyses.

Information on ridership on the different modes has been presented in summary, comparative fashion in the Program EIR/EIS, especially Sections 1.2.2, 2.3.3(C), 3.1.2, and 7.2. More detailed results have been completely documented in a series of technical reports that are posted on the Authority's web site at http://www.cahighspeedrail.ca.gov/ridership/.

The catchment areas are an output of the ridership and revenue model, not an input assumption. Hence, "consistent assumptions concerning catchment areas" do not exist, nor should they exist. Station catchment areas are very dynamic and are a function of the alignment and station location options included in a particular HST alternative, as well as the relative travel time and cost among the different travel options available in each travel market.

O007-80

The comment asks for overly detailed analysis of unforeseeable transportation improvements that would be speculative and inappropriate for this programmatic analysis. Please see Standard Responses 1 and 2.

The potential for the HST system to induce the need for future transportation system improvements was addressed in Section 5.4.1. Please see Response to Comment O007-78. Access and egress to the HST system can be provided by the existing, planned, and programmed transportation system that is part of the No Project Alternative.

O007-81

The comment asks for overly detailed analysis of unforeseeable transit improvements that would be speculative and inappropriate for this programmatic analysis. Please see Standard Responses 1 and 2.

As discussed in the Draft Program EIR/EIS, connectivity was a key consideration in station location. Table 3.1-4 identifies connecting transit services at HST stations. The tables in Chapter 7 also summarize transit connectivity for the network alternatives. The existence of the publicly owned Caltrain Corridor and the ability to provide a four-track system in this corridor, with impacts that are less than other new or expanded corridors, was among the reasons for identification of the Pacheco Pass /Caltrain Corridor as the Preferred Alternative. Please also see Standard Response 3. Please see Response to Comments L025-3 and L025-5 regarding complementary commuter and HST service along the Caltrain Corridor. Please also see letter L026 from SamTrans, Caltrain, and San Mateo County Transportation Authority in support of the Pacheco Pass/Caltrain Corridor alternative.

It is acknowledged that an Altamont alternative crossing the San Francisco Bay and heading into San Francisco would not require use of the Caltrain Corridor south of Dumbarton nor would it result in the associated impacts. The identification of the Preferred Alternative took these reduced impacts into account but also acknowledged that other impacts that would occur for this alternative, for instance impacts on the San Francisco Bay. Please see Chapter 8 of this Final Program EIR/EIS.

Please also see Response to Comment O007-46.

The Transbay Transit Center is currently reviewing the appropriate and most effective mix of peak-hour HST and commuter trains, and the Authority will participate in this discussion during the preliminary engineering and project-level environmental review. Please also see Response to Comment L030-3.

The Authority and the FRA disagree with the comment that the described design of the two-level, eight-track HST San Jose Diridon station is "implausible." The City of San Jose has already undertaken planning studies for such a station.

The multiple transit providers at the Diridon station—Caltrain, Capitol Corridor, ACE, AMTRAK, light rail, the proposed BART extension, and bus and shuttle services—and the extensive connectivity that this provides are among the reasons that Pacheco Pass/Caltrain Corridor is identified as the Preferred Alternative.

O007-82

Please see Standard Response 5. During preliminary engineering and the project-level environmental review phase, the Authority and FRA will not only review mitigation of potential adverse impacts on transit, but also the opportunities to enhance connections between the HST system and these transit providers. The Authority and FRA note that construction impacts on transit systems would be temporary, while the HST system would be ultimately beneficial and complementary.

O007-83

Please see Standard Response 5 regarding mitigation strategies, as well as Response to Comments L029-61, O007-25, O007-28, O007-37, O007-61, and O007-67. A number of detailed cost-effective mitigation measures that are consistent with the overall mitigation strategies identified in this Program EIR/EIS will be possible. Given the level of conceptual engineering and the sheer number of alignment alternatives and station location options under review in this Program EIR/EIS, development of detailed mitigation measures for possible options and combinations is neither achievable nor practical.

Detailed mitigation measures, including the exact location and design, consistent with the mitigation strategies in this Program EIR/EIS, will be identified during the preliminary engineering and project level environmental review phase, and the right-of-way required and associated impacts can be determined in detail at that point. Even though impacts associated with these detailed measures will likely fall within the overall envelope of impacts identified in this Program EIR/EIS, the impacts associated with the detailed measures will be fully reviewed and disclosed in the project-level environmental review.

Right-of-way costs have been included for the conceptual alignments (Chapter 4). Detailed right-of-way maps are unnecessary and impractical at this program level.

O007-84

Please see Standard Response 5. The commenter states that the Draft Program EIR/EIS "concludes that all potentially significant traffic and circulation impacts of the HST alternative will be reduced to less than significant with mitigation." This statement is not what is stated in the Draft Program EIR/EIS. Specifically, Section 3.1.5, Mitigation Strategies and CEQA Significance Effects, states:

> *The above mitigation strategies would be refined and applied at the project level and are expected to substantially avoid or lessen impacts around station areas to a less-than-significant level in most circumstances. Planning multi-modal stations, coordinating with transit services, providing accessible locations and street improvements, and encouraging transit-oriented development in station areas would help to ease traffic constraints in station areas. At the project level, it is expected that for various HST station projects, impacts would be mitigated to a less-than-significant level, but it is possible that for some stations impacts would not be mitigated to the less-than-significant level. Sufficient information is not available at this programmatic level to conclude with certainty that the above mitigation strategies would reduce impacts around stations to a less-than-significant level in all circumstances. This document therefore concludes that traffic impacts around station areas may be significant, even with the application of mitigation strategies. Additional environmental assessment will allow a more precise evaluation in the second-tier, project-level environmental analyses. The co-lead agencies will work closely with local government agencies at the project level to implement mitigation strategies.* (page 3.1-38, emphasis added)

O007-85

Please see Response to Comments O007-69 through O007-77 regarding treatment of current conditions and the No Project Alternative.

O007-86

The Authority and FRA disagree with the contentions that the air quality methodology used in the analysis is faulty and the air quality analysis is inadequate. The air quality methodology is consistent

with the other environmental methodologies in the EIR/EIS, which were developed with input from the appropriate regulatory agencies. The potential effects are compared between the existing conditions and the no-build alternative, and then the no-build alternative is compared to the HST alternatives.

O007-87

Executive Order S-3-05, signed by Governor Arnold Schwarzenegger on June 1, 2005, calls for a reduction in GHG emissions to 1990 levels by 2020 (equivalent to a 25% reduction) and for an 80% reduction in GHG emissions to below 1990 levels by 2050. Assembly Bill 32, enacted in 2006, calls for the California Air Resources Board to adopt regulations to help achieve these emission-reduction goals. See discussion of GHG issues in Section 3.3, Air Quality, of this Final Program EIR/EIS.

The effect of the HST system on emissions of CO_2 was calculated and presented in the Draft Program EIR/EIS. 2005 statewide CO_2 levels have been quantified and were estimated at 1.280 million tons per day (California Energy Commission). The air quality analysis identified a reduction of about 17.6 billion pounds of CO_2 emissions annually by 2030 attributed to the proposed HST project. The proposed HST project is shown to have net beneficial impacts related to climate change. Any additional carbon entering the atmosphere, whether by emissions from the project itself or removal of carbon sequestering plants (including agricultural crops), would be more than offset by the beneficial reduction of carbon resulting from the project due to a reduction in automobile VMT (mobile sources) and reduction in the number of airplane trips.

O007-88

Please see Standard Response 5 and mitigation strategies listed in Chapter 3.3 of the Final EIR/EIS. CEQA requires that feasible mitigation be identified where significant adverse impacts have been identified. Mitigation measures are not required for effects which are not found to be significant (CEQA §15126.4 [a]). As noted previously, the proposed HST project is shown to have net beneficial impacts related to climate change. Where beneficial impacts have been identified, mitigation measures are not required. Benefits of the proposed HST system would include reduced vehicle trips, reduced VMT and multi-modal HST stations. Increased energy efficiency for HST facilities, increased recycling, and use of green building technology are all measures that can appropriately be considered in the future during project-level environmental reviews, when more detailed system design and location information will be available.

O007-89

As noted in Response to Comments O007-87 and O007-88, the proposed HST project is shown to have net beneficial impacts related to climate change. Where beneficial impacts have been identified, mitigation measures are not required.

O007-90

Please see Response to Comments O007-87 and O007-88. The Final EIR/EIS includes an expanded discussion of global climate change, including a revised setting discussion, and emissions inventories for the 2005 existing condition, the 2030 No Project Alternative, and proposed HST project alternative. In addition, the Authority is investigating the feasibility of having the HST system be powered by energy sources with zero emissions, but this is not required as a mitigation measure.

O007-91

The Authority agrees that, while not required, creating a carbon neutral HST system is an appropriate goal for the HST. The Authority will examine its feasibility at the project-level analysis. Also see Response to Comment O007-90.

O007-92

See Standard Response 5.

O007-93

The Authority and FRA do not agree that the approach to analyzing impacts on agricultural land is flawed. Please see Standard Response 2. The analysis of all the alternatives identified impacts when compared to the existing (baseline) condition. As stated in the Program EIR/EIS, because it is not possible to identify or quantify the amount of farmland that might be affected by future transportation projects, no quantified impacts were identified for the No Project Alternative. HST alternatives were therefore compared to the existing (baseline) condition.

The Program EIR/EIS recognizes that there would likely be significant impacts from severance. Analyzing severance impacts requires a level of specificity that will be available as the design progresses and will be analyzed as part of the Tier 2, project-level environmental analysis. Assuming that severed lands would be converted to nonagricultural use is speculative at this time, as are potential impacts on agricultural infrastructure and other indirect effects.

Growth inducement is discussed in Chapter 5. An HST trackway does not lend itself to inducing growth in unpopulated areas, such as along the Pacheco Pass alignment, especially along Henry Miller Road. Please also see Standard Response 4.

The direct impacts on agricultural land that were addressed include acquisition of this land. These acres were quantified in Section 3.8 and Chapter 7. The cost of acquiring land was discussed in Chapter 4. Because the HST would generally follow existing transportation corridors, it would tend to result in acquisition of farmland at existing parcel edges, where right of way is needed, thereby reducing severance and other impacts. However, it is likely that some severance impacts would be significant. These and other impacts will be further analyzed in the Tier 2, project-level environmental analysis.

Impacts on specific types of farmland outside of those categorized on available farmland mapping were not addressed in this program document. However, because the HST system generally follows existing transportation corridors, impacts on grazing uses would be limited.

The project does not include residential development and the only potential for growth inducement would be around station locations, which are located in existing developed areas. Chapter 5 addresses the potential growth-inducing impacts of a faster mode of transportation (HST). Please see Standard Response 4 regarding growth.

The identification of the preferred network alternative was based on many factors including in some cases, off-setting or competing impacts. It was not based on the potential for agricultural impacts alone. Please see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative.

The mitigation strategies will be refined in the Tier 2 project-level environmental document. If agricultural easements are identified as a mitigation measure, the timing of these easements will also be identified. In general mitigation intended to avoid or offset impacts is timed to occur before the impact or contemporaneously with the impact. Local land use planning authority resides primarily with local government agencies. The Authority does not have the power to set urban growth boundaries or establish smart growth zoning in individual jurisdictions but has established principles to guide station area planning that are consistent with state “smart growth” goals. See Chapter 6 and Chapter 8, Section 8.6.2.A, and Standard Response 5 regarding mitigation strategies.

The Program EIR/EIS did not state that farmland impacts could be reduced to less than significant even with the mitigation strategies implemented. More specific findings will be determined at the Tier 2 project-level environmental analysis.

O007-94

The Authority and FRA consider the information adequate for the decisions to be made and to meet CEQA and NEPA requirements. Section 3.15 discloses the direct and indirect impacts on biological

resources and wetlands. Section 3.17 discusses the cumulative impacts. See Standard Responses 1 and 2.

O007-95

Please see Standard Responses 2 and 3. Extensive biological resources and wetlands data and information were collected and analyzed and are presented in a comprehensive and uniform manner for the alignment alternatives and station location options. Chapter 3, "Affected Environment, Environmental Consequences, and Mitigation Strategies", Section 3.0.1, "Purpose and Content of This Chapter," of the Draft Program EIR/EIS states:

> *The program EIR/EIS analyzed the potential environmental impacts, including biological resources and wetlands, of the HST alignment alternatives and stations equally. Impacts on resources resulting from both the Altamont Pass and Pacheco Pass alignment alternatives and stations were analyzed consistently and are documented in the program EIR/EIS.*

O007-96

See Standard Responses 1, 2, and 5 regarding the programmatic decision, nature of a programmatic analysis, and the role of mitigation strategies. See also Response to Comment O007-34.

The data for biological resources and wetlands were interpreted and synthesized to the appropriate level for a program-level environmental analysis. Further interpretation and qualifiers, including quality and regional importance, will be developed as part of the Tier 2 project-level environmental analysis, following detailed surveys and habitat assessments.

The biological analysis was based on the thresholds and criteria set in CEQA Appendix G. Impacts on nonsensitive species and habitats were not considered a criterion to base decisions of identifying a preferred alternative. Methods of impact evaluation for the project were developed with input from both state and federal resource agencies. As noted above, additional detailed information regarding potentially affected species will be provided in the subsequent project-level environmental evaluation and documentation. This information will include species descriptions, distribution, seasonal activity, range, reproduction, habitat characteristics, population status, threats, conservation status, and a detailed evaluation of effects of the project and proposed mitigation. Refer to Response to Comment O007-95 regarding the biological analysis. Section 3.17 includes a cumulative biological resources impact assessment. Section 3.15 recognizes the potential impact that the HST may have on wildlife movement and sets forth mitigation strategies to minimize this impact, such as, include design features such as wildlife underpasses, bridges, and/or large culverts, to facilitate known wildlife movement corridors; ensure that wildlife crossings are of a design, shape, and size to be sufficiently attractive to encourage wildlife use; provide appropriate vegetation to wildlife overcrossings and undercrossings to afford cover and other species requirements; establish functional corridors to provide connectivity to protected land zoned for uses that provide wildlife permeability; design protective measures for wildlife movement corridors in consultation with resource agencies; and use aerial structures or tunnels to allow for unhindered crossing by wildlife.

O007-97

Additional information on wildlife movement linkages was added to Figure 3.15-3 in this Final Program EIR/EIS from the draft Santa Clara County Habitat Conservation Plan. It should also be noted that many of the wildlife movement corridors are along drainages. The HST would be elevated over drainages, which would minimize impacts on wildlife movement corridors. When field surveys are conducted as part of the Tier 2, project-level analysis, specific biological values and ecosystem functions will be assessed, habitat connectivity and other wildlife movement corridors will be identified, specific impacts on biological resources and wetlands will be analyzed, and detailed mitigation measures building off the strategies proposed in Section 3.15.5 will be identified. See also Standard Responses 2 and 5 regarding the nature of a programmatic analysis and the role of mitigation strategies.

O007-98

The specific functions and values of wetlands potentially affected by the HST alignment alternatives will be determined as part of a subsequent Tier 2, project-level environmental evaluation when detailed wetland delineations are conducted and impact areas for direct and indirect effects are identified in more detail. At the time that project-level analysis is being conducted, a survey of the availability of replacement wetlands will also be conducted. The Authority and FRA will continue to work with the resource agencies and others to identify wetlands mitigation. As noted in Section 3.15.5, mitigation strategies include onsite or offsite restoration, creation, or enhancement; mitigation banking; or in-lieu fee payments. The USACE typically favors the use of approved mitigation banks or in-lieu fee programs in cases where they result in more regional or watershed benefit than onsite compensatory mitigation.

O007-99

Section 3.15.2 provides information on the U.S. Fish and Wildlife Service Grasslands Wildlife Management Area, The Nature Conservancy lands including the Mount Hamilton Project, East Bay Regional Park District lands, CDFG-owned/managed lands, as well as other conservation lands. The impacts on these lands are discussed in Section 3.15.3, and such impacts will be analyzed in further detail in future project-level environmental documents addressing the selected alternative or alternatives.

O007-100

The Authority and FRA disagree with this comment. The Draft Program EIR/EIS adequately characterized biological resources potentially affected by the HST alternatives, and, to better convey the information, an additional figure, Figure 3.15-4, Public Lands – San Jose to Central Valley Corridor, has been added in this Final Program EIR/EIS to show urban areas, roads, and publicly owned/managed lands. This figure, in addition to Figures 3.15-1 through 3.15-3, as well as other figures throughout the Program EIR/EIS, shows information that characterizes the resources within the project study area. This is discussed on page 3.15-11 of the Draft EIR/EIS, and an additional sentence was added in this Final Program EIR/EIS stating that no field surveys to identify species were conducted at the program level.

O007-101

Each of the HST alignment alternatives and station location options is evaluated at a consistent level of detail in Section 3.15. Quantification of impacts of projects and programs included in the No Project Alternative was not provided for this document because location information is known for only some of the projects and programs out to 2030. For others, no alignment or other physical locations have been identified. Therefore, any quantification estimate would represent only a partial magnitude of the potential impacts, and reporting this would be confusing and misleading. Each project-level Tier 2 EIR/EIS will evaluate site-specific HST project alternatives and a related No Project Alternative that will be further refined with the information known at that time.

Please see Standard Response 2 and Response to Comment O007-96 regarding level of analysis. Additional information on wildlife corridors and linkages has been added to Section 3.15 in this Final Program EIR/EIS. Additional detail related to species identified, habitats, and wildlife corridors is contained in Appendices 3.15-A through 3.15-N. Further interpretation and qualifiers, including relative values, functions, and regional importance, will be developed as part of the Tier 2 project-level environmental analysis following detailed surveys and habitat assessments. The discussion of the network alternatives in Chapter 7 takes into consideration the impacts of alignments and stations identified in Chapter 3 that, when added together, constitute a network alternative.

O007-102

The direct and indirect impacts on the grasslands vegetation community, including the San Jose to Central Valley corridor, was identified in Section 3.15.3 of the Draft Program EIR/EIS. Appendices 3.15-A-1 and 3.15-A-7 identify habitats, including

grasslands, where sensitive species may occur. Impacts on species that may occur in grassland habitat are also discussed in Section 3.15, including the San Joaquin kit fox. It should be noted that San Joaquin kit foxes occur in a variety of habitats, including grasslands, scrublands, vernal pool areas, alkali meadows and playas, and an agricultural matrix of row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands (U.S. Fish and Wildlife Service 1998). Mitigation strategies are discussed in Section 3.15.5 and include biological resources management plans (BRMP). BRMPs will specify the design and implementation of biological resource mitigation measures, including habitat replacement and revegetation, protection during construction, performance (growth) standards, maintenance criteria, and monitoring requirements. The primary goal of a BRMP is to ensure the long-term perpetuation of the existing diversity of habitats in the project area and adjacent urban interface zones. Specific to habitats, including grasslands, BRMPs will contain, among other things, specific measures for the protection of sensitive amphibian, mammal, bird, and plant species during construction; identification and quantification of habitats to be removed, along with the locations where these habitats are to be restored or relocated; and procedures for vegetation analyses of adjacent protected habitats that will be used to determine the requirements of the revegetation areas.

To avoid impacts from building access roads, construction in sensitive areas (as defined at the project level) would use in-line construction (i.e., use new rail infrastructure as it is built) to transport equipment to/from the construction site and to transport excavated material away from the construction to appropriate reuse or disposal sites. See discussion of construction methods and impacts in Section 3.18, and Response to Comment L029-29

Cumulative biological impacts are discussed in Section 3.17 and growth inducement is discussed in Chapter 5. See also Standard Response 4. The HST trackway itself would not induce growth, especially in relatively undeveloped areas along the Pacheco Pass corridor. Station location options have been placed within urban areas in the San Jose to Central Valley corridor, including San Jose, Morgan Hill, and Gilroy.

O007-103

Impacts on parks and wildlife refuges are discussed in Section 3.16, Section 4(f) and 6(f) in more detail. Some parks and recreation areas, depending on uses, can provide functional biological open space. Where this occurs, those are discussed in Section 3.15 under the heading Special Management Areas. Potential impacts on these lands and conservation areas are also discussed in Section 3.15. Design practices have been included in the alignment alternatives to minimize potential impacts on these lands, including the use of tunnels through much of the Diablo Range and in the East Bay under parks and conservation areas and elevated structures through a large portion of the GEA. Additional engineering design refinements will be undertaken to avoid and/or minimize environmental impacts on these resources as part of the Tier 2 project-level environmental analysis.

It would be very unlikely that growth-inducing impacts would occur within special management areas (parks, refuges, or conservation areas) since the management agency or entity would be required to approve any development. Specific impacts on special management areas will be further identified as part of the Tier 2 project-level environmental analysis once additional design details are known. Refer to Response to Comment Letters S006, California Department of Fish and Game, and L029, Grassland Water District. Also refer to Response to Comment F002-10 regarding the kit fox. Detailed noise and vibration studies as they relate to biological resources will be required and conducted as part of the Tier 2 project-level environmental analysis.

O007-104

Please see Standard Response 5 regarding mitigation strategies. Section 3.15 does not purport that the mitigation strategies identified would fully mitigate significant impacts at the program level. It concludes that impacts on biological resources would

remain significant, even with the application of mitigation strategies. Additional environmental assessment at the Tier 2 project-level will allow a more precise evaluation of the effectiveness of mitigation measures, which will also be further refined at the Tier 2 project level.

O007-105

The Authority and FRA do not agree that the cumulative impacts assessment for biological resources presented in the Draft EIR/EIS is deficient. Revision of the Draft Program EIR/EIS and recirculation are not necessary. The cumulative impacts analysis for biological resources and wetlands discussed in Section 3.17.4, subsection N, indicates that under the No Project Alternative, the cumulative impact related to biological resources and wetlands would be significant when considering past, present, and reasonably foreseeable future projects in the study area. The Program EIR/EIS also states that the HST network alternatives would result in a considerable contribution to a significant cumulative impact on biological resources and wetlands when considering past, present, and reasonably foreseeable future projects in the study area.

The direct and indirect impacts of the HST network alternatives are discussed in Section 3.17, subsection N. There is not enough specific information about the proposed network alternatives or many of the projects included in the cumulative impact analysis to provide a discussion of the issues in this comment at a more detailed level in this program-level document. Each of these issues as they relate to a particular section of the HST System will be further reviewed as part of a subsequent Tier 2 project-level analysis, when more detailed engineering, design and location information will be available, along with variations in alignments to further reduce and avoid impacts.

O007-106

Please see Standard Response 2 regarding the level of detail. Please see Section 3.7.1, Land Use Compatibility, which states:

> *Future land use compatibility is based on information from general plans and other regional and local transportation planning documents. These documents were examined to assess an alignment alternative's potential consistency with the goals and objectives defined therein. An alignment alternative is considered highly compatible if it would be located in areas planned for transportation multi-modal centers or corridor development, redevelopment, economic revitalization, transit-oriented development, or high-intensity employment. Compatibility would be considered low if an alignment alternative would be potentially inconsistent with local or regional planning documents...* (page 3.7-2)

In addition to the program-level analysis, local standards and requirements will be considered during preliminary engineering and Tier 2 project-level environmental review, and during final design. Please refer to Chapter 6 for a review of the potential of the HST stations to promote sprawl.

Development of parcel maps, zoning maps, and ownership data is well beyond what is required for a program-level review. The land use analysis did review the land use compatibility in areas (including station areas) where right-of-way would need to be acquired. Please see Section 3.7.1, Land Use Compatibility, which states:

> *Because in this analysis an area's sensitivity or compatibility is based on the presence of residential properties, low, medium, and high levels of potential compatibility are identified based on the percentage of residential area affected, the proximity of the residential area to facilities included in an alignment alternative, and the presence of local or regional uses (such as parks, schools, and employment centers). For highway corridors (under the No Project Alternative) and for proposed alignment alternatives, land use compatibility was assessed using GIS layers (or aerial photographs where available) to identify proximity to housing and population and to determine whether the alignment alternatives would be within or outside an existing right-of-way in the study area. Potential impacts are considered low if existing land uses within a potential alignment, station, or maintenance facility area are found to be compatible with the land use changes that may result from the alignment alternative. The type of improvement*

that would be associated with the alignment alternative would also affect the level of potential impact… (page 3.7-2)

Wetland, agricultural land, and geologic impacts are reviewed in Sections 3.14, 3.8, and 3.13. For a discussion of existing land use—the environmental land use setting—please see Section 3.6, B. Discussion of Resources by Corridor, Existing Land Use. As stated,

This section briefly discusses the land use–related resources by corridor along HST Alignment Alternatives in the study area and vicinity. The following five land use-related resources are addressed: (1) existing and planned land use, (2) population characteristics, (3) income, (4) neighborhood and community characteristics, and (5) housing. (page 3.7-6)

O007-107

The contention that land use impacts are reviewed for only one network alternative each for Pacheco and Altamont is incorrect.

All alignment alternatives are reviewed in Section 3.6, B. Discussion of Resources by Corridor, Existing Land Use. Table 3.7.3 reviews land use compatibility, community cohesions, property impacts, and environmental justice for each of the alignment alternatives under consideration, and each of these impacts are reviewed for each of the alignment alternatives in Section 3.7.3, Environmental Consequences. Land use impacts (i.e., compatibility, environmental justice, community, and property) for all alignment alternatives are also provided in Tables 7.3-1 through 7.3-11 in Chapter 7.

The composition of the network alternatives is described at the beginning of Chapter 7 of the Draft Program EIR/EIS, which states:

The purpose of this chapter is to summarize and compare the physical and operational characteristics and potential environmental consequences associated with different combinations of alignment alternatives that comprise the HST Network Alternatives, as well as differences among alignment alternatives and potential station location options. This chapter summarizes potential environmental consequences for each of 21 representative network alternatives for the environmental resource areas where relative differences were identified (refer to Chapter 3 under Affected Environment, Environmental Consequences, and Mitigation Strategies for a comprehensive presentation of potential environmental consequences in each environmental resource area for each alignment alternative). The 21 representative network alternatives present a range of reasonable alternatives among the three basic approaches for linking the Bay Area and Central Valley: Altamont Pass (11 network alternatives); Pacheco Pass (6 network alternatives); and Pacheco Pass with Altamont Pass (local service) (4 network alternatives). (page 7-1)

O007-108

Please see Standard Response 2 and Chapter 6 regarding station area development. Infrastructure and public service requirements will be further evaluated as part of the preliminary engineering and project-level environmental review. See also Chapter 5 and Standard Response 4. The need for general plan and zoning amendments by the local jurisdictions will be reviewed at the project level. The Program EIR/EIS appropriately reviews and discloses land use impacts at the program level.

O007-109

Please see Standard Responses 2 and 4. Please see Response to Comment O007-106, which notes that general plans were reviewed as part of the land use evaluation and notes that existing land uses along each corridor are described in Section 3.6.B, Discussion of Resources by Corridor, Existing Land Use.

Regarding the study area, Section 3.7.1.B, Methods of Evaluation of Impacts, states:

The analysis was conducted using U.S. Census 2000 block group information/data compiled in a geographic information systems (GIS) format, local community general plans or regional plans, and land use information provided by the planning agencies in each of the regions. Existing and future conditions were described for the No Project Alternative by documenting existing information for existing and planned future land use policy near HST Alignment Alternatives and potential station location options, development patterns for employment and population growth, demographics, communities and neighborhoods, housing, and economics…

> *"…Because this is a programmatic environmental review, the analysis of these potential impacts was performed on a broad scale to permit a comparison of relative differences among the alignment alternatives. Further evaluation of potential impacts would occur at the project-level environmental review.* (page 3.7-1-2)

The study area for growth inducement is California's 58 counties grouped into seven geographic regions, as noted in Chapter 5, Section 5.2.2, Study Area and Alternatives. There will be further study of community impacts in future Tier 2 project-level environmental analysis, when more detailed information concerning the HST system design, engineering, and operations will be available, and will support more detailed review of environmental impacts.

O007-110

Please see Standard Response 5 regarding mitigation strategies. The Authority and FRA agree that additional mitigation strategies may be appropriate for potential land use impacts and further consideration of the mitigation strategies included in this Final Program EIR/EIS will occur in future project-level analyses.

Please see Standard Response 4 regarding potential growth inducement; Chapter 6 for station area development policies; Chapter 8, Section 8.6.2.A, regarding the Los Banos area; and Section 3.7 and Section 3.15.5 regarding future consideration of easements to provide mitigation for impacts.

O007-111

Please see Standard Response 5, Response to Comment O007-37 regarding the identification of significant impacts and the determination of significance with mitigation, and Response to Comment O007-60 regarding station configurations.

O007-112

Please see Standard Response 4 regarding growth, as well as Response to Comment O007-15.

The Authority and FRA disagree that the growth-inducement analysis is inadequate, contradictory, or flawed. The assertion that the Program EIR/EIS characterizes HST growth potential as "potentially beneficial" is false; that term is not used in the Program EIR/EIS in relation to induced growth or secondary impacts.

O007-113

The comment reflects a lack of understanding about potential for rail systems to stimulate land use development and urban growth, which is limited to effects from stations. Please see Standard Response 4 regarding growth and discussion of Los Banos in Chapter 8.

The spatial allocation model used in the growth-inducement analysis (CURBA) accurately characterizes the development potential of land parcels based on ownership, aerial photography (to verify current development patterns), and other critical factors (e.g. access to employment, adjacency to current development and transportation facilities, etc.).

The historical growth examples noted by the commenter are irrelevant for analyzing the potential growth-inducement effects of an HST alternative. The highway improvements that contributed to growth in the San Fernando Valley, Contra Costa County, and other locations disperse accessibility benefits over a very wide geographic area – essentially for several miles around any interchange. The HST alternatives, on the other hand, would provide very localized accessibility benefits to a limited number of station sites around the state. For example, between Sacramento and the Grapevine, there are more than 50 interchanges just on I-5; there are only six preferred HST stations in all of the Central Valley. Therefore, it would be inappropriate to draw conclusions about the type of growth and development that might ensue with the HST system based on the widely dispersed development patterns that are sometimes associated with freeway expansion projects.

The HST system would not lead to a significant increase in commute accessibility between Central Valley homes and Bay Area or southern California jobs. When combined with the fact that the preferred HST

station sites are located in existing downtown areas, HST would not open up new areas to development.

O007-114

The comment points to an example of the meaningful station-by-station differences in growth effects that were described in the Draft Program EIR/EIS to assist the reader. Please see Standard Response 4 regarding growth.

The Authority and FRA disagree that the growth-inducement analysis does not provide sufficient information on HST alignment and rail stations consistent with the program-level of analysis. Refer to Standard Response 4 regarding growth, as well as Response to Comment O007-15. See Response to Comment F007-12 for a discussion of the need for mitigation of secondary impacts. See Response to Comment F007-12 for a discussion of inferring growth-inducing impacts of specific station sites.

O007-115

The comment reflects a lack of understanding about potential for rail systems to stimulate land use development and urban growth, which is limited to effects from stations. No station is planned near or in the "Grasslands area." Please see Standard Response 4 regarding growth, and Chapter 8, Section 8.6.2.A.

Contrary to the commenter's assertion, introduction of HST along the Pacheco (or Altamont) alignment will not make it possible for Bay Area employees to easily commute to and from locations around the Grasslands area, or elsewhere in the Central Valley. See Standard Response 4 for a discussion of the commute accessibility potential of HST versus auto; Response to Comment O007-113 for a discussion of general accessibility differences between highways and HST; and Response to Comment O006-6 for a discussion of how access and egress to an HST station affects the door-to-door travel time and cost of HST relative to auto.

O007-116

The methodology used to derive the results shown in Table 5.3-5 and all subsequent tables is summarized in Section 5.3.1 and detailed in the technical report on economic growth effects[4]. The values presented in these tables are accurate, reasonable, and logical.

The induced population and population growth in each county are a function of three factors: 1) changes in highway VMT and vehicle-hours of travel (VHT) due to diversion of highway trips to HST and access/egress to HST stations; 2) utility benefits that travelers gain by switching to HST from air, auto and conventional rail; and 3) improved access to labor and markets due to the introduction of HST. The three factors are somewhat interrelated, yet can interact in complex and conflicting ways.

At a county level, the Altamont and Pacheco alignment alternatives provide about the same extent of utility benefits for travel to/from the Bay Area, and they also create about the same VMT and VHT reduction due to diversion of auto trips to HST. The key factor that leads to the results noted in the comment (higher Contra Costa County and Alameda County growth under Pacheco than Altamont) is the increase in auto VMT and VHT due to HST station access/egress. Essentially, counties with HST stations end up with increased VMT/VHT due to in the influx of travelers from adjacent counties; this influx reduces the relative travel time benefit for the counties with the HST stations, and in turn reduces the induced population and employment growth. From a growth inducement standpoint, the improvements in access to labor and markets are simply not able to offset the travel time benefit of having an HST station in the county.

[4] Cambridge Systematics, Inc.; Economic Growth Effects Analysis for the Bay Area to Central Valley Program-Level Environmental Impact Report and Tier 1 Environmental Impact Statement – Final Report; July 2007.

O007-117

The FRA and Authority disagree that the growth analysis needs to be redone. Please see Standard Response 4.

Section 5.2.2 in the Program EIR/EIS provides the list of HST stations that were included in the quantitative growth analysis. See Response to Comment F007-12 for a discussion of inferring growth-inducing impacts of specific station sites.

Sections 4.2 and 5.2 of the technical report on economic growth effects provide a detailed review of growth inducing differences between the alternatives, and these differences are fully disclosed in summary fashion in Section 5.3 of the Bay Area to Central Valley Program-Level EIR/EIS. These discussions are based on information derived from a multi-tiered analytic process and state-of-the art economic forecasting tools. The methodology, assumptions and supporting data for the analysis process are fully explained in the technical report on economic growth effects. See Response to Comment O007-15 for a summary of this analysis process.

O007-118

The growth analysis considered and described the changes from the existing conditions to the future No Project Alternative. The comment reflects a lack of understanding that growth in all parts of the study region will take place with or without the HST system. Please see Standard Responses 1, 2, and 4.

The growth-inducement analysis comprehensively considers all assumed demographic, economic and transportation system features of each alternative as described in Chapters 2, 3 and 5. By definition, "undeveloped areas [that are] underserved by roads and transit" are unlikely to experience induced growth since they lack access to employment, consumers, and other key necessities of everyday life. Since preferred HST station sites are in currently developed downtown areas, HST will not improve accessibility to undeveloped areas.

O007-119

The comment reflects a lack of understanding of concentrating effects of rail (transit, commuter, intercity, and high-speed) stations on land development and urban growth demonstrated in countless locations around the world. Please see Standard Response 4 regarding growth.

The methodology, assumptions, supporting data, results, and conclusions for the analysis process are explained and substantiated in the technical report on economic growth effects. (See Response to Comment O007-15 for a summary of this analysis process.) In particular, see Section 3.3 and Appendices E and F in that report for a discussion of the models and data that were used to derive the analysis results and conclusions. The technical report demonstrates that consistent development and density assumptions were used for all alternatives, and that a continuation of each county's trend in development patterns was assumed except for a small density increase within 1-mile of an HST station.

The analysis indicates that HST system "concentrates commercial growth around stations" and is "correlated with higher overall growth rates." Results and conclusions presented in Chapter 5 support these points. The HST system also has the potential to disperse "residential populations and induce long distance commuting," but only if HST offers substantially better door-to-door travel time and cost than competing options; these conditions would not be met for the vast majority of Central Valley locations (see Standard Response 4 regarding growth).

"Land consumption," as used in Table 5.3-7, is equivalent to the increase in the size of urbanized area as shown in Table 5.3-6. The figures shown in Table 5.3-7 for the entire study area are not misleading or overly broad. Results from Tables 5.3-5 and 5.3-6 can be used to derive comparable results for any county or combination of counties in the study area.

O007-120

See Standard Response 4, and Response to Comments L029-114 and O007-113. The proposed HST system could perhaps induce some ranchette development only if HST removed the barrier of accessibility to jobs; but such barrier removal would not occur with the HST system. Ranchettes, by definition, are not located in urbanized areas; they are low-density housing options that, even in the Central Valley, will be located well away from downtown areas and HST stations. While residents of many ranchettes will be geographically closer to a Central Valley HST station than to most Bay Area jobs, the door-to-door time and cost via HST would quickly exceed a pure auto drive for residents of low-density Central Valley ranchettes that commute to Bay Area jobs. Individuals living in outlying ranchettes would be unlikely to use HST on a daily basis due to the greater time and monetary cost associated with using HST versus automobile for long-distance commutes. See Standard Response 4 and Response to Comment O006-6 for further discussion of the reasons why HST will not remove accessibility barriers between Central Valley homes and Bay Area jobs.

O007-121

The commenter has misstated the paragraph in question, and this misstatement misrepresents the conclusion. The paragraph actually reads:

> *In short, either HST Network Alternative provides a strong incentive for directing urban growth and minimizing a variety of impacts that are frequently associated with growth. This outcome would be seen in results for resource topics such as farmland, hydrology, and wetlands, where the indirect effects of either HST Network Alternative are <u>in some cases</u> less than the No Project Alternative, even with more population and employment expected with the HST Network Alternative.* (underlined text was omitted from commenter's quote)

The conclusion, as actually written in the Program EIR/EIS is fully supported by results presented in Tables 5.4-2, 5.4-3, and 5.4-4.

The commenter's discussion of alleged impacts of the BART system is irrelevant when assessing the growth inducement potential of a statewide HST system with widely spaced stations. Further, the commenter also provides no evidence to substantiate the claim that "sprawl development" in Pittsburg and Antioch was related to development of the BART system as opposed to highway expansion or some other factor. Given that only 4% of the Bay Area's job are within walking distance of a BART station (see Response to Comment O006-6), it is not conclusive that BART was the sole or even contributory cause of the alleged outcome.

Contrary to the assertion of the commenter, the Program EIR/EIS does not claim that HST will induce "compact urban growth" or "dense, focused urban development." Chapter 5 indicates that an HST station creates a strong draw for business development (due to economies of agglomeration), and it is this draw that can encourage more compact development patterns in the station area. Although this draw is recognized, the analysis of growth-inducing effects and secondary impacts assumed continuation of each county's trend in development patterns in order to capture growth potential. However, Chapter 6 enumerates station area development principles appropriate to encourage more concentrated development around HST stations.

O007-122

The comment expresses concern about a potential increase in the demand for second homes as a result of the proposed HST system, particularly in the Sierra foothills. First, HST would not "bring these areas within an hour of major population centers", as asserted in the comment. Door-to-door travel times between the Sierra foothills and San Jose, for example, would be a minimum of 2½ hours. On top of this high time, problems would be presented by station access/egress between a second home and a Central Valley HST station. For individuals to use HST as a primary access mode to second homes, individuals owning a second home would need to either keep an extra car at a Central Valley HST station (and incur long-term parking costs) or regularly rent a car at a Central Valley HST station. This combination of high egress cost and multiple

mode shifts would be at odds with rational travel and economic behavior. See also Standard Response 4, and Response to Comment L029-114.

O007-123

No stations are proposed for "greenfield" areas. Please see Standard Response 4.

Preferred HST station sites are in currently developed downtown areas, not "formerly underserved and relatively remote areas" as asserted in the comment. The potential impacts around each proposed station site are described in Chapter 3.

O007-124

Please see Response to Comment L029-116.

O007-125

The Authority and FRA disagree that the conclusions regarding no growth-inducing impacts on 4(f) and 6(f) resources are incorrect at this program-level of analysis. Contrary to the commenter's assertion, none of the three comment letters submitted by the U.S. Fish and Wildlife Service (F002, F005, F008) mentions growth-inducing impacts on 4(f) or 6(f) lands.

O007-126

San Benito and Monterey Counties are included in the "rest of California" category throughout Chapter 5. See Standard Response 4

O007-127

The commenter accurately states that the land use efficiencies displayed in Table 5.3-7 differ at the third decimal, and that there is no characterization in the document as to whether these differences are significant. Since the variability of the various models and third-party data sources are not known for a year 2030 analysis, the statistical significance of the difference in results cannot be determined.

O007-128

No stations are proposed for "greenfield" areas. Please see Standard Response 4 regarding growth, Response to Comments L029-117 and O007-110, Chapter 6, and Chapter 8, Section 8.6.2.A. in this Final Program EIR/EIS.

The commenter's assertion that Altamont, and not Pacheco, has "stations in locations where the local jurisdiction has enacted 'smarter' planning and zoning" is puzzling. Both Altamont and Pacheco Pass network alternatives include HST station options involving smart growth planning. The only substantial difference outside the Bay Area is that Altamont provides the opportunity for an additional HST station in Tracy. Within the Bay Area, the only potential station differences are in southern Santa Clara County and eastern Alameda County.

O007-129

A single interactive modeling system was used to forecast growth-inducing effects for the entire state. This modeling system, TREDIS/REDYN, uses discrete economic regions that are based on some type of geographic boundary. Creating economic regions using boundaries for individual counties is advantageous because it allows the model itself to simulate economic interaction rather than relying solely on post-processing, as is often done when a single economic region is used. The overall analytic approach and individual models have been independently validated and used elsewhere, and they represent a state-of-the-practice approach that is appropriate for this program-level analysis. See Response to Comment O007-15 for further information.

O007-130

The conclusion that the Altamont alternative may result in 5,000 more acres of urbanized developed compared to the Pacheco alternative is reasonable given that Altamont is projected to induce 41,000 more people and 13,500 more jobs than Pacheco. More jobs and people will result in more urbanized land.

The spatial allocation model used in the growth-inducement analysis (CURBA) accurately characterizes the development potential of land parcels based on ownership, aerial photography (to verify current development patterns), and other critical factors (e.g., access to employment, adjacency to current development, and transportation facilities).

O007-131

As noted in the discussion of the spatial allocation model on page F-4 of the technical report on economic growth effects:

> *Average infill rates and population densities will increase with additional development. It is an axiom of economics that scarce resources are used more intensely than plentiful ones. Following this logic, as available supplies of developable land are used up, developers seek ways to use remaining land more intensely, either by increasing densities or through redevelopment. Thus, both development densities and infill activity should increase with population growth.*

Footnote 5 on page 5-7 of the Program EIR/EIS clarifies that the statistical relationships in the spatial allocation model reflect historical increases in marginal development density over time, and assumes continuation of this trend into the future for all alternatives. This trend was not selectively changed for one or both HST alternatives in order to provide an objective analysis. See also Response to Comment O007-121.

O007-132

Please see Response to Comment O007-116.

O007-133

The Authority and FRA disagree that a revised analysis of potential growth-inducing effects is needed. See Standard Response 4 regarding growth, as well as Response to Comment O007-15.

O007-134

Please see Response to Comment L029-57.

O007-135

Please see Response to Comment L029-57. The Authority and FRA are aware of the decision in Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, and the intent and requirements of Sections 4(f) and 6(f). The setting for 4(f) and 6(f) resources will be characterized in greater detail consistent with requirements of Sections 4(f) and 6(f) during the preliminary engineering and project-level environmental review phase. Impacts on 4(f) and 6(f) resources played an important role in the identification of the Preferred Alternative. As noted in Chapter 8, the identified Preferred Alternative would avoid the Don Edwards Wildlife Refuge.

O007-136

Figure 3.16-1 has been added to show the locations of publicly owned lands.

O007-137

Please see Response to Comment L029-57.

O007-138

Please see Response to Comment L029-57.

O007-139

During the preliminary engineering and project-level environmental review, the Authority and FRA will continue to look for avoidance alternatives for the precise alignment of the Preferred Alternative. In the absence of avoidance, the Authority and FRA will ensure that all possible planning to minimize harm to the resources has occurred. Please see Standard Response 5 regarding mitigation strategies and Response to Comment L029-57.

O007-140

The analysis of cumulative impacts is in Section 3.17. A list of detailed projects and plans used in the analysis are listed and discussed in Appendix 3.17-A. A definition of cumulative impacts per CEQA and NEPA is included in Section 3.17. Sufficient detail is

provided for this program-level analysis, and further analysis will be included in future Tier 2 project-level environmental analyses, when more detailed engineering, design, and location information will be available for the HST system and when future projects can be considered in more detail.

O007-141

The cumulative projects included in the analysis were those that would be close to the HST network alternatives and have the potential to result in a cumulative impact on a given resource or those that are of a size/scale that could affect regional resources.

Although both CEQA and NEPA include the requirement to consider "past projects" when addressing cumulative impacts, recent Council on Environmental Quality (CEQ) guidance discounts the value of this assessment of past projects directing that relevance of addressing past projects relates to the "concise description of the identifiable present effects" (CEQ June 24, 2005 Memorandum). Because of the population growth potential and the proximity to study corridors and stations analyzed in this environmental document, a few other major projects are also considered as part of the cumulative analysis, including the University of California at Merced campus. Appendix 3.17-A lists the projects identified for consideration in this cumulative impact analysis. While other project-specific actions may be likely to occur in the study area by 2030, this Program EIR/EIS analyzes the broad environmental issues based on the broad program definition and the regional cumulative impacts and, therefore, does not consider the more localized cumulative issues related to subsequent approvals.

Information from existing environmental documents completed for regional projects, such as regional transportation plans that include transportation improvement projects approved for future implementation under the No Project Alternative and projections made in the state implementation plan for air quality, were used. The list of these projects is included in Chapter 2 (Tables 2.4-1, 2.4-2, and 2.4-3) and Appendices 2-A, 2-B, and 2-C.

O007-142

The 4,500-acre planned community, El Rancho San Benito, which is located south of the proposed Pacheco Pass alignment and not in the vicinity of the Gilroy station, was included in the cumulative impacts analysis. The Transbay Transit Center and Union City projects were also already included in the analysis and identified in Appendix 3.17-A. The project listed in Sacramento was not included because it was outside the study area.

Mitigation strategies for significant impacts are discussed under each topic in Chapter 3.

O007-143

Please see Standard Response 5 and Response to Comments L029-61, O007-25, O007-28, O007-37, O007-61, O007-67, and O007-83 regarding the approach to mitigation strategies and the determination of significance with mitigation.

O007-144

As listed under 3.1.5, Mitigation Strategies and CEQA Significance Effects, of this Final Program EIR/EIS, one of the local mitigation strategies is "Increase bus feeder service and/or add routes to serve the proposed station areas."

The Draft Program EIR/EIS identifies connectivity for all of the station locations options. Please see Response to Comment O007-81. It has been the Authority and FRA's experience that transit providers are consistently willing to work with the Authority to provide improved station connectivity (e.g., station design for efficient and convenient transfers). The design of such facilities and the corresponding efficiency and convenience can be developed only during the preliminary engineering and project-level environmental review phase.

O007-145

Section 3.7.3 reviews the compatibility of each of the station areas with a HST station and notes where TOD planning is already

underway. For instance, the Cities of Tracy (Downtown), San Jose, Millbrae, San Francisco, and Union City have developed planning and redevelopment documents to promote multimodal stations and TOD, with the option for an HST station. Other station areas have not advanced their planning to this level, and in some cases (i.e., Livermore, Pleasanton, Fremont) are concerned with the effects of an HST station in their community. As noted for this mitigation strategy, the Authority and FRA intend to continue the coordination with the planning efforts underway for TOD in the Preferred Alternative station areas.

Please also see Chapter 6, "Station Area Development."

O007-146

Comment acknowledged. Please see Chapter 6, "Station Area Development."

See also Response to Comment F007-12 for a discussion of the need for mitigation of secondary impacts.

O007-147

See Standard Response 5 regarding mitigation strategies. The Authority and FRA disagree with the statement that the EIR/EIS suggests that all potentially significant impacts will be reduced to less-than-significant levels. As noted in Section 3.15.4, a design practice for the HST includes the use of bridges or elevated railways across water bodies or sensitive natural communities. The new bridges would replace older bridges whenever possible, and the new bridges would use materials and designs to minimize the number of piles/columns in the water. This design practice would minimize impacts. Mitigation strategies for impacts on jurisdictional waters and wetlands are discussed in Section 3.15.5. This section notes that mitigation strategies are expected to substantially lessen or avoid impacts on biological resources in many circumstances, but at the program level, sufficient information is not available to conclude with certainty that the mitigation strategies will reduce impacts on biological resources to a less-than-significant level in all circumstances. The EIR/EIS, therefore, concludes that impacts on biological resources would remain significant, even with the application of mitigation strategies. Additional environmental analysis for the subsequent Tier 2 document will allow a more precise evaluation of impacts and mitigation measures.

O007-148

This mitigation strategy can only be further developed in collaboration with the local jurisdictions and local/regional transit providers during the preliminary engineering and project-level environmental review phase, when more detailed information will be available regarding system engineering and design, alignment locations, and station configurations. Such discussions could not realistically be undertaken for all transit providers and all 26 station areas (Table 3.1-4) during the program-level environmental analyses.

O007-149

Mitigation measures for noise are presented in Section 3.4.5, Mitigation Strategies and CEQA Significance Conclusions, and will be further reviewed and evaluated in project-level environmental documents for selected alignments, when more detailed information will be available regarding system engineering and design and alignment locations.

O007-150

This mitigation strategy can only be developed in collaboration with the operators of the connecting rail lines (ACE, Capitol Corridor, AMTAK [Caltrans], and Caltrain) and truly depends on the configuration of the HST system—the identification and ultimate approval of the Preferred HST Alternative—and its relation to these feeder lines. The identification of the Preferred Alternative now allows for discussion and development of collaborative agreements during the preliminary engineering and project-level review phase regarding integration of rail services on a line-by-line and station-by-station basis.

O007-151

The Authority and FRA disagree with the comment that the program-level mitigation strategies are inadequate. Please see Standard Response 5 regarding mitigation strategies.

The mitigation strategies in the Draft Program EIS/EIS are included because they are considered feasible and have proven to be effective for other rail projects. Costs for these mitigation strategies have been included in the overall project costs as a line item in Appendix 4-A "Total Construction and Right of Way (Includes Environmental Mitigation)."

O007-152

Please see Response to Comment O007-69 regarding the evaluation of current conditions, the baseline, and the No Project Alternative.

The Authority and FRA find that the comprehensive information provided in the Draft Program EIR/EIS and its level of detail are fully sufficient to allow for a meaningful comparison of alignment alternatives and network alternatives and for the identification of a Preferred Alternative. The Authority and FRA also find that the Program EIR/EIS provides the appropriate information and framework for the advancement of the project to the preliminary engineering and project-level environmental review phase. The Authority and FRA note, as does the Draft Program EIR/EIS, that the next phase will involve more detailed field reviews and engineering for the Preferred Alternative alignment, which will in turn enable a more precise description of the impacts and the appropriate locational and quantitative aspects of the mitigation measures, and use of the word "potential" will no longer be needed.

The Draft Program EIR/EIS presents the impacts for all alignments and station location options. A comparison is then made of the impacts and benefits of all alignment alternatives and 21 representative network alternatives—not two alternatives—in Chapter 7. The 21 network alternatives are also compared in the Draft Program EIR/EIS Summary.

Each of the impact areas mentioned (with the exception of Energy) are categorized as potentially less than significant after mitigation. Please also see Response to Comment O007-84. Energy impacts are appropriately identified as beneficial.

O007-153

Please see Response to Comments O007-154 through O007-157 below.

O007-154

Section 2.5.2, Alignment Alternatives and Station Locations Considered but Rejected, refers the reader (page 2-42) to Appendix 2-G for a further explanation of the underlying reasons for rejection of an alignment or station location. Please see page 2G-4 for a more expanded explanation of why this alternative was eliminated from further examination.

O007-155

Appendix 2G-4 appropriately describes the status of this corridor and the reason for its withdrawal from further consideration.

O007-156

See Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative. It is important to note that the HST system is designed to serve intercity travel, not local travel as is suggested in the comment. The existing and future BART system and planned Dumbarton service would serve the local travel demand between Fremont and San Jose and San Francisco.

O007-157

A station at San Jose Mineta International Airport (Santa Clara) was appropriately considered but rejected. Please see Chapter 2 and Appendix 2G (page 2-G-2), which states that the Diridon station would adequately connect the airport with the HST system.

O007-158

The Authority and FRA intentionally reviewed a reasonable range of alternatives for the Bay Area to Central Valley study area, consistent with the Authority Board directive and the requirements of CEQA and NEPA. To limit the number of alternatives would have been a disservice to the citizens of California. Please See Response to Comment O007-40. Please also see Response to Comment O007-34, which suggests that there are an "excessive" number of alternatives.

O007-159

The environmentally superior alternative is identified in this Final Program EIR/EIS in the Summary and in Chapter 8.

O007-160

Based on a review of the 161 comments in this letter, and based on a review of the public comments provided by the organizations represented in this letter for both the statewide and the Draft Program EIR/EIS for the Bay Area to Central Valley, it is clear to the Authority and FRA that the organizations represented prefer the Altamont alternative.

Additionally, the comments in this letter and from the organizations represented appear to the Authority and FRA to essentially request preparation of a project-level EIR/EIS for all alignment alternatives and station location options in advance of identification of a Preferred Alternative.

The Authority and FRA do not feel that this is legally necessary. The time, effort, and cost of this approach would essentially halt the HST Program, and it ignores the intent and the advantages of preparing a program-level review.

The Authority and FRA have responded to the alleged deficiencies in the Draft Program EIR/EIS. While a few of our responses have led to revisions to the draft document, the Authority and FRA find that none of the alleged deficiencies provide sufficient legal justification for recirculation of the Draft Program EIR/EIS.

Chapter 2, "Alternatives," of the Draft Program EIR/EIS provides a comprehensive description of the alternatives under consideration and refers the reader to appropriate detailed maps and drawings. Extensive data and information were collected and analyzed and are presented in a comprehensive and uniform manner throughout the Draft Program EIR/EIS for numerous subject areas for all of the Bay Area to Central Valley alignment alternatives and station location options. The comprehensive information provided in the Draft Program EIR/EIS and its level of detail are fully sufficient to allow for a useful comparison of alignment alternatives and network alternatives and for the identification of a Preferred Alternative.

The Authority and FRA also find that the Program EIR/EIS provides the appropriate information and framework for the advancement of the project to the preliminary engineering and project-level environmental review phase. The Authority and FRA note, as does the Draft Program EIR/EIS, that the next phase will involve more detailed field reviews and engineering for the Preferred Alternative alignment, which will in turn enable a more precise description of the impacts and the appropriate locational and quantitative aspects of the mitigation measures.

O007-161

The Authority and FRA appreciate the contact information and will notify these individuals of the release of future relevant documents.

Comment Letter O012 (Gary A. Patton, Planning and Conservation League, October 23, 2007)

To view attachments of this comment letter see electronic file:
O 012 PCL.pdf

O 012

PLANNING AND CONSERVATION LEAGUE

October 23, 2007

RECEIVED
OCT 25 2007
BY:

Quentin Kopp, Chair, and Members of the High Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814

Attention: Comments on Draft Bay Area to Central Valley Program EIR/EIS

Dear Mr. Kopp and Members of the Authority:

The Planning and Conservation League is joining with a number of other organizations to submit extensive comments on the Draft EIR/EIS prepared on the High Speed Rail Bay Area to Central Valley Program. Those more extensive comments will reach you separately. O012-1

This letter is to attach an important article by Attorney Dave Owen, discussing the application of the California Environmental Quality Act (CEQA) to projects that might lead to an increase in global warming emissions. The article appears as an Appendix to a soon to be published revision of the Planning and Conservation League Foundation's "Community Guide to the Environmental Quality Act." O012-2

We strongly believe that the Draft EIR/EIS on the High Speed Rail Bay Area to Central Valley Program must do a better job of analyzing (and mitigating) the global warming impacts of the proposed project, as outlined in the attached paper. O012-3

Thank you for taking these, and our other, comments into account. The current Draft EIR/EIS needs to be significantly revised and recirculated, prior to being used as the foundation for a decision on the appropriate route for the entry of the proposed High Speed Rail line into the San Francisco Bay Area.

Very truly yours,

Gary A. Patton, Executive Director

Attachment: Climate Change and Environmental Assessment Law

1965-2005 40 years
PLANNING AND CONSERVATION LEAGUE
www.pcl.org

1107 9th Street, Suite 360, Sacramento, CA 95814 Phone: 916-444-8726 Fax: 916-448-1789
Website: www.pcl.org Email: pclmail@pcl.org

Response to Letter O012 (Gary A. Patton, Planning and Conservation League, October 23, 2007)

O012-1

Comment acknowledged.

The Authority and FRA acknowledge receipt of comments from the Planning and Conservation League. The Authority and FRA received a letter from Stuart M. Flashman in which he states that he is representing the Planning and Conservation League. Please refer to the Response to Comment Letter O007.

O012-2

Comment noted. The Authority appreciates receiving a copy of the article.

O012-3

The FPEIS/FPEIR includes a discussion and analysis of global climate change. The proposed HST system is shown to have net beneficial impacts related to climate change. Where beneficial impacts have been identified, mitigation measures are not required.

Comment Letter O016 (Florence M. LaRiviere, Citizens Committee to Complete the Refuge, October 26, 2007)

CITIZENS COMMITTEE TO COMPLETE THE REFUGE

453 Tennessee Lane, Palo Alto CA 94306 Tel 650 493-5540 Fax 650 494-7640 e-mail: marsh@refuge.org

October 26, 2007

RECEIVED
OCT 2 6 2007
BY:

Mr. Mehdi Morshed
Executive Director
California High Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814
Fax#: 916-322-0827

Subject: Draft Bay Area to Central Valley High-Speed Train (HST) Program EIR/EIS

The Citizens Committee to Complete the Refuge, consisting of 2,000 members, has an ongoing history of interest in wetland protection, wetland restoration and wetland acquisition. As such, the Committee has taken an active interest in Clean Water Act regulations, policies, implementation and enforcement. We have established a record of providing information regarding possible CWA violations to both the Corps and EPA. We regularly respond to Corps public notices, and inform the public of important local CWA issues. These actions demonstrate our ongoing commitment to wetland issues, toward protecting the public interest in wetlands, and in Section 404 of the CWA. We also respond to CEQA Negative Declarations and Environmental Impact Reports (EIRs). All of these actions demonstrate our ongoing commitment to wetland issues, towards protecting the public interest in wetlands, in Section 404 and 401 of the CWA, and CEQA. O016-1

We are submitting comments to urge you to drop consideration of the proposed Pacheco Pass alignment due to significant and substantial impacts to valuable and pristine open space resources, wetlands, and listed and sensitive species habitat. O016-2 In addition, the proposed alignment would have a tremendous growth inducing impact on undeveloped regions of the Pacheco Pass area encouraging urban sprawl in areas away from existing development. O016-3

An alternative that has been suggested for the Bay Area is the Altamont Pass alignment; of prime concern to our organization would be the portion of the alignment that would pass through the Don Edwards San Francisco Bay National Wildlife Refuge, but we would also be concerned about the possible fragmentation or disruption of any San Joaquin kit fox habitat and corridors. O016-4

Of the alternatives that have been proposed for the portion of the alignment that passes through the refuge crossing the south end of San Francisco Bay, we would support the Kiesling tunnel alternative, which proposes tunneling under the refuge and the bay. We would still have concerns regarding the approaches to the tunnel on either side of the bay and in particular any impacts that would occur on the eastern and western sides of the bay that are adjacent to areas that have been included in the Congressionally approved refuge expansion boundary: O016-5

- existing salt ponds and crystallizers in Fremont and Newark,
- Area 4 in Newark (site of the former Whistling Wings and Pintail duck clubs,
- the wetlands mitigation areas in Fremont for the Pacific Commons development and the Warm Springs unit of the refuge, and
- Ravenswood saltpond complex, Ravenswood Triangle and Carnduff & Kavanaugh lands on the western side of San Francisco Bay.

Therefore it is important if this alternative is to be considered, that information regarding the direct and indirect nature, physical extent, duration of any impacts in these areas be fully identified and assessed. We would also have concerns regarding any noise or vibration impacts on existing neighborhoods along this alignment. O016-5 Cont.

Another alignment that has been suggested and warrants further review is a high bridge alternative. Under this alternative, rather than retaining the existing approach fills (embankments) the current bridge alignment would be completely reconstructed, rather than merely rehabilitated, and the portion of the rail crossing refuge lands would be on piles rather than earthen fill. This would allow the restoration of tidal flows across refuge lands in the vicinity of the rail line. If this alternative is studied further it would be important to assess and propose mitigation for the following types of impacts in addition to those listed above:

- Construction impacts through direct physical alteration of the habitat – how would this be minimized? If a bridge alternative was selected could construction be conducted from the span rather than disturbing the adjacent marsh?
- Duration and timing of construction activities and potential impacts on listed and rare species? O016-6
- The alignment through the refuge is within prehistoric/early historic inner Dumbarton Marsh fragment. Ground disturbance could and would likely increase invasion of non-natives , especially *Salsola*, hybrid *Spartina*, *Lepidium* (in the area above MHHW), etc. how would this be prevented?
- How long would the disturbance last? Would there be any permanent impacts, e.g. access roads, etc?
- Indirect impacts associated with construction including, noise, vibration, human disturbance, etc.
- What kind of emergency access would be necessary for a bridge alignment, e.g. what happens in the event of a derailment within the refuge?
- Shade impacts on existing marsh vegetation?
- Maintenance? Cleaning rails? Where does the material cleaned from the rails go and how would introduction into the marsh be prevented?

CCCR appreciates the opportunity to provide comments. We urge you to abandon the Pacheco Pass alignment as the preferred alternative; the adverse impacts of the alignment are significant and cannot be mitigated. If the Altamont Pass alignment is considered further, we support the Kiesling tunnel alternative with as long as the areas mentioned above are not adversely impacted. O016-7

Sincerely,

Florence M. LaRiviere

Florence M. LaRiviere

Chairperson

Response to Letter O016 (Florence M. LaRiviere, Citizens Committee to Complete the Refuge, October 26, 2007)

O016-1

Comment acknowledged.

The Authority and FRA acknowledge receipt of public comments from the Citizens Committee to Complete the Refuge and the Committee's interest in the Clean Water Act regulations, policies, implementation and enforcement.

O016-2

Please see Standard Response 3 regarding identification of Pacheco Pass as the Preferred Alternative.

The Pacheco Pass network alternatives are within areas that have undergone human change either through the development of buildings, transportation, or through ranching, farming and other agricultural activities. The alignments were located to minimize impacts on both the built and natural environments. The use of tunnels and elevated sections of the HST system have been included to minimize impacts through open space resources and sensitive habitats. Mitigation strategies are discussed in Section 3.15 in the program EIR/EIS to minimize impacts on sensitive species, habitat, wetlands, and wildlife movement corridors.

O016-3

The analysis of this Program EIR/EIS concluded that the Pacheco Pass alternatives would have slightly less growth inducement potential than the Altamont Pass alternatives (please refer to Chapter 5 of the Program EIR/EIS). Please also see Standard Response 4 regarding growth inducement.

O016-4

Please see Response to Comment O016-2.

Potential impacts on the San Francisco Bay and the Don Edwards San Francisco Bay National Wildlife Refuge, discussed in Section 3.15, played an important part in the identification of the Preferred Alternative. The Preferred Alternative identified by the Authority is the Pacheco Pass, San Francisco and San Jose Termini. Please see Standard Response 3 and Chapter 8.

Refer to Response to Comment F002-10 regarding the kit fox.

O016-5

Please see Response to Comment O016-2.

Comment acknowledged. This is not the Preferred Alternative; however, if it is carried forward to the project level environmental analysis, a more detailed analysis of the direct and indirect, and duration of potential wetland and noise and vibration impacts on the potentially affected areas would be performed.

O016-6

Please see Response to Comment O016-2.

Comment acknowledged. This is not the Preferred Alternative; however, if it is carried forward to the project level environmental analysis, a more detailed analysis of the potential construction impacts would be performed. Future project-level analysis would include study of the following:

- Duration and timing of construction activities and associated disturbances
- Examination of potential ground disturbances and shading
- An examination of the operating and maintenance procedures across the proposed bridge to understand what the potential impacts are.

O016-7

The Authority and FRA have identified the Pacheco Pass Alignment are the Preferred Alternative for the reasons identified in Chapter 8 of the Final Program EIR/EIS. Please also see Standard Response 3 and Chapter 8 regarding identification of Pacheco Pass as the Preferred Alternative.

Comment Letter O017 (Bill Allayaud et. al., Sierra Club, California, October 26, 2007)

From:Sierra Club 916 557 9669 10/26/2007 11:02 #792 P.001/002

SIERRA CLUB
CALIFORNIA

RECEIVED
OCT 26 2007
BY:

October 26, 2007

California High-Speed Rail Authority
925 L Street, Suite 1425
Sacramento, CA 95814

RE: Draft Bay Area to Central Valley Program EIR/EIS Comments

Dear Chairman Kopp and Members of the Authority:

The Sierra Club appreciates the opportunity to comment on the Bay Area to Central Valley HST DEIR/S. This letter is a supplement to our detailed comments on the Draft Program EIR/S being submitted jointly with other environmental and rail transit advocacy groups, which we incorporate by reference. O017-1

The Sierra Club has long been supportive of the concept of high-speed rail, particularly as an alternative to airport expansion. See for example lomaprieta.sierraclub.org/HighSpeedRail.html and www.sierraclub.org/sprawl/transportation/highspeedrail.asp. The Club chose to highlight the California High-Speed Rail project as one of 49 worthy transportation projects nationally in our "Smart Choices, Less Traffic" report of 2002. See www.sierraclub.org/sprawl/report02/.

It is our hope that the HSR system can be built in a manner that complements the Sierra Club's top priorities goals including: Smart Energy Solutions - combating greenhouse gas emissions and climate change; Safe and Healthy Communities, and preserving America's Wild Legacy. O017-2
As such, we think the HSR project can help California shift future demand for long-distance transportation to more energy-efficient modes and is less-polluting than new airport or highway expansions. And, we note that there is much greater potential for trains to be powered with renewable energy than there is for airplanes. In addition, we're concerned that proposed airport expansions would result in thousands of acres of fill being added to San Francisco Bay and significantly and adversely affect neighborhoods in the Los Angeles area. High-speed rail would provide an alternative to such airport expansions, reduce greenhouse gas emissions, and promote urban infill through smartly designed stations.

Nonetheless we have significant concerns about the important detail of how high-speed rail will connect the Bay Area and the Central Valley. We are concerned that serious flaws in the Draft Program EIR/S do not make clear the significant differences in environmental impacts between the Altamont and Pacheco alternatives, which make it extremely difficult for decision-makers and the public to assess the alternatives. Particularly egregious is the obfuscation of alternatives, through descriptions that are not consistent between sections, figures, and tables. And, there are incomplete O017-3
and almost "in passing" references in the document to federal and state lands that each alternative traverses or is adjacent to, and a near-complete omission of these important lands and boundaries from the maps provided. This makes it very difficult to assess the potential biological and 4(f)/6(f) impacts O017-4

1414 K Street, Ste. 500 Sacramento, CA 95814 (916) 557-1100 FAX (916) 557-9669 www.sierraclub.org

From:Sierra Club 916 557 9669 10/26/2007 11:03 #792 P.002/002

October 26, 2007
Page 2 of 2

posed by the HSR project. We understand that the approach to analyzing the project and that the development of transportation segments for modeling purposes was complicated by the requirements of the Bay Area Regional Rail Plan Study. However, the omission of such basic information about these parks and lands is not acceptable. O017-4 Cont.

Throughout the impacted territories of the Sierra Club, we are unanimously of the opinion that the Altamont alignments for high-speed rail are environmentally preferable to the Pacheco alignments, and we are disappointed that the severely flawed Draft Program EIR/S does not make clear the environmental differences between the two key alignments. High-speed rail in the Pacheco alignment would impact larger areas of wilderness which are relatively untouched and which would be more radically altered by the noise and infrastructure that high-speed rail would introduce. O017-5

Our environmental allies who work on restoration of the San Francisco Bay have also expressed to us that a new bay crossing could actually present an opportunity to reverse some of the historical impacts to the Bay and the Don Edwards San Francisco Bay National Wildlife Refuge. They are also anxious about the continuing pressures to expand SFO airport runways into the bay.

The Club also believes it is important for the future viability of high-speed rail to have a first phase that serves the population in the upper San Joaquin Valley and Livermore Valley and to provide synergy with needed improvements to regional rail services along this corridor to San Jose and across the Dumbarton corridor. The Altamont route will also make the reality of serving the State Capitol, Sacramento, and this growing area with high-speed rail much more likely in the near term. O017-6

Again, we appreciate the opportunity to comment and urge the Authority to revise and recirulate the environmental documents to address the serious concerns outline in detail in the referenced longer comment letter. O017-7

Sincerely,

Bill Allayaud
Bill Allayaud
Sierra Club California

BA for
Michael Bornstein
Sierra Club SF Bay Chapter

BA for
Melissa Hippard
Sierra Club Loma Prieta Chapter

Terry Davis
Terry Davis
Sierra Club Mother Lode Chapter

Gerald Vinnard
Gerald Vinnard
Sierra Club Tehipite Chapter

Response to Letter O017 (Bill Allayaud et. al., Sierra Club, California, October 26, 2007)

O017-1

Comment acknowledged.

The Authority and FRA acknowledge receipt of comments from the Sierra Club - California. The Authority and FRA received a letter from Stuart M. Flashman in which he states that he is representing the Sierra Club.

O017-2

Comment acknowledged.

The Authority and FRA acknowledge the Sierra Club's support for the concept of High Speed Rail. The Authority and FRA likewise are committed to a proposed HST system that recognizes and incorporates smart energy solutions, reduction in GHGs, safe and healthy communities, and preservation of wildlife and habitat.

As noted in the Program EIR/EIS, the purpose of the HST system is to provide an environmentally friendly alternative to highways or airways for long-distance intercity travel in the State of California. In response to the Sierra Club's request, the Authority Board has directed evaluation of the feasibility of powering the HST system using zero emission sources of electricity. The Authority and FRA are committed to smart growth and urban infill, as evidenced by chapter 6 "Station Area Development" of the Program EIR/EIS document. Please also see chapter 8 and the Summary of the Program EIR/EIS regarding the "Altamont Corridor."

O017-3

Please see Response to Comment Letter O007 from Mr. Flashman. The Authority and FRA find that the differences in environmental impacts between the Altamont and Pacheco Alternatives are clearly presented in the Draft Program EIR/EIS. Chapter 2, "Alternatives," of the Draft Program EIR/EIS provides a comprehensive description of the alternatives under consideration and refers the reader to appropriate detailed maps and drawings. A map showing publicly owned lands is provided as Figure 3.16-1 in this Final Program EIR/EIS. Please see Responses to Comments Lo29-57 and O007-134 regarding the identification and listing of 4(f) and 6(f) resources.

O017-4

The Draft Program EIR/EIS recognized the importance of the federal and state lands in proximity to and along the alignment alternatives being considered for the HST system linking the San Francisco Bay Area and the Central Valley. The analysis contained in the program EIR/EIS included the potential environmental impacts, including biological resources and wetlands, of the HST alignment alternatives and stations regardless of land designation. Impacts on resources within and outside of ownership/management boundaries were analyzed and are documented in the Draft and Final Program EIR/EIS. Additional information has been added to the document regarding parks and conservation lands.

O017-5

See Response to Comment O007-22.

O017-6

In terms of service to the upper San Joaquin Valley, the HST system approved at the conclusion of the Statewide Program EIR/EIS includes corridors and stations for HST service through the Central Valley from southern California to Sacramento, regardless of the Preferred Alternative selected for the Bay Area to Central Valley.

Consistent with the current statewide bond measure for 2008, the Authority Board has selected as its first phase the line from Anaheim to the Bay Area, and has stated its intent to subsequently add service to both Sacramento and San Diego. The first phase of the Board-adopted phasing plan includes development of a test track from Bakersfield to Merced, regardless of whether the Altamont or Pacheco Alignment is selected. Thus, for the initial phase, the

Central Valley is served between Bakersfield and Merced for either alternative.

The Authority recognizes the desire of the Central Valley to be served. While the Pacheco Pass is identified as the Preferred Alternative serving as the primary north/south alignment between southern and northern California, the Authority is working with regional partners on identifying additional improvements in the Altamont Corridor, and correspondingly, the is pursuing high-speed rail bond funds for such improvements.

O017-7

The Authority and FRA acknowledge the receipt of the Sierra Club's comments. The Authority and FRA do not find that the environmental document needs to be recirculated. Please see Response to Comment O007-160. Please see Standard Responses 1 and 2.

Responses to Livermore Public Hearing Transcripts

PH-L1-1

The Authority and FRA acknowledge the comments from the Tri-Valley Policy Advisory Committee.

PH-L1-2

The Pacheco Pass is identified in this Program EIR/EIS as the Preferred Alternative, in part due to the comments provided. Please see Standard Response 3 and Chapter 8 regarding the identification of the Pacheco Pass as the Preferred Alternative and Chapter 8 of this Final Program EIR/EIS.

PH-L1-3

Connectivity with the regional rail system is an important consideration for the HST stations.

The Authority is currently working with regional stakeholders to review priorities and possible funding options for improvements to commuter rail services in the Altamont Corridor. Please see Standard Response 3 regarding the identification of the Pacheco Pass as the Preferred Alternative and Chapter 8 of this Final Program EIR/EIS.

PH-L1-4

The Authority and FRA acknowledge the comments from the Tri-Valley Policy Advisory Committee.

PH-L1-5

The Authority and FRA appreciate the offer to ask questions of Livermore Mayor Lockhart.

PH-L1-6

The Authority and FRA acknowledge the composition of the representatives on the Tri-Valley Policy Advisory Committee.

PH-L1-7

The Authority and FRA acknowledge the tenure of the Tri-Valley Policy Advisory Committee.

PH-L2-1

In response to public requests, the Authority and FRA added two additional public hearings in Stockton and Sacramento on the Draft Program EIR/EIS.

PH-L2-2

The Authority and FRA acknowledge the comments from the Regional Policy Council for the San Joaquin Valley.

PH-L2-3

The Authority and FRA acknowledge the Regional Policy Council for the San Joaquin Valley's support for the Altamont Pass Alternative.

As evidenced by the public comments on the Draft Program EIR/EIS, strong support and opposition was expressed for both the Altamont and Pacheco Pass alternatives. Pacheco Pass is identified in this Final Program EIR/EIS as the Preferred Alternative. The underlying reasons for this identification are presented in Standard Response 3 regarding the identification of the Pacheco Pass as the Preferred Alternative and Chapter 8 of this Final Program EIR/EIS.

In terms of the HST project purpose and need, service to the fast-growing San Joaquin Valley is viewed as a critical part of the statewide system. The HST system approved at the conclusion of the statewide program EIR/EIS includes corridors and stations for HST service through the entire Central Valley from southern California to Sacramento. This has not changed. The subject at hand is the service connecting the Central Valley to the Bay Area, but the Authority Board has clearly stated its intent to serve the entire Central Valley.

Consistent with the current statewide bond measure for 2008, the Authority Board has selected as its first phase the line from Anaheim to the Bay Area, and has stated its intent to subsequently add service to both Sacramento and San Diego. The first phase of the Board-adopted phasing plan includes development of a test track from Bakersfield to Merced, regardless of whether the Altamont or Pacheco Alignment is selected. Thus, for the initial phase, the Central Valley is served between Bakersfield and Merced for either alternative.

The staff recommendation recognizes the desire to serve the full Central Valley. While the Pacheco Pass is identified as the Preferred Alternative in this Final Program EIR/EIS—the primary north/south alignment between southern and northern California—the Authority, working with regional stakeholders regarding additional commuter rail improvements in the Altamont Corridor, is pursuing high-speed rail bond funds for such improvements.

The exact nature of these improvements has not been defined, but it is clear that improvements to train services in the Altamont Corridor would provide additional mobility and accessibility to Central Valley residents and would likely involve improvements in the Central Valley. The Authority and regional partners, including the Central Valley, need to define the priorities for these improvements.

It is envisioned that this approach would involve incremental improvements in the Central Valley and Altamont Corridor during the initial phase of the adopted phasing plan, and these improvements could come before the development of the Pacheco Pass portion of the HST alignment.

Please see Response to Comment L019-3 regarding the Authority's intent to provide service to the San Joaquin Valley. The Authority and FRA understand that there are important trade-offs among the geographic areas by the various alternatives. For instance, the Pacheco Pass alternative would serve the growing Monterey County and Monterey Bay area, and the northern San Joaquin Valley area—north of Merced—would still be served by the planned extension of the HST system to Sacramento.

Please also note that, for the Altamont Pass alternative serving San Jose and San Francisco, some of the trains would travel south to San Jose and some would cross the Bay into San Francisco, thus reducing the train frequencies to each of these urban areas.

PH-L2-4

The Authority and FRA are well aware of the importance of the Central Valley to the ridership and success of the proposed HST system. Please see Response to Comment PH-L2-3.

PH-L2-5

Please see Response to Comment PH-L2-3.

PH-L2-6

The Authority and FRA acknowledge the comments from the Regional Policy Council for the San Joaquin Valley.

PH-L3-1

Potential impacts on the Don Edwards Wildlife Refuge Preserve were among the reasons for identification of the Pacheco Pass alternative as the Preferred Alternative in this Final Program EIR/EIS. Please see Standard Response 3 and Chapter 8 regarding the identification of the Pacheco Pass as the Preferred Alternative.

PH-L3-2

The Pacheco Pass Preferred Alternative identified in this Final Program EIR/EIS provides direct (one-line) service to San Jose and San Francisco, as noted in this comment. This was among the reasons for its identification as a Preferred Alternative. Please see Standard Response 3 regarding the identification of the Pacheco Pass as the Preferred Alternative.

PH-L3-3

The ability to use the existing Caltrain Corridor is among the reasons for identification of the Pacheco Pass as the Preferred Alternative in this Final Program EIR/EIS, which is consistent with Caltrain's strategic planning for the year 2025.

Sacramento Public Hearing Transcripts - Continued

odds a lot higher that you ultimately develop a Yosemite connector system with internet technology. PH-S1-4 cont'd

HON. QUENTIN KOPP: What about the miles from Merced itself to the park, how much is that?

MR. GOSTING: That's 75 miles.

HON. QUENTIN KOPP: Okay.

MR. GOSTING: There's winding roads. There used to be a rail line, a Yosemite Valley rail line going from Yosemite to -- it's relatively flat land done by old-fashioned steam locomotives which is not exactly comparable to what they are using right now. PH-S1-4 cont'd

HON. QUENTIN KOPP: Thank you very much. Thank you, Supervisor. Say hello to Frank Long for me.

Walter Strakosch and then Jeremy Bailey.

MR. STRAKOSCH: Good afternoon. My name is Walter Strakosch and I'm a resident of Mill Valley. I've come to comment on the Bay Area to the Central Valley program EIR/EIS. There are a number of issues to be considered in evaluating the Altamont Pass via Pacheco Pass, some of which I would discuss later. PH-S3-1

Initially there's a cost factor pertaining to go a project, a total project that started out with a $18 billion price tag. The estimated cost are now twice that. With regard to the cost of the Bay Area to the PH-S3-2

11

Valley segment, the program EIS/EIR is not given analysis of the cost, but left me with some questions that the High-Speed Rail officer was unable to answer. I then was referred to the lead on the DEIS/DEIR, Dave Manson. He was on vacation in France and hopefully enjoying the High-Speed trains. I then decided to work with what I had, which was the program EIR/EIS. PH-S3-2 cont'd

In any event, this is my take, table S5-1 program. EIR/EIS shows comprehensive non-risk (mileage, costs, ridership, etc) on many alternate routes between the Valley and the Bay Area. There are 11 alternates via the Altamont Pass and six via Pacheco Pass. What I had tried to do is analyze only two. It gets too complicated to go beyond that. The base of the Pacheco in my judgement, the best route would be the Altamont Pass. PH-S3-3

What I think is important here is that the project got so involved in the past five years that unless you get something, anything built, you may end up getting nothing built because sensible segment built and operating and the rest will come very quickly. High-Speed Rail is that good.

Following that line of reasoning, we should do exactly what the French did in 1981 on the initial PH-S3-4

12

Sacramento Public Hearing Transcripts - Continued

14 KGB -- TGV Line. And I rode for ten days after it PH-S3-4 cont'd
15 opened. Between Paris and Lyon, they opened the
16 majority of the line between the two cities, produced
17 the existing rail into both Lyon and Paris, and
18 completed the final segments at a later time.
19 Now, this is kind of important as is where the PH-S3-5
20 entire Caltrain line plays the part in getting line
21 opened sooner and initially in keeping the costs down.
22 This then takes us to the best case scenario, Pacheco
23 Pass through the Altamont Pass. First, the best case
24 for the Pacheco Pass with cost figures as shown in the
25 summary table S-5-1 and further detailed in table 4.2-3,
1 it would seem that the mileage could be measured from
2 where the line leads to San Joaquin Valley. Remember,
3 the system is going all the way to Sacramento for about
4 10 miles below Merced, but it doesn't. The mileage
5 shown is 267.53. And this where I couldn't get any
6 answer, whereas the mileage is closer from the point
7 where Merced to San Jose is about 150 miles and 200 to
8 San Francisco. Anyway at a cost to $46,300,000 a mile,
9 the 150 miles from the Valley to San Jose is $6,946,000.
10 My base AP routing for the same strange reason
11 that is shown in table 4.23 has a mileage shown as
12 213.30 miles with the actual miles from the valley

13

13 connection to the Caltrain track via a rebuilt Dumbarton PH-S3-5 cont'd
14 Bridge is about 83 miles at a cost of 58,912,000 per
15 mile. The total cost is 4,831,000 miles via that
16 routing. Therefore, if you compare the cost of the
17 Pacheco Pass to San Jose to the AP Valley to the train
18 connection, the Pacheco Pass routing is 6,946,000, the
19 AP Valley routing 4,831,000. The AP Valley is about
20 $2 billion cheaper. And it is not necessary to have
21 build 70 miles of redundant double track which the
22 Pacheco Pass would require.
23 There are other factors favoring the PH-S3-6
24 Altamont Pass as well. The largest travel market in the
25 state is 2,000 business plans between San Joaquin Valley
1 and other metro areas. The third largest travel market
2 in the state is between Sacramento and San Francisco.
3 The Altamont Pass routing allows you to keep Merced,
4 Modesto, and Stockton on the direct line to San
5 Francisco. The Pacheco Pass routing does not. It also
6 favors the Sacramento to San Francisco market because it
7 is foolish. Once the Sacramento extension is built, do
8 you think that people will travel almost halfway to
9 Los Angeles to travel between these two cities?
10 In addition, you have two existing rail right PH-S3-7
11 of ways in the Altamont Pass. One is the operating UP

14

Sacramento Public Hearing Transcripts - Continued

12 line which may or may not be for sale at the right price PH-S3-7 cont'd
13 and the others in the abandon, I believe, right of way
14 to southern pacific. My guess is that part, if not all,
15 of one of the other could be rebuilt at a High-Speed
16 Rail standards. And let us not forget how much easy it
17 is -- it might be to obtain environmental clearance.
18 The issue could have been decided years ago PH-S3-8
19 but politics being politics and sometimes wrongly used
20 it's never that simple. The original recommendation by
21 the High-Speed Rail Commission recommended the Altamont
22 Pass, but it was left of 2,000 business plan. Because
23 of overwhelming objections, it had to be restudied. The
24 problem is the High-Speed Rail Authority could have
25 saved $1.7 million dollars to spend on other issues and
1 be two hours ahead of what's necessary to have to do
2 this all over again. Thank you.
3 HON. QUENTIN KOPP: Do you have a copy of your
4 statement?
5 MR. STRAKOSCH: I can give you this or I could
6 just give one to the clerk.
7 HON. QUENTIN KOPP: Why don't you give us --
8 that to Rose Mary.
9 Mr. Bailey, maybe you want to remove your hat,
10 you're inside a public domain.

15

11 MR. BAILEY: Sorry about that.
12 HON. QUENTIN KOPP: Public hearing.
13 MR. BAILEY: I just want to start by saying I PH-S4-1
14 had the good fortune to take the Paris to Lyon train in
15 January, it really was a wonder. And I think it's going
16 to be like high speed internet. And like TiVos and
17 DVRs, once we get it completed, people are just
18 wondering why it didn't happen sooner.
19 Going on the website on the high rail --
20 High-Speed Rail authority, it stated that the
21 projections in the next 10 or 15 years, if this were
22 completed within the Altamont Pass, would ultimately be
23 serving 96 million passengers annually and that the
24 Pacheco Pass would considerably serve up to 80 million.
25 Just looking on the demographic point of view,
1 I really don't see where -- as the gentleman mentioned
2 earlier, how we're connecting major metropolitan areas
3 like Modesto, Stockton, Tracy, Livermore, and Sacramento
4 region to the Bay Area. How you can have a 16 percent
5 only differential when the Pacheco Pass, after you get
6 south of Morgan Hill or Gilroy, you have really nothing
7 until you get to Merced. I think those are pretty
8 liberal projections. I think they are a little bit
9 bias. I don't know how they came up with that.

16

Sacramento Public Hearing Transcripts - Continued

23 letter that's being written along.
24 HON. QUENTIN KOPP: Thank you.
25 Alan Miller.
1 Is Lieutenant Governor Garamendi here? Does
2 anybody received notice that he will testify in the --
3 he made it a point to request this additional public
4 hearing.
5 Mr. Miller, Train Riders' Association, and
6 that appears to be -- or he appears to be our last
7 witness.
8 MR. MILLER: Is it alright if I stand?
9 HON. QUENTIN KOPP: Yeah, sure.
10 MR. MILLER: Okay. A picture is worth a
11 thousand words. And this is a picture. It is a
12 satellite photo taken from space of the city lights of
13 the Bay Area and the Central Valley to the east. And
14 briefly there for the audience.
15 The blue is the Pacheco and the yellow is
16 Altamont. As you can see, there are many more lights
17 along this route which includes Modesto near Stockton,
18 Tracy, the Amador Valley near to the east bay. There
19 are, in fact, you know, the -- like Santa Cruz and
20 Gilroy and so forth. The comment is they would like
21 Pacheco. There are, in fact, two and a half million

PH-S7-1

29

22 more people in this region here than there are in
23 Santa Cruz, San Benito, and Monterey counties. That
24 also translates into more votes when you have a bond on
25 the ballot.
1 Now, when this is completely built out, and
2 you can see from down here, parting and then back
3 together up to San Francisco roughly the same mileage.
4 But when you then add on from Pacheco up here to
5 Sacramento in phase 2, you have this much more mileage,
6 roughly 70 or so miles for your total system which has
7 to be built, paid for, land acquired, and then operated
8 and maintained in perpetuity. Pacheco --

PH-S7-1 cont'd

9 HON. QUENTIN KOPP: Explain, where is this 70
10 miles?
11 MR. MILLER: It's a little difficult to
12 explain. But if you're just going to San Francisco in
13 phase 1 and San Jose, you have these two routes, which
14 is visually you can see it roughly the same miles. When
15 you then add on phase 2, you have to go from this point
16 down here all the way up to Sacramento.
17 If you do Altamont, instead of having these
18 two parallel routes, you know, roughly parallel one
19 going to San Francisco and one to Sacramento, you share
20 this much of the right of way to this point. So you

PH-S7-1 cont'd

30

Sacramento Public Hearing Transcripts - Continued

only have to build this distance from Tracy to Sacramento. So when the entire system is built out, there will be more total miles via using Pacheco in order to serve San Jose and San Francisco and Sacramento.

The Pacheco profile is steeper; therefore, it takes more energy to lift the people up to higher elevation and bring them back down. Every train in perpetuity.

San Jose is very important. It's very populated that's why it's very white on this photograph. The disadvantage for San Jose is that it takes ten minutes longer to go to point south than does this way because you have this 12-mile leg. But still, San Jose, to get to point south, is still 15 or 20 minutes less time than for people coming from San Francisco. In addition, for people going from San Jose over Stockton and Sacramento, much faster going via Altamont than down and back up. For people going from San Francisco -- or, for instance, from Sacramento -- from Sacramento over to San Francisco, 270 miles roughly, I think. And this is 85 miles via Capitol Corridor, 120 miles, just over an hour's travel time by Altamont rather than two hours going --

PH-S7-1 cont'd

31

HON. QUENTIN KOPP: What are you showing over there at the bottom of the bay, South Bay, what is that?

MR. MILLER: Here?

HON. QUENTIN KOPP: Crossing above the 12-mile segment, what are you showing there? Is that the Dumbarton Bridge?

MR. MILLER: Dumbarton Bridge, yes.

HON. QUENTIN KOPP: Okay.

MR. MILLER: Okay. For Silicon Valley commuters, it takes them where they want to go, where they live.

PH-S7-1 cont'd

HON. QUENTIN KOPP: I don't mean the Dumbarton Bridge, I should correct that.

MR. MILLER: Dumbarton Express, yes.

PS7-1 cont'd

HON. QUENTIN KOPP: Express?

MR. MILLER: Yes.

HON. QUENTIN KOPP: Okay.

MR. MILLER: So many of the commuters coming from the Central Valley come from this area, this will serve people going both in San Francisco and into San Jose at a much faster speed. The San Jose would get its own terminal and the trains -- number of trains that San Jose would get and San Francisco would get to be proportional to the population as roughly to the market.

PH-S7-1 cont'd

32

Sacramento Public Hearing Transcripts - Continued

19 Roughly San Jose would get about 40 percent. PH-S7-1 cont'd

20 HON. QUENTIN KOPP: And what are those two Xs?

21 MR. MILLER: The two Xs are -- this is a

22 geographic center of the nine Bay Area counties, and PH-S7-1 cont'd

23 this the population center of the nine Bay Area

24 counties.

25 HON. QUENTIN KOPP: The bottom X -- this is

1 for the court reporter -- population center, and then

2 the higher X is for the geographic center.

3 MR. MILLER: Geographic center, roughly. PH-S7-1 cont'd

4 And the point being that all these people

5 here, couple of million people in east bay, in the

6 Amador Valley, to get down to train would have to cross

7 these bridges, park in parking lots, and take public

8 transit which is somewhat slow, come down here to

9 San Jose or with Altamont we have the option of taking

10 BART and so forth or can drive down to stations along

11 here. So it brings it much closer to the population

12 geographic center.

13 For San Francisco -- or to get from

14 Sacramento/San Francisco, it is three times further to

15 go this distance than on the Capitol Corridor, but it's

16 three times faster. So it's kind of a wash, and it's

17 not really a practical way to get people from one to the

33

18 other by High-Speed Rail. PH-S7-1 cont'd

19 I want to make one comment about the hybrid

20 idea which is being thrown out there. I think it's a

21 really good way for people who are politicians or agency

22 heads to say they are in favor of the hybrid option.

23 And it sounds great except that it costs a few billion

24 dollars more, and it's impractical to say that that can

25 be done in phase 1.

1 Now, this dark area here, the reason it's dark PH-S7-2

2 is this is wilderness here and this is the Grassland and

3 Water District Area. That's what this is passing

4 through. This, on the other hand, freeways and

5 population spine of California.

6 There is a few things I have heard. These are

7 not all actually in the EIR, but they have somehow

8 gotten out loosely and therefore stands have been taken

9 on it. One that I believe is in the EIR is that the

10 bridge over the bay of Dumbarton needs to be at an area

11 other than where the actual right of way is currently.

12 And I believe that we can build it on the fair right of

13 way, therefore have a minimum effect on the wetlands

14 there.

15 The idea that there is -- this is an EIR that PH-S7-3

16 there is a great deal more recreational travel by going

34

Sacramento Public Hearing Transcripts - Continued

17 via Pacheco rather than Altamont. I don't see how that PH-S7-3 cont'd
18 is substantiated. The idea that there is greater
19 revenue from San Francisco to Sacramento when you're
20 traveling 270 miles, you have to price this by the
21 distance between the two points, not by the distance
22 that people are going to have traveled because of an
23 extremely long route.
24 Also, the MTC has their preferred route for
25 Altamont and San Jose is via Redwood City, which adds an
1 extra 18 minutes to the already 10 greater minutes going
2 via Pacheco -- Altamont other than Pacheco. This makes
3 it appear that San Jose is at a much greater
4 disadvantage that it actually is because that is not
5 practical routing to get people to San Jose.
6 And some of these elevated structures, the PH-S7-4
7 idea of going through the middle of Fremont an elevated
8 structure just invites Fremont to oppose this, which
9 they have. And I think that it is much more practical
10 is there are places such as the PGE right of way in the
11 City of Fremont where it's just a few miles. And I
12 think that the idea of a trench --
13 HON. QUENTIN KOPP: Fremont is opposed to
14 High-Speed Rail?
15 MR. MILLER: They have opposed the Altamont PH-S7-5

35

16 alignment -- PH-S7-5 cont'd
17 HON. QUENTIN KOPP: They have not opposed
18 High-Speed Rail.
19 MR. MILLER: No, no, no. They opposed the PH-S7-5 cont'd
20 Altamont alignment. I want to make that clear.
21 HON. QUENTIN KOPP: They support High-Speed
22 Rail.
23 MR. MILLER: Yes. I want to make that clear PH-S7-5 cont'd
24 because they're concerned about the elevated structures
25 going through their neighborhoods. And that's a very
1 short distance. And I think that it is much more
2 practical to go into a trench.
3 The point here, to conclude, is follow the
4 people and follow the lights.
5 HON. QUENTIN KOPP: Okay.
6 MR. MILLER: Thank you.
7 HON. QUENTIN KOPP: Thank you. Are you going
8 to leave that with us or --
9 THE WITNESS: This?
10 HON. QUENTIN KOPP: Yeah.
11 MR. MILLER: I will make you some small copy.
12 HON. QUENTIN KOPP: You make a copy. Thank
13 you.
14 And we have got one more card, Dr. Rudolf

36

Sacramento Public Hearing Transcripts - Continued

15 Rosen of Ducks Unlimited.
16 DR. ROSEN: Thank you. Mr. Chairman, members
17 of the committee, my name is Rudolf Rosen. I am
18 director of the western regional office of Ducks
19 Unlimited. And we are here today to express concerns
20 about the alignment that would go through or be adjacent
21 to the Grassland's Ecological District.
22 Ducks Unlimited is a nonprofit conservation
23 organization that focuses on wetlands protection and
24 preservation throughout the United States. We have
25 600,000 members throughout the US, about 50,000 of which
1 reside in California. Currently in California we have
2 about 200 restoration -- wetland restoration projects
3 underway. I have staff present there who work with
4 other members of the conservation community such as the
5 US Fish and Wildlife Service who also have expressed
6 concerns about any alignment that would pass through the
7 Ecological District or be adjacent to it.
8 You have already heard discussion today about
9 the value of the District to wetlands and waterfowl and
10 issues that have to do with some specific alignments.
11 These were already described. And what I would like to
12 do is augment my presentation today with detailed
13 written comments that would be provided later.

PH-S8-1

37

14 HON. QUENTIN KOPP: Yeah. Well, you have got
15 another month to do that.
16 DR. ROSEN: Apparently so.
17 HON. QUENTIN KOPP: Right.
18 DR. ROSEN: From the perspective of Ducks,
19 about 20 percent of the entire population of the Pacific
20 Coast waterfowl resource winters in the Ecological
21 District. That's between half a million and a million
22 birds visit the Ecological District each year in the
23 Grasslands. That's a significant proportion of all the
24 birds. And these are birds that migrate all that way to
25 Russia, Alaska, Canada through the United States and
1 down into Mexico, Central America, and sometimes beyond.
2 The significance of the Grasslands Ecological
3 District Area has been described before but it is
4 immense when it comes to waterfowl and other water
5 birds. As a result, potential for impact due to any
6 alignment that would pass through the Grasslands and
7 because there is an alternative, the Altamont
8 alternative, we recommend that alternative or at least
9 any alternative that does not impact Grasslands as a
10 preferred alternative recommendation for Ducks
11 Unlimited.
12 Thank you, Mr. Chairman.

PH-S8-1 cont'd

38

Sacramento Public Hearing Transcripts - Continued

HON. QUENTIN KOPP: Thank you, Doctor.

All right. I think this concludes today's public hearing, and all public hearings on the Draft EIR. I thank everybody for their attendance and their time and attention. We are adjourned.

(whereupon, the proceedings concluded at 2:06 p.m.)

State of California)
) ss.
County of San Francisco)

I, Angie M. Materazzi, a Certified Shorthand Reporter of the State of California, do hereby certify that the foregoing proceedings were reported by me, a disinterested person, and thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel of attorney for either or any of the parties in the

foregoing proceedings and caption named, nor in any way interested in the outcome of the cause named in said caption.

Dated the 10th day of October, 2007.

ANGIE MATERAZZI CSR NO. 13116

Response to Sacramento Public Hearing (Sacramento, CA – September 26, 2007)

PH-S1-1

Comment acknowledged.

PH-S1-2

Comment acknowledged. Direct HST service to Yosemite is not part of the proposed statewide HST system. Currently, bus service is provided from the Amtrak station to Yosemite.

PH-S1-3

As shown in Table 3.3-4, the project is predicted to reduce mobile source emissions burdens in the affected air basins and on an overall statewide level. As such, the project is predicted to have a beneficial effect on air quality levels. Though individual roadway links were not analyzed separately in this study, the project is predicted to reduce overall VMT and, thus, pollutant burdens in the areas analyzed. It is expected that these predicted emission reductions would also be beneficial to air quality in Yosemite.

The analysis has been expanded to include the regional emissions analysis for two major build alternatives the Pacheco Base and Altamont Base.

PH-S1-4

Please see Response to Comment PH-S1-2.

PH-S2-1

Comment acknowledged.

PH-S2-2

Comment acknowledged.

PH-S3-1

Comment acknowledged.

PH-S3-2

Please see Response to Comment PH-S1-1.

PH-S3-3

Please see Response to Comment PH-S1-2.

PH-S3-4

Please see Response to Comment PH-S1-2.

PH-S3-5

Please see Response to Comment PH-S1-3.

PH-S3-6

Please see Response to Comment O007-51.

PH-S3-7

Please see Response to Comment PH-S1-4.

PH-S3-8

Please see Response to Comment PH-S1-4.

PH-S4-1

Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass as the Preferred Alternative.

PH-S5-1

Comment acknowledged.

PH-S5-2

Comment acknowledged

PH-S5-3

Please see Response to Comment L029-5 regarding the GEA.

PH-S5-4

See Response to Comments L029-5, L029-20, and L029-21 regarding the GEA. Refer to Section 3.17 regarding cumulative impacts.

PH-S5-5

The comments during the Notice of Preparation were reviewed as part of this Program EIR/EIS. The information provided was used in the Authority's consideration of the Preferred Alternative.

PH-S5-6

The GEA is acknowledged as an area of controversy in Section S.4 of the Summary in this Final EIR/EIS document.

PH-S5-7

See Response to Comments L029-5 and L029-66 regarding the GEA and migration corridors. Please also see Standard Response 5 regarding mitigation strategies.

PH-S5-8

See Standard Response 4 regarding growth.

PH-S5-9

See Standard Responses 1 and 2.

PH-S5-10

See Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass as the Preferred Alternative.

PH-S6-1

Comment acknowledged. Also please see Standard Responses 1 and 3.

PH-S6-2

Comment acknowledged. Please also see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass as the Preferred Alternative.

PH-S7-1

Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass as the Preferred Alternative.

PH-S7-2

Please see Standard Response 3 and Chapter 8 in regarding the identification of Pacheco Pass as the Preferred Alternative.

PH-S7-3

There is substantial intraregional trip making in the corridor between Santa Clara County and San Francisco. Pacheco's ability to draw more "recreational and other" trips is due primarily to the directness of service that Pacheco provides in the entire Santa Clara County to San Francisco corridor rather than the inclusion of a Gilroy station. The HST would substitute for some Caltrain and auto travel in this corridor across all trip purposes. HST is at a relative disadvantage to Caltrain for commute and business travelers since, during peak commute hours, Caltrain runs at similar frequencies to HST with lower fares and many more stations. However, HST is at a competitive advantage to Caltrain for recreation and other trips since most of these trips occur during off-peak hours; in the off-peak, HST's travel time and frequency advantage outweigh Caltrain's lower cost. Hence, HST would be able to capture recreation and other riders at a higher rate than business and commute riders in the corridor between Santa Clara County and San Francisco.

From a ridership and revenue standpoint, one of the main differences between the Altamont and Pacheco scenarios involves the splitting of train service between San Jose and San Francisco in the Altamont scenario. This split eliminates a direct HST connection between San Jose and San Francisco and significantly reduces the frequency of train service to either destination. The effects of an Altamont operational split are not obvious for business and commute travelers since, during peak commute hours, HST would provide high frequency service to both San Jose and San Francisco, and the alternative transit options (BART to San Francisco and ACE to San Jose) provide substantially slower travel times. The effects are much more obvious for recreation and other travelers since:

- Overall HST frequencies would be lower during off-peak hours when most recreation and other trips occur. With the operational split, frequencies would be further reduced to San Jose and San Francisco, putting HST at a strong disadvantage to the auto for recreation and other trips.
- In spite of its slower travel time, BART is a relatively more attractive transit option for recreation and other travelers between the East Bay and San Francisco due to its lower cost and much higher off-peak frequency.
- The loss of direct service between Santa Clara County and San Francisco means that HST is capturing very few recreation/other trips in this corridor.

Hence, HST is able to capture business and commute riders at a much higher rate than recreation and other riders for trips to and from the East Bay.

PH-S7-4

Comment acknowledged. The Draft Program EIR/EIS evaluated two alignment alternatives through Fremont: one using existing narrow rail right-of-way and the other using utility easement and tunnel.

PH-S7-5

Please see Standard Response 3 in regards to the identification of the Pacheco Pass as the Preferred Alternative.

PH-S8-1

See Response to Comments L029-5, L029-20, and L029-21 regarding the GEA.

Comment Letter PH-S9 (Walter Strakosch, 2007)

PH-S9

Comments on the Bay Area to Central Valley Program EIS/EIR
My name is Walter Strakosch and I am a resident of Mill Valley.

There are a number of issues to be considered in evaluating the Altamont (AP) vs. the Pacheco Pass (PP) routings, some of which I will discuss later, but initially there is the cost factor. Where 10 years ago the project had started out with a $18 Billion dollar (total project) price tag the estimated costs are now about twice that. With regard to the costs of the Bay Area to Valley segment the Program EIS/EIR does give an analysis of the costs, but it left me with some questions that the HSR Office was unable to answer. I then was referred to the lead on the DEIS/DEIR at P-B (Dave Manson) but he is on vacation in France and hopefully enjoying their high-speed trains. I then decided to work with what I had. WHICH WAS THE PROGRAM EIS/EIR PH-S9-1

In any event this is my take: Table S 5-1 in the Program EIS/EIR shows comprehensive numbers (mileage, costs, ridership, etc.) on many alternate routings between the Valley and the Bay Area. There are 11 alternates via the AP and 6 via the PP. What I have tried to do is analyze only two (it gets to complicated to go beyond that): the base route via Pacheco and, in my judgment, the best base route via the AP.

What I think is important here is that the project has gotten so INVOLVED ~~mucked up~~ in the past five years that unless you get something (anything) built you may end up getting nothing built, but get a sensible segment built and operating and the rest will come very quickly—***HSR is that good, I guarantee it.*** PH-S9-2

Following that line of reasoning we should do exactly what the French did in 1981 on their initial TGV Line (and I rode it 10 days after it opened) between Paris and Lyon. They built the majority of the line between the two cities, but used the existing rail to enter both Lyon and Paris. They completed the final segments at a later time.

Now this becomes important and is where the entire Caltrain Line plays a part in getting the line opened sooner and, initially keeping the costs down.

This then takes us to the base case scenario of the PP vs. the AP. First the base case for the PP with the cost figures as shown in the Summary Table (S. 5-1) and further detailed in Table 4.2-3. It would seem that the mileage should be measured from where the line leaves the SJV (remember the system *is* going all the way to Sacramento) or about 10 miles below Merced, but it doesn't. ~~It~~ THE MILEAGE shows as 267.53 ~~miles~~ (And this is where I couldn't get an PH-S9-3

answer.), whereas the mileage is closer to 150 miles to San Jose and 200 to San Francisco. Anyway at a cost of $46,303,853 a mile (Table 4.2-3), the 150 miles from the Valley to SJ is $6,946,000,000. PH-S9-3 Cont.

My base AP routing for the same strange reason as shown in Table 4.2-3 has a mileage shown as 213.30 whereas the actual mileage from the Valley connection to the Caltrain track (via a rebuilt Dumbarton Bridge) is about 83 miles at a cost of $58,912,092 per mile the total cost is $4,831,000,000.

Therefore if you compare the cost of the PP (Valley to SJ) $6,946,000,000 to the AP (Valley to a Caltrain connection) $4,831,000,000, the AP is about $2,000,000,000 cheaper and it is not necessary to build about 70 miles of redundant double track. WHICH IS WHAT THE AP WILL REQUIRE

There are other factors favoring the AP as well. The largest travel market in the State (2000 Business Plan) is between the SJV and other major metro areas. The third largest travel market in the State is between Sacramento and San Francisco. The AP routing allows you to keep Merced, Modesto and Stockton on a direct line to SF. The PP routing does not. It also favors the Sac. to SF market because it is foolish, once the Sacramento extension is built, to think that people will travel almost half-way to Los Angeles to travel between these two cities. AP

In addition you have two existing rail Row's in the Altamont Pass. One is the operating UP Line which may, or may not be, for sale at the right price and the other is an abandoned, I believe, ROW of the Southern Pacific. My guess is that part, if not all, of one or the other could be rebuilt to HSR standards and let us not forget how much easier it might be to obtain environmental clearance. PH-S9-4

The issue could have been decided several years ago but politics being politics, and sometimes wrongly used, it's never that simple. The original recommendation by the HSRC recommended the AP but it was ~~mysteriously~~ left out of the 2000 Business Plan, but because of overwhelming objections it had to be restudied. The problem is the HSRA could have been $1.7 million dollars to spend on other issues and two years ahead if wasn't necessary to have to DO this ~~issue~~ all over again.

Walter Strakosch
415 388-6206

DEISHSR.doc

Response to Letter PH-S9 (Walter Strakosch, 2007)

PH-S9-1

The most common reasons for significant increases in project costs are the addition of more expensive project elements, expansion of the project, and cost inflation due to delays.

PH-S9-2

Comment acknowledged. The Authority will examine a variety of staging plans to implement the statewide system in the most cost-effective manner. Please also see Response to Comment PH-SF22-1.

PH-S9-3

For all network alternatives, the Authority and FRA used a common end point in the northern San Joaquin Valley to allow for a uniform and objective comparison. Costs, costs per mile, and lengths for each network alternative are provided in the Summary (Table S.9-1 in the Draft Program EIR/EIS) and Chapter 7.

PH-S9-4

See Standard Response 3 regarding the identification of the Pacheco Pass as the Preferred Alternative.

Comment Number	Name / Organization / Occupation / City, State	Comment	Response
W015-1	Mr. Craig Easton / Stevinson, CA	I am totally against the high speed train on Henry miller road there are other places to put it without in are grasslands I hope you see both side on this issue.	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative. Please also see Responses to Comment Letters L029 and O011.
W016-1	Mr. Lane Davis / Engineer / Salinas, CA	The 'Pacheco Pass Route' should be the preferred bay area route so as to include Monterey County and Santa Clara County in the transportation benefits of the California High-Speed Rail Project.	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.
W016-2	Mr. Lane Davis / Engineer / Salinas, CA	A stop in Gilroy would be very beneficial to the citizens on the central coast and provide a hub for tourist transport to the Monterey/Santa Cruz tourist destinations. Also, a stop en route to San Francisco in San Jose (aka 'Silicon Valley') would be valuable as the technological engine to the world lies here. Sincerely, Lane Davis Salinas, CA	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.
W017-1	Mr. Anthony Dominguez / Santa Clara County / Law Enforcement / Gilroy, CA	Please do the right thing and route high-speed rail through the Pacheco Pass into the Bay Area. San Jose and Silicon Valley should be a focal point of the HSR system, not a spur destination. For Central Valley commuters east of Tracy, make improvements instead to ACE rail. Thank you.	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.
W018-1	Mr. Jose Govea / Fremont, CA	In reviewing the Draft EIR/EIS, I would like to strongly recommend that the Pacheco Pass Alternative be the one selected for the High Speed Train from the Central Valley to the S.F. Bay Area. In terms of revenue, more direct connection to San Jose (and then San Francisco) would yield the largest potential considering rider ship need and quantity. I believe it would also minimize environmental impact to such areas as Niles, if the Altamont pass were to be used. Regards, José Govea	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.
W019-1	Ms. Joanne Bertoli / Fremont, CA	We want the Pacheco Pass Alternative not the Altamont Pass Alternative because of the environmental consequences to Niles Canyon and the loss of the Historic Train.	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass (San Francisco and San Jose via the Peninsula) as the

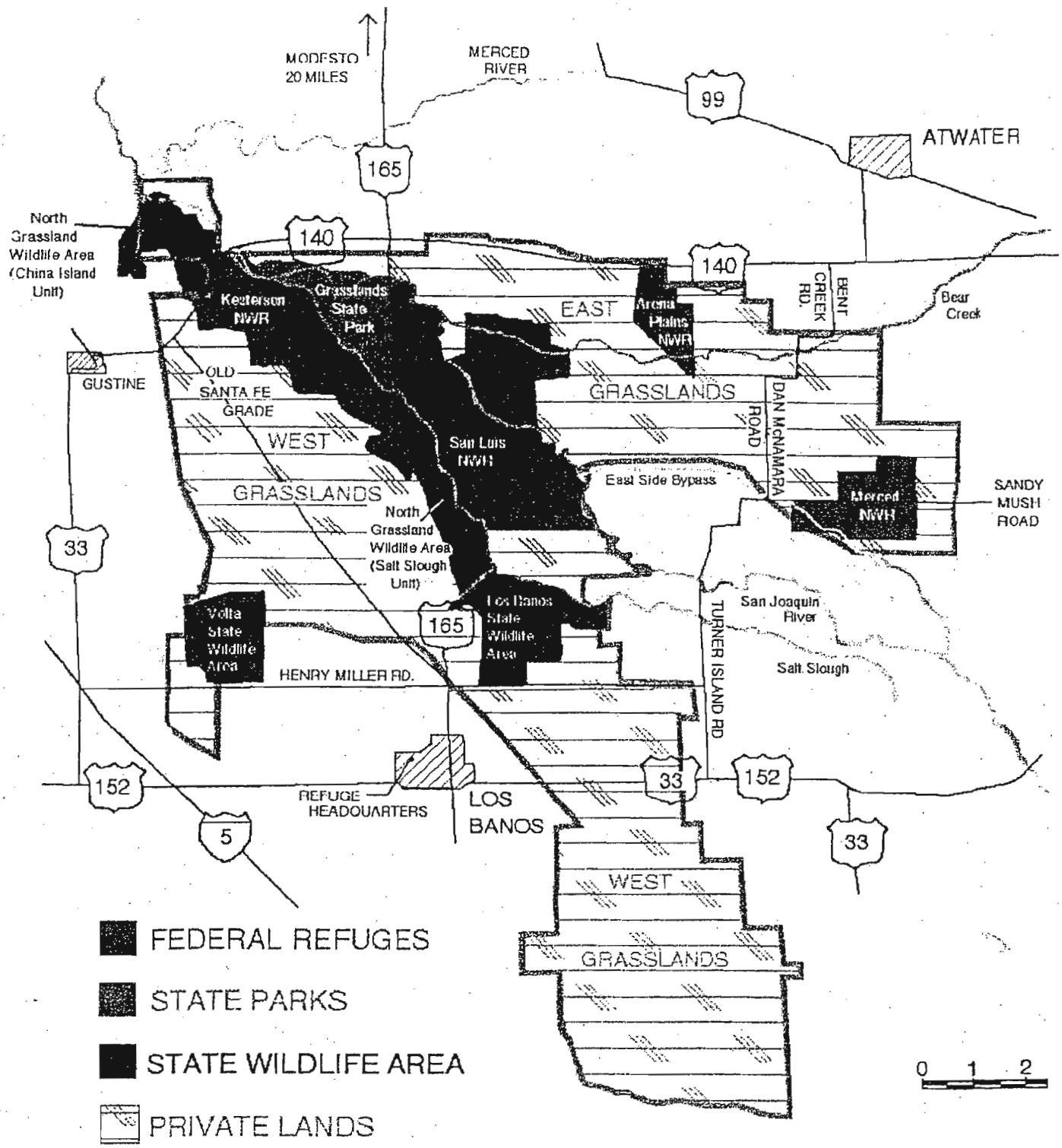
Comment Number	Name / Organization / Occupation / City, State	Comment	Response
		Contrary to public testimony heard at the San Jose Public Hearing, the new Bay rail crossing is a key advantage of the Altamont alternative. Because it would take huge pressure off the BART transbay tube, the EIR/EIS should highlight this advantage.	
W076-3	Mr. Eric McCaughrin / East Bay Bicycle Coalition / meric@ebbc.org / CA, 94604	Bicycle Access Chapter 6 "HST Station Area Development" calls for a "grid street pattern" that promotes walking and bicycle access. EBBC supports this concept, and also recommends adoption of BART's Bicycle Access "Toolkit" - a set of design standards for station design, including signage and secure bike parking. Maximum feasible accommodation for bicycles (and other types of luggage) should be provided on trains, particularly the regional and suburban services.	Comment acknowledged. Please refer to Chapter 6, "Station Area Development," of this Final Program EIR/EIS. The Authority believes that planning for bicycles is an essential component of station design and for transit-oriented development at station areas. It is also the Authority's adopted policy that HST trains should provide accommodation for bicycles. The adoption of BART's Bicycle Access "Toolkit" is beyond the scope of this project-level process, but this may be considered at the project-level should the project move forward.
W076-4	Mr. Eric McCaughrin / East Bay Bicycle Coalition / meric@ebbc.org / CA, 94604	Ridership Analysis Ridership analysis for the Bay Area - Los Angeles segment appears to rely on a dubious assumption. Page 11 of the Report Summary, states the following: "The Altamont Pass network alternatives would require the system to split in two separate directions to serve both San Jose and San Francisco given a constant number of trains. This decreases the frequency of service from other markets in the state to these stations by a factor of two, as compared to network alternatives using the Pacheco Pass alignment alternatives." As noted in our 2004 comments, "splitting" trains does not necessarily result in decreased service to San Jose. By using timed cross-platform connections, the Altamont alternative can provide service to San Jose with no decrease in frequency. For example, a passenger departing from San Jose on a Sacramento-bound train could transfer to the San Francisco-Los Angeles train at a multi-modal station in Fremont or Pleasanton. This is similar to BART system operations, where trains split off in four directions at Oakland. On BART's heavily used Richmond line, a 1-seat ride into San Francisco has a 15 minute headway, but when the timed transfer at	There is a decided disadvantage in requiring intercity travelers to transfer between trains. Research on the TGV Atlantique line[1] has shown that this transfer "penalty" can amount to up to 60 minutes of equivalent in-vehicle time for intercity travelers, which would greatly outweigh any benefit from increased frequency to San Jose and San Francisco. This penalty is much higher than the 8- to 10-minute values typically associated with commuter rail and rapid transit systems such as BART[2]. The research paper also pointed out several other critical problems with an integrated timed transfer system, including inefficient facility usage, reliability problems, and difficulty in varying service headways to match demand throughout the day.

[1] Clever, Reinhard; "Integrated Timed Transfer: A European Perspective"; in Transportation Research Record 1571.

[2] "Journal of Public Transportation"; Vol 8, No 1; pg 46.

Comment Number	Name / Organization / Occupation / City, State	Comment	Response
		MacArthur (and 12th Street) is counted, the headway is actually 7.5 minutes. While much attention has focused on the Bay Area to Los Angeles segment, the business plan showed a substantial fraction of daily ridership would be commute trips. For Bay Area voters, the real value added for this project is not so much the ability to visit Southern California, but rather the improvements in their daily commute. Thus, there is an error of omission in the EIR/EIS: a complete lack of analysis of the potential for commuter, suburban, regional types of travel possible with this project. The only mention is a single sentence on Page 2-11, which indicates 69,000 daily commuters. The report does not indicate how this figure was derived, nor does it distinguish commuter figures for the various alignment options. The 69,000 figure seems an underestimate based on today's census figures, let alone what may be expected by the year 2030. The ridership analysis should provide a system approach for all destinations, rather than focus exclusively on the Los Angeles to Bay Area market. The EIS/EIR provides little information on Sacramento ridership. We note that the Altamont "local-service" alternative adds $6 billion to the total cost of the project. In the event the Pacheco alignment is constructed, the Altamont local-service option would be required to provide time-competitive service to Sacramento. For this scenario, the EIR/EIS needs to evaluate the cost per trip for Sacramento (and Tri-Valley) service, versus other design alternatives. We are also doubtful that $6 billion in private investment capital can be obtained for Sacramento service.	The ridership and revenue model used for the Program EIR/EIS explicitly forecasts HST's ability to capture all types of travel across California, including commuter, suburban, and regional types; it does not "focus exclusively on the Los Angeles to Bay Area market." Please see Response to Comment L006-8 for availability of ridership information for Sacramento and other markets. About 30% of HST's projected ridership is commute travel. See Standard Response 4 for a discussion of the commute accessibility potential of HST versus auto, Response to Comment O007-113 for a discussion of general accessibility differences between highways and HST, and Response to Comment O006-6 for a discussion of how access and egress to an HST station affects the door-to-door travel time and cost of HST relative to auto.
W076-5	Mr. Eric McCaughrin / East Bay Bicycle Coalition / meric@ebbc.org / CA, 94604	Caltrain Coordination Page 2-18 states that the current Caltrain Dumbarton Rail project would "conflict" with the proposed HST system. We urge the High-Speed Rail Authority to coordinate with the Caltrain Joint Powers Board in the implementation of a joint Dumbarton crossing. Coordination is especially important as the two agencies will share Caltrain ROW.	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.
W076-6	Mr. Eric McCaughrin / East Bay Bicycle Coalition / meric@ebbc.org / CA, 94604	Because the Altamont alignment reduces conflicts between Caltrain and HST service, the EIR/EIS should note some of the operational advantages of the Altamont alignment. Under the Pacheco alternative, HST trains would run the entire length of the highly congested Caltrain corridor -- increasing the possibility of delays to HST due to equipment breakdowns, police actions, and other interruptions along the Caltrain ROW. By comparison, the Altamont alternative would have HST diverge from the shared Caltrain ROW much earlier (at Redwood City), thereby reducing the chances of service disruption. HST operators in other countries follow a similar policy of getting high-speed trains off mainline commuter tracks as early as possible.	Comment acknowledged. Please see Standard Response 3 and Chapter 8 regarding the identification of Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.

Comment Number	Name / Organization / Occupation / City, State	Comment	Response
W100-1	Stanley Kao / Daly City, CA	What about a station at SJ airport? And also instead of a station at union city, have it at the new Fremont baseball stadium.	Comment acknowledged. Please see Standard Response 3 for the rationale for identifying the Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative. A station at San Jose Airport (Santa Clara) was considered but rejected.
W101-1	Mr. Kevin Standlee / Computer Programmer / Fremont, CA	I urge the Authority to select the Altamont-Dumbarton alignment as the most sensible choice for the entire Bay Area. My apartment complex adjoins the existing rail line in Fremont/Centerville. I live within easy walking distance of Centerville Station. Unlike it seems many of my neighbors, I welcome a modern transportation system in my area. I have traveled in Europe and Japan and see what a boon a well-designed, well-placed system is to a country. Please do not knuckle under to parochial concerns. The Altamont alignment is the most sensible choice and makes far more sense for people traveling from the Central Valley to points in the Bay Area. If it is really so vital that San Jose be served by every single train, then adopt split/join operation such as used in Europe and Japan, with trains joining/splitting at Redwood Junction.	Comment acknowledged. Please see Standard Response 3 for the rationale for identifying the Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.
W102-1	Mr. Douglas Sibley / retired / Martinez, CA	1. I agree with MTC's recent decision to support both the Altamont Pass (my first choice) and the Pacheco Pass routes.	Comment acknowledged. Please see Standard Response 3 for the rationale for identifying the Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative. The Authority also has committed to work with the region to implement improvements in the Altamont Corridor (as a separate but related project). The Authority believes that its Preferred Alternative together with its commitment in the Altamont Corridor are consistent with MTC's recommendations and the Bay Area Regional Rail Plan.
W102-2	Mr. Douglas Sibley / retired / Martinez, CA	2. I disagree with the proposed Oakland Station underneath BART's 12th Street station. With the depth required in unstable Bay silt, the proximity of so many tall buildings, the lack of any additional (let alone convenient) parking for drop off, overnight, or longer stays, the cost of tunneling there from both the north and south of 12th Street BART makes even the thought of such a proposal as only proposed to kill even the concept of a downtown station. What I see as a much more viable alternative is to locate an Oakland station underground just two blocks or so south of the West Oakland BART Station focused on a site on 7th Street owned by Caltrans	Comment acknowledged. Please see Standard Response 3 for the rationale for identifying the Pacheco Pass (San Francisco and San Jose via the Peninsula) as the Preferred Alternative.

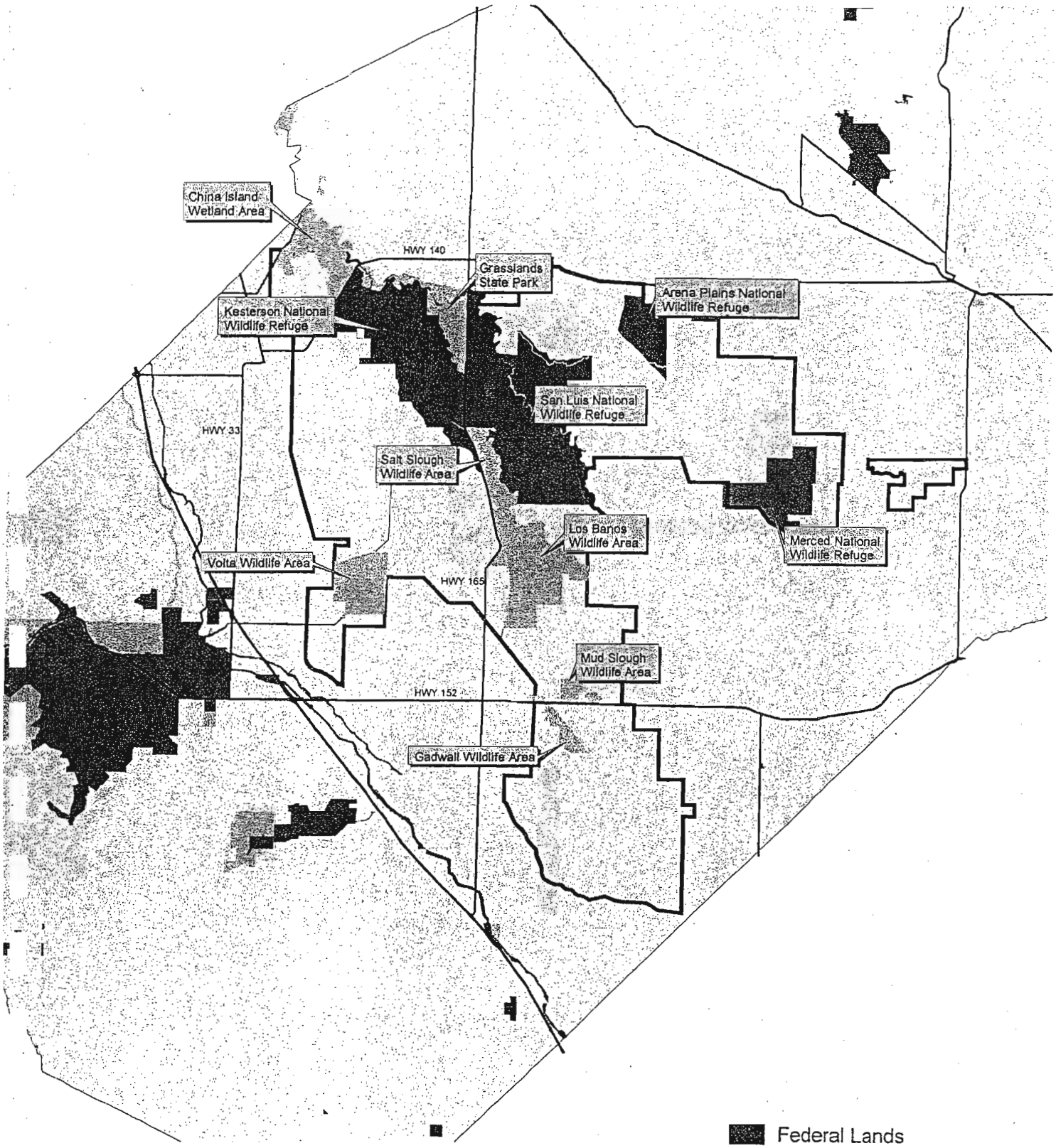


3. Federal, State and private owned lands in the Grasslands area.

EXHIBIT 2

Map of GEA and Public Lands

Figure 2
Grassland Ecological Area and Public Lands



Federal Lands
State Lands
Grassland Ecological Area

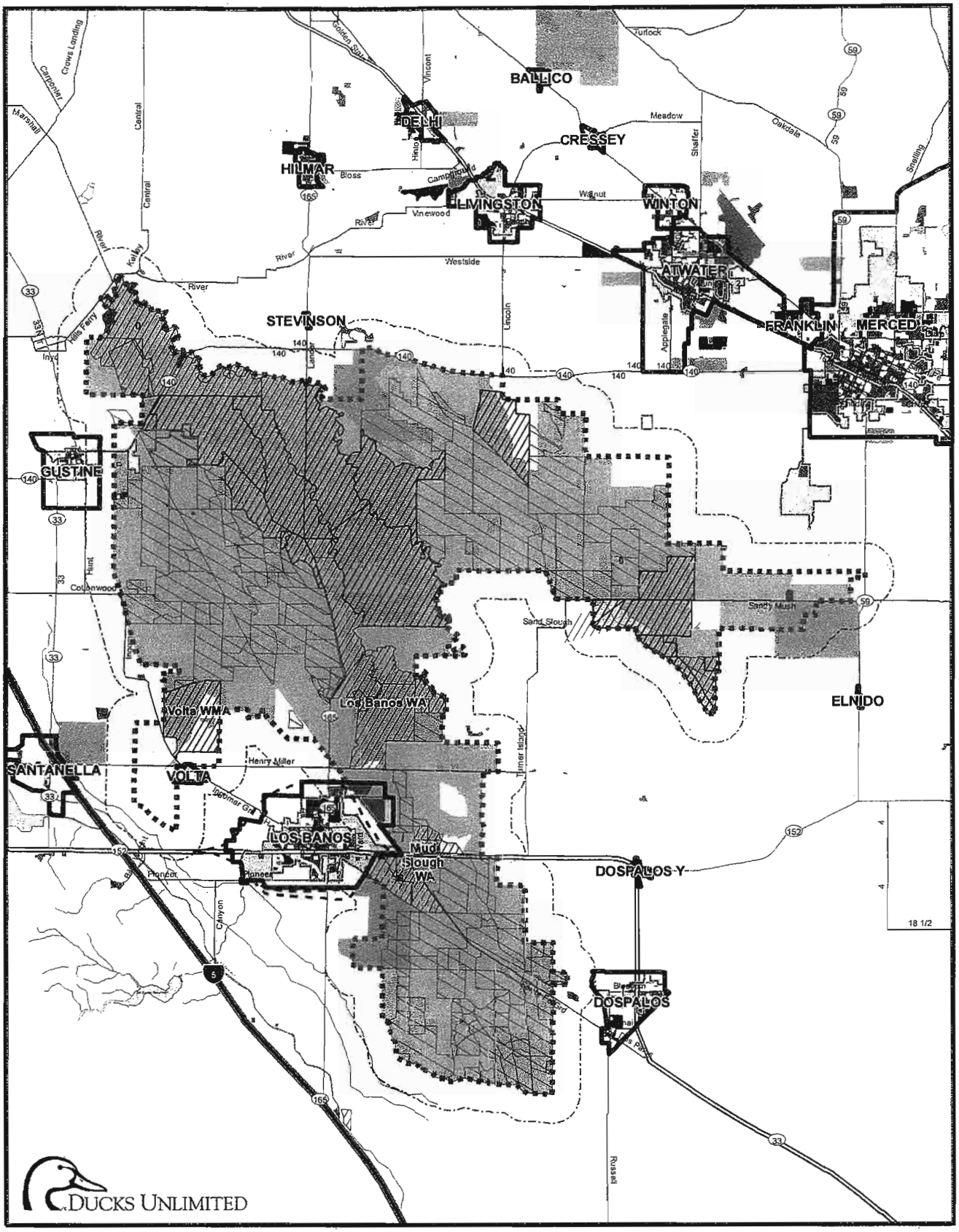
N

0 1 2 3 4 5 Miles

Source: MDSS
Map: Thomas Reid Associates, 6/20/01

EXHIBIT 3

Ducks Unlimited, Map of Grasslands Ecological Area Boundary, Federal and State Lands, and Federal and State Easements (2005)



The Grasslands Ecological Area & Surrounding Communities

Population Growth 1990-2000

- 0 - 10
- 11 - 50
- 51 - 100
- 101 - 200
- 201 - 764

- Sphere of Influence
- City Limit
- Urban or Built-up
- River, Creek or Canal
- Water body

Data Sources: U.S. Census, Merced CAG, Central Valley Joint Venture

Grassland Ecological Area

- Boundary
- 1 Mile Buffer

Protection Status

- Federal Lands
- State Ownership
- Easements

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EXPERIENCE

1989 - **TERRELL WATT PLANNING CONSULTANTS**
Planning Consulting Firm Owner

1981-1989 **SHUTE, MIHALY & WEINBERGER**
Planning Expert/Paralegal

PROFESSIONAL MEMBERSHIPS AND BOARDS

American Institute of Certified Planners (AICP)
American Planning Association (APA)
Board Member of the Conservation Biology Institute www.consbio.org
Board Member of the Planning and Conservation League

AWARDS

California State Association of Counties Distinguished Service Award, 2005

EDUCATION

USC GRADUATE SCHOOL OF URBAN AND REGIONAL PLANNING
Masters degree in City and Regional Planning

STANFORD UNIVERSITY
Bachelor's degree in Urban Studies

Since 1989, Terrell Watt, AICP, has owned Terrell Watt Planning Consultants. Ms. Watt's firm specializes in planning and implementation efforts focused on regionally-significant projects that promote resource conservation and sustainable development patterns. Prior to forming her own consulting group, she was the staff planning expert with the environmental and land use law firm Shute, Mihaly & Weinberger. She is an expert in general and specific planning, open space and agricultural land conservation and

environmental compliance. Her skills also include facilitation, public outreach, and negotiation.

Terrell works with a wide variety of clients throughout California including non-profit organizations, government agencies and foundations. Her recent projects include:

- Contract Project Manager for the Marin Countywide Plan update and EIR currently schedule for Board of Supervisors action in 2007.

- Facilitator for the Los Angeles Housing Infill Potential Methodology study, funded by an Environmental Justice Grant from Caltrans and jointly sponsored by the City of Los Angeles, County of Los Angeles and Environment Now. The Study Toolbox can be obtained at www.solimar.org

- Planner and meeting facilitator for the Santa Clara County Parks Strategic Plan. http://www.parkhere.org/SCC/docs/Parks%20and%20Recreation,%20Department%20of%20(DEP)/attachments/346915strategicplanfinal.pdf

- Consultant to the Institute of Local Self Government for the development of A Local Official's Guide to Funding Open Space Acquisition. Terry was responsible for meeting preparation and facilitation of advisory group meetings and calls. Report available at www.ilg.org.

- Project coordinator and meeting facilitator for the Silicon Valley Conservation Council for a successful Proposition 218 Funding Measure for the Santa Clara County Open Space Authority.

- Consultant to the Planning and Conservation League led coalition of community and environmental groups on California High Speed Rail (HSR). Co-facilitated calls with coalition members to develop comments on the HSR DEIR.[1]

- Workshop planner and facilitator to develop the Monterey County Community Plan. Prepared materials for 7 workshops including 2 in Spanish. Community Plan can be found at www.landwatch.org.

[1] Other recent EIR/S comment letters are available on request and include Comments on the MND for the proposed Ortega Highway Widening Project, Sonoma County General Plan DEIR, Placer County Martis Valley Community Plan DEIR/FEIR and numerous other letters.

Michael D. White, Ph.D.—Curriculum Vitae

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SUMMARY

Dr. White is a Senior Ecologist with over 20 years of experience conducting ecological research, developing species and habitat conservation programs, and conducting impact assessment studies throughout the Southwestern U.S. and the Pacific Rim. His project experience includes conservation assessments and multiple species conservation planning, lake management and water quality assessments, riparian and stream assessments and restoration, aquatic invertebrate ecology, ecological risk assessments, environmental impact analyses, resource management plans, and environmental regulatory compliance. Dr. White is trained as a limnologist, and his technical expertise includes the ecology of aquatic and riparian habitats, water resources management, and use of GIS for environmental analyses. His research interests are exploring the interrelationships of hydrological and biological characteristics and how they are influenced by land use and water management practices.

Dr. White's recent projects have involved conducting landscape-scale conservation assessments, developing water quality management strategies, conducting wildlife corridor assessments and habitat linkage planning studies, and developing habitat management plans for conserved land. These projects involve coordination with local governmental agencies (e.g., City of San Diego, San Diego Association of Governments), state and federal wildlife and land management agencies (i.e., California Department of Fish and Game, U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service), local academic and research institutions (San Diego State University, San Diego Natural History Museum, U.S. Geological Survey, San Diego Supercomputer Center) and non-governmental organizations (e.g., The Nature Conservancy, The Trust for Public Land, Pronatura, Sierra Watch, Southwest Wetlands Interpretive Association, Endangered Habitats League, Back Country Land Trust). Dr. White serves on the Scientific Advisory Panel of the Southern California Wetlands Recovery Project, the County of San Diego's Biological Advisory Panel, and the Technical Advisory Committee of the San Diego Tracking Team, a volunteer organization that conducts wildlife tracking studies and promotes environmental awareness in San Diego County.

Dr. White is a board member of the non-profit Conservation Biology Institute and manages the Institute's San Diego region. He is an Adjunct Associate Professor in the Biology Department and a Faculty Associate at the Center for Inland Waters at San Diego State University. Dr. White regularly lectures on a variety of subjects, including habitat conservation and land management planning, experimental design and statistical analysis, limnology and aquatic ecology, and ecological risk assessment.

EDUCATION

Ph.D. Ecology, San Diego State University and University of California, Davis, 1991. Dissertation: Horizontal distribution of pelagic zooplankton in relation to predation gradients.
B.A. Ecology, Behavior and Evolution, University of California, San Diego, 1982.

PERSONAL

Born July 20, 1960, Los Angeles, California (citizen of U.S.A.).
Married.

PROFESSIONAL ORGANIZATIONS AND AFFILIATIONS

Adjunct Professor, San Diego State University
Faculty Associate, Center for Inland Waters, San Diego State University
Society for Conservation Biology
Ecological Society of America
Societas Internationalis Limnologiae
Southwest Association of Naturalists
Arizona Riparian Council
California Native Grassland Association

Dr. White holds an Endangered Species Act 10(a)(1)(A) Scientific Collecting Permit (#TE027425-0) for the following species listed under the Act:

- Conservancy fairy shrimp (*Branchinecta conservatio*)
- Longhorn fairy shrimp (*Branchinecta longiantenna*)
- Riverside fairy shrimp (*Streptocephalus woottoni*)
- San Diego fairy shrimp (*Branchinecta sandeigonensis*)
- Vernal pool fairy shrimp (*Branhinecta lynchi*)
- Vernal pool tadpole shrimp (*Lepidurus packardi*)

EMPLOYMENT HISTORY

July 1999 – present. Senior Ecologist and San Diego Director of the Conservation Biology Institute, San Diego, California. Providing administrative and fiscal oversight of

a four-person operation with a budget of approximately $500K/yr. Responsibilities include marketing and proposal preparation, oversight of office contracts, staff timekeeping and project tracking, accounts payable, accounts receivable, and project management and technical studies.

September 1991 – present. Adjunct Professor, San Diego State University, San Diego California.

July 1998 – July 1999. Senior Technical Specialist. Ogden Environmental and Energy Services Co., Inc., San Diego, California. Responsibilities included providing technical oversight of the Lower Colorado River Multiple Species Conservation Program project and senior technical support of project staff.

January 1997 – June 1998. Manager, Aquatic Sciences Group. Ogden Environmental and Energy Services Co., Inc., San Diego, California. Managed a group of nine professional aquatic scientists with revenues of approximately $2M/year. Responsibilities included administration, marketing and proposal preparation, strategic planning, annual budgeting and performance tracking, timekeeping oversight, personnel supervision (including direct supervision of four professional biologists), project management, and project technical support.

January 1994 – December 1996. Deputy Manager, Biological Resources Group, Ogden Environmental and Energy Services Co., Inc., San Diego, California. Deputy manager for a group of 23 professional biologists. Responsibilities included, marketing and proposal preparation, strategic planning, annual budgeting, group health and safety program oversight, personnel supervision (including direct supervision of five professional biologists), project management, and project technical support.

September 1989 – July 1994. Senior Ecologist, Ogden Environmental and Energy Services Co., Inc., San Diego, California. Responsibilities included marketing and proposal preparation, project management, project technical support, and direct supervision of three professional biologists.

September 1983 – December 1990. Graduate Assistant, San Diego State University, San Diego, California.

July 1984 – June 1985. Graduate Assistant, UC Davis Tahoe Research Group, Lake Tahoe City and Davis, California.

SELECTED PROJECT EXPERIENCE

REGIONAL HABITAT CONSERVATION PLANNING, MONITORING, RESTORATION AND MANAGEMENT

Tejon Ranch Reserve Design. CBI, working with the South Coast Wildlands Project, is developing a science-based reserve design for the 270,000-acre Tejon Ranch. The reserve design uses a series of conservation planning principles and the results of previous CBI studies conducted for the Ranch to design and justify a reserve that captures regional conservation objectives, such as habitat representation goals, protection of intact watersheds, rare and endangered species protection and recovery, and maintenance of intact core reserve areas. The reserve design is undergoing review by a peer review group of academics, resource agency staff, and local experts. The final reserve design will be provided to stakeholders with an interest in significant conservation on Tejon Ranch for use in negotiations with the landowner.

Environmental Monitoring Program for the Ramona Grasslands – The County of San Diego Department of Parks and Recreation. CBI is overseeing a monitoring program for the Ramona grasslands in central San Diego County. The Ramona Grasslands are a regionally important conservation area, supporting a variety of target resources, including vernal pools and rare vernal pool species, Stephens' kangaroo rat, wintering and breeding raptors, riparian habitats and arroyo southwestern toads, and native grasslands. The Ramona Grasslands are currently grazed by cattle, which maintain habitat suitability for some species but adversely affect other natural resources. The monitoring program is intended to provide information to land managers to inform adaptive management of the Grasslands and to track the efficacy of management actions. Monitoring activities include, grassland, vernal pool, and riparian botany; stream channel geomorphology and water quality; and avian, small mammal, amphibian, and fairy shrimp surveys.

Hydrologic and Hydraulic Assessment of Santa Maria Creek – The Nature Conservancy. CBI is collaborating with researchers from San Diego State University's Department of Geography to conduct an analysis of the historic, current, and future hydrologic and hydraulic regime, and the associated changes in channel geomorphology and riparian vegetation, of Santa Maria Creek, Ramona, San Diego County. The analysis is looking at how changes in land uses in the watershed has affected runoff quantity, stream discharge and stage, and channel geomorphology and riparian vegetation distribution. Historic land uses were quantified from California Department of Water Resources land use maps and historic channel geomorphology and riparian vegetation distribution from historic aerial photography. Future land use was projected from County of San Diego General Plan information. This information is being incorporated into management planning for the Ramona Grasslands Open Space Preserve, which is traversed by Santa Maria Creek.

Exhibit A - continued

El Monte Valley Restoration Project – Endangered Habitats Conservancy. Lead scientist directing restoration planning for approximately 450 acres of the San Diego River and its floodplain in the El Monte Valley, Lakeside, California. The riverine functions and values of the site are compromised by a lack of surface-water hydrology due to the El Capitan dam upstream of the site, lowered groundwater elevations from groundwater withdrawals, and significant invasion of the river channel by exotic species. The project entails coordinating the design of the restoration project with a groundwater recharge project proposed for the Valley by the Helix Water District.

Conservation Assessment of Ranch Guejito. CBI prepared a conservation assessment for the 20,000-acre Rancho Guejito in northern San Diego County, one of the most important conservation targets in the region. The assessment documents the conservation significance of Rancho Guejito from both a natural and cultural resources perspective. The assessment evaluated the resources of Rancho Guejito within a Southern California regional context, and assessed its potential contribution to conservation of landscape-scale processes, protecting intact watershed basins, under-protected vegetation associations, and key sensitive species, as well as prehistoric and historic cultural resources. The assessment is being used by conservation organizations to justify and develop strategies for conservation of the property.

Las Californias Binational Conservation Initiative – San Diego Foundation and Resources Legacy Fund Foundation. In partnership with the Mexican non-governmental organization, *Pronatura*, and The Nature Conservancy, CBI is designing a conservation reserve system for a 2.5 million-acre area of southern California and northern Baja California. The study area extends from the Sweetwater River watershed in California to the Rio Guadalupe watershed in Baja California. The project is making use of the reserve selection algorithm, *SPOT*, to select a reserve portfolio. The project has required extensive manipulation and merging of various U.S. and Mexican digital datasets (e.g., land cover, roads, digital elevation models, etc.) and cross-walking of different vegetation classification systems.

Central Sierra Nevada Science Assessment – The Trust for Public Land. Ownership in the Central Sierra Nevada is characterized by a "checkerboard" pattern of public and private land, which potentially complicates management of the landscape for conservation, recreational, and timber harvest values. CBI is conducting a science assessment of the Central Sierra to identify high resource value areas, threats to these resources, and spatially explicit management strategies that could be implemented by TPL and their partners to improve resource values. CBI is working with TPL and their conservation partners for the project, Sierra Nevada Forest Protection Campaign and California Wilderness Coalition. As part of the assessment, CBI has assembled and will work with a Scientific Advisory Panel, comprised of academics and resource agency staff with relevant experience in the Sierra Nevada.

Tejon Ranch Conservation Assessments – Environment Now and Resources Legacy Fund Foundation. Principal investigator for assessments that characterized the conservation value of the 270,000-acre Tejon Ranch, California. The Conservation Significance Project was conducted in partnership with the South Coast Wildlands Project and California Wilderness Coalition. The Conservation Significance Project made use of available data, museum records, and expert opinion and assessed the biogeographic importance of the Tejon Ranch, its core habitat and natural community representation values, roadlessness, terrestrial and watershed integrity, importance as a habitat linkage, and habitat for rare and endangered species. CBI also conducted an additional Conservation Assessment Project that predicted the distribution of a set of conservation values across Tejon Ranch. Conservation values included threatened, endangered and endemic species distributions, roadless areas analysis, watershed integrity analysis, habitat diversity and regionally under-protected vegetation communities. As part of the Conservation Assessment Project, CBI conducted a remote sensing analysis to update information on roads, land cover, and vegetation community distributions.

Framework Management Plan for the Ramona Grasslands – The Nature Conservancy. CBI is developing a framework management plan for the Ramona grasslands in central San Diego County. The Ramona Grasslands are a regionally important conservation area, supporting a variety of target resources, including vernal pools and rare vernal pool species, Stephens' kangaroo rat, wintering and breeding raptors, riparian habitats and arroyo southwestern toads, and native grasslands. The Ramona Grasslands are currently grazed by cattle, which maintain habitat suitability for some species but adversely affect other natural resources. The intent of the framework management plan is to lay out a scientific basis for implementing management activities, describe experimental manipulations to increase our understanding of the dynamics of the system, and to develop a biological monitoring program to assess changes in resource states.

South Coast Missing Linkages Project – South Coast Wildlands Project. Working on a project in partnership with the South Coast Wildlands Project, The Nature Conservancy, and Pronatura to conduct planning studies on five important habitat linkages in the U.S.-Mexico border region. The Conservation Biology Institute is taking the lead on two of the five linkages. One is linking National Forest land in the Laguna Mountains with important habitats in Baja California through the Campo Valley area of San Diego County. The other is linking habitats in the Jacumba Mountains with those in the Sierra Juarez in Baja California. The project will result in a detailed comprehensive report describing threats and conservation opportunities for each of the five linkages described above. The report will also evaluate the likely biological impacts of losing ecoregional connectivity in these areas.

Habitat Management Planning for the Lake Hodges/San Pasqual Valley MSCP Preserve Area – City of San Diego. Project manager for the development of a habitat

management plan for the over 9,000-acres Lake Hodges/San Pasqual Valley MSCP Preserve Area. Coordinated a team of specialists associated with CBI, local biologists, the U.S. Geological Survey, and San Diego State University to conduct baseline surveys and map the distributions of key resources, including vegetation communities, rare plants, Hermes Copper butterfly, herpetofauna (including arroyo southwestern toad), and breeding riparian birds (including least Bell's vireo and southwestern willow flycatcher). The management plan addressed issues such as control of adjacent land use impacts, fire management, recreational access, fencing, exotic species control, monitoring, and research.

Monitoring Program for the Santa Margarita River – The Nature Conservancy. Developed a program to monitor future potential changes on the Santa Margarita River associated with modification of base flows resulting from a water rights settlement on the river. Base flow augmentation resulting from the settlement has been designed to mimic natural discharge patterns historically observed in the river. The monitoring plan was structured around geomorphically distinct reaches of the river that are anticipated to respond similarly to river hydrology. Elements considered in the monitoring plan include biological resources (riparian and coastal stream communities), water quality, discharge, and channel geomorphics. The objective of the monitoring program is to quantify conditions prior to the modification of base flows and to track changes following base flow augmentation.

Multiple Species Conservation Program – City of San Diego Clean Water Program. Participated in development of a conservation and management plan for federally listed species and key candidate species and their habitats in a 900-square-mile area in San Diego County. Coordinated the development of a GIS-based habitat evaluation model, prepared hydrologic management guidelines for the preserve system, and assisted with development of the species and habitat monitoring program for the preserve system.

Regional Conservation Planning and Constraints Analyses for Eastern San Diego Mountains – The Nature Conservancy. Worked with The Nature Conservancy and a team of regional scientific experts to prioritize conservation opportunities for a 400,000-acre area in San Diego County that includes the headwaters of five major watersheds. The study involved development and review of a spatial and non-spatial database for the area, identification of regionally important resources and landscape connections, and a gap analysis to identify regionally important resources that were in private ownership and zoned for development or agriculture. CBI identified and evaluated the potential effects of land uses and other stressors, including those that may affect downstream portions of the watersheds. CBI and a team of scientists conducted biological surveys of selected properties. As a result of the studies, CBI prepared a conservation strategy report that identifies conservation priorities, research needs, land use constraints, potentially compatible land uses and appropriate locations, restoration opportunities, and habitat management goals.

Exhibit A - continued

MSCP Monitoring Program Coordination – California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS) and City of San Diego. Working with the City of San Diego and other San Diego County jurisdictions, USFWS, and CDFG to implement the Subregional Biological Monitoring Program for the San Diego MSCP. As part of this effort, CBI is compiling an inventory of existing monitoring efforts in western San Diego County, developing a strategic framework of the roles and responsibilities of the monitoring partners, refining biological monitoring protocols, developing structures and protocols for managing large biological databases, formulating a strategy for developing a centralized database repository, and developing a web site to disseminate MSCP-related information to the public.

Regional Biological Monitoring Plan for the Multiple Habitats Conservation Program – San Diego Association of Governments. Developing a regional biological monitoring plan for the North Coastal San Diego County Multiple Habitats Conservation Program (MHCP). The plan is being developed in coordination with the California Department of Fish and Game and the U.S. Fish and Wildlife Service and the seven North San Diego County cities participating in the MHCP. The MHCP biological monitoring program is intended to provide a systematic data collection effort to gauge the progress and success of the habitat preserve system. The plan addresses regional monitoring objectives and describes specific monitoring approaches for riparian communities, uplands, vernal pools, coastal lagoons, and wildlife movement corridors within the preserve system.

Habitat Management Planning for the Marron Valley Preserve Area – City of San Diego. Project manager for the development of a habitat management plan for the 2,600-acre Marron Valley MSCP Preserve Area. Coordinated a team of biologists associated with CBI, the U.S. Geological Survey, and the San Diego Natural History Museum to conduct baseline surveys and map the distributions of key resources, including vegetation communities, rare plants, Quino checkerspot butterflies, herpetofauna (including arroyo southwestern toad), and breeding riparian birds (including least Bell's vireo and southwestern willow flycatcher). Dr. White conducted surveys for the endangered San Diego fairy shrimp in vernal pools on the property. The management plan addressed issues such as cattle grazing, fire management, access, fencing, exotic species control, monitoring, and research.

Wildlife Corridor Monitoring Study – City of Poway and City of San Diego. The study evaluated the use of designated wildlife corridors by target mammal species, including mountain lions, bobcats, coyotes, mule deer. Field monitoring was conducted in the Los Penasquitos, Carmel Valley, Carmel Mountain/Del Mar Mesa, and eastern Poway areas by a graduate student and by a local volunteer organization using different methodologies over several seasons. CBI analyzed the data generated to assess the functionality of the wildlife corridors and to compare the methods.

Lower Colorado River Multi-Species Conservation Program – National Fish and Wildlife Foundation. Served as a technical consultant to the plan development team for the Lower Colorado River Multiple Species Conservation Program (LCR MSCP). The LCR MSCP plan is being prepared for a consortium of federal and state agencies (California, Nevada, and Arizona), water and hydropower interests, and Native American Tribal governments. The LCR MSCP was initiated to optimize opportunities for current and future water and power development in the lower Colorado River basin, while working towards conservation of listed and selected unlisted species and their habitats in compliance with both the federal and California Endangered Species Acts. The result of the plan will be the issuance of incidental take authorizations under Sections 7 and 10(a)(1)(B) of the Endangered Species Act, and Section 2835 of the California Natural Communities Conservation Program Act for those species deemed to be adequately addressed by the plan, through a combination of conservation, management, restoration, and operational measures.

Responsibilities include providing overall technical oversight for the project team. Current efforts involve the development of a conservation strategy for the program and alternatives for evaluation under the California Environmental Quality Act and National Environmental Policy Act. The conservation strategy will involve a strong riparian habitat restoration component, which involves integrating the requirements of riparian species with the hydrologic and hydraulic conditions on the river in light of future water management scenarios (e.g., intrastate water transfers to achieve compliance with California's 4.4 Plan, offstream storage and interstate transfer rules). Implementation of the conservation strategy will have to consider large-scale water management activities and water accounting practices dictated by the large body of legislation and court decrees collectively known as the Law of the River.

TECHNICAL STUDIES

Fairy Shrimp Survey Protocol Analysis – Western Riverside County Regional Conservation Authority. Dr. White performed an analysis of Endangered Species Act section 10(a)(1)(A) fairy shrimp survey data to assess the adequacy of a single survey, as opposed to multiple surveys, in detecting fairy shrimp in vernal pools. The analysis used the survey data to determine the conditional probability of detecting shrimp in the second survey period if shrimp either were or were not collected in the first survey period.

The Influence of Watershed Urbanization on the Hydrology and Biology of Los Peñasquitos Creek – The San Diego Foundation Blasker Rose-Miah Fund. Dr. White was awarded a research grant to study the effects of urbanization in the Los Peñasquitos Creek watershed. The Los Peñasquitos Creek watershed is a small coastal watershed in San Diego, California that contains significant areas of conserved natural habitats, but has experience rapid urban growth. The study examined how patterns of land use change in the Los Peñasquitos Creek watershed have affected downstream hydrology of the creek, channel geomorphology, and associated riparian vegetation

communities. The research showed that urbanization of the watershed has resulted in significant increases in discharge, annual runoff, flood peaks, and dry-season flows. These hydrologic changes have driven changes in the distribution and composition of riparian habitats associated with Los Peñasquitos Creek.

Source Water Protection Guidelines – The City of San Diego Water Department. Providing technical assistance to City of San Diego Water Department staff for a project to develop development guidelines intended to ensure protect of the quality of San Diego source water supply reservoirs. The project is being conducted by a consulting firm, Brown and Caldwell, and Dr. White is serving as a technical advisor directly to the City.

Guajome Lake Water Quality Assessment Project – County of San Diego. Project manager for a water quality study at Guajome Lake in northern San Diego County funded under the U.S. Environmental Protection Agency's (USEPA) Clean Lakes Program. The focus of the project was to characterize water quality in the lake through field sampling and chemical analysis of soil, sediment, stream flow, and lake water to identify pollution problems in the lake and its watershed. The project included preparation of a Quality Assurance Project Plan (QAPP), assessing historic uses of agricultural chemicals in the watershed, estimating sediment and chemical constituent loadings to the lake with watershed modeling techniques, developing and assessing pollution control measures, and developing pollution control and water quality monitoring programs for the lake.

San Diego River Live Stream Discharge Studies – City of San Diego. Biology task manager for analysis of potential effects of live stream discharge of reclaimed water to the San Diego River. Objectives of the study were to determine the feasibility of a live stream discharge program in light of the potential effects to wetlands (including habitat for the endangered least Bell's vireo), aquatic fauna, water quality, and public health. Responsibilities included an assessment of the effects of varying quantities of live stream discharge on fisheries habitat, riparian and salt marsh wetlands, wetland-associated terrestrial species, and disease vectors. Completion of this task required interpretation of the QUAL2E water quality model output and hydraulic modeling output.

Salton Sea Water Quality Management Project – Salton Sea Authority. Project manager for a program funded under a USEPA Clean Lakes Grant, which summarized and presented environmental and economic analyses of salinity and surface elevation management alternatives at the Salton Sea. Contracted with the Salton Sea Authority, a Joint Powers Authority comprised of the counties of Imperial and Riverside, the Imperial Irrigation District, and the Coachella Valley Water District. The purpose of the project was to identify, summarize, and evaluate alternatives for managing the salinity and elevation of the Salton Sea. The project entailed interaction with the USEPA, U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Fish and Wildlife Service, California Department of Fish and Game, Regional Water Quality Control Board, California Environmental Protection Agency, and local citizens groups to identify and summarize their concerns.

Exhibit A - continued

Olivenhain Reservoir Limnological Assessment – Olivenhain Water District. Project manager and technical lead for the assessment of anticipated limnological conditions of a planned reservoir in San Diego County. The assessment projected anticipated thermal stratification and dynamics of nutrients, dissolved oxygen, and other water quality constituents. Recommended design features to better manage water quality in the reservoir, including a multi-port outlet tower to allow selective withdrawals, artificial circulation/hypolimnetic aeration, and a separate inlet structure for aqueduct inflows.

Fairy Shrimp Survey and Assessments – Twentynine Palms Marine Corps Air Ground Combat Center. Task manager overseeing field surveys of anostracans (primarily fairly shrimp) in desert playas and impact assessments of base operations on these resources. Field surveys involved collecting samples of sediments containing anostracan eggs that were reared in controlled conditions in the laboratory. The impact assessment primarily evaluated the effects of vehicle traffic (e.g., tanks and armored personel carriers) to desert playa habitats.

Fairy Shrimp Surveys – Rancho del Rey, City of Chula Vista. Performed field surveys of remnant vernal pools on Otay Mesa to characterize the fairy shrimp fauna on a proposed development site.

Fisheries Survey – Newhall Land and Farming. Conducted a field survey of native fishes in the Santa Clara River, Los Angeles County, California, as part of an emergency road crossing project. The purpose of the survey was to document the species present in the study area and to relocate fish potentially impacted by construction operations to areas outside of the impact zone as conditioned in the California Department of Fish and Game Streambed Alteration Agreement for the project. Species of particular interest were threespined stickleback (*Gasterosteus aculeatus*), arroyo chub (*Gila orcutti*), and Santa Ana sucker (*Catostomus santaanae*).

Impacts of Threadfin Shad on Largemouth Bass – San Diego State University. Participated in a project to examine the impacts of threadfin shad introductions on aquatic biota in southern California reservoirs. Sampled fish and plankton, conducted physical and chemical analyses, and conducted echosounding in six lakes in San Diego County. Identified zooplankton and provided statistical review.

Impacts of Opossum Shrimp on Zooplankton – Tahoe Research Group. Participated in a project assessing the impacts of opossum shrimp (*Mysis relicta*) introductions on Lake Tahoe zooplankton. Installed experimental enclosures with scuba, sampled and counted zooplankton, and analyzed data. Performed a variety of routine limnological analyses such as collection of temperature, oxygen, and nutrient profiles. Conducted short-term opossum shrimp feeding experiments.

ENVIRONMENTAL IMPACT ANALYSIS AND REGULATORY COMPLIANCE

Martis Valley Community Plan – Sierra Watch and Mountain Area Protection Foundation. Conducted a review and provided comments on the Environmental Impact Report prepared of for the update to the Martis Valley Community Plan on behalf of Sierra Watch and Mountain Area Protection Foundation. The Community Plan Update proposed alternatives that would change development patterns in the Martis Valley Community Planning Area, Placer County, California. These impacts would have potentially significant impacts to high value terrestrial and aquatic resources, including forests, shrub communities, meadows, and stream systems. To assist with critiquing the biological resources analyses in the EIR, CBI developed a natural resources conservation vision for the Martis Valley and identified how the proposed developments authorized under the proposed Community Plan would adversely affect these resources. Participated in landowner negotiations over development designs and provided litigation support.

Evaluation of the Cabo San Quintín Development Project and Environmental Impact Study – *pro esteros* and Endangered Habitats League. Conducted an evaluation of the proposed Cabo San Quintín development plan and associated Mexican environmental impact study (Manifestación de Impacto Ambiental) for the Punto Mazo peninsula, San Quintín, Baja California, Mexico. The evaluation discussed inadequacies and inconsistencies of the environmental analysis, and presented an independent analysis of key project features and their potential impacts. Key points discussed in the evaluation included the inadequate consideration of Mexican endangered species laws, state land use regulations, potable and irrigation water supply issues, waste water treatment and potential nutrient loading, potential effects of marina dredging on the Bahía San Quintín, potential impacts to endemic species and sensitive habitats, and potential socioeconomic impacts associated with the increased regional infrastructure and services needs that would result from implementing the project.

Wetlands Permitting, Mission Valley West Light Rail Transit – Metropolitan Transit Development Board. Project manager responsible for coordinating wetlands and endangered species permitting for the Mission Valley West Light Rail Transit project. Conducted a Section 404(b)(1) alternatives analysis, selected potential riparian mitigation sites, acted as permitting agency liaison, coordinated development of a wetlands mitigation plan, conducted U.S. Army Corps of Engineers 404 and California Department of Fish and Game Streambed Alteration Agreement permitting, and coordinated Section 7 consultation for the endangered least Bell's vireo.

Wetlands Permitting and Mitigation Plan, East Mission Gorge Sewer Interceptor Force Main and Pump Station – City of San Diego Water Utilities Department. Prepared a detailed wetlands mitigation plan for impacts associated with the construction of a sewage pump station and force main. The wetlands mitigation plan was developed in consultation with the U.S. Fish and Wildlife Service, California Department of Fish and Game, and City of San Diego. The mitigation plan was required for the U.S. Army

Corps of Engineers' Section 404 and California Department of Fish and Game 1601 permitting process. Also conducted the biological resources impact analysis for the California Environmental Quality Act (CEQA) compliance.

CONSERVATION OUTREACH, TRAINING, AND EDUCATION

San Dieguito River Watershed Information System – San Dieguito River Valley Conservancy. Directed the development of a Geographic Information System (GIS) based information system that will assist the Conservancy and the San Dieguito River Valley Joint Powers Authority (JPA) with planning, land acquisition and conservation, and community outreach. The project was funded by the San Diego Foundation. The GIS tool combines available regional data layers such as land use, land ownership, biological resources information, topography, water resources information, and political boundaries, into a user-friendly mapping and analysis tool. The tool allows staff at the Conservancy and JPA to combine various data layers for environmental analyses, to track resource and land status in the watershed, and to create maps and displays for outreach purposes.

Conservation Resource Center Feasibility Study – San Dieguito River Valley Conservancy. CBI prepared a study evaluating the feasibility and desirability of establishing a establishing a resource support service for conservation groups in San Diego County. The first phase of the study included an exploratory workshop and discussions with individuals from the San Diego conservation community about alternative strategies for sharing resources. CBI conducted research on other organizational models across the country and evaluated the local availability of technical services. We prepared a report summarizing the results of our study and that provided recommendations on a structure and strategy for developing a resource center.

Aquatic Ecology Training Program – Campo Environmental Protection Agency. Conducted training of tribal members working for the Campo Band of Mission Indians Environmental Protection Agency (Campo EPA) in aquatic and riparian resource ecology, inventory, and restoration. The program was funded under Section 106 of the Clean Water Act. The ultimate goal of the program was to provide tribal members sufficient training to allow for an efficient and effective transition of delegation of authority over water resources matters to the Campo Band. Conducted training in riparian ecology, aquatic invertebrate ecology, Rapid Bioassessment Protocols, and stream and riparian restoration techniques.

Lake Ecology Display – City of San Diego. Developed an educational display for "Lake Day" sponsored by the City of San Diego Recreational Lakes Program and held at Lake Morena, San Diego County, California. The display included a presentation of physical dynamics of lake (thermal stratification and turnover), oxygen dynamics, microscope viewing of zooplankton, and a listing of local fish species. Questions from the public were entertained.

ECOLOGICAL RISK ASSESSMENTS

Ecological Risk Assessment, U.S. Naval Activities (NAVACTS), Guam – U.S. Navy. Coordinated investigations in support of ecological risk assessments for terrestrial and freshwater habitats at four sites at NAVACTS Guam. Field studies included mapping and characterization of vegetation and wildlife habitat, floral and faunal inventories, collection of soils and sediments for toxicity tests and chemical analyses, and analysis of resident biota for contaminant bioaccumulation. This information was compared to data from offsite reference areas. These data were used to develop preliminary ecological risk assessments evaluating the potential risk that the chemicals onsite posed to aquatic and terrestrial communities. Of special concern was the potential for adverse impacts to the endangered Mariana common moorhen, which utilizes freshwater marshes in the area. Chemicals of concern for these sites included metals, pesticides, polychlorinated biphenyls (PCBs), dioxins, petroleum hydrocarbons, and polynuclear aromatic hydrocarbons (PAHs).

Ecological Risk Assessment, Old WESTPAC Site, NAVACTS, Guam – U.S. Navy. Coordinated field studies at NAVACTS, Guam to sample soils and freshwater sediments for chemical analyses and toxicity tests. Collected aquatic and terrestrial organisms for tissue analyses to determine bioaccumulation of chemicals found onsite. These data were used to develop a preliminary ecological risk assessment evaluating the potential risk that the chemicals onsite posed to aquatic and terrestrial communities. Of particular concern were wetlands supporting the endangered Mariana common moorhen. Chemicals of concern included metals, pesticides, PCBs, petroleum hydrocarbons, and PAHs.

Ecological Risk Assessment RCRA Facilities Investigation – Rocketdyne Division, Boeing North American. Task manager overseeing the development of ecological risk assessments at 36 sites at the 2,500-acre Santa Susana Field Laboratory (SSFL) for the Rocketdyne Division of Boeing North American. Supervised biologists conducting extensive field surveys of the SSFL that involved vegetation community mapping, rare plant surveys, and wildlife species inventories. Coordinated with the California Department of Toxic Substances Control (DTSC) on development of a series of "white papers" describing the approach and methodologies that will ultimately be employed to conduct the risk assessments for the SSFL. The white papers dealt with issues such as determining background concentrations, selecting contaminants of concern, proposed conceptual site models, calculation of exposure point concentrations, development of exposure model parameters, and risk-based decision criteria.

PUBLICATIONS AND PRESENTATIONS

PUBLICATIONS AND REPORTS

White M.D. and K.A. Greer. 2006. The effects of watershed urbanization on stream hydrologic characteristics and riparian vegetation of Los Peñasquitos Creek, California. *Landscape and Urban Planning* 74(2):125-138.

White, M.D., J.A. Stallcup, K. Comer, M.A. Vargas, J.M. Beltran-Abaunza, F. Ochoa, and S. Morrison. In press. Designing and establishing conservation areas in the Baja California-Southern California border region. In: *Border Institute VI, Transboundary Ecosystem Management*, Southwest Center for Environmental Research and Policy.

Strittholt, J.R., N.L. Stauss, and M.D. White. 2000. Importance of Bureau of Land Management Roadless Areas in the Western U.S.A. Prepared for the National Bureau of Land Management Wilderness Campaign by the Conservation Biology Institute. March.

White, M.D. 1999. The Lower Colorado River Multi-Species Conservation Program. *Arizona Riparian Council Newsletter* 12(1). January.

White, M.D. 1998. Horizontal distribution of pelagic zooplankton in relation to predation gradients. *Ecography* 21:44-62.

Hurlbert, S.H. and M.D. White. 1994. Experiments with invertebrate zooplanktivores: Quality of statistical analysis. *Bulletin of Marine Science* 53(2):128-153.

White, M.D. 1993. Morphological characteristics of threespined sticklebacks (*Gasterosteus aculeatus*) from the Sweetwater River, San Diego County, California. *Proceedings of the Western Association of Fish and Wildlife Agencies 73rd Annual Conference*. Pages 219-224. July.

PRESENTATIONS

White, M.D. 2006. Applying landscape ecology to wetland and watershed management in Southern California. Presented at the Southern California Wetlands Recovery Project Symposium 2006, Santa Barbara, CA. March.

White, M.D., J.A. Stallcup, K. Comer, M.A. Vargas, J.M. Beltran-Abaunza, F. Ochoa, and S. Morrison. 2004. Designing and establishing conservation areas in the Baja California-Southern California border region. Presented at Border Institute VI, Transboundary Ecosystem Management, organized by the Southwest Center for Environmental Research and Policy. April.

White, M.D. and K.A. Greer. 2003. The effects and conservation implications of watershed urbanization in a Southern California stream system. Presented at the Society for Conservation Biology Annual Meeting, Duluth, Minnesota. July.

White, M.D. 2003. The influence of human land use modifications on Southern California stream hydrology. Presented at the Western Division of the American Fisheries Society Annual Meeting, San Diego, CA. April.

Stallcup, J.A. and M.D. White. 2002. Wildlife corridor monitoring for the Multiple Species Conservation Program. Presented at the MSCP Annual Workshop. San Diego, CA. October.

White, M.D. 2002. A review of the ecological effects of roads with examples from Southern California. Presented to the National Research Council Committee on the Ecological Impacts of Road Density. Newport Beach, California. June.

White, M.D. and J.A. Stallcup. 2000. The Lower Colorado River – Conservation planning in a degraded riverine ecosystem. Presented at the Society for Conservation Biology Annual Meeting, Missoula, Montana. June.

White, M.D. 1998. Moderator for a panel discussion on salinity and surface elevation management options for the Salton Sea. Salton Sea Symposium II. La Quinta, California. January.

White, M.D. 1995. Managing salinity and surface elevation at the Salton Sea, California. Presented at the American Society of Civil Engineers Annual Convention 95, San Diego, California. October.

White, M.D. 1993. Morphological characteristics of threespined sticklebacks (*Gasterosteus aculeatus*) from the Sweetwater River, San Diego County, California. Presented at the American Fisheries Society Western Division Annual Conference, Sacramento, California. July.

White, M.D. 1991. Horizontal distribution of zooplankton in relation to predation gradients. Presented at the Zooplankton Ecology Symposium, Lawrence University, Appleton, Wisconsin. August.

Hurlbert, S.H. and M.D. White. 1991. Quality of statistical analyses in studies on the effects of invertebrate zooplanktivores. Presented at the Zooplankton Ecology Symposium, Lawrence University, Appleton, Wisconsin. August.

White, M.D., T. Morrison, G. Orlob, H. Chang ,and C. Nordby. 1991. An environmental assessment of the potential effects of live stream discharge of reclaimed water to the

San Diego River. Presented at the Symposium on Water Supply and Water Reuse: 1991 and beyond. American Water Resources Association, San Diego, California. June.

White, M.D. 1989. The role of vertebrate and invertebrate predation gradients in producing horizontal heterogeneity of zooplankton populations. Symposium on Intrazooplankton Predation, University of Sao Paulo, Sao Carlos, Brasil. June.

Hurlbert, S.H. and M.D. White. 1989. A review of the experimental intrazooplankton predation literature with emphasis on experimental design and analysis. Symposium on Intrazooplankton Predation, University of Sao Paulo, Sao Carlos, Brasil. June.

White, M.D. 1989. Evidence for diel horizontal migrations of an invertebrate predator, *Mesocyclops edax*. Southern California Academy of Sciences Annual Meeting, Thousand Oaks, California. May.

White, M.D. 1988. Predation-induced horizontal zooplankton gradients. Ecology Supplement 69(2) pg. 340. Ecological Society of America Annual Meeting, Davis, California. August.

INVITED LECTURES AND TEACHING

March 2006. Guest lecturer Watershed Analyses, Geography Department, San Diego State University. Topic: Habitat Management in the Ramona Grasslands, San Diego County.

July 2004. Guest lecturer in the joint Masters in Public Administration Program at San Diego State University and Universidad Autónoma de Baja California. Topics: the San Diego Multiple Species Conservation Program and Transboundary conservation planning.

January 2004. The Binational Expedition to the Sierra la Giganta, Baja California Sur: a limnologist's perspective. Presented to the San Diego State University Ecology and Evolutionary Biology Program Seminar Series.

September 2003. Presentation to Antelope Valley Chapter of the Sierra Club. Topic: Conservation significance of Tejon Ranch.

March 2001. Guest lecturer in Ecology of the Colorado River Delta, San Diego State University. Topics: Colorado River law, river operations, and the Multiple Species Conservation Program.

Fall Semester 2000. Instructor - Environmental Policy and Regulation (Biology 538) – San Diego State University. Curriculum covered aquatic and wetland ecology,

jurisdictional wetland determinations, Clean Water Act, CWA section 404 permitting, California Fish and Game Code, California Regional Water Quality Control Plans, California Environmental Quality Act, National Environmental Policy Act, Fish and Wildlife Coordination Act, Federal Endangered Species Act, California Endangered Species Act, Habitat Conservation Plans, local governmental ordinances and regulations, and included presentations by environmental non-governmental organizations.

November 2000. Guest lecturer in Conservation Ecology, San Diego State University Department of Biology. Topic: Conservation planning in practice.

January 2000. Invited speaker at the Strategic Planning Education Seminar of the Coalition for the Sonoran Desert Protection Plan. Topic: Use of science in habitat conservation planning.

October 1999. Guest lecturer for the San Diego State University Department of Biology Graduate Student Seminar Series. Topic: Habitat Conservation Planning on the Lower Colorado River.

March 1999. Guest lecturer in Ecology of the Colorado River Delta, San Diego State University Department of Biology. Topic: Lower Colorado River Multi-Species Conservation Program.

February 1997. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.

March 1996. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.

April 1995. Reviewed manuscripts for the "Ecological Risk Assessment" conference Society of Environmental Toxicology and Chemistry (SETAC) Special Publication.

March 1995. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.

April 1994. Guest lecturer in Topics in Toxicology, San Diego State University Graduate School of Public Health. Topic: Ecological Risk Assessment.
Spring Semester 1992. Environmental Assessment (Environmental Studies 105) – University of San Diego. Curriculum covered general ecological principals, regional ecology, California Environmental Quality Act/National Environmental Policy Act, Clean Water Act, Rivers and Harbors Act, Endangered Species Act, local government ordinances and policies, and biological impact assessment issues and methodologies.

February 1990. Guest lecturer in Experimental Design, San Diego State University Department of Biology. Topic: Data Transformations.

April 1988. Guest lecturer in Experimental Design at San Diego State University. Topic: Split-plot and Repeated Measures Designs.

March 1988. Guest lecturer in Limnology, San Diego State University. Topic: Physical Limnology.

April 1986. Guest lecturer in Limnology, San Diego State University. Topic: Benthic Ecology.

Exhibit B

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Date: September 21, 2007

To: Terry Watt

From: Michael White

RE: **Bay Area to Central Valley High Speed Train (HST) Program EIR/EIS**

The following comments are focused on my review of the Biological Resources and Wetlands section of the referenced document. In general, the discussion of the Regulatory Requirements and Methods of Evaluation is misleading and does not meet the intent or standards for CEQA significance determinations, the description in the Affected Environment lacks crucial information necessary to allow a complete assessment of impacts, and thus the Environmental Consequences of the project are not fully assessed and are under-represented. Furthermore, a lack of information and analysis raises the question of bias in the document. Because two of the major alignment alternatives – Altamont Pass and Pacheco Pass differ with respect to many of the resources that were not adequately described or assessed, the conclusions regarding the relative impacts of these two alternatives are potentially misleading.

An overarching problem with the analysis is that there is no real synthesis or interpretation of the biological resources information available for the project alignments. The document essentially presents raw data on biological resources and impacts (numbers of species, acres of wetlands, etc.) but these data are never meaningfully discussed or interpreted. The purpose of the EIR/EIS is to present technical information in a meaningful and understandable way, so that the public and decision-makers can be adequately informed and do not have to synthesize and interpret raw data themselves. For example, the EIR/EIS should discuss the quality and regional importance of the biological resources in the various alignment segments and describe the nature and magnitude of the impacts to these resources, rather than just list the resources present and impacted. This information is readily available from the data sources listed in the EIR/EIS, but requires a biologist to interpret and discuss the data rather than pushing a button on the computer to create lists of resources and acreages from a GIS data base. Other specific issues and examples are discussed further below.

The discussion in the EIR/EIS on the Regulatory Requirements and Methods of Evaluation seems to ignore a central purpose of CEQA: to disclose when projects may have significant effects on the environment. Significant effects are defined as substantial, or potentially substantial, adverse change in any of the physical conditions with the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic and aesthetic significance. The significance criteria defined for the HST evaluation are largely focused on sensitive resources (e.g., special status species and their habitats) or those protected by specific regulations or policies (e.g., wetlands, HCP or NCCP plans). This does not meet the CEQA's requirement to disclose <u>any</u> of the potential impacts to the flora and fauna of California, not just potential impacts to those with regulatory status. The analysis must assess the potential impacts of the project alternatives within a broader biological context – where are existing biological resources, regardless of their regulatory status, likely to be significantly affected by the project and what are the nature and magnitude of those impacts? The document's significance criteria should be expanded to include impacts that would degrade high quality and intact habitats, functional watersheds and wetland systems, regional functions of existing conserved natural areas, etc. – i.e., should assess impacts to high priority conservation targets for public agencies and conservation organizations in California.

The discussion of the Affected Environment is presented in a piecemeal fashion and does not describe the overall resource values within the project area. The Affected Environment discussion is critical to the analysis of impacts and to allow the nature of the impacts to be placed into their appropriate biological context. The document lists the species, habitats, water resources, wildlife corridors, and management plans that are present in each HST corridor. However, there is no context provided or interpretation of this information that allows the quality, integrity, value, or importance of these resources to be assessed. The document should answer questions such as: How much potential special status species habitat is present? Are the communities and habitats in small, fragmented patches or part of a larger intact area? Are the existing communities and habitats degraded by urban edge effects or other stressors? Do unique soils exist that may support unique assemblages of plants and animals? Are portions of the HST corridor in protected status or targeted for protection by public agencies or private conservation organizations? Only by characterizing biological resources with respect to these and other issues, rather than merely presenting a list of species and habitats with no context or interpretation, can the impacts to biological resources be meaningfully assessed.

The information used to describe wildlife corridors in the Affected Environment section is taken out of context and does not provide a true description of areas important for wildlife movement and habitat connectivity in the study area. In fact, restricting the focus to "wildlife corridors" rather than assessing habitat connectivity more generally, misses an important biological value that can be significantly degraded by the project. The Missing Linkages report (California Wilderness Coalition 2000) discusses linkages and corridors *identified by participants* at the conference in 2000. These were high priority corridors and linkages, which themselves have varying levels of existing

functionality not discussed by the EIR/EIS. However, that an area was not identified by the Missing Linkages project does not imply that habitat connectivity is not an issue. On the contrary, landscape scale habitat connectivity through an area such as the Diablo Range is relatively secure in comparison to more urbanized areas such as the Altamont Hills, which may explain why it was not identified in the Missing Linkages report. The Missing Linkages report is one source of information, but regardless of what it reported, the HST EIR/EIS must characterize the true biological values and ecosystem functions of land that may be affected by the project. This was not done adequately for habitat connectivity and well as other landscape functions and values, such as watershed processes, ecosystem integrity, fire regimes, etc.

Fundamental to national wetlands policies is the protection of wetland "functions and values," not just wetland acreage. Wetlands are listed by Cowardin class in the Affected Environment discussion; however, no characterization of their functions or values is provided. Without this information, the wetland impact acreages presented in the Environmental Consequences section cannot be meaningfully interpreted, alternatives cannot be meaningfully compared, and the potential to adequately mitigate for lost functions and values as a result of the project cannot be assessed.

The EIR/EIS does not provide a discussion of the status and regional contributions of conservation areas (i.e., public and private lands protected and managed for natural resources values) in the study area. Substantial investments of public and private funds have been made to acquire and manage lands to protect natural resources, and they support essential regional natural resources functions. The EIR/EIS must assess the potential for the project to degrade and reduce the quality of these areas from a biological resources standpoint. To do this adequately, the EIR/EIS must assess the conservation contributions and regional natural resources functions of these protected areas in the Affected Environment section.

Figures 3.15-1 to 3.15-3 do not adequately characterize the biological resources in the various alignments, and thus, give a false impression as to the magnitudes of their impacts. The figures do not depict the distribution of habitats and rely solely on sensitive species, wetlands, and wildlife corridors to visually depict environmental consequences of the project. At a minimum, figures showing the distribution of vegetation communities, urban, agricultural land, and other infrastructure such as roads should be provided. In addition, it should also be clarified that the special status species information reported was not collected for this project and does not provide a comprehensive description of special status species distributions across all parts of the study area.

The Environmental Consequences section of the EIR/EIS is fundamentally flawed in that alternatives are not evaluated at an equal level of detail. For example, the EIR/EIS states at 3.1.5.A: "It was not possible as part of this study to identify or quantify impacts on biological resources that would occur as a result of transportation improvements in the No Project Alternative. For existing transportation facilities to be improved, impacts on

biological resources have previously been addressed, and only small additional or increased impacts are expected from the future transportation improvements in the No Project Alternative. In some cases, widening of existing corridors or similar improvements could results in additional impacts on biological resources." If impacts of transportation improvements associated with the No Project Alternative have "previously been addressed," then a summary of these impacts should be available for inclusion in the HST EIR/EIS. Furthermore, impacts due to widening existing transportation corridors as part of the No Project Alternative could be assessed in the same way that impacts for HST alignment alternatives were assessed – by making assumptions regarding direct and indirect impact buffers around the existing transportation corridors. Not presenting information that is readily available not only demonstrates a significant bias in the analysis of impacts, it leads one to wonder what other information may not be adequately disclosed in the EIR/EIS.

The presentation of potential impacts of the project in the Environmental Consequences section of the EIR/EIS is inadequate and misleading. The analysis of impacts is presented as a list of impact acreages and potentially affected species, without any interpretation of the significance of the these impacts. In the case of special status species, the analysis relies on available species data, which does not include areas that have not been surveyed in the past, and thus is a potentially misleading assessment of impact to special status species. The analysis must interpret the numbers and lists presented in the document so that the public and decision-makers can understand the implications of these numbers and lists and be adequately informed. Furthermore, the summary tables presenting biological resources impacts (e.g., Table 3.15-1 and Summary Table S.5-1) only list numbers of special status species potentially affected, wildlife corridors identified by the Missing Linkages Project, linear feet of non-wetland waters, acres of wetlands, and presence/absence of anadromous fish. The acreages of impact to terrestrial vegetation communities, particularly those considered sensitive by governmental agencies and non-governmental organizations, should also be listed in these or other summary tables. Furthermore, the length of each alignment segment appears to vary substantially, thus the potential for impacts varies considerably. It is virtually impossible from the presentation of biological impacts for the average reader to assess the overall magnitude of impacts to major alignment alternatives. The impacts across segments for major alternatives should totaled and presented to provide a comparable assessment of impacts.

While the acreage of impacts to terrestrial vegetation communities is presented in the text for each alignment segment, there are several problems with this presentation. First, many communities listed as impacted under each segment are not presented under the heading "Sensitive Vegetation Communities" and should be. For example, grasslands are not considered sensitive communities in the EIR/EIS; however, large expanses of grasslands in California are increasingly rare and those that support special status species, such as San Joaquin kit fox, are certainly considered sensitive by the California Resources Agency and the U.S. Fish and Wildlife Service. The southern alignment alternatives (e.g., Pacheco Pass, Henry Miller UPRR, Henry Miller, BNSF, and GEA

North) would each adversely affect thousands of acres of grasslands, which is never specifically discussed except for presenting a single acreage number buried in a long list of other acreages for each alignment segment.

The impact analysis does include a indirect impact buffer zone, but it does not acknowledge or provide any discussion of indirect or cumulative impacts that may occur as a result of the project outside of this zone. For example, construction of the HST can be expected to induce residential growth in the vicinity of the alignment. This residential growth is likely to produce impacts to biological resources outside of the assumed indirect impact corridor for the HST project. Furthermore, these growth-inducing impacts would have different magnitudes of effect in different parts of the study area, such as the relatively undeveloped areas along the Pacheco Pass corridor versus the relatively more developed Altamont Pass corridor. Growth inducing effects on biological resources requires a much more thorough analysis.

The discussion of impacts to Special Management Areas is completely inadequate. There is no assessment of the nature or magnitude of impacts to these areas. Public parks and other conserved lands serve as the back bone of functional biological open space. These areas are refugia for flora and fauna in the face of ongoing land uses changes that degrade habitat quality. When parks and private conservation areas are part of a larger system of relatively unfragmented open space, they serve as core areas managed for natural resources values within larger landscapes. Thus, indirect impacts, including growth inducing impacts, to Special Management Areas can be quite significant and merit special attention. Given the resources that have been invested in these areas and their importance to maintaining regional biological functions in light of ongoing land use and climate changes, impact to these special management area are potentially very significant impacts that merit much more evaluation and discussion in the EIR/EIS.

The mitigation measures presented in the Mitigation Strategies and CEQA Significance Conclusions provide no meaningful assurance that impacts from any project alignment would be fully mitigated. The current discussion in the EIR/EIS relies on a formulaic presentation of mitigation considerations but presents no concrete information on which to assess whether potential impacts can be adequately mitigated. While selection of specific mitigation measures may not be appropriate at this time, at a minimum, an assessment of the availability of adequate mitigation land and the ability to mitigate particular impacts (e.g., landscape scale fragmentation impacts) must be realistically assessed.

Selections from Deutsche Bahn (German National Railways) timetables of a high-speed train departing Berlin, which splits at Hamm; and return trains from Koblenz and Köln/Bonn Airport which join at Hamm before proceeding to Berlin.

For example, examine the schedule for ICE 546/556 departing Berlin at 2:40 PM (14:40 in 24-hr notation). 546, the front unit, departing platform areas A-D on Track 13 at Berlin runs to Köln/BonnAirport while 556, platform areas D-G runs to Koblenz. After a 4 minute stop at Hamm, the Airport module leaves two minutes ahead of the Koblenz module.

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Hilfe

Fahrtinformationen

ICE 556

Halt	Ankunft	Abfahrt	Fahrt
Berlin Ostbahnhof		14:40	ICE 556
Berlin Hbf		14:51	
Berlin-Spandau		15:05	
Hannover Hbf	16:28	16:31	
Bielefeld Hbf	17:20	17:22	
Hamm(Westf)	17:48	17:54	
Hagen Hbf	18:22	18:24	
Wuppertal Hbf	18:39	18:41	
Köln Hbf	19:09	19:12	
Bonn Hbf	19:32	19:37	
Koblenz Hbf	20:11		

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Hilfe

Fahrtinformationen

ICE 546

Halt	Ankunft	Abfahrt	Fahrt
Berlin Ostbahnhof		14:40	ICE 546
Berlin Hbf		14:51	
Berlin-Spandau		15:05	
Hannover Hbf	16:28	16:31	
Bielefeld Hbf	17:20	17:22	
Hamm(Westf)	17:48	17:52	
Dortmund Hbf	18:09	18:12	
Bochum Hbf	18:23	18:25	
Essen Hbf	18:34	18:36	
Duisburg Hbf	18:47	18:49	
Düsseldorf Hbf	19:00	19:02	
Köln/Bonn Flughafen	19:43		

Exhibit C - page 2

14:35		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:35 - Berlin Bellevue 14:37 Berlin Zoologischer Garten 14:41 - Berlin-Charlottenburg 14:46 - [illegible] 14:49 - Berlin Wannsee 15:01 - Potsdam Hbf 15:15 not every day, 25., 26. Oct	
14:38		S S5	**Berlin Westkreuz** Berlin Hbf (S-Bahn) 14:38 - Berlin Bellevue 14:40 Berlin-Tiergarten 14:42 - Berlin Zoologischer Garten 14:44 - Berlin Savignyplatz 14:46 - Berlin-Charlottenburg 14:48 - Berlin Westkreuz 14:51 daily	16 Berlin Hbf (S-Bahn)
14:38		S S7	**Ahrensfelde** Berlin Hbf (S-Bahn) 14:38 - Berlin Friedrichstr 14:40 Berlin Alexanderplatz 14:44 - Berlin Ostbahnhof 14:49 - Berlin Ostkreuz 14:53 - Berlin-Lichtenberg 14:58 - Ahrensfelde 15:14 daily	15 Berlin Hbf (S-Bahn)
14:39		ICE 546	**Köln/Bonn Flughafen** Berlin Hbf 14:39 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Dortmund Hbf 18:09 - Bochum Hbf 18:23 - Essen Hbf 18:34 - Duisburg Hbf 18:47 - Düsseldorf Hbf 19:00 - Köln/Bonn Flughafen 19:43 not every day, 30. Oct until 11. Nov 2007	13 A - D
14:39		IC 2444	**Münster(Westf)Hbf** Berlin Hbf 14:39 - Stendal 15:32 - Wolfsburg 16:03 - Hannover Hbf 16:37 - Minden(Westf) 17:10 - Bad Oeynhausen 17:20 - Bünde(Westf) 17:33 - Osnabrück Hbf 17:57 - Münster(Westf)Hbf 18:24 daily, not 30. Oct until 11. Nov 2007	13
14:39		ICE 556	**Koblenz Hbf** Berlin Hbf 14:39 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Hagen Hbf 18:22 - Wuppertal Hbf 18:39 - Köln Hbf 19:09 - Bonn Hbf 19:32 - Koblenz Hbf 20:11 not every day, 30. Oct until 11. Nov 2007 (Berlin Hbf - Köln Hbf) not every day, 30. Oct until 11. Nov 2007 Mo - Fr, Su (Köln Hbf - Bonn Hbf) not every day, 30. Oct until 9. Nov 2007 Mo - Fr (Bonn Hbf - Koblenz Hbf)	13 D - G
14:40		S S9	**Berlin-Spandau** Berlin Hbf (S-Bahn) 14:40 - Berlin Bellevue 14:42 Berlin Zoologischer Garten 14:46 - Berlin Savignyplatz 14:48 - Berlin-Charlottenburg 14:51 - Berlin Westkreuz 14:53 - Berlin-Spandau 15:07 daily	16 Berlin Hbf (S-Bahn)
14:40		IC 2454	**Düsseldorf Hbf** Berlin Hbf (tief) 14:40 - Berlin Südkreuz 14:44 - Lutherstadt Wittenberg 15:19 - Bitterfeld 15:36 - Halle(Saale)Hbf 15:56 - Weißenfels 16:24 - Naumburg(Saale)Hbf 16:33 - Weimar 16:58 - Erfurt Hbf 17:16 - Gotha 17:41 - Eisenach 17:57 - Bebra 18:21 - Kassel-Wilhelmshöhe 18:58 - Warburg(Westf) 19:32 - Altenbeken 19:54 - Paderborn Hbf 20:08 - Lippstadt 20:25 - Soest 20:36 - Hamm(Westf) 20:52 - Dortmund Hbf 21:15 - Bochum Hbf 21:29 - Essen Hbf 21:39 - Duisburg Hbf 21:53 - Düsseldorf Flughafen 22:04 - Düsseldorf Hbf 22:11 daily, not 27., 28. Oct (Berlin Hbf (tief) - Dortmund Hbf) Su, not 28. Oct (Dortmund Hbf - Düsseldorf Hbf)	3 Berlin Hbf (tief)
14:40		IC 2454	**Düsseldorf Hbf** Berlin Hbf (tief) 14:40 - Berlin Südkreuz 14:44 - Lutherstadt Wittenberg 15:19 - Bitterfeld 15:36 - Halle(Saale)Hbf 15:56 - Weißenfels 16:24 - Naumburg(Saale)Hbf 16:33 - Weimar 16:58 - Erfurt Hbf 17:16 - Gotha 17:41 - Eisenach 17:57 - Bebra 18:21 - Kassel-Wilhelmshöhe 18:58 - Warburg(Westf) 19:32 - Altenbeken 19:54 - Paderborn Hbf 20:08 - Lippstadt 20:25 - Soest 20:36 - Hamm(Westf) 20:52 - Dortmund Hbf 21:15 - Essen Hbf 21:39 - Duisburg Hbf 21:53 - Düsseldorf Flughafen 22:04 - Düsseldorf Hbf 22:11 not every day, 28. Oct	3 Berlin Hbf (tief)
14:40		IC 2454	**Dortmund Hbf** Berlin Hbf (tief) 14:40 - Berlin Südkreuz 14:44 - Lutherstadt Wittenberg 15:19 - Bitterfeld 15:36 - Halle(Saale)Hbf 15:56 - Weißenfels 16:30 - Naumburg(Saale)Hbf 16:39 - Weimar 17:04 - Erfurt Hbf 17:20 - Gotha 17:46 - Eisenach 18:01 - Bebra 18:25 - Kassel-Wilhelmshöhe 19:02 - Warburg(Westf) 19:35 - Altenbeken 19:57 - Paderborn Hbf 20:10 - Lippstadt 20:27 - Soest 20:38 - Hamm(Westf) 20:53 - Dortmund Hbf 21:15 not every day, 27. Oct	3 Berlin Hbf (tief)
14:41		S S9	**Berlin-Schönefeld Flughafen** Berlin Hbf (S-Bahn) 14:41 - Berlin Friedrichstr 14:43 Berlin Alexanderplatz 14:47 - Berlin Ostbahnhof 14:52 - Berlin Warschauer Straße 14:54 - Berlin Treptower Park 14:58 - Berlin-Schönefeld Flughafen 15:21 daily	15 Berlin Hbf (S-Bahn)
14:41		RE 33110	**Rostock Hbf** Berlin Hbf (tief) 14:41 - Berlin Gesundbrunnen 14:45 - Oranienburg 15:06 Gransee 15:27 - Neustrelitz Hbf 15:55 - Waren(Müritz) 16:24 - Güstrow 17:00 - Rostock Hbf 17:24 daily, not 3., 4. Nov	6 Berlin Hbf (tief)
14:41		RE 33110	**Schwaan** Berlin Hbf (tief) 14:41 - Berlin Gesundbrunnen 14:45 - Oranienburg 15:06 Gransee 15:27 - Neustrelitz Hbf 15:55 - Waren(Müritz) 16:24 - Güstrow 17:00 - Schwaan 17:13 not every day, 3., 4. Nov	6 Berlin Hbf (tief)
14:42		RE 38213	**Ludwigsfelde** Berlin Hbf (tief) 14:42 - Berlin Potsdamer Platz 14:44 - Berlin Südkreuz 14:48 Berlin-Lichterfelde Ost 14:53 - Teltow 14:57 - Großbeeren 15:04 - Birkengrund 15:08 - Ludwigsfelde 15:10 daily	1 Berlin Hbf (tief)
14:43		RE 38078	**Brandenburg Hbf** Berlin Hbf 14:43 - Berlin Zoologischer Garten 14:47 - Berlin Wannsee 14:59 Potsdam Hbf 15:07 - Potsdam Charlottenhof 15:10 - Potsdam Park Sanssouci 15:13 - Werder(Havel) 15:19 - Brandenburg Hbf 15:37 daily	14
14:44		RE 38019	**Eisenhüttenstadt** Berlin Hbf 14:44 - Berlin Friedrichstr 14:46 - Berlin Alexanderplatz 14:49 Berlin Ostbahnhof 14:53 - Erkner 15:13 - Fürstenwalde(Spree) 15:26 - Frankfurt(Oder) 15:57 - Eisenhüttenstadt 16:14 daily (Berlin Hbf - Berlin Ostbahnhof) daily (Berlin Ostbahnhof - Frankfurt(Oder)) daily (Frankfurt(Oder) - Eisenhüttenstadt)	11
14:45		S S5	**Strausberg Nord** Berlin Hbf (S-Bahn) 14:45 - Berlin Friedrichstr 14:47 Berlin Alexanderplatz 14:51 - Berlin Ostbahnhof 14:56 - Berlin Ostkreuz 15:01 - Berlin-Lichtenberg 15:05 - Strausberg Nord 15:49 daily	15 Berlin Hbf (S-Bahn)
14:45		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:45 - Berlin Bellevue 14:47 Berlin Zoologischer Garten 14:51 - Berlin-Charlottenburg 14:56 - Berlin Westkreuz 14:58 - Berlin Wannsee 15:11 - Potsdam Hbf 15:25 daily	16 Berlin Hbf (S-Bahn)
14:46		EC 371	**Praha hl.n.** Berlin Hbf (tief) 14:46 - Berlin Südkreuz 14:51 - Dresden-Neustadt 16:44 - Dresden Hbf 16:52 - Bad Schandau 17:36 - Decin hl.n. 17:57 - Usti nad Labem hl.n. 18:15 - Praha-Holesovice 19:21 - Praha hl.n. 19:34 daily, not 24. Nov until 7. Dec 2007	2 Berlin Hbf (tief)
14:46		EC 371	**Praha hl.n.** Berlin Hbf (tief) 14:46 - Berlin Südkreuz 14:51 - Dresden-Neustadt 16:44 - Dresden Hbf 17:06 - Bad Schandau 17:36 - Decin hl.n. 17:57 - Usti nad Labem hl.n. 18:15 - Praha-Holesovice 19:21 - Praha hl.n. 19:34 not every day, 24. Nov until 7. Dec 2007 (Berlin Hbf (tief) - Dresden-Neustadt) not every day, 25. Nov until 7. Dec 2007 (Dresden-Neustadt - Praha hl.n.)	2 Berlin Hbf (tief)
14:48		S S5	**Berlin-Charlottenburg** Berlin Hbf (S-Bahn) 14:48 - Berlin Bellevue 14:50 - Berlin-Tiergarten 14:52 - Berlin Zoologischer Garten 14:54 - Berlin Savignyplatz 14:56 - Berlin-Charlottenburg 14:58 Fr	16 Berlin Hbf (S-Bahn)

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14:48		S S7	**Ahrensfelde** Berlin Hbf (S-Bahn) 14:48 - Berlin Friedrichstr 14:50 ⊙ Berlin Alexanderplatz 14:54 - Berlin Ostbahnhof 14:59 - Ber Berlin-Lichtenberg 15:08 - Ahrensfelde 15:24 daily	
14:50		S S75	**Berlin-Spandau** Berlin Hbf (S-Bahn) 14:50 - Berlin Bellevue 14:52 ⊙ Berlin Zoologischer Garten 14:56 - Berlin Savignyplatz 14:58 - Berlin-Charlottenburg 15:01 - Berlin Westkreuz 15:03 - Berlin-Spandau 15:17 daily	16 Berlin Hbf (S-Bahn)
14:51		ICE 546	**Köln/Bonn Flughafen** Berlin Hbf 14:51 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Dortmund Hbf 18:09 - Essen Hbf 18:34 - Duisburg Hbf 18:47 - Düsseldorf Hbf 19:00 - Köln/Bonn Flughafen 19:43 not every day, 26. Oct	13 A - D
14:51		ICE 546	**Köln/Bonn Flughafen** Berlin Hbf 14:51 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Dortmund Hbf 18:09 - Bochum Hbf 18:23 - Essen Hbf 18:34 - Duisburg Hbf 18:47 - Düsseldorf Hbf 19:00 - Köln/Bonn Flughafen 19:43 daily, 26. Oct until 11. Nov 2007 Mo; not 5. Nov; also 27., 28. Oct	13 A - D
14:51		ICE 556	**Koblenz Hbf** Berlin Hbf 14:51 - Hannover Hbf 16:28 - Bielefeld Hbf 17:20 - Hamm(Westf) 17:48 - Hagen Hbf 18:22 - Wuppertal Hbf 18:39 - Köln Hbf 19:09 - Bonn Hbf 19:32 - Koblenz Hbf 20:11 daily, not 30. Oct until 11. Nov 2007 (Berlin Hbf - Köln Hbf) Mo - Fr, Su, not 30. Oct until 11. Nov 2007 (Köln Hbf - Bonn Hbf) Mo - Fr, not 30. Oct until 9. Nov 2007 (Bonn Hbf - Koblenz Hbf)	13 D - G
14:52		S S75	**Berlin-Wartenberg** Berlin Hbf (S-Bahn) 14:52 - Berlin Friedrichstr 14:54 ⊙ Berlin Alexanderplatz 14:58 - Berlin Ostbahnhof 15:03 - Berlin Ostkreuz 15:08 - Berlin-Lichtenberg 15:13 - Berlin-Wartenberg 15:29 daily	15 Berlin Hbf (S-Bahn)
14:55		RE 38172	**Rathenow** Berlin Hbf 14:55 - Berlin Zoologischer Garten 15:00 - Berlin-Spandau 15:08 ⊙ Berlin-Staaken 15:13 - Dallgow-Döberitz 15:17 - Elstal 15:21 - Wustermark 15:24 - Rathenow 15:50 Mo - Th, Sa	14
14:55		RE 38172	**Rathenow** Berlin Hbf 14:55 - Berlin Zoologischer Garten 15:00 - Berlin-Spandau 15:08 ⊙ Berlin-Staaken 15:13 - Dallgow-Döberitz 15:17 - Elstal 15:21 - Wustermark 15:24 - Rathenow 15:55 Fr, Su	14
14:55		S S5	**Hoppegarten(Mark)** Berlin Hbf (S-Bahn) 14:55 - Berlin Friedrichstr 14:57 ⊙ Berlin Alexanderplatz 15:01 - Berlin Ostbahnhof 15:06 - Berlin Ostkreuz 15:11 - Berlin-Lichtenberg 15:15 - Hoppegarten(Mark) 15:34 Fr, also 25. Oct	- Berlin Hbf (S-Bahn)
14:55		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:55 - Berlin Bellevue 14:57 ⊙ Berlin Zoologischer Garten 15:01 - Berlin-Charlottenburg 15:06 - Berlin Westkreuz 15:08 - Berlin Wannsee 15:21 - Potsdam Hbf 15:35 daily, not 25., 26. Oct	16 Berlin Hbf (S-Bahn)
14:55		S S7	**Potsdam Hbf** Berlin Hbf (S-Bahn) 14:55 - Berlin Bellevue 14:57 ⊙ Berlin Zoologischer Garten 15:01 - Berlin-Charlottenburg 15:06 - Berlin Westkreuz 15:09 - Berlin Wannsee 15:21 - Potsdam Hbf 15:35 not every day, 25., 26. Oct	16 Berlin Hbf (S-Bahn)
14:57		ICE 1513	**München Hbf** Berlin Hbf (tief) 14:57 - Berlin Südkreuz 15:01 - Leipzig Hbf 16:05 - Naumburg(Saale)Hbf 16:49 - Jena Paradies 17:17 - Saalfeld(Saale) 17:44 - Bamberg 18:47 - Nürnberg Hbf 19:25 - Ingolstadt Hbf 19:59 - München Hbf 20:39 daily, not 27. Oct	1 Berlin Hbf (tief)
14:57		ICE 1513	**München Hbf** Berlin Hbf (tief) 14:57 - Berlin Südkreuz 15:01 - Leipzig Hbf 16:05 - Naumburg(Saale)Hbf 16:59 - Jena Paradies 17:23 - Saalfeld(Saale) 17:49 - Bamberg 18:50 - Nürnberg Hbf 19:25 - Ingolstadt Hbf 19:59 - München Hbf 20:39 not every day, 27. Oct	1 Berlin Hbf (tief)
14:58		S S5	**Berlin Westkreuz** Berlin Hbf (S-Bahn) 14:58 - Berlin Bellevue 15:00 ⊙ Berlin-Tiergarten 15:02 - Berlin Zoologischer Garten 15:04 - Berlin Savignyplatz 15:06 - Berlin-Charlottenburg 15:08 - Berlin Westkreuz 15:11 daily	16 Berlin Hbf (S-Bahn)
14:58		S S7	**Ahrensfelde** Berlin Hbf (S-Bahn) 14:58 - Berlin Friedrichstr 15:00 ⊙ Berlin Alexanderplatz 15:04 - Berlin Ostbahnhof 15:09 - Berlin Ostkreuz 15:13 - Berlin-Lichtenberg 15:18 - Ahrensfelde 15:34 daily	15 Berlin Hbf (S-Bahn)
	more		All stops shown up to this sign ⊙, behind only the most important are shown. **Following stations are included in this station schedule:** - Berlin Hbf (S-Bahn) - Berlin Hbf (tief)	

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Hilfe

Fahrtinformationen

ICE 845

Halt	Ankunft	Abfahrt	Fahrt
Köln/Bonn Flughafen		7:11	ICE 845
Düsseldorf Hbf	7:53	7:55	
Duisburg Hbf	8:07	8:10	
Essen Hbf	8:22	8:24	
Bochum Hbf	8:34	8:36	
Dortmund Hbf	8:46	8:49	
Hamm(Westf)	9:07	9:11	
Bielefeld Hbf	9:35	9:37	
Hannover Hbf	10:28	10:31	
Wolfsburg	11:03	11:05	
Berlin-Spandau	11:56		
Berlin Hbf	12:10		
Berlin Ostbahnhof	12:20		

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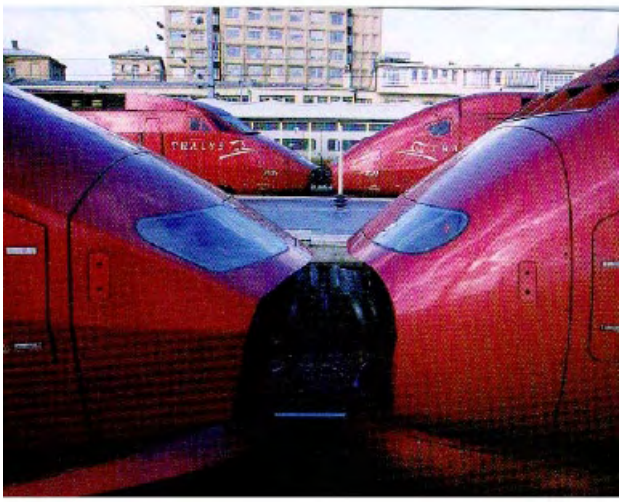
Fahrtinformationen

ICE 855

Halt	Ankunft	Abfahrt	Fahrt
Köln Hbf		7:49	ICE 855
Wuppertal Hbf	8:15	8:17	
Hagen Hbf	8:33	8:35	
Hamm(Westf)	9:02	9:11	
Bielefeld Hbf	9:35	9:37	
Hannover Hbf	10:28	10:31	
Wolfsburg	11:03	11:05	
Berlin-Spandau	11:56		
Berlin Hbf	12:10		
Berlin Ostbahnhof	12:20		

Thalys runs a high speed

Paris-Köln-Amsterdam network that splits at Brussels. At peak hours, double sets run Paris–Köln or Paris–Amsterdam. However, at off-peak hours, when a double set cannot be justified, mixed-destination trains join and divide in Brussels. Thus, midday trains 9333 and 9433 depart Paris Gare du Nord coupled at 12:55pm, with one module running as 9333 to Amsterdam and the other as 9444 to Köln. Likewise, trains 9345 and 9445 leave Paris at 3:55pm and split in Brussels. This arrangement maintains frequencies on both branches despite a split in the route.



Mit der Deutschen Bahn zu den Mumienausstellungen.
Bequem und schnell im ICE/ EC/IC vom 30.09. bis 24.03.08 nach Mannheim und vom 06.10.07 bis 24.03.08 nach Stuttgart.

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Hilfe

Fahrtinformationen

THA 9333

Halt	Ankunft	Abfahrt	Fahrt
Paris Nord		12:55	THA 9333
Bruxelles-Midi	14:17	14:25	
Antwerpen-Berchem	15:03	15:05	
Rotterdam Centraal	16:06	16:08	
Den Haag HS	16:26	16:28	
Schiphol (Airport)	16:49		
Amsterdam Centraal	17:06		

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Hilfe

Fahrtinformationen

THA 9433

Halt	Ankunft	Abfahrt	Fahrt
Paris Nord		12:55	THA 9433
Bruxelles-Midi	14:17	14:22	
Liege-Guillemins	15:08	15:10	
Aachen Süd(Gr)			
Aachen Hbf	15:58	16:06	
Köln Hbf	16:45		

Exhibit C - page 6

12:46	RER E	**Paris Blvd Haussmann/St-Lazare** Paris Magenta 12:46 - Paris Blvd Haussmann/St-Lazare 12:50 daily	
12:46	RER D	**Villiers-le-Bel-Gonesse** Paris Nord RER 12:46 - Stade de France St Denis 12:50 - St Denis 12:53 - Pierrefitte Stains 12:58 - Garges 13:00 - Villiers-le-Bel-Gonesse 13:04 Mo - Sa, not 1. Nov	Paris Nord RER
12:47	RER B	**Robinson** Paris Nord RER 12:47 - Paris Chatelet/Les Halles 12:50 - Paris St-Michel 12:52 - Paris Luxembourg 12:54 ⊙ Paris Port Royal 12:56 - Paris Denfert Rochereau 12:58 - Paris Cite Universitaire 13:00 - Gentilly 13:01 - Bourg la Reine Ratp 13:09 - Robinson 13:16 daily	Paris Nord RER
12:48	RER B	**Aeroport Paris-Charles de Gaulle RER** Paris Nord RER 12:48 - La Plaine-Stade de France 12:51 - La Courneuve Aubervilliers 12:54 - Le Bourget 12:58 ⊙ Aulnay sous Bois 13:05 - Sevran Beaudottes 13:09 - Villepinte 13:11 - Villepinte Parc des Expositions 13:14 - Roissy Aeroport Charles de Gaulle 13:19 - Aeroport Paris-Charles de Gaulle RER 13:22 daily	Paris Nord RER
12:49	RER E	**Chelles Gournay** Paris Magenta 12:49 - Noisy-le-Sec 12:56 - Bondy 12:59 - Le Raincy Villemomble Montferm 13:02 - Gagny 13:04 - Chenay Gagny 13:07 - Chelles Gournay 13:09 daily	Paris Magenta
12:51	RER D	**Melun** Paris Nord RER 12:51 - Paris Chatelet/Les Halles 12:54 - Paris Lyon Banlieue 12:58 - Maisons Alfort Alfor 13:05 ⊙ Villeneuve St George 13:11 - Montgeron Crosne 13:16 - Yerres 13:19 - Brunoy 13:22 - Boussy St Antoine 13:26 - Melun 13:47 Su, also 1. Nov	Paris Nord RER
12:51	RER D	**Corbeil Essonnes** Paris Nord RER 12:51 - Paris Chatelet/Les Halles 12:54 - Paris Lyon Banlieue 12:59 - Maisons Alfort Alfor 13:05 ⊙ Le Vert de Maisons 13:07 - Villeneuve St George 13:16 - Vigneux sur Seine 13:20 - Juvisy 13:24 - Viry Chatillon 13:27 - Corbeil Essonnes 13:43 Mo - Sa, not 1. Nov	Paris Nord RER
12:53	RER E	**Paris Blvd Haussmann/St-Lazare** Paris Magenta 12:53 - Paris Blvd Haussmann/St-Lazare 12:57 daily	Paris Magenta
12:53	RER E	**Tournan** Paris Magenta 12:53 - Noisy-le-Sec 12:59 - Val de Fontenay 13:05 - Villiers s Marne Plessis Trevi 13:12 ⊙ Les Yvris Noisy le Grand 13:16 - Emerainville Pontaul 13:20 - Roissy en Brie 13:23 - Ozoir la Ferriere 13:27 - Gretz-Armainvilliers 13:31 - Tournan 13:37 daily	Paris Magenta
12:53	RER B	**Remy les Chevreuse** Paris Nord RER 12:53 - Paris Chatelet/Les Halles 12:56 - Paris St-Michel 12:58 - Paris Luxembourg 13:00 ⊙ Paris Port Royal 13:02 - Paris Denfert Rochereau 13:04 - Paris Cite Universitaire 13:06 - Bourg la Reine Ratp 13:11 - Antony Ratp 13:15 - Remy les Chevreuse 13:43 daily	Paris Nord RER
12:54	RER B	**Mitry Claye** Paris Nord RER 12:54 - La Plaine-Stade de France 12:58 - Le Bourget 13:02 - Aulnay sous Bois 13:07 - Sevran Livry 13:11 - Vert Galant 13:14 - Villeparisis 13:17 - Mitry Claye 13:22 daily	Paris Nord RER
12:55	THA 9333	**Amsterdam Centraal** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Antwerpen-Berchem 15:03 - Rotterdam Centraal 16:06 - Den Haag HS 16:26 - Schiphol (Airport) 16:49 - Amsterdam Centraal 17:06 daily, not 27., 28. Oct	
12:55	THA 9333	**Amsterdam Centraal** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Antwerpen-Berchem 15:03 - Rotterdam Centraal 16:06 - Den Haag HS 16:26 - Amsterdam Centraal 17:09 not every day, 27., 28. Oct	
12:55	THA 9433	**Köln Hbf** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Liege-Guillemins 15:08 - Aachen Hbf 15:58 - Köln Hbf 16:48 not every day, 10., 17. Nov	
12:55	THA 9433	**Köln Hbf** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Liege-Guillemins 15:08 - Aachen Hbf 15:58 - Köln Hbf 16:51 not every day, 27. Oct	
12:55	THA 9433	**Köln Hbf** Paris Nord 12:55 - Bruxelles-Midi 14:17 - Liege-Guillemins 15:08 - Aachen Hbf 15:58 - Köln Hbf 16:45 daily, not 27. Oct, 10., 17. Nov	
12:55	R 25069	**Sarcelles St Brice** Paris Nord Banlieue 12:55 - St Denis 13:00 - Epinay Villetaneuse 13:04 - Deuil Montmagny 13:08 - Groslay 13:10 - Sarcelles St Brice 13:14 Sa	Paris Nord Banlieue
12:55	R 25271	**Montsoult Maffliers** Paris Nord Banlieue 12:55 - St Denis 13:00 - Epinay Villetaneuse 13:04 - Deuil Montmagny 13:08 ⊙ Groslay 13:10 - Sarcelles St Brice 13:13 - Ecouen Ezanville 13:17 - Domont 13:20 - Bouffemont Moisselle 13:23 - Montsoult Maffliers 13:26 Mo - Fr, not 1. Nov	Paris Nord Banlieue
12:56	RER E	**Villiers s Marne Plessis Trevi** Paris Magenta 12:56 - Pantin 13:00 - Noisy-le-Sec 13:04 - Rosny Bois Perrier 13:08 - Rosny sous Bois 13:10 - Val de Fontenay 13:13 - Nogent le Perreux 13:16 - Les Boullereaux Champigny 13:20 - Villiers s Marne Plessis Trevi 13:24 daily	Paris Magenta
12:56	RER B	**Massy Palaiseau Ratp** Paris Nord RER 12:56 - Paris Chatelet/Les Halles 12:59 - Paris St-Michel 13:01 - Paris Luxembourg 13:03 ⊙ Paris Port Royal 13:05 - Paris Denfert Rochereau 13:07 - Paris Cite Universitaire 13:09 - Bourg la Reine Ratp 13:18 - Antony Ratp 13:23 - Massy Palaiseau Ratp 13:32 daily	Paris Nord RER
12:58	TGV 7043	**Lille Flandres** Paris Nord 12:58 - Lille Flandres 14:00 daily	
12:58	RER D	**Orry-la-Ville-Coye** Paris Nord RER 12:58 - Stade de France St Denis 13:02 - Garges 13:09 - Villiers-le-Bel-Gonesse 13:12 ⊙ Goussainville 13:17 - Les Noues 13:19 - Louvres 13:22 - Survilliers Fosses 13:28 - La Borne Blanche 13:31 - Orry-la-Ville-Coye 13:34 Mo - Sa, not 1. Nov	Paris Nord RER

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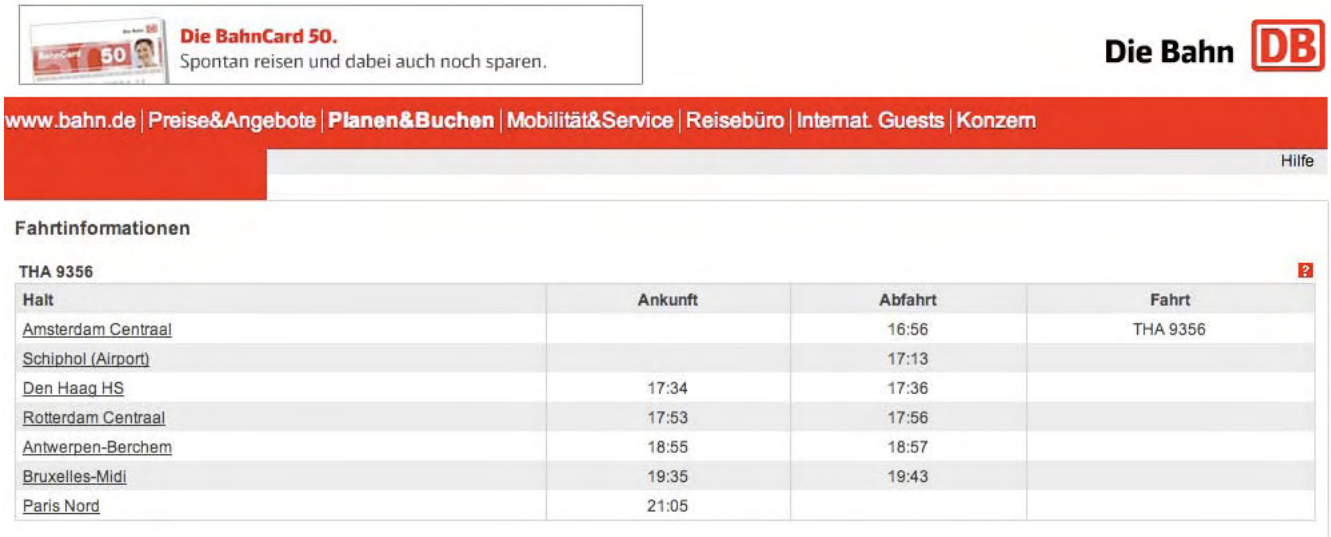
Fahrtinformationen

THA 9456

Halt	Ankunft	Abfahrt	Fahrt
Köln Hbf		17:14	THA 9456
Aachen Hbf	17:52	18:02	
Aachen Süd(Gr)			
Liege-Guillemins	18:50	18:52	
Bruxelles-Midi	19:38	19:43	
Paris Nord	21:05		



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Fahrtinformationen

THA 9356

Halt	Ankunft	Abfahrt	Fahrt
Amsterdam Centraal		16:56	THA 9356
Schiphol (Airport)		17:13	
Den Haag HS	17:34	17:36	
Rotterdam Centraal	17:53	17:56	
Antwerpen-Berchem	18:55	18:57	
Bruxelles-Midi	19:35	19:43	
Paris Nord	21:05		

Similarly, the French tend to use splitting trains on their extensively-branched TGV network at the beginning and end of the day when loads are lighter.
For example, weekday trains 6751 and 6781 leave Paris Gare de Lyon together at 7:14am and split at Dijon, with 6751 proceeding straight to Besançon and 6781 turning south to Chalon-sur-Saône.

Coupled TGV trainset

Another example is between Paris Montparnasse station and Brest/Quimper.

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Fahrtinformationen

TGV 8603

Halt	Ankunft	Abfahrt	Fahrt
Paris Montparnasse		7:05	TGV 8603
Rennes	9:08	9:11	
St-Brieuc	9:57	10:00	
Guingamp	10:15	10:17	
Morlaix	10:48	10:50	
Brest(F)	11:23		

Verkehrstage: fährt 3. Sep bis 2. Nov 2007 Mo - Fr; nicht 1. Nov

Zum besonders günstigen Festpreis von 39,- EUR (2.Kl.) und 59,- EUR (1.Kl.).

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Fahrtinformationen

TGV 8705

Halt	Ankunft	Abfahrt	Fahrt
Paris Montparnasse		7:05	TGV 8705
Rennes	9:08	9:14	
Vannes	10:11	10:14	
Auray	10:24	10:27	
Lorient	10:44	10:46	
Quimper	11:22		

Verkehrstage: fährt 27. Aug bis 7. Dez 2007 Mo - Fr; nicht 1. Nov

Bern, Zürich, Basel, Interlaken, Chur.

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Fahrtinformationen

TGV 8634

Halt	Ankunft	Abfahrt	Fahrt
Brest(F)		11:34	TGV 8634
Morlaix	12:04	12:06	
Plouaret	12:32	12:34	
Guingamp	12:47	12:49	
St-Brieuc	13:05	13:12	
Rennes	14:00	14:05	
Paris Montparnasse	16:10		

Verkehrstage: fährt 31. Aug bis 2. Nov 2007 Mo - Fr; nicht 1. Nov

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Fahrtinformationen

TGV 8730

Halt	Ankunft	Abfahrt	Fahrt
Quimper		11:44	TGV 8730
Lorient	12:16	12:19	
Auray	12:37	12:39	
Vannes	12:51	12:54	
Redon	13:19	13:21	
Rennes	13:57	14:05	
Paris Montparnasse	16:10		

Verkehrstage: fährt 7. Sep bis 3. Nov 2007 Mo - Sa

California High Speed Rail
Bay Area - Central Valley

Exhibit D - Population and Distance for the Two Alignments

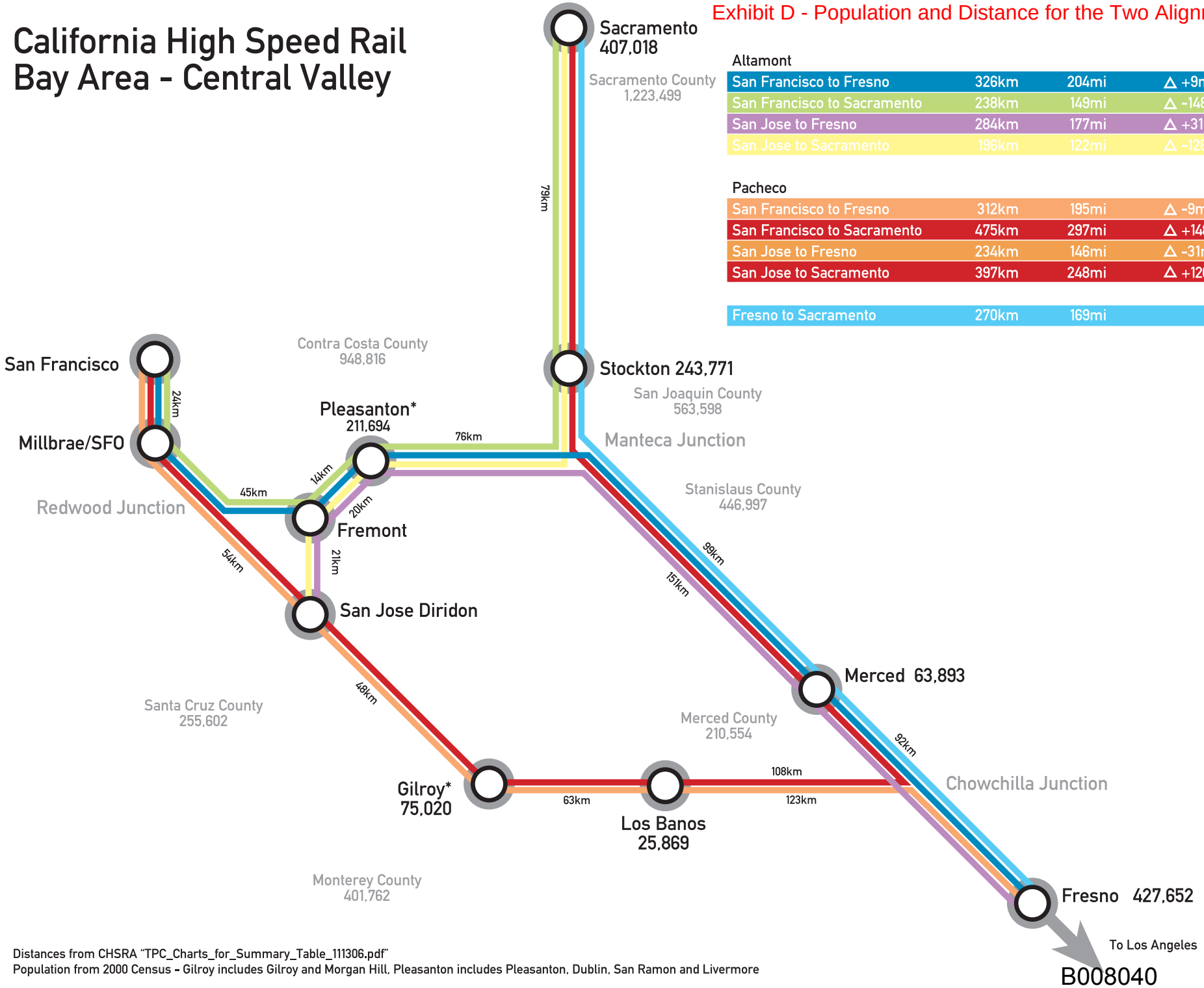
Altamont

San Francisco to Fresno	326km	204mi	Δ +9mi
San Francisco to Sacramento	238km	149mi	Δ -148mi
San Jose to Fresno	284km	177mi	Δ +31mi
San Jose to Sacramento	196km	122mi	Δ -126mi

Pacheco

San Francisco to Fresno	312km	195mi	Δ -9mi
San Francisco to Sacramento	475km	297mi	Δ +148mi
San Jose to Fresno	234km	146mi	Δ -31mi
San Jose to Sacramento	397km	248mi	Δ +126mi

Fresno to Sacramento	270km	169mi



Distances from CHSRA "TPC_Charts_for_Summary_Table_111306.pdf"
Population from 2000 Census - Gilroy includes Gilroy and Morgan Hill, Pleasanton includes Pleasanton, Dublin, San Ramon and Livermore

B008040

EDMUND G. BROWN JR.
Attorney General

State of California
DEPARTMENT OF JUSTICE

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May 11, 2007

Yuba County Board of Supervisors
915 8th Street, Suite 109
Marysville, CA 95901

RE: Yuba Highlands Environmental Impact Report

Dear Chairman Stocker and Members of the Board of Supervisors:

We have only recently had the opportunity to review the Environmental Impact Report (EIR) for the Yuba Highlands project, which we understand the Board of Supervisors will be considering on May 15, 2007. We are submitting these comments because the EIR completely ignores impacts from greenhouse gas emissions and improperly defers analysis and mitigation of significant effects on other natural resources in violation of the California Environmental Quality Act (CEQA). We urge the Board to reject the EIR until these deficiencies are corrected.

The Attorney General of the State of California submits these comments pursuant to his independent power and duty to protect the natural resources of the State from pollution, impairment, or destruction in furtherance of the public interest. (*See* Cal. Const., art. V., § 13; Cal. Gov. Code, §§ 12511, 12600-12612; *D'Amico v. Board of Medical Examiners*, 11 Cal.3d 1, 14-15 (1974).) These comments are made on behalf of the Attorney General and not on behalf of any other California agency or office.

Introduction

The Yuba Highlands project is a particularly egregious example of sprawl. It is proposed for a very rural area with no public transit and no existing infrastructure, and would be adjacent to Beale Air Force Base and the State's Spenceville Wildlife and Recreation Area. The main employers, in the Lincoln-Roseville area, are almost 50 miles away on existing roads; if the developer obtains approval to improve the gravel roads that run through the Spenceville Wildlife Area, the distance would be 30 miles, still a considerable commute. The Sacramento Area Council of Governments, which specializes in modeling travel behavior resulting from land uses, estimates that developing Yuba Highlands will result in 25,000 automobile trips per day throughout the county. Many of these trips will be lengthy commute trips, yet the EIR fails to quantify the impacts of or propose any significant mitigation for the resulting greenhouse gas emissions. In addition, the EIR fails to identify or adequately mitigate (1) air quality impacts on

the Nevada City area, which is non-attainment for ozone; (2) impacts on the Spenceville Wildlife Area and endangered and threatened species; and (3) impacts of supplying water to the development. For all these reasons the EIR fails to comply with CEQA.

The Attorney General recognizes that much of Yuba County's undeveloped land is either in a flood plain or supporting agriculture, and that this project avoids the problems of flooding and destroying farmland. Our point here is that the EIR, as written, is inadequate as a matter of law, and should not be certified unless the project's impacts are adequately mitigated, as required by CEQA.

The EIR fails to adequately analyze or mitigate impacts on air quality

The EIR, criticized by several commentators for severely underestimating travel trips and impacts, itself projects that the development will result in 1870 commute trips per day, to and from the major employment center in the Lincoln-Roseville area. In spite of the tremendous number of vehicle trips that the project will generate, the EIR fails to adequately analyze the emissions from the project and their impacts.

Greenhouse Gas Emissions

Under CEQA, Public Resources Code § 21000, et seq., the EIR must consider the Yuba Highlands project's global warming impacts. The project could result in significant increases in emissions of greenhouse gases that cause global warming, and any increase in such emissions will make it more difficult for the state to achieve the greenhouse gas reductions required by Assembly Bill 32. The EIR must evaluate the global warming impacts of the project and discuss feasible alternatives and mitigation measures to avoid or reduce those impacts.

The Intergovernmental Panel on Climate Change of the United Nations recently published its finding that overwhelming evidence establishes that global warming is occurring and is caused by human activity. ("Climate Change 2007: The Physical Science Basis, Summary For Policymakers" (Fourth Assessment Report of the IPCC, February 2007).) The California Climate Change Center has reported on the impacts global warming is expected to cause in the state, including substantial loss of snow-pack, a substantially increased risk of large wildfires, and reductions in the quality and quantity of agricultural products. (Amy Lynd Luers, Daniel R. Cayan et. al, *Our Changing Climate: Assessing the Risks to California* (July 2006) at pp. 2, 10.)

On June 1, 2005, Governor Schwarzenegger issued Executive Order S-3-05. The Order recognized California's vulnerability to global warming and the need to implement mitigation measures to limit the impacts to the State. The Order also set greenhouse gas emission reduction targets for California. A year later the Governor signed AB 32, the California Global Warming

Solutions Act of 2006, codified at Health and Safety Code section 38500, et seq. AB 32 recognizes the serious threats global warming poses to California and requires California to reduce its greenhouse gas emissions to 1990 levels by 2020. (Cal. Health & Saf. Code, §§ 38501, 38550.) The legislation also encourages entities to voluntarily reduce greenhouse gas emissions prior to 2012 by offering credits for early voluntary reductions. (*Id.*, §§ 38562(b)(3), 38563.)

CEQA requires that all aspects of potential environmental damage from a project be examined, disclosed, and mitigated to the extent feasible. It requires the governmental decision-maker to make a reasonable effort to gather information, identify mitigation opportunities, and adopt mitigation measures where feasible. The CEQA Guidelines provide that "[a]n EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. . . . '[C]umulatively considerable' means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (CEQA Guidelines, § 15130(a).) Although a project may only contribute a minor amount to a large problem, agencies are still required to analyze whether the project's contribution is considered significant in light of the nature of the larger problem. (*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 718.) Thus, where a project's direct and indirect greenhouse gas-related effects, considered in the context of the existing and projected cumulative effects, may interfere with California's ability to achieve the greenhouse gas reduction requirements of the California Global Warming Solutions Act, the project's global warming-related impacts should be considered cumulatively significant.

Accordingly, the EIR must describe the existing level of greenhouse gas emissions in the county, and the estimated increased greenhouse gas emissions associated with the Yuba Highlands project. The EIR must then evaluate feasible alternatives and adopt mitigation measures that would avoid or reduce the development's greenhouse gas emissions. The existing EIR does none of these things. Instead, the EIR requires the developer to submit an "emissions reduction plan" prior to groundbreaking. There are several major problems with this plan. First, it only requires a reduction in "emissions," without designating the types of emissions that need to be reduced. The offsite mitigation strategies, for example, are specifically targeted at reductions in NOx and particulates. There is no requirement that CO2 and other greenhouse gases be reduced. Second, many of the measures are beyond the control of the developer to implement, such as telecommute programs, alternative work schedules, and employees working at a satellite work center. Third, other measures, such as promoting bicycle trips within the development, are good ideas but will have only a minor impact on reducing the project's emissions. Fourth, the measures are too vague. The plan, for example, requires the developer to develop a "transit services plan" but the does not contain standards or specific mitigation measures.

The EIR does include some energy-efficiency features that would reduce greenhouse gas emissions to a small degree. The measures include requirements such as planting trees, installing Energy Star roofing materials, installing energy efficient appliances, and prohibiting gas powered landscape maintenance equipment within the development. While a good start, the measures are insufficient to offset even a fraction of the greenhouse gas emissions the project will generate.

While no state agency has issued guidelines for carrying out AB 32, the absence of specific guidelines does not excuse CEQA compliance. In determining specific mitigation actions for the EIR, the County could look to a number of communities that are beginning to formulate strategies to reduce greenhouse gas emissions. There are a growing number of resources available to help guide Yuba County in calculating and mitigating the emissions. The Attorney General's Office would be happy to identify some of those resources if the County is interested.

Other Air Quality Impacts

Nevada County, two miles downwind of the project, has not attained the federal ozone standard. According to the Northern Sierra Air Quality Management District, the Yuba Highlands project will increase locally emitted ozone precursors by 18 percent. This is significant for Nevada County because its nonattainment results from pollution being transported from upwind areas. If Nevada County fails to attain the federal ozone standard by the target date of 2014, it is subject to serious federal sanctions under the Clean Air Act, including the cutoff of highway funds and the imposition of stricter standards for stationary sources.

The EIR proposes that before ground can be broken, the Feather River Air Quality Management District must approve an "emissions reductions plan." While the requirements of the plan sound good in theory, they are neither practical nor legally adequate under CEQA, as discussed above.

The EIR fails to adequately analyze or mitigate impacts on biological resources

Yuba Highlands is adjacent to the Spenceville Wildlife and Recreation Area (Spenceville) managed by the Department of Fish and Game. Spenceville is a 11,000- acre blue oak woodland, home to over 230 fish and wildlife species, including species listed as threatened or endangered. As suggested by its name, Spenceville serves two purposes, protection of wildlife

and human recreation; there are a number of hiking trails and even limited hunting is permitted. The recreational use of the area is light, however, and regulated by DFG.

The proposed development will potentially affect Spenceville in a number of ways. First, there will be only a 450-foot buffer separating houses from the wildlife area; second, the development will be constructed in the middle of two separate parts of the wildlife area; and third, the project proposes to "improve" the narrow gravel roads that traverse the wildlife area to serve as the main commuter routes into the Lincoln-Roseville area. The EIR fails to adequately analyze or mitigate the impacts that are likely to result from siting a large development adjacent to the wildlife area (increased human use of the area, lighting, noise, domestic pets), fragmenting the wildlife area (interruption of wildlife mobility), and developing the roads through the wildlife area (species mortality and displacement from road construction and vastly increased traffic). In addition, the EIR fails to meaningfully address the impacts the development will have on habitat or species on the development site. The surveys of on-site species were conducted during the wrong time of the year, resulting in an inadequate baseline of species that may be affected. The EIR improperly defers most of these analyses to future project-specific EIR's.

The EIR defers evaluating significant mitigation on the ground that the EIR is "only" a Program EIR and that mitigation will be required at later stages. It is appropriate to use a Program EIR to consider broad environmental issues at an early stage of the planning process (CEQA Guidelines, § 15168). The use of a Program EIR, however, does not excuse an agency from identifying and mitigating significant environmental impacts a project is expected to cause. (*Stanislaus Natural Heritage Project v. County of Stanislaus* (1996) 48 Cal.App.4th 182, 199.) An agency is permitted to defer analysis of certain details of long-term projects to the future, but it must consider all reasonably foreseeable consequences of approving a project. (*Laurel Heights Improvement Assn v. Regents of University of California* (1988) 47 Cal.3d 376, 399.)

Here, the EIR fails to assess the reasonably foreseeable impacts of the project and improperly defers assessing reasonably foreseeable impacts on the Spenceville Wildlife Area and the area's biological resources. For example, the EIR has mapped out residential, commercial, and open space areas, and has determined the number of houses for each neighborhood, but has based these decisions on incomplete biological surveys done at the wrong time of the year. The EIR states that some additional surveys will be done in the future. But without knowing whether sensitive habitat or species exist on site, the Board is not able to make an informed decision about the appropriate location of areas to be developed. Also, all assessment and mitigation of impacts of widening the roads through the Spenceville Wildlife Area has been deferred until the roads are constructed. The Board cannot make a reasoned judgment whether to approve the paving of the roads unless the EIR discloses the impacts of that decision. And if the roads through Spenceville are not improved, commuters will have to travel even farther to the Lincoln-Roseville area, resulting in more greenhouse gas emissions and other pollutants. The Board thus

needs to know what the impacts are of improving and not improving the roads.

The EIR fails to adequately analyze and mitigate impacts from supplying water to the project

The EIR maintains that the project is entitled to groundwater from the Yuba Goldfields well field, near the Yuba River. Even if Yuba Highlands can secure this water supply, which is uncertain, the EIR fails to discuss any impacts from using the groundwater. There are indications that the well field is hydraulically connected to the Yuba River. If the two are connected, pumping groundwater will draw down the river. The EIR acknowledges that it is unknown whether using groundwater will affect the Yuba River but assures the Board and the public that those impacts will be studied later, in an EIR on the well field. The California Supreme Court has specifically forbidden EIR's from deferring this type of analysis. It recently held that an EIR must address the reasonably foreseeable impacts of supplying water to a project and cannot put off the analysis to a future EIR, which is exactly what the EIR proposes to do here. (*Vineyard Area Citizens v. City of Rancho Cordova* (2007) 40 Cal.4th 412; *Stanislaus Natural Heritage Project v. County of Stanislaus*, *supra*, 48 Cal.App.4th 182.)

Thank you for the opportunity to submit these comments. We respectfully request the Board to refuse to certify the EIR until it has been re-drafted to eliminate the deficiencies described above and then recirculated for public comment.

Sincerely,

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Deputy Attorney General

For EDMUND G. BROWN JR.
Attorney General

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State of California
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March 30, 2006

VIA OVERNIGHT MAIL AND U.S. MAIL

Glenn Campbell, Principal Transportation Analyst
Orange County Transportation Authority
550 South Main Street
P.O. Box 14184
Orange, CA 92863-1584

RE: Orange County Transportation Authority 2006 Long-Range Transportation Plan Draft Program Environmental Impact Report

Dear Mr. Campbell:

The Attorney General of the State of California submits the following comments regarding the Orange County Transportation Authority ("OCTA") 2006 Long-Range Transportation Plan ("Plan") Draft Program Environmental Impact Report ("DPEIR"). The Attorney General provides these comments pursuant to his independent power and duty to protect the natural resources of the State from pollution, impairment, or destruction in furtherance of the public interest. (*See* Cal. Const., art. V, § 13; Cal. Gov. Code, §§ 12511, 12600-12; *D'Amico v. Board of Medical Examiners*, 11 Cal.3d 1, 14-15 (1974).) These comments are made on behalf of the Attorney General and not on behalf of any other California agency or office. While these comments focus on some of the primary issues raised by the Draft PEIR, they are not an exhaustive discussion of all issues.

I. Introduction

The Plan is described as being OCTA's "blueprint" for maintaining and improving Orange County's transportation network, including freeways, roadways and bus and rail systems through 2030. The Plan focuses much of its attention and planned spending on freeways and roadways, with a much smaller emphasis on public transit. Consequently, the Plan forecasts huge increases (approximately 45%) in vehicle miles traveled ("VMT") per day in the coming years. The environmental analysis in the DPEIR fails to adequately analyze air quality impacts and contains no analysis at all of the impact of the Plan on climate change, both in violation of the California Environmental Quality Act ("CEQA"), Pub. Resources Code §§ 21000, et seq. Orange County is one of the most populous counties in the State, in one of the worst air quality

regions in the country. The environmental and public health concerns raised by the projected increases in vehicular travel under the proposed plan deserve, and CEQA requires, serious and thorough environmental analysis.

II. The DPEIR Should Discuss The Plan's Impact On Climate Change.

Despite the Plan's heavy reliance on vehicular travel and improvements to freeways, roads and streets, and the acknowledged increase in vehicle travel that the Plan will encourage, the DPEIR never analyzes one of the most important environmental impacts of vehicle emissions--greenhouse gases and resulting climate change

Climate change results from the accumulation in the atmosphere of "greenhouse gases" produced by the burning of fossil fuels for energy. Because greenhouse gases (primarily, carbon dioxide("CO_2"), methane and nitrous oxide) persist and mix in the atmosphere, emissions anywhere in the world impact the climate everywhere. The impacts on climate change from greenhouse gas emissions have been extensively studied and documented. (*See* Oreskes, Naomi, *The Scientific Consensus on Climate Change*, 306 Science 1686 (Dec. 3, 2004) [review of 928 peer reviewed scientific papers concerning climate change published between 1993 and 2003, noting the scientific consensus on the reality of anthropogenic climate change]; J. Hansen, *et al.*, *Earth's Energy Imbalance: Confirmation and Implications,* Sciencexpress (April 28, 2004) (available at http://pubs.giss.nasa.gov/abstracts/2005/HansenNazarenkoR.html) [NASA and Department of Energy scientists state that emission of CO_2 and other heat-trapping gases have warmed the oceans and are leading to energy imbalance that is causing, and will continue to cause, significant warming, increasing the urgency of reducing CO_2 emissions].)

In California, the state government has acknowledged the true environmental impacts of greenhouse gas emissions on climate change. Governor Schwarzenegger, in his Executive Order S-3-05 issued on June 1, 2005, recognized the significance of the impacts of climate change on the State of California, noting that "California is particularly vulnerable to the impacts of climate change." The Order goes on to itemize a litany of the direct impacts that climate change and the increased temperatures resulting from the increased presence of greenhouse gases in the atmosphere, will have on the state:

- "[I]ncreased temperatures threaten to greatly reduce the Sierra snowpack, one of the State's primary sources of water;"
- "[I]ncreased temperatures also threaten to further exacerbate California's air quality problems and adversely impact human health by increasing heat stress and related deaths;"

- "[R]ising sea levels threaten California's 1,100 miles of valuable coastal real estate and natural habitats;" and

- "[T]he combined effects of an increase in temperatures and diminished water supply and quality threaten to alter micro-climates within the state, affect the abundance and distribution of pests and pathogens, and result in variations in crop quality and yield."
  Executive Order S-3-05, June 1, 2005.

The California legislature, also recognized all of these severe impacts resulting from climate change, as well as a "projected doubling of catastrophic wildfires due to faster and more intense burning associated with drying vegetation." (Stats. 2002, ch, 200, Section 1, subd. (c)(4), enacting Health & Saf. Code § 43018.5) In the particular realm of vehicular travel and emissions from cars and truck, the California legislature went on to recognize that "passenger vehicles and light-duty trucks are responsible for *40 percent of the total greenhouse gas pollution in the state.*" (*Ibid.*, subd. (e)(emphasis added).)

Despite the increasing attention that governments, climate scientists, environmentalists, and other members of the public are rightfully directing to the issue of climate change, OCTA does not even mention the issue in its long term transportation plan, which is meant to cover the next quarter century. The DPEIR never once mentions carbon dioxide, climate change or global warming, and mentions greenhouse gases only by passing reference, when discussing other emissions, without explaining either the importance, or the projected impacts, of greenhouse gases.

Under CEQA, an environmental impact report must identify and focus on the "significant environmental effects" of a proposed project. (Pub. Res. Code § 21100(b)(1); Cal. Code Regs., Title 14, §§ 15126(a), 15126.2(a), 15143.) "'Significant effect on the environment' means a substantial, or potentially substantial, adverse change in the environment." (Pub. Res. Code § 21068). CEQA also provides that the CEQA guidelines "shall" specify certain criteria that *require* a finding that a project may have a significant effect on the environment:

> "(1) A proposed project has the potential to degrade the quality of the environment, curtail the range of the environment, or to achieve short-term, to the disadvantage of long-term, environmental goals.
>
> (2) The possible effects of a project are individually limited but cumulatively considerable. As used in this paragraph, "cumulatively considerable" means that

> the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.
>
> (3) The environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly."
> (Pub. Res. Code § 21083(b).)

In other words, if these criteria are present with regard to a project's impacts on the environment, they must be considered in an EIR. The Plan under consideration in this DPEIR, with its projected 45% increase in vehicular miles traveled by the year 2030, when considered in light of the severe impacts cars and trucks have on the level of greenhouse gas emissions in this state, clearly "has the potential to degrade the environment." (*See ibid.*, subd. (b)(1).) Moreover, the cumulative effects of this project on greenhouse gas emissions, when taken in consideration with the impacts statewide of increased population and vehicular travel over the next quarter century, are undeniable. (*See ibid.*, subd. (b)(2).) When considering the impacts of climate change on California, it is impossible to ignore that the impacts of this project will have either direct or indirect effects on human beings. (*See ibid.*, subd. (b)(3).) Given the scope of the Plan (both in years, and geographically), the projected increase in vehicle travel it calls for, and the fact that it covers one of the most heavily populated regions in the State, there is no question that the impacts of this Plan on greenhouse gas emissions and climate change may, and likely will, have significant cumulative environmental impacts for California. These impacts should have been considered and analyzed in the DPEIR.

There *could* be such analysis in the DPEIR; the data is obtainable. Carbon dioxide emissions from cars can be quantified. The California Air Resources Board has information that could be applied to the projected increase in VMT. The impacts could be assessed as to their cumulative impact on climate change, assuming (as is highly probable in this Plan) that there would be a considerable impact from the increase in CO_2 resulting from the increased VMT. (*See* Cal. Code Regs., title 14, § 15130(a) ["an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable.] *See also* Cal. Code Regs., title 14, § 15065(a)(3) ["'Cumulatively considerable' means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probably future projects."].)

Moreover, the Plan could include mitigation for these impacts. The Governor has recognized, "mitigation efforts will be necessary to reduce greenhouse gas emissions and adaptation efforts will be necessary to prepare Californians for the consequences of global warming." (Executive Order S-3-05, June 1, 2005.) Increased public transportation, increased

support of alternative fuels and technologies, the purchase of carbon offsets (or mitigation "credits"), installation of electric vehicle charging stations, and other affirmative steps to reduce the transportation impacts of CO_2 could be considered as potential mitigation projects. These are real, achievable and available mitigation measures that could be considered when OCTA recognizes its obligations to analyze greenhouse gas emissions and their impact on climate change as part of its long term transportation planning.

III. The DPEIR Does Not Adequately Discuss The Plan's Impact On Air Quality.

The DPEIR's discussion of air quality fails to address potentially serious impacts on Orange County and the South Coast air basin. In the DPEIR chapter on air quality the drafters concluded that there would be no significant unavoidable adverse long-term air quality impacts from the Plan (see DPEIR, 4.1-17 through 4.1-20), that the plan would have a neutral effect on air quality (see id.), and that the only potentially significant impacts relate solely to regional and local short term impacts from the construction of individual projects (e.g., construction of individual road widening, or lane building projects anticipated under the Plan). (*See id.* at 4.1-21 through 4.1-23)[1]. The DPEIR bases these optimistic conclusions on a comparison of the future, year 2030, emissions under the Plan to the emissions budgets of the federally mandated, local Air Quality Management Plan (AQMP), prepared by the South Coast Air Quality Management District (SCAQMD) and projected for 2030. The DPEIR finds that the Plan's emissions are within the projected emissions for the AQMP in 2030, and thus there are no significant impacts. The fundamental basis on which all of the DPEIR's assumptions rests, however, is that by the year 2030, "better fuels" and "improved emission controls" will result in overall emission reductions from vehicles. (See DPEIR at 4.1-18.) There are a number of things wrong with this analysis.

First, the comparison fails to analyze all phases of this 24-year project. The CEQA Guidelines require that an EIR consider "all phases of a project when evaluating its impact on the environment." (Cal. Code Regs., title 14, §15126.) The huge emission reductions anticipated in the Plan by the year 2030 as an anticipated result of "better fuels" and "improved emission controls" will surely take some time. The DPEIR must look at the all phases of the 24-year project time frame, not just 2030, to discern if the project will have significant impacts on health and air quality. The DPEIR contains no analysis of whether the impacts on air quality in the "in between" years, before all of the "better fuels" and "improved emission controls" have been implemented, will be significant; there is no way to discern, from the information available in the DPEIR what the emissions during those years will be.

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1. These impacts, according to the DPEIR, would be addressed through mitigation measures, but the mitigation measures include no monitoring requirements.

Second, there is no detailed comparison of the project with the emissions budgets of the AQMP. The DPEIR states that "[c]umulative impacts were assessed by comparing projected vehicle emissions in 2030 to the emission budgets established in the local AQMP." (DPEIR at 4.1-16.) Nowhere in the document, however, is a detailed comparison shown to the public, nor is there any indication of how the project emission budgets compare year by year with the AQMP emission budgets. This failing is linked to the failure to consider "all phases" of the project, but displays as well the fundamental lack of detailed information in this DPEIR. The conclusory statement that "the impacts were assessed," without any backup, is not sufficient disclosure for the public to make its own evaluation, and, in fact, this lack of information precludes the informed decision making and public participation required by CEQA. (*See* Pub. Res. Code § 21061; Cal Code Regs, title 14, § 15121(a) [an EIR is an informational document which will inform public agency decision-makers and the public generally].) The purpose of an EIR, inter alia, is to provide public agencies and the public in general with detailed information about the effect of the proposed project on the environment. (Pub. Resources Code § 21061; *Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal.3d 376, 391.) An EIR should, when viewed as a whole, provide a reasonable, good faith analysis of known environmental impacts. (*Al Larson Boat Shop, Inc. v. Board of Harbor Commissioners* (1993) 18 Cal.App.4th 729, 749.)

Third, the air quality appendix does not contain any actual useful emissions data or modeling to allow the public to evaluate the accuracy or appropriateness of the model. Appendix B, Air Quality, contains only summary tables of the results of some computer modeling performed by OCTA for criteria pollutant emissions. The tables may represent various alternative scenarios (perhaps for the proposed Plan and for some plan alternatives; it is not clear), but there are no explanations of the assumptions and data (or "inputs") that went into the modeling program that produced these results. There is no explanation of what the various summaries (or "outputs") represent. Without an explanation of the data inputs for the modeling done to support the DPEIR, or an explanation of what the summaries show, it is impossible for the public or the public agency decision makers to make informed decisions. (*See* Pub. Res. Code § 21061.)

Fourth, the toxics analysis is inadequate. In its discussion of impacts on hydrology and water quality, the DPEIR acknowledges that there will be "new roadways in undeveloped areas" under the Plan. (DPEIR at 4.7-11.) In its discussion of toxic air contaminants, however, there is no discussion of the impacts of those "new roadways in undeveloped areas" which will expose new populations to both criteria and toxic pollutants. There should be a risk assessment in order to draw valid conclusions about public health, and such an assessment should be done for each phase of the project (just as with the overall air quality assessment). The DPEIR recognizes that diesel emissions are a known carcinogen, but limits its analysis of cancer risk from the project to

construction emissions and to the expected situation in 2030. The DPEIR does not consider the cancer risks resulting from the operation of current and new roadways, expanded freeways, etc. In Health & Safety Code Section 39606(b), the Legislature recognized the special susceptibility of children and infants to air pollution, and the DPEIR itself recognizes that there are particularly sensitive receptors (DPEIR at 4.1-16), yet the DPEIR makes no effort to evaluate the project's effects on them.[2]

Fifth, where the DPEIR does provide some mitigation for the few significant air quality impacts it does recognize (related to construction), the document makes no assignments, not even tentatively, of responsibility for enforcing them through mitigation monitoring. The DPEIR recognizes only two categories of potentially significant impacts on air quality: Short-term (construction) regional impacts (from a number of construction-related activities and materials) and short-term localized impacts (from construction vehicles which are sources of carcinogenic pollutants and diesel exhaust). (*See* DPEIR at 4.1-21 through 4.1-23.) With regard to the construction impacts, the DPEIR acknowledges that "a large number of the projects in the [Plan] would involve extensive construction or reconstruction" and that it is "very likely" that some of the projects would be under construction at the same time. (DPEIR at 4.1-21.) Notwithstanding the acknowledged significant air quality impacts the construction activities are expected to produce, there are no monitoring requirements for the list of mitigation measures that the DPEIR says "should be considered" when EIR's are prepared for the individual projects. Likewise, there are no monitoring requirements incorporated in the mitigation measures to address the emissions from construction equipment. Moreover, Chapter 7, Mitigation Monitoring and Reporting Program, does not indicate any monitoring actions, or responsible implementation agencies for the proposed mitigation measures. (DPEIR at 7-1 through 7-34.)

OCTA is required to "provide that measures to mitigate or avoid significant effects on the environment are fully enforceable through permit conditions, agreements or other measures." (Pub. Res. Code § 21081.6(b).) The DPEIR should disclose and discuss such mitigation monitoring measures, or at least make tentative assignments of responsibility for enforcing them, so that the public can take these proposed measures into account.[3]

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2. In addition to these failures to address toxic air contaminants, in the chapter on Hazardous Materials, the DPEIR does not examine the indirect effects of the 45 % increase in VMT, such as increased cancer risk from benzene and other petrochemical toxic emissions released from gas stations, increased refinery emission, and the like.

3. In addition, the Plan should contemplate, discuss and disclose whether funding for the mitigation measures it will require is or will be available.

Finally, given the inadequacies and lack of detail in the air quality impacts analysis it is not appropriate for all future projects contemplated under this Plan to be able to "tier" off of a document as deficient as this DPEIR.[4] The DPEIR states "[t]he lead agencies for individual projects may use this PEIR as the basis of their regional and cumulative analysis." (DPEIR at 2-13.) The deficient analysis of the air quality impacts would make any meaningful project-level analysis of regional and cumulative of air quality impacts for an individual project nearly impossible. For example, it is possible that a project-level EIR could be prepared next year for a project such as a lane-addition to a freeway. Based on "tiering" from this DPEIR, the planners of such a project would have only the conclusory statements regarding air quality impacts in the year 2030 from this DPEIR upon which to base cumulative and regional impacts analyses in their EIR, whereas the new hypothetical freeway lane might be operational in 2009. There would be no analysis of the cumulative and regional impacts of that project for years 2009 through 2029. While this example pertains only to the air quality analysis, the other failings of the DPEIR discussed below also contribute to the inappropriateness of allowing future project level EIR's to "tier" off of this deficient CEQA document.

IV. The DPEIR Contains Many Other Inadequacies.

In addition to the failure of the DPEIR to adequately address air quality, and to address greenhouse gas emissions impacts at all, the DPEIR is inadequate in a number of other areas.

A. The DPEIR Does Not Contain An Adequate Description of the Project

Chapter 2 of the DPEIR, is titled "Project Description" and it does contain a list of the projects that the Plan envisions. The description, however, is lacking. The list of projects contemplated under the plan includes one-line, bullet-point descriptions of various freeway and interchange improvements, lane additions and ramp construction projects that will make up the improvements to freeways under the Plan. (There are also one-line, bullet-point descriptions of the other planned projects.) Despite the fact that the primary focus of projects and spending under the Plan is on freeway construction projects, however, the Project Description does not contain any maps or visual drawings of the Plan's contemplated improvements. It is very difficult to ascertain what the impacts on the ground will be from the brief descriptions of the planned projects. Guidelines indicating areas of disturbance, or footprints, for planned projects

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4. "'Tiering' or 'tier' means the coverage of general matters and environmental effects in an [EIR] prepared for a policy, plan, program or ordinance followed by narrower or site-specific [EIRs] which incorporate by reference the discussion in any prior EIR . . ." (Pub. Res. Code §§ 21068.5.)

should be included. From the descriptions in the DPEIR, an understanding of the true impact of the Plan is not possible.

The public should be able to understand from the DPEIR what implementation of the Plan will mean to their communities and their surroundings in physical terms. "Only through an accurate view of the project may affected outsiders and public decision-makers balance the proposal's benefit against its environmental cost, consider mitigation measures, assess the advantage of terminating the proposal (i.e., the "no project" alternative) and weigh other alternatives in the balance. An accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." *County of Inyo v. City of Los Angeles*, (1977) 71 Cal.App.3d 185, 192-193.

B. The DPEIR Does Not Contain An Adequate Analysis of Alternatives.

The alternatives considered in the DPEIR consist entirely of plans that envision varying degrees of funding, as opposed to plans that envision alternative mixes of various transportation improvements or projects. The four alternatives to the Proposed Plan are:

(i) the No Project (Baseline) Alternative, which "includes projects and programs that have secured funding, have been assessed for their environmental impacts, and have been approved to be implemented" (a small sub-set of the projects in the Proposed Plan) (DPEIR at 5-4,);

(ii) the Constrained Alternative, which is "a set of projects and services that can be completed within the County's traditional revenue sources for transportation improvements" (a sub-set, larger than the No Project Alternative sub-set, of the same projects that are included in the Proposed Plan) (DPEIR at 5-11, 5-17);

(iii) the Balanced II Alternative, which "includes all of the projects from the Proposed Plan with the exception of the High Occupancy Toll (HOT) projects proposed along [SR 91, including the direct connectors between SR-241 and the SR-91 toll lanes" (DPEIR at 5-29); and

(iv) the "Unconstrained" Alternative, which "includes projects and services that could be implemented . . . if funding was not an issue." (DPEIR at 5-43.)

It is clear from the alternatives considered that the planners looked only at alternative levels of funding that would allow variable numbers of projects off a master-list of desired projects, and not at alternatives designed to provide alternative levels of environmental impact,

or a different master-list of projects. For example, nowhere does the DPEIR consider a potential alternative that changes the balance of spending to focus more on improvements to mass transit services rather than on improvements to freeways and roadways. The decision to focus so much attention on freeway upgrades was pre-determined by the planners' view that the only solution to increased congestion is to build more freeways. The planners exhibit this view when they explain that "the projections for 2030 indicate that vehicle miles will increase faster than population and employment, mostly due to longer trips or commutes. In short, freeway capacity must grow to meet future freeway travel demand." (DPEIR at 2-5) This conclusion ignores the obvious alternative viewpoint: some of the increased travel demand might be more properly diverted to mass transit solutions, as opposed to simply concluding that increased freeway capacity is the only solution. Based on a review of the Plan "objectives" to increase mobility, protect transportation resources and enhance the quality of life (see DPEIR at 2-3), other types of alternatives – alternatives that examine variable mixes of modes of transportation as opposed to just variable mixes of dollars – that still met the objectives of planners could have been considered.

Given that the impacts on the environment from the proposed Plan are projected to be significant, such alternatives should have been considered. One of the purposes of the discussion of alternatives in an EIR is to diminish or avoid adverse environmental effects. (*See Laurel Heights Improvement Ass'n v. Regents of Univ. of Cal.* (1988) 47 Cal.3d 376, 403 [discussion of only three alternatives, where planners claimed they had already ruled out other alternatives as infeasible, was inadequate]; Pub. Res. Code § 21002 [EIR should consider alternatives which would substantially lessen the significant environmental effects].)

C. The DPEIR Does Not Contain Adequate Discussion of Biological Resource Impacts.

The DPEIR does not quantify the biological resource impacts that it recognizes will be more significant under the proposed Plan than under the No Project alternative. (See DPEIR at 5-6 through 5-7.) Additional detail on the magnitude of direct impacts of the project must be provided for the Proposed Project and all project alternatives. All of the proposed alternatives and the proposed Plan contain lists of the projects they include. The Program EIR should make an attempt to quantify the impacts. Instead, the DPEIR puts off the analysis of the biological resource impacts of all the projects until the EIR for the individual project is prepared. (*See* DPEIR at 4.2-22.) It is impossible to analyze the difference between alternatives on this subject, when the impacts have not been described.

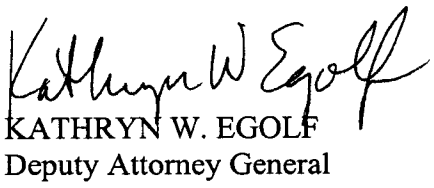
D. The Plan And DPEIR Should Include Plans For Improving Air Quality And Reducing Greenhouse Gas Emissions In Its Discussion Of "Environmental Programs."

The only "environmental program" contemplated under the Plan is a program for augmenting urban runoff treatment and mitigation to create a "coordinated high-quality urban runoff program." (DPEIR at 2-11.) As discussed in detail above, the impacts of the Plan on greenhouse gas emissions and the cumulative impacts of those emissions on climate change, warrant close examination in this DPEIR. Likewise, a plan like this one which places so much of its emphasis for transportation planning and spending on automobile and truck travel versus mass transit will likely result in greater emissions of criteria pollutants and toxic air contaminants than would an alternative that focuses on improving mass transit and *reducing* vehicular miles traveled. Given these considerations, the state of air quality in the South Coast air basin and the severe impacts climate change can inflict on the citizens of Orange County, it would be a responsible and reasonable planning measure to include some "environmental program" aimed at reducing the air quality and climate impacts of the proposed Plan. As mentioned in above, there are some easily implemented steps that might be considered, such as the purchase of mitigation credits. There are also programs that might encourage greater use of alternative technologies and fuels (e.g., electric and hybrid vehicles) or that might add incentives for increased use of public transit (enhanced employer managed discount programs that reward use of transit when compared with parking costs) that could be explored. This long term plan is an opportunity for OCTA to take a truly "visionary" role in shaping the transportation *and* environmental landscape of Orange County for the next quarter century. We hope that the opportunity will not be missed.

V. Conclusion

If you or your staff have questions regarding these comments, please contact me at 213-897-0628.

Sincerely,

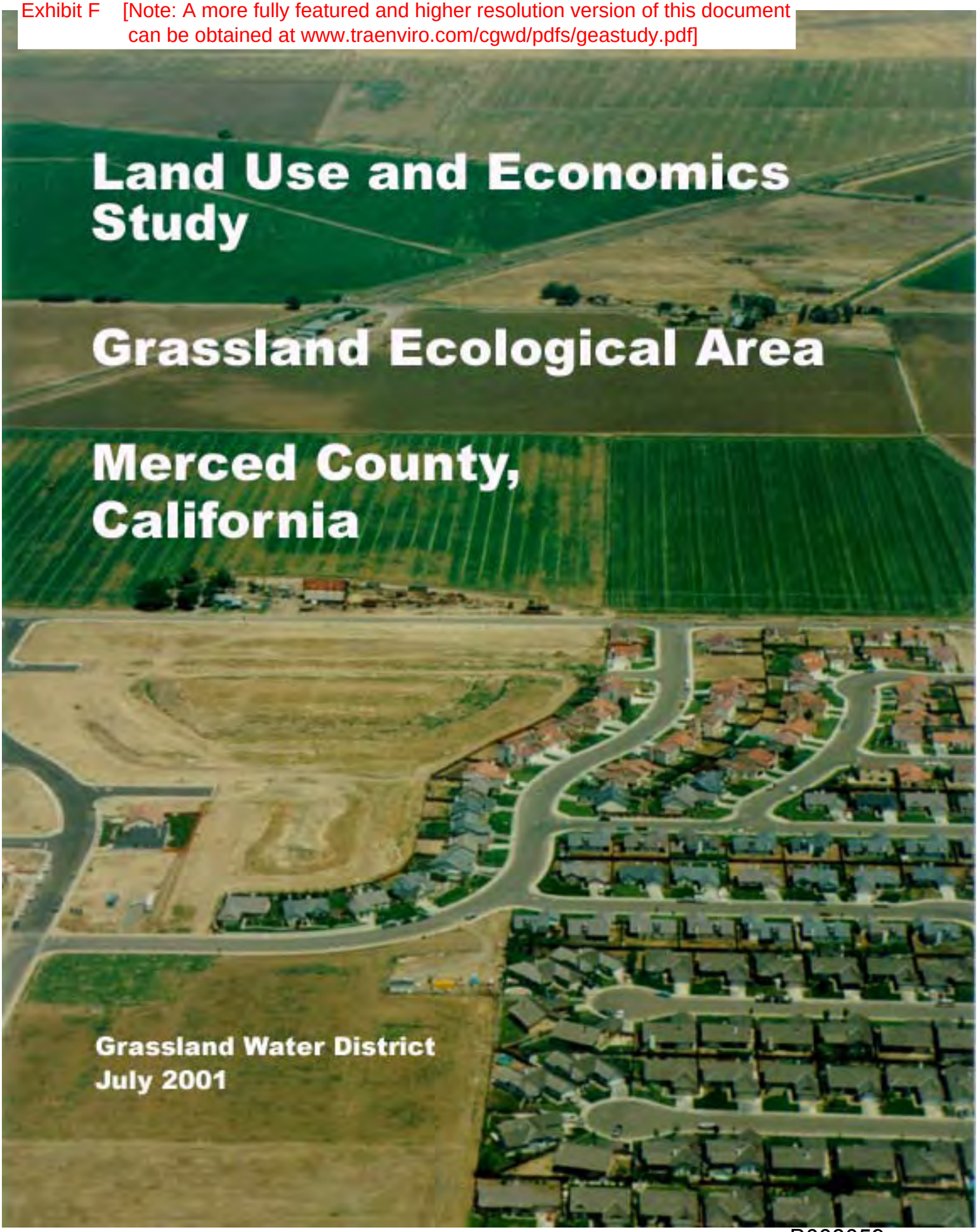


KATHRYN W. EGOLF
Deputy Attorney General

For BILL LOCKYER
Attorney General

bcc: Theodora Berger
Mary Hackenbracht
Ken Alex
Susan Durbin
Ellen Peter

Exhibit F [Note: A more fully featured and higher resolution version of this document can be obtained at www.traenviro.com/cgwd/pdfs/geastudy.pdf]



Land Use and Economics Study

Grassland Ecological Area

Merced County, California

Grassland Water District
July 2001

LAND USE AND ECONOMICS STUDY

GRASSLAND ECOLOGICAL AREA
MERCED COUNTY, CALIFORNIA

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LAND USE AND ECONOMICS STUDY
GRASSLAND ECOLOGICAL AREA/
MERCED COUNTY, CALIFORNIA

Economics of Merced County Wetlands and the Impact of Urban Growth

SUMMARY

Wetlands and wildlife habitat have more economic value than most people realize. These lands contribute to the local and regional economy through direct expenditures by public and private entities for habitat management and enhancement and by the money spent for recreation of all types in the resource areas. These areas are worthy of protection for more than just their ecological values. Protection from encroachment of non-compatible uses is most important when the wetlands are embedded in a rapidly growing region such as the Central Valley of California.

This Land Use and Economics Study, jointly funded by the Grassland Water District, the Packard Foundation and the Great Valley Center, may be the first of its kind to provide a comprehensive picture of the economic values of wetlands in the County, and their impact on the local economy. These non-urban land uses produce a net economic benefit to the local economy whereas urban development, particularly sprawl type residential development, produces a net economic loss to local government. The reason is that it costs local government more to provide public infrastructure (water supply, sewer, roads, storm drains, schools) and services (police, fire, mosquito abatement, other local services) than the revenue a city and/or county receive from the residential development. Wildlife habitat and agriculture contribute to the local economy but require very little in the way of urban services.

The wildlife habitat resource areas of Merced County include the Grassland Ecological Area (GEA) of about 178,000 acres which includes two federal wildlife refuges, three state wildlife areas and a large number of private duck clubs. In addition, wildlife habitat resource areas in the County include another 23,000 acres of state wildlife areas and 33,400 acres of state parks and recreation areas.

Waterfowl are central to private recreation in the Grasslands.

The typical total annual value of habitat maintenance and land acquisitions in the Grasslands is $16.4 million and the value of expenditures related to recreation in the Grasslands is about $11.4 million per year. With a multiplier of 1.41 to account for induced jobs and spending by other providing services to the wetlands users and managers, the total $27.7 million spent on the wetlands contributes $41 million per year to the local economy, and accounts for about 800 jobs. In Merced County as a whole, habitat management and wildlife-associated recreation contributes $53.4 million to the county's economy and accounts for about 1100 jobs.

The productive economy of the wetlands is threatened by burgeoning population growth. There is an inevitable conflict between urban growth and protection of open space and

agricultural values. Growth introduces more roads, motor vehicles, houses, noise, urban pets, pests, vandalism, litter and the like into the pristine wetland environment. California Department of Finance projections show a growth in the total Merced County population from 198,000 to about 620,000 people by the year 2040. The number of urban acres is expected to increase from about 50,000 to as many as 94,000 to accommodate this population growth as well as the associated commercial and industrial development within the cities. The Merced Case Study looked at two growth scenarios: conventional or "sprawl" growth at a density of 5.5 persons per acre (2.2 dwelling units (DU) per gross acre)[1] and a more compact scenario of 10.7 persons per gross acre (4.3 DU per gross acre) and 10% of the residential and job growth as infill rather than annexation of lands around cities.

Water supply is a key part of the infrastructure needed to maintain habitat value in the wetlands.

The economic impact on the wetlands of this explosive growth is difficult to predict. The amount of urban land in a two-mile band around the wetlands complex is expected to increase by a factor of 3 to 6 by 2040, depending upon whether growth is compact or conventional. Broadly, if non-compatible urban development encroaches on the wetlands so as to reduce its utilization by wildlife, then recreational usage could be expected to decline, and public funds for habitat management may be more difficult to obtain. The impact will depend on how closely this growth encroaches on the boundaries of the refuges, or whether it, as in the case of Los Banos, divides the North from the South Grasslands.

The cities of Merced, Los Banos, Gustine and Dos Palos have planning spheres of influence affecting the GEA. Growth in unincorporated areas of the county such as Volta could also adversely affect the wildlife refuge areas. Because of its size and location, Los Banos presents the greatest challenge; the city boundary and its sphere include the GEA and its two-mile band. The current Los Banos General Plan restricts growth on the eastern end of the city to protect the wetlands, and the city has the opportunity to place important lands in open space and recreation uses.

This study also addresses growth in Merced County in relation to impact on the agricultural economy. The analysis of agricultural impact of sprawl vs. compact growth follows the same methodology as the 1995 American Farmland Trust study: *Alternatives for Future Urban Growth in California's Central Valley: The Bottom Line for Agriculture and Taxpayers.*

Agriculture is generally compatible as a buffer to the wetlands.

The total value of agricultural production in Merced County in 1998 was $1.45 billion

[1] Gross acreage includes streets, public facilities, commercial and industrial land uses.

($2.11 billion with the economic multiplier applied) from 966,200 acres of field crops, 57,400 acres of vegetable and seed crops and 115,900 acres of fruit and nut crops. Within the GEA the approximately 50,000 acres of agricultural lands and 128,700 acres of range and wetlands had an economic value in 1998 of $114 million ($160 million with the economic multiplier effect). Thus the GEA accounts for 5.3% of the total agricultural production in the County.

Two tables summarize the economic impact of the various land uses and growth types in this study. Table S1 gives the economic picture today of the economic impact of land uses on local government. In Table S-1 net revenue is the *difference* between the total cost of local government to provide services and infrastructure to the various land uses and the revenue that each land use type produces. The revenue/cost ratio is total revenue *divided by* total cost. Net revenue per acre is the net revenue divided by the total number of acres of that land use category. It can be seen from Table S-1 that agriculture and wetlands have a highly positive revenue to cost ratio. That is, for example, agriculture produces $3.42 of revenue to local government for every dollar it costs to serve agriculture. Wetlands produce $1.70 of revenue for every dollar of cost – less than agriculture because their productivity and market value is less, but they demand very little in the way of urban services. In addition, these two land uses produce a modest net revenue per acre.

Table S-1: Economic Impact on Local Government – Existing Revenue vs. Cost by Land Use

	Agriculture	Wetlands	Cities Only	All Urban	County
Revenue ($1000's)	$12,194	$272	$86,125	$279,874	$206,215
Cost ($1000's)	$3,562	$160	$84,274	$289,442	$208,890
Net Revenue	$8,632	$112	$1,851	($9,568)	($2,675)
Revenue/Cost Ratio	3.42	1.70	1.02	0.97	0.99
Area (ac)	1,162,000	129,000	22,875	50,130	1,162,000
Population			125,232	198,522	198,522
Net Revenue per capita			$14.78	($48.20)	($13.47)
Net Revenue per acre	$7.43	$0.87	$80.92	($190.86)	($2.30)

Source: Appendix 2 Summary Table C, Tables 4E, 4F.

In contrast, all types of urban development are a "break even" proposition or are negative. Considering the cities only (city population and city-provided urban services) the revenue/cost ratio is very slightly positive. Also, within the cities only there appears to be a net revenue per acre of about $81. However, this is misleading because the cities populations also utilize many services provided only by the County such as District Attorney, assessor, courts and judicial services, elections etc. Looking at the entire County urban population, there is already a large net deficit in the cost per acre to provide services to its urban population – the County and cities spend $190.86 more per acre to serve their urban population than they get back in revenue. It is more expensive and inefficient to serve this far flung scattered population compared to the more concentrated population in cities.

In Table S2 net revenue per urban acre is the net revenue divided by the total number of acres that are urban under each scenario. When one now considers the effect of the two growth scenarios on local government economics, Table S2 depicts the following: at present there is a small net deficit to local governments (cities and County together) to provide infrastructure and urban services to the urban population. This impact is negative (a deficit) whether one considers the cost per capita (population) or the cost per urban acre.

Table S2: Economic Impact on Local Government
– Effect of Growth to 2040 on Revenue vs. Cost

	Existing	2040 "Sprawl"	2040 "Compact"
Revenue ($1000's)	$292,340	$942,360	$943,272
Cost ($1000's)	$293,164	$1,005,015	$943,988
Net Revenue	($824)	($62,655)	($716)
Revenue/Cost Ratio	1.00	0.94	1.00
Urban Area (ac)	50,130	144,325	97,228
Population	198,522	620,457	620,457
Net Revenue per capita	($4.15)	($100.98)	($1.15)
Net Revenue per urban acre	($16.44)	($434.12)	($7.36)

Source: Appendix 2 Summary Table D, Tables 4E, 4F.

Under the sprawl growth scenario for year 2040, the present $16.44 deficit per acre grows to $434.12. With the same population accommodated with compact growth, the deficit shrinks to $7.36 per acre. The sprawl scenario shows that continued growth at the current average density per gross urbanized acre is so inefficient that unless revenues (fees and taxes) are raised substantially, local governments will fall farther behind in their ability to provide capital improvements and services.

The improvement (from -$16.44 per acre to -$7.36 per acre) under the compact growth scenario shows that marked effect that even a modest effort at making growth more compact would have in reducing the costs of infrastructure (e.g. roads, sewer, water, storm drainage). Even with the tripling in population under either growth scenario, serving the new population at increased compact densities is so much more efficient than serving the present population that the overall cost to serve each person or each dwelling unit (or acre) drops. Note that even under the compact scenario as depicted in this study, the net impact of the growth on local government is still negative (a net loss).

Sprawl growth would also consume twice as much land over the 44 year period. The difference in net revenue between the sprawl and compact scenarios is also related to: (1) the saving of 47,000 acres of farm land under the compact compared to sprawl scenario and (2) the fact that this land remaining in production continues to produce revenues for the County of some $115 million per year.

Compact growth makes more than economic sense: keeping more of the land surrounding the wetlands complex in some kind of agricultural use helps to preserve both the economic viability of agriculture in the County and its value in protecting the wetlands from the effects of urban encroachment. Preserving wetlands as a land use includes guarantee of an adequate supply of inexpensive water of sufficient quality, protection of a one to two mile buffer around the "core" area with only compatible uses (agriculture, open space uses), more land in permanent protection in easement or fee, and continuation of seasonal land use diversification. Protection would also be enhanced by a greater level of public expenditure for wetlands, including in lieu fees paid to local governments for their loss of property taxes. Private landowners could also make greater use of other federal sources of money such as the USDA Wetland Reserve and Conservation Reserve Program or endangered species funds.

Expenditures for water delivery and improvements are a major part of public and private investments in the wetlands.

This analysis has confirmed that for Merced County, agriculture has a net positive economic impact on local government and generates over $2 billion per year in county economic productivity. Likewise, in contrast to the common view of wetlands as an economic "wasteland" suitable only as habitat for ducks, this study shows that wetlands too have a net positive economic impact on local governments and represent important public and private investment and local economic activity.

The substantial economic values of non-urban uses emphasize the importance of their long-term protection in future land use planning decisions. This study focuses on Merced County, California, but its results are clearly applicable to most of California's Central Valley and to other regions where the balance of urban, agricultural, and natural resource land uses is undergoing rapid change. Regional planning often considers the quality of life contribution of agricultural and natural open space; this study shows that planning also needs to provide for the integrity and long term viability of agriculture and natural resources as components of our economy.

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LAND USE AND ECONOMICS STUDY
GRASSLAND ECOLOGICAL AREA/
MERCED COUNTY, CALIFORNIA

Economics of Merced County Wetlands and the Impact of Urban Growth

I. Purpose

The purpose of the Land Use and Economic Study of Merced County is five-fold:

- Provide specific tools for local government and citizens to use in directing the course of future local land use planning
- Estimate current economic values of wetland habitat and agriculture in Merced County as contributors to the local economy
- Show that wetlands and agriculture have substantial demonstrable direct economic value to the local economy and deserve to be better protected in future land use planning decisions
- Offer a model for other Central Valley counties to use for protecting their open space and agricultural resource areas from urban encroachment
- Reinforce other studies which have shown the positive economic impact of compact growth compared to sprawl growth

II. Report Organization

The main text describes the study methodology, results, conclusions and recommendations. The main text contains tables listed as "Text Table 1 through "n" and refers to Figures 1 through 8 which are included in Appendix 1. Appendix 1 also includes the tables relating to wetland expenditures and recreational use and expenditures in Merced County. Appendix 2 is the analysis of population, land use, existing costs and revenues to local government (cities, counties) in Merced County, and the fiscal analysis of two growth scenarios to the year 2040: conventional "sprawl" growth vs. compact growth. Appendix 2 is intended to be a *self-standing document*, but portions of the analysis are also included in the analysis in the main text of the report.

III. Background of the Current Study

A. Existing Land Use and Resources of Merced County

Merced County, located in the central portion of the Great Valley of California, encompasses 1.262 million acres. (See Figure 1) The 1998 land use distribution in Merced County is as follows:

Text Table 1

Distribution of Land Uses in Merced County (1996) (See Also Figure 1)

Land Use	***Acres***
Agriculture	1,162,008
Grassland Ecological Area (GEA)	179,464*
Developed area – incorporated	22,875
Developed area – unincorporated	27,255

* Includes 49,799 acres of agriculture out of the 1,162,00

The total value of **agricultural production** in Merced County in 1998 was $1.45 billion ($2.11 billion with the economic multiplier applied) from 966,200 acres of field crops, 57,400 acres of vegetable and seed crops and 115,900 acres of fruit and nut crops. Within the GEA the approximately 50,000 acres of agricultural lands and 128,700 acres of range and wetlands had an economic value in 1998 of $90.8 million ($126 million with the economic multiplier effect). Thus the GEA accounts for 6% of the total agricultural production in the County. (See also Appendix 2, Table 2A).

About 46% (22,875 acres) of the urbanized area (50,069 acres) of Merced County is in its six cities. (See Figure 1 and Appendix 2, Table 1). The remainder is scattered throughout the rural areas around the cities, and in rural communities such as Volta and Santa Nella. There is a higher density of development near the boundaries of cities. For this study we have defined a two-mile ring or "doughnut" around each city as a way of project where a major portion of the growth in the next 40 years is likely to go. Merced, the county seat and largest city accounts for about half of the urbanized area in cities. The remaining cities, in decreasing order of size and population are: Los Banos, Atwater, Livingston, Dos Palos and Gustine. Merced, Atwater and Livingston are in the Highway 99 transportation corridor, Gustine is on the I-5 corridor and Los Banos is on S.R. 152.

B. Grassland Ecological Area (GEA)

The **Grassland Ecological Area (GEA)** is the largest wetland complex in California. The GEA boundary is a non-jurisdictional boundary established by the U.S. Fish and Wildlife Service for the purpose of designating an area in which public easements for wetland conservation were to be purchased. Its land use distribution, as shown in Appendix 2, Table 5 includes the following land uses: wetlands/rangeland -- 128,674 acres, agriculture 49,799 acres, urban development 771 acres, and other miscellaneous 220 acres. About 110,000 acres are privately owned by about 160 hunting clubs. Approximately 51,000 acres are in public ownership in federal wildlife refuge, state wildlife areas and state park (see Figure 4 and Text Tables 2 and 3 below). The area of year-round and seasonal wetlands, riparian corridors and native grasslands provides habitat for more than 550 species of plants and animals, including 47 species that have been federally listed as threatened, endangered or sensitive (GWD, 1997). Over a million waterfowl regularly are found in the GEA during the winter months. (See Figure 3). **For the purpose of this study we have termed the GEA the "focus area", and the County as a whole the "study area".**

1. Federal Refuges

The **San Luis National Wildlife Refuge** comprises 26,074 acres of permanent and seasonal marshes, wooded sloughs and grasslands. This refuge includes the Kesterson, Freitas, Blue Goose, West and East Bear Creek Units and the San Luis Unit (see Figure 2). Migratory waterfowl feed and rest on the seasonal marshes which are flooded in fall, winter and spring. The sloughs and channels of the San Joaquin River provide songbird and wading bird habitat, while the uplands include remnant native grasslands which are habitat for raptors.

The **Merced National Wildlife Refuge** comprises 7,034 acres of marshes, uplands and farmed fields planted with small grain and corn and pasture grasslands. Collectively, these lands provide an abundance of food for waterfowl, cranes and shorebirds..

2. State Wildlife Areas

California State wildlife areas and their acreages are listed below. (See Figure 2). State wildlife areas that are part of the GEA are shown in *italics.*

Text Table 2
State Wildlife Areas

State Wildlife Area Name	***Acreage***
North Grasslands Wildlife Area (WA)*	6,335
Volta Wildlife Area	3,000
Los Banos WA	6,130
Upper and Lower Cottonwood Creek WA	6,000
San Luis Reservoir WA	900
O'Neill Forebay WA	700
Total acres in State Wildlife Areas	23,065

* Includes Gadwall, Salt Slough and China Island wildlife areas (a small portion of the latter is in Stanislaus County)

North Grasslands Wildlife Area* - This Wildlife Area is composed of 6,335 acres of permanent and seasonal marshes, riparian corridors, shrublands, and grasslands. The area provides habitat for almost 200 species of birds and many species of mammals, reptiles, amphibians, and fish.

Volta Wildlife Area - This Wildlife Area is composed of 3,300 acres of permanent and seasonal marshes, shrublands, and grasslands. Most of the 2,800 acres of emergent marsh are open for hunting in season, bird watching and fishing. The area provides habitat for almost 150 species of birds and many species of mammals, reptiles, amphibians, and fish, including the state-threatened Giant Garter Snake.

Los Banos Wildlife Area - This Wildlife Area is composed of 6,130 acres of permanent and seasonal marshes, riparian corridors, shrublands, and grasslands. The wildlife area includes the

Los Banos and Mud Slough units. The area provides habitat for almost 200 species of birds and many species of mammals, reptiles, amphibians, and fish.

Upper and Lower Cottonwood Creek WA – Upper Cottonwood Creek is a 4,000 acre wildlife area, located on the coastal mountains of western Merced County. The area is steep and rugged with deep gullies and canyon hillsides. The area contains grasslands, with some oak trees and scrub vegetation. Elevations range from a high of 2,001 feet to 600 feet at the low point. Lower Cottonwood Creek WA (2000 acres) has different topography The hills are grass covered with very few trees or brush clusters and are much more gentle and rolling than the upper unit. Elevation varies from a low of 300 feet to a high of 1,078 feet.

San Luis Reservoir Wildlife Area – This Wildlife Area is a 1,083 acre blue oak woodland in the foothills of western Merced County. The area is fairly steep with east facing hillsides. Elevations range from 600 feet to 1,490 feet. The majority of the landscape is annual grassland savannah with scattered blue oaks and interior live oaks. Sycamore riparian areas line the creeks leading into the reservoir. Lush corridors of California bay and poison oak are found along the southern border.

O'Neill Forebay WA – When this 700 acre area was established over twenty years ago, thousands of cottonwood and willow trees were planted, as well as wild rose and blackberry bushes. They have grown into maturity, providing habitat, food and cover for many species of upland and non-game wildlife. In addition to the shrubs and trees, cereal grains are planted each year to benefit upland game. Discing is also done yearly to enhance turkey mullein which is a favorite with dove.

3. State Parks and Recreation Areas

The State Parks and Recreation Areas in Merced County are as listed below.

Text Table 3
State Park and Recreation Area Acreages

State Park or Recreation Area	***Acres***
San Luis Reservoir (including Los Banos Creek)	23,551*
Grasslands State Park (in GEA)	*2,826*
Pacheco State Park	6,880*
McConnell State Recreation Area	74
George J. Hatfield SRA	46.5
Total acres in State Parks and Recreation Areas	33,378

* Only a portion of these areas is in Merced County. The total acreage of State Parks and Recreation Areas in Merced County is about 2/3 of the 33,378 (22,263 acres)

C. 1995 Land Planning Guidance Study

The 1995 *Land Planning Guidance Study* prepared for the Grassland Water District addressed both immediate, critical threats and long-term threats to habitat in the wetland ecosystems of the Grasslands Management Area. The immediate threats would be brought about through the urban expansion of the City of Los Banos, especially in the easterly direction. The longer term threats were related to the ultimate expansion of Los Banos and the other cities in Merced County that would bring urban development to within one mile or closer of the boundary of the resource conservation area.

The study addressed the concept of a buffer or band of appropriate land uses around the GEA. It examined the effect of a range of buffer widths in protecting the interior of the resource area from encroachment. The recommended actions to avoid fragmentation and impacts to the wildlife corridor area between the North and South Grasslands included:

- Restriction of land uses incompatible with habitat to an area geographically west of the Santa Fe Grade
- A minimum 200-foot wide buffer strip of agricultural land separating any waterways from the nearest road or urbanization
- An impenetrable barrier over several tens of feet close to habitat

Compact Growth Alternative

The study specifically requested the City of Los Banos to consider a compact growth alternative to its conventional General Plan. The new General Plan proposed to designate as urban a total of over 10,000 acres for urban development, of which only about 2,100 acres were actually developed in 1992. The study showed that there was enough vacant land within the existing city limit of Los Banos to accommodate 45 years of growth at historic rates and more than double the 1992 population There was also appropriately zoned vacant land within the existing city limit sufficient to accommodate an additional 8 million square feet of commercial and industrial development.

D. 1995 American Farmland Trust (AFT) economics study

The AFT study was titled *Alternatives for Future Urban Growth in California's Central Valley: The Bottom Line for Agriculture and Taxpayers.*[1] The purpose of the study was to compare the land use and economic impacts of two alternative growth scenarios for the Central Valley of California: conventional "sprawl" growth versus compact growth. The study looked at eleven counties from Kern in the south to Sacramento and Sutter in the north. The two scenarios assumed the same amount of growth would occur between 1995 and 2040 – the study's planning horizon -- a tripling of the 1995 population. The difference was in the distribution of the growth: 3 units per acre which approximates the existing average urban density of the Valley versus 6 units to the acre, which was "intended to represent a relatively conservative, realistically achievable goal for new development in the valley". In addition, the compact scenario assumed that 10 percent of the new population would be accommodated as urban infill.

[1] David Strong of Strong Associates, who prepared the economic analysis of urban growth and its effect on agriculture and wetlands for this study, was a principal author on the 1995 AFT study.

The study defined a "Zone of Conflict" around urbanizing areas within which "urbanization can be assumed to alter agricultural investment, crop patterns and ownership, slowly changing in anticipation of further urbanization." In the zone of conflict agriculture would not have a long term future and its economic value would be diminished. The zone of conflict was defined to extend only out to one-third of a mile from the agriculture/urban boundary or interface.

The study found the following differences between the sprawl and compact growth scenarios:

Text Table 4
Results of American Farmland Trust 1995 Study

	Lower Density "Sprawl"		***Compact Growth***	
	11 County	*Merced Co.*	*11 County*	*Merced Co.*
Acres of Farmland Lost				
Prime and Important	613,669	38,858	265,937	16,090
Other	421,808	16,540	208,433	8,657
Total	1,035,477	55,398	474,370	24,747
Zone of Conflict Around Urban Areas				
Acres	2,537,490	112,610	1,585,870	92,876
Dollar value of productivity lost	$2,537,490	$112,610	$1,575,870	$92,876
Reduction of Agricultural Sales (1993 dollars)	$5,266,000,000	$267,000,000	$2,448,000,000	$145,000,000
Net revenue (cost) to local government providing urban services	($985,000,000)	($39,000,000)	$217,000,000	$18,000,000

The study showed that sprawl growth would have a far greater impact on the loss of agricultural lands and productivity. In addition, the study showed that in each of the eleven counties, sprawl growth would cause a substantial net loss to local government in that the cost to provide urban services was far in excess of the additional revenue the growth would produce.

E. Study Methodology

1. Estimate the current economic values accruing to the wetlands of Merced County

Unlike other studies of wetland economics[2] this study looks only at actual expenditures related to wetlands and other public open space (state parks and recreation areas). Prior studies attributed an economic value to a whole host of other functions that wetlands have that are not usually expressed in direct economic terms – for example, toxics filtration, flood protection, erosion and sediment control, endangered species habitat and people's willingness to pay to preserve wildlife habitat. In terms of assessing the overall scope of the values wetlands have, these are valid methods of valuing wetlands. The values attributed to wetlands in these studies are mostly "avoided" costs – that is, the cost of a removing pollutants from water in an industrial water treatment plant, the cost of building a flood control dam, or the costs of repairing flood damage, the cost of dredging shipping channels clogged with silt etc. (See Allen et al. (1992), Loomis et al. (1990)).

The avoided cost methodology has merit if one wants to assign a comprehensive or "global" value to wetlands. However, the key point is that if costs, such as federal government expenditures are avoided somewhere, such as in Merced County, then the funds they represent may be available to be spent elsewhere, for example to build a flood control dam in another state, and not in Merced County. The avoided costs are not likely to show up directly stimulating the economy of Merced County. Therefore, in this study we purposely limit the values attributable to wetlands to *actual expenditures* "on the books" that show up in for example, the California Department of Fish and Game budget or the State Board of Equalization records for sales taxes. We are trying to encompass **all actual expenditures** on wetlands, as listed below. The total thus represents a *lower limit* on the value of wetlands, without considering any avoided costs. This methodology also provides a baseline comparable to other traditional economic analyses.

This case study looks at economic activity for agriculture and wetlands which can be traced to real budgets of agencies or the private sector. Economic activity for agriculture includes direct sales (agricultural product value) and jobs. Economic activity for wetlands includes two categories of expenditures: expenditures related to land, and expenditures related to recreational use. The number of jobs supported by these expenditures is estimated.

Expenditures related to land:

- infrastructure
- operation and maintenance
- consulting
- equipment mobilization
- levee repair
- canal cleaning
- water control structure, pipe and pump replacement
- flooding and irrigation
- vegetation management (mowing, herbicide spraying, discing, seeding, irrigation)

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[2] For example, Allen et, al. "The Value of California Wetlands – An Analysis of their Economic Benefits", a 1992 study prepared by the Campaign to Save California Wetlands

- land acquisition (purchase of conservation easements)
- wages of employees related to land management
- landowner expenditures

Expenditures related to recreation:

- transportation
- food
- supplies (equipment/auxiliary/retail)
- services

For each category of expenditures there is an economic multiplier which shows the effect of spending the money – that is the expenditure of funds generates demand for more goods and services in the community or the region where the money is spent. For example, if a hunter or fisherman purchases supplies from a local supermarket, the employees of that supermarket are supported and they in turn have more money to spend locally on their own purchases. The estimates of the number of jobs directly supported by the expenditures and the economic multiplier effect (sales and jobs) uses the widely accepted economic model for agriculture and open space developed by Dr. Charles Goldman of the UC Cooperative Agricultural Extension Service.[3]

The expenditures are broken down into the categories as shown in Appendix 2 Table 5C – Wetland Sales and Jobs – 1998.

This study compiles economic information on all of the components of wetlands and agriculture. The study looks at expenditures, revenues and contributions of taxes or other fees to the government of Merced County and its cities. Tax revenues include property taxes for private property and in lieu taxes paid by public agencies (California Department of Fish and Game and the US Fish and Wildlife Service) to the County. The study considers the sources of revenue to the entities which spend money for habitat management including public and private investment and water wheeling and delivery charges.

2. Provide an estimate of the economic value of agriculture in Merced County

This study uses geographic data base information from the Merced County Data Services to delineate the extent of each type of agriculture now practiced in Merced County and assigns values to the agricultural production based on current data from the County Agricultural

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[3]George Goldman uses the IMPLAN system for creating regional input-output models. IMPLAN (IMpact of PLANning) is a system for IBM compatible computers of algorithms and data which allows the user to construct, with no additional data requirements, Leontief input-output models for any county (parish, borough, township), region or state in the United States. There are 521 sectors in the U.S. model, closely corresponding to the sectors in the Department of Commerce input-output model for the United States, and roughly corresponding to 3 or 4 digit level SIC code. The 1996 model for the state of California has 516 of these 528 sectors.

IMPLAN was originally started in the late 1970's by economists in the Fort Collins office of the U.S. Forest Service to meet the economic impact requirements of the Forest Service plans. It was originally on the Forest Service computer in Fort Collins and was accessible only by modem. In the mid-1980s, a version for IBM compatible personal computers was designed. The IMPLAN system was turned over to the University of Minnesota to run and in 1993 IMPLAN was privatized. It is now run by the Minnesota IMPLAN Group (MIG) in Minneapolis and this group is now responsible for the data requirements of the system. MIG has a WEB page supplying information.

Commissioner's office. See Appendix 2, Tables 2 and 5B for detail on calculation of agricultural productivity values.

3. Compare the economic impacts of two growth scenarios on wildlands and agriculture: compact urban growth vs. sprawl growth

In a manner similar to the 1995 AFT study, this study compares the impact of sprawl growth and compact growth on the local economy in terms of:

1. Loss of agricultural land (acres)
2. Loss of agricultural revenue
3. Increased urbanization in a two-mile zone of conflict around the GEA
4. Increased urbanization in a two-mile zone around existing cities and its impact on agriculture

The study compares the economic impacts of the growth anticipated between the test year (1998) and the year 2040. The end year was picked to be the same as that in the 1995 AFT study.

4. Suggest concrete measures that can be used to more permanently protect agriculture and open space resources.

The study provides lists of concrete suggestions to enhance the long-term or permanent protection of agricultural lands and wetlands areas, as well as numerous strategies from other studies to encourage compact growth through infill and more efficient land use in built-up areas (Appendix 3)

IV. Wetlands Resources Economic Values

A. Description of geographic area and resources for which economic data apply

The geographic areas to which the economic values apply are shown in Figures 1 through 3 and are listed in Text Tables 2 and 3 and the tables in Appendices 1 and 2. These areas include the federal wildlife refuges, state wildlife areas, state recreation areas, state parks, and private duck clubs and other wetlands. Figure 4 of Appendix 1 shows land status in the GEA by management entity and corresponds to Summary Table 1 of Appendix 1.

B. Expenditures for wildlife management, habitat enhancement and restoration (federal, state and private)

Expenditures for are generally reported for the period 1990 through 1999, or some portion thereof. Not all entities reported data for the entire period so there are gaps. The overall organization of the data presented in Appendix 1 is:

<u>Expenditures for Habitat Management and Acquisition, Agency Operations and Management</u> (one summary table and 12 supporting tables). The **summary table (Summary Table S-1)** shows all expenditures for habitat management by all agencies and sponsors for the years each entity reported. The table shows the acreage to which these expenditures applied and the annual

cost per acre per year for public and for all (public and private) expenditures. The data in the summary table are derived from each of the supporting tables.

Expenditures for Recreational Use (two Summary Tables and three supporting tables). The Summary Tables (**Summary Table R-1** is a summary of the users to public and private wetlands in the GEA and the rest of Merced County. **Summary Table R-2** is a summary of expenditures for hunting/fishing and wildlife watching in the GEA and all of Merced County (for the year 1996/97).

Entities which spend money in the GEA include the following:

Text Table 5
Merced County Wetlands Land Management and Expenditure Categories

Entity	***Lands Managed***	***Categories of Expenditures***
PRIVATE		
Private landowners and duck clubs	Miscellaneous throughout GEA (see Figures 2 and 3, Appendix 1)	Mowing, discing, irrigation, spraying weeds, plant watergrass, grazing, burning
Ducks Unlimited	Private duck clubs Public lands (through partnership agreements)	Habitat enhancement Habitat restoration water conveyance infrastructure flood relief monitoring and evaluation
California Waterfowl Association	Private lands	Habitat enhancement programs, advisory programs and direct habitat services Water conveyance infrastructure
PUBLIC/PRIVATE PARTNERSHIP		
USFWS Partners for Wildlife Program	Private ranches, duck clubs	Habitat enhancement Habitat restoration Water conveyance and drainage structures Silt removal Levees and other flood control structures Administration and engineering
PUBLIC		
USFWS	Federal refuges Private lands through partnerships	Habitat enhancement Habitat restoration

Entity	***Lands Managed***	***Categories of Expenditures***
Natural Resources Conservation Service		Agricultural Conservation Program Waterbank program Wetland reserve program Permanent easements 30-year easements
CDFG	State wildlife areas	Habitat restoration (Presley program), endangered species, research
California Wildlife Conservation Board	State Wildlife Areas Private lands (Partners for Wildlife)	Public access, water conveyance system, soil samples, planning, wetland restoration, educational center, administration and engineering
CWCB Inland Wetlands Conservation Program		Easement acquisitions Restoration projects Administration and engineering
Grassland Water District (GWD)	Public and private lands in the GEA	Water conveyance system installation and repair Water delivery Levee repair Silt removal Vegetation management Consulting, administration and engineering Education

Source: GWD and agencies listed in table.

C. Conservation Easements (NRCS-FWS, CDFG)

A conservation easement is the transfer of a partial interest in a property from a private landowner to the government or a private non-profit entity such as a land trust. The conservation easement restricts the landowner's right to use the property so that it cannot be developed. The landowner is still permitted certain other uses, such as grazing, which are compatible with the biological or open space values the purchaser of the easement is seeking to protect. The donation (as opposed to sale) of a conservation easement can have tax benefits to the donor (e.g. the difference in value between the fair market value of the land and the value diminished by the easement is considered a charitable donation). In addition, property taxes are reduced according to the reduction in fair market value. Conservation easements are granted in perpetuity, so that the conservation easement transfers with the property each time it is sold.

The entities which have purchased conservation easements in the GEA include the NRCS, the California Wildlife Conservation Board, California Department of Fish and Game, Ducks Unlimited, and the US Fish and Wildlife Service. Supporting Table S12 of Appendix 1 shows the years, acreages and fees paid by these various entities to acquire conservation easements over portions of the GEA. In all, a total of about 64,000 acres have been acquired at a

total cost of $28 million. The average annual expenditure on such easements has been about $2.2 million since 1990.

D. Water conveyance facilities (GWD, local canal companies)

The GWD supplies irrigation water from the U.S. Bureau of Reclamation to a portion of the public and private lands within the 178,000 acres of the GEA. The GWD encompasses about 51,000 acres within the GEA (see Figure 2 of Appendix 1). Depending on the area, the water supplies permanent wetlands, or seasonal (summer or winter) flooded areas. Areas supplied include 5 public refuges and wildlife areas and 159 private duck clubs. The GWD currently maintains 160 structures for water delivery including concrete weirs, metal box weirs, concrete pipe and gates. The GWD has an annual budget of about $1.5 million which includes about $250,000 to $360,000 for structure repair and replacement (capital expenditures), silt removal and channel repair, aquatic weed control and herbicide application. The remaining budget is mainly for staff salaries and related expenses, legal, engineering and professional services related to administration, operations, and depreciation.

Revenue for the GWD comes primarily from three sources: (1) sale of water (2) standby charges applied to owners within the District and (3) conveyance charges. The GWD has a cooperative agreement with the U.S. Bureau of Reclamation (Bu Rec) to transport Central Valley Project Improvement Act (CVPIA) water to the refuges. In addition the Central California Irrigation District (CCID), San Luis Canal Company (SLCC) also transport water to public and private wetlands within the GEA through cooperative agreements with the Bu Rec.

Charges and annual revenues for the three entities providing water to the GEA area as follows:

Text Table 6
Annual Revenues for Water Transported by Public Agencies – Merced Co.

Entity	***Annual Water Supplied (After 2002) (Acre-feet)***	***Charges per Acre-foot***	***Total Revenues***
GWD	35,810	$13.75	$492,388
CCID	163,630	$4.59 - $12.75/acre-foot	$927,327
SLCC	14,000	$14.09	$197,260
Total Water Deliveries	213,440		$1,616,975

Source: Don Marciochi, Grassland Water District.

E. Land valuation, in lieu fees and property taxes

Government agencies are exempt from ordinary taxation. The agencies which have purchased land in fee or conservation easement in the GEA or elsewhere in Merced County may contribute to local government (county and city) revenue through the payment of in-lieu fees or other revenue sharing payments. For example, since 1935 the USFWS has made revenue sharing payments to counties for refuge land under its administration. The most recent revision (1978) of the original Act of Congress that created this revenue sharing provides that (1) Congress is authorized to appropriate funds to make up any shortfall in the revenue sharing fund (2) all lands administered solely or primarily by the USFWS (not just refuges) qualify for revenue sharing (3) payments to units of local government can be used for any governmental purpose. The minimum payment is 75 cents per acre for all purchased and donated land, with no minimum for public domain land. Public domain land pays 25% of net income. Purchased land pays the greatest of 3/4 of 1% of fair market value, 25% of net receipts or 75 cents per acre. FWS areas are reappraised by the Service at least once every five years. For example, in 1998 the FWS paid $92,684 to Merced County on an appraised value of $1.985 million for the San Luis and Merced National Wildlife Refuges (see Summary Table S2).

The California Department of Fish and Game has paid in lieu fees of over $50,000 per year to the County since 1995 for lands in the state wildlife areas.

F. Visitor usage and expenditures (hunting, fishing, non-consumptive recreation) – Data Sources and Methodology

The methodology used to estimate visitor usage and expenditures in the public lands and wetlands of Merced County was to (1) obtain records of actual visitor usage at each of the federal, state and private facilities for the entire county for as many years as possible between 1990 and 1999 and (2) use the US Fish and Wildlife *1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation* to calculate the expenditures related to this visitor usage.

Private duck club usage was estimated from a questionnaire that the GWD mailed to 1362 members of duck clubs in May 1998. From this mailing, 495 forms were returned by June 30, 1998. This questionnaire asked the number of days the member hunted waterfowl during the 1997-98 season in ranges from 0 to 41 or more days. From the data were tallied the total number of user days (28,465) and divided by the number of members (1,362) to give the mean number of user days per member (20.9).

Usage figures for the federal refuges and state wildlife areas were obtained directly from the respective agencies (see Tables Support R1 through Support R3 in Appendix 2, and Figures 6 and 7).

The user figures were converted into expenditures by assuming that expenditures in Merced County were proportional to the number of users (visitor-days) compared to visitor days for fishing, hunting and wildlife-associated recreation throughout California as reported in the National Survey. Wildlife-associated recreation includes bird and other wildlife watching, hiking, dog trials and nature photography. In our analysis, we have termed this "non-consumptive" recreation.

The National Survey is aggregated at a state by state level and does not discriminate visitor use at a smaller subdivision of the states (e.g. counties). However, we used the reasonable
assumption that the usage in Merced County is the proportion of total state usage as reported by the federal, state, and private facilities for Merced County. These facilities have data for usage but not expenditures. However, using the assumption that expenditures are in proportion to user days, we were able to estimate the expenditures for these recreational activities in the County (see Table R2).

Expenditures in the national survey were reported as "trip related" "equipment" and "other". Trip-related expenses include food, lodging and transportation costs. Equipment includes sporting goods equipment, clothing and other supplies related to the sport or activity being pursued. Based on the responses to the GWD questionnaire of duck club members showing that only 11% of the members who hunted in Merced County also lived in Merced County, we attributed 100% of the trip-related expenditures were spent in Merced County but only 15% of the equipment expenditures. In other words, duck club members who live out of the County are assumed to buy their hunting supplies in the county where they live.

The analysis shows that there are over 300,000 visits per year in the GEA for hunting, fishing and non-consumptive wildlife recreation, and almost 550,000 in all of Merced County. The greatest proportion of usage is for non-consumptive recreation (64% of user-days in the GEA and 78% in Merced County as a whole). The expenditure per trip is greatest for hunting ($115) and least for non-consumptive recreation ($37). Based on these usage figures, typical annual expenditures for wildlife-related recreation are about $11.4 million in the GEA and $17.5 million in all of Merced County.

V. Agricultural Resources Economic Values

A. Description and mapping of agricultural resources

The footnote to Table 2B of Appendix 2 estimates the percentage of land around each city in the various crop types, based on interviews with Agricultural Commissioner and Cooperative Extension staff and review of the GIS LU 90 data. Crop types vary substantially from city to city. For example, northeast Los Banos has an estimated 80% of its farmland in low-value hay pasture use, jointly in seasonal wetlands. Atwater and Livingston, on the other hand, both have 55% of their adjoining farmlands in high-value nut production.

B. Current economic values

Text Table 7
Acreage and Value of Agricultural Crops in Merced County (1998)

Crop Type	***Harvested Acreage***	***Total Value of Crops[a]***	***Value per Acre***
Grain, seed, truck and row crops	295,756	$323,583,000; *$479,982,516*	$1,094 *$1,622*
Fruit and nut crops	115,881	$220,815,000; *$329,267,557*	$1,906 *$2,841*
Dairy, other and non-range livestock, poultry, fish farms	19,433	$768,715,000; *$1,094,204,267*	$39,557 *$56,306*
Hay pasture and range	730,938	$136,641,000; *$210,310,895*	$187 *$288*
Total in County	1,162,008	$1,449,754,000	$1,248 *$1,819*
In GEA[b]	88,401	$86,273,530 *$119,738,516*	$976 *$1,354*
In 2 mile band around GEA[c]	157,620	$237,482,090 *$329,336,571*	$1,507 *$2,089*

Sources: Merced County Department of Agriculture. *1999 Annual Report of Agriculture, Merced County* Appendix 2, Table 2A, 5A.

[a] Direct sales value is shown in regular type. Total value with economic multiplier applied is shown in *italic* type.

[b] Does not include value of the wetlands, which is calculated separately.

[c] See column 5 of Table 5A of Appendix 2 (139,659 "as" +17,961 range land/wetlands)

Table 2A of Appendix 2 provides detail on the existing agricultural sales and jobs county-wide. As reported in the County Agricultural Commissioner's report, of the county's 1,162,000 acres of farmland, nearly one-half (568,000 acres) are in range fed cattle production. Other major crop types include: hay pasture 162,900 acres; feed grains 129,900 acres; nuts 83,800; cotton 68,800 acres; vegetables 44,700; food grains 36,500; and fruits 32,000 acres. Minor amounts of acreage are also in dairy; poultry, sheep, pigs and other animal products; sugar, greenhouse, and other miscellaneous crops.

The values of these types of agricultural production, however, vary widely. For example, the huge acreage of range land produces an average value of only $96 per acre, while the value of the county's 5,684 acres of dairies averages $92,700 per acre, and poultry (2,680 acres) is a close second at an average of $87,600 per acre. In all, county-wide agriculture currently yields direct annual sales of almost $1,450 million, an average of $1,248 per agricultural acre.

When indirect economic activity is added (using the multipliers specific to each crop types as shown in the footnote), total agriculture-related sales are estimated at $2,114 million annually. The sales multipliers are from the Cooperative Extension Input-Output study of Merced County generated by George Goldman specifically for this analysis based on calculations of indirect economic activity generated by each crop type.

The number of direct farm jobs is estimated at almost 14,000; when indirect jobs are added to this, the current farm-related jobs in the county total 27,300. These direct and indirect job estimates are also from the Cooperative Extension Input-Output study, specific to each crop type.

It must be noted that the distribution of crop types and value is not equal throughout the county. Indeed, the areas close to the cities - the flat, higher quality soils areas of the county - produce the higher value crops. The footnote to Table 2B estimates the percentage of land around each city in the various crop types, based on interviews with Agricultural Commissioner and Cooperative Extension staff and review of the GIS LU 90 data.

C. Growth and Land Use Change Scenarios

1. Current General Plans (County, cities)

The third section of Table 1A of Appendix 2 estimates the currently urbanized acres of each city and the unincorporated area. The data for the cities are from the Merced County (MDSS) GIS file LU 90.dbf updated by current city zoned land use information. These data are more accurate than the 1990 GIS data, since a great deal of land in the current city boundaries has been developed since 1990. Generalized Merced County land uses were shown in Figure 1 of Appendix 1.

For the unincorporated area, the Merced County Data Services (MDSS) GIS LU 90.dbf identified 8,182 acres as residentially developed with 19,865 units. These represent urban or suburban pockets in the unincorporated area, mostly adjoining or near the cities. For purposes of this analysis, Strong Associates has also identified smaller developed rural lots (1.5 to 10 acre parcels) as a residential land use. Based on Strong Associates' "Analysis of Rural Parcels in the Central Valley," May 1999 (prepared for American Farmland Trust), we estimate an additional 9,667 acres in this use, accommodating 2,188 dwelling units. It is appropriate to count these

smaller rural lots as part of the County's current low density housing mix; very few of them are in commercial farming.

These estimates of urbanized land use provide the gross density per acre ratios, which are then used in Table 1 of Appendix 2 for projecting the impact of the low density (current average density) growth scenario.

2. Current demographics

Table 1 of Appendix 2 shows the baseline (year 1996) population for Merced County, each of its six cities and the unincorporated area. The 1996 population was 198,522 of which 125, 232 (63%) was in the six cities. Half of the city population is in the City of Merced. The population per gross acre was 4.0 for the county as a whole. Population density in the unincorporated area was 2.7 per gross acre, which includes rural residential lots of less than 10 acres. (This is calculated in the footnote to DS Table 1A.). City densities varied from a low of 4.7 per gross acre (Livingston) to a high of 6.7 per gross acre (Atwater). Overall, these densities are typical of areas that are experiencing sprawl or suburban growth. The total developed area in the county was 50,130 acres of which 15,533 (slightly less than half) was in cities. This shows the effect of the less intense and more inefficient use of the land in the unincorporated areas.

3. Additional population growth and land use conversion under current General Plans

Table 1 of Appendix 2 describes the impacts of projected population growth to the year 2040 on Merced County, including each of the six incorporated cities and the unincorporated area. Overall, the population is expected to triple from the 1996 total of almost 200,000 to over 600,000. The cities of Merced, Los Banos, and Livingston are all expected to grow by more than 400%, while Atwater and the unincorporated area are projected to just over double.

The new population (added between 1996 and 2040) totals 422,000. The major share of that is expected to be in Merced, with 187,500 new residents. The unincorporated area will account for 82,200 new residents. The other cities follow with: Los Banos, 63,600 new residents; Livingston, 38,000; Atwater, 31,000; Gustine, 10,700; and Dos Palos 9,000.

Along with the projected new population, we have estimated new jobs, totaling almost 161,400 county-wide. These jobs are proportional to population for each city, based on the ratios from the 1990 census as noted in Table 1A of Appendix 2.

4. Additional population growth and land use conversion to year 2040 (per AFT report)

This report specifically compares the impact of two growth scenarios: (1) conventional or "sprawl" growth and (2) compact growth. These scenarios are essentially the same as were defined in the 1995 American Farmland Trust study for all of the Central Valley of California.

- **Conventional or "sprawl" growth** is relatively low density and represents **the current average density per gross urbanized acre**.

- **Compact growth** assumes the potential to accommodate **10% of new residents in urban infill areas** and the remaining 90% at **densities not quite double the current average**. For this type of densification of growth to become a reality would require substantial changes in the General Plans and zoning districts of the area's cities and a reduction of the amount of growth that could occur in the unincorporated area.

Note that the study assumes that the growth will occur according to California Department of Finance projections. The study deliberately does not include a *reduced growth scenario* because the intent of the study is to show how the physical and financial impact of growth that is predicted to occur can be reduced by concentrating that growth more efficiently.

D. Economic Model

1. Inputs to the model (demographics, public service and infrastructure revenues and costs, local expenditures for goods and services)

The model is an input-output model (see Footnote 3) which includes information on:

- population (Appendix 2 Table 1, 1A, 1B)
- housing units (Appendix 2 Table 1, 1A)
- jobs (Appendix 2 Table 1, 1A, 2)
- acres of developed land (residential, commercial, industrial, other) (Appendix 2 Table 1, 1A, 2
- agricultural sales (Appendix 2 Table 2A, 2B,
- multiplier showing the effect of additional spending induced by direct sales (Appendix 2 Table 2B)
- annual city revenues (taxes, benefit assessments, licenses and permit fees, fines and forfeitures, use of money and intergovernmental funds transfers, fees for services and other revenues) (Appendix 2 Table 3A, 3C)
- annual city costs (general government, public safety, transportation, community development, enterprise, culture and leisure, public utilities, and other costs) (Appendix 2 Table 3B)
- city annualized capital costs for public infrastructure (sewer mains, roads, storm drains, fire stations) (Appendix 2 Table 3D)annual county revenues (taxes, special benefit assessments, license and permit fees and franchises, fines, forfeitures, penalties, use of money, state and federal subventions, service fees, bond sales and other miscellaneous revenues) (Appendix 2 Table 4, 4A, 4C)annual county costs (general government, public protection, public roads, health care, public assistance, education, recreation and debt service). (Appendix 2 Table 4, 4B, 4C)

The model assigns the expenditures for wetlands and wildlife habitat into standard economic categories to which multipliers, developed by the Cooperative Extension Input-Output Study (George Goldman) can be applied. These are divided into:

- land expenditures (structures, maintenance, acquisition (easement and fee), wages and salaries of public employees, and expenditures by private landowners (duck clubs) (See Table Appendix 2, Table 5C)
- recreation expenditures by users of the wetlands complex (transportation, equipment, food, retail and services). (See Table Appendix 2 Table 5C)

2. Economic Analysis using Model Outputs (See Appendix 2 Summary Tables and all other Appendix 2 Tables)

a. Present Day – Economic value of wetlands uses vs. public costs (Summary Tables, Appendix 2 Tables 4F, 5)

The economic value of the GEA wetlands complex, including land management, acquisition, and recreational use, as shown in Appendix 2 Tables 5 and 5C, is about $27.7 million annually and accounts for about 600 jobs. With multipliers applied, this value jumps up to $40.9 million and 800 jobs. The comparable figures for all of Merced County are $36.5 million of direct expenditures (753 jobs) and $53.4 million (1100 jobs) with multipliers applied. For the GEA wetlands, this works out to an average of about $318 per acre of stimulation to the local economy. In contrast, the cost to local governments to serve this vast wetlands complex is low – only about $160,000 per year in County administrative costs and sheriff's patrol, or about $1.24 per acre (Appendix 2 Table 4F).

b. Present Day — Economic value of agriculture vs. cost of services by local government (Summary Tables, Table 4E)

The present day value of agriculture in Merced County as a whole on about 1.16 million acres is about $2.1 billion with multipliers applied and supplies over 27,000 jobs. (Summary Tables of Appendix 2). Within the 179,464 acres of the GEA, the agriculture accounts for almost $120 million in annual sales (with multipliers applied) and about 2500 jobs (Summary Tables, Table 5 of Appendix 2). The average value per acre of economic stimulation provided by agriculture is $1,819 ($2,113 billion/1.162 million acres), whereas the cost to local government (county) to provide services to agriculture is only about $3.6 million per year (Appendix 2 Table 4E) or $3.07 per acre. These services comprise the agricultural commissioner's office, the cooperative extension service, county administrative cost and sheriff's patrol.

c. Economic value of urbanization vs. cost of services by local government (Table 1, 1A of Appendix 2)

Under the growth scenarios to the year 2040 projected by the State of California Department of Finance, the existing revenues to the cities of $86.1 million per year will increase under either the low or compact density scenario to about $229 million per year. The revenues are slightly higher under the compact scenario because the property tax revenue for infill is greater than for annexation. The existing costs to the cities of about $84.3 million to provide

services yields a net positive revenue to the cities of about $1.85 million (Summary Tables of Appendix 2).

Overall, sprawl growth would consume twice as much land over the 44 year period and result in a large net annual loss to cities in the costs to serve new development vs. the revenue produced. The Summary Tables shows a net revenue *loss* to the cities of $53.6 million annually or a loss of $158 per capita to serve 94,195 acres of conventional sprawl growth (-$569/acre). In contrast, compact growth, even under the conservative case study scenario, would have a net revenue benefit to the cities of $6.3 million per year on 47,097 acres or $19 per capita (+$134/acre). This is a total net difference of $703 per acre between the conventional and compact growth scenarios. This striking difference is due to two factors: (1) the saving of 47,000 acres of farm land under the compact compared to sprawl scenario and the fact that this land remaining in production continues to produce revenues for the County of some $115 million per year and (2) the relatively lower cost to local government to provide infrastructure (roads, sewer, water, storm drainage) to more compact development.

E. Target year scenarios

1. Land use conversion (loss of wetland and agricultural acreage) (Summary Tables of Appendix 2)

a. Conventional growth

If growth occurs according to the sprawl growth scenario, the added population of 421,934 by the year 2040 will require a total of 94,127 new acres of urbanized land. (See Summary Tables of Appendix 2). The population estimates are assigned to each city are based on California Department of Finance projections . See the discussion in Appendix 2 Section 1.

b. Compact growth

Under the compact scenario, the new population would only require 47,063 acres of new urbanization, of which about 32,000 acres are in cities and 15,000 are in the unincorporated county.

2. Economic impacts – conventional vs. compact growth scenarios

3. Wetlands (loss of acreage, revenue, total economic effect)

a. GEA — Wetland, Rangeland and Agriculture

The impact on the wetlands from the two growth scenarios is shown in Appendix 2 Tables 4F and 5 and the Summary Tables of Appendix 2. Appendix 2 Table 4F shows an existing revenues to local governments from the wetlands and recreational uses of about $273,000 per year or about $2.11 per acre. This revenue comes from property taxes on the assessed value of private lands, in lieu fees paid to local governments by the federal and state governments. The only local government costs to serve these areas are the costs to county government to provide sheriff patrol and related administrative cost. The costs to serve these areas now is about $160,000 per year or about $1.24 per acre. This is a net benefit to local government of about $113,000 per year or about 87 cents per acre per year.

Under the conventional growth scenario the 94,195 acres of additional urbanization by the year 2040 will include 7,810 acres of rangeland and wetlands, and 1,953 acres of agricultural lands **within the GEA** based on discussions with the City of Los Banos about where the growth will occur. Under the compact growth scenario about 3,900 acres of the wetlands area and 976 agriculture acres would be lost to urbanization. (Appendix 2 Summary Tables and Table 5). These values are, respectively, 6 and 3% of the existing range and wetland area in the GEA (total 128,893 acres). Including agricultural land, the increase in urbanized land in the GEA would be 4881 acres under the compact scenario and 9,763 under the sprawl scenario.

Note that most of the acreage affected is combined range/wetlands, converting an estimated 20% of the GEA total in this land use under the low density scenario. These lands are dual use, and their conversion will thus result in a loss of farm sales as well as wetlands economic activity, as discussed below.

The conversion of agricultural and range lands will result in loss of farm-related economic activity. Currently, the GEA generates an estimated $119.7 million in direct and indirect annual farm sales and supports 2,487 total farm-related jobs. By 2040 with low density development, on the basis of the acreage of farmland lost there would be a loss of $11.8 million (10%) in total direct and indirect agricultural sales and a loss of 243 farm-related jobs. Compact development would reduce those losses to $5.9 million in total annual agricultural sales and 122 jobs.

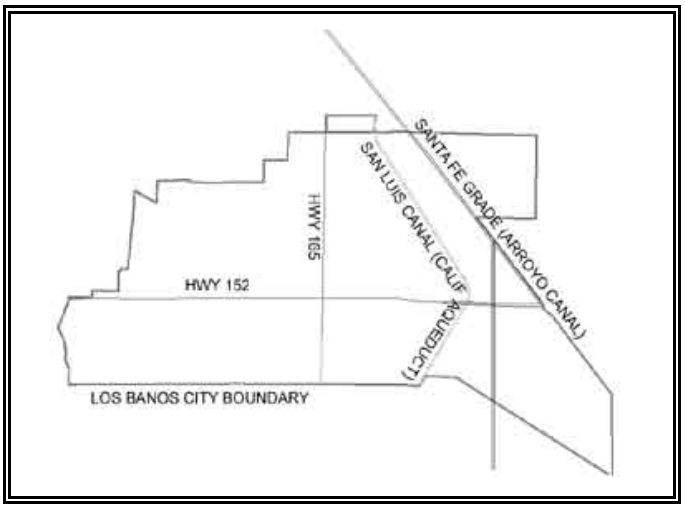
The potential urbanization of wetlands would also reduce the economic benefits of recreation and government and private investment in these areas. Current direct and indirect benefits from the wetlands are estimated at $40.9 million in annual sales and 798 jobs. Using a direct proportional extrapolation from the acreage lost with urban conversion by 2040 shows that under low density development, wetland-related sales would drop by $2.5 million (10%) annually and jobs by 85. Under compact density, sales would be reduced by an estimated $1.2 million (5%) annually and jobs by 42. Combined, the conversion of farmlands and wetlands within the GEA would result in direct and indirect annual sales losses of $14.3 million under low density development compared to $7.1 million with compact development.

b. Band Around the GEA

Recall that we had defined a two-mile band of land around the core area of the GEA in the earlier land planning guidance study. In the long term, it is essential that this band contain only resource beneficial or resource neutral uses to protect the integrity of the interior of the refuge complex as a whole. The growth of the City of Los Banos directly to the east is a particular threat to both the band and the GEA interior, and can isolate the North from the South Grasslands. Thus, urbanization in the band is almost of equal importance to urbanization within the GEA complex in its potential adverse effects on the wetlands complex.

The net loss to the focus area band from with the urbanization of another 5000 to 7000 total acres under the compact scenario and 10,000 to 14,000 under the sprawl scenario increases the total urban land within the band from the current 1.4% to as much as 10% (see Text Table 8, below).

The 1995 "*Grassland Water District Land Planning Guidance Study*" studied the effectiveness of a one-mile and a two-mile band of only compatible (agriculture, open space) uses around the wetlands. The study showed that the two mile buffer was substantially more effective in protecting the core, or interior of the refuge. Using the model of a two-mile buffer, we attempted to estimate where growth would occur in relation to the buffer – specifically, within a corresponding two mile ring or "doughnut" around existing city boundaries. Text Table 8 summarizes this analysis. Text Table 8 shows that within the 160,000-acre area that corresponds to a two-mile band around the GEA, the present 2187 acres of urban land (1.4% of total area) could grow to as much as 9300 acres(5% urban) under the compact scenario and as much as 16,400 acres (10% urban) under the low-density "sprawl" scenario. Correspondingly, of the 167,600 acres that form a two-mile ring around the six cities, the percentage of land that is urban is expected to grow from the present 7% up to as much as 45% under the low-density scenario. The intersection of the growth zone around cities with the two-mile band around the GEA (and in the case of Los Banos, the GEA interior as well), corresponds to a potential "zone of conflict" — see Figure 8.



Los Banos boundaries delimiting "Zones of Conflict"

Of the six cities in Merced County, Los Banos, Gustine and Dos Palos have city spheres that include a portion of the two-mile GEA band. Growth in unincorporated areas such as Volta could also have adverse consequences on the wildlife refuge areas. Los Banos presents the greatest problem with lands within both its current city boundary and its sphere that are either directly within the GEA area or its two-mile band. The current Los Banos General Plan prohibits growth east of the Santa Fe Grade and discourages non-compatible uses east of the San Luis Canal, both of which are intended to slow down encroachment on the nearby wetlands complex (see Figure 8 of Appendix 1). However, General Plans are re-written on a 5 or 10-year cycle. Land use restrictions, such as conservation easements, that are more permanently preventive of growth in the east/north direction are needed to prevent encroachment and fragmentation of the wetlands complex in the long term.

Text Table 8
Effect of City and Non-city Growth on GEA Two-mile Band (1996-2040)

	Year 1996 (Acres)	***Year 2040 (Acres)***		***Comment***
		Sprawl Growth	*Compact Growth*	
GEA				
Within 2-mile band around GEA	160,359	160,359	160,359	
City land within 2-mile band				
Non-urban	31,678	20,503	26,866	
Urban	1550	12,726[a] 8,548 (Appendix 2 Table 2B)[b]	6363[b] 4,274 Appendix 2 Table 2B	20% of 63,632 acres of city growth is in GEA band (sprawl) 20% of 31,816 acres (compact)[8]
Total	33,230	33,230	33,230	
Unincorporated urban land in band	638	1,528 (Appendix 2 Table 2)[c]	764[c]	5% of 30,563 acres of growth in the unincorporated County is in the GEA band[c] (sprawl) 5% of 15,281 acres (compact)
Total urban land in band	2187	12,263 - 16,441	7225 - 9314	6-7 fold increase (sprawl) 3-4 fold increase (compact)
Percent of Band that is Urban Land	1.4%	8 - 10%	4 - 5%	
CITIES				
Acres within 2-mile radius of city limits	167,606	167,606	167,606	
Urban lands	12,341 (7%)	75,973 = 12,341+63,632 (45%)	44,157 (=12,341+31,816 (26%) see Appendix 2 Table 1)	

See Figure 8 of Appendix 1

[a] The 20% is the ratio of total city land in GEA band to total land in band 33,229/160,359

[b] Based on interviews with the cities, the only cities where growth is projected to occur in the direction of the GEA and band are Los Banos if it grows to the northeast and Gustine.

[c] These values are calculated as 5% of the total amount of growth calculated for the unincorporated area in Appendix 2 Table 2B (30,563 acres for sprawl growth) and (15,281 acres for compact growth).

4. Agriculture (loss of revenue, costs vs. revenues, total economic effect)

Based on these percentages, Text Table 9 below projects the acreage and value of the agricultural land around the six cities where the projected urban growth will occur.

Text Table 9
Effect of Sprawl Vs. Compact Growth on Agriculture

Scenario	***Sprawl Growth***			***Compact Growth***		
	Total	*In Cities*	*Unincorp*	*Total*	*In Cities*	*Unincorp*
Urban Acres 1996 [a]	50,130	22,875	27,255	50,130	22,875	27,255
Urban Acres 2040 [a]	144,325	86,507	57,818	97,227	54,691	42,537
New Urban Acres 2040 [a]	94,195	63,632	30,563	47,097	31,816	15,281
Loss of Ag Acreage	86,385 (7.4%)			43,192 (3.7%)		
Loss of Wetlands [b]	9,763			4,881		
Loss of Ag Income [c]	$229.2 million			$114.6 million.		
Loss of Ag Jobs [d]	2,709			1,355		
Net Annual Revenue/ Cost in 2040	($53.63 million net loss)			$6.3 million net gain		

[a] Summary Tables, Appendix 2
[b] Table 5, Appendix 2
[c] Agricultural income includes direct and indirect annual sales of agricultural products, and personal income
[d] Table 2B, Appendix 2

5. Urban lands (costs vs. revenues, total economic effect)

These effects are fully described in **Appendix 2** and are summarized below in Text Tables 10, 11 and 12.

Text Table 10
Effect of Sprawl Vs. Compact Growth in City and County Revenues

Scenario	***Sprawl Growth***			***Compact Growth***		
	Total	*In Cities*	*Unincorp*	*Total*	*In Cities*	*Unincorp*
Urban Acres 1998	50,130	22,875	27,255	35,734	22,875	12,859
Urban Acres 2040	144,325	86,507	57,818	81,968	54,691	42,537
New Urban Acres 2040	94,195	63,632	30,563	47,097	31,816	15,281
Net Annual Revenue/ Cost in 2040 (Cities)	($51.8 million) loss			$8.2 million		
Net Annual Revenue/cost in 2040 (County)	($10.9 million) loss			($8.9 million) loss		

Source: Appendix 2, Summary Table B

City Fiscal Impacts

Population and employment growth in the county's cities will increase both revenues and costs to the city governments, under any development scenario. Table 3 of Appendix 2 estimates the total new revenues and new costs anticipated due to population growth between 1996 and 2040 for each city.

Under the low density scenario, all of the cities would produce less new revenue than the new costs involved. For the cities combined, the estimated net annual shortfall is $53.6 million. This net shortfall is 23% of the $229 million of new revenues generated. On a per capita basis, the average city resident would produce a $158 net annual shortfall.

The compact density scenario, on the other hand, generates small net revenue surpluses for almost all of the cities (the exception being Livingston), with the combined total net annual surplus of $8.2 million, about 2.5% over the revenues. The average city resident would generate a $19 net annual surplus. Some of the revenues and costs are the same or minimally affected by density, while others vary considerably: Revenues and costs estimated on an average per resident or per employee basis increase in direct proportion to the increase in population, regardless of density.

Property tax revenues vary somewhat due to differences in tax share distribution. The compact scenario yields almost $1.0 million more in annual revenues due to the cities receiving a higher share of property tax in infill areas than in new annexations. The biggest differences between the scenarios are the costs that are based on the acreage affected and capital improvements required. The low density option requires an estimated $73.3 million in acre-

related costs and $55.9 million in annualized capital costs, compared to $36.6 million and $33.5 million respectively for the compact scenario.

Capital costs of new services are calculated on an annualized basis in Table 3D of Appendix 2, based on a Strong Associates case study. (We have assumed the costs will be the same for these new capital improvements in all of the cities.) As shown, at current average densities, internal acre-related capital costs include: sewer systems, at $1,400 per acre; roads and storm drains, at $5,000 per acre; and fire station, at $500 per acre. These total $703/acre on an annualized basis (financed over 20 years at 8% interest). Spine infrastructure for sewer mains and arterial roads are an additional $2.24 million per mile in one-time costs, which converts to $1,726 per acre, or to $176/acre on an annualized basis. Although most of these costs relate to acreage, we have assumed that the compact density would cost slightly more (an added 20%) per new acre served, since quantity of development per acre will be almost doubled.

The low density scenario would involve an estimated $55.9 million annually to cover these capital improvements. The compact density alternative would cost an estimated $33.5 million.

County Fiscal Impacts

The County's revenues and costs are affected by growth both within the cities and in the unincorporated area. Most of the County's revenues and costs will be nearly the same under the two alternative scenarios, as shown in Table 4 of Appendix 2.

Average revenues from new residents are estimated at $359.9 million annually, and from jobs, $32.5 million - the same under both scenarios. Property taxes are almost the same under both scenarios - $28.4 million annually from the low density option vs. $28.0 million from the compact approach - with the difference due to a lower county share from infill development.

The County will lose net revenue from conversion of farmlands and wetlands. For the low density option, these lost revenues are estimated at $786,000 and $6,800, whereas for the compact scenario, the losses would be $393,000 and $3,400 annually (see Tables 4E and 4F of Appendix 2).

Average costs to serve residents, at $404.0 million, and for job-related services, at $21.2 million, are the same for both scenarios. Road cost is the significant difference between the two scenarios in impact on County government (see discussion below). With estimated road costs of $133 per urbanized acre, the low density approach would increase costs by almost $4.1 million annually, whereas the compact density alternative would cost $2.0 million. (See Table 4B of Appendix 2).

In all, the growth generated by the low density approach will produce estimated revenues of $421.1 million, exceeded by costs of $429.3 million, yielding a net annual deficit of $8.2 million. Under the compact density option, revenues are almost identical, at $421 million, while costs are estimated at $427.3 million, reducing the county's net annual deficit to $6.2 million. (See Summary Tables of Appendix 2). Together with existing development, total revenues to the County in 2040 under the low density scenario will be $607.8 million, exceeded by costs of $638 million for a net annual deficit of $10.9 million. Under the compact scenario, the revenues

would be the same as under low density, but the costs would be about $636 million, reducing the annual deficit to $8.9 million.

VI. Conclusions and Recommended Strategies to be implemented by local government and stakeholders (et al)

A. Comparison of economic effect of growth scenarios

The full economic impact of this explosive growth on the wetlands is difficult to predict. Broadly, if non-compatible urban development encroaches on the wetlands so as to reduce its utilization by wildlife, then recreational usage could be expected to decline, and public funds for habitat management may be more difficult to obtain. The impact will depend on how closely this growth encroaches on the boundaries of the refuges, or whether it, as in the case of Los Banos, divides the North from the South Grasslands.

The total economic effects of this change are difficult to quantify. In the earlier discussion, it was estimated that on the basis of acreage alone, loss direct sales and total revenues due to urban development would reduce the economic values within the GEA by about 10% in 2040 compared to 1996. While the total urbanized land within the GEA in 2040 would only be 5652 - 10,534 acres[5] (3 to 6 percent of the total acreage), there could effects in addition to the direct loss of productivity on urbanized lands. Effects on the *remaining* lands include threshold effects related to fragmentation of habitat, increased number of roads, domestic pets, pollution and illegal hunting. In addition, the increase in intensity of land uses in the band from the present 1.4% to as much as 8 to 10% may begin to affect the integrity of the wetlands complex by direct incursions, introduction of more exotic species, effects on water quality or more subtle effects. As reported in the 1995 Land Planning Guidance Study, many studies of conservation biology have shown that many wildlife refuges lose a number of their key species over time if they are not large enough or are not protected from outside effects by a large enough buffer. These effects are seen even in refuges of hundreds of thousands or even millions of acres. On the level of watersheds, at least one study (E. Strecker, pers. comm.) showed that biodiversity in streams drops sharply when as little as 5% of its area is impervious surface.

If the increase in urban land, however modest, results in decreased utilization by wildlife, then this will negatively impact the amount of valid public recreational use of these lands that are dependent upon healthy wildlife populations. In particular, if growth of Los Banos toward the east were to fragment and isolate the North from the South Grasslands, this could have a profound effect on the movement of waterfowl between different parts of the refuges they now utilize on a daily basis (Grassland Land Planning Guidance Study, 1995, Fleshkes, J. 1992). In addition, there may be more public pressure to decrease the levels of public expenditure in the wetlands at both the state and federal level. This is in direct contradiction to the other economic indicators from this study which show that if anything, the levels of public expenditure in the wetlands should increase. If the level of expenditure declines, then this may create a positive feedback loop in which the resources are negatively impacted further and more incentive is created for further urban development at the expense of wildlife habitat.

---

[5]10,534 acres urbanized = 771 existing urban + 9,763 new urban (sprawl growth). 5,632 acres urbanized = 771 existing urban + 4,881 new urban (compact growth).

B. Economic Implications for Planning

Table 11 summarizes the economic impact of the various land uses and growth types.

Text Table 11
Economic Impact of Land Use Types on Local Government
Existing Revenue vs. Cost by Land Use

	Agriculture	*Wetlands*	*Cities Only*	*All Urban*	*County*	*Co Urban*	*All Merced*
Revenue ($1000's)	$12,194	$272	$86,125	$279,874	$206,215	193749	$292,340
Cost ($1000's)	$3,562	$160	$84,274	$289,442	$208,890	205168	$293,164
Net Revenue	$8,632	$112	$1,851	($9,568)	($2,675)	($11,419)	($824)
Revenue/Cost Ratio	3.42	1.70	1.02	0.97	0.99	0.94	1.00
Area (ac)	1,162,000	129,000	22,875	50,130	1,162,000	27255	1,184,875
Population			125,232	198,522	198,522	73290	323,754
Net Revenue per capita			$14.78	($48.20)	($13.47)	($155.81)	($2.55)
Net Revenue per acre	$7.43	$0.87	$80.92	($190.86)	($2.30)	($418.97)	($0.70)

Source: Appendix 2 Summary Table B, Tables 4E, 4F.

Text Table 11 gives the economic picture today of the economic impact of land uses on local government. In Text Table 11 net revenue is the *difference* between the total cost of local government to provide services and infrastructure to the various land uses and the revenue that each land use type produces. The revenue/cost ratio is total revenue *divided by* total cost. Net revenue per acre is the net revenue divided by the total number of acres of that land use category. It can be seen from Text Table 11 that agriculture and wetlands have a highly positive revenue to cost ratio. That is, for example, agriculture produces $3.42 of revenue to local government for every dollar it costs to serve agriculture. Wetlands produce $1.70 of revenue for every dollar of cost – less than agriculture because their productivity and market value is less, but they demand very little in the way of urban services. In addition, these two land uses produce a modest net revenue per acre. The economic value of agriculture is also much higher than for wetlands in terms of stimulation of the local economy ($317/acre for wetlands, $1,819 average for agriculture) because of the much higher value of agricultural commodities in the marketplace.

In contrast, all types of urban development are a "break even" proposition or are negative. Considering the cities only (city population and city-provided urban services) the revenue/cost ratio is very slightly positive. Also, within the cities only there appears to be a net revenue per acre of about $81. However, this is misleading because the cities populations also utilize many services provided only by the County such as District Attorney, assessor, courts and judicial services, elections etc. Looking at the entire County urban population, there is already a large net deficit in the cost per acre to provide services to its urban population – the County and cities spend $190.86 more per acre to serve their urban population than they get back in revenue. This amount grows to $418.97 per acre looking only at the County serving the unincorporated population – since that illustrates that it is the most expensive and inefficient to serve this far flung scattered population compared to the more concentrated population in cities.

Text Table 12
Economic Impact of Land Use Types on Local Government – Effect of Growth to 2040 on Revenue vs. Cost by Land Use

	Existing	*2040 Sprawl*	*2040 Compact*
Revenue ($1000's)	$292,340	$942,360	$943,272
Cost ($1000's)	$293,164	$1,005,015	$943,988
Net Revenue	($824)	($62,655)	($716)
Revenue/Cost Ratio	1.00	0.94	1.00
Urban Area (ac)	50,130	144,325	97,228
Population	198,522	620,457	620,457
Net Revenue per	($4.15)	($100.98)	($1.15)
Net Revenue per	($16.44)	($434.12)	($7.36)

Source: Appendix 2 Summary Table B Table, Tables 4E, 4F.

In Text Table 12 net revenue per urban acre is the net revenue divided by the total number of acres that are urban under each scenario. When one now considers the effect of the two growth scenarios on local government economics, Text Table 12 depicts the following: at present there is a net deficit to local governments (city and County together) to provide urban services to the urban population. This impact is negative (a deficit) whether one considers the cost per capita (population) or the cost per acre. When one compares the exist deficit per acre ($16.44) with the comparable value in the year 2040 this value ($-16.44) grows to -$434.12 under the sprawl growth scenario but shrinks to -$7.36 per acre under the compact growth scenario. The sprawl scenario shows that continued growth at the current average density per

gross urbanized acre is so inefficient that unless revenues (fees and taxes) are raised substantially, local governments will fall farther behind in their ability to provide capital improvements and services.

The improvement (from -$16.44 per acre to -$7.36 per acre) under the compact growth scenario shows that marked effect that even a modest effort at making growth more compact would have in reducing the costs of infrastructure (e.g. roads, sewer, water, storm drainage). Even with the tripling in population under either growth scenario, serving the new population at increased compact densities is so much more efficient than serving the present population that the overall cost to serve each person or each dwelling unit (or acre) drops. Note that even under the compact scenario as depicted in this study, the net impact of the growth on local government is still negative (a net loss).

Sprawl growth would also consume twice as much land over the 44 year period. The difference in net revenue between the sprawl and compact scenarios is also related to: (1) the saving of 47,000 acres of farm land under the compact compared to sprawl scenario and (2) the fact that this land remaining in production continues to produce revenues for the County of some $115 million per year.

The key point is that agriculture and wetlands are compatible uses to each other. Agriculture of all types is a productive use within the wetlands complex and especially in the two-mile band we have defined around the wetlands to protect the core area from the effects of urban encroachment.

About 8% of all of the County's agriculture takes place within the GEA and another 14% within the two mile band. Within the GEA portion about 44% of the 88,401 acres of non-wetlands is grazing land and within the band only 11% of the 160,359 acres is grazing land and the rest is higher value agriculture. Considering the difference in total economic values and in net revenue to local government ($7.43 for agriculture vs. $0.87 per acre for wetlands), buffer lands should be kept in agriculture and lands within the wetlands complex which are purchased for conservation easement should be allowed to continue as agriculture if that agriculture is compatible with wetland use (e.g. small grain crops), to preserve their economic productivity unless this is completely incompatible with wildlife utilization.

The overall impact over time, beyond 2040 will depend on many factors, including whether growth has become more compact by that time, and whether the intense growth pressures on the Central Valley continue. This analysis has confirmed that for Merced County, agriculture, in contrast to the bulk of urban growth, has a net positive economic impact on local government and generates over $2 billion per year in county economic productivity. Likewise, in contrast to the common view of wetlands as a "wasteland" suitable only as habitat for ducks, this study shows that wetlands too have a net positive economic impact on local governments and represent substantial public and private expenditures and local economic activity. These substantial economic values of non-urban uses emphasize the importance of their long-term protection in future land use planning decisions.

C. Strategies to protect wetland uses and infrastructure

The following are a preliminary (rather than an exhaustive) list of suggested means to better protect wetland uses and their infrastructure.

- Adequate supply of water of sufficient quality at affordable price (should not be shorted in State or federal water plans, or re-allocated for urban uses at a higher price)
- Protection of one to two mile band around the "core" area with only compatible uses (agriculture, open space uses) inside the band
- Permanent protection of more lands through progressive public purchase by fee or conservation easement. Concentrate purchase on lands with low agricultural value or allow continuation of agriculture if not entirely incompatible with wildlife usage.
- Continuation of seasonal land use diversification (e.g. flooded for duck clubs in fall, winter; agriculture in summer)
- General Plan policies (e.g. City of Los Banos) and case-by-case local land use planning decisions should be directed away from any further encroachment on the GEA.
- Increase level of public expenditure for wetlands, including the rate of in lieu fees paid to local government. Currently, the level of in lieu fees paid by federal and state agencies to Merced County is extremely low in comparison to the property taxes paid by either agriculture or development (see Table Text-12 below)

Text Table 13
Revenue per Acre from Property and In-lieu Property Taxes

Entity	*Type of Revenue*	*Total Revenue*	*Acres*	*Revenue per Acre*
Cities – developed	property tax	$5,164,699	22,875	$225.78
County– developed	property tax	$19,069,090	27,255	$699.65
County – Ag	property tax (1% of A.V.)	$38,260,680	1,162,008	$32.93
County+cities – developed	property tax	$24,233,789	50,130	$483.42
GWD – private wetland	property tax (1% of A.V.)	$232,416	38,602	$6.02
Federal/State	in lieu	$146,897	56,177	$2.61

Source: Appendix 2, Tables 3A and 4A.

Private landowner partnerships to make use of other federal sources of money such as endangered species funds, USDA Wetland Reserve and Conservation Reserve Programs

D. Strategies to protect agriculture

The means to protect agriculture in the potential zone of conflict between the wetlands buffer and the cities as they grow include:

- the use of tax incentives (e.g. Farmland Security Zone super Williamson Act)),
- creation of easements through cash sales, donation, or a combination
- funding for easement purchase through local bond issues, sales tax etc.
- changes in the federal inheritance tax law
- greater use of the right-to-farm laws
- education of Realtors on right-to-farm,
- County and city general plan language
- Urban boundary or urban limit lines
- requirements for the Board of Supervisors or City Councils to make findings before allowing conversion of agricultural areas to non-agricultural uses.
- Assurance of a reliable source of adequate water at affordable cost to agriculture

VII. Reference

A. Persons and Organizations Consulted

American Farmland Trust
- Erik Vink, Policy Director, Davis Field Office

California State Parks Department
- Joe Hardcastle, District Head
- Dave Gould, Chief Ranger, Four Rivers District
- Jean Leavitt, Administrative Chief

California Department of Fish and Game
- John Beam, Los Banos Wildlife Area Manager
- Joyce Bigham
- Leslie Howard, North Grasslands Wildlife Area Manager
- Dave Smith

California Wildlife Conservation Board
- Jim Sorro

Central Valley Habitat Joint Venture
- Ruth Ostroff
- Mike Eichholz

Ducks Unlimited
- Fritz Reid, Director of Conservation Planning
- Jim Gleason, Director of Development

Grassland Water District
- Dean Kwasny, Biologist
- Don Marciochi, General Manager
- Dave Widell

Great Valley Center
- Carol Whiteside, Executive Director

City of Los Banos
- Lynn Azevedo, Planning Director

Merced County
- Robert Smith, Director of Planning
- Robert King, Planner

Merced Data Special Services (MDSS)

U.S. Fish and Wildlife Service
- San Luis National Wildlife Refuge
  - Mike Chouinard

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Strecker, Eric. Water quality consultant, Seattle, WA.

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U.S. Department of the Interior, U.S. Fish and Wildlife Service. 1997. "1996 National Survey of Fishing, Hunting and Wildlife Associated Recreation"

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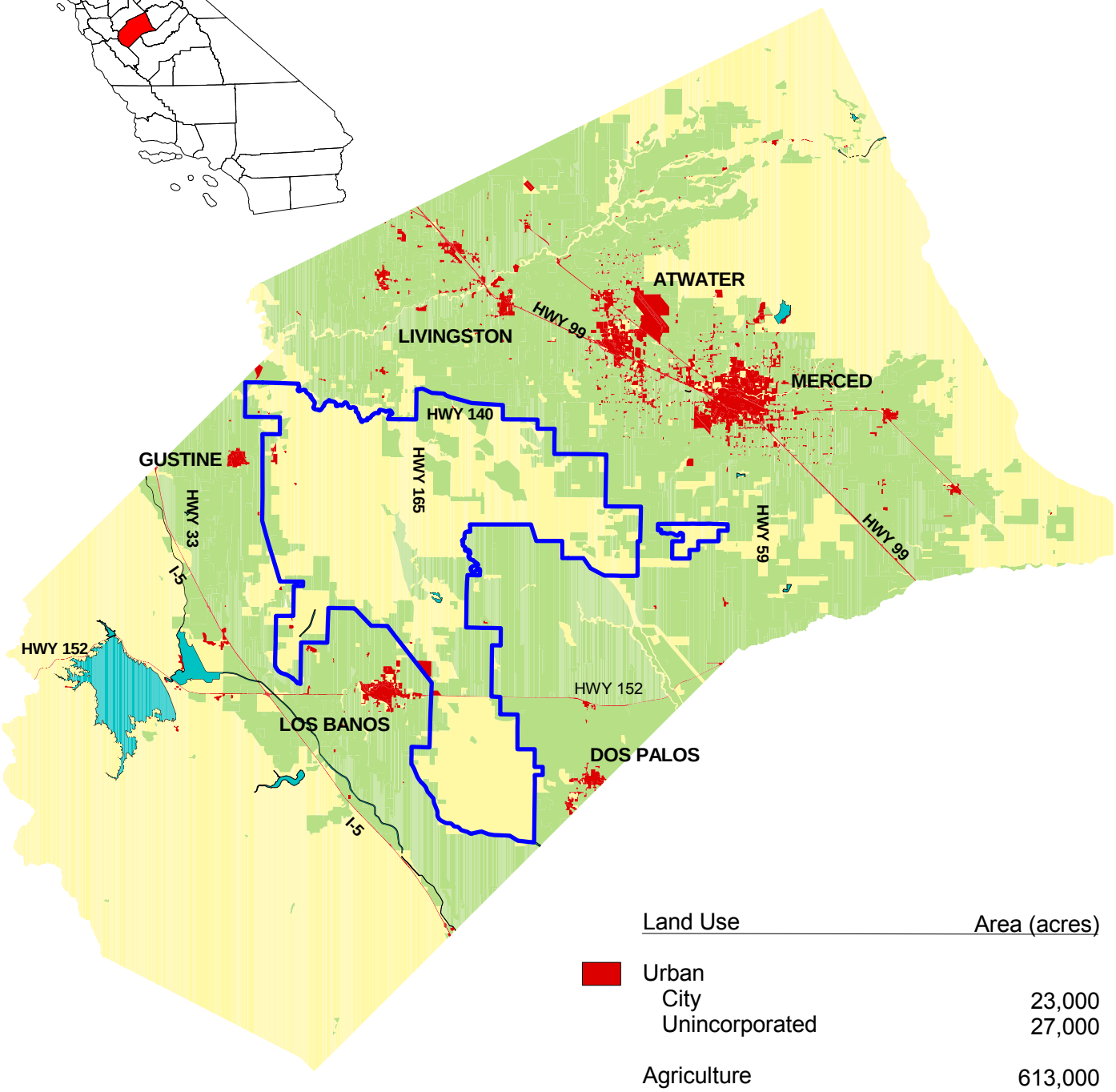
APPENDIX 1

MAIN TEXT FIGURES

Figure 1
Merced County
Land Use and Municipalities



Land Use	Area (acres)
Urban	
City	23,000
Unincorporated	27,000
Agriculture	613,000
Rangeland and Other	588,000
Water	16,000
All Merced County	1,267,000
Grassland Ecological Area	

N

0 1 2 3 4 5 Miles

Source: MDSS, 1999
Map: Thomas Reid Associates, 6/20/01

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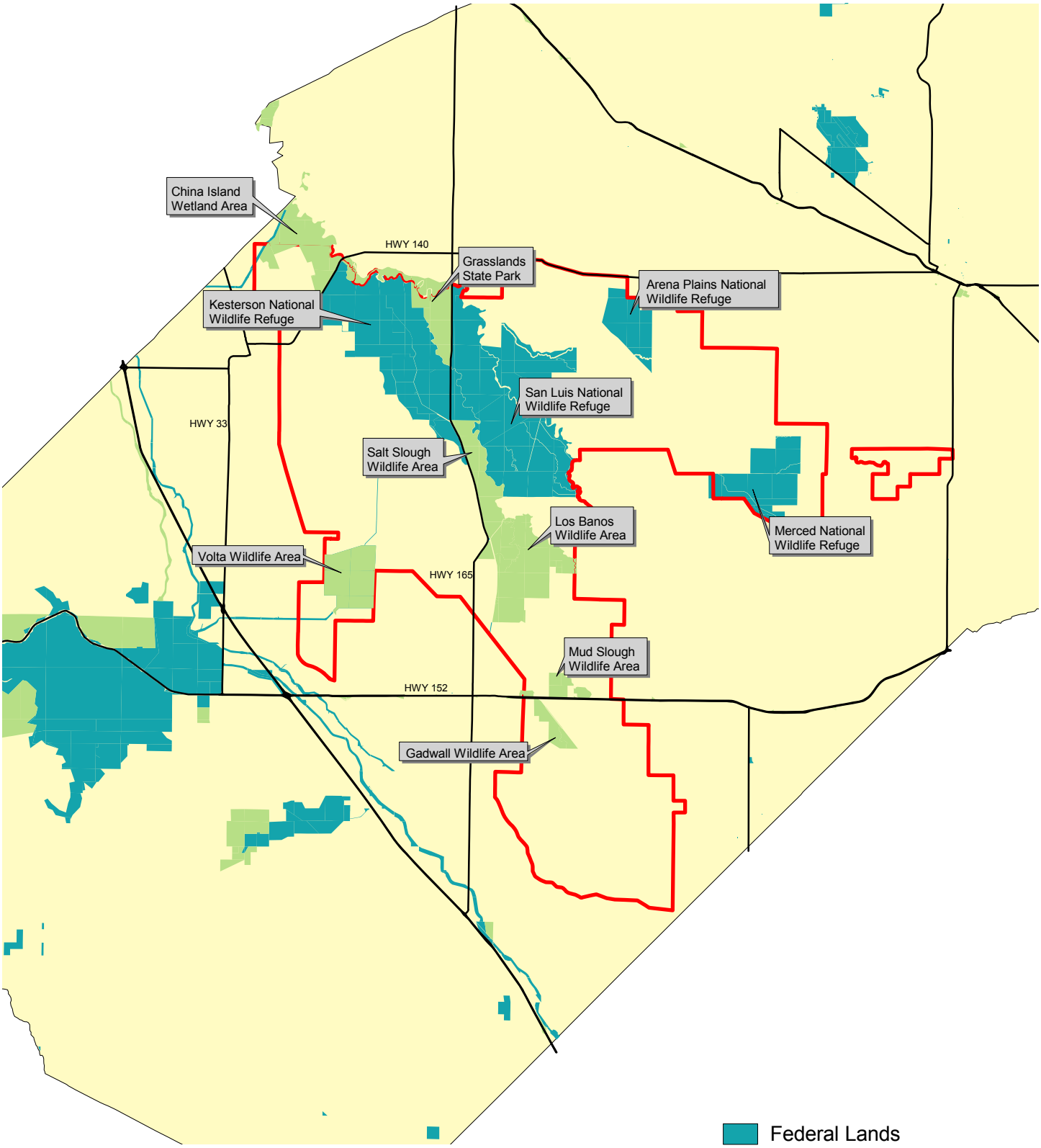
Figure 2
Grassland Ecological Area and Public Lands

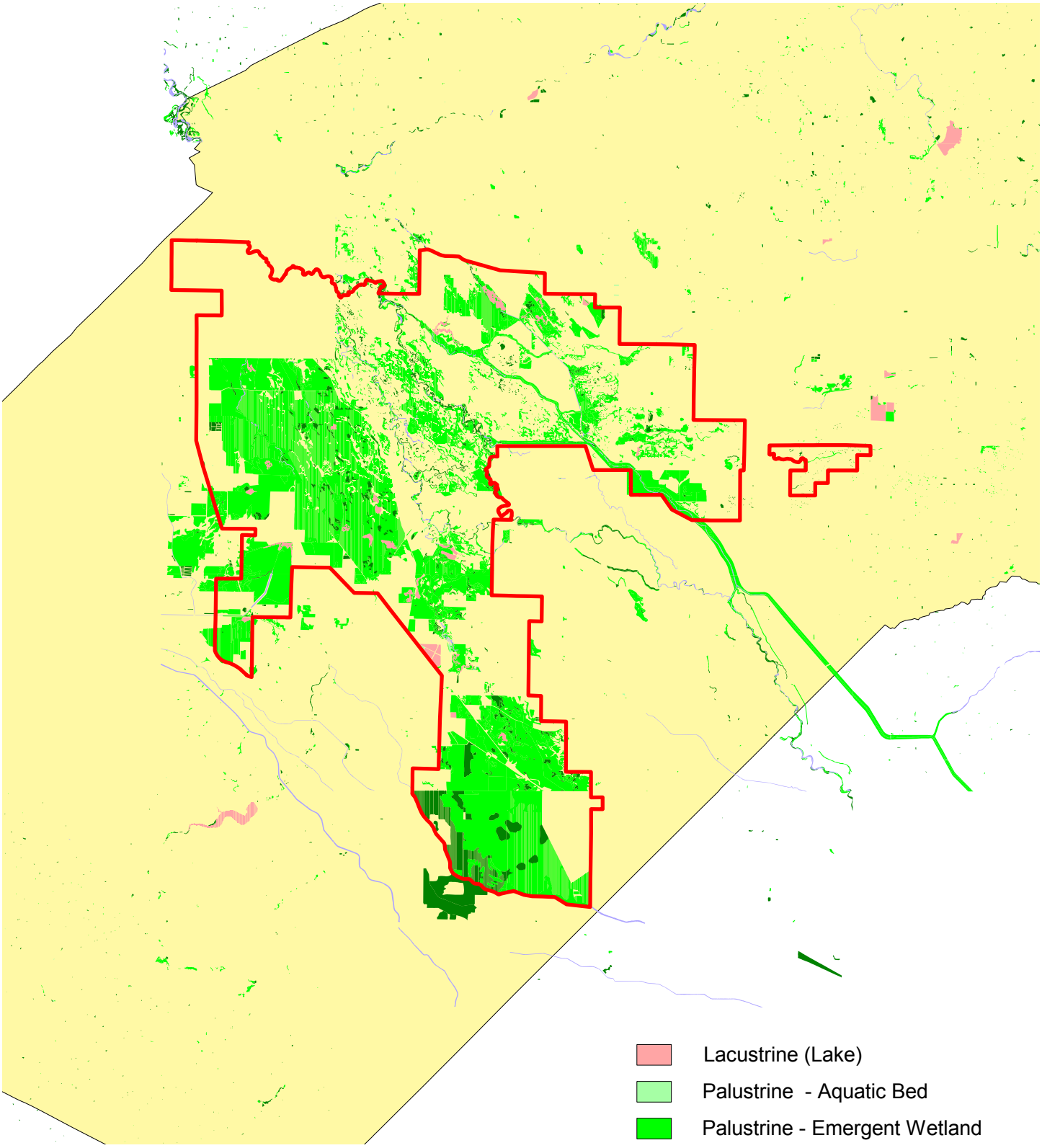


Federal Lands
State Lands
Grassland Ecological Area

N
0 1 2 3 4 5 Miles

Source: MDSS
Map: Thomas Reid Associates, 6/20/01

Figure 3
Grassland Ecological Area and Wetlands

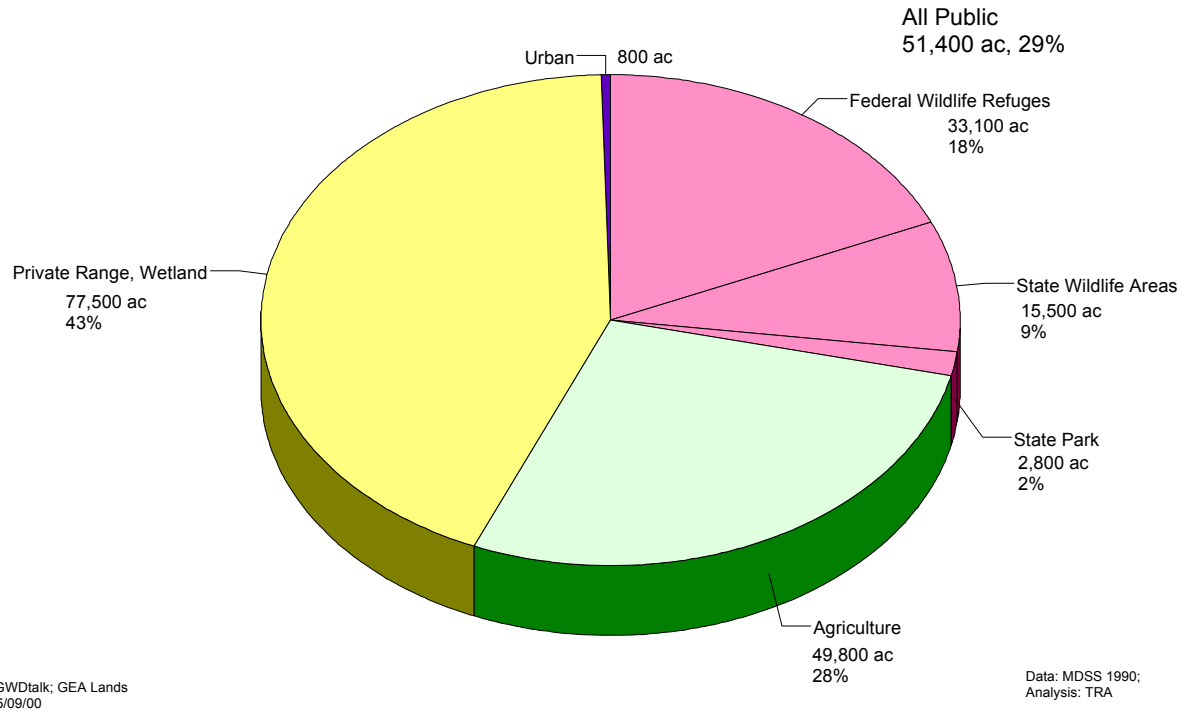


Lacustrine (Lake)
Palustrine - Aquatic Bed
Palustrine - Emergent Wetland
Palustrine - Scrub and Other
Riverine
Grassland Ecological Area (GEA)

N
0 1 2 3 4 5 Miles

Source: National Wetlands Inventory
Map: Thomas Reid Associates, 7/6/00

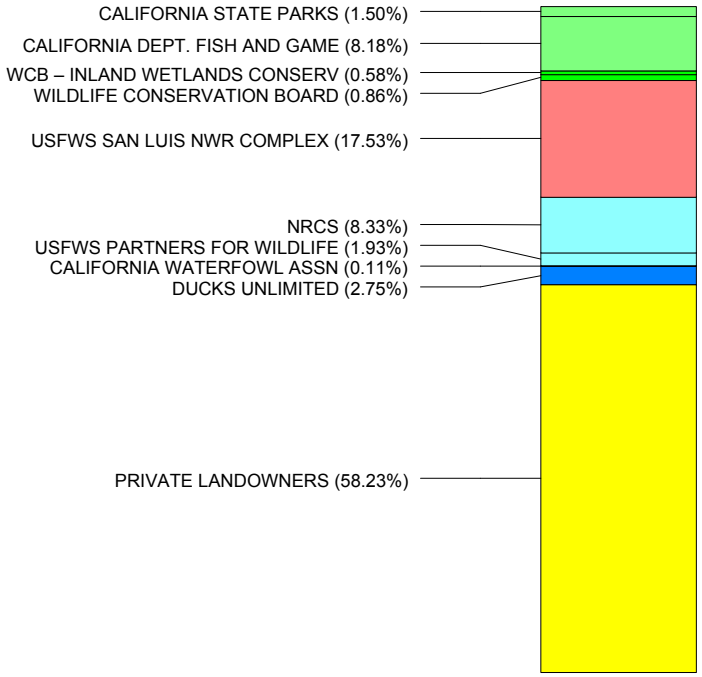
Figure 4 - Land Status in Grassland Ecological Area



CGWDtalk; GEA Lands
05/09/00

Data: MDSS 1990;
Analysis: TRA

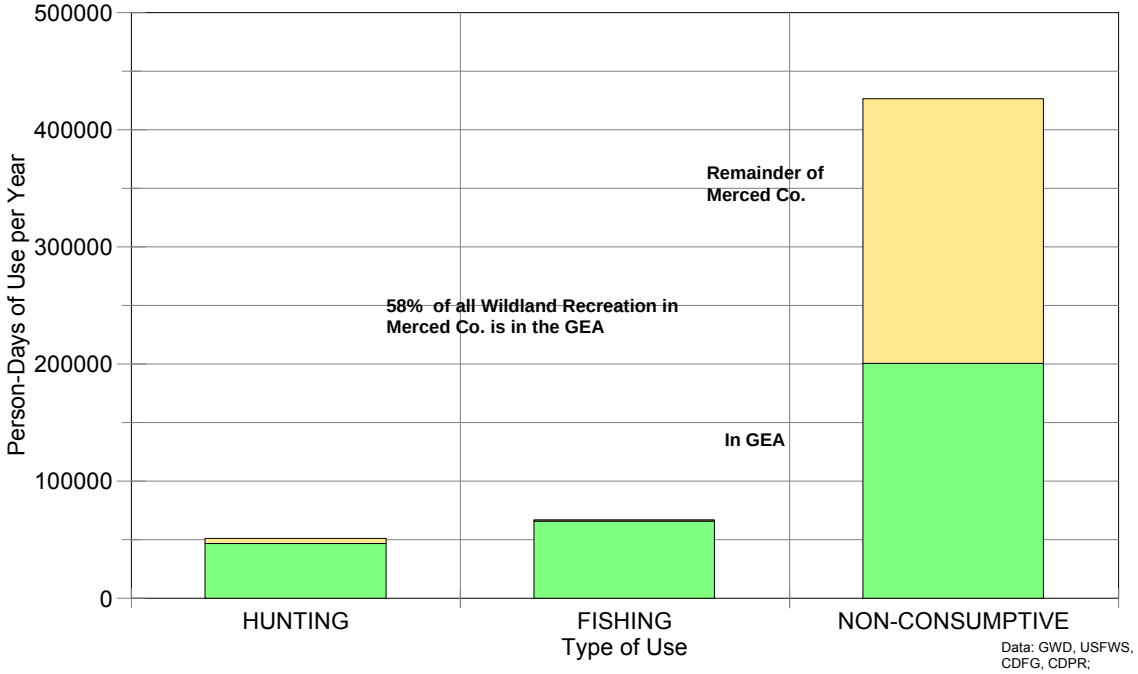
Figure 5 Participation in Land Management in Grassland Ecological Area



CGWDtalk; Mgmt Lands
05/09/00

Data: GWD, USFWS,
CDFG, others;
Analysis: TRA

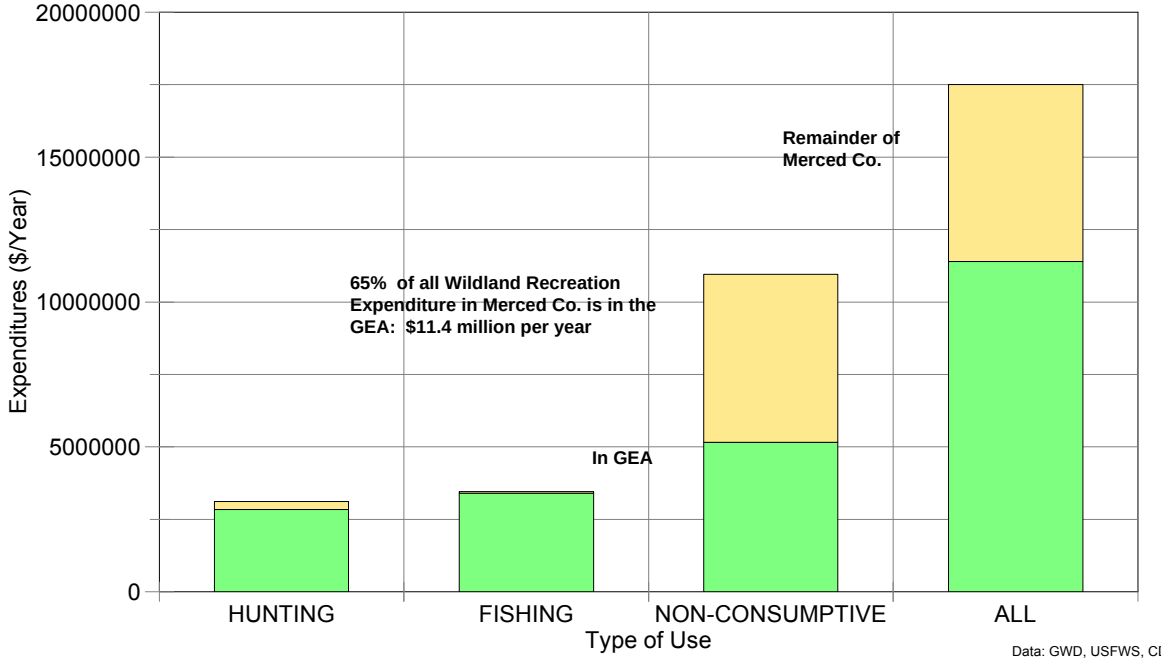
Figure 6
Recreation Use in GEA and Merced Co.



Data: GWD, USFWS, CDFG, CDPR;
Analysis: TRA

CGWDtalk; Rec Use
05/09/00

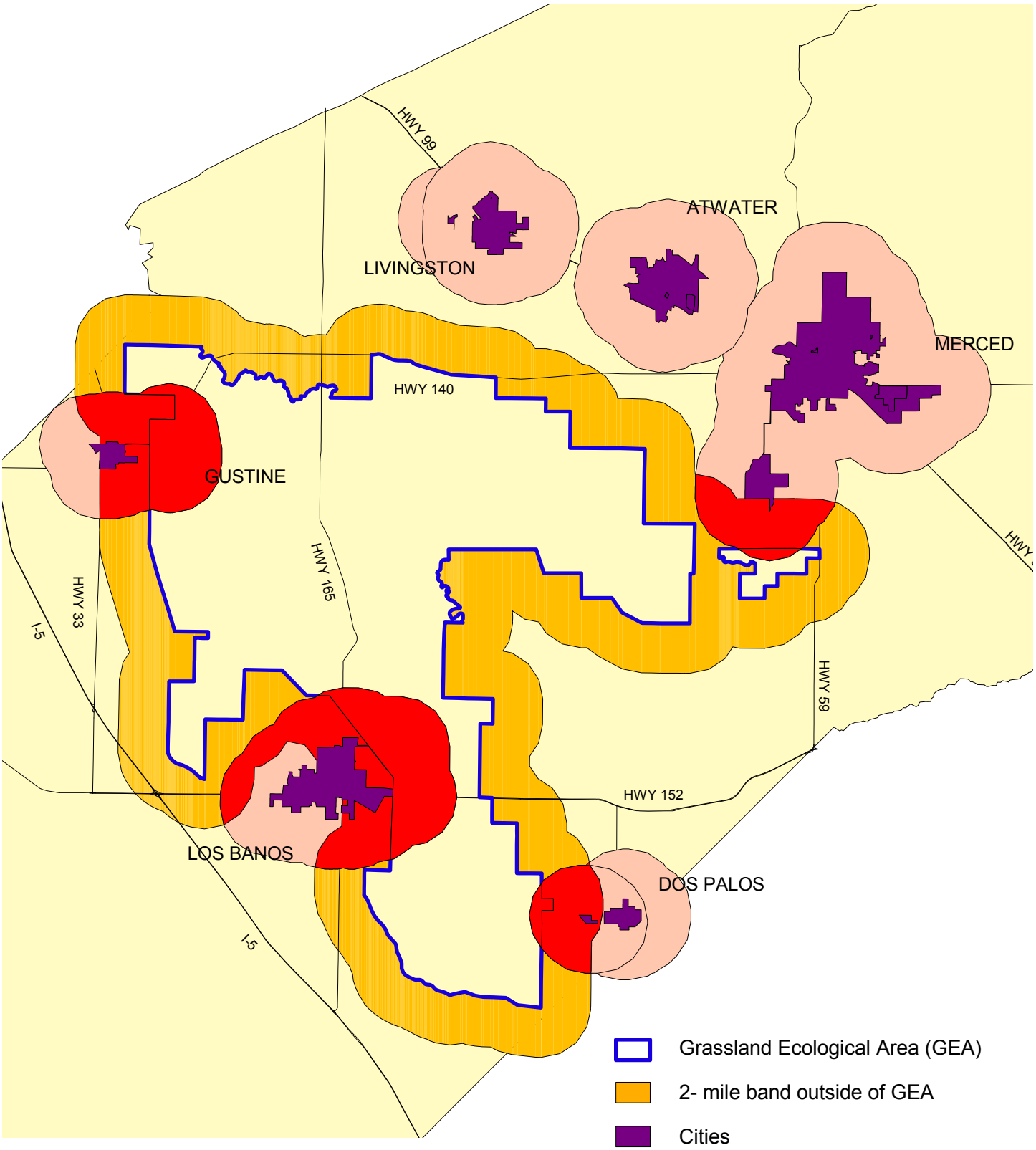
Figure 7
Recreation Value in GEA and Merced Co.



Data: GWD, USFWS, CDFG, CDPR;
Analysis: TRA

CGWDtalk; Rec Val
05/09/00

Figure 8
Cities and the Grassland Ecological Area
Zones of Conflict 2040



Grassland Ecological Area (GEA)
2- mile band outside of GEA
Cities
2-mile potential city expansion zone
Zone of conflict

N
0 1 2 3 4 5 Miles

Source: Toby Goldman
Map: Thomas Reid Associates, 6/20/01

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APPENDIX 1

TABLES

SUMMARY TABLE S-1: ALL EXPENDITURES FOR HABITAT MANAGEMENT IN THE GEA AND MERCED COUNTY – 1990-99
ALL EXPENDITURES FOR HABITAT MANAGEMENT – 1990 - 1999
ALL AGENCIES AND SPONSORS

ACRES												ALL MERCED	GEA
PROGRAM SPONSOR	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**TOTAL ACRES**	**AVG/YR**	**ONLY**
Private Landowners	110000	110000	110000	110000	110000	110000	110000	110000	110000	110000	1100000	110000	110000
NRCS					20372	19913	14174	8492	15771		78722	15744	15744
WILDLIFE CONSERVATION BOARD	5595		1198	340	697	483	2213	280	2160		12966	1621	1621
WCB – INLAND WETLANDS CONSERV	1101	1101	1101	1101	1101	1101	1101	1101	1101		9909	1101	1101
CAL FISH AND GAME	23065	23065	23065	23065	23065	23065	23065	23065	23065	23065	230650	23065	15454
CALIFORNIA STATE PARKS	33378	33378	33378	33378	33378	33378	33378	33378	33378	33378	333780	33378	2837
DUCKS UNLIMITED					2235	6786	20997	10200	6540		46758	5195	5195
USFWS PARTNERS FOR WILDLIFE	1294	4303	1749	276	10089	7149	2499	3496	1992		32847	3650	3650
USFWS SAN LUIS NWR COMPLEX	33108	33108	33108	33108	33108	33108	33108	33108	33108	33108	331080	33108	33108
CALIFORNIA WATERFOWL ASSN				203	203	203	203	203	203		1218	203	203
TOTAL ACRES	207541	204955	203599	201471	234248	235186	240738	223323	227318	199551	2177930	227065	188913

EXPENDITURES												ALL COUNTY	GEA ONLY
PROGRAM SPONSOR	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**TOTALS**	**AVG/YR**	
Private Landowners	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$4,325,200	$43,252,000	$4,325,200	$4,325,200
GWD	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,434,353	$1,537,605	$14,971,958	$1,497,196	$1,497,196
NRCS					$240,562	$218,277	$166,278	$416,847	$78,232		$1,120,196	$140,025	$140,025
WILDLIFE CONSERVATION BOARD	$6,275,000		$1,220,000	$776,845	$1,550,000	$1,033,000	$119,668	$40,386	$429,020		$11,443,919	$1,271,547	$1,271,547
WCB – INLAND WETLANDS CONSERV	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222	$94,222		$847,998	$84,800	$84,800
CAL FISH AND GAME	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$30,000,000	$3,000,000	$2,010,000
CALIFORNIA STATE PARKS	$1,818,626	$1,561,666	$1,791,779	$1,736,411	$1,948,999	$1,803,604	$1,782,720	$1,725,242	$1,969,156	$1,570,645	$17,708,848	$1,770,885	$150,525
DUCKS UNLIMITED					$461,835	$2,373,770	$1,883,355	$258,661	$5,389,612		$10,367,233	$1,151,915	$1,151,915
USFWS PARTNERS FOR WILDLIFE	$157,535	$222,681	$160,315	$88,245	$253,199	$192,250	$135,351	$1,097,163	$205,545		$2,512,284	$279,143	$279,143
USFWS SAN LUIS NWR COMPLEX	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$2,403,281	$2,691,569	$2,822,974	$3,327,770	$5,530,023	$31,775,617	$3,177,562	$3,177,562
CALIFORNIA WATERFOWL ASSN				$31,866	$31,866	$31,866	$31,866	$31,866	$31,866		$191,196	$31,866	$31,866
TOTAL EXPENDITURES	$20,170,583	$13,703,769	$15,091,516	$14,552,789	$16,405,883	$16,975,470	$15,730,229	$15,312,561	$20,284,976	$15,963,473	$164,191,249	$16,730,139	$14,119,779
EXPENDITURE PER ACRE PER YEAR	$97	$67	$74	$72	$70	$72	$65	$69	$89	$80		$74	$75
PUBLIC EXPENDITURE PER ACRE PER YE	$162	$99	$115	$112	$97	$101	$87	$97	$136	$130		$106	$124

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SUPPORTING TABLE S1
USFWS EXPENDITURES FOR WETLAND ENHANCEMENT AND RESTORATION 1996-98
US FISH AND WILDLIFE SERVICE COST SHARE

NAME	WETLAND ACRES RESTORED	WETLAND ACRES ENHANCED	TOTAL ACRES	RIPARIAN MILES RESTORED	TOTAL COST	FWS COST	COOPERATORS
Bee Ess Land and Cattle	0	700	700	0	$31,651	$5,000	WCB
Eighty Gun Club	0	80	80	0	$4,000	$2,000	
Hewitson Ranch	285	0	285	0	$25,800	$12,000	DU,NRCS
Modesto Properties	0	600	600		$37,000	$12,000	DU?
Oh So Hi	0	118	118		$3,500	$1,750	
Salinas Land and Cattle	0	200	200		$15,000	$7,500	
Stevens Creek Quarry	84	0	84		$2,400	$1,200	
Underwood	0	152	152		$6,000	$3,000	DU
Webfoot	0	280	280		$10,000	$5,000	
1996 TOTAL	369	2130	2499	0	$135,351	$49,450	
Gustine Land and Cattle	0	2211	2211		$12,012	$6,000	
La Canada	0	127	127		$11,620	$5,000	
Modesto Properties	47	500	547		$25,775	$10,000	DU,NRCS
New McNamara	0	173	173		$38,978	$0	DU
Ramacclotti-Wooten	0	138	138		$60,898	$10,000	DU,NRCS
San Felipe Ranch	0	0	0	5	$902,880	$25,000	DU,NRCS,WCB
Vogt, Chet	0	300	300		$45,000	$5,000	
1997 TOTAL	47	3449	3496		$1,097,163	$61,000	
240 Gun Club	0	240	240		$14,200	$7,100	DU
Castle Duck Club	0	712	712		$116,545	$10,000	WCB, NRCS
Gables Land and Cattle	0	197	197		$12,525	$4,700	NRCS
Gallo, Michael	75	0	75		$19,150	$4,800	NRCS
Giovanotto Duck Club	0	47	47		$20,000	$7,500	NRCS
Salinas Land and Cattle	0	675	675		$20,500	$10,250	
Wooten Gun Club	0	46	46		$2,625	$1,100	NRCS
1998 TOTAL	75	1917	1992		$205,545	$45,450	

SUPPORTING TABLE S2
NRCS EXPEIDITURES FOR HABITAT RESTORATION AND EASEMENT ACQUISITIONS 1994 - 98

YEAR	PARTICIPANTS	ACRES	RESTOR	ACQUIS	PAYMENTS
1994					
AG CONSERVATION PROGRAM	9	459	$22,285		$22,285
WATERBANK PROGRAM	43	19913	$218,277		$218,277
1994 TOTALS	52	20372	$240,562		$240,562
1995					
AG CONSERVATION PROGRAM	0	0	$0		$0
WATERBANK PROGRAM	43	19913	$218,277		$218,277
1995 TOTALS	43	19913	$218,277		$218,277
1996					
AG CONSERVATION PROGRAM	8	734	$22,967		$22,967
WATERBANK PROGRAM	33	13440	$143,311		$143,311
HABITAT SUBTOTAL	41	14174	$166,278	$0	$166,278
WETLAND RESERVE PROGRAM					
Permanent Easements	1	149	$51,304	$298,160	$349,464
30-Year Easements	0	0			$0
EASEMENT SUBTOTAL	1	149	$51,304	$298,160	$349,464
1997					
AG CONSERVATION PROGRAM					
WATERBANK PROGRAM	26	7922			$92,600
Restoration Agreements	3	570	$416,847		$416,847
HABITAT SUBTOTAL	29	8492	$416,847	$0	$509,447
WETLAND RESERVE PROGRAM					
Permanent Easements	0	0			$0
30-Year Easements	1	593	$85,000	$800,280	$885,280
1997 EASEMENT SUBTOTAL	1	593	85000	800280	885280
1998					
AG CONSERVATION PROGRAM					
WATERBANK PROGRAM	23	6576			$77,443
CONSERVATION RESERVE PROGRAM	7	5340	$78,232		$101,565
WILDLIFE HABITAT INCENTIVE PROGRAI	11	3855			$81,339
HABITAT SUBTOTAL	41	15771	$78,232	$0	$260,347
WETLAND RESERVE PROGRAM					
Permanent Easements	1	178	$75,000	$267,750	$101,565
30-Year Easements	0	0			$0
1998 TOTALS	1	178	$75,000	$267,750	$101,565

SUPPORTING TABLE S3
CWCB EXPENDITURES FOR WETLAND RESTORATION AND ACQUISITIONS 1990 - 1998
CALIFORNIA WILDLIFE CONSERVATION BOARD
INLAND WETLANDS CONSERVATION PROGRAM
1990 to 1998

PROJECT	ACRES	COST
Acquisitions		
Los Banos Wildlife (Reserve Gun Club)	171	$278,000
Mud Slough Wetlands (Hwy 152)	780	$570,000
Mud Slough Wildlife Area (Neves and Lo Bue)	258	$661,000
TOTAL ACQUISITIONS	1209	$1,509,000
Restoration Projects		
Mud Slough Wetland Restoration	780	$30,000
Los Banos Wildlife Area (Field 62)	302	$312,000
Stillbow Water Delivery System	2000	$8,000
N. Grassland Wildlife Area (China Island Unit)	535	$291,000
San Joaquin Valley Wetland Restoration	285	$47,000
Mud Slough North Drainage	2800	$34,000
Grassland Envir. Education Center	15	$27,000
Wetland Enhancement Bee Ess	700	$23,000
Wetland Enhancement (Modesto Properties)	1283	$76,000
TOTAL RESTORATION PROJECTS	8700	$848,000
GRAND TOTAL	9909	$2,357,000
PER YEAR AVERAGE	1101	$261,889

SUPPORTING TABLE S4
CDFG EXPENDITURES FOR ALL ACTIVITIES 1999-2000

Habitat Conservation and Planning	$160,000
Inland and Anadromous Fisheries Management	$600,000
Wildlife Management	$160,000
Wildlife Refuge Management	$1,120,000
Hatchery Programs	$240,000
Law Enforcement	$370,000
Administration	$350,000
Subtotal	$3,000,000

CALIFORNIA DEPARTMENT OF FISH AND GAME
CALIFORNIA WATERFOWL HABITAT PROGRAM (Presley Program)

	NO. PROPERTIES	ANN. AV.	ACRES	ANN. AV.
1993 through 1996	17	4.25	5619	1405
1997 through 1998	9	4.5	1828	914
TOTAL	26		7447	

YEAR	PAYMENT
1994	$112,380
1995	$112,380
1996	$112,380
1997	$107,844
1998	$148,940
TOTAL	$593,924

EASEMENT	Klamath	248	$372,000

SUPPORTING TABLE S5
DUCKS UNLIMITED EXPENDITURES FOR HABITAT ENHANCEMENT 1994-1999
DUCKS UNLIMITED

YEAR	PROJECT	ACRES	COST
1994	Underwood	1093	$10,500
	Salt Slough I	686	$246,560
	Salt Slough II	336	$149,775
	Salt Slough Pipeline I	120	$55,000
	1994 TOTALS	2235	$461,835
1995	Mud Slough	395	$1,450,100
	Greenhouse	3650	$57,500
	Greenhouse	1900	$15,135
	China Island I	636	$291,644
	Los Banos WA Road 62	205	$46,283
	1995 TOTALS	6786	$2,373,770
1996	Rooney Ranch	100	$8,500
	Modesto Property	500	$32,045
	Baron	600	$23,000
	Mesquite?	220	$4,000
	South City	179	$8,000
	Red Fern	100	$9,000
	Santa Fe L&C	106	$10,600
	Ramogni	216	$25,400
	Haywire	180	$13,000
	Triple D	90	$9,800
	Underwood	246	$10,000
	China Island III	250	$83,836
	Gadwall Unit	470	$95,264
	Boundary Drain	500	$142,305
	Salt Slough Pipeline II	175	$122,416
	San Luis NWR-- Kesterson Unit	306	$224,174
	San Luis NWR-- Nevada Unit	350	$20,000
	San Luis NWR-- Sousa	256	$80,000
	San Luis NWR-- Mariposa	400	$185,000
	San Luis NWR-- East Kesterson	407	$187,000
	Gadwall Ditch Extension	1718	$163,190
	Los Banos Creek Rehabilitation	6267	$216,991
	Eagle Ditch Enhancement	3021	$72,360
	Big Water Delivery Ditch	306	$66,167
	Fremont Drain	1024	$3,478
	Big Water Drain	1658	$15,678
	Upper Gadwall	740	$12,256
	Brillo Ditch	612	$9,895
	Monitoring and Evaluation		$30,000
	1996 TOTALS	20997	$1,883,355

YEAR	PROJECT	ACRES	COST
1997	Monitoring and Evaluation		$30,000
	Underwood	3780	$10,000
	New Windmere?	640	$49,476
	San Joaquin Wedland Farms	246	$38,500
	Ramagiotti Wooden	620	$62,550
	Deer Park	230	$3,000
	Hollow Tree	457	$10,000
	Wheel Berry	72	$15,135
	Hollister	4000	$10,000
	Mendota	155	$30,000
	1997 TOTALS	10200	$258,661
1998	Monitoring and Evaluation		$30,000
	Hollister?	35	$7,000
	Fresher Farms?	150	$17,500
	Ducks Home	266	$10,000
	Modesto Properties	935	$46,242
	South City	179	$10,915
	240 Club	1600	$16,200
	Santa Cruz		
	Santa Fe Sierra	100	$7,345
	San Luis NWR – Flood Relief	1850	$2,765,000
	Merced NWR	1000	$1,500,000
	Los Banos WA Road 62		$151,770
	San Felipe Ranch	425	$827,640
	1998 TOTALS	6540	$5,389,612
1999	Rooney Ranch	100	$20,750
	Lower Borgess	40	$16,000
	Gallo	360	$56,500
	Pioneer	153	$3,700
	South City	75	$4,000
	Frasher Farms	150	$19,000
	Mar	220	$22,500
	Halfback	119	$15,000
	Riverfield	342	$8,250
	Redfern	192	$3,800
	The Duck Club	167	$3,750
	Oh So Hi	188	$5,000
	Six Spot	55	$4,500
	North Anchor Marsh	30	$7,000
	Mesquite	200	$4,000
	Fremont Pond	73	$25,500
	Castle Duck Club – Ph. 2		$36,884
	Exeter Land and Cattle Ph. 2		$5,875
	1999 TOTALS	2464	$262,009
	GRAND TOTAL	49222	$10,629,242

SUPPORTING TABLE S6
USFWS PARTNERS FOR WILDLIFE EXPENDITURES FOR HABITAT ENHANCEMENT 1990 - 98
USFWS PARTNERS FOR WILDLIFE PROGRAM

CLUB	ACRES	COST
B" AND "D" GUSTINE	198	$4,900
SIMPLE TEN CLUB	166	$5,915
EXETER DEVELOPMENT CLUB	0	$10,600
SAN JOAQUIN WETLAND FARMS	600	$33,100
FOUR "S" LAND AND CATTLE	150	$32,000
MESQUITE GUN CLUB	45	$7,000
GUSTINE LAND AND CATTLE	19	$14,500
COACHES GUN CLUB	43	$20,020
KLAMATH LAND AND CATTLE	73	$29,500
1990 TOTALS	1294	$157,535
GUSTINE GUN CLUB	500	$5,479
HOLLISTER LAND AND CATTLE	1000	$15,400
DEER PARK	24	$7,300
UNDERWOOD SOUTH	50	$8,000
ABINANTE CLUB	30	$15,000
SAN JOAQUIN WETLAND FARMS	12	$15,200
CLEAR LAKE LAND AND CATTLE	60	$12,000
DOUBLE "D" DUCK CLUB	56	$7,500
REEDLEY GUN CLUB	56	$7,500
SANTA FE SIERRA	75	$39,000
STILLBOW RANCH ET AL	2000	$20,000
SAND LAKE	51	$12,000
E.T.N. INC.	14	$11,502
KLAMATH LAND AND CATTLE	250	$4,800
FOUR "S" LAND AND CATTLE	125	$42,000
1991 TOTALS	4303	$222,681
GUSTINE LAND AND CATTLE	220	$3,588
HOLLISTER GUN CLUB	72	$9,600
BARBARA DUCK CLUB	70	$5,000
REEVES LAKE	13	$17,000
UNDERWOOD NORTH	20	$6,000
SIMPLE TEN CLUB	15	$5,000
EXETER	115	$10,000
RAMOGNI LAND COMPANY	42	$8,032
PIEDMONT	73	$5,500
FLYWAY CLUB	26	$17,800
SAND LAKE	30	$16,000
GABLES GUN CLUB	445	$7,000
COACHES GUN CLUB	43	$10,000
GATOS GUN CLUB	15	$6,000
$"D" AND "B"	60	$5,000
BARDIN RANCH	245	$12,710
SNOWBIRD RANCH	120	$12,000
FOUR "S" LAND AND CATTLE	125	$4,085
1992 TOTALS	1749	$160,315
MAR LAND AND CATTLE	0	$0
SUNSET	0	$6,522
FLYWAY RANCH	0	$8,250
SAND LAKE DEVELOPMENT	0	$9,945
FRASHER FARMS	0	$5,000
COACHES GUN CLUB	0	$10,261
ABC LAND AND CATTLE	30	$12,508
BARBARA DUCK CLUB	0	$13,761
ROBERT FLYNN	160	$12,319
WHEEL-BERRY	86	$9,679
1993 TOTALS	276	$88,245
CLUB	ACRES	COST
BRIDGEPORT RESERVOIR	0	$6,000
MAGNESON	0	$2,750
MESQUITE DRAIN	0	$14,124
BRITTO DRAIN	0	$5,835
SANTA FE LAND AND CATTLE	0	$3,937
TRANQUILITY GUN CLUB	160	$5,000
PIEDMONT LAND DEVELOPMENT	20	$2,100
SUNSET	30	$5,300
STILLBOW RANCH	588	$12,462
ROONEY RANCH (CLEAR LAKE)	55	$9,985
ALMADEN	228	$9,700
SOUTH SAN FRANCISCO	50	$6,700
COON DUCK CLUB	55	$6,843
GALLO (BEAR CREEK)	400	$8,000
MODESTO PROPERTIES	1900	$22,025
SAN FELIPE RANCH	400	$25,000
WHEEL-BERRY	30	$5,142
MUD SLOUGH DRAIN PROJECT	5633	$80,893
SAN JOAQUIN WETLAND FARMS	220	$9,403
WINGSETTER (SASO)	320	$12,000
1994 TOTALS	10089	$253,199
SOUTH SAN FRANCISCO	20	$5,000
BARDIN	600	$27,000
GREENHOUSE RANCH	650	$66,250
EXETER DEVELOPMENT	0	$12,000
HOLLOW TREE DRAIN	5839	$48,000
SAN JOAQUIN WETLAND FARMS	40	$34,000
1995 TOTALS	7149	$192,250
EIGHTY GUN CLUB	80	$4,000
UNDERWOOD	152	$6,000
OH SO HI	118	$3,500
WEBFOOT	280	$10,000
HEWITSON RANCH	285	$25,800
SALINAS LAND AND CATTLE	200	$15,000
MODESTO PROPERTIES	600	$37,000
STEVENS CREEK QUARRY	84	$2,400
BEE ESS LAND AND CATTLE	700	$31,651
1996 TOTALS	2499	$135,351
Gustine Land and Cattle	2211	$12,012
La Canada	127	$11,620
Modesto Properties	547	$25,775
New McNamara	173	$38,978
Ramacclotti-Wooten	138	$60,898
San Felipe Ranch	0	$902,880
Vogt, Chet	300	$45,000
1997 TOTAL	3496	$1,097,163
240 Gun Club	240	$14,200
Castle Duck Club	712	$116,545
Gables Land and Cattle	197	$12,525
Gallo, Michael	75	$19,150
Giovanotto Duck Club	47	$20,000
Salinas Land and Cattle	675	$20,500
Wooten Gun Club	46	$2,625
1998 TOTAL	1992	$205,545
GRAND TOTAL	32847	$2,512,284

SUPPORTING TABLE S7
CWA EXPENDITURES FOR HABITAT ENHANCEMENT 1993-98
CALIFORNIA WATERFOWL ASSOCIATION

1993 THROUGH 1998

PROJECT	ACRES	COST
BEE ESS LAND AND CATTLE	100	$26,500
ELLWORTHY BROTHERS	325	$16,198
CASTLE DUCK CLUB	720	$135,000
UNDERWOOD GUN CLUB	40	$9,000
EXETER LAND AND CATTLE	32	$4,500
TOTALS	1217	$191,198
PER YEAR AVERAGE	203	$31,866

SUPPORTING TABLE S8
CALIFORNIA WILDLIFE CONSERVATION BOARD MERCED COUNTY PROJECTS
CAPITAL PROJECTS (PUBLIC ACCESS AND CONVEYANCE) 1965-1999

YEAR/PROJECT	ALLOCATION	ACREAGE	PURPOSE
1965			
Los Banos WLA Expansion	$46,506	208	
1969			
Canyon Road	$12,400		public access
Cottonwood Road	$11,800		public access
Mervel Road	$10,800		public access
1978			
Cottonwood Creek WLA	$722,000	6136	
1980			
Cottonwood Creek WLA – Dev. Planning	$23,500		soil samples
Los Banos WLA Water System Improvement	$45,200		conveyance system
1981			
Los Banos WLA Water System Improvement	$33,075		
1982			
Los Banos WLA Water Supply Agreement	$200,000		water supply
1984			
Cottonwood Creek WLA – – Water Supply	$0		conveyance system
1985			
1986			
Grassland Water Facility Improvement Project	$450,000		conveyance system
1987			
Los Banos – Exp 1	$1,725,000	1329	
Los Banos - Exp 2	$1,465,000	929	
Los Banos - Exp 3	$210,000	120	
1990			
North Grassland WLA-- Salt Slough/China Islanc	$6,275,000	5595	
1992			
Los Banos - Exp 4	$278,000	171	
Mud Slough Wetlands	$570,000	779	
Wetland CEP-Klamath Land/Cattle	$372,000	248	
1992 TOTAL	$1,220,000	1198	
1993			
Mud Slough Wetlands Restoration	$30,000		conveyance system
Stillbow Water Delivery System	$8,000		conveyance system
West Hilmar WLA	$690,000	340	
Los Banos WLA PA (Parking Lot)	$48,845		public access
	$776,845	340	
PRE-1993 TOTAL ALL YEARS	$13,227,126	17053	
1994			
Mud Slough WLA	$1,200,000	395	
Los Banos WLA Wetland Restoration	$350,000	302	
1994 TOTAL	$1,550,000	697	
1995			
Mud Slough North Drainage Project	$34,000		conveyance system
Mud Slough Exp 1	$661,000	258	
North Grassland WLA – China Is. Unit	$291,000	225	
San Joaquin Valley Wetland Restoration	$47,000		
1995 TOTAL	$1,033,000	483	
1996			
Grassland Educational Center – WR	$27,000	230	
Wetland Enhancement – Bee Ess Property	$23,051	700	
Wetland Enhancement – Modesto Property	$69,617	1283	
1996 TOTAL	$119,668	2213	
1997			
Wetland Habitat Restoration (Elworthy)	$40,386	280	
1998			
Owens Creek Habitat Restoration	$150,000		
Wetland Habitat Restoration and Enhancement (Santa Cruz Land and Cattle)	$65,000	1440	
Enhancement/Restoration (Castle Land and Cattle)	$62,250	720	
Los Banos WLA PA	$151,770		
1998 TOTAL	$429,020	2160	
1999			
East Grasslands Wetlands	$15,000	41	
Mud Slough-- Exp 2	$1,300,000	724	
1999 TOTAL	$1,315,000	765	
GRAND TOTAL	$17,714,200	22453	

SUPPORTING TABLE S9
GWD BUDGETS FOR CAPITAL EXPENDITURES AND MAINTENANCE; WATER DELIVERY CHARGES BY AGENCY

	1996	
Capital Expenditures		
Structures		
Silt Removal/Channel Repair		
SUBTOTAL	$269,360	
Maintenance Cost		
Aquatic Weed Control	$13,000	
Levee Road Maintenance	$70,000	
Herbicide Application	$10,000	
SUBTOTAL	$93,000	
TOTAL ANNUAL CAPITAL EXPENDITURE	$362,360	For total GWD budget see O&M page
Water Delivery Charges		
CCID (163630 acf @ 5.67/acf)	$927,327	
GWD (35810 acf @ 13.75/acf)	$492,388	
SLCC for CVPIA water (14000 acf @14.09/acf)	$197,260	
SLCC (36,480 acf @ 13.02/acf)	$474,979	
	$2,091,954	

SUPPORTING TABLE S10
IN LIEU FEES PAID TO MERCED COUNTY BY STATE AND FEDERAL AGENCIES

STATE OF CALIFORNIA
CALIFORNIA DEPARTMENT OF FISH AND GAME

YEAR	IN LIEU FEE AMOUNT
94thru 95	$36,702
95 thru 96	$51,922
96 thru 97	$54,213
97 thru 98	$54,213
98 thru 99	$54,213

FEDERAL GOVERNMENT

US FISH AND WILDLIFE SERVICE	SAN LUIS NWR	MERCED NWR	
ACRES	26,074	7,034	
APPRAISED VALUE	$1,620,000	$365,000	$1,985,000
1998 TAXES PAID TO MERCED CO.	$75,641	$17,043	$92,684
IN LIEU FEES PER ACRE	$2.90	$2.42	

TOTAL (STATE PLUS FEDERAL) $146,897

SUPPORTING TABLE S11
STATE, FEDERAL AND GWD O&M BUDGETS

CAL STATE PARKS

	SALARIES AND BENEFITS	O&E PROJECTS	CONTRACTS AGREEMENTS	TOTAL
FY 99/00				$1,570,645
FY 98/99	$931,462	$1,037,964		$1,969,426
FY 97/98				$1,725,242
FY 96/97				$1,782,720
FY 95/96				$1,803,604
FY 94/95				$1,948,999
FY 93/94				$1,736,411
FY 92/93				$1,791,779
FY 91/92				$1,561,666
FY 90/91				$1,818,626

FEDERAL: SAN LUIS NWR COMPLEX

FY 1999	$1,438,429	$1,773,404	$2,318,190	$5,530,023

GWD

FY1998	$1,297,506	$240,099		$1,537,605
FY1999	$1,104,932	$329,421		$1,434,353

SUPPORTING TABLE S12
TOTAL ACRES AND COSTS OF CONSERVATION EASEMENTS – ALL ENTITIES
CONSERVATION EASEMENT AQUISITIONS

	PRE-1990	1990	1991	1992	1993	1994	1995	1996	1997	1998	TOTALS
ACRES											
NRCS								149	593	178	
WILDLIFE CONSERVATION BOARD		134	134	134	134	134	134	134	134	134	1209
WCB – INLAND WETLANDS CONSERV											
CAL FISH AND GAME											248
DUCKS UNLIMITED							130				
USFWS	28018.82	4527.6	5352.4	692.64	1955	3952.46	8189.67	5335.72	3791.14	875.94	62691.39
CALIFORNIA WATERFOWL ASSN											
TOTAL ACRES	28018.82	4661.6	5486.4	826.64	2089	4086.46	8453.67	5618.72	4518.14	1187.94	64148.39
COST											
NRCS								$51,304	$85,000	$75,000	
WILDLIFE CONSERVATION BOARD											
WCB – INLAND WETLANDS CONSERV		$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$167,667	$1,509,000
CAL FISH AND GAME											$372,000
DUCKS UNLIMITED							$310,000				
USFWS	$8,588,181	$1,688,280	$1,736,200	$430,421	$660,822	$2,377,540	$3,957,392	$3,395,803	$2,653,798	$633,370	$26,121,807
CALIFORNIA WATERFOWL ASSN											
TOTAL COST	$8,588,181	$1,855,947	$1,903,867	$598,088	$828,489	$2,545,207	$4,435,059	$3,614,774	$2,906,465	$876,037	$28,002,807
										9 yr AV	$2,157,181

RECREATION: SUMMARY TABLE R-1 (rev. 3/20/00)
SUMMARY OF USERS TO PUBLIC AND PRIVATE WETLANDS IN THE GEA AND REST OF MERCED CO. 1994-1998

	Analysis Year				
	1994//5	1995//6	1996//7	1997//8	1998//9
HUNTING					
In GEA					
Federal NWR	3809	5420	5798	7846	8510
State Refuges		12411	12378	10950	
Private			*28465*	28465	
Subtotal			46641	47261	
In All Merced Co.					
Federal NWR	3809	5420	5798	7846	8510
State Refuges		17376	16660	15070	
Private			28465	28465	
Subtotal			50923	51381	
FISHING					
In GEA					
Federal NWR	4964	32085	52027	54700	65640
State Refuges		12888	14022	10924	
Private					
Subtotal			66049	65624	
In All Merced Co.					
Federal NWR	4964	32085	52027	54700	65640
State Refuges		14784	15129	11501	
Private					
Subtotal			67156	66201	
NON-CONSUMPTIVE					
In GEA					
Federal NWR	29343	146725	184782	181158	184782
State Refuges		11514	15984	9031	
Private					
Subtotal			200766	190189	
In All Merced Co.					
Federal NWR				181158	
State Refuges		15222	22131	13407	
State Parks			404472	377008	499806
Private					
Subtotal			426603	571573	

SUMMARY TABLE R-2 (rev. 3/20/00)
EXPENDITURES FOR HUNTING/FISHING AND WILDLIFE WATCHING IN THE GEA AND ALL OF MERCED CO. – 1996/97
BASED ON FEDERAL SURVEY OF HUNTING/FISHING AND WILDLIFE WATCHING 1996

		HUNTING	FISHING	NON-CONSUMPTIVE	TOTAL
IN GEA		46641	66049	200,766	313,456
IN ALL MERCED CO.		50923	67,156	426,603	544,682
CALIF		7,452,000	35,815,000	77,467,000	120,734,000
GEA % of CA		0.63%	0.18%	0.26%	0.26%
Merced % of CA		0.68%	0.19%	0.55%	0.45%
EXPENDITURES					
CALIFORNIA					
TRIP		$277,060,000	$1,454,325,000	$1,579,434,000	$3,310,819,000
EQUIP		$471,380,000	$1,746,979,000	$1,040,355,000	$3,258,714,000
OTHER		$106,518,000	$123,055,000	$254,561,000	$484,134,000
TOTAL		$854,958,000	$3,324,359,000	$2,874,350,000	$7,053,667,000
Average Expenditure					
TRIP		$37	$41	$20	$27
EQUIP		$63	$49	$13	$27
OTHER		$14	$3	$3	$4
TOTAL		$115	$93	$37	$58
	% in Area				
IN GEA					
TRIP	100%	$1,734,100	$2,682,000	$4,093,300	$8,509,400
EQUIP	15%	$442,500	$483,300	$404,400	$1,330,200
OTHER	100%	$666,700	$226,900	$659,700	$1,553,300
TOTAL		$2,843,300	$3,392,200	$5,157,400	$11,392,900
IN ALL MERCED CO.	% in Co.				
TRIP	100%	$1,893,300	$2,727,000	$8,697,800	$13,318,100
EQUIP	15%	$483,200	$491,400	$859,400	$1,834,000
OTHER	100%	$727,900	$230,700	$1,401,800	$2,360,400
TOTAL		$3,104,400	$3,449,100	$10,959,000	$17,512,500

ASSUMPTIONS AND METHODS:
Tables referred to by number are from the USFWS 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation
Non-Consumptive days estimated from Number of Calif Participants times 13 days national average days per participant.

5,959,000	13	77,467,000

California expenses for hunting from Table 55: 100% of trip and "other" assumed spent in Merced Co.; 15% of equipment expenses
California trip expenses for fishing from Table 60; Cal. equipment expenses for wildlife watching from Table 48
Participation in wildlife watching activities away from home from Table 37.

RECREATION: SUPPORTING TABLE R1 (rev. 3/20/00)
USERS OF STATE REFUGES IN MERCED COUNTY 1994-1999
VISITS TO WETLANDS REFUGE AREAS IN MERCED COUNTY (1994 - 1999)

STATE RECREATIONAL AREAS

1997 to 1998	**Los Banos WA**	**North Grassl WA**	**Volta**	**GEA Subtotal**	**O'Neill Forebay WA**	**Little Panoche Reservoir WA**	**San Luis Reservoir**	**Cottonwood Creek**	**Merced Co. Total**
Hunting									
Waterfowl	3849	2224	2224	8297	138	81	18	50	8584
Other game birds	1169	27	27	1223	1169	0	92	165	2649
Mammals	1260	85	85	1430	175	366	509	1357	3837
Total Hunting	6278	2336	2336	10950	1482	447	619	1572	15070
Fishing	8364	1280	1280	10924	34	539	4	0	11501
Non-Hunting Uses	8611	210	210	9031	1315	2121	322	618	13407
TOTALS - 1997/8	23253	3826	3826	30905	2831	3107	945	2190	39978

1996 to 1997	**Los Banos WA**		**Volta**	**GEA Subtotal**	**O'Neill Forebay WA**	**Little Panoche Reservoir WA**	**San Luis Reservoir**	**Cottonwood Creek**	**Merced Co. Total**
Hunting									
Waterfowl	4811	2347	2347	9505	115	81	0	12	9713
Other game birds	2079	7	7	2093	1132	55	373	475	4128
Mammals	700	40	40	780	180	215	469	1175	2819
Total Hunting	7590	2394	2394	12378	1427	351	842	1662	16660
Fishing	10272	1875	1875	14022	44	1060	3	0	15129
Non-Hunting Uses	15568	208	208	15984	3360	1716	367	704	22131
TOTALS 1996/7	41020	6871	6871	54762	4831	3127	1212	2366	66298

1995 to 1996	**Los Banos WA**		**Volta**	**GEA Subtotal**	**O'Neill Forebay WA**	**Little Panoche Reservoir WA**	**San Luis Reservoir**	**Cottonwood Creek**	**Merced Co. Total**
Hunting									
Waterfowl	4424	3002	3002	10428	132	93	0	96	10749
Other game birds	695	26	26	747	1190	220	410	550	3117
Mammals	1036	100	100	1236	171	717	278	1108	3510
Total Hunting	6155	3128	3128	12411	1493	1030	688	1754	17376
Fishing	10268	1310	1310	12888	13	1845	20	18	14784
Non-Hunting Uses	11076	219	219	11514	1436	1426	274	572	15222
TOTALS 1995/6	27499	4657	4657	36813	2942	4301	982	2344	47382

Sources: California Department of Fish and Game, California State Parks

RECREATION: SUPPORTING TABLE R2
STATE PARK ATTENDANCE RECORDS

	MCC0NNELL SRA	HATFIELD SRA	SAN LUIS RESERVOIR SRA	GVG SRA	PACHECO SP	TOTAL
1996 TO 1997	15434	4873	380458	1225	2482	**404472**
1997 TO 1998	18145	5345	348256	1750	3512	377008
1998 TO 1999	14449	5765	472592	2128	4872	499806
	48028	15983	1201306	5103	10866	1281286
3-YEAR AVERAGE	16009	5328	400435	1701	3622	427095

RECREATION: SUPPORTING TABLE R3
USERS IN FEDERAL WILDLIFE REFUGES (GEA) 1996-1998

	SAN LUIS NWR	MERCED NWR	FEDERAL TOTAL
1998 TO 1999			
Hunting			
Waterfowl	7842	668	8510
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	7842	668	8510
Fishing	65640	0	65640
Non-Hunting Uses	92992	91790	184782
TOTALS 1998/99	166474	92458	258932
1997 TO 1998			
Hunting			
Waterfowl	6736	1110	7846
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	6736	1110	7846
Fishing	54700	0	54700
Non-Hunting Uses	91168	89990	181158
TOTALS 1997/8	152604	91100	243704
1996 TO 1997			
Hunting			
Waterfowl	5305	493	5798
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	5305	493	5798
Fishing	52027	0	52027
Non-Hunting Uses	92017	86989	179006
TOTALS 1996/7	149349	87482	236831
1995 TO 1996			
Hunting			
Waterfowl	5067	353	5420
Other game birds	0	0	0
Mammals	0	0	0
Total Hunting	5067	353	5420
Fishing	32085	0	32085
Non-Hunting Uses	71171	75554	146725
TOTAL 1995/6	108323	75907	184230
1994 TO 1995			
Hunting			
Waterfowl	3429	180	3609
Other game birds	200	0	200
Mammals	0	0	0
Total Hunting	3629	180	3809
Fishing	4964	0	4964
Non-Hunting Uses	17642	11701	29343
TOTALS 1994/5	26235	11881	38116

Source: U.S. Fish and Wildlife Service

APPENDIX 2: ECONOMICS SUPPORTING STUDY

EXECUTIVE SUMMARY

This presents a one-page summary of Strong Associates' analysis of the economic impact of growth to the year 2040 in Merced County.

Demographics: Merced County's population is projected to grow by **422,000** from 1996 to 2040. Most of this (340,000) will occur within and in annexations to the cities.

- At low densities (averaging 4.5 residents per acre), **94,195 new acres** would be urbanized by 2040.
- At compact densities (9.0 residents per acre), **47,097 new acres** would accommodate the same growth.

Agriculture Impact: Currently, the County's farmlands produce total annual sales of $2.1 billion and support 27,300 jobs. With conversion to urban use by 2040:

- The low density scenario would result in an estimated **$229.2 million (11%) loss** in total annual sales and reduction of 3,300 jobs (12%).
- The compact scenario would halve that impact, with a **$114.6 million (5%) loss** in total annual sales and reduction of 1,660 farm-related jobs (6%).

Grasslands Ecological Area Impact: The 179,500-acre GEA generates total annual sales of $160.6 million and 3,286 jobs. With potential urban growth by 2040:

- The low density scenario would reduce total sales by an estimated **$14.3 million** (9%) annually and jobs by 328.
- Under the compact alternative, total annual sales would decrease by **$7.1 million** and jobs by 164.

Cities Fiscal: For the six cities combined, new growth from 1996-2040:

- Under the low density approach would result in a **shortfall of $53.6 million**, or $158 shortfall per capita, annually.
- Under the compact alternative would yield a **surplus of $6.3 million**, or $19 surplus per capita, annually.
- Thus the low density approach costs the cities ***$60 million more per year*** than the same growth at more compact density.

County Fiscal:

- Under the low density approach, new growth produces an estimated **$8.2 million deficit**, or $19 per new resident, annually.
- The compact alternative produces a **$6.2 million deficit**, or $15 per new resident.

INTRODUCTION

This report presents Strong Associates' economic analysis of the impact of growth to the year 2040 in Merced County. The recap table summarizes the overall findings, briefly discussed below.

Following this overview, the sections of the report provide the detailed findings and supporting documentation for the five series of tables:

- Table 1 series covers demographic impacts (population, jobs, and acres affected);
- Table 2 series shows the impact on private sector agricultural economy;
- Table 3 series pertains to the fiscal impact (revenues and costs) on the cities;
- Table 4 series is the fiscal impact on the County; and
- Table 5 series is the impact on the 179,500-acre Grasslands Ecological Area (GEA).

Note that all dollars are in constant current value, not adjusted for inflation.

Demographics: The population of Merced County is projected to more than triple from the existing 198,500 to 620,500 by 2040, an increase of 422,000.

- Most of this growth (340,000) will occur within and in annexations to the cities.
- About 82,000 new residents are projected in the unincorporated area.

The population growth by city is illustrated in Figure 1.1. As shown, the cities of Livingston, Los Banos and Merced are projected to be the fastest growing in the County.

Job growth closely parallels population growth. The County's existing 75,900 jobs will also more than triple to a total of 237,300 in 2040, an addition of 161,400 new jobs.

Currently, the County's population and businesses occupy 50,130 developed acres, an average of 3.96 residents per acre.

- Using a low density scenario for new growth, 94,195 new acres would be urbanized by 2040, almost tripling the total developed acreage, with an average of 4.48 residents per new acre developed.
- Under an alternative compact option, the same population could be accommodated on 47,097 new acres, at an average of 8.96 people per new acre.

Figure 1.2 illustrates the impact of the two scenarios on acres urbanized for each of the cities and unincorporated area.

Agriculture (Private Sector) Impact: Currently, the County has 1,162,000 acres of farmland producing total (direct and indirect) annual sales of $2.1 billion and supporting 27,300 farm-related jobs. With conversion of farmland to urban use by 2040:

- The low density scenario would result in an estimated $229.2 million (11%) loss in total annual sales and reduction of 3,300 jobs (12%).
- The compact scenario would halve that impact, with a $114.6 million (5%) loss in total annual sales and reduction of 1,660 farm-related jobs (6%).

Figure 2 graphically compares the total agricultural sales lost annually due to city and unincorporated area urbanization under the two scenarios.

Grasslands Ecological Area Impact: The GEA, comprising 179,500 acres, currently generates total annual sales of $160.6 million (from farming, land maintenance, recreation uses, and related economic activities) and 3,286 direct and indirect jobs. With fairly small amounts of farm and wetland acreage potentially affected by urban growth by 2040, we estimate:

- Under the low density scenario, total annual sales would drop by $14.3 million (9%) and jobs by 328.
- Under the compact alternative, in contrast, total annual sales would decrease by $7.1 million and jobs by 164.

Cities Fiscal Impact: The County's six cities combined currently average a balanced budget, with $86.1 million in annual revenues slightly exceeding $84.3 million in annual costs. For new growth from 1996 to 2040:

- Under the low density approach, combined new revenues of $228.9 million annually would be outstripped by estimated costs of $282.6 million – a $53.6 million annual shortfall.
- Under the compact alternative, new revenues of $229.9 million exceed estimated costs of $223.6 million, yielding an annual surplus of $6.3 million.
- Thus the low density approach costs the cities *$60 million more per year* than the same growth at more compact density.

On a per capita basis:

- Under the low density approach, combined cities' revenues averaging $674 per capita are exceeded by $832 costs, for a $158 annual loss per new resident.
- Under the compact alternative, however, revenues of $677 per capita exceed costs of $658, yielding a small annual surplus of $19 per new resident.

The revenues are nearly the same for both scenarios (with a slight difference due to the cities' greater tax share from infill development), while the costs are substantially higher for low density due to acre-related and capital improvement costs.

County Fiscal Impact: The County's 1996-97 budget shows slightly less revenues ($206.2 million) than costs ($208.9 million), for a $2.7 million shortfall. The new growth in both cities and unincorporated area will increase the deficit, but with less adverse impact from the compact density scenario, primarily due to lower projected road costs.

- Under the low density approach, the estimated annual deficit would increase by $8.2 million, or $19 per new resident.
- Under the compact alternative, $6.2 million would be added to the County's annual deficit, or $15 per new resident.

Figure 3 illustrates the difference in impact from the two scenarios on net annual revenues/costs per capita for all the cities as well as the County.

I. DEMOGRAPHICS

Results:

Table 1 describes the impacts of projected population growth to the year 2040 on Merced County, including each of the six incorporated cities and the unincorporated area. Overall, the population is expected to triple from the 1996 total of almost 200,000 to over 600,000. The cities of Merced, Los Banos, and Livingston are all expected to grow by more than 400%, while Atwater and the unincorporated area are projected to just over double.

The new population (added between 1996 and 2040) totals 422,000. The major share of that is expected to be in Merced, with 187,500 new residents. The unincorporated area will account for 82,200 new residents. The other cities follow with: Los Banos, 63,600 new residents; Livingston, 38,000; Atwater, 31,000; Gustine, 10,700; and Dos Palos 9,000.

Along with the projected new population, we have estimated new jobs, totaling almost 161,400 county-wide. These jobs are proportional to population for each city, based on the ratios from the 1990 census as noted in Table 1A below.

Currently, the density per gross urbanized acre averages 4.0 residents per acre county-wide. For this cities, the average is 5.5 persons per acre, with the ratio varying from a low of 4.7 and 4.8 persons per acre in Los Banos and Livingston to a high of 6.7 persons per acre in Atwater. Merced, Dos Palos, and Gustine are all close the average of 5.5. For the unincorporated area of the County, we estimate an average of 2.7 persons per gross urbanized acre, which includes rural residential lots of less than 10 acres. (This is calculated in the footnote to Table 1A.)

Most importantly for this analysis, Table 1 projects the amount of land needed to accommodate the new residents. For ease of comparison, we have used two scenarios:

- Low density represents the current average density per gross urbanized acre. At these densities, the new population by year 2040 will require a total of 94,195 new acres of urbanized land.
- Compact density, in contrast, assumes the potential to accommodate 10% of new residents in urban infill areas and the remaining 90% at densities not quite double the current average. At these more compact densities, the new population would only require 47,097 acres of new urbanization.

Supporting Methodology:

The supporting information for Table 1 is presented in Tables 1A and 1B. Table 1A shows how the demographic baseline data was calculated. The first section is directly from the 1990 Census, showing population, jobs, housing units, and the ratios of population to housing and jobs. The second section of Table 1A begins with the

updated 1996 population figures from the State Department of Finance. From these, the census data ratios are applied to estimate the 1996 jobs and housing units. These 1996 figures are the baseline for projecting the land use and fiscal impacts in the rest of this report.

Finally, the third section of Table 1A estimates the currently urbanized acres of each city and the unincorporated area. The data for the cities is from the Merced County GIS file LU 90.dbf updated by current city zoned land use information. These data are more accurate than the 1990 GIS data, since a great deal of land in the current city boundaries has been developed since 1990.

For the unincorporated area, the GIS LU 90.dbf identified 8,182 acres as residentially developed with 19,865 units. These represent urban or suburban pockets in the unincorporated area, mostly adjoining or near the cities. For purposes of this analysis, Strong Associates has also identified smaller developed rural lots (1.5 to 10 acre parcels) as a residential land use. Based on Strong Associates' "Analysis of Rural Parcels in the Central Valley," May 1999 (prepared for American Farmland Trust), we estimate an additional 9,667 acres in this use, accommodating 2,188 dwelling units. It is appropriate to count these smaller rural lots as part of the County's current low density housing mix; very few of them are in commercial farming.

These estimates of urbanized land use provide the gross density per acre ratios which are then used in Table 1 for projecting the impact of the low density (current average density) growth scenario.

Table 1B shows two alternative methodologies for projecting population growth in the County. Both begin with the projection to year 2020 from the Merced County Association of Governments' "1998 Regional Transportation Plan". The first method takes the average growth rate from 1995-2025 and continues it to 2040 (an average growth of 16% per five-year period). This method represents a high-end potential growth. If this growth rate were to continue, the overall County population in 2040 would be quadruple the 1995 level.

The second method - the one used in this report - uses the State Department of Finance projections of population in the year 2040. The overall growth rate between 2025 (using the COG 1998 Regional Plan estimate for that year) and 2040 would be 9% per five-year period, yielding a 2040 population of 620,000, a little over triple the 1995 population.

II. AGRICULTURAL IMPACT

Results:

As a result of the projected urban growth, productive farmland will be reduced by an equal number of acres. (It is assumed that the agricultural land around cities - level, well-irrigated, accessible land - cannot be replaced with comparable agricultural use elsewhere in the county, so each acre of urbanization is essentially lost from farm use.) Table 2 shows the amount of farmland that would be urbanized:

- For the low density scenario (at current average densities), 63,632 acres would be annexed into the cities, and 30,563 acres of the unincorporated area would be urbanized, for a total of 94,195 acres.
- For the compact density scenario, the amount of farmland lost to urbanization would be one-half of that: 31,816 acres annexed to cities and 15,281 acres in the unincorporated area, for a total of 47,097 acres.

The value of the agricultural economy on these lands is also shown in Table 2.

- At low densities, 94,195 acres converted to urbanization would reduce direct annual farmgate sales by $156.4 million and total (direct and indirect) farm-related sales by *$229.2 million*. (The indirect multiplier is explained in Table 2A.)
- At compact densities, on the other hand, the direct annual sales of the 47,097 acres lost to farming would drop to $78.2 million, and the total direct and indirect sales lost are estimated at *$114.6 million* annually.

The number of farm-related jobs affected by projected urban growth is estimated as follows:

- For low density growth, 1,846 direct farm jobs would be lost, and a total of 3,314 direct and indirect jobs would be lost.
- For compact growth, 923 direct farm jobs and a total of 1,657 direct and indirect jobs would be lost.

Supporting Methodology:

Table 2A provides detail on the existing agricultural sales and jobs county-wide. As reported in the County Agricultural Commissioner's report, of the county's 1,162,000 acres of farmland, nearly one-half (568,000 acres) are in range fed cattle production. Other major crop types include: hay pasture 162,900 acres; feed grains 129,900 acres; nuts 83,800; cotton 68,800 acres; vegetables 44,700; food grains 36,500; and fruits 32,000 acres. Minor amounts of acreage are also in dairy; poultry, sheep, pigs and other animal products; sugar, greenhouse, and other miscellaneous crops.

The values of these types of agricultural production, however, vary widely. For example, the huge acreage of range land produces an average value of only $96 per acre, while the value of the county's 5,684 acres of dairies averages $92,700 per acre, and poultry (2,680 acres) is a close second at an average of $87,600 per acre.

In all, county-wide agriculture currently yields direct annual sales of almost $1,450 million, an average of $1,248 per agricultural acre.

When indirect economic activity is added (using the multipliers specific to each crop types as shown in the footnote), total agriculture-related sales are estimated at $2,114 million annually. The sales multipliers are from the Cooperative Extension Input-Output study of Merced County generated by George Goldman specifically for this analysis, based on calculations of indirect economic activity generated by each crop type.

The number of direct farm jobs is estimated at almost 14,000; when indirect jobs are added to this, the current farm-related jobs in the county total 27,300. These direct and indirect job estimates are also from the Cooperative Extension Input-Output study, specific to each crop type.

It must be noted that the distribution of crop types and value is not equal throughout the county. Indeed, the areas close the cities - the flat, higher quality soils areas of the county - produce the higher value crops. The footnote to Table 2B estimates the percentage of land around each city in the various crop types, based on interviews with Agricultural Commissioner and Cooperative Extension staff and review of the GIS LU 90 data. Crop types vary substantially from city to city. For example, northeast Los Banos has an estimated 80% of its farmland in low-value hay pasture, jointly in seasonal wetlands use. Atwater and Livingston, on the other hand, both have 55% of their adjoining farmlands in high-value nut production.

Based on these percentages, Table 2B estimates the acreage and value of the agricultural land around the six cities where the projected urban growth will occur. The first section shows acreage converted to urbanization by 2040. Note that all detailed figures are for the low density approach, with the total for the compact scenario (at one-half of the low density) shown on the last line.

The second section shows direct sales lost, using the average direct sales per acre for each crop type projected to be converted to urban use. As shown:

- In the low density approach, annual direct sales would drop by $156.4 million.
- In the compact scenario, $78.2 million in annual direct sales would be lost.

The third section calculates the *total* direct and indirect sales lost, using the Input-Output multipliers for each crop type (shown and discussed in Table 2A).

- The low density approach reduces total annual sales by $229.2 million.
- The compact alternative halves that impact, with total annual sales reduced by $114.6 million.

The fourth and fifth sections of Table 2B (on the second page) show the projections of direct and indirect jobs lost due to urbanization, again using the Input-Output multipliers relevant to the crop types affected. Total farm-related jobs lost are estimated at 3,314 for low density versus 1,657 for the compact alternative.

III. CITY FISCAL IMPACT

Results:

Population and employment growth in the county's cities will increase both revenues and costs to the city governments, under any development scenario. Table 3 estimates the total new revenues and new costs anticipated due to population growth between 1996 and 2040 for each city.

- Under the low density scenario, new revenues are less than the new costs involved for all of the cities. For the cities combined, the estimated net annual shortfall is $53.6 million. On a per capita basis, the average new city resident would produce a $158 net annual shortfall.
- The compact density scenario, on the other hand, generates small net revenue surpluses for almost all of the cities (the exception being Livingston), with the combined total net annual surplus of $6.3 million. The average new city resident would generate a $19 net annual surplus.

Some of the revenues and costs are the same or minimally affected by density, while others vary considerably:

- Revenues and costs estimated on an average per resident or per employee basis increase in direct proportion to the growth in population, regardless of density.
- Property tax revenues vary somewhat due to differences in tax share distribution. The compact scenario yields almost $1.0 million more in annual revenues due to the cities receiving a higher share of property tax in infill areas than in new annexations.
- The biggest differences between the scenarios are the costs that are based on the acreage affected and capital improvements required. The low density option requires an estimated $73.3 million in acre-related costs and $55.9 million in annualized capital costs, compared to $36.6 million and $33.5 million respectively for the compact scenario.

These estimates are discussed in more detail in the supporting section below.

Supporting Methodology:

Table 3A presents detailed data on the cities' revenues from the California State Controller's Cities Annual Report for Fiscal Year 1996-97. The last column is our allocation of each line item to its primary revenue source, i.e. residents, jobs, both residents and jobs, property taxes, or enterprise accounts. On page 3 of the table, these allocations are subtotaled; then revenues that derive from both residents and jobs are allocated at the ratio of residents to job population equivalents. (Each job is considered to equal 2/3 the impact of one resident. The ratio of population-to-job equivalents is calculated for each city in Table 1B above. The average for all cities is about 80% residential to 20% jobs.)

Finally on page 3 of Table 3A, the average revenues generated per resident and per job are calculated based on the 1996 population and estimated jobs. These factors are applied to the new population and jobs to project average revenues (excluding property

tax) in Table 3. These are the same under both scenarios, with new city residents generating $159.4 million and jobs generating $57.1 million in revenues.

Table 3B follows the same methodology and source document for city costs as Table 3A did for revenues. Page 2 shows the totals by allocation and calculates the average costs per resident and per job, again based on the 1996 baseline. When these factors are applied to growth in Table 3, we project average costs of $127.6 million for residents and $25.8 million for jobs - the same for both scenarios.

An allocation factor is added for acre-related costs, which include fire protection, streets and street lighting, and an estimated half the ongoing costs of solid waste, sewer, and water services. (The other half of those items is split to residents and jobs. This is based on the assumption that some service costs relate to people served while some is due to expansiveness of the system.) As itemized in Table 3B, these costs currently total $26.7 million annually for the cities combined, coming to an average of $1,169 per city acre. (Note that these costs vary from city to city, with a low of $749 per acre in Livingston to a high of $1,768 per acre in Gustine). These per acre factors are used to project the costs shown in Table 3.

- The low density scenario, adding 63,632 acres to the cities, would generate new acre-related costs of $73.3 million annually.
- In contrast, the compact density option, with only 31,816 new acres, would cost $36.6 million for annual acre-related services.

Table 3C evaluates property taxes as a case study item. The average household value for each city is estimated based on regional real estate values, cross-checked with city property tax revenues. We also estimate that job-related property value will average 25% of per resident value. Note that this analysis assumes that the average property values of new development will be the same under either density. Price of housing is primarily a function of new residents' ability to pay and size of unit, rather than lot size. If all housing within the region is at higher density, relative values should remain constant.

All property is taxed at 1% of assessed value, but the city share of this revenue varies. According to information from LAFCo, the city share of property tax ranges from 14.5% to 18.5% for infill (that is within existing city boundaries); for new annexations, however, the city tax share ranges from 9.0 to 9.7%. (With new annexations, the County retains its full share, while the cities receive only the Fire District share of the property tax.)

Based on these values and tax rates, property taxes differ slightly under the two scenarios. The low density approach generates an estimated $12.4 million in annual property tax, while the compact plan would produce over $13.3 million. This is due to the infill development yielding a higher share of taxes to the cities than newly annexed areas.

Capital costs of new services are calculated on an annualized basis in Table 3D, based on a Strong Associates case study. The two types of capital costs, as detailed in the footnote of Table 3D, are:

- Internal area costs, including sewer mains (at $1,400/acre), roads/storm drains (at $5,000/acre), and fair share of fire station costs ($500/acre assuming a $2.5 million station serves 5,000 acres). These total $6,900 per acre, or an annualized cost of $703 per acre (financed for 20 years at 8% interest).
- Spine infrastructure costs, consisting of sewer mains and spine roads into new urban areas, estimated at $2,244,000 per mile, or $1,726 per acre (one mile per 1,300 acres), for an annualized cost of $176 per acre.
- The combined $879 annualized cost per acre is used to project capital costs of low density development.
- For compact density, we have added 20% to the average cost to allow for larger pipes and greater usage levels, coming to $1,054 per acre.

Note that we have used the same average costs for new capital improvements for all of the cities. For the cities combined, these capital costs to serve new development to the year 2040 are estimated as follows:

- The low density scenario would cost $55.9 million annually for capital improvements.
- The compact density alternative would cost $33.5 million.

IV. COUNTY FISCAL IMPACT

Results:

The County's revenues and costs are affected by growth both within the cities and in the unincorporated area. Most of the County's revenues and costs will be nearly the same under the two alternative scenarios. As shown in Table 4, on the revenue side:

- Average revenues from new residents are estimated at $359.1 million annually, and from jobs, $32.5 million - the same under both scenarios.
- Property taxes are almost the same under both scenarios - $30.3 million annually from the low density option vs. $29.9 million from the compact approach - with the difference due to a lower county share from infill development.
- The County will lose net revenue from conversion of farmlands and wetlands. For the low density option, these lost revenues are estimated at $786,000 and $6,800, whereas for the compact scenario, the losses would be $393,000 and $3,400 annually.

On the cost side:

- Average costs to serve residents, at $404.0 million, and for job-related services, at $21.2 million, are the same for both scenarios.
- Road cost is the significant difference between the two scenarios in impact on County government (see discussion below). With estimated added road costs of $133 per new unincorporated urbanized acre, the low density approach would

increase costs by almost $4.1 million annually, whereas the compact density alternative would cost $2.0 million.

Comparing total new annual revenues and costs under the two alternatives:

- The low density approach has estimated revenues of $421.1 million, exceeded by costs of $429.3 million, yielding a net annual deficit of $8.2 million (or $19 per capita).
- Under the compact density option, revenues are almost identical, at $421.0 million, while costs are estimated at $427.3 million, reducing the net annual deficit to $6.2 million (or $15 per capita).

Supporting Methodology:

Table 4A details the existing County revenues and Table 4B details the costs, with data for both drawn from the California State Controller's Counties Annual Report for Fiscal Year 1996-97. In both tables, we have allocated revenues and costs to:

- Residents and jobs (depending on the nature of the item and using the resident-to-job equivalent ratio where the item relates to both);
- Unincorporated area only; and
- Case studies, which include property tax, agriculture and wetland-related items.

In Table 4C, the total of average revenues and costs (excluding case study items) are calculated on a per resident and per job basis, using the 1996 baseline data (from Table 1A). These factors are then used to project average revenues and costs from the new population. These added revenues and costs are the same for both scenarios.

Table 4D shows the estimated County property tax revenues. The County's shares of property tax per resident and job are from Table 3C above. We have assumed the average value for future unincorporated area development will be the same as the all-cities average value. Based on these values:

- The low density approach yields projected new property tax revenues of $30.3 million annually.
- The compact scenario yields slightly less, at $29.9 million annually.

Tables 4E and 4F present the case studies of agricultural and wetlands area impact on the County fiscal picture. The compact scenario benefits the County in maintaining more land in farming and wetlands, since both of these land uses produce more revenue than they cost in services.

- Under the low density approach, the County would lose annual net revenues of $786,000 from converted farmland and $6,800 from converted wetlands.
- Under the compact plan, the estimated lost annual net revenues would be $393,000 and $3,400 respectively.

While significant, these impacts are small compared to the large fiscal impacts of urbanization.

In Table 4E, note that we have subtracted wetland acres from total farmlands converted to urbanization, so that the fiscal analysis does not double-count those lost revenues. (For private sector analysis, however, mixed use acres affect both farm and wetlands economic activity.) Also note that the farmlands slated for urbanization are generally more valuable per acre than the county-wide average. Thus while the low density scenario would convert 7.4% of existing farm acres, it results in a loss of 9.1% of farm assessed value. Similarly the compact option would convert 3.7% of acres but 4.6% of value. These same percentages of value lost are applied to all other revenues and costs for farmlands, on the conservative assumption that higher value crops require somewhat more County services.

In Table 4F, potential wetland acres lost to urbanization are based on the Los Banos northeastward growth plus a proportionate share of unincorporated area growth. The wetlands are estimated at an average assessed value of $600 per acre. Other wetlands-related revenues and costs are estimated from the budget and interviews.

V. GRASSLANDS ECOLOGICAL AREA IMPACTS

Results:

The Grasslands Ecological Area (GEA) encompasses the Grasslands Water District and surrounding area. As summarized in Table 5, the area totals 179,500 acres, of which 90,100 acres are wetlands, 38,600 are combined range and wetlands, 49,800 are currently agricultural, and less than 800 are in urban development. (Details are discussed in reference to Table 5A below.)

Los Banos northeastward development is the major potential for conversion of wetlands and farms to urbanization. (The other cities close to the Grasslands Ecological Area are directing their growth away from the GEA and thus will have virtually no impact.) Assuming one-half of the population growth of Los Banos occurs in this direction, Table 5 projects that by 2040:

- Under the low density approach, almost 9,800 acres would urbanize, with most of that (6,600 acres) in Los Banos annexation and the balance in the surrounding unincorporated area. (The unincorporated area impact is based on the county-wide ratio of city-to-unincorporated area development.)
- Under the compact density alternative, 4,900 acres would be converted, 3,300 of that annexed to Los Banos and the balance in the unincorporated area.

Note that most of the acreage affected is combined range/wetlands, converting an estimated 20% of the GEA total in this land use under the low density scenario. These lands are dual use, and their conversion will thus result in a loss of farm sales as well as wetlands economic activity, as discussed below.

The conversion of agricultural and range lands will result in loss of farm-related economic activity. Currently, the GEA generates an estimated $119.7 million in direct and indirect annual farm sales and supports 2,487 total farm-related jobs. By 2040:

- With low density development, there would be a loss of $11.8 million (10%) in total direct and indirect agricultural sales and a loss of 243 farm-related jobs.
- Compact development would reduce those losses to $5.9 million in total annual agricultural sales and 122 jobs.

The potential urbanization of wetlands would also reduce the economic benefits of recreation and government and private investment in these areas. Current direct and indirect benefits from the wetlands are estimated at $40.9 million in annual sales and 798 jobs. With urban conversion by 2040:

- Under low density development, wetland-related sales would drop by $2.5 million (10%) annually and jobs by 85.
- Under compact density, sales would be reduced by an estimated $1.2 million (5%) annually and jobs by 42.

Combined, the conversion of farmlands and wetlands within the GEA would result in direct and indirect annual sales losses of $14.3 million under low density development compared to $7.1 million with compact development.

Supporting Methodology:

A detailed description of existing Grasslands Ecological Area (GEA) land uses is shown in Table 5A, along with a comparison to the County at large and the two-mile buffer area around the GEA. All of this data is from the GIS LU90 maps. Note that the 179,500-acre GEA comprises over 14% of the total County. Within the GEA:

- 90,000 acres (50% of the total) is exclusively wetlands, with approximately 20,000 acres of that in State and federal ownership;
- Dual-use range and wetlands comprise another 38,600 acres, or 22% of the total (based on interviews with GWD staff);
- Other agricultural use is predominantly grain, seed, truck and row crops, accounting for 50,000 acres, or 27% of the total acreage; and
- There is a very low ratio of urbanized area (0.4%).

The two-mile buffer area encompasses another 160,400 acres, or almost 13% of the County area. Of this, 127,100 acres are unincorporated area with little urbanization (0.5%). The portion of buffer area within city boundaries is 33,200 acres, with almost 5% of that urbanized. In all of the buffer area, most of the farmland is in grain, seed, truck and row crops. It should be noted that the analysis of GEA impacts above does not include the buffer area. These impacts, however, are included in the County-wide analysis.

Table 5B provides details on the existing GEA agricultural uses and economic activity. As shown, the 88,400 acres of farm and rangeland produce annual direct sales of $86.3 million, or an average of $976 per acre. There is a wide range of sales value depending

on crop type, with rangelands at only $50 per acre (based on the county-wide average), up to the very high value dairy and poultry uses. The large acreage of grain, seed, truck and row crops average $990 in annual sales per acre.

Using the multipliers for indirect economic activity for each type of agricultural use (from the Input-Output study for Merced County developed by George Goldman, Coop Extension), the total direct and indirect annual sales are estimated at $119.7 million. In addition, farming in the GEA generates an estimated 2,487 direct and indirect jobs.

In our analysis of the impacts of urbanization on the GEA, we have used the GIS map identification of actual acreage of range/wetlands affected and have assumed that the balance of farmlands affected will be a mix of the crop types represented throughout the GEA.

Table 5C compares the wetlands-related economic activity county-wide and within the GEA. Overall, it is estimated that wetlands generate $53.4 million in total (direct and indirect) sales county-wide, with almost $40.9 million of that occurring in the GEA.

The three main categories of economic activities from wetlands are:

- Land maintenance, consisting of Grasslands Water District (GWD) and State and federal government costs. Annual *direct* costs of such wetlands maintenance are estimated at $11.0 million County-wide, of which $8.4 million is in the GEA (see Table 5C footnote #2).
- Other land expenditures, including GWD costs for structures and wages, State and federal land acquisition costs, and private landowners' land expenses. These come to an estimated $8.0 million in direct sales annually for the GEA, which is 100% of the county-wide cost.
- Recreation expenditures, including transportation, equipment, food, retail, and services for hunting, fishing, and non-consumptive use of the wetlands. These generate estimated *direct* sales of $17.5 million County-wide, of which $11.4 million is from the GEA.

The *total* (direct plus indirect) sales and jobs generated from these three categories of wetlands economic activity are estimated as follows:

- County-wide, land maintenance of $15.9 million, other land costs of $12.4 million, and recreation expenditures of $25.2 million come to a total of $53.4 million in annual sales and generate an estimated 1,092 wetlands-related jobs.
- From the GEA only, land maintenance of $12.1 million, other land costs of $12.4 million, and recreation expenditures of $16.4 million total $40.9 million in annual sales and generate 798 related jobs.

Note that these totals are based on the type of economic activity (maintenance, banking, personal income, retail, etc.) and the Input-Output multipliers (shown in Table 5C footnote #1).

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APPENDIX 2

SUPPORTING STUDY TABLES AND FIGURES

SUMMARY TABLE A - COMPARISON OF CITY AND COUNTY REVENUE EFFECTS BY LAND USE AND COMMON GROWTH SCENARIO

		Change from 1996 to 2040			
	Existing	< Low Density	>	< Compact Density	>
	Total in 1996	Amount	%	Amount	%
Demographics					
Population	198,522	421,934	213%	421,934	213%
Jobs	75,916	161,351	213%	161,351	213%
Developed Acres	50,130	94,195	188%	47,097	94%
Pop per Acre	4.0	4.5		9.0	
Agriculture Impact					
Total Annual Sales (000)	$2,113,765	($229,245)	-11%	($114,623)	-5%
Total Jobs	27,319	-3,314	-12%	-1,657	-6%
GEA Impact					
Total Annual Sales (000)	$160,605	($14,291)	-9%	($7,146)	-4%
Total Jobs	3,286	-331	-10%	-166	-5%
Cities Fiscal Impact					
Revenues (000)	$86,125	$228,937	266%	$229,892	267%
Costs (000)	($84,274)	($282,568)	335%	($223,574)	265%
Net Revenue/(Cost) (000)	$1,852	($53,631)		$6,318	
Per Capita net Rev/(Cost)	$15	($158)		$19	
County Fiscal Impact					
Revenues (000)	$206,215	$421,083	204%	$421,039	204%
Costs (000)	($208,890)	($429,284)	206%	($427,250)	205%
Net Revenue/(Cost) (000)	($2,675)	($8,201)		($6,211)	
-	($13)	($19)		($15)	

SUMMARY TABLE B - CHANGE IN REVENUE FOR ALTERNATE GROWTH SCENARIOS

		Change from 1996 to 2040				Total 2040	
	Existing	< Low Density >		< Compact Density		Low	Compact
Demographics (T1)	Total in 1996	Amount	%	Amount	%		
Population							
Cities	125,232	339,751	271%	339,751	271%	464,983	464,983
Unincorp. Area	73,290	82,184	112%	82,184	112%	155,474	155,474
Total	198,522	421,934	213%	421,934	213%	620,456	620,456
Jobs							
Cities	47,806	128,043	268%	128,043	268%	175,849	175,849
Unincorp. Area	28,111	33,308	118%	33,308	118%	61,419	61,419
Total	75,916	161,351	213%	161,351	213%	237,267	237,267
Developed Acres							
Cities	22,875	63,632	278%	31,816	139%	86,507	54,691
Unincorp. Area	27,255	30,563	112%	15,281	56%	57,818	42,537
Total	50,130	94,195	188%	47,097	94%	144,325	97,227
Average Pop/Acre	3.96	4.48		8.96		4.30	6.38
Agriculture Impact (T2)							
Ag. Acres	1,162,008	-94,195	-8%	-47,097	-4%	1,067,813	1,114,910
Direct Annual Sales (000)	$1,449,754	($156,390)	-11%	($78,195)	-5%	$1,293,364	$1,371,559
Total Annual Sales (000)	$2,113,765	($229,245)	-11%	($114,623)	-5%	$1,884,520	$1,999,143
Direct Jobs	13,971	-1,846	-13%	-923	-7%	12,125	13,048
Total Jobs	27,319	-3,314	-12%	-1,657	-6%	24,006	25,663
GEA Impact (T5)							
Ag/Wetland Acres	179,464	-9,763	-5%	-4,881	-3%	169,701	174,582
Direct Annual Sales (000)	$114,021	($10,021)	-9%	($5,011)	-4%	$104,000	$109,010
Total Annual Sales (000)	$160,605	($14,291)	-9%	($7,146)	-4%	$146,314	$153,459
Direct Jobs	1,865	-249	-13%	-124	-7%	1,617	1,741
Total Jobs	3,286	-331	-10%	-166	-5%	2,955	3,120
Cities Fiscal Impact (T3)							
Revenues (000)	$86,125	$228,937	266%	$229,892	267%	$315,062	$316,017
Costs (000)							
Average (Res + Jobs)	($57,540)	($153,399)	267%	($153,399)	267%	($210,939)	($210,939)
Acre-related	($26,734)	($73,261)	274%	($36,631)	137%	($99,995)	($63,365)
Capital/year	NA	($55,907)		($33,544)		$55,907	$33,544
Total Costs	($84,274)	($282,568)	335%	($223,574)	265%	($366,841)	($307,848)
Net Revenue/(Cost) (000)	$1,852	($53,631)		$6,318		($51,779)	$8,169
Per Capita							
Revenue	$688	$674	98%	$677	98%	$678	$680
Cost	($673)	($832)	124%	($658)	98%	($789)	($662)
Net Revenue/(Cost)	$15	($158)		$19		($111)	$18
County Fiscal Impact (T4)							
Revenues (000)							
Average + New prop tx	$185,958	$421,876	227%	$421,436	227%	$607,834	$607,394
Agriculture	$19,541	($786)	-4%	($393)	-2%	$18,755	$19,148
Wetlands	$716	($7)	-1%	($3)	0%	$709	$713
Total	$206,215	$421,083	204%	$421,039	204%	$627,298	$627,254
Costs (000)							
Average (Res + Jobs)	($205,263)	($425,217)	207%	($425,217)	207%	($630,480)	($630,480)
Acre-related	($3,627)	($4,067)	112%	($2,034)	56%	($7,694)	($5,661)
Total Costs	($208,890)	($429,284)	206%	($427,250)	205%	($638,174)	($636,140)
Net Revenue/(Cost) (000)	($2,675)	($8,201)		($6,211)		($10,876)	($8,886)
Per Capita							
Revenues	$1,039	$998	96%	$998	96%	$1,011	$1,011
Cost	($1,052)	($1,017)	97%	($1,013)	96%	($1,029)	($1,025)
Net Revenue/(Cost)	($13)	($19)		($15)		($18)	($14)

SUMMARY TABLE C – REVENUE VS. COST BY LAND USE

Revenue vs. Cost by Land Use

	Agriculture	Wetlands	Cities Only	All Urban	County
Revenue ($1000's)	$12,194	$272	$86,125	$86,125	$206,215
Cost ($1000's)	$3,562	$160	$84,274	$84,274	$208,890
Net Revenue	$8,632	$112	$1,851	$1,851	($2,675)
Revenue/Cost Ratio	3.42	1.70	1.02	1.02	0.99
Area (ac)	1,162,000	129,000	22,875	22,875	1,162,000
Population			125,232	125,232	198,522
Net Revenue per capita			$14.78	$14.78	($13.47)
Net Revenue per acre	$7.43	$0.87	$80.92	$80.92	($2.30)

SUMMARY TABLE D – REVENUE VS. COST BY GROWTH SCENARIO

	Existing	2040 Sprawl	2040 Compact
Revenue ($1000's)	$292,340	$942,360	$943,272
Cost ($1000's)	$293,164	$1,005,015	$943,988
Net Revenue	($824)	($62,655)	($716)
Revenue/Cost Ratio	1.00	0.94	1.00
Urban Area (ac)	50,130	144,325	97,228
Population	198,522	620,457	620,457
Net Revenue per capita	($4.15)	($100.98)	($1.15)
Net Revenue per urban acre	($16.44)	($434.12)	($7.36)

TABLE 1 - DEMOGRAPHIC IMPACTS
Population, Jobs and Acres: 1996 Vs. 2040

	1	2	3	4	5	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities	Unincorp	Total
1996 Baseline: Population, Jobs, & Acres									
Population (1)	23,672	4,430	4,216	10,508	20,694	61,712	125,232	73,290	198,522
Jobs (2)	10,086	1,473	1,583	3,886	7,821	22,956	47,806	28,111	75,916
Developed Land Area (3)									
Residential	2,673	447	612	1,119	2,855	7,828	15,533	17,849	33,382
Commercial/Industrial	364	227	117	538	1,439	2,705	5,390	1,423	6,813
Other	503	106	42	565	0	735	1,951	7,983	9,935
Total	3,540	780	771	2,222	4,294	11,267	22,875	27,255	50,130
Population per gross acre	6.7	5.7	5.5	4.7	4.8	5.5	5.5	2.7	4.0
2040 Projected Population, Jobs									
% diff: 1996 Vs 2040	231%	302%	353%	461%	407%	404%	371%	212%	313%
2040 - Population	54,718	13,395	14,899	48,471	84,261	249,238	464,983	155,474	620,456
2040 - Jobs	23,314	4,455	5,594	17,926	31,844	92,715	175,849	61,419	237,267
New Population, Jobs in 2040 (vs 1996)									
Population	31,046	8,965	10,683	37,963	63,567	187,526	339,751	82,184	421,934
Jobs	13,228	2,982	4,011	14,040	24,023	69,758	128,043	33,308	161,351
New Urbanized Acres in 2040									
Low Density									
Pop/ Acre (existing ratio	6.7	5.7	5.5	4.7	4.8	5.5	5.3	2.7	4.5
Acres Urbanized	**4,643**	**1,579**	**1,953**	**8,029**	**13,190**	**34,239**	**63,632**	**30,563**	**94,195**
Compact Density (4)									
Pop/ Acre	12.0	10.2	9.8	8.5	8.7	9.9	9.6	4.8	8.1
Acres Urbanized	**2,321**	**790**	**976**	**4,014**	**6,595**	**17,119**	**31,816**	**15,281**	**47,097**

(1) Population estimates are based on Department of Finance, Population Unit projections

(2) Jobs estimates are based on 1990 Census ratio of jobs-to-population as applied to 1996.

[3]See Table 1A for Acreage documentation

(4) Compact density assumes 10% of new residents & jobs will be in infill; 90% in new annexations but at higher average density as shown.

(4) Compact: Infill Vs. Annexatic	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities	Unincorp	Total
Population Infill 10%	3,105	897	1,068	3,796	6,357	18,753	33,975	8,218	42,193
Population Annex 90%	27,941	8,069	9,615	34,167	57,211	168,773	305,775	73,965	379,741
Jobs infill 10%	1,323	298	401	1,404	2,402	6,976	12,804	3,331	16,135
Jobs Annex 90%	11,905	2,684	3,610	12,636	21,621	62,783	115,238	29,978	145,216

TABLE 1A - DETAIL DEMOGRAPHIC DATA: 1990, 1996

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	All Cities	Unincorp Area (1)	Total County
1990 Census Information (for appropriate ratios)									
Population	22,282	4,080	3,931	7,317	14,519	56,216	108,345	70,058	178,403
K-12 ADA	4,920	906	793	1,959	3,070	12,840	24,488	NA	
Employment	9,494	1,357	1,476	2,706	5,487	20,912	41,432	26,791	68,223
Occ Housing Units	7,189	1,363	1,523	1,654	4,772	18,282	34,783	22,491	57,274
Census Ratios									
Pop to HH Ratio	3.099	2.993	2.581	4.424	3.043	3.075	3.115	3.115	
K-12 to HH Ratio	0.684	0.665	0.521	1.184	0.643	0.702	0.704	NA	
Pop/Job Ratio	0.426	0.333	0.375	0.370	0.378	0.372	0.382	0.382	
Employee to HH Ratio	1.321	0.996	0.969	1.636	1.150	1.144	1.191	1.191	
Resid & Job split calculation									
Population	22,282	4,080	3,931	7,317	14,519	56,216	108,345	70,058	178,403
Job Pop Equiv (jobs x 2/3)	6,329	905	984	1,804	3,658	13,941	27,621	17,861	45,482
Total	28,611	4,985	4,915	9,121	18,177	70,157	135,966	87,919	223,885
Percentage Pop	77.9%	81.9%	80.0%	80.2%	79.9%	80.1%	79.7%	79.7%	79.7%
Percentage Jobs	22.1%	18.1%	20.0%	19.8%	20.1%	19.9%	20.3%	20.3%	20.3%
1996 Information (for base year and fiscal analysis) (1)									
Population	23,672	4,430	4,216	10,508	20,694	61,712	125,232	73,290	198,522
Increase % Population - 1990 to 1996	6.2%	8.6%	7.3%	43.6%	42.5%	9.8%	15.6%	4.6%	11.3%
K-12 Students	5,227	984	850	2,813	4,376	14,095	28,345	NA	
Dwelling Units	7,637	1,480	1,633	2,375	6,802	20,069	39,997	23,529	63,526
Jobs	10,086	1,473	1,583	3,886	7,821	22,956	47,806	28,027	75,833
Job Population Equiv (jobs x 2/3)	6,724	982	1,055	2,591	5,214	15,304	31,871	18,684	50,555
Pop as % of pop/job equiv total	77.9%	81.9%	80.0%	80.2%	79.9%	80.1%	79.7%	79.7%	79.7%
Jobs as % of pop/job equiv total	22.1%	18.1%	20.0%	19.8%	20.1%	19.9%	20.3%	20.3%	20.3%
Acres (2)									
Residential	2,673	447	612	1,119	2,855	7,828	15,533	17,849	33,382
Commercial/Industrial	364	227	117	538	1,439	2,705	5,390	1,423	6,813
Other	503	106	42	565	0	735	1,951	7,983	9,935
Total Acres	3,540	780	771	2,222	4,294	11,267	22,875	27,255	50,130
Population/Acre	6.7	5.7	5.5	4.7	4.8	5.5	5.5	2.7	4.0
Resid acres as % of Total	88.0%	66.3%	83.9%	67.5%	66.5%	74.3%	74.2%	65.5%	66.6%
Commercial acres as % of Total	12.0%	33.7%	16.1%	32.5%	33.5%	25.7%	25.8%	5.2%	13.6%

(1) Department of Finance for population, 1990 Census ratios for other data

(2) City land areas are from Merced County GIS file LU 90.dbf updated by current city zoned use data.
Unincorporated area is from GIS file LU 90.dbf with added Strong Assoc. estimate of developed rural parcels, as follows:

	Pop@2.5	Units	Acres
Unincorporated Total	73,290	29,316	1,179,857
Farms (over 10 acre parcel 1DU/160ac	18,156	7,263	1,162,008
Rural Residential (1.5 to 10 ac parcels)	5,470	2,188	9,667
Urban Residential	49,664	19,865	8,182
Residential Developed (less than 10 acres)	55,134	22,053	17,849

TABLE 1B - DETAIL OF POPULATION PROJECTIONS

Method # 1

Based on Average percentage Increase (years 2020 to 2040)

	1		2		3		4		5		6						
	Atwater	%	Dos Palos	%	Gustine	%	Livingston	%	Los Banos	%	Merced	%	All Cities	Unincorp.	%	Total	%
1990	22,282		4,196		3,931		7,317		14,519		56,216		108,461	69,942		178,403	
1995	23,915	7%	4,365	4%	4,135	5%	10,437	43%	20,123	39%	60,973	8%	123,948	77,524	11%	201,472	13%
2000	26,115	9%	5,655	30%	5,484	33%	13,888	33%	25,042	24%	84,994	39%	161,178	77,806	0%	238,984	19%
2005	29,083	11%	6,461	14%	6,265	14%	17,683	27%	30,522	22%	102,667	21%	192,681	86,860	12%	279,541	17%
2010	31,410	8%	7,382	14%	7,370	18%	21,956	24%	36,280	19%	120,254	17%	224,652	94,810	9%	319,462	14%
2015	37,239	19%	8,434	14%	8,669	18%	25,048	14%	41,389	14%	142,571	19%	263,350	110,180	16%	373,530	17%
2020	42,523	14%	9,635	14%	10,196	18%	28,140	12%	51,000	23%	162,797	14%	304,291	124,199	13%	428,490	15%
2025	47,388	11%	11,090	15%	11,979	17%	35,345	26%	62,993	24%	194,957	20%	363,751	136,811	10%	500,562	16%
2030	52,809	11%	12,764	15%	14,074	17%	44,395	26%	77,806	24%	233,469	20%	435,317	150,704	10%	586,021	16%
2035	58,851	11%	14,691	15%	16,536	17%	55,761	26%	96,103	24%	279,589	20%	521,530	166,008	10%	687,538	16%
2040	65,583	11%	16,908	15%	19,427	17%	70,038	26%	118,702	24%	334,821	20%	625,480	182,865	10%	808,345	16%
Average increase per 5 yr interval		11%		15%		17%		26%		24%		20%			10%		16%

Note: Growth Projections as follows:

1995 to 2020 based on "1998 Regional Transportation Plan" - Merced County Association of Governments

2025 to 2040 based on the average growth rate of "1998 Regional Transportation Plan"

Method # 2

Based on meeting Target 2040 Population

	1		2		3		4		5		6						
	Atwater	%	Dos Palos	%	Gustine	%	Livingston	%	Los Banos	%	Merced	%	All Cities	Unincorp.	% inc	Total	% inc
1990	22,282		4,196		3,931		7,317		14,519		56,216		108,461	69,942		178,403	
1995	23,915	7%	4,365	4%	4,135	5%	10,437	43%	20,123	39%	60,973	8%	123,948	77,524	11%	201,472	13%
2000	26,115	9%	5,655	30%	5,484	33%	13,888	33%	25,042	24%	84,994	39%	161,178	77,806	0%	238,984	19%
2005	29,083	11%	6,461	14%	6,265	14%	17,683	27%	30,522	22%	102,667	21%	192,681	86,860	12%	279,541	17%
2010	31,410	8%	7,382	14%	7,370	18%	21,956	24%	36,280	19%	120,254	17%	224,652	94,810	9%	319,462	14%
2015	37,239	19%	8,434	14%	8,669	18%	25,048	14%	41,389	14%	142,571	19%	263,350	110,180	16%	373,530	17%
2020	42,523	14%	9,635	14%	10,196	18%	28,140	12%	51,000	23%	162,797	14%	304,291	124,199	13%	428,490	15%
2025	45,290	7%	10,462	9%	11,210	10%	32,238	15%	57,821	13%	181,087	11%	338,108	131,372	6%	469,480	9%
2030	48,237	7%	11,361	9%	12,325	10%	36,932	15%	65,554	13%	201,433	11%	375,841	138,959	6%	514,801	9%
2035	51,375	7%	12,336	9%	13,551	10%	42,310	15%	74,321	13%	224,064	11%	417,958	146,985	6%	564,943	9%
2040	54,718	7%	13,395	9%	14,899	10%	48,471	15%	84,261	13%	249,238	11%	464,983	155,474	6%	620,456	9%
% to meet 2040		7%		9%		10%		15%		13%		11%			6%		9%

Note: Growth Projections as follows:

1995 to 2020 based on "1998 Regional Transportation Plan" - Merced County Association of Governments

2025 to 2040 based on Dept. of Finance population projection growth rate percentage.

TABLE 2 - PRIVATE SECTOR AGRICULTURE IMPACT:2040

Annual Acres, Sales & Jobs Lost

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos NE (1)	Los Banos SW (1)	Merced	All Cities	Unincorp	Total
Acres Urbanized (2)										
Low Density	4,643	1,579	1,953	8,029	6,595	6,595	34,239	63,632	30,563	94,195
Compact Density	2,321	790	976	4,014	3,298	3,298	17,119	31,816	15,281	47,097
Direct Annual Sales Lost ($000)										
Low Density	$10,887	$2,447	$2,544	$18,710	$5,632	$19,291	$46,136	$105,647	$50,743	$156,390
Compact Density	$5,444	$1,224	$1,272	$9,355	$2,816	$9,646	$23,068	$52,824	$25,371	$78,195
Total Annual Sales Lost ($000)										
Low Density	$15,997	$3,684	$3,719	$27,500	$7,979	$28,553	$67,432	$154,864	$74,382	$229,245
Compact Density	$7,998	$1,842	$1,860	$13,750	$3,989	$14,276	$33,716	$77,432	$37,191	$114,623
Direct Jobs Lost (3)										
Low Density	102	29	30	164	123	190	609	1,247	599	1,846
Compact Density	51	14	15	82	61	95	305	623	299	923
Total Jobs Lost										
Low Density	206	55	54	343	164	385	1,032	2,239	1,075	3,314
Compact Density	103	28	27	171	82	192	516	1,119	538	1,657

(1) Los Banos growth area is divided into two areas: NE affects Grasslands WD(Focus Area) , SW does not affect the Focus Area
Strong Associates assumes a 50/50 split of growth for illustrative purposes.

(2) The ag impact is estimated based on total urbanized acres, which may slightly overlap with wetlands and vacant lands.

(3) Sales and jobs impact figures for the unincorporated area are assumed to be proportional to the city figures.

TABLE 2A - AGRICULTURAL SALES & JOBS: 1998

Sector Description	Acres	Dir. Sales/Acre	Direct Sales (1)	Total Sales (2)	Direct Jobs (2)	Total Jobs (2)
Dairy	5,684	$92,706	$526,908,000	$749,997,686	3,053	7,234
Poultry	2,680	$87,613	$234,820,000	$333,864,258	858	3,183
Range Fed Cattle	568,000	$96	$54,391,000	$94,357,888	759	1,369
Sheep, Lambs & Goats	3,374	$500	$1,687,000	$2,659,171	102	132
Hogs, Pigs & Swine	2,870	$500	$1,435,000	$2,018,507	15	24
Other Meat Animal Products	4,750	$500	$2,375,000	$3,708,054	32	53
Cotton	68,772	$884	$60,823,000	$88,564,249	396	961
Food Grains	36,545	$309	$11,297,000	$15,330,989	234	288
Feed Grains	129,911	$358	$46,567,000	$66,117,456	639	968
Hay Pasture	162,938	$505	$82,250,000	$115,953,007	3,169	3,734
Fruits	32,044	$2,829	$90,637,000	$135,126,987	1,001	1,987
Nuts	83,837	$1,553	$130,178,000	$194,140,570	1,337	2,659
Vegetables	44,704	$3,341	$149,371,000	$227,469,478	1,253	2,978
Sugar Crops	12,658	$1,199	$15,176,000	$20,205,827	250	338
Misc. Crops	1,952	$10,933	$21,342,000	$35,869,009	632	1,040
Greenhouse & Nursery	1,214	$15,657	$19,007,000	$26,425,508	224	348
Commercial Fishing	75	$19,867	$1,490,000	$1,956,591	18	25
Total All	1,162,008	$1,248	$1,449,754,000	$2,113,765,234	13,971	27,319

(1) Direct Sales from Ag Commissioner Crop/Livestock Report

(2) Input Output Multiplier for Sales, Income and Employment - Coop Extension, George Goldman

I-O #	Sector Description	Sales Multiplier	Direct Jobs Per $1M Sales	Total Jobs Per $1M Sales
1	Dairy	1.4234	5.7944	13.7293
2	Poultry	1.4218	3.6544	13.5536
4	Range Fed Cattle	1.7348	13.9602	25.1706
6	Sheep, Lambs & Goats	1.5763	60.2469	78.0057
7	Hogs, Pigs & Swine	1.4066	10.4100	16.6830
8	Other Meat Animal Products	1.5613	13.5223	22.2791
10	Cotton	1.4561	6.5051	15.7977
11	Food Grains	1.3571	20.7085	25.5081
12	Feed Grains	1.4198	13.7263	20.7857
13	Hay Pasture	1.4098	38.5283	45.3970
16	Fruits	1.4909	11.0463	21.9229
17	Nuts	1.4913	10.2696	20.4244
18	Vegetables	1.5228	8.3877	19.9357
19	Sugar Crops	1.3314	16.4511	22.2812
20	Misc. Crops	1.6807	29.5999	48.7288
23	Greenhouse & Nursery	1.3903	11.7964	18.2913
25	Commercial Fishing	1.3131	11.8341	16.7378

TABLE 2B - AGRICULTURAL IMPACT: 2040

By Crop Type and City (1)

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Los Banos	Merced	All Cities	Unincorp.	Total County
Acres Urbanized					NE	SW				
1-8 Animal Products	93	0	20	161	66	132	342	813	391	1204
11 - Food Grains	464	316	781	803	0	0	10,272	12,636	6069	18705
12 - Feed Grains	0	0	0	803	989	0	0	1,792	861	2653
13 - Hay Pasture	464	474	488	0	5,276	1,649	13,695	22,047	10589	32636
16 - Fruits	464	0	0	803	0	1,979	0	3,246	1559	4805
17 - Nuts	2,553	0	195	4,416	0	660	3,424	11,248	5402	16650
18 - Vegetables	464	632	293	803	0	1,979	5,136	9,306	4470	13776
Other	139	158	176	241	264	198	1,370	2,545	1222	3767
Low Density Total	4,643	1,579	1,953	8,029	6,595	6,595	34,239	63,632	30563	94195
Compact Density	2,321	790	976	4,014	3,298	3,298	17,119	31,816	15,281	47,097
									48.03%	
Direct Sales Lost										
1-8 Animal Products	$3,680,167	$0	$773,885	$6,364,077	$2,613,892	$5,227,783	$13,570,111	$32,229,914	$15,480,135	$47,710,049
11 - Food Grains	$143,518	$97,636	$241,438	$248,185	$0	$0	$3,175,223	$3,906,000	$1,876,065	$5,782,065
12 - Feed Grains	$0	$0	$0	$287,788	$354,606	$0	$0	$642,393	$308,544	$950,937
13 - Hay Pasture	$234,361	$239,156	$246,413	$0	$2,663,333	$832,292	$6,913,394	$11,128,948	$5,345,271	$16,474,219
16 - Fruits	$1,313,199	$0	$0	$2,270,903	$0	$5,596,313	$0	$9,180,416	$4,409,384	$13,589,800
17 - Nuts	$3,964,938	$0	$303,188	$6,856,529	$0	$1,024,056	$5,316,424	$17,465,137	$8,388,563	$25,853,700
18 - Vegetables	$1,551,286	$2,110,695	$978,638	$2,682,623	$0	$6,610,939	$17,160,460	$31,094,641	$14,934,859	$46,029,500
Low Density Total	$10,887,470	$2,447,487	$2,543,563	$18,710,104	$5,631,830	$19,291,383	$46,135,611	$105,647,448	50742820.11	$156,390,268
Compact Density	$5,443,735	$1,223,743	$1,271,781	$9,355,052	$2,815,915	$9,645,692	$23,067,806	$52,823,724	$25,371,410	$78,195,134
Total Sales Lost										
1-8 Animal Products	$5,238,327	$0	$1,101,543	$9,058,588	$3,720,598	$7,441,195	$19,315,614	$45,875,867	$22,034,331	$67,910,197
11 - Food Grains	$194,766	$132,501	$327,652	$336,808	$0	$0	$4,309,047	$5,300,774	$2,545,979	$7,846,753
12 - Feed Grains	$0	$0	$0	$408,611	$503,481	$0	$0	$912,092	$438,081	$1,350,173
13 - Hay Pasture	$330,394	$337,153	$347,384	$0	$3,754,668	$1,173,334	$9,746,247	$15,689,179	$7,535,565	$23,224,744
16 - Fruits	$1,957,795	$0	$0	$3,385,596	$0	$8,343,314	$0	$13,686,705	$6,573,770	$20,260,475
17 - Nuts	$5,913,099	$0	$452,159	$10,225,464	$0	$1,527,223	$7,928,633	$26,046,579	$12,510,258	$38,556,837
18 - Vegetables	$2,362,374	$3,214,270	$1,490,317	$4,085,230	$0	$10,067,461	$26,132,790	$47,352,442	$22,743,535	$70,095,978
Low Density Total	$15,996,755	$3,683,923	$3,719,056	$27,500,298	$7,978,748	$28,552,528	$67,432,331	$154,863,639	$74,381,520	$229,245,158
Compact Density	$7,998,378	$1,841,962	$1,859,528	$13,750,149	$3,989,374	$14,276,264	$33,716,165	$77,431,819	$37,190,760	$114,622,579

(1) Percentage of Crop Mix in City Expansion Areas per Agricultural Commissioner, Cooperative Extension & GIS LU90.shp

	Atwater	Dos Palos	Gustine	Livingston	Los Banos-NE	Los Banos-SW	Merced	Unincorp (All Cities Aver.)
1-8 Animal Products	2.0%	0.0%	1.0%	2.0%	1.0%	2.0%	1.0%	1.3%
11 - Food Grains	10.0%	20.0%	40.0%	10.0%			30.0%	19.9%
12 - Feed Grains				10.0%	15.0%			2.8%
13 - Hay Pasture	10.0%	30.0%	25.0%		80.0%	25.0%	40.0%	34.6%
16 - Fruits	10.0%	0.0%		10.0%		30.0%		5.1%
17 - Nuts	55.0%	0.0%	10.0%	55.0%		10.0%	10.0%	17.7%
18 - Vegetables	10.0%	40.0%	15.0%	10.0%		30.0%	15.0%	14.6%
19 - Other open	3.0%	10.0%	9.0%	3.0%	4.0%	3.0%	4.0%	4.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 2B, CONT. - AGRICULTURAL IMPACT:2040

By Crop Type and City

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Los Banos	Merced	All Cities	Unincorp.	Total County
Direct Jobs Lost					NE	SW				
1-8 Animal Products	21	0	4	37	15	30	79	187	90	276
11 - Food Grains	3	2	5	5	0	0	66	81	39	120
12 - Feed Grains	0	0	0	4	5	0	0	9	4	13
13 - Hay Pasture	9	9	9	0	103	32	266	429	206	635
16 - Fruits	15	0	0	25	0	62	0	101	49	150
17 - Nuts	41	0	3	70	0	11	55	179	86	266
18 - Vegetables	13	18	8	23	0	55	144	261	125	386
Total Low Density	102	29	30	164	123	190	609	1247	599	1,846
Total Compact Density	51	14	15	82	61	95	305	623	299	923
Total Jobs Lost										
1-8 Animal Products	51	0	11	87	36	72	186	442	213	655
11 - Food Grains	4	2	6	6	0	0	81	100	48	147
12 - Feed Grains	0	0	0	6	7	0	0	13	6	20
13 - Hay Pasture	11	11	11	0	121	38	314	505	243	748
16 - Fruits	29	0	0	50	0	123	0	201	97	298
17 - Nuts	81	0	6	140	0	21	109	357	171	528
18 - Vegetables	31	42	20	53	0	132	342	620	298	918
Total Low Density	206	55	54	343	164	385	1032	2239	1075	3314
Total Compact Density	103	28	27	171	82	192	516	1,119	538	1,657

Sources: Interviews with Ag commissioner and Coop Extension staff
GIS LU90 map for buffer areas
I-O Multipliers for Table 2A

TABLE 2B, CONT. - AGRICULTURAL IMPACT:2040
By Crop Type and City

	1	2	3	4	5a	5b	6			
	Atwater	Dos Palos	Gustine	Livingston	Los Banos NE	Los Banos SW	Merced	All Cities	Unincorp.	Total County
Direct Jobs Lost										
1-8 Animal Products	21	0	4	37	15	30	79	187	90	276
11 - Food Grains	3	2	5	5	0	0	66	81	39	120
12 - Feed Grains	0	0	0	4	5	0	0	9	4	13
13 - Hay Pasture	9	9	9	0	103	32	266	429	206	635
16 - Fruits	15	0	0	25	0	62	0	101	49	150
17 - Nuts	41	0	3	70	0	11	55	179	86	266
18 - Vegetables	13	18	8	23	0	55	144	261	125	386
Total Low Density	102	29	30	164	123	190	609	1247	599	1,846
Total Compact Density	51	14	15	82	61	95	305	623	299	923
Total Jobs Lost										
1-8 Animal Products	51	0	11	87	36	72	186	442	213	655
11 - Food Grains	4	2	6	6	0	0	81	100	48	147
12 - Feed Grains	0	0	0	6	7	0	0	13	6	20
13 - Hay Pasture	11	11	11	0	121	38	314	505	243	748
16 - Fruits	29	0	0	50	0	123	0	201	97	298
17 - Nuts	81	0	6	140	0	21	109	357	171	528
18 - Vegetables	31	42	20	53	0	132	342	620	298	918
Total Low Density	206	55	54	343	164	385	1032	2239	1075	3314
Total Compact Density	103	28	27	171	82	192	516	1,119	538	1,657

Sources: Interviews with Ag commissioner and Coop Extension staff
GIS LU90 map for buffer areas
I-O Multipliers for Table 2A

TABLE 3 - CITY FISCAL IMPACTS: 2040

($000'97 dollars)	1	2	3	4	5	6		
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities	Per Capita
New Residents	31,046	8,965	10,683	37,963	63,567	187,526	339,751	
New Jobs	13,228	2,982	4,011	14,040	24,023	69,758	128,043	
Low Density: New Acres	4,643	1,579	1,953	8,029	13,190	34,239	63,632	
Revenues								
Average/Resident	$17,434	$3,172	$6,597	$14,144	$25,269	$92,824	$159,440	
Average/Job	$4,313	$1,462	$1,401	$5,179	$9,611	$35,144	$57,109	
Property Tax (1)	$858	$236	$407	$1,012	$2,675	$7,199	$12,388	
Total Rev.	**$22,605**	**$4,869**	**$8,406**	**$20,335**	**$37,555**	**$135,167**	**$228,937**	**$674**
Costs								
Average/Resident	($13,107)	($2,370)	($3,323)	($11,756)	($20,182)	($76,853)	($127,591)	
Average/Job	($3,405)	($511)	($735)	($2,626)	($4,154)	($14,377)	($25,809)	
Acre-Related	($5,554)	($2,093)	($3,453)	($6,014)	($11,245)	($44,902)	($73,261)	
Capital/year	($4,079)	($1,388)	($1,716)	($7,054)	($11,589)	($30,082)	($55,907)	
Total Cost	**($26,145)**	**($6,362)**	**($9,227)**	**($27,450)**	**($47,170)**	**($166,214)**	**($282,568)**	**($832)**
Net Revenue/(Cost)	**($3,540)**	**($1,493)**	**($820)**	**($7,115)**	**($9,615)**	**($31,047)**	**($53,631)**	**($158)**
Net as % of Revenue	-15.7%	-30.7%	-9.8%	-35.0%	-25.6%	-23.0%	-23.4%	
Compact: New Acres	2,321	790	976	4,014	6,595	17,119	31,816	
Revenues								
Average/Resident	$17,434	$3,172	$6,597	$14,144	$25,269	$92,824	$159,440	
Average/Job	$4,313	$1,462	$1,401	$5,179	$9,611	$35,144	$57,109	
Property Tax (1)	$915	$249	$438	$1,119	$2,838	$7,785	$13,344	
Total Rev	**$22,662**	**$4,882**	**$8,436**	**$20,442**	**$37,717**	**$135,753**	**$229,892**	**$677**
Costs								
Average/Resident	($13,107)	($2,370)	($3,323)	($11,756)	($20,182)	($76,853)	($127,591)	
Average/Job	($3,405)	($511)	($735)	($2,626)	($4,154)	($14,377)	($25,809)	
Acre-Related	($2,777)	($1,047)	($1,726)	($3,007)	($5,623)	($22,451)	($36,631)	
Capital/year	($2,447)	($833)	($1,029)	($4,232)	($6,953)	($18,049)	($33,544)	
Total Cost	**($21,737)**	**($4,760)**	**($6,814)**	**($21,621)**	**($36,912)**	**($131,730)**	**($223,574)**	**($658)**
Net Revenue/(Cost)	**$925**	**$122**	**$1,622**	**($1,180)**	**$805**	**$4,024**	**$6,318**	**$19**
Net as % of Revenue	4.1%	2.5%	19.2%	-5.8%	2.1%	3.0%	2.7%	

(1) See Table 3C for Property Tax detail

TABLE 3A - DETAIL OF EXISTING CITY REVENUES

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingstone	5 Los Banos	6 Merced	All Cities	Allocation
Taxes								
Secured and Unsecured Prop Tax	749,066	134,395	199,665	347,119	1,070,444	2,664,010	5,164,699	Prop. Tax CS (1)
Indebtedness Property Tax	0		50,500		0		50,500	Prop. Tax CS (1)
Property Tax - Prior Year	45	4,430	268	1,807	1,356	30,648	38,554	Prop. Tax CS (1)
Other Property Taxes				0		28,013	28,013	Prop. Tax CS (1)
Interest, Penalties /Delinquent								
Sales and Use Taxes	876,740	267,690	159,274	229,957	1,462,499	6,691,063	9,687,223	Jobs.67 (3)Res.33 (4)
Transportation Tax	344,390	90,117	54,629	201,526	32,527	546,605	1,269,794	Jobs.67 (3)Res.33 (4)
Transient Lodging Taxes	25,128		319	1,797	96,552	522,367	646,163	Res/Jobs (2)
Franchises	227,966	32,345	70,171	344,631	409,518	545,147	1,629,778	Res/Jobs (2)
Business License Taxes	82,199	17,428	17,606	33,236	69,758	788,073	1,008,300	Jobs (3)
Real Property Transfer Taxes	23,533			2,761	34,454	48,265	109,013	Res/Jobs (2)
Utility Users Tax	14,705		163,367				178,072	Res/Jobs (2)
Other Non-Property Taxes	0	48,258	13,693		180,925		242,876	Res/Jobs (2)
Benefit Assessments								
Fire		0		4,567			4,567	Res/Jobs (2)
Paramedics		0				0	0	Res/Jobs (2)
Lighting	84,787	0	96,767		182,175		363,729	Res/Jobs (2)
Other		0		215,144		458,297	673,441	Res/Jobs (2)
Licenses and Permits								
Construction Permits	244,227	33,892	35,609	32,959	303,307	337,604	987,598	Res/Jobs (2)
Other Licenses and Permits	27,536	3,550	2,661	12,009	15,513	5,005	66,274	Res/Jobs (2)
Fines and Forfeitures								
Vehicle Code Fines	24,553	7,108	4,629	23,716	32,753	306,787	399,546	Res/Jobs (2)
Other Fines, Forfeitures /Penalties	26,572	3,484	4,268	28,630	48,346	39,340	150,640	Res/Jobs (2)
Use of Money								
Investment Earnings	503,738	17,482	98,996	268,463	356,037	2,006,240	3,250,956	Res/Jobs (2)
Rents and Concessions	42,090	12,175		32,921	16,706	34,938	138,830	Res/Jobs (2)
Royalties								Res/Jobs (2)
Other				8,343		0	8,343	Res/Jobs (2)
Intergovernmental								
State Motor Vehicle In-Lieu Tax	904,307	171,665	165,569	406,500	788,129	2,398,933	4,835,103	Resid (4)
State Trailer Coach In-Lieu Tax	0			0	0	0	0	Resid (4)
State Cigarette Tax	0			0	0	0	0	Resid (4)
Homeowners Property Tax Relief	18,481	3,408	5,037	8,435	28,131	68,205	131,697	Prop. Tax CS (1)
State Gasoline Tax	412,478	81,157	74,968	186,548	352,968	1,062,065	2,170,184	Resid (4)
Other State Grants	235,620	55,495	339,242	89,123	568,563	1,841,132	3,129,175	Resid (4)
County Grants of State Gas Tax						0	0	Resid (4)
County Grants	0	405					405	Resid (4)
Federal Revenue Sharing								Resid (4)
Other Federal Grants	586,540		2,400	60,072	113,848	2,319,699	3,082,559	Resid (4)
Other Taxes in-Lieu	0	76,600		62,472			139,072	Resid (4)

TABLE 3A CONT. - DETAIL OF EXISTING CITY REVENUES

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingstone	5 Los Banos	6 Merced	All Cities	Allocation
Charges for Services								
Zoning Fees and Subdivision Fees	0	4,834		6,573	41,805	310,072	363,284	Res/Jobs (2)
Police Department Services	13,932	7,743	21,026	71,283	101,050	117,136	332,170	Res/Jobs (2)
Fire Department Services	0	180			26,977	107,883	135,040	Res/Jobs (2)
Plan Checking Fees	67,776	2,196	630		40,189	113,662	224,453	Res/Jobs (2)
Animal Shelter Fees and Charges	523	780	447			0	1,750	Resid (4)
Engineering Fees	415				30,321	334,421	365,157	Res/Jobs (2)
Street, Sidewalk and Curb Repairs		1,031	2,425	1,034	492	18,546	23,528	Resid (4)
Weed and Lot Cleaning		780	1,406	965	17,755	7,206	28,112	Resid (4)
Sewer Charges/Connect Fees *	2,299,979	415,420	893,289	1,003,693	1,454,797	5,372,724	11,439,902	Enterprise Res/Jobs (2)
Solid Waste Revenues *	1,240,160	256,694	529,930	583,054	1,215,641	4,120,045	7,945,524	Enterprise Res/Jobs (2)
First Aid and Ambulance Charges								Resid (4)
Library Fines and Fees								Resid (4)
Parking Facilities						6,433	6,433	Jobs (3)
Parks and Recreation Fees	71,855	13,167	34,307	63,416	450,934	390,509	1,024,188	Resid (4)
Golf Course Fees								Resid (4)
Water Charges/Connect Fees *	1,411,827	550,179	321,593	910,326	1,426,744	5,164,913	9,785,582	Enterprise Res/Jobs (2)
Electric Revenues								Res/Jobs (2)
Airport Revenues	0		34,052		153,330	155,086	342,468	Res/Jobs (2)
Cemetery Revenues								Resid (4)
Housing Revenues						526,792	526,792	Resid (4)
Transit Revenues	3,389					925	4,314	Res/Jobs (2)
Quasi-External Transactions	653,535		356	249,990	450,315	4,510,173	5,864,369	Res/Jobs (2)
Other Current Service Charges	292,887	16,148		0	430,534	411,188	1,150,757	Res/Jobs (2)
Other Revenues								
Sale of Real and Personal Property	5,708,564					145,066	5,853,630	Res/Jobs (2)
Contributions: Non-Govt Sources	2,810	5,000	8,000			47,043	62,853	Res/Jobs (2)
Other Sources of Revenues	108,487	50,079		204,158	0	232,876	595,600	Res/Jobs (2)
Other Sources								
Sale of Bonds					41,220	0	41,220	Res/Jobs (2)
Notes and Other		43,007			379,924		422,931	Res/Jobs (2)
Total Revenues	**$17,330,841**	**$2,428,324**	**$3,407,102**	**$5,697,232**	**$12,426,542**	**$44,835,141**	**$86,125,161**	

Source: Annual Report 1996/97 - Financial Transactions Concerning Cities
State of California, Office of the Controller

TABLE 3A CONT. - EXISTING CITY REVENUES

Totals and Per Resident & Job

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	All Cities
Revenue Totals - by Allocation							
Case Study (Property Tax)	$749,111	$138,825	$250,433	$348,926	$1,071,800	$2,722,671	$5,281,766
Res/Jobs (1)	$8,115,111	$290,889	$559,581	$1,516,380	$3,400,082	$10,857,726	$24,739,769
Resident Share	$6,319,905	$238,096	$447,551	$1,216,462	$2,715,838	$8,700,130	$19,720,938
Job Share	$1,795,206	$52,793	$112,030	$299,918	$684,244	$2,157,596	$5,018,831
Resident	$2,614,296	$519,156	$691,352	$1,012,519	$2,786,048	$10,953,312	$18,576,684
Jobs	$900,356	$257,159	$160,921	$322,330	$1,071,425	$5,643,744	$8,355,934
Enterprise (Sewer/water) (1)	$4,951,966	$1,222,293	$1,744,812	$2,497,073	$4,097,182	$14,657,682	$29,171,008
Resident Share	$4,359,006	$809,962	$1,464,695	$1,685,918	$2,724,139	$10,893,733	$21,656,294
Job Share	$592,960	$412,331	$280,117	$811,155	$1,373,043	$3,763,949	$7,514,714
Total Revenue	**$17,330,840**	**$2,428,322**	**$3,407,099**	**$5,697,228**	**$12,426,537**	**$44,835,135**	**$86,125,161**
Residents & Jobs Base							
Population (1996)	23,672	4,430	4,216	10,508	20,694	61,712	125,232
Jobs (1996 est.)	10,086	1,473	1,583	3,886	7,821	22,956	47,806
Average Rev per Resident (w/o Prop Tax)							
Resid. share of resid/job	$266.98	$53.75	$106.16	$115.77	$131.24	$140.98	$157.48
Resid. only	$110.44	$117.19	$163.98	$96.36	$134.63	$177.49	$148.34
Resid. share of enterprise	$184.14	$182.84	$347.41	$160.44	$131.64	$176.53	$172.93
Total per Resident	**$561.56**	**$353.77**	**$617.55**	**$372.56**	**$397.51**	**$495.00**	**$478.74**
Average Rev per Job (w/o Prop Tax)							
Job share of resid/job	$177.99	$35.83	$70.77	$77.18	$87.49	$93.99	$104.98
Job only	$89.27	$174.53	$101.66	$82.94	$137.00	$245.85	$174.79
Job share of enterprise	$58.79	$279.85	$176.95	$208.73	$175.57	$163.96	$157.19
Total per Job	**$326.04**	**$490.21**	**$349.38**	**$368.85**	**$400.06**	**$503.79**	**$436.96**

(1) Revenues/costs affecting both residents & jobs are allocated at the ratio of residents to job population equivalents from Table 1A. This ratio varies by city. The average for all cities is 79.7% res. to 20.3% jobs.

TABLE 3B - DETAIL OF EXISTING CITY COSTS

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	Total Cities	Allocation
General Government								
Legislative	$6,632	$7,163	$21,283	$85,478	$371,271	$174,809	$666,636	Res/Jobs (2)
Management and Support	$1,389,272	$124,758	$62,173	$605,050	$833,305	$2,659,532	$5,674,090	Res/Jobs (2)
Public Safety								
Police	$1,593,500	$578,728	$461,644	$1,515,593	$2,800,650	$9,658,337	$16,608,452	Res/Jobs (2)
Fire	$851,033	$65,932	$19,647	$39,229	$512,280	$5,692,179	$7,180,300	Acre (5)
Animal Regulation			$4,829		$66,909		$71,738	Resid (4)
Street Lighting	$55,130		$89,269	$41,800	$248,024	$0	$434,223	Acre (5)
Other			$46,654					Res/Jobs (2)
Transportation								
Street, Highways, & Storm Drains	$715,565	$333,030	$471,512	$237,986	$1,038,734	$1,816,202	$4,613,029	Acre (5)
Street Trees & Landscaping			$7,269	$17,216	$0	$278,296	$302,781	Acre (5)
Public Transit	$22,937				$32,527	$965,853	$1,021,317	Res/Jobs (2)
Airports	$0		$33,361		$224,537	$337,161	$595,059	Res/Jobs (2)
Other				$6,679				Res/Jobs (2)
Community Development			$9,698					
Planning	$179,421	$15,882		$64,979	$305,644	$303,805	$869,731	Res/Jobs (2)
Regulation Enforcement	$230,948	$28,993	$38,541	$52,526	$288,110	$1,931,025	$2,570,143	Res/Jobs (2)
Housing	$479,772					$2,615,232	$3,095,004	Resid (4)
Community Promotion		$105			$0	$302,370	$302,475	Res/Jobs (2)
Other				$14,512		$484,817	$499,329	Res/Jobs (2)
Enterprise								
Solid Waste	$1,130,189	$270,613	$259,119	$557,159	$854,930	$4,530,376	$7,602,386	Ac(5)0.5 & Res/job(2)0.5
Sewers	$2,923,953	$425,004	$838,522	$880,463	$1,364,290	$5,276,048	$11,708,280	Ac(5)0.5 & Res/job(2)0.5
Culture and Leisure								
Parks and Recreation	$374,647	$32,469	$100,349	$237,428	$1,137,416	$2,905,060	$4,787,369	Resid (4)
Community Center/Auditoriums	$0		$47,962			$693,987	$741,949	Resid (4)
Other				$69,821		$0	$69,821	Resid (4)
Public Utilities (Enterprise)								
Water	$1,172,027	$575,084	$452,068	$1,219,298	$1,504,310	$4,173,623	$9,096,410	Ac(5)0.5 & Res/job(2)0.5
Other Costs	$5,700,000							Res/Jobs (2)
Total Costs	**$16,825,026**	**$2,457,761**	**$2,963,900**	**$5,645,217**	**$11,582,937**	**$44,798,712**	**$84,273,553**	

TABLE 3B CONT. - EXISTING CITY COSTS
Totals and Per Resident, Job & Acre

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	Total Cities
Cost Totals - by Allocation							
Case Study	NA	NA	NA	NA	NA	NA	
Res/Jobs total (1)	$11,735,795	$1,390,980	$1,448,209	$3,673,277	$6,717,809	$23,807,733	$48,773,801
Residential share	$9,139,628	$1,138,531	$1,158,272	$2,946,756	$5,365,894	$19,076,771	$38,825,852
Jobs share	$2,596,166	$252,449	$289,936	$726,521	$1,351,915	$4,730,962	$9,947,949
Resident only	$854,419	$32,469	$153,140	$307,249	$1,204,325	$6,214,279	$8,765,881
Job only	$0	$0	$0	$0	$0	$0	$0
Acre-Related	$4,234,813	$1,034,313	$1,362,552	$1,664,691	$3,660,803	$14,776,701	$26,733,871
Total Cost	**$16,825,026**	**$2,457,761**	**$2,963,900**	**$5,645,217**	**$11,582,937**	**$44,798,712**	**$84,273,553**
Residents, Jobs & Acres: Base							
Population (1996)	23,672	4,430	4,216	10,508	20,694	61,712	125,232
Jobs (1996 est.)	10,086	1,473	1,583	3,886	7,821	22,956	47,806
Acres	3,540	780	771	2,222	4,294	11,267	22,875
Average Cost per Resident, Job & Acre							
Per Resident	$422.19	$264.33	$311.06	$309.67	$317.49	$409.82	$380.03
Per Job	$257.42	$171.53	$183.34	$187.03	$172.90	$206.10	$208.10
Per Acre	$1,196.27	$1,325.44	$1,768.21	$749.10	$852.54	$1,311.45	$1,168.71

(1) Revenues/costs affecting both residents & jobs are allocated at the ratio of residents to job population equivalents from Table 1A. This ratio varies by city. The average for all cities is 79.7% res. to 20.3% jobs.

Source: Annual Report 1996/97 - Financial Transactions Concerning Cities
State of California, Office of the Controller

TABLE 3C - PROPERTY TAX CASE STUDY

	1	2	3	4	5	6	
	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities
Value Per: (1)							
Household	$ 80,000	$ 75,000	$ 100,000	$ 120,000	$ 130,000	120,000	
Resident	$ 25,811	$ 25,055	$ 38,743	$ 27,126	$ 42,727	39,025	
Job (@ 25% per resid value)	$ 6,453	$ 6,264	$ 9,686	$ 6,781	$ 10,682	9,756	
City Property Tax							
For City Infill							
City Rate for Infill	16.1%	15.1%	15.6%	18.5%	14.5%	16.3%	
Per Resident	$41.59	$37.78	$60.59	$50.13	$61.77	64	57
Per Job	$10.40	$9.45	$15.15	$12.53	$15.44	16	14
For Annexation Areas							
City Rate from County (2)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
City Rate from Fire	9.7%	9.7%	9.0%	9.0%	9.0%	9.0%	
Total	9.7%	9.7%	9.0%	9.0%	9.0%	9.0%	
Per Resident	$24.99	$24.25	$34.87	$24.41	$38.45	$35.12	$32.53
Per Job	$6.25	$6.06	$8.72	$6.10	$9.61	$8.78	$8.06
City Revenue Projections							
Population	31,046	8,965	10,683	37,963	63,567	187,526	
Jobs	13,228	2,982	4,011	14,040	24,023	69,758	
Low Density:							
Population Property Tax ($000)	$776	$217	$373	$927	$2,444	$6,586	
Jobs Property Tax ($000)	$83	$18	$35	$86	$231	$613	
Total ($000)	**$858**	**$236**	**$407**	**$1,012**	**$2,675**	**$7,199**	**$12,388**
Compact Density:							
Infill Resid. (10%)	$129	$34	$65	$190	$393	$1,195	
Infill Jobs (10%)	$14	$3	$6	$18	$37	$111	
Annex Residents (90%)	$698	$196	$335	$834	$2,200	$5,928	
Annex Jobs (90%)	$74	$16	$31	$77	$208	$551	
Total ($000)	**$915**	**$249**	**$438**	**$1,119**	**$2,838**	**$7,785**	**$13,344**

(1) Property value is based on regional real estate values and cross checked with City property tax revenue. Strong Associates

(2) Annexation Prop Tax Shift: Per Bill Nicholson, Merced Co. LAFCo Exec. Director, County will retain its full share of property tax in annexation areas; cities will receive the Fire District share.

NOTE: The following are the County property tax shares, used in Table 4D below.

For City Infill	Atwater	Dos Palos	Gustine	Livingston	Los Banos	Merced	All Cities
County Rate in City	13.6%	14.2%	13.2%	12.2%	15.0%	16.0%	
Per Resident	$35.14	$35.57	$50.99	$33.15	$64.29	$62.36	$53.75
Per Job	$8.79	$8.89	$12.75	$8.29	$16.07	$15.59	$13.31
For Annexation Areas							
County Rate in City (2)	18.8%	18.8%	18.3%	18.3%	18.3%	18.3%	
Per Resident	$48.45	$47.03	$71.02	$49.72	$78.32	$71.53	$65.58
Per Job	$12.11	$11.76	$17.75	$12.43	$19.58	$17.88	$16.31

TABLE 3D - CITY ANNUALIZED CAPITAL COSTS
($000'97 dollars)

	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	All Cities
Low Density							
Number of Acres	4,643	1,579	1,953	8,029	13,190	34,239	63,632
Annualized Capital Cost							
For new area @$879/ac (1)	**$4,079**	**$1,388**	**$1,716**	**$7,054**	**$11,589**	**$30,082**	**$55,907**
Compact Density							
Number of Acres	2,321	790	976	4,014	6,595	17,119	31,816
Annualized Capital Cost							
For new area @$1,054/ac (1)	**$2,447**	**$833**	**$1,029**	**$4,232**	**$6,953**	**$18,049**	**$33,544**

Source: Strong Associates Case Study (assumes the same costs for all cities)

(1) Capital costs include internal area and spine infrastructure as follows:

Internal Area Capital Costs	Ft/Ac	Cost/Ft	Cost/Ac	Cost/Ac	Cost/Ac
Sewer Main	40	$35	$1,400	Low	Compact (+20%)
Roads/Storm	40	$125	$5,000		
	Ac served	Station Cost			
Fire Station	5,000	$2,500,000	$500		
Total Internal per acre			$6,900		
Per acre annualized @ 20yr/8%				$703	$843
Spine Infrastructure Capital Costs	Ft/mile	Cost/Ft	Cost/Mile		
Sewer Main	5,280	$75	$396,000		
Spine Roads/Storm	5,280	$350	$1,848,000		
Total per mile			$2,244,000		
Total Spine per Acre (1Mi. per 1,300Ac)			$1,726		
Per acre annualized @ 20yr/8%				$176	$211
Total Capital cost per acre				$879	$1,054

TABLE 4 - COUNTY FISCAL IMPACTS: 2040

	< Acres Urbanized >		< - Per Res/Job/Ac - >		City area	Unincorp	Total	Per Capita
	City area	Unincorp	City area	Unincorp				
New Population					339,751	82,184	421,934	
New Jobs					128,043	33,308	161,351	
Low Density								
Revenues								
Av/Resident			$843.96	$880.63	$286,735,854	$72,373,150	$359,109,004	
Av/Job			$196.17	$220.62	$25,118,593	$7,348,433	$32,467,026	
Property Tax					$24,367,382	$5,932,421	$30,299,803	
Subtotal Above					$336,221,829	$85,654,005	$421,875,834	
Agriculture	58,356	28,029	$9.10	$9.10	($530,988)	($255,035)	($786,023)	
GEA (range/wetlands)	5,276	2,534	$0.87	$0.87	($4,597)	($2,208)	($6,805)	
Total	63,632	30,563			$335,686,244	$85,396,762	$421,083,006	$998
Costs								
Av/Resident			$950.78	$985.14	$323,027,151	$80,962,166	$403,989,317	
Av/Job			$126.83	$149.74	$16,239,738	$4,987,484	$21,227,222	
Subtotal Above					$339,266,889	$85,949,650	$425,216,539	
Roads (per Acre)		30,563		$133.07		$4,067,073	$4,067,073	
Total					$339,266,889	$90,016,723	$429,283,612	$1,017
Net Revenue/(Cost)					($3,580,645)	($4,619,962)	($8,200,607)	($19)
Net as a % of Revenues					-1.07%	-5.41%	-1.95%	
Compact Density								
Revenues								
Av/Resident			$843.96	$880.63	$286,735,854	$72,373,150	$359,109,004	
Av/Job			$196.17	$220.62	$25,118,593	$7,348,433	$32,467,026	
Property Tax					$23,927,385	$5,932,421	$29,859,807	
Subtotal Above					$335,781,833	$85,654,005	$421,435,837	
Agriculture	29,178	14,014	$9.10	$9.10	($265,494)	($127,518)	($393,012)	
GEA (range/wetlands)	2,638	1,267	$0.87	$0.87	($2,298)	($1,104)	($3,402)	
Total	31,816	15,281			$335,514,040	$85,525,383	$421,039,423	$998
Costs								
Av/Resident			$950.78	$985.14	$323,027,151	$80,962,166	$403,989,317	
Av/Job			$126.83	$149.74	$16,239,738	$4,987,484	$21,227,222	
Subtotal Above					$339,266,889	$85,949,650	$425,216,539	
Roads		15,281		$133.07		$2,033,537	$2,033,537	
Total					$339,266,889	$87,983,186	$427,250,076	$1,013
Net Revenue/(Cost)					($3,752,849)	($2,457,803)	($6,210,652)	($15)
Net as a % of Revenues					-1.12%	-2.87%	-1.48%	

Existing City and County Demographic Information

	County Wide	-	Unincorp
Estimated Population	198,522	125,232	73,290
Estimated Jobs	75,916	47,806	28,111

TABLE 4A - DETAIL OF EXISTING COUNTY REVENUES

	Total	< - - - - - - - - - - Allocation		- - - - -	- - - - - - >
Taxes		Resident	Jobs	Unincorp only	Case Study
Property Taxes	$19,069,090				$19,069,090
Other Taxes					
Sales and Use Taxes	$3,088,839		$3,088,839		
Transportation Tax (non-transit)	$941,747	$750,433	$191,314		
Property Transfer	$288,343	$229,767	$58,576		
Transient Lodging	$287,036	$228,725	$58,311		
Subtotal Other Taxes	$4,605,965	$1,208,924	$3,397,041		
Total Taxes	**$23,675,055**	**$1,208,924**	**$3,397,041**		**$19,069,090**
Special Benefit Assessments					
Capital Outlay	$558,684	$445,188	$113,496		
Total Special Benefit Assmts	$558,684	$445,188	$113,496		
Licenses, Permits & Franchises					
Animal Licenses	$113,318	$113,318			
Business Licenses	$0	$0	$0		
Construction Permits	$735,500	$586,084	$149,416		
Road Privileges & Permits	$47,988	$38,239	$9,749		
Zoning Permits	$33,552	$26,736	$6,816		
Franchises	$977,576	$778,983	$198,593		
Other	$223,592	$178,170	$45,422		
Total Licenses & Permits	**$2,131,526**	**$1,721,530**	**$409,996**		
Fines, Forfeitures & Penalties					
Vehicle Code Fines	$238,066	$189,703	$48,363		
Superior Court Fines	$4,743	$3,779	$964		
Municipal Court	$1,300,147	$1,036,024	$264,123		
Forfeitures and Penalties	$284,309	$226,552	$57,757		
Total Fines, Forfeitures & Penalties	$1,827,265	$1,456,059	$371,206		
Revenue From Use of Money & Property					
Interest	$4,228,408	$3,369,414	$858,994		
Rents and Concessions	$1,096,657	$873,873	$222,784		
Total Revenues From Use of Money & Property	**$5,325,065**	**$4,243,287**	**$1,081,778**		
State & Federal & Other					
State					
Highway Uses Tax	$3,826,103	$3,826,103			
Motor Vehicle In-lieu Tax	$13,497,494	$8,066,625	$2,056,495	$3,374,374	
Highway Property Rentals	$1,545	$1,231	$314		
Other State In-Lieu Taxes	$9,506	$7,575	$1,931		
Public Assistance Administration	$14,574,715	$14,574,715			
Public Assistance Programs	$37,281,559	$37,281,559			
Aid for Mental Health	$6,541,611	$6,541,611			
Alcohol and Drug Abuse	$1,568,367	$1,568,367			
Other Aid for Health	$3,968,482	$3,968,482			
Aid for Agriculture	$610,326				$610,326
Aid for Construction	$167,967	$133,845	$34,122		
Aid for Corrections	$152,322	$152,322			
Aid for County Fairs	$117,000	$93,232	$23,768		
Aid for Disaster	$7,619	$6,071	$1,548		
Homeowners Property Tax Relief	$471,531				$471,531
Public Safety	$6,967,278	$5,551,887	$1,415,391		
SP 90 Mandated Costs	$61,985	$49,393	$12,592		
Trial Court Funding	$2,830,377	$2,830,377			
Other	$5,609,451	$4,426,701	$1,128,537		$54,213
Subtotal State	$98,265,238	$89,080,096	$4,674,699	$3,374,374	$1,136,070

TABLE 4A - CONT. COUNTY REVENUES, CONTINUED

	Total	< - - - - - - - - - - Allocation		- - - - -	- - - - - - >
		Resident	Jobs	Unincorp only	Case Study
Federal					
Public Assistance Administration	$9,076,865	$9,076,865			
Public Assistance Programs	$37,873,238	$37,873,238			
Aid for Construction	$857,702	$683,461	$174,241		
In-Lieu Taxes	$118,933	$94,772	$24,161		
Other	$7,406,780	$5,828,250	$1,485,846		**$92,684**
Subtotal Federal	$55,333,518	$53,556,586	$1,684,248		**$92,684**
Other: In-Lieu Taxes	$0	$0	$0		
Other: Governmental Agencies	$54,670	$43,564	$11,106		
Total State, Federal and Other	**$153,653,426**	**$142,680,245**	**$6,370,053**	**$3,374,374**	**$1,228,754**
Charges for Current Services					
Assessments & Tax Collection Fees	$793,887	$632,610	$161,277		
Auditing and Accounting Fees	$11,236	$8,953	$2,283		
Communication Services	$176,597	$140,722	$35,875		
Election Services	$44,776	$44,776			
Legal Services	$66,971	$53,366	$13,605		
Planning and Engineering Services	$404,895	$322,641	$82,254		
Agricultural Services	$105,438				**$105,438**
Civil Process Services	$153,650	$122,436	$31,214		
Court Fees and Costs	$1,025,567	$817,225	$208,342		
Estate Fees	$60,248	$60,248			
Humane Services	$112,392	$112,392			
Law Enforcement Services	$99,347	$79,165	$20,182		
Recording Fees	$394,699	$314,517	$80,182		
Road and Street Services	$70,276	$56,000	$14,276		
Health Fees	$288,259	$288,259			
Mental Health Services	$793,867	$793,867			
California Children's Services	$4,988	$4,988			
Sanitation Services	$600,361	$478,399	$121,962		
Institutional Care and Services	$1,938,532	$1,938,532			
Library Services	$26,876	$21,416	$5,460		
Park and Recreation Fees	$193,430	$193,430			
Other	$4,689,886	$3,737,143	$952,743		
Total Charges for Current Services	**$12,056,178**	**$10,221,085**	**$1,729,655**		**$105,438**
Miscellaneous Revenue					
Miscellaneous	$3,238,055	$2,580,250	$657,805		
Total Miscellaneous Revenue	**$3,238,055**	**$2,580,250**	**$657,805**		
Other Financing Sources					
Sale of Fixed Assets	$106,194	$84,621	$21,573		
Proceeds From Sale of Bonds		$0	$0		
Other Long Term Debt Proceeds	$1,600,929	$1,275,703	$325,226		
Total Other Financing Sources	**$1,707,123**	**$1,360,324**	**$346,799**		
Grand Total Revenue Sources	**$204,172,377**	**$165,916,892**	**$14,477,829**	**$3,374,374**	**$20,403,282**
Total Transfers in	$2,042,721	$1,627,746	$414,975		
Total Revenue Sources and Transfers in	**$206,215,098**	**$167,544,638**	**$14,892,804**	**$3,374,374**	**$20,403,282**

Case Study Revenues - Total		$20,403,282
Property Tax Share		$19,540,621
Agriculture Share		$715,764
Wetlands Share		$146,897
Unincorporated Only - Total	$3,374,374	
Resident Share	$2,687,243	
Job Share	$687,131	

Source: California State Controller: County Annual Report 1996-97

TABLE 4B - DETAIL OF EXISTING COUNTY COSTS

	Total	< - - - - - - - - - - - Allocation		- - - - -	- - - - - - >
General (Leg/Admin/Fin/Counsel etc.)		Resident	Jobs	Unincorp only	Case Study
Legislative and Administrative					
Board of Supervisors	$417,196	$332,443	$84,753		
Administrative Officer	$737,518	$587,692	$149,826		
Other	$868	$692	$176		
Subtotal Legislative & Admin.	$1,155,582	$920,827	$234,755	$0	$0
Finance					
Treasurer-Tax Collector	$1,968,625	$1,568,702	$399,923		
Assessor	$1,509,109	$1,202,536	$306,573		
Purchasing Agent	$439,948	$350,573	$89,375		
Other	$549,796	$438,106	$111,690		
Subtotal Finance	$4,467,478	$3,559,917	$907,561	$0	$0
Counsel					
County Counsel	$587,887	$468,459	$119,428		
'District Attorney	$94,300	$75,143	$19,157		
Other		$0	$0		
Subtotal Counsel	$682,187	$543,602	$138,585	$0	$0
Personnel	$648,040	$516,392	$131,648		
Elections	$355,921	$355,921			
Communications	$157,599	$125,583	$32,016		
Property Management	$1,382,906	$1,101,971	$280,935		
Jails	$3,751	$2,989	$762		
Courts	$89,163	$71,050	$18,113		
Other	$455,793	$363,199	$92,594		
Plant Acquisition	$548,707	$437,238	$111,469	$0	$0
Promotion	$1,304,375	$1,039,393	$264,982		
Other General	$2,035,531	$355,022	$90,509		$1,590,000
Total General	**$12,738,326**	**$8,955,867**	**$2,192,459**	**$0**	**$1,590,000**
Public Protection					
Judicial					
Court Appointed Counsel	$1,480,593	$1,480,593			
Other	$16,223,250	$12,927,524	$3,295,726		
Subtotal Judicial	$17,703,843	$14,408,117	$3,295,726		$0
Police Protection	$6,994,008	$2,519,648	$642,356	$3,162,004	$670,000
Detention and Correction					
Adult Detention	$8,651,972	$8,651,972			
Juvenile Detention	$1,221,580	$1,221,580			
Probation	$2,242,540	$2,242,540			
Subtotal Detention and Correction	$12,116,092	$12,116,092	$0		
Fire Protection	$6,700,544	$5,339,340	$1,361,204		
Flood Control - Soil & Water Conservation	$130,346	$103,866	$26,480		
Protective Inspection					
Agricultural Commissioner	$1,341,149				$1,341,149
Building Inspector	$466,648	$371,849	$94,799		
Sealer of Weights and Measures	$252,518	$201,219	$51,299		
Subtotal Protective Inspection	$2,060,315	$573,069	$146,097		$1,341,149
Other Protection					
LAFCo	$14,911	$11,882	$3,029		
Recorder	$348,181	$277,449	$70,732		
Coroner	$320,797	$320,797			
Emergency Services	$0	$0	$0		
Planning and Zoning	$774,693	$774,693			
Pound	$519,410	$519,410			
Other	$1,295,696	$1,032,478	$263,218		
Subtotal Other Protection	$3,273,688	$2,936,708	$336,980		
Total Public Protection	**$48,978,836**	**$37,996,840**	**$5,808,843**	**$3,162,004**	**$2,011,149**

TABLE 4B - CONT. COUNTY COSTS

	Total	< - - - - - - - - - - Allocation		- - - - -	- - - - - - >
		Resident	Jobs	Unincorp only	Case Study
Public Ways and Facilities					
Roads	$7,253,886	$2,890,136	$736,807		$3,626,943
Total Public Ways and Facilities	$7,253,886	$2,890,136	$736,807	$0	$3,626,943
Health					
Public Health	$14,581,745	$14,581,745			
Medical Care	$2,300,778	$2,300,778			
Mental Health	$8,943,321	$8,943,321			
Drug & Alcohol Abuse	$1,592,598	$1,592,598			
Total Health	**$27,418,442**	**$27,418,442**	$0	$0	$0
Public Assistance (Welfare/Soc/Relief etc.)					
Welfare					
Administration	$19,056,093	$19,056,093			
Aid Programs-Cash	$72,458,431	$72,458,431			
Subtotal Welfare	$91,514,524	$91,514,524	$0	$0	$0
Social Services					
Administration & Programs	$7,700,355	$7,700,355			
Other	$9,142	$9,142			
Subtotal Social Services	$7,709,497	$7,709,497	$0	$0	$0
General Relief					
Aid to Indigents	$451,217	$451,217			
Subtotal General Relief	$451,217	$451,217	$0	$0	$0
Care of Court Wards					
Veterans' Services	$47,512	$47,512			
J.T.P.A.	$5,688,915	$5,688,915			
Other	$827,835	$827,835			
Subtotal Other Public Assistance	$6,516,750	$6,516,750	$0	$0	$0
Total Public Assistance	**$106,239,500**	**$106,239,500**	$0	$0	$0
Education					
Library Services	$575,914	$575,914			
Agricultural Education	$121,338				$121,338
Total Education	**$697,252**	**$575,914**	**$0**	**$0**	**$121,338**
Recreation/Cultural Services					
Recreation Facilities	$1,178,959	$1,178,959			
Cultural Services	$1,902	$1,902			
Total Recreation & Culture	**$1,180,861**	**$1,180,861**	$0	$0	$0
Debt Service					
Retirement/ Long Term Debt	**$2,496,638**	**$1,989,450**	**$507,188**		
Interest of Long Term Debt	$1,578,362	$1,257,720	$320,642		
Interest of Short Term Notes & Warrants	$308,126	$245,531	$62,595		
Total Debt Service	$4,383,126	$3,492,701	$890,425	$0	$0
Total Financing Uses	**$208,890,229**	**$188,750,260**	**$9,628,535**	**$3,162,004**	**$7,349,430**
Total Transfers Out	$0	$0	$0		
Total Fin. Uses and Transfers Out	**$208,890,229**	**$188,750,260**	**$9,628,535**	**$3,162,004**	**$7,349,430**

Case Study Cost - Total	$7,349,430
Agriculture Share	$3,562,487
Wetlands Share	$160,000
Roads Share (acre related)	$3,626,943
Unincorporated Only - Total	$3,162,004
Resident Share	$2,518,118
Job Share	$643,886

Note: Total road costs are divided 50:50 to county-wide system and the case study portion allocated to developed areas in the unincorporated area. The per acre share is based on unincorp. developed areas (27,195) from Table 1.

TABLE 4C - COUNTY AVERAGE REVENUES & COSTS

Existing Average Revenues & Costs	County-wide	Unincorp Area	Total
Total Resident Revenues	$167,544,638	$2,687,243	$170,231,881
Total Job Revenues	$14,892,804	$687,131	$15,579,935
Total Resident Costs	$188,750,260	$2,518,118	$191,268,379
Total Job Costs	$9,628,535	$643,886	$10,272,420
Base Resident & Job Factors - 1996			
Resident Count	198,522	73,290	
Job Count	75,916	28,111	
Revenues/Resident	$843.96	$36.67	$880.63
Revenues/Job	$196.17	$24.44	$220.62
Costs/Resident	$950.78	$34.36	$985.14
Costs/Job	$126.83	$22.91	$149.74
New Resident & Job Impact - 2040			
Resident Count	421,934	82,184	
Job Count	161,351	33,308	
Average Revenues	County-wide	Unincorp Added	Total
New Residents	$356,095,664	$3,013,340	$359,109,004
New Jobs	$31,652,837	$814,189	$32,467,026
Total Revenue	$387,748,501	$3,827,529	$391,576,031
Average Costs			
New Residents	$401,165,624	$2,823,693	$403,989,317
New Jobs	$20,464,275	$762,948	$21,227,222
Total Cost	$421,629,899	$3,586,640	$425,216,539

TABLE 4D - COUNTY PROPERTY TAX: 2040 GROWTH

	City Infill	City Annex	Unincorp	Total
County Property Tax (1)				
Per Resid	$53.75	$65.58	$65.58	
Per Job	$13.31	$16.31	$16.31	
Low Density				
New Residents		339,751	82,184	421,934
New Jobs		128,043	33,308	161,351
New Property Taxes		**$24,367,382**	**$5,932,421**	**$30,299,803**
Compact Density (2)				
New Residents	33,975	305,775	82,184	421,934
New Jobs	12,804	115,238	33,308	161,351
New Property Taxes	**$1,996,742**	**$21,930,644**	**$5,932,421**	**$29,859,807**

(1) County property tax estimates are from Table 3C.
Unincorporated area new devt. revenue at cities annexation area average.
(2) Compact assumes 10% infill and 90% city annexations for city growth

TABLE 4E- AGRICULTURAL FISCAL IMPACT

		Existing	< 2040 Reduced Acres, Rev/Cost >	
		County Wide	Low Density	Compact
Agricultural Acreage (1)		1,162,008	86,385	43,192
		100.0%	7.4%	3.7%
Revenues				
Property Assessed Value ($000'96)	$3,826,068		$348,420	$174,210
Percent share of AV (2)	100.0%		9.1%	4.6%
Property Tax Rev @ 1%	$38,260,680		$3,484,199	$1,742,099
County Share @ 30%		$11,478,204	$1,045,260	$522,630
Other County Revenue				
Aid for Agriculture	$610,326		$55,579	$27,790
Agricultural Services	$105,438	$715,764	$9,602	$4,801
Total Ag Revenue		**$12,193,968**	**$1,110,440**	**$555,220**
Revenue per Acre		$10.49	$12.85	$12.85
Costs				
Agricultural Commissioner	$1,341,149		$122,131	$61,066
Agricultural Education (Coop Ext)	$121,338		$11,050	$5,525
County Administrative Cost (3)	$1,500,000		$136,597	$68,299
Sheriff Patrol (3)	$600,000		$54,639	$27,319
Total Ag Costs		**$3,562,487**	**$324,417**	**$162,208**
Cost per Acre		$3.07	$3.76	$3.76
Net Revenue/Cost		**$8,631,481**	**$786,023**	**$393,012**
Net Per Acre		$7.43	$9.10	$9.10
Percent Reduction of Net Revenue			9.1%	4.6%

(1) Ag acreage impact is based on total urbanized area minus estimated wetlands impact area.

(2) Percent share of A/V has been applied to all other ag revenues & costs

(3) Strong Associates - based on interviews.

TABLE 4F - WETLANDS AREA FISCAL IMPACT

			< 2040 Reduced Acres, Rev/Cost >	
		Existing	Low Density	Compact
GEA Wetlands Acreage		128,893	7,810	3,905
		100.0%	6.1%	3.0%
Revenues				
Property Assessed Value ($000'96) (1)	$66,000		$3,999	$2,000
Property Tax Revenue @ 1%	$660,000		$39,992	$19,996
County Share @ 19%		$125,400	$7,599	$3,799
Other County Revenue				
State - Fish & Game	$54,213			
Federal Wetlands	$92,684	$146,897	$8,901	$4,451
Total Wetlands Revenue		**$272,297**	**$16,500**	**$8,250**
Revenue per Acre		$2.11	$2.11	$2.11
Costs				
County Administrative Cost (2)	$90,000			
Sheriff Patrol (2)	$70,000	$160,000	$9,695	$4,848
Cost per Acre		$1.24	$1.24	$1.24
Net Revenue/Cost		**$112,297**	**$6,805**	**$3,402**
Per Acre		$0.87	$0.87	$0.87
Percent Reduction of Net Revenue			6.1%	3.0%

(1) GEA acreage impact estimated based on Los Banos NE for city; proportionate share for unincorp area.

	Private acres	Per Ac AV	Total AV
Assessed Value Calculation	110,000	$600.00	$66,000,000

(2) Strong Associates - based on interviews.

TABLE 5 - GRASSLANDS ECOLOGICAL AREA (GEA) IMPACTS

		< - - - - - - - - - - Lost to Urbanization: 2040 - - - - - - - - - - >					
	Existing	2040: Low Density			2040: Compact Density		
		City	Unincorp (1)	Total	City	Unincorp (1)	Total
Focus Area Acreage by Land Use							
Urban development	771						
Agriculture	49,799	1,319	634	1,953	660	317	976
Range & Wetlands	38,602	5,276	2,534	7,810	2,638	1,267	3,905
Wetlands only	90,072						
Other	220						
Total	179,464	6,595	3,168	9,763	3,298	1,584	4,881
Agricultural Economic Impact							
Acres (Ag + Rangeland)	88,402	6,595	3,168	9,763	3,298	1,584	4,881
Direct Sales	$86,273,530	$5,631,830	$2,704,987	$8,336,817	$2,815,915	$1,352,493	$4,168,409
Total Sales	$119,738,516	$7,978,748	$3,832,219	**$11,810,966**	$3,989,374	$1,916,109	**$5,905,483**
Direct Jobs	1,257	123	59	182	61	29	91
Total Jobs	2,487	164	79	243	82	39	122
Wetlands Economic Impact							
Acres (Wetlands + Range)	128,674	5,276	2,534	7,810	2,638	1,267	3,905
Direct Sales	$27,747,283	$1,137,739	$546,460	$1,684,199	$568,869	$273,230	$842,099
Total Sales	$40,866,536	$1,675,676	$804,833	**$2,480,508**	$837,838	$402,416	**$1,240,254**
Direct Jobs	609	45	22	67	23	11	34
Total Jobs	798	60	29	88	30	14	44
Combined Economic Impact							
Direct Sales	$114,020,813	$6,769,569	$3,251,447	$10,021,016	$3,384,785	$1,625,723	$5,010,508
Total Sales	$160,605,052	$9,654,423	$4,637,052	**$14,291,475**	$4,827,212	$2,318,526	**$7,145,737**
Direct Jobs	1,865	168	81	249	84	40	124
Total Jobs	3,286	224	107	331	112	54	166

(1) Based on county-wide ratio of city-to-unincorporated are new growth (from Table 1).

TABLE 5A - GEA & BUFFER AREA LAND USE:1990

	Entire County	% share	Focus Area	% share	2-Mi Buffer around Focus Area	% share	City portion of Buffer Area	% share	Unincorp portion of Buffer Area	% share
Urban										
Residential	15,826	1.2%	24	0.0%	1,154	0.7%	1,069	3.2%	86	0.1%
Commercial/Industrial	3,679	0.3%	39	0.0%	463	0.3%	315	0.9%	149	0.1%
Right of Ways	6,335	0.5%	657	0.4%	436	0.3%	40	0.1%	396	0.3%
Public land	3,956	0.3%		0.0%	71	0.0%	64	0.2%	8	0.0%
Parks/sports/openspace	1,378	0.1%	51	0.0%	63	0.0%	63	0.2%		0.0%
Subtotal Urban	**31,174**	**2.5%**	**771**	**0.4%**	**2,187**	**1.4%**	**1,550**	**4.7%**	**638**	**0.5%**
Agriculture										
Dairy and Livestock	5,684	0.4%	318	0.2%	1,141	0.7%	201	0.6%	940	0.7%
Grain, Seed and Truck and Row Crops	442,074	34.9%	47,585	26.5%	123,860	77.2%	25,650	77.2%	98,210	77.3%
Improved Pasture / Grazing Operation	12,195	1.0%	352	0.2%	1,817	1.1%	467	1.4%	1,350	1.1%
Orchards, Vineyards and Tree Farms	137,620	10.9%	1,257	0.7%	7,714	4.8%	617	1.9%	7,097	5.6%
Other Agricultural Land Uses	1,247	0.1%	35	0.0%	255	0.2%	45	0.1%	210	0.2%
Poultry	2,680	0.2%	45	0.0%	729	0.5%	51	0.2%	678	0.5%
Rice Fields	10,987	0.9%	154	0.1%	3,539	2.2%	1,740	5.2%	1,799	1.4%
Fish Farms	852	0.1%	53	0.0%	605	0.4%	189	0.6%	416	0.3%
Subtotal Ag	**613,339**	**48.4%**	**49,799**	**27.7%**	**139,659**	**87.1%**	**28,960**	**87.2%**	**110,699**	**87.1%**
Range Land/Wetlands	**603,162**	**47.6%**	**38,602**	**21.5%**	**17,961**	**11.2%**	**2,513**	**7.6%**	**15,448**	**12.2%**
Wetlands - only (1)			90,072	50.2%						
Other										
Extractive	1,417	0.1%		0.0%		0.0%		0.0%		0.0%
Land In Transition	1,109	0.1%	13	0.0%	345	0.2%	207	0.6%	138	0.1%
Open Water	16,411	1.3%	207	0.1%	183	0.1%		0.0%	183	0.1%
Unknown	35	0.0%	0	0.0%	23	0.0%		0.0%	23	0.0%
Subtotal Other	**18,972**	**1.5%**	**220**	**0.1%**	**551**	**0.3%**	**207**	**0.6%**	**344**	**0.3%**
Total	**1,266,648**	100.0%	**179,464**	100.0%	**160,359**	100.0%	**33,230**	100.0%	**127,129**	100.0%
Percent share of County acres	100.0%		14.2%		12.7%		2.6%		10.0%	

Source: LU90.shp. This GIS file was developed in 1990 and is not consistent with Ag Commissioner acreage or with urban acreage uses persented elsewhere

(1) Based on interview with GWD

TABLE 5B - GEA - AG SALES & JOBS: 1998

	Acres	Av. Sales/ac	Direct Sales	Total Sales (1)	Direct Jobs (1)	Total Jobs (1)
Agricultural Uses						
Dairy & Livestock	318	$92,706	$29,517,513	$42,015,051	171	577
Grain, Seed, Truck & Row	47,585	$989	$47,049,367	$63,849,990	974	1,629
Pasture, Grazing	352	$192	$67,416	$116,954	1	3
Orchard, Vine & Tree	1,257	$1,906	$2,395,826	$3,571,839	26	78
Other Agricultural Uses	35	$1,491	$52,782	$88,710	2	4
Poultry	45	$87,613	$3,898,787	$5,543,249	14	75
Rice	154	$2,000	$308,800	$419,068	6	11
Fish Farms	53	$19,867	$1,052,933	$1,382,657	12	23
Subtotal	49,799	$1,694	$84,343,424	$116,987,517	1,207	2,400
Range Land/Wetlands (2)	38,602	$50	$1,930,106	$2,750,999	49	87
Total	**88,402**	$976	$86,273,530	**$119,738,516**	1,257	**2,487**

(1) Input Output Multipliers per Coop Extension, George Goldman, as follows:

	Direct Sales	Total Sales	Direct Jobs	Total Jobs
Dairy & Livestock	1.0000	1.4234	5.7944	13.7293
Grain, Seed, Truck & Row	1.0000	1.3571	20.7085	25.5081
Pasture, Grazing	1.0000	1.7348	13.9602	25.1706
Orchard, Vine & Tree	1.0000	1.4909	11.0463	21.9229
Other Agricultural Uses	1.0000	1.6807	29.5999	48.7288
Poultry	1.0000	1.4218	3.6544	13.5536
Rice	1.0000	1.3571	20.7085	25.5081
Fish Farms	1.0000	1.3131	11.8341	16.7378
Undeveloped & Range	1.0000	1.4253	25.5480	31.7132

(2) Based on interviews with GWD Staff

TABLE 5C - WETLANDS SALES & JOBS: 1998 - COUNTY & GEA

		GEA/Co Ratio	Dir/Tot Ratio	Direct Sales	Total Sales (1)	irect Jobs (1)	Total Jobs (1)
COUNTY-WIDE							
Land Maintenance Costs (2)		1.3112	1.4421	$10,998,911	$15,861,299	184	265
Other Land Costs		1.0000	1.5544	$7,965,832	$12,381,739	111	168
Recreation Expenditures (3)		1.5371	1.4384	$17,512,500	$25,190,435	458	659
Total				**$36,477,243**	**$53,433,473**	753	**1,092**
GEA ONLY		ST.& Fed	GWD (4)				
Land Maintenance Costs (2)		$8,297,383	$91,168	**$8,388,551**	**$12,096,954**	142	**202**
Other Land Costs (3)							
Structures			$198,192	$198,192	$274,267	2	3
Land Acquisition (Banking) (5)		$862,800		$862,800	$1,261,388	12	18
Land Acquisition (Income) (5)		$1,294,200		$1,294,200	$2,032,922	18	27
Wages/Other			$1,210,640	$1,210,640	$1,901,667	17	26
Landowners (110,000ac/$40per)				$4,400,000	$6,911,496	62	93
Subtotal Other Land Costs		$2,157,000	$1,408,832	**$7,965,832**	**$12,381,739**	111	**168**
Recreation Expenditures (3)	Hunting	Fishing	Non-Consum				
Transportation	$328,831	$333,081	$523,091	$1,185,004	$1,732,440	17	25
Equipment/Auxiliary	$1,400,654	$582,842	$1,192,671	$3,176,167	$4,494,887	109	128
Food	$390,937	$487,443	$735,169	$1,613,549	$2,433,887	51	62
Retail	$322,260	$1,863,267	$2,416,297	$4,601,825	$6,444,303	163	190
Services	$400,618	$125,566	$290,171	$816,355	$1,282,326	16	24
Subtotal Recreation	$2,843,300	$3,392,200	$5,157,400	**$11,392,900**	**$16,387,843**	356	**429**
Combined Total				**$27,747,283**	**$40,866,536**	609	**798**

TABLE 5C FOOTNOTES - WETLANDS SALES & JOBS 1998 - COUNTY & GEA

(1) Input Output Multipliers per Coop Extension, George Goldman, as follows:	Direct Sales	Sales Multiplier	Direct Jobs	Total Jobs
New Industrial and Commercial Buildings	1.0000	1.3838	10.2919	16.5350
Maintenance Repair, other Facilities	1.0000	1.4421	16.9025	24.0615
Transportation Services	1.0000	1.4620	14.0883	20.6996
General Merchandise Store	1.0000	1.4152	34.2205	40.3439
Food	1.0000	1.5084	31.7355	38.3278
Special Retail	1.0000	1.4004	35.3375	41.3769
Banking	1.0000	1.2920	6.6801	10.9123
Services	1.0000	1.4703	19.9968	29.2110
Personal Income	1.0000	1.5708	14.0563	21.2369

(2) Land Maintenance - Direct Costs per Thomas Reid Associates

	County Wide	% in GEA	GEA
Grasslands Water Dist.	$91,168	100.0%	$91,168
Other State & Federal			
NRCS	$140,025	100.0%	$140,025
Wildlife Conservation Board	$1,271,547	100.0%	$1,271,547
WCB	$84,800	100.0%	$84,800
California Fish & Game	$3,000,000	67.0%	$2,010,000
California State Parks	$1,770,885	8.5%	$150,525
Ducks Unlimited	$1,151,915	100.0%	$1,151,915
USFWS Partners for Wildlife	$279,143	100.0%	$279,143
USFWS San Luis NWR Complex	$3,177,562	100.0%	$3,177,562
California Waterfowl Assn.	$31,866	100.0%	$31,866
Subtotal Other St /Fed.	$10,907,743		$8,297,383
Total Maintenance	**$10,998,911**		**$8,388,551**

(3) Recreation & other land costs are from Thomas Reid & Assoc.

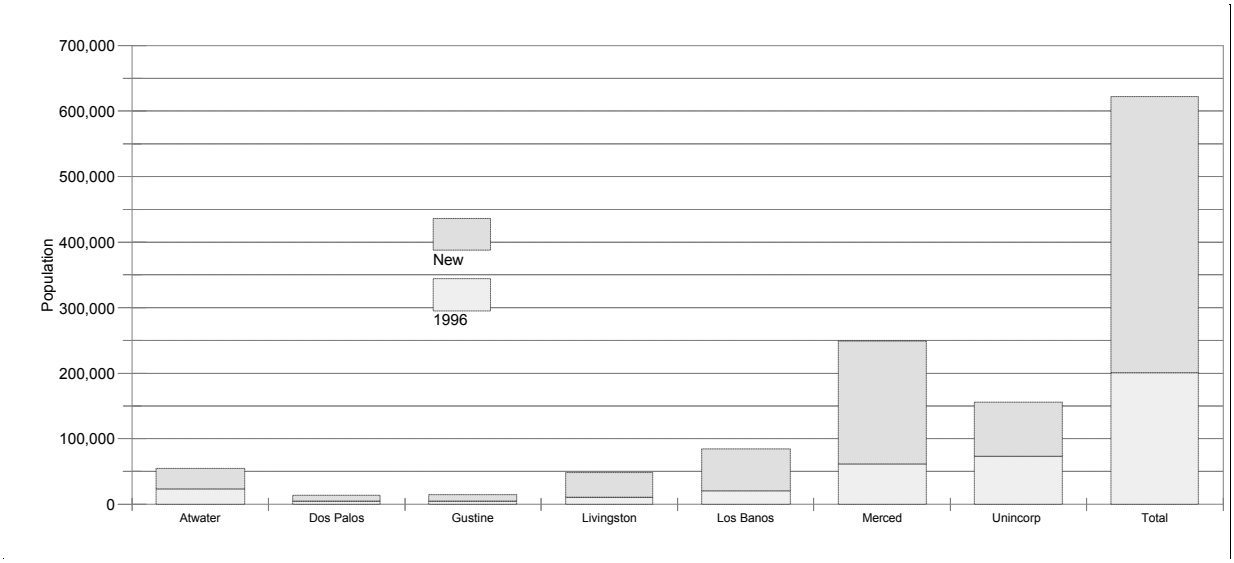
(4) GWD (Grassland Water Dist.) Annual Budget - $1,500,000 ($91,168 is Maintenance;$1,408,832 is other land costs)

(5) Land Acquisition total of $2,157,000 is allocated to banking (40%) and personal income (60%)

TABLE 5C - WETLANDS SALES & JOBS: 1998 - COUNTY & GEA

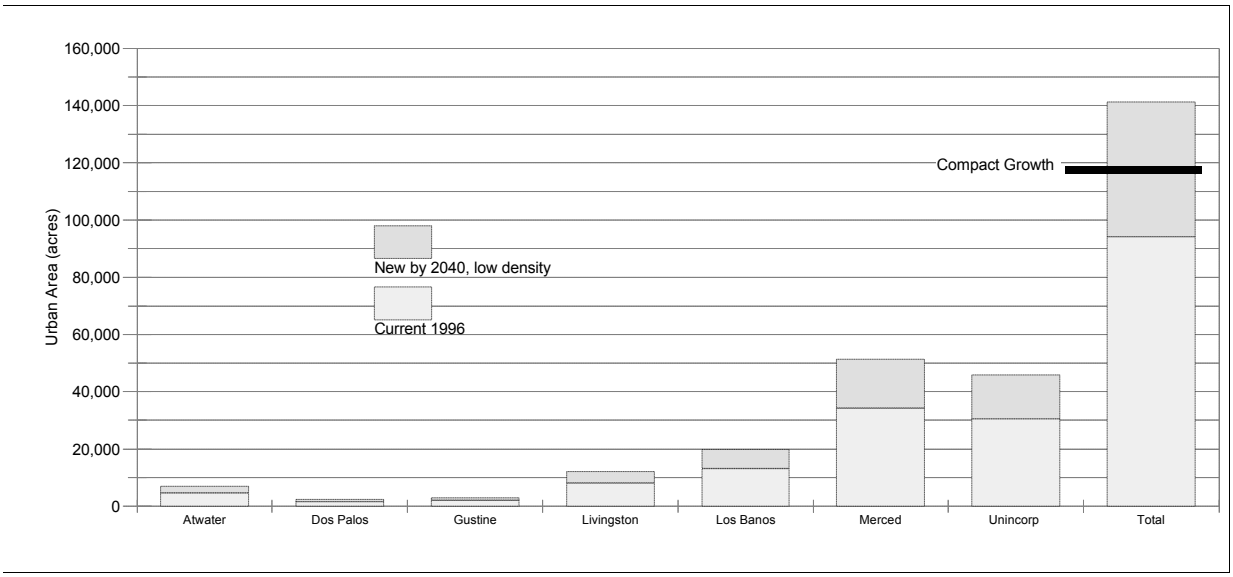
			GEA/Co Ratio	Dir/Tot Ratio	Direct Sales	Total Sales (1)	irect Jobs (1)	Total Jobs (1)
COUNTY-WIDE								
Land Maintenance Costs (2)			1.3112	1.4421	$10,998,911	$15,861,299	184	265
Other Land Costs			1.0000	1.5544	$7,965,832	$12,381,739	111	168
Recreation Expenditures (3)			1.5371	1.4384	$17,512,500	$25,190,435	458	659
Total					**$36,477,243**	**$53,433,473**	753	**1,092**
GEA ONLY			ST.& Fed	GWD (4)				
Land Maintenance Costs (2)			$8,297,383	$91,168	**$8,388,551**	**$12,096,954**	142	**202**
Other Land Costs (3)								
Structures				$198,192	$198,192	$274,267	2	3
Land Acquisition (Banking) (5)			$862,800		$862,800	$1,261,388	12	18
Land Acquisition (Income) (5)			$1,294,200		$1,294,200	$2,032,922	18	27
Wages/Other				$1,210,640	$1,210,640	$1,901,667	17	26
Landowners (110,000ac/$40per)					$4,400,000	$6,911,496	62	93
Subtotal Other Land Costs			$2,157,000	$1,408,832	**$7,965,832**	**$12,381,739**	111	**168**
Recreation Expenditures (3)	Hunting		Fishing	Non-Consum				
Transportation	$328,831		$333,081	$523,091	$1,185,004	$1,732,440	17	25
Equipment/Auxiliary	$1,400,654		$582,842	$1,192,671	$3,176,167	$4,494,887	109	128
Food	$390,937		$487,443	$735,169	$1,613,549	$2,433,887	51	62
Retail	$322,260		$1,863,267	$2,416,297	$4,601,825	$6,444,303	163	190
Services	$400,618		$125,566	$290,171	$816,355	$1,282,326	16	24
Subtotal Recreation	$2,843,300		$3,392,200	$5,157,400	**$11,392,900**	**$16,387,843**	356	**429**
Combined Total					**$27,747,283**	**$40,866,536**	609	**798**

Figure 1.1 - Population Growth in Merced County: 1996 to 2040



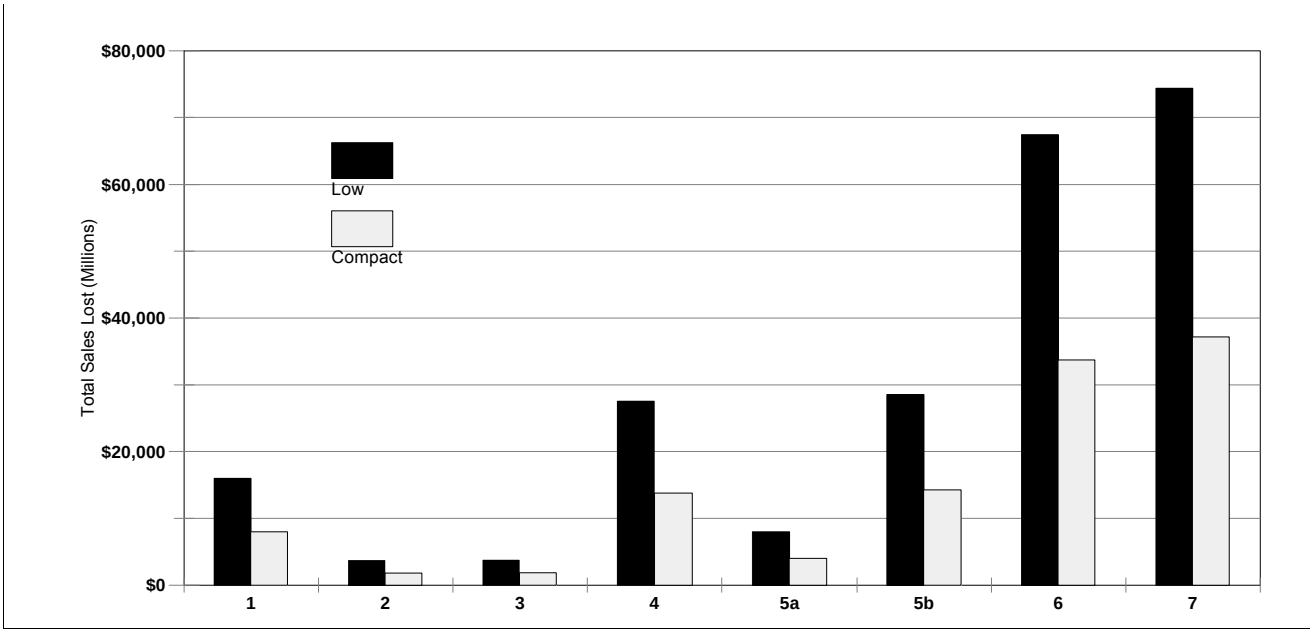
Population	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	7 Unincorp	Total
1996	23,672	4,430	4,216	10,508	20,694	61,712	73,290	198,522
New	31,046	8,965	10,683	37,963	63,567	187,526	82,184	421,934
2040	54,718	13,395	14,899	48,471	84,261	249,238	155,474	620,456
% Added	131%	202%	253%	361%	307%	304%	112%	213%

Figure 1.2 - Acres Urbanized: 1996 to 2040, Low density ("sprawl") growth



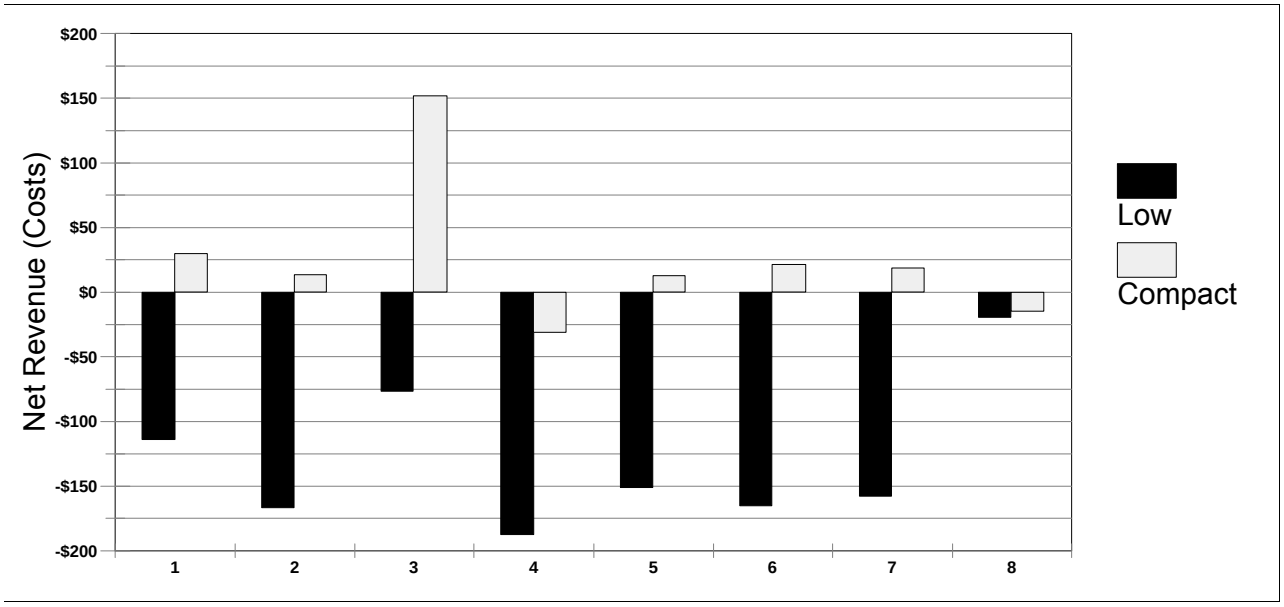
Acres	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	7 Unincorp	Total
Current 1996	3,540	780	771	2,222	4,294	11,267	27,255	50,130
New by 2040, low density	4,643	1,579	1,953	8,029	13,190	34,239	30,563	94,195
New by 2040, Compact	2,321	790	976	4,014	6,595	17,119	15,281	47,097

Figure 2 - Ag Sales Lost, Low Vs. Compact Density: 2040



	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5a Los Banos NE (1)	5b Los Banos SW (1)	6 Merced	7 Unincorp	Total
Annual Sales Lost									
Low Density ($000'97)									
Direct	$10,887	$2,447	$2,544	$18,710	$5,632	$19,291	$46,136	$50,743	$156,390
Indirect	$5,109	$1,236	$1,175	$8,790	$2,347	$9,261	$21,297	$23,639	$72,855
Total	$15,997	$3,684	$3,719	$27,500	$7,979	$28,553	$67,432	$74,382	$229,245
Compact Density ($000'97)									
Direct	$5,444	$1,224	$1,272	$9,355	$2,816	$9,646	$23,068	$25,371	$78,195
Indirect	$2,555	$618	$588	$4,395	$1,173	$4,631	$10,648	$11,819	$36,427
Total	$7,998	$1,842	$1,860	$13,750	$3,989	$14,276	$33,716	$37,191	$114,623
Total Value/Acre	$3,446	$2,333	$1,905	$3,425	$1,210	$4,329	$1,969	$2,434	$2,434

Figure 3 - Net Fiscal Balance per Capita, Low Vs. Compact: 2040



	1 Atwater	2 Dos Palos	3 Gustine	4 Livingston	5 Los Banos	6 Merced	7 Total Cities	8 County Gov.
New Population	31,046	8,965	10,683	37,963	63,567	187,526	339,751	339,751
Low Density ($000'97)								
Revenues	$22,605	$4,869	$8,406	$20,335	$37,555	$135,167	228,937	$421,083
Costs	$26,145	$6,362	$9,227	$27,450	$47,170	$166,214	282,568	-$429,284
Net Annual	-$3,540	-$1,493	-$820	-$7,115	-$9,615	-$31,047	-53,631	-$8,201
Per Capita Net	-$114	-$167	-$77	-$187	-$151	-$166	-$158	-$19
Compact ($000 '97)								
Revenues	$22,662	$4,882	$8,436	$20,442	$37,717	$135,753	229,892	$421,039
Costs	$21,737	$4,760	$6,814	$21,621	$36,912	$131,730	223,574	-$427,250
Net Annual	$925	$122	$1,622	-$1,180	$805	$4,024	6,318	-$6,211
Per Capita Net	$30	$14	$152	-$31	$13	$21	$19	-$15

APPENDIX 3 — Strategies to Encourage Compact Growth

1. Commercial, Industrial, Institutional[1]

- Policies and standards that encourage construction of multi-story buildings in commercial centers
- Minimize land devoted to parking (multi-story structures)
- Shared use of parking facilities with different peak demand hours
- Enhancement of pedestrian access to parking and employment
- Financial incentives such as tax exempt bond financing or density bonuses to encourage infill, redevelopment and re-use of prior development sites (including blighted sites)
- Promote infill development and discourage expansion of growth into open lands
- Concentrate growth in areas with existing infrastructure in preference to building new infrastructure
- Change zoning, if necessary to permit uses that serve employees of industrial and office developments, such as restaurants and other retail shops (to reduce automobile trips for these services)

2. Residential Development

- Encourage nodes of higher density housing (village centers) served by a full range of urban services (within walking or short transit distance from residences)
- Provide incentives for commercial development that serves residences in village centers such as reduced parking requirements and increased allowable floor area ratios.
- Transit and pedestrian-oriented guidelines for specific plans
- Overlay zones that facilitate compact growth
- Revise local street standards to be narrower and more pedestrian-friendly
- Exclude motor vehicles from village centers
- Promote infill development and discourage expansion of growth into open lands
- Re-designate vacant land for higher density or mixed use where appropriate
- Create housing near employment centers to allow for non-vehicular "commuting" or realistic public transit
- Design housing to be affordable to household incomes of the population working in local employment centers

3. Downtown Redevelopment

- Create mixed-use zone districts that encourage residential, commercial and office use on the same site
- Promote downtown or village centers to centralize activities
- Improve transportation and public transit access to downtown from all areas of a city
- Promote infill development and revitalization/redevelopment of run-down or non-functioning neighborhoods
- Create activity centers that give each area a sense of identity

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[1] Sources of Information: Growth Alternatives Alliance. A Landscape of Choice (1998). Association of Bay Area Governments. Jobs/Housing Balance for Traffic Mitigation. (1985). The Local Government Commission. Land Use Strategies for More Livable Places (1992). Center for Land Recycling. Land Recycling and the Creation of Sustainable Communities. (1998).

CLIMATE CHANGE AND ENVIRONMENTAL ASSESSMENT LAW

Dave Owen*

This article considers the ability of environmental assessment laws to bolster legal responses to climate change. Using the California Environmental Quality Act as an example, it explains that environmental assessment laws already impose legal limits upon greenhouse gas emissions. It then evaluates whether those legal limitations are desirable. It concludes that while environmental assessment laws do not provide comprehensive or independently sufficient mechanisms for limiting climate change, they can substantially improve regulatory portfolios for addressing the problem, and can limit greenhouse gas emissions while allowing creative and reasonably efficient compliance methodologies.

I. INTRODUCTION

As anyone who reads Sports Illustrated[1] or watches the Oscars—let alone follows trends in environmental science, policy, or law—now knows, anthropogenically-induced climate change[2] is a very big problem. Scientists predict that in California, upon which this article focuses, unchecked climate change would decimate water supplies, intensify heat waves, accelerate coastal erosion, degrade air quality, increase wildfires, and reduce wildlife habitat—among other impacts.[3] Similar consequences are likely worldwide.[4] Those impacts threaten to create major social and economic costs,[5] and while climate change will probably affect almost

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[1] *See* Alexander Wolff, *Going, Going Green*, SPORTS ILLUSTRATED, March 6, 2007, *available at* http://sportsillustrated.cnn.com/2007/more/03/06/eco0312/index.html.

[2] This memorandum refers to "climate change," which encompasses both warming temperatures and changed storm and precipitation patterns, rather than using the narrower term "global warming." In most popular discussions, however, the terms are used interchangeably.

[3] *See, e.g.*, CALIFORNIA CLIMATE CHANGE CENTER, OUR CHANGING CLIMATE: ASSESSING THE RISKS TO CALIFORNIA 2 (2006) (hereinafter "OUR CHANGING CLIMATE"); CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, CLIMATE ACTION TEAM REPORT TO GOVERNOR SCHWARZENEGGER AND THE LEGISLATURE 5 (2006) ("global warming will impose compelling and extraordinary impacts on California").

[4] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS SUMMARY FOR POLICYMAKERS 12 (2007) (hereinafter IPCC, THE PHYSICAL SCIENCE BASIS) (describing some of the expected changes); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: CLIMATE CHANGE IMPACTS, ADAPTATION AND VULNERABILITY (2007) (hereinafter IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY); Massachusetts v. EPA, 127 S. Ct. 1438, __ (2007) ("The harms associated with climate change are serious and well recognized.").

[5] IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3; *see* Cal. Health and Safety Code § 38501(a), (b); Anthony C. Fisher et al., *The Most Expensive Thing We Can Do Is Nothing: An Open Letter From California Economists*, August, 2006 ("California's economy is vulnerable to climate change impacts, including

everyone, the burdens for low-income or otherwise vulnerable communities are likely to be particularly heavy.[6]

Those threats have led to widespread academic and, increasingly, political interest in developing new legal mechanisms for addressing climate change. Many states now are acting (or are pressuring the federal government for action), Congress has begun considering proposed legislation, and academic and popular commentary is increasingly focused on potential new responses at all levels of government.[7] Nothing written here questions the importance of such innovations, but the central thesis of this article is that existing provisions of a familiar set of old laws also can help.

Narrowly, this article discusses one such law.[8] After providing some background discussion of the causes and effects of climate change, and of existing regulatory efforts, it explains how the California Environmental Quality Act (CEQA),[9] a somewhat typical environmental assessment statute,[10] limits the emissions that drive climate change.[11] CEQA requires that California's state and local agencies identify and, if feasible, mitigate or avoid the

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changes in water availability, agricultural productivity, electricity demand, health stresses, environmental hazards, and sea level.").

[6] REDEFINING PROGRESS, CLIMATE CHANGE IN CALIFORNIA: HEALTH, ECONOMIC AND EQUITY IMPACTS (2006); IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3, at 19 (observing that factors like poverty can limit adaptive capacity); *see also* Julie Eilperin, *Military Sharpens Focus on Climate Change*, WASHINGTON POST, April 15, 2007, at A06 (discussing the U.S. military's fears that climate change will exacerbate strife in politically unstable areas).

[7] *See infra* Part II.B.3; Kirsten H. Engel and Scott R. Saleska, *Subglobal Regulation of the Global Commons: The Case of Climate Change*, 32 ECOLOGY L.Q. 183 (2005) (describing state programs, and exploring why states are taking the lead).

[8] I focus primarily on CEQA for several reasons. First, California is a logical place to start this inquiry, for California has led efforts to address climate change and therefore can provide a more concrete context in which to analyze the interplay between environmental assessment and other regulatory approaches. Second, the relationship between environmental assessment laws and climate change has quickly assumed prominence in California, and California's resolution of these questions will likely help define the debate elsewhere. Third, some of CEQA's characteristics—particularly its substantive mandate, its well-developed body of caselaw on cumulative impacts, and its history of sympathetic judicial implementation—make it a particularly useful for exploring the potential benefits of applying environmental assessment laws to climate change. Finally, California is important in its own right; it has a huge economy and is a major source of emissions. Additional discussion of climate change and NEPA may still be a subject for a future article.

[9] Cal. Pub. Res. Code §§ 21000-21177.

[10] Environmental assessment laws require evaluation and public disclosure of (a) the environmental consequences of planned projects; (b) alternatives to those projects; and (c) ways that project impacts can be mitigated, all before the project is approved. *See, e.g.*, 42 U.S.C. § 4332 (the National Environmental Policy Act). They also generally include provisions allowing public comment and requiring some agency response to those comments.

[11] CEQA also creates obligations for agencies to evaluate how climate change will affect the environmental context of their projects—for example, whether other environmental impacts will become more significant if superimposed upon a changing climate—but that obligation is not the subject of this article.

significant adverse environmental impacts of projects they propose or approve.[12] Climate change is a classic example of a "cumulative" environmental impact, and CEQA requires identification of contributions to such significant cumulative impacts.[13] Because mitigation of those contributions almost always will be feasible—between on-site changes and off-site measures, including purchases from emissions markets, agencies should be able to avoid or fully offset emissions of the pollutants that cause climate change—CEQA also effectively requires that the projects it regulates make climate change no worse.[14]

I then address a related normative question, which has received hardly any academic attention: do environmental assessment laws like CEQA provide good mechanisms for responding to climate change?[15] That question is highly relevant—politically explosive, even[16]—within California; California's contributions to climate change are not small, and CEQA, which applies to thousands of projects every year, could make a significant dent in those emissions, but would do so by changing many projects. It also has broad relevance outside California. In responding to climate change, as in many other areas of environmental regulation, California has been a pioneer, and its approach to climate change and environmental assessment law may be imitated elsewhere. Mechanisms for such imitation already are widespread; legal systems not just in the United States but throughout the world include laws like CEQA.[17] This

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[12] *See* Cal. Public Resources Code § 21002. CEQA applies to both government-sponsored projects and private projects that require discretionary approvals from government agencies. Friends of Mammoth v. Board of Supervisors, 8 Cal. 3d 247 (1972).

[13] *See infra* Part III.B.2.

[14] *See infra* Part III.B.3.

[15] No academic articles discussed the relationship between CEQA and climate change, and I have found just one academic work—a comment published in 1989—that considers (fairly briefly) NEPA and climate change. *See* Jennifer Woodward, *Note: Turning Down the Heat: What United States Laws Can Do to Help Ease Global Warming*, 39 AM. U. L. REV. 203, 224-28 (1989).

[16] Non-profit groups—particularly the Center for Biological Diversity—and the California Attorney General's office have filed multiple lawsuits challenging development projects approved following environmental reviews that did not address climate change, and California's Republican legislators have retaliated by demanding CEQA exemptions, which Democrats refused to grant as conditions for budget approval. *See* Samantha Young, *Ca. Land Use Dispute Complicates Budget*, FORBES, July 26, 2007, *available at* http://www.forbes.com/feeds/ap/2007/07/26/ap3956150.html. The Legislature ultimately resolved the impasse by passing a law creating a narrow CEQA exemption, but not before delaying the budget for well over a month.

[17] *E.g.* 42 U.S.C. § 4332; New York Environmental Conservation Law § 8-0109; Environmental Assessment, *at* http://ec.europa.eu/environment/eia/home.htm (describing environmental assessment requirements in the European Union); Canadian Environmental Assessment Agency, *Introduction and Features: Canadian Environmental Assessment Act*, *at* http://www.ceaa-acee.gc.ca/013/intro_e.htm#3 (last checked January 23, 2007); WORLD BANK, OPERATIONAL MANUAL: ENVIRONMENTAL ASSESSMENT OP 4.01 P 1 (2004), *available at* http://wbln0018.worldbank.org/Institutional/Manuals/OpManual.nsf/toc2/9367A2A9D9DAEED38525672C007D0972?OpenDocument. *See also* State Environmental Protection Administration (China), *82 Projects Seriously Violating EIA Rules Blacklisted and EIA Approval of Construction*

article's analysis therefore applies, albeit with some modification,[18] to compliance with the National Environmental Policy Act (CEQA's federal-law counterpart),[19] several existing state laws, laws in many other countries, and even the operational rules of institutions like the World Bank. [20] It also can provide guidance for other jurisdictions considering enactment or modification of environmental assessment laws.

The question also isn't rhetorical. Although the prevalence and staying power of environmental assessment laws attests to their electoral support, their value has been vigorously contested, sometimes in academic and often in political circles, since environmental assessment laws first emerged in the early 1970s.[21] Disagreements about the wisdom of decentralized[22] environmental enforcement mechanisms—upon which laws like CEQA largely rely—also can be intense, particularly where those laws would address geographically extensive problems.[23]

Projects in Some Regions or Enterprises Suspended, January 12, 2007, *at* http://english.sepa.gov.cn/zwxx/xwfb/200701/t20070112_99526.htm (describing enforcement of China's law); Environmental Assessment in Countries in Transition, *Legislation*, at http://www.ceu.hu/envsci/eianetwork/legislation/index.html (last checked January 23, 2007) (providing links to environmental assessment laws in former Soviet Bloc countries).

[18] *See, e.g.,* Executive Office of Environmental Affairs, Commonwealth of Massachusetts, Greenhouse Gas Emissions Policy, April 23, 2007, *available at* http://www.mass.gov/envir/mepa/pdffiles/misc/ghgemissionspolicy.pdf (requiring discussion of GHG emissions in some reports prepared pursuant to the Massachusetts Environmental Policy Act).

The key distinction between CEQA and many other environmental disclosure laws is that CEQA includes express substantive constraints; unlike NEPA, it is not "purely procedural." *Compare* Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350-51 (1989) *with* Cal. Pub. Res. Code § 21081. There are other differences, and a reader should be aware that not all environmental assessment laws are clones.

[19] *See, e.g.* Border Power Working Group v. Dept. of Energy, 260 F. Supp. 2d 997, 1028-29 (S.D. Cal. 2003) (holding, following a brief analysis, that failure to evaluate CO_2 emissions created a violation of NEPA).

[20] *See supra* note 17.

[21] Most debate has focused on NEPA rather than NEPA's state counterparts. *See, e.g.,* Bradley C. Karkkainen, *Whither NEPA?*, 12 N.Y.U ENVTL. L.J. 333, 338-43 (2004) (describing those debates); Robert W. Adler, *In Defense of NEPA: The Case of the Legacy Parkway*, 26 J. LAND RESOURCES & ENVTL. L. 297 (2006); Dinah Bear, *Some Modest Suggestions for Improving the National Environmental Policy Act*, 43 NAT. RESOURCES J. 931 (2003); Task Force on Improving the National Environmental Policy Act and Task Force on Updating the National Environmental Policy Act, Committee on Resources, United States House of Representatives, *Initial Findings and Recommendations*, December 21, 2005 (critiquing NEPA, and proposing changes; Professor Adler's article, cited *supra*, critiques the proposed revisions). However, CEQA also caused occasional consternation. *See supra* note 16.

[22] I use this term, rather than "citizen enforcement," because some CEQA suits are filed not by individual private citizens or citizens' groups but by professional environmental organizations or government agencies.

[23] *See, e.g.,* Lujan v. Defenders of Wildlife, 504 U.S. 555, 576 (1992) ("Vindicating the public interest... is the function of Congress and the Chief Executive."); Mass. v. EPA, 415 F.3d 50, 59-60 (2005) *rev'd by* Massachusetts v. EPA, 127 S. Ct. 1438 (2007) (Sentelle, J. concurring) ("The generalized public good that petitioners seek is the thing of legislatures and presidents, not of courts."); William W. Buzbee, *The Story of* Laidlaw*: Standing and Citizen Enforcement*, in ENVIRONMENTAL LAW STORIES (Richard J. Lazarus and Oliver A. Houck, eds. 2005) (describing those controversies as part of the backdrop for the Supreme Court's decision in *Friends of the Earth, Inc. v. Laidlaw Environmental Services (TOC), Inc.*, 528 U.S. 167 (2000)); Mark Seidenfeld

CEQA thus exemplifies a potentially widespread but probably controversial method for addressing climate change, and one might reasonably ask whether the potential environmental gains are worth the associated expenses and disputes.

I conclude that the potential gains are worthwhile, and that CEQA's model, although not perfect, is very good. As decentralized, adaptable legal mechanisms, environmental assessment laws can improve many individual projects, creating environmental benefits that would escape other regulatory approaches. And by allowing flexible—even market-friendly—compliance techniques, laws like CEQA can efficiently achieve those benefits. Environmental assessment laws are not comprehensive or cost-free solutions and usually are unevenly implemented, and their presence does not obviate the need for complementary regulatory approaches. Nevertheless, they can contribute substantially, and with a problem as urgent and complex as climate change, substantial contributions are extremely important.

II. CLIMATE CHANGE BACKGROUND

A. A Brief Overview of the Problem

In the 1970s and 1980s, climate scientists increasingly came to a troubling consensus.[24] Carbon dioxide, which our fossil-fuel-powered economy was pumping into the atmosphere in increasing quantities, creates a "greenhouse effect."[25] While it lets light energy into the earth's atmosphere, CO_2 reduces the amount of reflected heat released.[26] Other gases create similar effects, and some, like methane, have greenhouse properties substantially more intense than CO_2.[27] Consequently, scientists predicted that as atmospheric levels of CO_2 and other greenhouse gases (GHGs) rose, the earth's climate would warm.

Those predictions have almost certainly proven accurate. Primarily because of fossil fuel combustion, atmospheric CO_2 levels have risen in recent decades, and are continuing to rise.[28]

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and Jana Satz Nugent, *"The Friendship of the People": Citizen Participation in Environmental Enforcement*, 73 GEO. WASH. L. REV. 269 (2005) (providing a qualified endorsement).

[24] For a concise overview of several decades of climate change research, see Spencer Weart, *The Modern Temperature Trend* (2006), *at* http://www.physicists.net/history/climate/20ctrend.htm.

[25] *See* James E. Hansen, et al., *Climate Impact of Increasing Atmospheric Carbon Dioxide*, 213 SCIENCE 957-66 (1981).

[26] *See* PEW CENTER FOR GLOBAL CLIMATE CHANGE, THE CAUSES OF GLOBAL CLIMATE CHANGE (2006).

[27] *See* THE CALIFORNIA CLIMATE CHANGE CENTER AT UC BERKELEY, MANAGING GREENHOUSE GAS EMISSIONS IN CALIFORNIA I-7 (2006) (hereinafter "MANAGING GREENHOUSE GAS EMISSIONS") (describing the impacts of other GHGs).

[28] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 2 ("Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed preindustrial values..."); CALIFORNIA DEPARTMENT OF WATER RESOURCES, PROGRESS ON

Global average temperatures also have been warming for several decades, and while warming earlier in the twentieth century was probably natural, human activity appears to have caused the more recent rise.[29] There is no real scientific doubt that anthropogenic emissions will warm our climate even more if they continue unabated into the future.[30] The projected changes are substantial, with the Intergovernmental Panel on Climate Change predicting worldwide average temperature increases ranging from 1.1 to 6.4 degrees Fahrenheit (with the lower figure assuming efforts to minimize GHG emissions) by the end of the 21st century.[31]

Those temperature increases will cause many major environmental changes, most of them undesirable.[32] Sea level rise threatens low-lying coastal areas with flooding and increases vulnerability to Katrina-like storms.[33] Extreme weather events, including droughts and floods, will almost certainly occur more frequently.[34] In combination with the loss of glaciers and summer snowpacks in mountain regions, droughts will increase water shortages, disrupting both natural systems and human economies.[35] Rising temperatures will warm waters and shift climate zones further north or further uphill, extinguishing those species that are unable to migrate, while facilitating the movement of some others—crop pests and disease vectors, for example—that

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INCORPORATING CLIMATE CHANGE INTO MANAGEMENT OF CALIFORNIA'S WATER RESOURCES 2-12 (2006) (chart showing rising CO2 levels); Massachusetts v. EPA, 127 S. Ct. 1438, __ (2007) (describing the rise, and early governmental responses).

[29] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4; PEW CENTER FOR GLOBAL CLIMATE CHANGE, *supra* note 26, at 1, 2-5 (("During the twentieth century, the earth's surface warmed by about 1.4 F.... Recent decades have seen record-high average global surface temperatures."); Massachusetts v. EPA, 127 S. Ct. 1438, __ (2007) ("Respected scientists believe the two trends are related.").

[30] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4; Naomi Oreskes, *Beyond the Ivory Tower: The Scientific Consensus on Climate Change*, 306 SCIENCE 1686 (2004) ("Politicians, economists, journalists, and others may have the impression of confusion, disagreement, or discord among climate scientists, but that impression is incorrect."); DAN CAYAN ET AL. (CALIFORNIA CLIMATE CHANGE CENTER), CLIMATE SCENARIOS FOR CALIFORNIA 1-2 (2006) (describing global and regional warming trends); *see id.* at 3 ("the winter and spring warming that has occurred in the California region over the last few decades is very unlikely to have been caused only be natural climate variations").

[31] IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 11. The IPCC's projections are based on a range of possible sociological/political/technological scenarios, some involving higher emissions than others. *See also* DEPT. OF WATER RESOURCES, *supra* note 28, at 2-12 to 2-13 (describing older projections from the IPCC and others).

[32] *See* IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3.

[33] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 11 (projecting sea level rises. The IPCC's projections do not include the potential effects of changing ice flow in Greenland or Antarctica); IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3, at 9.

[34] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 12 ("It is *very likely* that hot extremes, heat waves, and heavy precipitation events will continue to become more frequent.... It is likely that future tropical cyclones (typhoons and hurricanes) will become more intense.... There is less confidence in projections of a global decrease in numbers of tropical cyclones.") (emphasis in original).

[35] IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 4, at 7-8.

most people would prefer to avoid.[36] Rising temperatures also can increase the frequency of extreme heat events like Europe's heat wave of 2003, which killed nearly 15,000 people in France alone.[37] Not all of the changes will be negative; for example, scientists anticipate some increases in crop productivity.[38] But in general, most human and natural systems have attempted, sometimes successfully, to adapt to the more stable climate of recent history, and a combination of changing environmental norms and increased variability will do more harm than good.[39]

Because changes already are occurring, total prevention of anthropogenic climate change no longer is possible.[40] But climate change and the resulting negative impacts are not all-or-nothing phenomena; they can occur to greater or lesser degrees, and the damage therefore still may be limited.[41] Limitations on GHG emissions will produce lower temperature increases,[42] which in turn should alleviate the severity of climate change's adverse consequences.[43] Similarly, increases at the middle of the projected range are less problematic than increases at the upper bound.[44] Taking steps to limit GHG emissions, and thus minimize climate change, therefore remains extremely important, and incremental solutions can offer far greater environmental benefits than no solutions at all.[45]

B. Climate Change and the State of California

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[36] *Id.* at 8 ("Approximately 20-30% of animal and plant species assessed so far are likely to be at increased risk of extinction if increases in global temperatures exceed 1.5 to 2.5 degrees C."), 9.

[37] *See* United Nations Environment Program, *Impacts of Summer 2003 Heat Wave in Europe*, *available at* http://www.grid.unep.ch/product/publication/download/ew_heat_wave.en.pdf (last checked January 5, 2007) ("We cannot attribute this one event to climate change, but this type of occurrence is expected to happen more frequently."); IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 12.

[38] *See* IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3.

[39] *See id.* (describing both positive and negative impacts).

[40] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 4-9; AMY LYND LUERS AND SUSANNE C. MOSER, PREPARING FOR THE IMPACTS OF CLIMATE CHANGE IN CALIFORNIA: OPPORTUNITIES AND CONSTRAINTS FOR ADAPTATION 3 (2006) ("climate change is demonstrably underway"); *id.* at 5 (table summarizing observed trends), 6; CLIMATE SCENARIOS FOR CALIFORNIA, *supra* note 30, at 1-2 (describing observed trends).

[41] *See* Mass. v. EPA, 127 S. Ct. 1438, __ (2007) (finding causation and redressibility because EPA's actions could reduce the problem, even if EPA cannot entirely resolve it).

[42] *See* CLIMATE SCENARIOS FOR CALIFORNIA, *supra* note 30, at 11 ("Regardless of which model is employed, the warming is greater for the higher-emission scenario than for the lower emission scenario.").

[43] *See* Katherine Hayhoe et al., *Emissions Pathways, Climate Change, and Impacts on California*, 101 PNAS 12422, 12427 (2004) (observing that impacts will be more severe with higher temperature increases); LUERS AND MOSER, *supra* note 40, at 3 ("the state's long-term ability to cope with climate impacts depends on the pace and magnitude of global climate change"); CAL. ENVTL. PROT. AGENCY, *supra* note 3, at 38 (table showing degrees of impact).

[44] *See* CAL. ENVTL. PROT; AGENCY, *supra* note 3, at 38 (table showing degrees of impact).

[45] *See generally* Massachusetts v. EPA, 127 S. Ct. 1438, __ (2007) (explaining the importance of incremental steps: "Agencies [] do not generally resolve massive problems in one fell regulatory swoop. They instead whittle away at them over time....") (internal citation omitted).

While it derives from the aggregate effects of many local sources, climate change is in many ways a global problem. Unlike most air pollution problems, the location of GHG emissions matters little. GHGs generally are sufficiently long-lived to disperse throughout the atmosphere, and a ton of CO^2 emitted in California is therefore no more harmful to California than a ton of CO^2 emitted in Shanghai.[46] The secondary environmental effects are similarly dispersed throughout the world; while some locations will feel climate change's impacts more than others, few areas are likely to be unaffected.[47] And because the sources of climate change are also dispersed—no one country contributes a majority share of global GHG emissions—comprehensive solutions will likely require international cooperation.[48] Nevertheless, some areas play major roles in contributing to climate change, in some areas the effects will be especially pronounced, and some areas can make particularly important contributions to climate change prevention. California fits within each of those categories.

1. California's Contributions to Climate Change

California is a major contributor to global climate change. If it were an independent nation, California would be ranked (depending upon the study) as the tenth- to sixteenth-highest GHG-emitting nation in the world.[49] Indonesia, with a population of nearly 250 million people, emits similar GHG amounts, and California's emissions are on a par with those of France.[50] California's emissions exceed—by a wide margin—those of any other state except Texas.[51] And

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[46] *See* CALIFORNIA ENERGY COMMISSION, INVENTORY OF CALIFORNIA GREENHOUSE GAS EMISSIONS AND SINKS iii (2006) (hereinafter "INVENTORY") ("GHGs affect the entire planet, not just the location where they are emitted"); IPCC, CLIMATE CHANGE 2001: THE PHYSICAL SCIENCE BASIS § 6.1.2, available at http://www.grida.no/climate/ipcc_tar/wg1/215.htm (explaining that several important GHGs, including carbon dioxide and methane, are "well-mixed gases" with long lifespans ensuring homogenous atmospheric mixing); NATIONAL ACADEMY OF SCIENCES, CLIMATE CHANGE SCIENCE: AN ANALYSIS OF SOME KEY QUESTIONS (2001), *available at* http://books.nap.edu//html/climatechange/3.html ("If the average survival time for a gas in the atmosphere is a year or longer, then the winds have time to spread it throughout the lower atmosphere, and its absorption of terrestrial infrared radiation occurs at all latitudes and longitudes.").

[47] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 12; IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3 (describing worldwide and regional impacts). To say that harms are global does not mean that climate change threatens the type of generalized and undifferentiated harm that cannot support a claim for standing. Particular places will be affected in particular ways; Massachusetts alone, for example, will suffer the loss of sovereignty over some of that state's coastal lands. *See Massacuhsetts v. EPA*, 127 S.Ct 1438.

[48] *See* INVENTORY, *supra* note 46, at 20 (2006) (showing worldwide emissions).

[49] The differences in emissions among the 10th through 19th-ranked nations are slight, and a slight difference in calculations can create a seemingly large difference in rankings. *Compare* INVENTORY, *supra* note 46, at i, 20 (ranking California sixteenth (and also counting Texas, which emits substantially more GHGs than California, as a nation)) *with* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at I-6 ("Only nine nations have greater total emissions than the state.").

[50] INVENTORY, *supra* note 46, at 20.

[51] *Id.* at i, 14.

while California's per-capita GHG emissions are among the lowest in the nation, those emissions nevertheless have been growing. "From 1990 to 2004," according to the California Energy Commission, "total gross GHG emissions rose 14.3%."[52]

Those emissions derive from a variety of sources. Transportation produces approximately 41% of California's total GHG emissions, with gasoline engines contributing the lion's share.[53] Electricity generation also contributes heavily, and out-of-state power, which more commonly derives from coal, disproportionately produces carbon dioxide emissions.[54] Industrial operations also contribute a large share, as do agriculture and forestry practices.[55] Fossil fuel combustion creates most of California's GHG emissions, but agricultural and landfill methane emissions and industrial releases of nitrous oxide and "high global warming potential" gases also add to the total output.[56] Some agricultural activities and natural processes partly compensate for those emissions by removing GHGs from the atmosphere, but in the aggregate California's contributions heavily outweigh its sinks.[57]

2. Climate Change's Effects Upon California

California also will be substantially harmed by climate change. Those harms are not unique; other states and countries will face similar threats, and in some places—particularly regions already more vulnerable to drought or flooding or already facing more intense resource scarcity, or poorer and less stable countries where social and economic adaptation will likely prove more difficult—the consequences could be much more severe.[58] The difficulties facing California therefore exemplify many of the worldwide threats posed by climate change, and are by no means outlying worst-case scenarios. But even if California alone were threatened, the likely adverse impacts still would be significant, and California's self-interest alone ought to prompt a vigorous response.

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[52] INVENTORY, *supra* note 46, at 8 ("California's GHG emissions are large and growing... they are expected to continue to increase in the future under 'business-as-usual' unless California implements programs to reduce emissions").

[53] *Id.* at ii, 9-10; *see* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at I-7, I-10.

[54] INVENTORY, *supra* note 46 at ii-iii, 10, 11-12.

[55] *Id.* at ii, 10-11; *see* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at I-7.

[56] INVENTORY, *supra* note 46, at 6. These other GHGs are emitted less than CO_2 but have much more powerful heat-trapping effects. *See* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at I-7 (describing the greenhouse potential of sulfur hexafluoride).

[57] *See* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at I-10.

[58] *See* IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3; Jeffrey Sachs, *Climate Change and War*, March 1, 2005, *available at* http://www.globalpolicy.org/socecon/develop/africa/2005/0301sachs.htm (connecting climate change and political conflict in sub-Saharan Africa); Eilperin, *supra* note 6, at A06 ("The U.S. military is increasingly focused on a potential national security threat: climate change.").

The litany of threats reads like the script of a bad disaster movie, and would seem improbably dire were it not repeated in so many government and scientific reports. Average temperatures will likely rise significantly, particularly in inland areas,[59] leading to a long list of adverse consequences.[60] Air quality, already poor in much of California, will get worse.[61] Much precipitation that now falls as snow will in the future be rain, increasing winter flooding, reducing spring snowpacks, and cutting water supplies in summer, when California needs water most badly.[62] Cold-intolerant pests and pathogens may expand their ranges, damaging the state's agricultural economy and threatening human health.[63] Forest fires probably will occur more

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[59] OUR CHANGING CLIMATE, *supra* note 3, at 2 ("The latest projections, based on state-of-the-art climate models, indicate that if global heat-trapping emissions proceed at a medium to high rate, temperatures in California are expected to rise 4.7 to 10.5 degrees Fahrenheit by the end of the century.").

[60] *Id.* ("These temperature increases would have widespread consequences including substantial loss of snowpack, increased risk of large wildfires, and reductions in the quality and quantity of certain agricultural products."); *see* Hayhoe et al., *supra* note 43 (describing a similar set of impacts); Cal. Health & Safety Code § 38501(a) ("Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California").

[61] OUR CHANGING CLIMATE, *supra* note 3, at 5. The report states:

> High temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, if temperatures rise to the medium warming range, there will be a 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions.

[62] OUR CHANGING CLIMATE, *supra* note 3, at 6-7; Hayhoe et al., *supra* note 43, at 12425-46; DEPT. OF WATER RESOURCES, *supra* note 28, at 4-1 ("Planning and design of the Central Valley Project [] and State Water Project has, for the most part, assumed an unchanging climate... and a changing climate my threaten to destabilize the infrastructure and operations dependent on that assumption."). "If heat-trapping emissions continue unabated," the California Climate Change Center predicts, "more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent." OUR CHANGING CLIMATE, *supra* note 3, at 6; *see* CALIFORNIA DEPARTMENT OF WATER RESOURCES, CALIFORNIA WATER PLAN UPDATE 2005 4-32 to 4-36 (2006) ("Predictions include increased temperature, reductions to Sierra snowpack, earlier snowmelt, and a rise in sea level, although the extent and timing of the changes remain uncertain. The changes could have major implications for water supply, flood management, and ecosystem health."); DEPT. OF WATER RESOURCES, *supra* note 28, at 2-6, 2-22 to 2-31. Specifically,

> [d]ecreasing snowpack and spring stream flows coupled with increasing demand for water resulting from both a growing population and hotter climate could lead to increasing water shortages... late spring stream flows could decline by up to 30 percent. Agricultural areas could be hard hit, with California farmers losing as much as 25 percent of the water supply they need.

OUR CHANGING CLIMATE, *supra* note 3, at 7; *see* DEPT. OF WATER RESOURCES, *supra* note 28, at 4-15 to 4-16 (discussing preliminary model runs predicting "dead storage" conditions during drought years; "[o]ne would expect this shift in runoff will make it more difficult for the CVP and SWP to capture water and deliver it to their customers. The resulting annual average deliveries to Table A contractors listed in Table 4.14 fit these expectations for three of the four climate change scenarios."). Hydropower generation would be similarly impacted. While precipitation projections are "quite uncertain," the CCCC states that "if temperatures rise to the medium warming range and precipitation decreases by 10 to 20 percent, hydropower may be reduced by up to 30 percent." OUR CHANGING CLIMATE, *supra* note 1, at 7. Both floods and droughts also will tend to occur more often. REDEFINING PROGRESS, *supra* note 6, at 35.

[63] OUR CHANGING CLIMATE, *supra* note 3, at 9 ("[c]ontinued climate change will likely shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion is expected in

frequently.[64] Heat waves will become more frequent, extreme temperatures will be higher,[65] and those rising temperatures will degrade many terrestrial and aquatic ecosystems. Rising sea levels will increase flooding, accelerate erosion, and leave coastal construction increasingly vulnerable to storm damage.[66] Those changes in turn will create major consequences not only for the state's environmental quality, but also for its economy; many of the state's most important industries are likely to suffer.[67]

Those problems would strike a state already struggling to cope with existing natural conditions. According to the California Climate Change Center,[68] "[t]he state's vital resources and natural landscapes are already under stress due to California's rapidly growing population, which is expected to grow from 35 million today to 55 million by 2050."[69] Californians currently experience the nation's worst air quality, with most of the state's population living in areas with violations of federal and state air quality standards.[70] Water allocation is chronically

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many species, while range contractions are less likely.... Continued climate change is likely to alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.").

[64] OUR CHANGING CLIMATE, *supra* note 3, at 10-11 (observing that global warming will exacerbate strains upon California's forests by "increasing the risk of wildfire and altering the distribution and character of natural vegetation"). Even in the "medium" range of predicted temperature rises, overall wildfire frequency is projected to increase by approximately 55%. If temperature increases are at the higher end of the range and precipitation levels drop, wildfire frequency in northern California, where most of the state's forests are located, could nearly double. *Id.*

[65] *Id.* at 5 ("As temperatures rise, Californians will face greater risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory diseases caused by extreme heat. By mid century, extreme heat events in urban centers such as Sacramento, Los Angeles, and San Bernardino could cause two to three times more heat-related deaths than occur today."); *see* REDEFINING PROGRESS, *supra* note 6, at 19-26; Hayhoe et al., *supra* note 43, at 12424-45 ("heat-related mortality in Los Angeles is projected to increase by about two to three times under [a lower temperature increase scenario] and five to seven times under [a higher increase scenario] by the 2090s of acclimatization is taken into account").

[66] DEPT. OF WATER RESOURCES, *supra* note 28, at 2-31 to 2-52.

[67] *See* Cal. Health & Safety Code § 38501(b) ("Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, skiing, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state.")

[68] The California Climate Change Center is an academic research unit based primarily at the University of California's Berkeley and San Diego campuses. Several of its reports have been sponsored by California state agencies. *See* OUR CHANGING CLIMATE, *supra* note 3, at 2.

[69] OUR CHANGING CLIMATE, *supra* note 3, at 2; *see* LUERS AND MOSER, *supra* note 40. Luers and Moser warn,

> [t]oday's climate variability and weather extremes already pose significant risks to California's citizens, economy, and environment. They reveal the state's vulnerability and existing challenges in dealing with the vagaries of climate. Continued climate changes, and the risk of abrupt or surprising shifts in climate, will further challenge the state's ability to cope with climate-related stresses.

[70] OUR CHANGING CLIMATE, *supra* note 3, at 5. The report continues:

> more than 90 percent of the population liv[es] in areas that violate the state's air quality standard for either ground-level ozone or airborne particulate matter. These pollutants can cause or

contentious.[71] Past logging and fire suppression have degraded forests, leaving them dangerously fire-prone.[72] Other natural ecosystems are similarly strained, with dozens of plant and animal species threatened or endangered even under existing conditions.[73] Even without rising sea levels, the Sacramento-San Joaquin Bay-Delta, from which the state pumps much of its water supplies, already is severely vulnerable to flooding.[74] All of those environmental problems create institutional, economic, and political strains in addition to environmental and health costs; in California, litigious natural resource battles are ubiquitous.

While most Californians will be affected, the impacts of climate change are likely to be particularly harsh for the state's poorest and most vulnerable people, many of whom are people of color.[75] In part, disproportionate impacts will arise because adjusting to environmental change generally requires money and insurance, and poorer people by definition lack the former and are less likely to own the latter.[76] Geography also will exacerbate distributional disparities. Some of the largest temperature increases are likely to occur in California's Central Valley,[77]

> aggravate a wide range of health problems including asthma and other acute respiratory and cardiovascular diseases, and can decrease lung function in children. Combined, ozone and particulate matter contribute to 8,800 deaths and $71 billion in healthcare costs every year.

Id.

[71] *See id.* at 6-7 (describing California's water resources as "already over-stretched by the demands of a growing economy and population"). CALIFORNIA WATER PLAN UPDATE 2005, *supra* note 62, at V.1 p. 3-7 ("environmental requirements are not always met"), V.1 p. 3-14 (tentatively estimating statewide groundwater overdraft at between one and two million acre-feet annually), V.2 p. 3-7 ("In dry years, California's water supply is inadequate to meet its current level of use...").

[72] *See* CALIFORNIA BOARD OF FORESTRY AND FIRE PROTECTION AND CALIFORNIA DEPARTMENT OF FORESTRY, CALIFORNIA FIRE PLAN 5-6 (1996) *available at* http://frap.cdf.ca.gov/fire_plan/ ("Deteriorating forest health, increasing fuel loads and other factors have led to more intense, destructive wildfires; unabated this pattern will continue."); Carl T. Hall, *Raging Tahoe Fire's Roots: 150 Years of Forest Abuse*, SAN FRANCISCO CHRONICLE, June 26, 2007, at A1.

[73] OUR CHANGING CLIMATE, *supra* note 3, at 10 ("The state's burgeoning population and consequent impact on local landscapes is threatening much of this biological wealth.").

[74] *See, e.g.*, CALFED Bay-Delta Program, *Delta Levee Break Information*, *at* http://calwater.ca.gov/Levee_Break/DeltaLeveeBreakInfo.shtml (last checked Jan. 12, 2007).

[75] *See* REDEFINING PROGRESS, *supra* note 6. Internationally, similar disparities of impact are likely. *See* Ann E. Carlson, *Federalism, Preemption, and Greenhouse Gas Emissions*, 37 U.C. DAVIS L. REV. 281, 288 (2003) ("The largest producers of greenhouse gas emissions are not necessarily the countries that will suffer the most from global warming.").

[76] *See* REDEFINING PROGRESS, *supra* note 6, at 16-19, 36-37. As the post-Katrina flooding starkly illustrated, those problems can be particularly intense when extreme weather events demand rapid adjustment. "Poor populations are less financially able to prepare for disaster, less likely to evacuate owing to lack of transportation, and less likely to relocate owing to lack of affordable housing alternatives." *Id.* at 57-58. Other effects of climate change, including economic disruption and increases in costs of basic necessities, such as household water or energy, also can intensify effects upon economically vulnerable groups. *Id.* at 63-64 ("The burden of rising prices affects low-income communities disproportionately because they spend more of their income on necessities than do high-income households.").

[77] *Id.* at 9-10; *see* Hayhoe et al., *supra* note 43, at 12,424 (mapping projected increases).

which already contains some of California's poorest areas, and poverty could increase as climate change disrupts the region's agricultural economy.[78] The Central Valley also is already one of California's hottest regions, and that heat contributes to one of the nation's worst air quality problems.[79] Consequently, some of the harshest impacts will fall upon California's most vulnerable people.

Though opposition to climate change regulation largely derives from fears of economic cost and disruption, California's economy actually may benefit substantially from responding to those problems, and not just through avoidance of costly environmental impacts. California's Environmental Protection Agency concludes that implementing climate change prevention strategies could add billions of dollars in additional income to the state economy.[80] Independent studies back those predictions; according to a recent California Climate Change Center report:

> [g]lobally, increasing GHG emissions are assumed to be essential to a growing economy. This is not true in California. The state can take an historic step by demonstrating that reducing emissions of GHG can accelerate economic growth and bring new jobs.... California can gain a competitive advantage by acting early in the new technologies and industries that will come into existence worldwide around the common goal of reducing GHG emissions.[81]

That message apparently has resonated with state lawmakers. According to the California Legislature, "[b]y exercising its global leadership role, California will also position its economy, technology centers, financial institutions, and businesses to benefit from national and international efforts to reduce emissions of greenhouse gases."[82] Governor Schwarzenegger has publicly made similar statements.[83]

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[78] *See id.* at 3-4, 41-50 ("agriculture... is a significant source of employment for low-income groups and people of color. Shocks experienced by the industry could disproportionately affect these communities."); OUR CHANGING CLIMATE, *supra* note 3, at 8-9 (describing impacts to agriculture); Hayhoe et al., *supra* note 43, at 12426-27 (describing impacts to dairy and wine grape production).

[79] *See* REDEFINING PROGRESS, *supra* note 6, at 19-26 (describing disparities in vulnerability to heat waves), 26-35 (describing threats posed by increasing ozone (smog) pollution); Hayhoe et al., *supra* note 43, at 12425 ("Individuals most likely to be affected (by increases in extreme heat) include elderly, children, the economically disadvantaged, and those who are already ill.").

[80] CALIFORNIA ENVTL. PROT. AGENCY, *supra* note 3, at 65 (stating that implementing climate change prevention strategies could "increase jobs and income by an additional 83,000 and $4 billion, respectively").

[81] MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at E-6.

[82] Cal. Health & Safety Code § 38501(e).

[83] Governor of the State of California, Executive Order S-3-05, June 1, 2005 ("technologies that reduce greenhouse gas emissions are increasingly in demand in the worldwide marketplace, and California companies investing in these technologies are well-positioned to profit from this demand, thereby boosting California's economy, creating more jobs and providing increased tax revenue").

The environmental impacts of climate change thus pose a significant but redressible threat to California. With consequences likely to strike across much of California's landscape and throughout many sectors of California's economy, with harsh and costly potential impacts upon most Californians—particularly those already vulnerable to economic and environmental risk—and with potential collateral economic benefits from a vigorous response, climate change threatens damage well worth minimizing or preventing. The key question, which legislators and lawyers have only begun to answer, is how.

3. Existing Regulatory Responses to Climate Change

Despite the threats posed by climate change and the potential benefits of a vigorous response, federal action has been almost totally absent. The United States has neither ratified the Kyoto Protocol nor advanced any serious proposals for alternate international regulatory structures.[84] Domestic legislation has been similarly lacking; notwithstanding recent legislative proposals, Congress as of this writing has acted primarily to thwart efforts to address the problem.[85] Until rebuked by the Supreme Court, EPA declined to regulate carbon dioxide emissions, instead insisting it had no power to do so.[86] And although the Bush Administration now acknowledges the reality of anthropogenically-caused climate change, it has placed its faith largely in voluntary responses.[87]

Unlike the federal government, California's leaders have recognized climate change as a problem requiring a vigorous response, but the state's efforts, though pathbreaking, still are in some ways only preliminary. The governor and the California legislature have taken several major steps, including the passage of legislation setting automotive emissions standards for greenhouse gases.[88] In 2005, Governor Schwarzenegger declared the climate change debate to

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[84] *See* Carlson, *supra* note 75, at 288-90 (describing the Bush Administration's climate change policies).

[85] *See* Jonathan B. Wiener, *Something Borrowed for Something Blue: Legal Transplants and the Evolution of Global Environmental Law*, 27 ECOLOGY L.Q. 1295, 1329 (2001) (describing the Byrd-Hagel resolution opposing the Kyoto Protocol, which the Senate passed by a 95-0 vote); Carlson, *supra* note 75, at 290 (describing failed congressional efforts to address climate change).

[86] *See* Mass. v. EPA, 127 S. Ct. 1438, __ (2007).

[87] Engel and Saleska, *supra* note 7, at 186; *see* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 2722, at ES-4 ("While helpful, there is no evidence that voluntary measures provide sufficient incentives to attain the Governor's targets.").

[88] *See* Cal Health & Safety Code § 43018.5. The automotive industry almost immediately challenged that legislation. *See* Cent. Valley Chrysler-Jeep Inc. v. Witherspoon, 2005 U.S. Dist. LEXIS 26536 (E.D. Cal. 2005) (allowing environmental groups to intervene in the automakers' lawsuit); Christopher T. Giovinazzo, *California's Global Warming Bill: Will Fuel Economy Preemption Curb California's Air Pollution Leadership?*, 30 ECOLOGY L.Q. 893 (2003) (describing likely challenges, and arguing that California should prevail); Carlson, *supra* note 75 (describing the legislation and likely challenges).

be "over," and issued an executive order targeting ambitious reductions in the state's carbon emissions.[89] In accordance with Schwarzenegger Administration policy, many of California's administrative agencies are studying ways in which those agencies may respond to climate change.[90] The state attorney general's office has repeatedly attempted to compel responses to climate change, most notably by joining lawsuits seeking to impose nuisance liability on the electric power industry and to compel EPA to regulate automotive GHG emissions, and more recently by directly suing automakers.[91] Those efforts build upon earlier achievements. Because of past energy shortages and stringent air quality protections, California has implemented many measures designed to improve energy efficiency. Partly because of those measures, Californians' per capita GHG emissions now are lower than those of most Americans, even though their aggregate emissions are still growing.[92]

Adding to those efforts, the California Legislature recently enacted and Governor Schwarzenegger signed into law AB 32, also known as the California Global Warming Solutions Act of 2006, a landmark statute designed to cap California's greenhouse gas emissions.[93] AB 32 requires the California Air Resources Board (CARB) to cap statewide emissions at 1990 levels.[94] It empowers CARB to use a variety of regulatory mechanisms to achieve compliance with that cap by 2020, if not sooner.[95] AB 32 also requires establishment of a monitoring and enforcement system for tracking and regulating GHG emissions, and empowers CARB to take immediate

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[89] *See* Bill Blakemore, *Schwarzenator v. Bush: Global Warming Debate Heats Up*, ABC NEWS, August 30, 2006, *at* http://abcnews.go.com/US/GlobalWarming/story?id=2374968&page=1 ("'I say the [global warming] debate is over. We know the science,' Schwarzenegger declared forcefully at a recent United Nations summit. 'We see the threat, and we know the time for action is now.'") (brackets in original); Executive Order S-3-05, *supra* note 83. The order states, in part: "the following greenhouse gas emission reduction targets are hereby established for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80% below 1990 levels...."

[90] *E.g.* DEPT. OF WATER RESOURCES, *supra* note 28. The efforts haven't been uniform; the governor's office recently proposed steep cuts in public transit budgets, and many state agencies have proven exceedingly reluctant to actually do something about their own contributions. *See* Rachel Gordon, *Governor's Budget Plan Diverts Millions from Public Transit*, SAN FRANCISCO CHRONICLE, May 16, 2007, at B1.

[91] Conn. v. Am. Elec. Power Co., 406 F. Supp. 2d 265 (S.D.N.Y. 2005) (dismissing that nuisance case); Mass. v. EPA, 127 S. Ct. 1438, __ (2007); Nick Bunkley, *California Sues 6 Automakers Over Global Warming*, NEW YORK TIMES, September 21, 2006.

[92] *See* INVENTORY, *supra* note 46 at i, 12 ("California's ability to slow the rate of growth of GHG emissions is largely due to the success of its energy efficiency and renewable energy programs and a commitment to clean air and clean energy").

[93] California Climate Change Solutions Act of 2006, A.B. 32, 2005-06 Sess., *codified at* Cal. Health & Safety Code §§ 38500-99.

[94] *Id.* §§ 38550-38551.

[95] *Id.* §§ 38560-38565.

steps to limit high-emitting sources.[96] The Legislature left most other details to the agency's discretion; while CARB must avoid environmental injustice in implementing its measures, its program will take shape primarily through rulemaking processes.[97]

Enacting AB 32 was a dramatic step.[98] No other state has a law like it,[99] and the federal government has taken only preliminary steps toward passing anything nearly so ambitious.[100] California already was leading domestic efforts to respond to climate change, and full implementation of AB 32 would likely put the state far ahead of most, if not all, of the rest of the United States. Nevertheless, and as discussed more fully in Part IV, its enactment is only a start. CARB's regulatory program has not yet taken shape, and no one yet knows how effective it will be, or to what extent AB 32 will join a long list of environmental statutes that only partially achieve their stated goals.[101] Neither AB 32 nor any other state statute purports to occupy the regulatory field,[102] and both the need and the opportunity for complementary approaches therefore remain. As the next section discusses, CEQA provides such a complementary approach, and exemplifies how environmental assessment laws can bolster (or help compensate for the weakness or absence of) conventional regulatory regimes.[103]

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[96] *Id.* § 38530. That provision already has proved controversial. Two CARB officials recently were fired, and claimed that their firing resulted from conflicts over efforts by the Schwarzenegger administration to slow implementation of AB 32. *Air Board Officials Blame Schwarzenegger for Weakening Smog Regs*, SAN FRANCISCO CHRONICLE, June 30, 2007.

[97] *See* Cal. Health & Safety Code §§ 38560-38574.

[98] *See, e.g.,* Janet Wilson and Richard Simon, *Feinstein, Boxer Differ on Global Warming*, LOS ANGELES TIMES, January 18, 2007 (quoting California Assembly Speaker Fabian Nunez: "It's attracted worldwide attention, and it's landmark legislation"); *Editorial: Fueling the Future*, SACRAMENTO BEE, January 15, 2004, at A4 ("The signing of Assembly Bill 32—California's landmark global warming law—brought loads of publicity to Gov. Arnold Schwarzenegger last year.").

[99] Other states and cities have taken important first steps toward addressing climate change, however, such as creating greenhouse gas registries or developing cap-and-trade programs applicable to limited sectors. *See* Engel and Saleska, *supra* note 7, at 216-22 (describing various types of local measures); Kirsten H. Engel, *Mitigating Global Climate Change in the United States: A Regional Approach*, 14 N.Y.U. ENVTL. L. J. 54, 65-66 (2005) (describing the "Regional Greenhouse Gas Initiative," an effort led by several northeastern states).

[100] *See* Carlson, *supra* note 75, at 288-90 (describing federal responses). Following the November 2006 elections, several proposed climate change bills are likely to move, but chances of passage of effective regulation seem slim so long as President Bush holds a veto. *See* Wilson and Simon, *supra* note 98 (describing proposed bills by Senators Feinstein and Boxer).

[101] *See infra* Part IV.A (describing the reasons why statutes don't achieve their stated goals); *Arnie's Uphill Climb*, THE ECONOMIST, June 23, 2007, at 36 (describing the challenges of implementing climate change legislation).

[102] *See* Cal. Health and Safety Code §§ 38592(b), 38598.

[103] That CEQA establishes obligations does not mean, of course, that agencies are fulfilling, or even acknowledging, those obligations. Without judicial enforcement—and as of yet there are no published decisions either enforcing or rejecting CEQA's applicability to climate change contributions—climate change analysis and mitigation is unlikely to become prevalent.

Discerning the reasons for that absence of cases is inherently somewhat speculative, but one likely reason is that until recently, plaintiffs could not count on a court accepting climate change as reality. Though the scientific consensus is now nearing middle age, governmental acceptance the reality of climate change is fairly new, and the absence of such consensus would have deterred potential plaintiffs. *Compare, e.g.,* Oreskes, *supra* note 30 (describing the consensus that human activity is making major contributions to climate change), with *Massachusetts v. Environmental Protection Agency*, Oral Argument Transcript, November 29, 2006, at 5 (question of Justice Scalia: "[w]ell, there's a lot of conjecture about whether—I gather that there's something of a consensus on warming, but not a consensus on how much of that is attributable to human activity."). In the dissenting opinion, vestiges of doubt remain; Justice Roberts dismissed as "conclusory" Massachusetts' unrebutted and scientifically non-controversial contention that sea level rise would take away state land. Mass. v. EPA, 127 S. Ct. 1438, __ (2007)

With increasing acknowledgment of the reality of climate change, however, cases cropping up. *See, e.g.,* Jason W. Armstrong, *Development in the Age of Climate Change: Lawsuit Challenges Housing Plan That Does Not Gauge Fossil Fuel Impacts*, DAILY JOURNAL, December 21, 2006 (describing a lawsuit filed by the Center for Biological Diversity); Edward Humes, *Showdown at Tejon Ranch*, CALIFORNIA LAWYER, June, 2007, at 20; Friends of the Earth v. Watson, 2005 U.S. Dist. Lexis 42335 (N.D. Cal. 2005) (granting standing in a similar claim filed under NEPA). Plaintiffs also increasingly are demanding that agencies consider climate change when assessing the environmental context of, and risks to, projects they propose—a separate issue not addressed in this article. *See, e.g.,* Dennis Pfaff, *Lawsuits Over the Effects of Climate Change Become New Legal Front in Development Wars*, THE LEGAL RECORDER, November 24, 2006, at 1-2 (describing litigation over development projects proposed for below-sea-level islands in the Sacramento-San Joaquin Delta).

III. EXPLAINING THE OBLIGATION: HOW CEQA ADDRESSES CLIMATE CHANGE

A. CEQA's Requirements

CEQA exists to ensure that environmental considerations play a central role in state and local agency decision-making,[104] and its procedural and substantive mandates are designed to force fulfillment of that end. The California Supreme Court has repeatedly directed that "CEQA is to be interpreted 'to afford the fullest possible protection to the environment within the reasonable scope of the statutory language.'"[105]

CEQA functions primarily through a few basic requirements, most of which parallel the requirements of NEPA and other environmental assessment laws. Any time a state or local public agency makes a discretionary decision[106] to approve or carry out a project with potentially significant environmental impacts—even if the project will be implemented by private parties[107]—the agency must disclose any potentially significant adverse environmental consequences of its decision.[108] It also must identify and discuss measures capable of reducing or avoiding those adverse environmental impacts.[109] Unlike NEPA and some (though not all[110]) other environmental assessment laws, which mandate only procedural compliance, CEQA also imposes an express substantive constraint: if mitigation or avoidance measures can feasibly reduce significant adverse impacts, the lead agency cannot approve the project without adopting

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[104] Cal. Pub. Res. Code §§ 21000(d), 21001(a), (d) (stating that agencies shall "[d]evelop and maintain a high quality environment now and in the future, and take all action necessary to protect, rehabilitate, and enhance the environmental quality of the state;" "take all coordinated actions necessary to prevent [critical environmental] thresholds being reached;" and "[e]nsure that the long-term protection of the environment, consistent with the provision of a decent home and suitable living environment for every Californian, shall be the guiding criterion in public decisions").

[105] *Mountain Lion Foundation,* 16 Cal.4th at 112 (quoting Friends of Mammoth v. Board of Supervisors, 8 Cal. 3d 247, 259 (1972)); Laurel Heights Improvement Ass'n v. Regents of the Univ. of Cal., 47 Cal.3d 376, 390 (1988). The California Supreme Court also has resolved cases in favor of environmental petitioners with far greater frequency than the U.S. Supreme Court, where no NEPA petitioner ever has won. *See* Jason Czarnezki, *Revisiting the Tense Relationship Between the U.S. Supreme Court, Administrative Procedure, and the National Environmental Policy Act,* 25 STANFORD ENVTL. L.J. 3, 10 (2006); David C. Shilton, *Is the Supreme Court Hostile to NEPA? Some Possible Explanations for a 12-0 Record*, 20 ENVTL L. 551 (1990).

[106] *See* Cal. Pub. Res. Code § 21080(a); Friends of Westwood v. City of Los Angeles, 191 Cal. App. 3d 259, 267 (1987) (holding that the existence of any discretion in an approval process triggers CEQA).

[107] *See* Friends of Mammoth v. Bd. of Supervisors, 8 Cal. 3d 247 (1972) (holding that CEQA applies to private projects receiving governmental approvals).

[108] CEQA does exempt certain classes of projects. *E.g.* Cal. Pub. Res. Code §§ 21080(b), 21080.14 (creating an exemption for "affordable housing projects in urbanized areas").

[109] Sierra Club v. State Bd. of Forestry, 7 Cal. 4th 1215, 1233 (1994).

[110] *See, e.g.,* N.Y. Envtl. Cons. L. § 8-0109(1) ("Agencies ... shall act and choose alternatives which, consistent with social, economic and other essential considerations, to the maximum extent practicable, minimize or avoid adverse environmental effects, including effects revealed in the environmental impact statement process.").

those measures.[111] And if feasible measures aren't available, the agency must provide findings justifying any decision to proceed with the project.[112]

The discussion below explains those requirements in more detail.

1. Disclosure of Significant Adverse Environmental Impacts

If a proposed project[113] may[114] cause significant adverse impacts upon the environment, CEQA requires the lead agency[115] to either: (a) adopt or require project changes that will avoid or fully mitigate potentially significant impacts;[116] or (b) prepare an "environmental impact

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[111] *See* Cal. Pub. Res. Code § 21081. In practice, however, the difference may not be dramatic. Though NEPA in theory imposes no such substantive constraint, agencies often will implement mitigation measures to avoid the procedural cost of EIS preparation, and thus substantive change sometimes will occur without an explicit substantive obligation. *See* Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing the Government's Environmental Performance*, 102 COLUM. L. REV. 903, 932-37 (2002) (describing the prevalent use of the mitigated finding of no significant impact). And while NEPA may sometimes function as though it has a substantive element, CEQA sometimes seems to function as though it lacks one; compliance with CEQA's substantive mandate is generally reviewed under an abuse-of-discretion standard, creating a heavy burden for plaintiffs challenging alleged substantive non-compliance. *See* City of Marina v. Bd. of Trustees of Cal. State Univ., 39 Cal. 4th 341, 368 (2006) ("an agency's decision that the specific benefits a project offers outweigh any environmental effects that cannot feasibly be mitigated, while subject to review for abuse of discretion [], lies at the core of the lead agency's discretionary responsibility under CEQA and is, for that reason, not lightly to be overturned.").

[112] Cal. Pub. Res. Code § 21081(b).

[113] *See* 14 Cal. Code Regs. § 15002(b) (explaining the types of actions to which CEQA applies).

[114] CEQA sets a fairly precautionary standard for requiring EIR preparation. "[A] public agency must prepare an EIR whenever substantial evidence supports a fair argument that a proposed project 'may have a significant effect on the environment.'" *Laurel Heights Improvement Assn. v. Regents of University of California*, 6 Cal. 4th 1112, 1123 (1993). Perhaps partly because of that precautionary standard, California agencies are more likely to prepare full environmental studies than their federal counterparts. While Professor Karkkainen observes that the ratio of FONSIs to EISs is at least 100:1, the ratio of negative declarations to EIRs is closer to 5:1. *Compare* Karkkainen, *supra* note 111, at 920, with California Office of Planning and Research, Environmental Document Filings with the State Clearinghouse, 1999 to 2005, *available at* http://www.opr.ca.gov/clearinghouse/PDFs/1999-2005_All_Document_Filings.pdf.

[115] CEQA defines a "lead agency" as "the public agency which has the principal responsibility for carrying out or approving a project which may have a significant effect upon the environment." Cal. Pub. Resources Code § 21067.

[116] 14 Cal. Code Regs. §§ 15064, 15065(b)(1):

> Where, prior to the commencement of preliminary review of an environmental document, a project proponent agrees to mitigation measures or project modifications that would avoid any significant effect on the environment specified by subdivision (a) or would mitigate the significant effect to a point where clearly no significant effect on the environment would occur, a lead agency need not prepare an environmental impact report solely because, without mitigation, the environmental effects at issue would have been significant.

report" (EIR) before approving or carrying out the project.[117] The EIR, if prepared, must identify and discuss the project's potentially significant adverse environmental impacts.[118]

CEQA defines "significant impacts" broadly and inclusively. Its definition includes—and agencies therefore must discuss—not only the direct environmental consequences of implementing the project, but also indirect effects following from direct physical consequences.[119] That discussion should not be speculative,[120] but where an indirect consequence is foreseeable, the existence of an extended causal chain between project and impact does not excuse the agency from discussing that impact.[121]

As is typically required by environmental assessment statutes, a lead agency also must address significant "cumulative" environmental impacts—that is, contributions, even if small, to larger environmental problems.[122] CEQA defines a "significant effect on the environment" as including

> possible effects of a project (that) are individually limited but cumulatively considerable. As used in this paragraph, 'cumulatively considerable' means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.[123]

Environmental law often addresses such problems; seemingly small increases in air pollution, while individually minor, can collectively add up to major regional air quality problems,[124] for example; individual projects that slightly increase noise levels may combine to create intolerable

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[117] *See* Friends of Davis v. City of Davis, 83 Cal. App. 4th 1004, 1016-17 (2000) ("An EIR is required whenever it can be 'fairly argued on the basis of substantial evidence that the project may have significant environmental impact.'") (citations omitted).

[118] *See Sierra Club*, 7 Cal. 4th at 1229 (describing an EIR as "an environmental alarm bell" and a "document of accountability").

[119] *See* 14 Cal. Code Regs. § 15064(d)(2) ("An indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project"). *See also* 14 Cal. Code Regs. § 15358.

[120] *See* Planning & Conservation League v. Department of Water Resources, 83 Cal. App. 4th 892, 919 (2000) ("We need not venture into speculation. But CEQA does compel reasonable forecasting.").

[121] *See* 14 Cal. Code Regs. § 15064(d)(2).

[122] *See, e.g.*, 40 C.F.R. § 1508.7 (defining cumulative impacts); D.C. Stat. § 8-109.03(a)(8) (same); Montana Code § 75-1-220(3) (same).

[123] Public Resources Code § 21083(b)(2). The CEQA Guidelines similarly state that "'[c]umulative impacts' refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." 14 Cal. Code Regs. § 15355. "While section 21083 governs the situations in which an agency must prepare an EIR, its provisions have also been applied to the contents of an EIR once it is determined an EIR must be prepared." *Los Angeles Unified School Dist.*, 58 Cal. App. 4th at 1024 n.6 (citing *Laurel Heights Improvement Ass'n*, 47 Cal.3d at 394).

[124] *E.g.* Kings County Farm Bureau v. City of Hanford, 221 Cal. App. 3d 692, 718-24 (1990).

aggregate effects;[125] and wildlife habitat may slowly be nibbled away by the incremental incursions of small development projects. Contributions to such cumulatively significant effects can trigger the obligation to prepare an EIR, for an agency must prepare an EIR if its "project has possible environmental effects that are individually limited but cumulatively considerable."[126] The EIR then must disclose those cumulative impacts; agencies are obligated to "discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable."[127]

Judicial enforcement of those mandates has been fairly rigorous. California's courts have repeatedly emphasized the importance of cumulative impacts analyses, cautioning that "[o]ne of the most important environmental lessons is that environmental damage often occurs incrementally from a variety of small sources. These sources appear insignificant when considered individually, but assume threatening dimensions when considered collectively with other sources with which they interact."[128] The courts therefore have required agencies to treat projects' contributions to larger environmental problems as significant, even where the individual project contribution would seem small in isolation.[129] They also have rejected a regulatory *de minimis* exemption from that general rule, reasoning that such an exemption would contravene the core purposes of a cumulative impacts analysis.[130] Some debate remains about

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[125] *E.g. Los Angeles Unified School Dist.*, 58 Cal. App. 4th at 1024; Grand Canyon Trust v. FAA, 290 F.3d 339, 343 (D.C. Cir. 2002) (requiring consideration of the cumulative noise impacts of additional flights over the Grand Canyon).

[126] 14 Cal. Code Regs. § 15065 (a)(3).

[127] *Id.* § 15130(a); *see Los Angeles Unified School Dist.*, 58 Cal. App. 4th at 1024-26 (1997); San Franciscans for Reasonable Growth v. City & County of San Francisco, 151 Cal. App. 3d 61, 73 (1984) ("Part of [CEQA's] vital informational function is performed by a cumulative impact analysis.").

[128] Communities for a Better Environment v. California Resources Agency, 103 Cal. App. 4th 98, 114 (2002); *see* Bakersfield Citizens for Local Control v. City of Bakersfield, 124 Cal. App. 4th 1184, 1214 (2005) (quoting *Communities for a Better Environment*); *Los Angeles Unified School Dist*, 58 Cal. App. 4th at 1025; San Joaquin Raptor/Wildlife Rescue Ctr. v. County of Stanislaus, 27 Cal. App. 4th 713, 739 (1996); Las Virgenes Homeowners Federation, Inc. v. County of Los Angeles, 177 Cal. App. 3d 300, 306 (1986); Whitman v. Board of Supervisors, 88 Cal. App. 3d 397, 408 (1979).

[129] *E.g.* Kings County Farm Bureau, 221 Cal. App. 3d at 718-24 (rejecting an EIR that failed to consider whether project emissions, in combination with emissions from other sources throughout the San Joaquin Valley, would create a significant impact); *Los Angeles Unified School Dist.,* 58 Cal.App.4th at 1025 ("the relevant issue to be addressed in the EIR on the plan is not the relative amount of traffic noise resulting from the project when compared to existing traffic noise, but whether any additional amount of traffic noise should be considered significant in light of the serious nature of the traffic noise problem already existing around the schools");

[130] *Communities for a Better Environment*, 103 Cal. App. 4th at 116–21 (following *Kings County*, which it described as "[t]he seminal decision," and *Los Angeles Unified School District*). *Communities for a Better Environment* invalidated a "de minimis" exception, which the Resource Agency had set forth in its regulations, and also rejected a theory that would have focused on the percentage contribution made by an individual project rather than on the overall scale of the impact. That theory, the court observed, "contravene[d] the very concept of

where exactly the lower bound of a cumulatively significant contribution lies; though the rejection of a *de minimis* exception implies that even tiny contributions can matter, the same court criticized a "one-molecule" standard for air pollution.[131] But notwithstanding that potential ambiguity, past decisions leave little doubt that CEQA's full suite of obligations can be triggered even by a seemingly small contribution to a larger problem.

CEQA's definition of significant impacts also includes impacts extending beyond California's borders. While CEQA governs only decisions made and conduct occurring within California, nothing in its definition of significant impact allows agencies to ignore impacts outside state lines. Instead, "CEQA requires a public agency to mitigate or avoid its projects' significant effects not just on the agency's own property but 'on the environment,' with 'environment' defined for these purposes as 'the physical conditions which exist within the area which will be affected by a proposed project.'"[132] That functional definition invokes no political boundaries; if an area is affected, it is part of the relevant physical environment.

2. Identification of Alternatives and Mitigation Measures

In addition to requiring identification of significant environmental impacts, CEQA also requires agencies to discuss ways in which those impacts can be reduced or avoided. Agencies must "systematically identif[y]... feasible alternatives or feasible mitigation measures which will avoid or substantially lessen [a project's] significant effects."[133] According to the courts, that discussion of alternatives and mitigation measures forms the "core" of an EIR.[134]

By requiring analysis of alternatives, CEQA attempts to compel agencies to consider whether different versions of the project, or even different projects, could accomplish most of the basic project purposes while reducing environmental costs.[135] Courts have repeatedly stated that agencies "must describe all reasonable alternatives to the project including those capable of

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cumulative impacts," for it ran counter to the basic principle that "the greater the existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant." 103 Cal. App. 4th at 120; *see Grand Canyon Trust*, 290 F.3d at 343 (noting that when an environment is vulnerable, any additional impact "can be the straw that breaks the back of the environmental camel").

[131] *Communities for a Better Environment*, 103 Cal. App 4th at 120

[132] American Canyon Community United for Responsible Growth v. City of American Canyon, 145 Cal. App. 4th 1062, 1082 (2006) (italics removed; *quoting* Cal. Pub. Res. Code § 21002.1(b) and City of Marina v. Board of Trustees of California State University, 39 Cal. 4th 341, 359-60 (2006)); 14 Cal. Code Regs. § 15360.

[133] Cal. Pub. Res. Code § 21002; *see* Cal. Pub. Resources Code § 21061 (stating that an EIR must "list ways in which the significant effects of such a project might be minimized" and "indicate alternatives to such a project.").

[134] Citizens of Goleta Valley v. Board of Supervisors, 52 Cal.3d 553, 564 (1990).

[135] *See* 14 Cal. Code Regs. § 15126.6.

reducing or eliminating environmental effects."[136] No universally-applicable list sets forth the alternatives agencies must consider—the scope of the analysis instead is governed by project-specific circumstances, the standards set forth in the statute and the California Resources Agency's CEQA guidelines, and a "rule of reason"[137]—but agencies often consider building in alternative locations,[138] using different infrastructure to accomplish project purposes,[139] or scaling back a project's scope.[140] The sufficiency of alternatives analyses is often disputed, with project opponents asserting that agencies exclude viable possibilities or set up only straw man options, and sometimes the "core" of an EIR can seem a bit hollow, but in many EIRs, the alternatives analysis does form a substantial component of the analysis.[141]

CEQA also requires discussion of mitigation measures.[142] The CEQA Guidelines describe several categories of mitigation measures, including "avoiding the impact altogether by not taking a certain action or parts of an action"; restoring the environment impacted by the action; altering project operations to minimize the impact; or—importantly, as later sections of this article will explain—"[c]ompensating for the impact by replacing or providing substitute resources or environments."[143] They also specify that "where relevant," EIRs must describe

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[136] County of Inyo v. City of Los Angeles, 71 Cal. App. 3d 185, 203 (1977); *see* Wildlife Alive v. Chickering, 18 Cal.3d 190, 197 (1976); Laurel Heights Improvement Assoc. v. Regents of Univ. of Calif, 47 Cal. 3d 376, 400 (1988); 14 Cal. Code Regs. § 15126.6.

[137] *See* 14 Cal. Code Regs. § 15126.6; *Citizens of Goleta Valley*, 52 Cal.3d at 565.

[138] *E.g. Citizens of Goleta Valley*, 52 Cal.3d at 570-75 (concluding that evaluation of a single off-site alternative was adequate); San Bernardino Valley Audubon Society, Inc. v. County of San Bernardino, 155 Cal.App.3d 738, 751 (1984) (rejecting an EIR that considered to narrow a range of site alternatives).

[139] *E.g. County of Inyo*, 71 Cal. App. 3d 185, 203 (1977) (rejecting an EIR for a water-delivery project that failed to consider conservation as an alternative to increased pumping); Kings County Farm Bureau v. City of Hanford, 221 Cal. App. 3d 692, 730-37 (1990) (rejecting an EIR that considered a natural gas-burning alternative to a coal-fired power plant, but did not provide enough quantitative data to facilitate an effective comparative analysis).

[140] *E.g.* Village of Laguna Beach v. Board of Supervisors, 134 Cal. App. 3d 1022, 1028-32 (1982) (upholding an EIR that considered a range of sizes for a proposed residential development).

[141] Some NEPA commentators have argued the NEPA's alternatives analysis requirement has essentially been gutted through non-enforcement, and that the federal courts' rhetorical endorsements of alternatives analyses have not translated into actual holdings. *See, e.g.,* Jason J. Czarnezki, Note: *Defining the Project Purpose Under NEPA: Promoting Consideration of Viable EIS Alternatives*, 70 U. CHI. L. REV. 599 (2003). Nevertheless, in my experience many EISs and EIRs do contain what appear to be thorough alternatives analyses. How often agencies actually adopt alternatives is another question, which I do not have empirical data to answer, but I would hypothesize that CEQA's mitigation requirement accomplishes much more than its alternatives requirement. Inducing lots of small, incremental changes seems much more practicable than creating a few big ones.

[142] Save Our Peninsula Committee v. Monterey County Bd. of Supervisors, 87 Cal. App. 4th 99, 139 (2001) (citing Cal. Public Resources Code §§ 21100, 21002.1, and 21061); *see* 14 Cal. Code Regs. § 15002(a)(2) (stating that one of CEQA's "basic purposes" is to "[i]dentify ways that environmental damage can be avoided or significantly reduced").

[143] 14 Cal. Code Regs. § 15370. At the boundaries, the difference between an alternative and a mitigation measure may be fuzzy, but generally speaking, mitigation measures involve revisions within the same project, while

mitigation measures capable of reducing "inefficient and unnecessary consumption of energy."[144]

C. Adoption, if Feasible, of Alternatives or Mitigation Measures Capable of Avoiding Significant Environmental Impacts

To those requirements, CEQA adds a substantive twist: the statute expressly precludes agencies from adopting projects without also adopting feasible mitigation measures or alternatives capable of reducing significant adverse environmental impacts.[145] CEQA, in other words, contains the unequivocal substantive constraints for which many NEPA critics have long pined.[146] "[N]o public agency shall approve or carry out a project," the statute directs, if "one or more significant effects on the environment [] would occur if the project is approved or carried out," unless the public agency formally finds either: (a) that the impacts will be mitigated to a less-than-significant level; or (b) that such mitigation is infeasible, but project benefits still justify proceeding.[147] The CEQA Guidelines repeat that mandate, stating that the "basic purposes of CEQA" include "[p]revent[ing] significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible."[148] Thus, if mitigation or avoidance of a project's significant adverse impacts is feasible, an agency cannot approve the project without adoption of those mitigation or avoidance measures.

Those provisions require mitigation of contributions to cumulatively significant impacts. A cumulatively significant impact is, by definition, a significant project impact,[149] and CEQA

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alternatives involve fundamentally different versions of the project. *See Laurel Heights*, 47 Cal.3d at 403 ("alternatives are a type of mitigation").

[144] 14 Cal. Code Regs. § 15126.4; CEQA Guidelines App. F, *available at* http://www.ceres.ca.gov/topic/env_law/ceqa/guidelines/Appendix_F.html (last checked June 11, 2007).

[145] Mountain Lion Foundation v. Fish and Game Commission, 16 Cal.4th 105, 134 (1997); *see Sierra Club v. State Bd. of Forestry*, 7 Cal.4th 1215, 1233 (1994) ("CEQA compels government first to identify the [significant] environmental effects of projects, and then to mitigate those adverse effects through the imposition of feasible mitigation measures or through the selection of feasible alternatives."); *Sierra Club v. Gilroy City Council*, 222 Cal.App.3d 30, 41 (1990) (CEQA "requires public agencies to deny approval of a project with significant adverse effects when feasible alternatives or feasible mitigation measures can substantially lessen such effects").

[146] *See, e.g,* Nicholas C. Yost, *NEPA's Promise—Partly Fulfilled*, 20 ENVTL. L. 533 (1990) (arguing that the U.S. Supreme Court has gutted NEPA of its substantive requirements); William H. Rodgers, Jr., *NEPA at Twenty: Mimicry and Recruitment in Environmental Law*, 20 Envtl. L. 485, 500-01 (1990).

[147] Cal. Pub. Res. Code § 21081.

[148] 14 Cal. Code Regs. §§ 15002(a)(3), (h), 15021.

[149] *See* 14 Cal. Code Regs. § 15065(a)(3) (stating that "a lead agency shall find that a project may have a significant impact on the environment" if the project "has possible environmental effects that are individually limited but cumulatively considerable.").

requires mitigation, if feasible, of all significant impacts.[150] That does not mean agencies must fully resolve environmental problems that their projects only partially cause; an agency may satisfy its CEQA obligations by mitigating its own contribution.[151] The agency also may accomplish its share of mitigation in a variety of ways, including participation in regional mitigation programs.[152] But an agency cannot simply ignore its project's share of a significant larger impact. If a project's contribution is incrementally important yet can be avoided or mitigated, the project cannot proceed without such mitigation.

B. Applying CEQA's Requirements to Climate Change

The CEQA provisions described above constrain state or local public agencies' contributions to climate change. This section explains how and why.

[150] Cal. Pub. Res. Code 21081.

[151] 14 Cal. Code Regs. § 15130(a)(3) ("An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact."); 14 Cal. Code Regs. § 15064(h)(2) (same).

[152] *Save Our Peninsula Committee*, 87 Cal. App. 4th at 139-40. The *Save Our Peninsula* court also warned, however, that "a commitment to pay fees without any evidence that mitigation will actually occur is inadequate." *Id.* at 140; *City of Marina*, 39 Cal.4th at 365.

1. Government Projects and Climate Change Contributions

CEQA's threshold trigger is a discretionary state or local government action with potential environmental consequences,[153] and much of California's GHG emissions derive at least partly from discretionary government decisions.

Listing all public agency projects that emit GHGs would require a book, but a partial sampling illustrates the extent to which emissions follow from discretionary government action. While vehicular emissions are partly the product of private choices, public agencies plan and build transportation systems, and their decisions strongly influence driving and transit use patterns.[154] Local government is largely responsible for land use planning, which plays a major role in determining automobile dependence.[155] Timber harvests, which release some of the carbon previously stored in forests, are regulated by California's State Board of Forestry.[156] Construction of methane-generating agricultural or industrial facilities typically is subject to local land use authority. Electric power consumption involves similarly extensive interconnections. State and local agency decisions help control the construction of power plants[157] and government decisions also affect power demand; every subdivision, industrial project, or water project[158] that public agencies approve necessitates electricity. Public agencies also are major power consumers; the single largest power user in the state, for example, is

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[153] *See* Friends of Mammoth v. Bd. of Supervisors, 8 Cal. 3d 247 (1972).

[154] *See, e.g.,* California Department of Transportation, *About Caltrans, at* http://www.dot.ca.gov/aboutcaltrans.htm (last checked January 23, 2007) (describing Caltrans' role in building state transportation infrastructure).

[155] Recognizing those interconnections, state and federal air quality planning already is highly intertwined with transportation planning, and just as government decisions help determine how much nitrogen dioxide, carbon monoxide, and particulate matter cars generate, those decisions also play a direct role in creating or controlling carbon emissions. *See* EDF, Inc. v. EPA, 82 F.3d 451, 454-55 (D.C. Cir. 1996) (describing these interrelationships); 1000 Friends of Md. v. Browner, 265 F.3d 216, 221-22 (4th Cir. 2001) (same); City of S. Pasadena v. Slater, 56 F. Supp. 2d 1095, 1101 (C.D. Cal. 1999) (same).

[156] *See* Big Creek Lumber Co. v. County of Santa Cruz, 38 Cal. 4th 1139, 1146-47 (2006). That State regulatory power does not extend, however, to the national forest system's extensive holdings within California.

[157] *See, e.g.,* Kings County Farm Bureau v. City of Hanford, 221 Cal. App. 3d 692 (1990) (considering the environmental consequences of constructing a new power plant); California Energy Commission, *Welcome to the California Energy Commission, at* http://www.energy.ca.gov/commission/index.html (explaining the CEC's role, which includes "[l]icensing thermal power plants 50 megawatts or larger").

[158] *See* NATURAL RESOURCES DEFENSE COUNCIL AND PACIFIC INSTITUTE, ENERGY DOWN THE DRAIN: THE HIDDEN COSTS OF CALIFORNIA'S WATER SUPPLY 2 (2004) ("According to the Association of California Water Agencies, water agencies account for 7 percent of California's energy consumption and 5 percent of summer peak demand.").

California's State Water Project, which uses an extraordinary amount of energy delivering water to users in southern California.[159]

2. GHG-Emitting Projects and Significant Environmental Impacts

Not all discretionary public agency decisions trigger CEQA's requirements; instead, the second major trigger for CEQA's disclosure and mitigation obligations is a potentially significant environmental impact.[160] Projects causing GHG emissions create such potential, for the collective result of those contributions is a perfect example of the principle "that environmental damage often occurs incrementally from a variety of small sources."[161] Climate change, in other words, is a perfect example of a cumulatively significant impact.

Every individual GHG-emitting project contributes to climate change. GHGs are generally long-lived and well-mixed, so there is no inconsequential location or time for GHG emissions to occur, and each GHG-emitting project inexorably adds to the worldwide total.[162] No reasonable doubt exists that rising worldwide totals are already causing, and will continue to cause, severe and sometimes catastrophic consequences.[163] Although those individual contributions might seem small, and articulating a causal chain between individual contributions and particular storms or droughts is impossible, scientists do generally agree that the more GHGs we emit, the more temperatures will rise, with corresponding increases in adverse consequences.[164] In other words, while we cannot determine that an individual GHG-emitting project caused an event like Hurricane Katrina or the American Southwest's recent drought,[165] we know that each GHG-emitting project makes those kinds of events incrementally more likely.

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[159] *See* ENERGY DOWN THE DRAIN, *supra* note 158, at 2 ("The California Energy Commission reports that SWP energy use accounts for 2 to 3 percent of all electricity consumed in California.").

[160] 14 Cal. Code Regs. § 15130(b)(5). Subsection 15130(e), however, states that for certain types of projects, an EIR need not address impacts previously addressed in a prior EIR.

[161] Communities for a Better Environment v. California Resources Agency, 103 Cal. App. 4th 98, 114 (2002).

[162] *See supra* note 46; *see also* Massachusetts v. EPA, 127 S. Ct. 1438, __ (2007) (rejecting EPA's argument that its contributions to climate change are insufficient to confer standing).

[163] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4; IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3; Oreskes, *supra* note 30.

[164] *See* CAL. ENVTL. PROT. AGENCY, *supra* note 3, at 15 ("actions taken to reduce climate change emissions today can reduce the magnitude and rate of climate change this century").

[165] For this reason, some CEQA attorneys argue that addressing climate change in EIRs is impossible or pointless. But a cumulative impacts analysis requires a lead agency only to discuss individual emissions and aggregate effects. There is no need to specify how much difference in ultimate effects is attributable specifically to one project.

The cumulative consequences of those emissions clearly are significant, for the resulting problem is huge. As discussed in Part II, climate change poses an extraordinary environmental threat, with the potential to harm multiple ecosystems, badly damage resource-dependant economies, and diminish the health and safety of millions of people in California.[166] And while California may face particularly acute threats, its likely burdens are by no means unique.[167] Both within and outside California's borders, climate change will create highly significant environmental impacts.[168] We can therefore be certain that every project that adds new GHG emissions makes a serious environmental problem worse.

Those incremental contributions cannot legally be dismissed as *de minimis* or inconsequential. Precisely because seemingly tiny contributions to a problem often are collectively consequential, California's courts have rejected a *de minimis* exemption to CEQA's cumulative impact requirements, instead cautioning that "the greater the existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant."[169] Nor can agencies claim that their emissions are insignificant because they are addressed by other regulatory programs. While projects' emissions of air pollutants like ozone or particulate matter may be treated as insignificant, even in non-attainment areas, where the project's emissions are accounted for in air districts' plans for attaining federal and state air quality standards,[170] that approach cannot yet work for greenhouse gases, because California does not have either a "state implementation plan" for GHG emissions.[171] Even when CARB finishes developing its AB 32 implementation program, California still will lack the functional equivalent of a SIP, for AB 32 does not mandate a plan for achieving safe emission levels.[172] Full compliance with the statute would reduce California's

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[166] *See* OUR CHANGING CLIMATE, *supra* note 3; Cal. Health and Safety Code § 38501.

[167] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4, at 12-13; IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3.

[168] *Id.*

[169] *See Communities for a Better Environment*, 103 Cal. App 4th at 116-21.

[170] *See* 14 Cal. Code Regs. § 15064(h)(3). As a practical matter, such compliance generally means that emissions from any new source must be offset by obtaining reductions in emissions from existing sources. *See* Citizens Against the Refinery's Effects v. EPA, 643 F.2d 183, 184-85 (4th Cir. 1981) (explaining the Clean Air Act's permitting requirements for new sources in non-attainment areas). CEQA's requirement of GHG-neutrality therefore is fairly similar to the requirements that probably would exist if California did have

[171] Those plans generally are promulgated for pollutants listed under the federal Clean Air Act. *See* 42 U.S.C. §§ 7409-10. Greenhouse gases are not so listed, however; indeed, EPA's refusal to list carbon dioxide created the controversy underlying *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007).

[172] The AB 32 program also is unlikely to account for every new proposed emissions source, for CARB is unlikely to be able to predict all future GHG-emitting projects.

emissions only by approximately 25%, but many experts estimate that an 80 to 90% reduction ultimately will be necessary to fully eliminate anthropogenic climate change, and the statute therefore is best understood as mandating first steps—crucial first steps, but first steps nonetheless—toward attainment, not as occupying the regulatory field and defining emission levels considered safe.[173] Nor has California elsewhere established any safe threshold for new greenhouse gas emissions. Instead, California's acknowledged need for drastic reductions, and for "[a]ll state agencies [to] consider and implement strategies to reduce their greenhouse gas emissions"[174] vitiates any argument that adding any new source, unless somehow offset or so small that it is essentially non-existent,[175] is concordant with some state plan for achieving safe emissions levels.

The task of addressing climate change impacts also should be feasible. Attributing ultimate environmental outcomes solely to a specific project's GHG emissions generally will be impossible, but the basic premise of a cumulative impacts analysis is that collective, not individual, effects matter,[176] and both individual emissions and collective effects are generally determinable.[177] Ample guidance already exists for projecting an individual project's GHG emissions, and the availability of such guidance is only likely to improve as climate change

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[173] *See* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at I-4; Executive Order S-3-05, *supra* note 83; Thomas Wigley, *The Kyoto Protocol: CO2, CH4, and Climate Implications*, 25 GEOPHYSICAL RESEARCH LETTERS 2285 (1998) (concluding that compliance with the Kyoto Protocol's modest targets would fall well short of removing the human footprint from the global climate). That does not mean these steps are not significant. Even partially reducing a colossal problem can create enormous benefits, especially where the intensity of that problem can increase or decrease incrementally. *See supra* notes 22-23 and accompanying text.

[174] Executive Order S-3-05, *supra* note 83; Cal. Health and Safety Code §§ 38592(a)

[175] *Communities for a Better Environment*, 103 Cal. App 4th at 120 ("the 'one-[additional]-molecule' rule is not the law") (brackets in original; quoting MICHAEL H. REMY ET AL., GUIDE TO THE CALIFORNIA ENVIRONMENTAL QUALITY ACT 476-78 (1998)).

[176] *See Kings County Farm Bureau*, 221 Cal. App. 3d at 722; *see also* National Steel Corp. v. Gorsuch, 700 F.2d 314, 323-24 (6th Cir. 1983) (observing, in a case addressing conventional air pollutants' contributions to non-attainment of air quality standards, that "[t]he fact that there is insufficient technical knowledge to determine the precise degree to which each source contributes to nonattainment does not require that the EPA be prohibited from acting with regard to all sources").

In accordance with those principles, a legally adequate discussion of a project's potential climate change contributions could simply discuss (1) the project's projected GHG emissions; (2) the predicted environmental consequences of those emissions in combination with other similar emission worldwide (a discussion that could be largely adopted from reports issued by the IPCC, the California Climate Change Center, and others); and (3) ways of avoiding or mitigating those project-specific emissions. Describing exactly how much sea level rise or how many storms would be attributable to the specific project would be neither feasible nor useful, and CEQA does not require such discussion.

[177] Many GHG emissions derive directly or indirectly from energy consumption, and lead agencies already are obliged to discuss their projects' energy consumption. *See* 14 Cal. Code Regs. § 15126.4; CEQA Guidelines App. F, *supra* note 144.

regulation becomes more prevalent and sophisticated.[178] Likewise, ample documentation of collective effects already exists, and describing those effects by no means requires agencies to project unforeseeable effects or engage in unfounded speculation.[179] Numerous studies, both from California state agencies and from international scientific bodies, describe the anticipated consequences of global GHG emissions, and those discussions can easily be quoted or summarized in CEQA-required reports.[180]

Though climate change cases are still relatively new to the courts, this type of cumulative environmental problem is not, and CEQA decisions addressing analogous environmental threats support treating GHG emissions as incrementally significant contributions to cumulative impacts. In *Kings County Farm Bureau v. City of Hanford*, a seminal cumulative impacts case, the respondent city had approved a power plant project that would emit ozone precursors.[181] That plant's contributions would have had little effect in isolation, and represented only a small percentage of regional emissions, and the project proponent[182] argued that those emissions therefore could not be significant.[183] The court disagreed. Noting that the small contribution would affect an area already beset by excess air pollution, the court required the city to assess whether, given that regional problem, the project's increased emissions would contribute to a

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[178] *See* U.S. Envtl. Prot. Agency, *State Inventory Guidance*, at http://www.epa.gov/climatechange/emissions/state_guidance.html (describing various resources for estimating GHG emissions) (last checked February 20, 2007); U.S. Envtl. Prot. Agency, *Personal Emissions Calculator*, at http://www.epa.gov/climatechange/emissions/ind_calculator.html (providing on-line calculator for individual impacts) (last checked February 20, 2007); *see also* Planning and Conservation League v. Dept. of Water Resources, 83 Cal. App. 4th 892, 919 (2000) ("CEQA does compel reasonable forecasting"). Compliance demonstrations for the Clean Air Act are based largely on emissions budgets that state and local agencies develop by predicting the likely emissions from individual projects. *See* 42 U.S.C. § 7502(c)(4).

This does not mean that *all* project contributions will readily be calculable; some may involve poorly understood science or complex and uncertain chains of cause and effect. But the fact that some contributions are uncertain does not vitiate the obligation to discuss those contributions that are reasonably foreseeable.

[179] *Compare* 14 Cal. Code Regs. §§ 15144-45 (stating that agencies need not "foresee[] the unforeseeable or address matters "too speculative for evaluation"). As described detail in the numerous reports cited herein, the connections between GHG emissions and climate change are no longer unforeseeable or speculative.

[180] *See, e.g.,* OUR CHANGING CLIMATE, *supra* note 3; IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4.

[181] Kings County Farm Bureau v. Hanford, 221 Cal. App. 3d 692, 718-24 (1990).

[182] Because CEQA applies to private projects that require discretionary government permits, often multiple parties defend the EIR. The lead agency may nominally be the primary defendant, but the project proponent often leads and funds the defense.

[183] *Id.* at 718 ("The DEIR concludes the project's contributions to ozone levels in the area would be immeasurable and, therefore, insignificant because the plant would emit relatively minor amounts of precursors compared to the total volume of precursors emitted in Kings County."); *id.* at 719 (quoting the EIR: "'the EIR has reached the conclusion that incremental effects of the project studied by the EIR are not significant, even though the cumulative ozone impacts of Valley-wide energy development might be considered substantial.'").

significant environmental impact.[184] "The relevant question to be addressed in the EIR," it held, "is not the relative amount of precursors emitted by the project when compared with preexisting emissions, but whether any additional amount of precursor emissions should be considered significant in light of the serious nature of the ozone problems in this air basin."[185] That reasoning is similarly applicable to climate change. Much as regional air quality problems derive incrementally from many sources, and no one source in isolation would seem important, climate change derives from the individually minor contributions of thousands of projects and actions worldwide, all of which collectively create major consequences.[186]

3. GHG Emissions and Avoidance or Mitigation

Because discretionary projects contribute to the GHG emissions that drive climate change, and because those emissions' cumulative environmental impacts are significant, any CEQA study must also discuss ways to avoid or mitigate contributions to those impacts.[187] Unless those measures are infeasible, no CEQA-regulated project may be approved without such avoidance or mitigation measures.[188] As discussed in detail below, such measures generally are available, affordable, and capable of generating collateral environmental and economic benefits.

a. Project Alternatives

For many projects, functionally similar alternatives can vastly reduce GHG emissions. Renewable power sources, for example, provide alternatives to constructing fossil fuel power plants. Constructing transit systems often provides a lower-emissions alternative to constructing new roads.[189] Rather than building new water delivery projects, which tend to consume huge amounts of energy, project proponents could implement water use efficiency programs, either

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[184] *Id.* at 722 ("We find the analysis used in the EIR and urged by GWF avoids analyzing the severity of the problem and allows the approval of projects which, when taken in isolation, appear insignificant, but when viewed together, appear startling.... the standard for a cumulative impacts analysis is defined by the use of the term 'collectively significant'").

[185] *Id.* at 718.

[186] Though this issue of individually minor actions collectively creating major consequences is quite common in environmental policy and law, it is by no means unique, or even always a problem. The same phenomenon explains why we go to the polls and protect the right to vote.

[187] Cal. Pub. Res. Code §§ 21002, 21061.

[188] *Id.* § 21081.

[189] *See, e.g. Letter from Bill Lockyer, California Attorney General, to Glenn Campbell, Orange County Transportation Authority, Re: Orange County Transportation Authority 2006 Long-Range Transportation Plan Draft Program Environmental Impact Report*, March 30, 2006, at 2-4 (identifying "[i]ncreased public transportation" as one of many measures capable of reducing the GHG emissions from a new regional transportation plan); REDEFINING PROGRESS, *supra* note 6, at 80 (summarizing community testimony from low-income Fresno residents, who "noted that the development pattern forces people to use their own cars...").

within their own supply areas or in areas sharing common water sources.[190] Instead of breaking new ground and building new housing in undeveloped areas, local governments could limit their land use approvals to infill development projects, which tend to require substantially less energy-intensive infrastructure, or could promote higher-density transit-oriented development.[191] Such alternatives won't always be feasible—some projects may require a particular location or design—and often environmentally-beneficial alternatives will still create some GHG emissions. Nevertheless, alternatives capable of substantially reducing GHG emissions are fairly often available.

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[190] *See, e.g.*, ENERGY DOWN THE DRAIN, *supra* note 158, at 34 (describing the costs and benefits of alternative methods of boosting San Diego's water supplies).

[191] Many air pollution control districts already publish guidelines for development patterns that minimize emissions of other pollutants, and the same principles can help minimize GHG emissions. *See, e.g.*, San Luis Obispo County Air Pollution Control District, *Residential Design Considerations*, *available at* http://www.slocleanair.org/business/pdf/residential%20flyer.pdf (last checked January 23, 2007); SOLANO TRANSPORTATION AUTH. ET AL., TRANSPORTATION AND LAND USE TOOLKIT (2003), *available at* http://www.ysaqmd.org/planning-info.php.

b. On-Site Mitigation

Even if no alternative is capable of avoiding a project's emissions, on-site measures often can substantially mitigate greenhouse gas emissions.[192] Developers can use green-building technology and renewable power systems, and can build housing with ready transit access and internal or nearby options for grocery shopping and recreation, reducing their projects' energy footprint.[193] A variety of measures, ranging from water recycling to appliance standards to tiered pricing, can reduce energy used to transport, distribute, heat, and dispose water.[194] Highways, where necessary, can include HOV lanes, and dairy farms and landfills can be constructed with methane-recovery technologies.[195] These examples provide only a partial sampling, and as efforts toward GHG management intensify, an increasing variety of mitigation measures will likely become available.

c. Off-Site Mitigation

Sometimes neither project alternatives nor on-site mitigation measures will be capable of fully avoiding GHG emissions.[196] But even for those projects, off-site mitigation should allow projects to achieve GHG neutrality. The primary available method is generally known as emissions trading.[197]

The concept behind emissions trading is straightforward. To compensate for increased emissions resulting from a project, the project proponent can reduce its own emissions

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[192] The distinctions between an alternative and a mitigation measure can blur. Alternatives can mitigate impacts, and a large number of mitigation measures can effectively create an alternative version of a project.

[193] *See* San Luis Obispo County Air Pollution Control District, *supra* note 191; SOLANO TRANSPORTATION AUTH. ET AL., *supra* note 191.

[194] *See* ENERGY DOWN THE DRAIN, *supra* note 158 (describing measures capable of reducing water use, and explaining their benefits).

[195] *See* United States Environmental Protection Agency, *Methane*, *at* http://www.epa.gov/methane/projections.html (last checked January 23, 2007) ("for many methane sources, opportunities exist to reduce emissions cost-effectively or at low cost by capturing the methane and using it as fuel.... EPA also provides information on cost-effective mitigation options for ruminant livestock emissions.").

[196] Even projects widely viewed as otherwise socially and environmentally desirable still create GHG emissions, unless those projects are able to purchase their energy from non-emitting sources. On-site mitigation therefore rarely will eliminate emissions entirely.

[197] The term "emissions trading" describes both cap-and-trade systems (in which emissions allowances are traded within a regulated group collectively subject to an emissions cap) and offsets (in which regulated entities pay non-regulated entities to reduce their emissions). Where cap-and-trade systems exist, environmental groups have argued that members of the system should not be allowed to use offsets from groups outside the system, primarily because outside-of-system reductions are far more difficult to track and verify. *See* TONY DUTZIK AND ROB SARGENT, STOPPING GLOBAL WARMING BEGINS AT HOME: THE CASE AGAINST THE USE OF OFFSETS IN A REGIONAL POWER SECTOR CAP-AND-TRADE PROGRAM 9-11 (2004). But because CEQA will extend obligations to emissions not regulated by a cap-and-trade system, this article does endorse the use of offsets, and focuses primarily on offsets as a means of reduction.

elsewhere, pay some other entity to commensurately reduce emissions, or undertake or fund actions that will permanently sequester an equivalent amount of carbon.[198] For example, a municipality approving a housing development with some unavoidable emissions might require the project developer to fund a city-wide energy efficiency program creating equivalent emissions reductions. The compensation need not be exactly in kind; for example, the emissions deriving from a new transportation project might be offset by ensuring the conversion of abandoned agricultural land to a permanent forest.[199]

In practice, the complexity is greater than in theory, for trading presents potential transparency and verifiability problems.[200] The basic premise of an offset—that it creates a different emissions pattern than otherwise would have existed—can facilitate gaming and false accounting, for calculating what would happen absent the offset can be a speculative counterfactual exercise.[201] "Not-carbon," as one article recently described it, is a difficult thing to measure.[202] Offset credits may support emissions-reducing measures that would have happened even absent payment, or even that were legally required.[203] Similarly, offset credits may go to projects that don't really create emissions reductions. Growing a forest provides no meaningful sequestration if the forest later is harvested or burned, or if the landowner simply shifts its logging trucks to a forest it otherwise would have left uncut.[204] Finally, offsetting may create distributional inequities. Mitigating GHG emissions often creates substantial collateral benefits, and utilizing trading can relocate those benefits out of the project areas, which can be problematic if agencies or industries in lower-income areas focus on purchasing offsets while entities in relatively affluent areas prefer to sell.[205] Effective reporting schemes or vigilant

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[198] *See* David M. Driesen, *Free Lunch or Cheap Fix? The Emissions Trading Idea and the Climate Change Convention*, 26 B.C. ENVTL. AFF. L. REV. 1, 2-3 (1998) (explaining the basic appeal of emissions trading. Driesen also discusses reasons why trading schemes should be somewhat less enticing than they superficially seem); The Climate Trust, *About Offsets*, *at* http://www.climatetrust.org/about_offsets.php (last checked January 24, 2007).

[199] *See, e.g.*, The Climate Trust, *Projects*, *at* http://www.climatetrust.org/offset_projects.php (providing links to project descriptions).

[200] *See generally* James Salzman and J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 STAN. L. REV. 607 (2000) (describing common pitfalls of environmental trading systems).

[201] *See* DUTZIK AND SARGENT, *supra* note 197, at 9-11.

[202] *Trading Thin Air*, THE ECONOMIST, May 31, 2007, *available at* http://www.economist.com/surveys/displaystory.cfm?story_id=9217960&CFID=9630437&CFTOKEN=30746497.

[203] *E.g.* Goodell, *supra* note 214 (describing "offset" payments to no-till farmers who had been no-till farming for years before the payments occurred).

[204] *See* DUTZIK AND SARGENT, *supra* note 201, at 10.

[205] *See id.* at 16-17 (describing collateral benefits of GHG regulation of power plants); *see, e.g.*, Jonathon Remy Nash and Richard L. Revesz, *Markets and Geography, Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 ECOLOGY L.Q. 569, 613-14 (2001) (describing criticisms of the South Coast Air

regulators could minimize those problems, but if either are absent—and sometimes both will be, for offset markets presently are self-regulated[206]—the reality, and thus the legality, of off-site mitigation measures may be highly difficult to discern.[207] Some offset providers are working diligently to correct those problems, but at present, some offsets are likely to be more trustworthy and real than others.

Despite those caveats, well-designed and transparent emissions trades could fulfill CEQA's legal requirements. Though sometimes subject to criticism, using offsets—purchasing conservation easements as partial mitigation for conversion of farmlands or habitat, for example, or constructing new wetlands to compensate for wetlands destroyed—already is endorsed by regulations[208] and is a commonly used mitigation practice,[209] and agencies often mitigate project impacts by contributing fees to regional mitigation programs.[210] That approach has parallels under other legal regimes; new projects in areas with deficient air quality, for example, often offset emissions by purchasing reduction credits from existing sources.[211] Those approaches have legal limitations; a "commitment to pay fees without any evidence that mitigation will actually occur is inadequate" under CEQA, and fictitious or non-verifiable offsets therefore cannot constitute legally sufficient mitigation.[212] But so long as the reality of reductions or sequestration is verifiable,[213] emissions trades should pass legal muster.

Trading also can facilitate mitigation that otherwise would not occur. Sometimes off-site alternatives or on-site measures simply aren't capable of fully mitigating a project's emissions, but purchasing offsets generally will be feasible; through a growing number of providers, such

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Quality Management District's RECLAIM program). Those concerns should be less salient with GHG regulation than with other pollutants, for most GHGs do not pose health risks other than through their contributions to climate change, which have little to do with their source location.

[206] *See, e.g., Goodell, supra* note 214 (describing reservations about the Chicago Climate Exchange)

[207] *See* City of Marina v. Board of Trustees of California State University, 39 Cal. 4th 341, 365 (2006).

[208] 14 Cal. Code Regs. § 15370 (allowing agencies to mitigate impacts by "replacing or providing substitute resources or environments).

[209] *See* Salzman and Ruhl, *supra* note 200.

[210] *See* 14 Cal. Code Regs. § 15130(a)(3) (allowing this practice).

[211] *E.g.* Berkeley Keep Jets over the Bay Com. v. Board of Port Commissioners, 91 Cal. App. 4th 1344, 1365 (2001) (referring to this technique); Kings County Farm Bureau v. City of Hanford, 221 Cal. App. 3d 692, 713 (1990) (same); 42 U.S.C. § 7503 (requiring offsets as conditions for permitting new air pollution sources in non-attainment areas); Citizens Against the Refinery's Effects, Inc. v. EPA, 643 F.2d 183, 184-85 (4th Cir. 1981).

[212] *City of Marina*, 39 Cal. 4th at 365.

[213] Unlike NEPA, CEQA requires lead agencies to develop and adopt a "reporting or monitoring program" whenever they rely on mitigation measures to avoid a significant adverse environmental impact. *See* Cal. Pub. Res. Code § 21081.6(a)(1); Karkkainen, *supra* note 111, at 952 ("this modest step represents an important conceptual advance over the federal statute").

offsets already are readily and cheaply available.[214] Under such circumstances, the feasibility of offsetting creates a legal obligation to implement mitigation that agencies otherwise could write off as impossible.[215] Similarly, while reluctant agencies and project proponents may try to argue that projects' climate change contributions are too small to justify full-scale environmental review or on-site mitigation, and might choose on that basis to ignore CEQA's requirements, trading creates a correspondingly non-intrusive method for mitigating minor emissions. If a project's emissions contributions really are small, so too will be the cost of purchasing offsets, and the agency should readily be able to fully mitigate its impacts, potentially even avoiding the obligation to prepare an EIR.[216] Trades thus can facilitate emissions reductions that agencies otherwise might not implement.

IV. EVALUATING THE OBLIGATION: SHOULD CEQA ADDRESS CLIMATE CHANGE?

The basic point of the foregoing discussion is that CEQA requires California's state and local agencies to avoid GHG emissions from projects they implement or approve. But that begs an additional question: *should* CEQA address climate change? Or, to put the question more broadly, should we use environmental assessment laws to help control greenhouse gas emissions? The answers aren't automatic, for laws like CEQA often provoke controversy and debate. Some detractors argue that they primarily create cost and delay and facilitate

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[214] Already several private organizations are offering offsets, the Kyoto Protocol allows emissions trading, and even small amounts of offsets can be purchased quickly, and thus with minimal transaction costs, on-line. *See, e.g.,* www.terrapass.org.; The Climate Trust, *at* http://www.climatetrust.org/index.php (last checked January 24, 2007); The Climate Exchange, *The Carbon Counter*, at www.carboncounter.org; *A New Approach to Global Warming*, THE ECONOMIST, Oct. 17, 2002 (describing the Chicago Climate Exchange); Jeff Goodell, *Capital Pollution Solution?*, NEW YORK TIMES, July 30, 2006 (discussing the Chicago Climate Exchange, and also describing the reservations of some of its critics); Driesen, *supra* note 198, at 30-35 (describing the Kyoto Protocol's mechanisms for emissions trading). Because of transparency issues, some of these offset sources might not qualify as adequate mitigation under CEQA, but some organizations do provide independently-verifiable offset projects. *See infra* note 206 (describing transparency concerns about the Chicago Climate Exchange). As offset markets grow, prices may rise; costs now are low largely because there are many more prospective sellers than buyers. *See* Jason Margolis, *My Kind of Down: Chicago Climate Exchange Paves the Way for U.S. Emissions Trading*, June 14, 2005, *at* http://www.grist.org/news/maindish/2005/06/14/margolis-ccx/ (comparing carbon unit costs in Europe, where caps compel participating in trading schemes, with the substantially lower unit costs in the United States, where participation is purely optional). Nevertheless, because markets should create innovation incentives, the rise in price may not be commensurate with the rise in demand.

[215] If a project has significant environmental impacts that can feasibly be mitigated, the agency cannot proceed with the project without such mitigation in place. If, however, the project has significant adverse environmental impacts that cannot feasibly be mitigated, the agency may proceed without mitigation so long as it adopts a "statement of overriding considerations" justifying its decision. *See* City of Marina v. Bd. of Trustees of Cal. State Univ., 39 Cal. 4th 341, 368 (2006). By expanding the realm of the feasible, offsets therefore can expand mitigation obligations.

[216] *See supra* note 214 (describing offset costs).

obstructionism.[217] Others claim that they rely on a naively idealistic assumption that obligatory studies can improve environmental outcomes.[218] Even some NEPA and CEQA proponents may view the laws as instruments of project derailment rather than mechanisms for governmental improvement.[219] Those critiques for years have provoked political and academic defenses, many centering on the common-sense notion that it seems fairly reasonable to require agencies to disclose environmental consequences before their actions become set in stone,[220] and it is perhaps telling that legislative amendments never have significantly weakened CEQA or NEPA. Nevertheless, even if it represents a minority position, intense skepticism about both laws remains common.

That skepticism to some extent overlaps with common distrust of decentralized environmental law enforcement.[221] Assessment laws like CEQA and NEPA generally do not designate enforcement agencies, and instead are enforced primarily through the discretionary initiatives of professional non-profit groups, ad-hoc citizens' groups, and state or local governments. Such dispersed enforcement, though often hailed as one of environmental law's most effective innovations,[222] creates tensions with common conservative preferences for consolidating enforcement authority within the executive branch.[223] The geographic scope of climate change is likely to exacerbate those tensions, for animating many objections to environmental litigation has been a belief that grievances affecting broad swaths of society ought

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[217] *See* Congressional Task Force, *supra* note 21, at 5 ("time and again public sector entities, companies, individuals and organizations have raised issues of cost and process burdens").

[218] *See, e.g.,* Joseph L. Sax, *The (Unhappy) Truth About NEPA*, 26 OKLA. L. REV. 239, 239 (1973) ("I think the emphasis on the redemptive quality of procedural reform is about nine parts myth and one part coconut oil."); *but see* COUNCIL ON ENVTL. QUALITY, THE NATIONAL ENVIRONMENTAL POLICY ACT: A STUDY OF ITS EFFECTIVENESS AFTER TWENTY-FIVE YEARS iii (1997) ("Overall, what we found is that NEPA is a success—it has made agencies take a hard look at the potential environmental consequences of their actions, and it has brought the public into the agency decision-making process like no other statute.").

[219] *See* Karkkainen, *supra* note 21, at 339-41 (describing the perspective of a "NEPA monkey wrencher").

[220] *See, e.g.*, Adler, *supra* note 21; Bear, *supra* note 21, COUNCIL ON ENVTL. QUALITY, *supra* note 218. In a qualified defense, Professor Karkkainen argues that NEPA is less valuable as an informational device and more valuable as a deterrent against approving projects with potentially significant environmental impacts. *See* Karkkainen, *supra* note 21.

[221] *See, e.g.,* Lujan v. Defenders of Wildlife, 504 U.S. 555, 576 (1992) ("Vindicating the public interest… is the function of Congress and the Chief Executive.").

[222] *See, e.g.,* Barton Thompson, *The Continuing Innovation of Citizen Enforcement*, 2000 U. Ill. L. Rev. 185.

[223] *See* Buzbee, *supra* note 23 (describing and critiquing those preferences).

not be addressed in the courts.[224] Because CEQA is a state law, and climate change is partly a national and international problem, its application to climate change also could conflict with trends toward limiting state environmental protection authority.[225] Drawing upon those strains of skepticism, litigants already have raised many arguments against addressing climate change at any level besides the national executive branch, and at any time before the national executive branch is good and ready to act, and CEQA litigation is likely to arouse similar objections.[226]

Critics also are likely to argue that CEQA-based regulation of climate change is unnecessary, for California already has begun developing a new statutory and regulatory framework for addressing climate change—a framework that probably will in some ways become more comprehensive than CEQA.[227] Parallel arguments will arise in other jurisdictions; even where no climate change legislation exists, skeptics may argue that we should focus solely on creating it, not on trying to invoke existing law. And other regulatory programs do present advantages. While environmental assessment laws generally govern only new discretionary decisions by government agencies, statutes like AB 32 can address purely private actions and can regulate emissions that follow solely from past decisions.[228] The AB 32 program offers the potential benefits of centralized regulation, including the economies of workload and communication that generally follow from consolidating implementing responsibility within a single agency. Agencies implementing statutes like AB 32 also may have at their disposal a diversity of regulatory instruments. For example, within the few limits set by the statute and by traditional administrative law constraints, CARB can ban practices or products, order monitoring and reporting, establish markets, and generally select, apply, and enforce whatever regulatory instruments it determines will most efficiently achieve the statutory caps. Under CEQA, by contrast, each agency must perform its own studies, identify its own impacts, generate its own

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[224] *See, e.g.,* Mass. v. EPA, 415 F.3d 50, 59-60 (2005), reversed, Massachusetts v. EPA, 127 S. Ct. 1438 (2007) (Sentelle, J. concurring) ("The generalized public good that petitioners seek is the thing of legislatures and presidents, not of courts.").

[225] *See* Robert L. Glicksman, *From Cooperative to Inoperative Federalism: the Perverse Mutation of Environmental Law and Policy*, 41 WAKE FOREST L. REV. 719, 786-98 (2006).

[226] *See, e.g.,* Cent. Valley Chrysler-Jeep Inc. v. Witherspoon, 2005 U.S. Dist. LEXIS 26536, *4 (N.D. Cal. 2005) (describing arguments made in the automakers' challenge to California's regulation of automotive GHG emissions); Thomas W. Merrill, *Global Warming as a Public Nuisance*, 30 COLUM. J. ENVTL. L. 293, 319-328 (2005) (describing, and ultimately rejecting, a foreign policy pre-emption argument; EPA unsuccessfully deployed a similar argument in the *Massachusetts v. EPA* litigation. *See* 127 S. Ct. 1438, __ (2007)); Conn. v. Am. Elec. Power Co., 406 F. Supp. 2d 265 (S.D.N.Y. 2005) (dismissing a nuisance claim on political question grounds).

[227] *See supra* Part II.B.3.

[228] *See* County of Inyo v. Yorty, 32 Cal. App. 3d 795, 804-07 (1973) (considering CEQA's applicability to a change to an existing project).

avoidance or mitigation measures, and engage in its own monitoring to ensure those measures' effectiveness, and no centralized authority enforces those obligations. A skeptic might therefore ask what laws like CEQA really can add.

The answer, I argue, is quite a lot. Even statutory schemes that purport to be comprehensive—and AB 32 does not so purport—rarely turn out that way, and environmental assessment laws can help limit or compensate for the "slippage" that inevitably occurs.[229] They can adapt to new environmental problems, and their amenability to dispersed enforcement allows a breadth of coverage exceeding that achievable under a law implemented solely through the efforts of a single agency. By allowing broad flexibility in selecting mitigation measures and alternatives, environmental assessment laws can sometimes improve environmental outcomes and spur innovative management at relatively low cost. The disclosure and dialogue they sometimes[230] successfully compel can also bolster other regulatory approaches by providing regulatory agencies information and leverage points. And, of course, they can fill in where complementary approaches are non-existent; laws like AB 32 are rare. Neither CEQA nor any other environmental assessment law is a regulatory panacea; compliance does not come free, and environmental assessment laws have by no means served as perfect antidotes to poor environmental decision-making. Nevertheless, and as explained in more detail below, the potential benefits of applying environmental assessment laws to climate change are great, and at least in the context of climate change, many of the standard objections have little force.

A. The Necessity of Complementary Approaches

Individual statutes hardly ever provide comprehensive responses to environmental problems. Sometimes that is by design; legislators may attempt only a preliminary response, leaving comprehensive regulation for a later date.[231] Other gaps are inadvertent and unwanted. Understanding the scientific or economic foundations of a problem may prove difficult, for

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[229] *See* Daniel A. Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297 (1999).

[230] I would not classify myself a full-fledged "NEPA optimist," to use Professor Karkkainen's terms; based on experience as a NEPA and CEQA practitioner, I think it naïve to suppose that environmental impact studies or reports uniformly produce the kind of informed, open, pre-decisional dialogue for which NEPA proponents traditionally hope. But I also find overly cynical and not particularly accurate the suggestion that useful dialogue rarely or never occurs. In my experience, NEPA and CEQA processes often focus attention on important environmental issues, create an imperfect but real forum for dialogue, lead to beneficial project changes, some small and some major, and sometimes stop unwise projects from proceeding. *See also* Adler, *supra* note 21 (describing a moderately successful, and in my view typical, NEPA process).

[231] *See, e.g.*, Cal. Health & Safety Code §§ 38550-38551 (requiring cutbacks only to 1990 emissions levels; a long-term solution probably will require significantly greater reductions).

example, and consequent misunderstandings can lead legislators to choose ineffective or insufficiently demanding regulatory instruments.[232] Funding mechanisms may leave implementing agencies short of the resources or leverage necessary to translate statutory aspirations into actual achievement.[233] New problems may emerge, or old problems may prove more intractable than expected.[234] Executive hostility to legislative mandates may result in those mandates simply being ignored. Those problems seem to be particularly recurrent with first attempts at addressing problems; the Clean Air, Clean Water, and Endangered Species Acts all required several iterations to reach their present form, and each, though in many ways highly successful, has provided only incomplete responses to the problems it was designed to resolve.[235] As we begin drafting statutory remedies for climate change, we may learn from that history, but we probably are also somewhat doomed to repeat it.

Exclusive reliance on one implementing agency or enforcement mechanism exacerbates the potential for gaps. Our environmental laws are filled with statutory provisions whose mandates long went un- or under-enforced, and with regulatory programs that agencies have ignored or found themselves unable to implement.[236] From unmet Clean Air Act deadlines[237] to the troubled history of TMDLs[238] to the rarity of recovering endangered species,[239]

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[232] For example, the State Implementation Plan-based regulatory system set up by the Clean Air Act has widely failed to ensure compliance with air quality standards. The system assumes that planning agencies will be able to predict with accuracy what regulatory measures will achieve compliance with air quality standards, but in practice offering such accurate predictions has often proved exceedingly difficult. *See* James D. Fine and Dave Owen, *Technocracy and Democracy: Conflicts Between Models and Participation in Environmental Law and Planning*, 56 HASTINGS L.J. 901 (2005).

[233] *See, e.g.,* Center for Biological Diversity v. Kempthorne, 466 F.3d 1098, 1101 (9th Cir. 2006) (considering, and rejecting, the Fish and Wildlife Service's decision to refrain from listing a species because of an alleged funding shortage); Dave Owen, *The Disappointing History of the National Marine Sanctuaries Act,* 11 N.Y.U. Envtl. L.J. 711 (2003) (contrasting Congressional aspirations for the National Marine Sanctuaries Act with actual achievements, and attributing the discrepancies partly to funding shortages).

[234] Classic examples of this problem include unanticipated but huge increases in vehicle-miles traveled, which delayed Clean Air compliance by offsetting many of the gains from the act's technology standards. *See* Michael P. Vandenbergh, *From Smokestack to SUV: The Individual as Regulated Entity in the New Era of Environmental Law*, 57 VANDERBILT L. REV. 515, 557-59 (2004).

[235] As discussed in the following notes and cited sources, many Americans live in areas that do not meet federal air quality standards; many American rivers do not comply with water quality standards; and while few species living in the United States have gone extinct since the Endangered Species Act was enacted, many have been listed, and few have recovered enough to no longer need the ESA's protections.

[236] *See* Thompson, *supra* note 222, at 189-90 (describing compliance gaps); Farber, *supra* note 229 (same).

[237] *See, e.g.,* Richard Lazarus, *The Tragedy of Distrust in the Implementation of Federal Environmental Law*, 54 LAW AND CONTEMPORARY PROBS. 311, 324 (1991) (describing failures to achieve goals set by the Clean Air Act); Oliver Houck, *More Unfinished Stories: Lucas,* Atlanta Coalition, *and* Palila/Sweet Home, 75 U. COLO. L. REV. 331, 386-87 (2004) (same).

[238] Natural Resources Defense Council v. United States EPA, 915 F.2d 1314, 1316-17 (9th Cir. 1990) (describing the troubled early history of Congressional attempts to impose water quality standards); Oliver A.

environmental law provides numerous cautionary examples demonstrating that just because a legislative body promulgates a mandate does not mean the mandate will be fulfilled.[240] Sometimes we fall short because regulated parties use litigation to successfully resist rulemaking or enforcement.[241] Politics and budgets create similar limits; mandates like the Clean Water Act's pollutant discharge prohibitions have sometimes been enforced primarily by private organizations.[242] Scientific uncertainties can create enforcement problems, as agencies struggle to assign responsibility and overcome burdens of proof. Consequently, when we confront any environmental problem, and particularly one with which we have little prior regulatory experience, it is naïve at best and cynical at worst to suggest that all our eggs can safely go in one enforcement basket.

Similar gaps could easily emerge—and may already be emerging[243]—in the processes of implementing legislative responses to climate change. California's AB 32, for example, though a landmark law, does not purport to offer a complete response. Full compliance with the statute would reduce California's GHG emissions only to 1990 levels, but even in 1990 California's emission levels were unsustainable.[244] Consistent with that limited goal, the statute expressly declines to occupy the regulatory field.[245]

Houck, *TMDLs, Are We There Yet?: The Long Road Toward Water Quality-Based Regulation Under the Clean Water Act*, 27 ENVTL. L. REP. 10,391, 10,401 (1997) (describing later failures to implement the Clean Water Act's program for achieving compliance with water quality standards)

[239] Federico Cheever, *The Road to Recovery: A New Way of Thinking About the Endangered Species Act*, 23 ECOLOGY L.Q. 1 (1996) (describing the failure of the Endangered Species Act to promote species recovery, despite statutory provisions ostensibly designed to achieve that goal)

[240] *See* Farber, *supra* note 229, at 299 (describing "slippage" as "a feature of environmental law so ubiquitous that we take it for granted").

[241] *See, e.g.*, Thomas O. McGarity, *The Courts and the Ossification of Rulemaking: A Response to Professor Seidenfeld*, 75 TEX. L. REV. 525 (1997) (arguing that implementing rules are blocked with excessive frequency).

[242] *See* Thompson, *supra* note 222, at 199-200 (describing water quality enforcement efforts by the Natural Resources Defense Council and others); Seidenfeld and Nugent, *supra* note 23, at 285.

[243] *See Arnie's Uphill Climb, supra* note 101 (describing California's struggles to implement its climate change legislation).

[244] *See* MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at I-4; Executive Order S-3-05, *supra* note 83; Wigley, *supra* note 173, at 2285.

[245] Cal. Health and Safety Code §§ 38592(a) ("All state agencies shall consider and implement strategies to reduce their greenhouse gas emissions."), 38592(b) ("Nothing in this division shall relieve any person, entity, or public agency of compliance with other applicable federal, state, or local laws or regulations, including state air and water quality requirements, and other requirements for protecting public health or the environment."), 38598 ("Nothing in this division shall limit the existing authority of a state entity to adopt and implement greenhouse gas emissions reduction measures. [] Nothing in this division shall relieve any state entity of its legal obligations to comply with existing law or regulation.").

Nor should full compliance, whether with AB 32 or with any other climate change statute, be assumed. CARB, the agency charged with implementing AB 32, has a poor record of attaining compliance with state or federal standards for other air pollutants.[246] CARB's regulatory program may leave GHG sources unaddressed, whether because CARB finds those sources too inconvenient, politically or practically, to regulate, or because shies away from regulating sources outside its areas of traditional expertise.[247] CARB may underestimate the degree of controls necessary to achieve the statutory goal, or the likelihood of achieving compliance levels sufficient to achieve those goals.[248] Enforcement likewise could prove problematic, particularly if budgetary, legal, or political constraints delay CARB's ability to promulgate a regulatory program.[249] None of these predictions assume any bad faith in CARB's implementation, but the unfortunate reality is that first statutory attempts at addressing major problems, though indispensable, often fall short of achieving statutory goals, and the need for complementary approaches usually remains.

B. The Functional Advantages of Environmental Assessment Laws

For several reasons, and in several ways, CEQA can provide an important complementary approach, and its breadth of coverage and amenability to flexible compliance can facilitate effectiveness where other regulatory approaches fall short.

1. Breadth of Coverage

Unlike traditional centralized regulatory approaches, which typically focus on a specific set of defined problems—pollution that flows from a point source, for example, or a certain subset of pollutants—CEQA's scope is broad: it addresses threats to "the environment."[250] That breadth of coverage allows adaptation to unanticipated environmental threats and reduces the risk of interstitial coverage gaps, for CEQA renders unnecessary debates about whether a

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[246] *See* OUR CHANGING CLIMATE, *supra* note 3, at 5 (describing California's present air quality problems).

[247] For example, AB 32 implies that the State Board should focus primarily on a subset of sources, *see* Cal. Health & Safety Code §§ 38530(b)(1), and for reasons of practicality and administrative efficiency the agency is likely to follow that directive. That means, however, that many smaller or more diffuse sources may escape regulation under AB 32, at least immediately and perhaps indefinitely, even though the aggregate effect of those smaller sources could be quite large.

[248] *See* Farber, *supra* note 229, at 315-16 (noting that standards may be set based on erroneous assumptions of full compliance).

[249] *See* Thompson, *supra* note 222, at 190-92 (describing the challenges agencies face in monitoring compliance).

[250] *E.g.* Cal. Pub. Res. Code §§ 21001(g), 21002, 21002.1.

particular type of environmental threat falls within the statutory scope.[251] It likewise avoids questions, much like those underlying the recent *Massachusetts v. EPA* litigation, about whether old statutes address new problems;[252] if the problem is environmental, CEQA applies. That broad applicability can be invaluable in addressing a problem like climate change, which derives from the contributions of a diverse set of sources, not all of which CARB is likely to find the authority, political capital, or financial resources to regulate. CEQA, in short, can catch emissions that other regulatory programs would likely miss.

CEQA's traditional amenability to dispersed enforcement also provides a valuable backstop. CARB will likely face the same financial and human resource limitations that have left other regulatory agencies, including EPA, so heavily dependent upon citizen suits.[253] Enforcement personnel may be few and may know little about most of the thousands of emissions-causing decisions around the state; budgets will be limited; and CARB may find it has limited political capital to invest in enforcement actions likely to provoke vociferous opposition. CEQA can ease that burden by requiring other agencies to avoid GHG emissions without any initial direction or rulemaking from CARB.[254] CARB also can use CEQA to complement its own enforcement efforts. CEQA processes can provide valuable information about emissions-causing decisions, and a CARB or EPA comment letter identifying deficiencies in an EIR's climate change discussion could quickly spur compliance. The credibility of such agency comment coupled with the threat of private enforcement creates a potent incentive.[255] And with

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[251] Such questions are ubiquitous in environmental litigation, and cases often turn not on whether a proposed action poses an environmental threat but rather whether the threat is addressed by the particular statutory provisions at issue. *See, e.g.*, Sierra Club v. Abston Construction Co., 620 F.2d 41 (5th Cir. 1980) (considering whether runoff qualified as a "point source" discharge subject to the Clean Water Act, with no suggestion that the point source determination would reflect the presence or absence of environmental harm). Likewise, some chemicals fall outside existing regulatory regimes not because they aren't harmful, but because no rule yet addresses the threat they pose. Environmental assessment laws generate their own threshold debates as well, of course; most commonly, the key threshold question is whether sufficient discretion exists to trigger the laws' remaining requirements. *E.g.* DOT v. Pub. Citizen, 541 U.S. 752, 756 (2004). But those laws at least reach broadly enough to address any form of environmental threat.

[252] 127 S. Ct. 1438 (2007). The merits turned on the question, answered in the negative by the D.C. Circuit but in the affirmative by the Supreme Court, whether CO_2 is a "pollutant" subject to the Clean Air Act, not on whether CO_2 emissions are a cause of environmental damage.

[253] *See* Thompson, *supra* note 222, at 190-92 (describing those limitations).

[254] *See* Cal. Pub. Res. Code § 21006 ("The Legislature finds and declares that this division is an integral part of any public agency's decisionmaking process…").

[255] *See* Michael C. Blumm and Lawrence R. Brown, *Pluralism and the Environment: The Role of Comment Agencies in NEPA Litigation*, 14 HARV. ENVTL. L. REV. 277 (1990); Adler, *supra* note 21, at 303-05 (describing EPA's participation in a NEPA process).

or without such agency participation, many projects will proceed under the watchful eye of community groups willing to independently use the CEQA process.

CEQA's age also provides advantages. Until CARB drafts and implements its regulatory program, no one will know how effective it will be, but past experience strongly suggests that it will produce mixed results, with areas of substantial progress but also significant glitches and gaps. Some key provisions may turn out to be difficult to enforce, and others may be ignored until CARB or non-governmental organizations establish a credible enforcement threat.[256] CEQA, by contrast, has existed for decades. State and local agencies know its requirements; environmental groups, state and local agencies, and the attorney general's office all have experience enforcing it; and courts are familiar with CEQA litigation and seem to evince a basic understanding of the statute's purposes and goals.[257] It is by no means a perfect tool for compelling environmental compliance—between litigation costs and deferential standards of review, the odds generally favor an agency even where non-compliance exists[258]—but it is at least a familiar one capable of producing immediate results.

None of the foregoing suggests that environmental assessment laws provide catch-all mechanisms for environmental protection. Other regulatory approaches can respond to some threats—particularly those deriving from completed projects—that environmental assessment

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[256] *See supra* notes 231-242 and accompanying text.

[257] That understanding is evinced in too many decisions to cite, but one of the more strongly-worded passages derives from *Citizens for Local Environmental Control v. City of Bakersfield*, 124 Cal. App. 4th 1184, 1220 (2004):

> When our morning commutes are marred by the sight of numerous vacant or half-vacant strip malls adorned with graffiti and weeds, when we hesitate to move into an established neighborhood because of the absence of close and convenient shopping and when it hurts to take a deep breath on hot August afternoons because of the poor air quality, the importance of thorough environmental analysis and complete disclosure before new projects are approved is all too evident.

[258] While critiques of dispersed enforcement often seem premised upon the notion that plaintiffs need only show up in court to stop a project, as though judges hand out injunctions as readily as dentists provide toothbrushes, plaintiffs actually must take the risk of funding litigation—generally no small task for a non-profit group facing a government agency or private developer—and then overcome both procedural objections and deferential review to show that the defendant agency clearly did violate established law. *See* Buzbee, *supra* note 23, at 203 ("Citizen litigants cannot even begin a case, let alone win it, unless their preferences comport with several layers of political judgments that are part of duly enacted statutory law..."); Cal. Pub. Res. Code § 21168.5 (judicial review "shall extend only to whether there was a prejudicial abuse of discretion"); Laurel Heights Improvement Ass'n v. Regents of University of California, 47 Cal. 3d 376, 393 (1987) (describing the deferential standards of review for CEQA cases). To actually obtain injunctive relief, the violation generally also must have been prejudicial. Cal. Pub. Res. Code § 21005(b) (directing courts to "continue to follow the established principle that there is no presumption that error is prejudicial"). Projects generally are enjoined, in other words, only when the approval process was fairly obviously illegal and a plaintiff had the money, determination, and persistence to do something about it, not just because a plaintiff woke up feeling litigious.

laws do not redress, and major emission reductions cannot possibly occur if those sources are ignored. Many advantages follow from utilizing the centralized expertise and regulatory culture of a single implementing agency, rather than depending on the labors of many dispersed decision-makers, some of which have little expertise in or commitment to environmental protection. The downside of dispersed enforcement can be uneven enforcement, with lawsuits reflecting parochial concerns rather than a coherent regulatory agenda. For all of these reasons, laws like CEQA do not obviate the need for laws like AB 32. But imperfection is the hallmark of environmental protection laws, and so long as we cannot create comprehensive statutory responses, reliance on complementary approaches will be indispensable to efforts to resolve any substantial environmental problem. As role players, if not the stars, in the game of environmental protection, environmental assessment laws like CEQA can add essential complements to a regulatory portfolio.

2. The Feasibility and Flexibility of Compliance

Broad applicability and ready enforcement of a law are of little benefit, of course, if the law is not effective, or if the burdens it imposes dwarf the benefits it produces. Some commentators have leveled just such a critique at environmental disclosure laws like CEQA, claiming that the information they produce is largely irrelevant to actual decisions, and that the costs of preparing environmental studies do not justify the meager benefits produced.[259] Neither critique applies particularly well to CEQA-based regulation of climate change contributions, however, for the benefits are important, and the burdens, though real, can be surprisingly small.[260]

a. Benefits

Most importantly, applying CEQA to climate change should limit GHG emissions. CEQA's procedural incentives should discourage projects with large emissions and encourage reformulation of lower-emissions projects, for procedural compliance will be easier if lead agencies neutralize their GHG emissions.[261] Similarly, CEQA's substantive mandate should ensure that even if agencies do not limit emissions at the beginning of their processes, they are

[259] *E.g.* Sax, *supra* note 218, at 239 (offering the irrelevance critique, which Professor Sax later to some extent reassessed); CONGRESSIONAL TASK FORCE, *supra* note 21, at 5 (summarizing the cost critique).

[260] What follows is not a quantitative cost-benefit analysis, which would be exceedingly difficult for even a brilliant economist (which I am not) to produce. It instead is a qualitative discussion of the likely benefits and burdens. But even that qualitative discussion should be sufficient to allow useful comparisons.

[261] *See infra* notes 269-271 and accompanying text.

compelled to do so as a condition of project approval. While the consequent limitations will not eliminate California's contributions to climate change, and will not address emissions from other states or countries, even imposing incremental limits upon a problem of such massive scale can create a significant aggregate benefit. A miniscule-percentage change in the risk of extreme weather events, for example, can represent a significant number of lives saved when one considers that the risk of such events is borne by billions of people throughout the world.[262] Moreover, while we cannot simply presume that incremental actions in places like California will spur complete resolution of climate change problems—California's actions create few constraints elsewhere[263]—those local efforts can test policy strategies, spur the development of mitigation technologies, and defuse the common moral argument that until the U.S. reduces its emissions, other nations have no obligation to reduce theirs.

CEQA also can improve the equity of other regulatory approaches. Environmental regulation often creates thorny fairness questions, particularly where a small subset of contributors to a problem is asked to bear the lion's share of regulatory burdens.[264] Those fairness concerns could be acute if regulation is left solely to CARB, which may have the political will or institutional capacity to impose reduction upon only a subset of sources while giving other new sources a free ride. Because emissions-reduction mandates create a zero-sum game, every new source created by a non-regulated project will either push California further from achieving its reduction targets or require greater sacrifices by those who fall under the AB 32 regulatory program, and regulated groups that might chafe at such differential treatment ought to appreciate the more inclusive approach allowed by CEQA.[265] Some unevenness in the

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[262] Impact is generally a product of the change in risk and the extent of exposure. Suppose a hypothetical project creates a risk increase of 1 additional death per billion people per year, but the increased risk is felt among six billion people worldwide. While that risk might seem negligible if it impacted only one hundred people, worldwide it would likely cause an additional six deaths per year, an adverse outcome that might vastly outweigh the benefits from the project.

[263] To posit a possible causal relationship is not implausible, however. California's actions and innovations could help spur federal responses, and many commentators believe no broadly-inclusive response will occur so long as American inertia provides a rhetorical justification for inaction elsewhere. *See Everybody's Green Now*, THE ECONOMIST, June 2nd-8th 2007, special report at 6 ("If America continues to refuse to control its carbon dioxide emissions at the federal level, there is no chance that countries such as China and India, whose emissions will soon overtake America's, will control theirs.").

[264] *See* Carol M. Rose, *The Story of* Lucas*: Environmental Land Use Regulation Between Developers and the Deep Blue Sea*, in ENVIRONMENTAL LAW STORIES, *supra* note 23, at 239.

[265] Those regulated by CEQA might see a different sort of unfairness: why, they might ask, should their development be subject to a no-net-emissions requirement, when the ten-year-old development down the street faced no such obligation? The availability of offsets should somewhat mitigate that complaint, for grandfathered sources then become potential sellers. But ultimately, the disparity arises from a reality fairly common in environmental

distribution of regulatory burdens is of course inherent in almost any governmental action, and achieving perfect fairness in climate change regulation will be impossible. But by broadening the scope of responsibility, CEQA can at least reduce the consequent "why-me?" moments,[266] when regulated parties claim they bear a disproportionate share of regulatory burdens.

Compliance with CEQA's mandates also can generate other significant collateral benefits. Limiting GHG emissions can spur development of mitigation technologies, and those incentives in turn may boost California's economy by turning the state into an incubator for green research and development.[267] Should California then export those technologies, the state may doubly benefit, first from the economic benefits of its exports and again from consequent reductions in GHG emissions elsewhere. Secondary economic and environmental benefits also may follow from measures to limit GHG emissions, for such measures often promote efficiency and incidentally mitigate other potential environmental harms. Reduced energy consumption, for example, saves money. Minimizing automobile use can lower traffic, noise, and other pollutant emissions; reducing water consumption can leave more water in rivers, streams, and aquifers.[268] Though the primary benefit of emissions limitations almost always will be the consequent reduction in climate change, the collateral bonuses can also be significant.

2. Burdens

Though few people dispute the value of some environmental protection, the most common critique of environmental assessment laws alleges that compliance requires time and expense disproportionate to any benefits received. Such critiques are likely to be particularly prevalent where environmental assessment laws apply to climate change; why, critics will ask, should we go through all the procedural hassle of EIR preparation, let alone the financial cost of installing mitigation systems, to address GHG sources that contribute only fractions of a

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law: activities initiated before awareness of a problem often get more favorable treatment than activities initiated after the problem was widely perceived.

[266] *See id.* at 260-61. I don't suggest that focused GHG emissions regulation would be likely to effect a taking, but instead that it might offend the fairness instincts that also motivate many takings claims.

[267] *See* CAL. ENVTL. PROT. AGENCY, *supra* note 3, at 65.

[268] In fact, some of the potential collateral benefits are sufficiently great that environmental justice advocates have warned of the potential unfairness if emissions trading regimes concentrate GHG-reduction efforts disproportionately in wealthy areas, while leaving low-income communities unable to reap the beneficial consequences of localized GHG reduction. Not all emissions-limitation strategies create win-win outcomes for the environment, however; nuclear power development, for example, threatens significant adverse consequences. *See* Nuclear Energy Inst. v. Envtl. Prot. Agency, 373 F.3d 1251, 1257 (D.C. Cir. 2004).

percentage of the worldwide output? In practice, however, those compliance burdens need not be nearly so high as some critiques of environmental disclosure laws might suggest.

In most circumstances, proactive mitigation can minimize procedural compliance costs. An agency must prepare a full EIR only if its project may have significant adverse environmental impacts, and by committing at the outset to full mitigation of any potentially significant impact, the lead agency can instead proceed on the basis of a "mitigated negative declaration," thus avoiding the expense and delay of EIR preparation.[269] The agency still must do some procedural work—it must prepare an "initial study," and a "mitigated negative declaration", and in order to mitigate its GHG emissions, it must calculate what those emissions will be—but the obligations are significantly less intensive than those involved in preparing a full-scale EIR.[270] Consequently, for most CEQA projects, and for an overwhelming majority of NEPA projects, lead agencies take exactly that course in addressing other environmental impacts.[271] By adopting all feasible on-site mitigation techniques and offsetting any potential impacts that remain—something agencies will probably be obligated to do anyway at the end of the CEQA compliance process—agencies therefore can ensure that potential climate change contributions never serve as the source of an obligation to prepare an EIR.

Even where agencies do prepare EIRs, a discussion of climate change contributions usually should add only moderately to the resulting expense. Tools already are available online for calculating carbon footprints,[272] and lead agencies also can piggyback their GHG emissions calculations on work they already must do to calculate energy consumption,[273] traffic generation, and emissions of other air pollutants.[274] Some projects will require more than a ready-for-download analytical method, and some emissions contributions may remain difficult to calculate

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[269] *See* 14 Cal. Code Regs. § 15369.5.

[270] *See* Cal. Pub. Res. Code § 21081.6.

[271] *See* Karkkainen, *supra* note 111, at 932-37.

[272] *See, e.g.,* California Climate Action Registry, Protocols, *at* http://www.climateregistry.org/PROTOCOLS/ (last checked June 12, 2007) (providing links to protocols for assessing emissions);

[273] *See* CEQA Guidelines App. F, *available at* http://www.ceres.ca.gov/topic/env_law/ceqa/guidelines/Appendix_F.html (last checked June 11, 2007).

[274] The same fossil fuel combustion activities responsible for most of California's GHG emissions also emit conventional pollutants like nitrogen dioxide, particulate matter, and volatile organic compounds, and projects in non-attainment areas—which include most of California—generally must address those emissions as part of EIR preparation. *See, e.g.,* Kings County Farm Bureau v. City of Hanford, 221 Cal. App. 3d 692, 718-24 (1990) (addressing an EIR's discussion of pollutant emissions).

precisely,[275] but as climate change regulation becomes more widespread, and as carbon markets develop, the availability and sophistication of emissions-assessment tools should only increase.[276] Likewise, discussions of the aggregate effects of GHG emissions could be essentially boilerplate; every GHG-emitting project ultimately contributes to the same set of cumulative impacts, and those impacts are amply described in a large and growing set of reports, many written to be accessible to lay audiences, readily available on the internet.[277]

Actual physical avoidance of GHG emissions isn't cost-free, but CEQA's substantive mandate comports with what many environmental law scholars have described as a model method for efficiently achieving environmental protection. Since the 1970s, many legal and economic scholars have blasted technology-based, "command-and-control" environmental laws as inefficient and undemocratic, arguing that environmental laws instead should define performance standards and allow regulated parties flexibility, including access to emissions-trading systems, in achieving those standards.[278] Environmental markets, they argued, and a willingness to allow diverse compliance mechanisms would create innovation incentives, allow lower-cost allocations of regulatory burdens, and focus government attention on more fundamental questions about goals and allowable pollutant levels rather than individual process technologies.[279] Those critiques have been controversial, with other scholars arguing that a traditional approach was reasonably functional, that actual practice bore little correspondence to system described in the reformers' critique,[280] or that the promise of markets is often exaggerated.[281] Nevertheless, a restrained version of the reformers' core argument—that a legal regime establishing mandatory goals but allowing flexible compliance mechanisms, including some trading of obligations, can at least sometimes improve efficiency and promote

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[275] For example, calculating how land use changes will affect emissions may create some tricky causality questions, and views may differ on the extent to which emissions can be attributed to specific projects rather than background trends.

[276] *See* Cal. Health & Safety Code § 38530 (providing for emissions inventorying and monitoring).

[277] *See, e.g.,* IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 3; OUR CHANGING CLIMATE, *supra* note 3; CAL. ENVTL. PROT. AGENCY, *supra* note 3.

[278] *See, e.g.,* Bruce A. Ackerman and Richard B. Stewart, *Reforming Environmental Law*, 37 STANFORD L. REV. 1333 (1985); Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUMBIA J. ENVTL. L. 171 (1988). The Ackerman and Stewart articles are part of a huge body of similar scholarship.

[279] *See id.*

[280] *See* Farber, *supra* note 229, at 316.

[281] *See, e.g.,* Howard Latin, *Ideal versus Real Regulatory Efficiency: Implementation of Uniform Standards and 'Fine-tuning' Regulatory Reforms*, 37 STAN. L. REV. 1267 (1985); *see also* Salzman and Ruhl, *supra* note 200 (analyzing factors affecting the effectiveness of environmental trading systems).

innovation—seems intuitive, has some empirical support,[282] often enjoys political support from parties and people who otherwise might be hostile to regulation, and has been highly influential in the development of climate change regulatory methodologies.[283]

Though its enactment preceded the post-command-and-control scholarship, CEQA's substantive mandate establishes a regulatory methodology in some ways quite similar to what those reformers advocated. It defines a functional standard for substantive outcomes: projects shall not cause significant environmental impacts if those impacts are feasibly avoidable.[284] Other than mandating that mitigation commitments be verifiable and enforceable,[285] however, it establishes few constraints on the methods agencies use to achieve those goals. Re-designing projects, using any kind of on-site mitigation, or using any kind of off-site mitigation all are fine, and technology controls, market mechanisms, or other economic incentives all are acceptable; the agency just has to show that its chosen mechanism will work. Many would argue that CEQA allows too much flexibility; rarely is it easy to monitor whether mitigation actually is working,[286] and projects therefore may slide through the CEQA process based on credible but ultimately inaccurate assurances that mitigation programs will succeed.[287] But if stakeholders and courts remain alert to the reality that real mitigation requires effective monitoring and enforcement structures,[288] CEQA should allow creativity in selecting or developing cost-effective mitigation techniques—without associated reductions in protection. Such flexibility cannot eliminate costs, of course, but it can reduce them.

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[282] The most often-cited example of a successful market-based approach to environmental regulation is the acid rain program enacted as part of the 1990 Clean Air Act amendments. *See, e.g.,* Salzman and Ruhl, *supra* note 200, at 621.

[283] *E.g.* Salzman and Ruhl, *supra* note 200 (describing increasing utilization of trading regimes); MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, at ES-5 ("Emission offsets provide an opportunity for cost-savings and economic development, and thus should be included under conditions that reduce the prospects for fictional emissions reductions and inefficient revenue transfers.").

[284] *See* Cal. Pub. Res. Code § 21081.

[285] *See* City of Marina v. Board of Trustees of California State University, 39 Cal. 4th 341, 365 (2006).

[286] CEQA requires agencies to develop programs to monitor the effectiveness of any mitigation measures used to support a mitigated negative declaration, and requires that those measures be "fully enforceable." *See* Cal. Pub. Res. Code § 21081.6. Nevertheless, attention to compliance with mitigation measures may be significantly less than attention to initial decisions, and mitigation conditions may be modified or deleted if an agency finds them "impracticable or unworkable." Lincoln Place Tenants Assn. v. City of Los Angeles, 130 Cal. App. 4th 1491, 1508 (2005).

[287] *See* Karkkainen, *supra* note 111, at 908 (identifying this threat with mitigated FONSIs, which are the NEPA equivalent of mitigated negative declarations).

[288] *See* Cal. Pub. Res. Code § 21081.6; *e.g.* Lincoln Place Tenants Assn., 130 Cal. App. 4th at 1507-10 (finding illegal a city's failure to comply with earlier mitigation measures).

That flexibility also can turn CEQA into an engine for innovation. By requiring many agencies to comply but allowing compliance in many different ways, CEQA creates incentives to develop and sell innovative GHG-mitigation techniques or technologies. It therefore can spur renewable-energy and green-development businesses, potentially creating stronger domestic markets for greenhouse mitigation products.[289] As climate regulation progresses elsewhere, those technologies could profitably be marketed beyond the state's borders.[290] Such markets could aid California in multiple ways—first, by boosting in-state businesses, and second, by facilitating emissions limitations elsewhere, with the ultimate result being a reduction in the scale of the global problem.

[289] *See supra* notes 80-83 and accompanying text (describing studies asserting that climate change regulation will substantially benefit the California economy).

[290] *See id.*

C. The Logic of Non-Exclusive Local Control

The other likely set of objections to CEQA-based climate change regulation concerns not the burdens or benefits of environmental assessment laws, but rather the efficacy or even constitutionality of addressing a global problem partly through localized legal regimes. Local agencies, skeptics may suggest, have neither the authority nor the competence to address a problem with so many international dimensions, and response efforts ought to come from the federal or even international level. In its most extreme version, the argument suggests that local regulation will make climate change worse: by regulating internally, California might reduce the federal government's bargaining chips in international negotiations.[291] In various forms, such theories have frequently been tested in climate change litigation, and those tests are likely to continue.[292] Nevertheless, those critiques also wither under close examination, for CEQA asks local agencies only to analyze and address the consequences of their own actions, a task that exceeds neither local authority nor local competence.

While climate change is global, and climate change regulation does have international dimensions, CEQA's provisions fall well within the state's traditional regulatory power. CEQA governs only actions taken within California. Neither the statutory text nor any reported judicial decision even purports to apply CEQA to decisions made or actions taken beyond the state's borders. Moreover, the triggers for CEQA's applicability—discretionary decisions by state and local government agencies—further preclude charges of usurpation of other authority.[293] Absent directly contrary federal authority, states clearly can control the actions of their own political subdivisions, and federal jurisprudence has generally protected that prerogative.[294]

The fact that within-state CEQA enforcement will limit cross-border benefits provides no reason for limiting that authority. Local actions clearly do have consequences outside California, and those consequences in part explain the significance of GHG emissions and the importance of

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[291] *See, e.g.*, Massachusetts v. EPA, Oral Argument Transcript, Nov. 26, 2006, at p. 50 lines 4-7 (question from Justice Scalia) ("If we have done everything we can to reduce CO2, you know, what deal do we make with foreign nations? What incentive do they have to go along with us?").

[292] *See, e.g.*, Cent. Valley Chrysler-Jeep Inc. v. Witherspoon, 2005 U.S. Dist. LEXIS 26536, *4 (N.D. Cal. 2005) (describing arguments made in the automakers' challenge to California's regulation of automotive GHG emissions); Conn. v. Am. Elec. Power Co., 406 F. Supp. 2d 265 (S.D.N.Y. 2005) (dismissing a nuisance claim on political question grounds); Mass. v. Envtl. Prot. Agency, 127 S.Ct. 1438 (2007) (rejecting standing arguments and arguments that presidential foreign policy powers allowed EPA to avoid regulating GHG emissions); Friends of the Earth v. Watson, 2005 U.S. Dist. Lexis 42355 (N.D. Cal. 2005) (rejecting a challenge to the plaintiffs' standing).

[293] *See* Cal. Pub. Res. Code § 21000(g), 21002, 21002.1 (directing CEQA's mandates at the conduct of state and local agencies).

[294] *See, e.g.*, New York v. United States, 505 U.S. 144 (1992).

addressing them.[295] Nevertheless, a state law with cross-border impacts is not at all unprecedented; many air or water pollution control rules benefit downwind or downstream jurisdictions. Nor are such rules unfair or politically suspect; while legal doctrines like the dormant commerce clause protect against state actions that unfairly protect in-state interests at others' expense, there is little reason to fear state laws that impose in-state obligations and create out-of-state benefits.[296] Such laws simply require acting as a good neighbor.

Nor does CEQA's applicability to climate change threaten to improperly interject state or local agencies into international affairs. As a legal matter, state action does not usurp foreign policy powers; traditional local regulation of local decisions also does not constrain the ability of the federal government or of other nations to act on a broader scale. As a practical matter, state-based climate change regulation obviously does have some international effects—that is partly the point—but the mere existence of such effects does not imply any improper intrusion into foreign policy. Almost any state law could conceivably have some international effect, and few would suggest that states should forfeit their police powers any time exercising those powers might have a negative effect on trade, immigration, or some other subject of international discussion.[297] The effects of such efforts also are unlikely to be negative. California's efforts may help persuade China or India to respond, for technological innovations may help lower costs elsewhere, or may blunt arguments that America is in no moral position to ask other countries to act.[298]

Though the ultimate problem is in some ways global, the analyses required by CEQA also fall within the traditional realm of local agencies. Those agencies are generally capable—though they can probably often benefit from assistance and comment from agencies expert in air quality management[299]—of predicting the quantity of GHGs their own projects could emit, and of devising feasible methods for avoiding such emissions. They are likely to be more familiar

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[295] *See* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4 (explaining those effects, and how they come about).

[296] *See, e.g.,* Philadelphia v. New Jersey, 437 U.S. 617 (1978).

[297] *See generally* Merrill, *supra* note 226, at 328 (discussing federal nuisance claims: "A suit brought by legal officers of American States against American defendants under a cause of action based on American common law in not pre-empted just because a favorable outcome in the action might have reverberations or ramifications for the conduct of American foreign policy.").

[298] *See* THE ECONOMIST, *supra* note 266, at 6 (asserting that China will do nothing significant if the U.S. does not act first).

[299] *See supra* note 255 and accompanying text (discussing the ability of expert agencies to influence CEQA and NEPA processes by submitting comments).

with those projects than any other governmental entity, and are traditionally responsible for predicting the traffic patterns, energy consumption, and other consequences that follow from their planning decisions.[300] Discerning that those local contributions will exacerbate the larger problem, and discussing the scope of that larger problem, is similarly straightforward, and requires only downloading and reading any one of an increasing number of reports prepared for policy-making audiences.[301] The expression "think globally, act locally" may be one of environmentalism's biggest clichés, but with climate change regulation, it is sometimes a reasonable and feasible approach.

V. CONCLUSION

In coming years, local, state, and national governments will likely take many steps to regulate GHG emissions and reduce climate change. Those actions are indispensable; addressing this challenge requires new legal regimes and regulatory approaches. But existing law also can help. The core principles of CEQA already require California's public agencies to evaluate and take steps toward addressing climate change. Compliance with those mandates can help move the state—and, through imitation, the nation and the world—toward resolving one of the most pressing environmental problems of our era.

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[300] *See supra* note 178 (discussing available tools for calculating GHG emissions).

[301] *E.g.* IPCC, THE PHYSICAL SCIENCE BASIS, *supra* note 4; OUR CHANGING CLIMATE, *supra* note 3; MANAGING GREENHOUSE GAS EMISSIONS, *supra* note 27, PEW CENTER FOR GLOBAL CLIMATE CHANGE, *supra* note 26.

P U B L I C N O T I C E

NOTICE OF CONSIDERATION BY THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY OF FINAL PROGRAM ENVIRONMENTAL IMPACT REPORT & ENVIRONMENTAL IMPACT STATEMENT (EIR/EIS) FOR A PROPOSED BAY AREA TO CENTRAL VALLEY HIGH-SPEED TRAIN

The California High-Speed Rail Authority (Authority), jointly with the Federal Railroad Administration (FRA), has completed a Final Program EIR/EIS for the San Francisco Bay Area to Central Valley region that responds to comments received on the Draft Program EIR/EIS and considers, describes, and summarizes the environmental impacts—at a programmatic level of analysis—of the proposed HST system within the broad corridor between and including the Altamont Pass and Pacheco Pass. The Authority and the FRA have identified the Pacheco Pass serving San Francisco and San Jose termini as the preferred HST Network Alternative, as well as mitigation strategies, design practices, and further measures to guide the system's development and avoid and minimize potential adverse environmental impacts. Should the proposed HST system be advanced within the Bay Area to Central Valley region, subsequent project level environmental review would consider site-specific environmental impacts.

On May 30, 2008, the Final Program EIR/EIS was made available to the public and public agencies in accordance with the California Environmental Quality Act and the National Environmental Policy Act prior to the Authority's and FRA's decisions at the conclusion of this program-level environmental review. At an Authority public Board Meeting to be held in San Francisco at the Judicial Council Conference Center - Auditorium (Hiram W. Johnson State Building) at 455 Golden Gate Avenue on July 8, 2008, starting at 1:00 p.m., the Board will receive comment on the Final Program EIR/EIS. On July 9, starting at 10:00 a.m. at the Judicial Council Conference Center - Auditorium, the Authority Board will receive a staff report and will consider certifying the Final Program EIR/EIS and adopting decision documents. The FRA may also issue a Record of Decision in the near future on the EIR/EIS.

The Final Program EIR/EIS (including an Addendum/Errata), a Staff Report, draft Resolution, draft CEQA Findings and a Statement of Overriding Considerations, and a draft Mitigation Monitoring and Reporting Program are all available on the Authority's web site [www.cahighspeedrail.ca.gov]. The Addendum/Errata has been issued to update the discussion of air quality and energy benefits associated with the HST alternative as presented in the Final Program EIR/EIS. Also visit the web site to view the Board Meeting agenda, request a CD-ROM of the Final Program EIR/EIS, and locate a library near you to review a copy of the Final Program EIR/EIS. Printed copies of the Final Program EIR/EIS have been placed in main public libraries in the following cities: Fremont, Gilroy, Livermore, Merced, Modesto, Mountain View, Oakland, Palo Alto, Pleasanton, Sacramento, San Francisco, San Jose, Stockton, and Tracy. Please call the Authority, (916) 324-1541, or check the Authority Web Site [www.cahighspeedrail.ca.gov] for more information.

The Authority does not discriminate on the basis of disability and, upon request, will provide reasonable accommodation to ensure equal access to its programs, services, and activities.
