

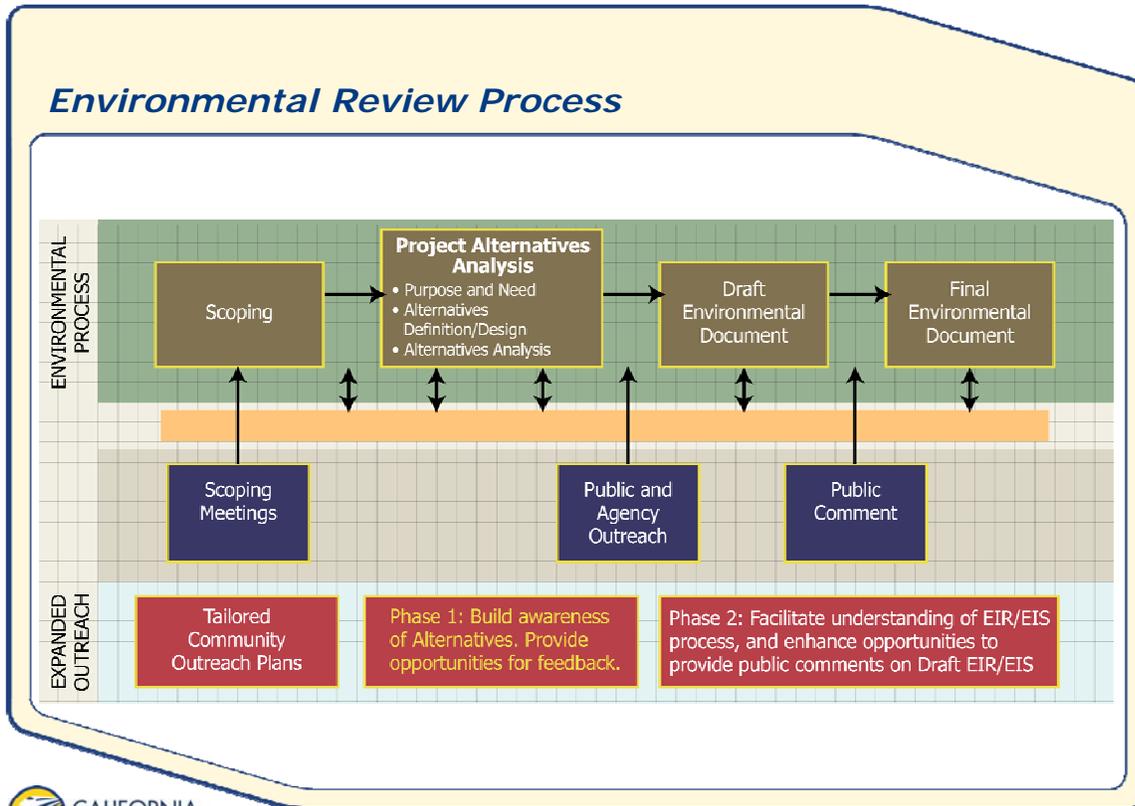
CALIFORNIA'S HIGH-SPEED RAIL SYSTEM

Merced to Fresno Section

**NEPA/404 Checkpoint B
Presentation**

April 2011

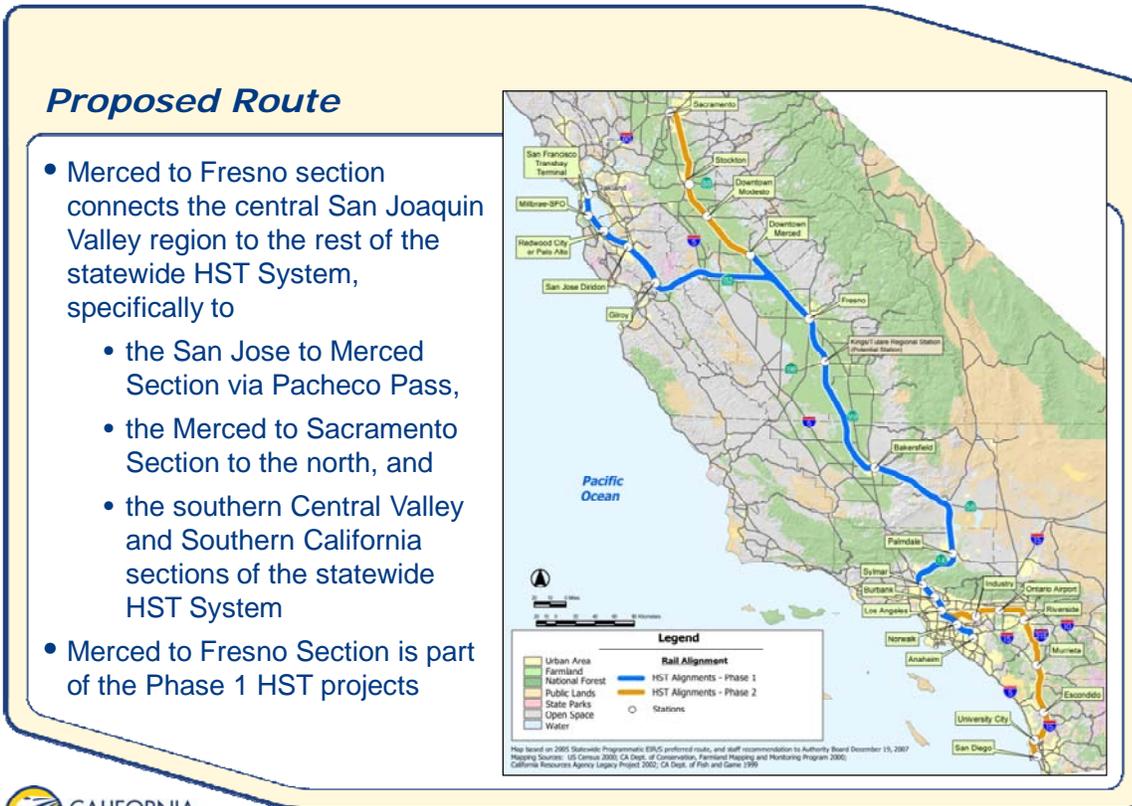




As required for any large federally funded process, the California High-Speed Train (HST) Project has started the NEPA and CEQA environmental process. The initial steps include the scoping and the project alternatives analysis process.

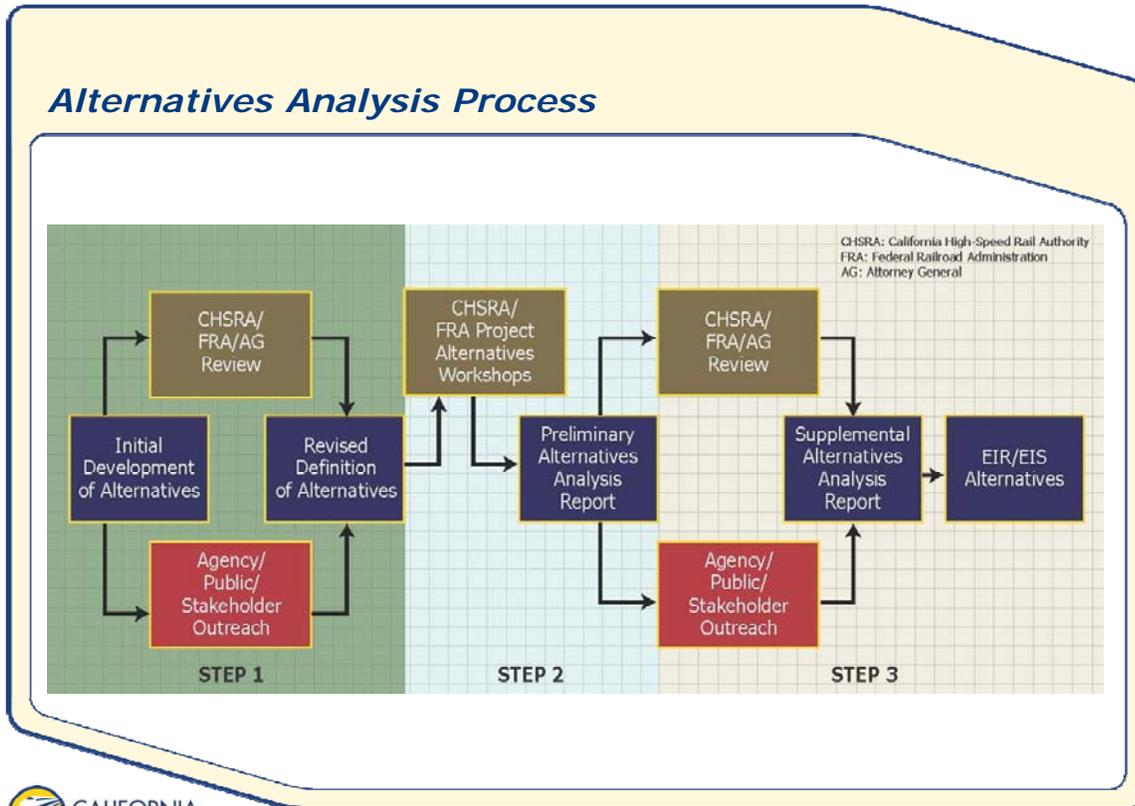
The High-Speed Rail Authority (Authority) and the Federal Railroad Administration (FRA) have entered into a memorandum of understanding (MOU) with the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to integrate the NEPA process with the Clean Water Act (CWA) Section 404 process. The Section 404 (b)(1) process includes an alternatives analysis and, therefore, the objective is for EPA and the USACE to reach concurrence with the Authority and the FRA on the alternatives to be carried forward into the EIR/EIS.

To compete for ARRA funds, the Project has undertaken a high-pace alternatives analysis process outside the 404 process. The goal is to integrate these two processes to reach similar conclusions. While the 404 process has a number of rules, the Authority's alternatives analysis criteria mirror the range of resources and considerations as generally analyzed under NEPA and CEQA. These are described later in this presentation.



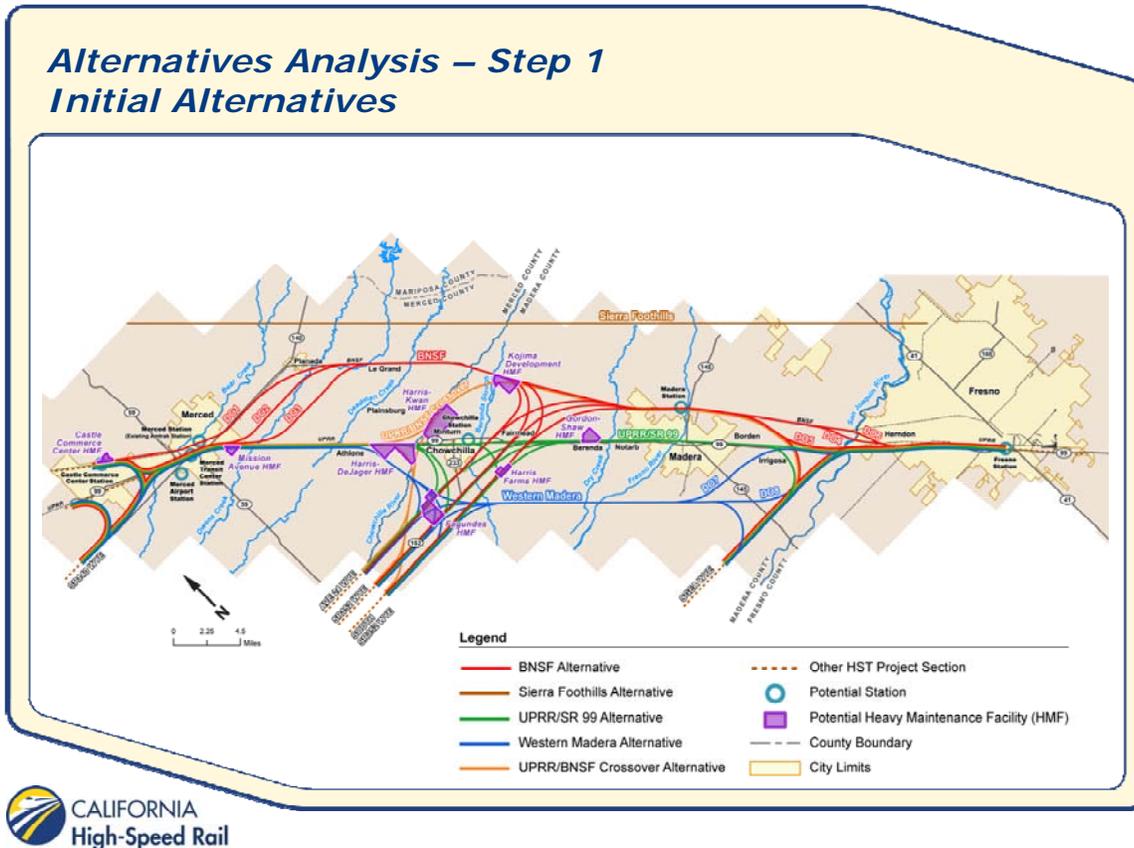
The California HST is planned to provide intercity, high-speed service on more than 800 miles of tracks throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The HST System is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which will include contemporary safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment, with an expected express trip time between Los Angeles and San Francisco of approximately 2 hours and 40 minutes.

The Merced to Fresno Section of HST System is a critical link connecting the Bay Area HST sections to the Fresno to Bakersfield, Bakersfield to Palmdale, and Palmdale to Los Angeles HST sections. The route development for the Merced to Fresno Section is built on the set of HST network alternatives and HST alignment alternatives that were analyzed in the *2005 Final Program EIR/EIS for the Proposed California HST System* (referred to hereafter as the Statewide Program EIR/EIS) and the *2008 Bay Area to Central Valley HST Final Program EIR/EIS* (referred to hereafter as the Bay Area to Central Valley Program EIR/EIS). Consistent with the Authority's project objective to maximize the use of existing transportation corridors and rights-of-way, to the extent feasible, the alternatives considered for the Central Valley alignment followed the two existing freight corridors of the UPRR and the BNSF. By sharing the existing freight railroad right-of-way in these corridors, where possible, HST impacts throughout the Central Valley could be further avoided and minimized.



The process for this study involves the creation and refinement of alternatives through a series of processes that are intended to compare alternatives. This study follows a defined alternative analysis process as described in the *Technical Memo Alternatives Analysis Methods for Project EIR/EIS, Version 2* (October 2009) and uses both qualitative and quantitative measures that reflect a mixture of applicable policy and technical considerations. Significant issues that qualify an alternative to be carried forward for further consideration include the following:

- Alternative meets the purpose and need and the project objectives in providing a sustainable reduction in travel time between major urban centers.
- Alternative has no environmental or engineering issues that would make approvals infeasible.
- Alternative is feasible and practical to construct.
- Alternative reduces or avoids adverse environmental impacts.



Input on the initial development of **north-south project alternatives** was collected during the public scoping periods for the Merced to Fresno Section and the San Jose to Merced Section. The wye alignments connecting the Merced to Fresno Section east to the Bay Area are discussed following the north-south alignment alternatives.

BNSF – Adjacent to BNSF Route (Alternative A1 – BNSF)

The BNSF Alternative is consistent with the Statewide Program Preferred Alternative. This alternative generally remains west of the BNSF from Castle Commerce Center through Merced and Madera, then joins to the east side of the UPRR near the San Joaquin River. Several design options were suggested: three design options on the north end and three on the south end. Those on the south end were quickly dismissed due to impacts of dividing residential communities in Fresno. Similarly, design option 1 at the north end traveled through several neighborhoods in Merced on the BNSF.

Sierra Foothills Alternative

This alternative, suggested by the public during scoping, is located approximately 10 miles east of the SR 99 corridor. This is the same as the alternative studied in the Statewide Program EIR/EIS. It was not carried forward in the 2005 Statewide Program EIR/EIS because it did not meet the purpose of the project. Since there is nothing new about this suggestion, this alternative was not carried forward in this study.

UPRR/SR 99 – Adjacent to UPRR and SR 99 Route (Alternative A2 – UPRR/SR 99)

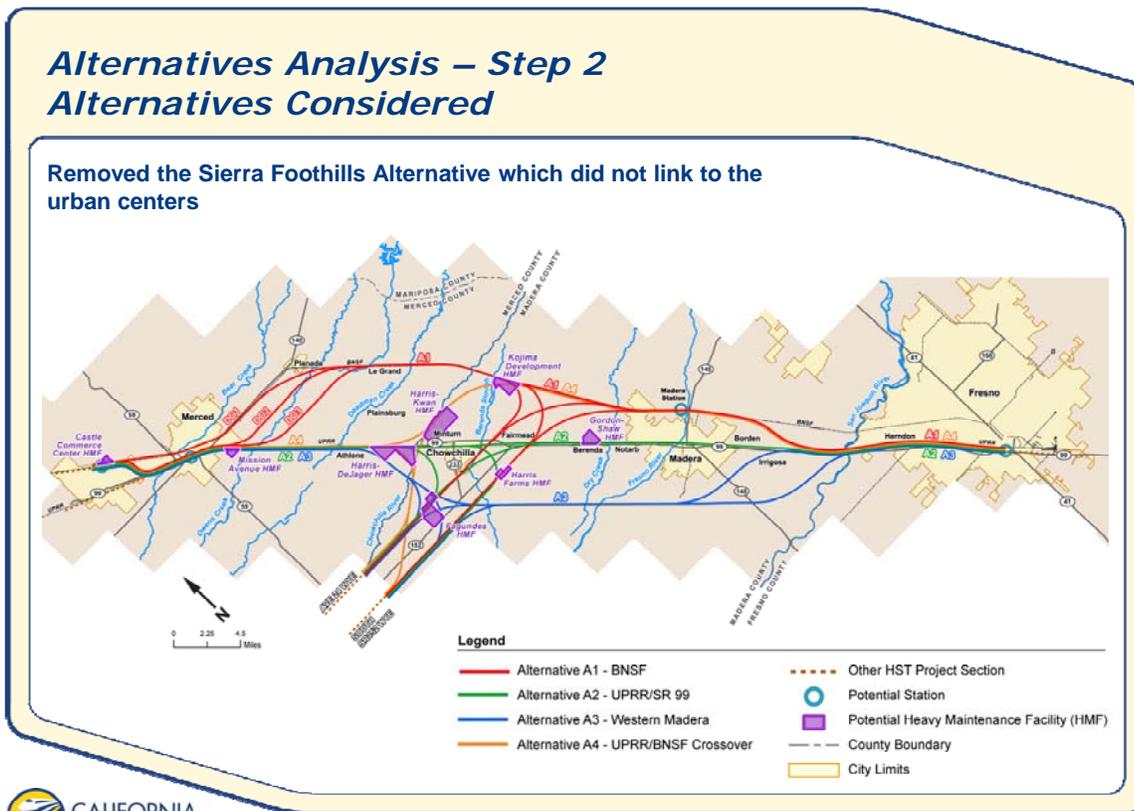
The UPRR/SR 99 Alternative is consistent with the Bay Area Program Preferred Alternative. This alternative generally remains parallel to but outside of the UPRR right-of-way, opposite SR 99, between Castle Commerce Center and the Downtown Fresno Station. There are no design options considered for this alternative.

Western Madera Alternative (Alternative A3 – Western Madera)

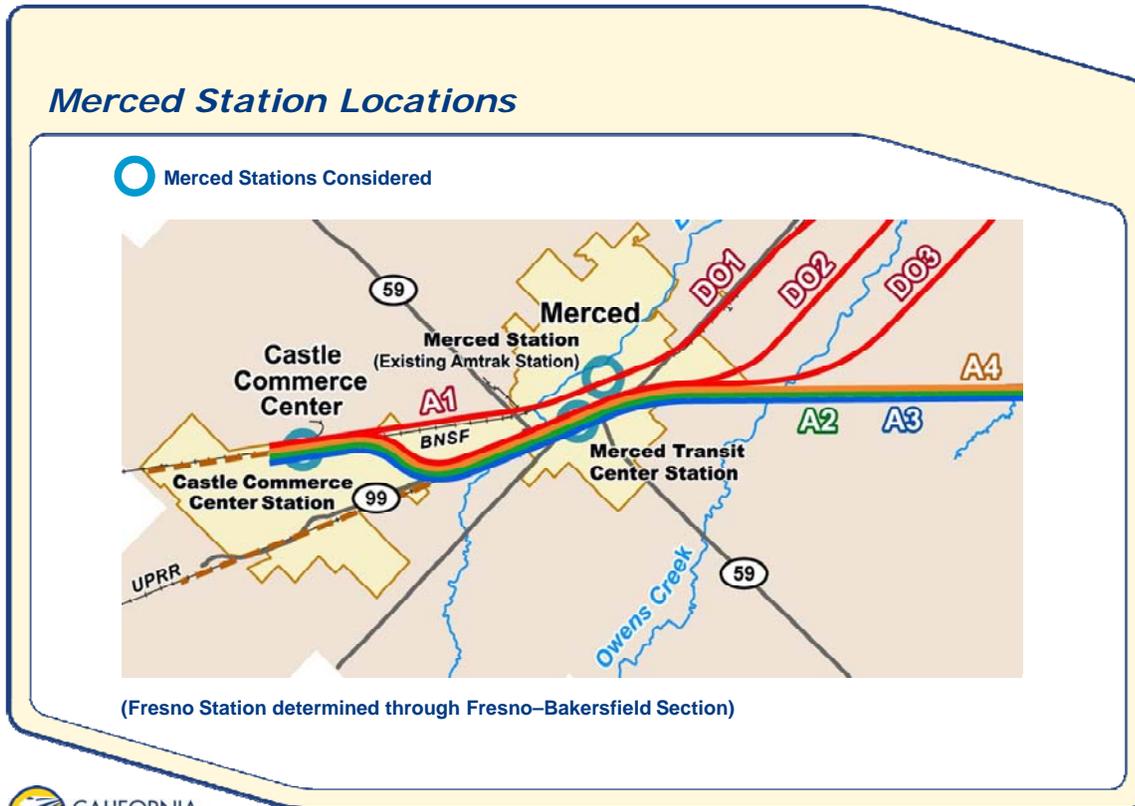
This alternative follows the UPRR/SR 99 route from Castle Commerce Center southward but deviates to the west before reaching Chowchilla. It moves west to a location approximately 3.75 miles west of and parallel to the UPRR, then returns to be adjacent to SR 99 and UPRR south of Madera. This alternative has two design options south of Madera.

UPRR/BNSF Crossover (Alternative A4 – UPRR/BNSF Crossover)

After the scoping period, the City of Chowchilla suggested an alternative that also follows the UPRR/SR 99 route and, like the Western Madera Alternative, deviates from the UPRR before Chowchilla, but which moves east to connect with the BNSF route. The alternative follows the BNSF and then connects back to the UPRR south of Madera. There are no design options suggested on this route.



- The SR152 Wye connection would have the second-highest cost, estimated to be twice as expensive as the SR 140, South SR 152, and SGEA wyes. The high cost is due to the need to reconstruct portions of SR 99 and crossings over SR 99 and the UPRR rail line. However, this connection would have fewer impacts and lower cost if combined with Alternative A3 – Western Madera.
- The South SR152 Wye connection is a similar concept to the Ave 24 Wye connection, running parallel to SR 152, but with fewer environmental impacts, more farmland impacts, lower cost, and comparable travel time to the Ave 24 Wye.



Stations were preliminary selected during the Program EIR/EIS process based on balancing project ridership viability to meet the statewide project purpose and need. Therefore, stations that were not within the urban centers as approved in the Program EIR/EIS were not considered in this analysis. Among the station locations initially reviewed, the Castle Commerce Center site, Merced Amtrak Depot site, and Merced Intermodal Transit Center site fulfilled the most station location criteria and were carried forward for further consideration.

- The Castle Commerce Center site would minimize neighborhood and natural resource impacts and is supported by local plans and policies, but it is not currently an intercity destination.
- The Merced Amtrak Depot site is located in a predominantly residential community and would negatively affect the surrounding neighborhoods. Access would require traveling through neighborhoods. This station would provide connectivity with Amtrak passenger service.
- The Downtown Merced Intermodal Transit Center site would fulfill all of the criteria, because it is centrally located near intercity destinations, has high potential for multimodal connectivity and transit-oriented development/redevelopment, would minimize neighborhood and natural resource impacts, and is supported by local plans and policies.

Alternatives Analysis - Steps 2 and 3 Selected Environmental Evaluation Criteria

| Measure | Method | Source |
|--|--|--|
| Environmental Assessment | | |
| Waterways and wetlands and nature preserves or biologically sensitive habitat areas affected | Acres of wetlands (vernal pools). Alternative: 50' to each side of centerline at grade, and 25' to each side of centerline elevated. | GIS NWI, CNDDDB |
| | Linear feet of waterways, measured by length of bridge crossings | GIS NWI, CNDDDB |
| | Acres of potential threatened and endangered habitats -within 300' to each side of centerline of alternative. | GIS NWI, CNDDDB |
| Cultural Resources | No. of listed historic/archaeological sites on the National Register of Historic Places (NRHP) or CHRIS. Alternative: 50' to each side of centerline at grade, and 25' to each side of centerline elevated. | GIS NRHP, CHRIS data, field reconnaissance inputs into GIS |
| Parklands | Number/acres of parks within alternative. Alternative: 50' to each side of centerline at grade, and 25' to each side of centerline elevated. | City and County GIS data |
| Agricultural lands | Acres of total prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance. Alternative: 50' to each side of centerline at grade, and 25' to each side of centerline elevated. | GIS FMMP and Farmland Conservancy Program data |
| Change in visual/scenic resources | Identify linear miles of alternative on elevated structure in urbanized areas versus rural areas. | Survey Data |
| Maximize avoidance of areas with geologic and soils constraints | Identify number of crossings of known seismic faults. | California Seismic Fault Data |
| | Acres of encroachment into areas with highly erodible soils. | NRCS Soil Data |
| | Acres of encroachment into areas with high landslide susceptibility. | NRCS Soil Data |
| Maximize avoidance of areas with potential hazardous materials | Number of hazardous materials sites within 1000' of centerline of alternative | EDR Data |
| Other Considerations | | |
| Degree of support expressed by communities | Assess degree of support by agency, ranked as Not Supported, Neutral, Moderate Support, High Support or Best Supported | Public Meetings, TWGS |
| Degree of support expressed by regulatory agencies | Assess degree of support by agencies, ranked as Not Supported, Not Well Supported, Moderate Support, High Support, or Highest Support | Agency TWG meetings |

Source: GIS NWI 1998, CNDDDB 2010; GIS NRHP 2009; CHRIS 2009; Farmland Conservancy Program Data 2007, 2008, and 2009; NRCS Soil Data 1962 & 1971; EDR Data 2009; Public Meetings, TWGS, field reconnaissance, and survey data were performed in 2009 and 2010.

Alternatives Analysis - Steps 2 and 3 Selected Environmental Evaluation Criteria

| Measure | Method | Source |
|--|--|---|
| Land Use | | |
| Development potential for TOD within walking distance of station | Identify existing and proposed land uses within 1/2-mile of station locations; identify if there are TOD districts, TOD overlay zones, mixed use designations, or if local jurisdictions have identified station areas for redevelopment or economic development | Regional and local planning documents, land use analysis, and input from local planning agencies |
| Consistency with other planning efforts and adopted plans | Qualitative - general analysis of applicable planning and policy documents | Land use analysis and input from planning agencies |
| Constructability and Right-of-Way | | |
| Constructability, access for construction, within existing transportation right-of-way | Extent of feasible access to alignment for construction | Conceptual design plans and maps |
| Disruption to existing railroads | Right-of-way constraints and impacts on existing railroads | Conceptual design plans and maps |
| Disruption to and relocation of utilities | Number of utilities crossed | Conceptual design plans and maps |
| Minimized Disruption to Neighborhoods and Communities | | |
| Displacements | If possible, identify number of properties by land use type that would be displaced, or acres of land within the right-of-way/station footprint, by type of land use: single family, multifamily, retail/commercial, industrial, etc. | Identified comparing the alignment conceptual design drawings with aerial photographs, zoning maps, and General Plan maps |
| Properties with access affected | Identify potential locations along the alignments or at station locations where access would be affected | Estimated off conceptual design plans and aerial photographs |
| Local traffic effects around stations | Identify potential locations where increases in traffic congestion or decreases in levels of service are expected to occur | Existing traffic levels of service from local jurisdictions |
| Local traffic effects at grade separations | Identify potential locations at grade-separations where increases in traffic congestion or decreases in levels of service are expected to occur | Existing traffic levels of service from local jurisdictions |

Source data is based upon research of local planning documents for the cities and counties in the Merced to Fresno Section, conceptual plans and maps developed during 2010, 2007 aerial photography, and traffic data provided by the cities and counties.

Comparison of the HST Project Alternatives

| Category | Measurement ^a | Alternative A1 + DO2 + South SR152 (Ave 24 Wye) | Alternative A2 + South SR152 (Ave 24 Wye) | Alternative A3 + DO5 + South SR152 ^b (Ave 24 Wye) | Alternative A4 + Ave 24 (South SR152 Wye) |
|---------------------|---|--|---|--|--|
| Design Objectives | Journey time (minutes) - San Luis Reservoir to Fresno Station | 24.26 (24.5) | 23.89 (24.02) | 23.66 (23.82) | 25.40 (25.68) |
| | Journey time (minutes) - Merced to Fresno | 21.07 (same) | 18.12 (same) | 20.18 (same) | 20.71 (same) |
| | Journey time (minutes) - San Luis Reservoir to Merced Station | 22.67 (22.3) | 19.48 (18.15) | 17.85 (16.84) | 17.84 (19.22) |
| | Route length (miles) | 93.1 (95.1) | 83.2 (83.9) | 81.1 (79.4) | 81.1 (81.8) |
| | <i>at-grade/ embankment</i> | 71.2 (58.1) | 56.1 (38.7) | 67.0 (60.1) | 48.5 (51.3) |
| | <i>retained fill</i> | 6.3 (5.3) | 7.1 (5.2) | 4.6 (same) | 3.4 (3.7) |
| | <i>Elevated</i> | 15.6 (31.8) | 20.1 (40.1) | 9.6 (14.8) | 29.3 (26.7) |
| | <i>miles of curvature</i> | 34.0 (35.8) | 20.8 (24.5) | 37.0 (36.1) | 35.6 (same) |
| | Intermodal connections | Not applicable (station measure only) | Not applicable (station measure only) | Not applicable (station measure only) | Not applicable (station measure only) |
| | Operating & Maintenance Costs | Medium (same) | Low (Medium) | Low (same) | Medium (same) |
| Capital Cost Factor | 1.23 (1.52) | 1.31 (1.69) | 1.00 (1.03) | 1.50 (same) | |
| Land Use | Potential for TOD | Not applicable (station measure only) | Not applicable (station measure only) | Not applicable (station measure only) | Not applicable (station measure only) |
| | Consistency with other planning efforts | Neutral – land use plans and policies do not support or conflict with alternative (same) | Supported by City and County of Merced with Ave 24 Not supportive – conflicts with land use plans and policies in Chowchilla and Madera (same) | Not supportive – conflicts with land use plans and policies in Merced and Madera County (same) | Supported by Chowchilla and City of Madera Neutral – land use plans and policies do not support or conflict with alternative (same) |
| Constructability | Constructability | High (same) | Medium (High) | Low (same) | Medium (same) |
| | Disruption to existing railroads (number of crossings of railroad right-of-way) | 5 (same) | 4 (same) | 1 (same) | 4 (same) |
| | Disruption to & relocation of utilities (miles of alternative in | 23 (24) | 23 (22) | 13 (same) | 17 (same) |

| Category | Measurement ^a | Alternative A1 + DO2 + South SR152 (Ave 24 Wye) | Alternative A2 +South SR152 (Ave 24 Wye) | Alternative A3 + DO5 + South SR152 ^b (Ave 24 Wye) | Alternative A4 + Ave 24 (South SR152 Wye) |
|--|---|--|--|---|--|
| | urban areas) | | | | |
| | Number of crossings of UPRR/ BNSF/ SR 99 | 11 (same) | 9 (same) | 5 (same) | 9 (same) |
| | <i># SR 99 crossings</i> | 6 (same) | 5 (same) | 4 (same) | 5 (same) |
| | <i># UPRR crossings</i> | 5 (same) | 4 (same) | 1 (same) | 4 (same) |
| | <i># BNSF crossings</i> | 0 (same) | 0 (same) | 0 (same) | 0 (same) |
| Disruption to Communities | Total property acquisition (acres) | 1042 (993) | 847 (774) | 876 (860) | 805 (837) |
| | Agricultural (acres) ^c | 779 (732) | 565 (503) | 707 (693) | 594 (625) |
| | Commercial (acres) | 12 (14) | 17 (11) | 11 (same) | 13 (same) |
| | Industrial (acres) | 8 (14) | 20 (same) | 9 (same) | 9 (same) |
| | Residential (acres) | 83 (70) | 36 (same) | 30 (28) | 52 (same) |
| | Other (acres) | 160 (162) | 209 (204) | 119 (118) | 138 (same) |
| | Properties with access affected (number of road closures) | 39 (31) | 55 (42) | 44 (same) | 26 (same) |
| | Local traffic effects around stations (number of roads with decreased levels of service) | Not applicable (station measure only) | Not applicable (station measure only) | Not applicable (station measure only) | Not applicable (station measure only) |
| Local traffic effects at grade separations (number of grade separations) | 37 (32) | 31 (18) | 57 (52) | 22 (24) | |
| Environmental Resources | Biological Resources - number of new bridge crossings | 22 (same) | 23 (same) | 21 (22) | 21 (same) |
| | Biological resources - acres of wetlands (vernal pool) | 10 (3)/(10 (3)) | 9 (0)/(9 (0)) | 9 (0)/(9 (0)) | 12 (2)/(13 (2)) |
| | Biological resources - linear feet of waterways crossed | 5050 (7040) | 5,200 (5,900) | 5,090 (5,590) | 6,280 (same) |
| | Biological resources - acres of potential T&E habitat | 298 (260) | 126 (131) | 201 (same) | 169 (same) |
| | Cultural Resources (number of sites) | 41(42) | 64 (53) | 34 (same) | 44 (43) |
| | Parklands (number of parks) | 0 (same) | 0 (0) | 0 (same) | 0 (0) |
| | Agricultural lands (acres of prime, unique, and important farmland) ^c | 725 (665) | 450 (395) | 719 (700) | 567 (599) |

| Category | Measurement ^a | Alternative A1 + DO2 + South SR152 (Ave 24 Wye) | Alternative A2 + South SR152 (Ave 24 Wye) | Alternative A3 + DO5 + South SR152 ^b (Ave 24 Wye) | Alternative A4 + Ave 24 (South SR152 Wye) |
|---------------------|---|---|--|--|--|
| Natural Environment | Noise and Vibration | High amount of residential land use (same) | High amount of residential land use (same) | Low amount of residential land use (same) | Medium amount of residential land use (same) |
| | Visual/scenic resources (miles of alternative in urban areas) | 10 (11) | 13 (11) | 6 (same) | 7 (same) |
| | Geotechnical constraints | Not applicable | Not applicable | Not applicable | Not applicable |
| | Hazardous Materials (number of sites) | 49 (51) | 144 (134) | 40 (same) | 49 (50) |

^a Totals may not equal sum of subtotals due to rounding differences.

^b The performance of Alternative A3 with the Ave 24 Wye is similar to the performance of the alternative with the South SR152 Wye.

^c The differences between affected acres of agricultural land use(City/County data) and prime, unique, and important farmland (California Department of Conservation) is due to the difference in the source and how they define agricultural land use.

Environmental impacts depend primarily on trade-offs between community impacts in urban areas and natural resource impacts in rural areas. The following reflects the best possible combination of design option and wye connection so that each alternative would have the best comparative advantage.

Alternative A1 – BNSF with South SR152 Wye

BNSF is a cooperative partner in planning and use of possible shared right-of-way and corridor planning. This alternative is only 30 seconds slower than the fastest alternative between the San Luis Reservoir and Fresno Station. While this alternative closely follows existing transportation corridors to avoid bifurcating farmlands and community resources, Alternative A1 – BNSF would result in the high impacts to private property, residential land uses, potential threatened and endangered species habitat, and important farmlands. Alternative A1 – BNSF would include avoidance alignments for community impacts near Planada and Le Grand. Alternative A1 – BNSF may affect sensitive vernal pool resources that support threatened and endangered species, along with some important conservation areas. However, the presence of the HST Project may create a barrier that would avoid future indirect impacts on these lands.

Alternative A2 – UPRR/SR 99 with South SR152 Wye

The South SR 152 Wye is designed to locate both its north and south legs south of Chowchilla. The Ave 24 Wye, however, would place Chowchilla in a triangle of track requiring longer length of track and affecting more farmlands in this wye area. Alternative A2 – UPRR/SR 99 offers strong travel time performance and environmental advantages over the other three alternatives. It would provide comparable top travel time. Because the UPRR corridor travels through four primary cities in the corridor, it would be elevated to avoid conflicts with existing infrastructure. Because of its proximity to the existing UPRR/SR 99 corridor, Alternative A2 – UPRR/SR 99 would have the lowest impacts of all alternatives related to private property acquisition, potential threatened and endangered species habitat, and important farmlands. The alternative would affect 17 acres of commercial property, but its residential impacts would be much lower than those of Alternatives A1 – BNSF and A4 – UPRR/BNSF Crossover because it would travel through fewer residential neighborhoods.

Alternative A3 – Western Madera with South SR152 Wye

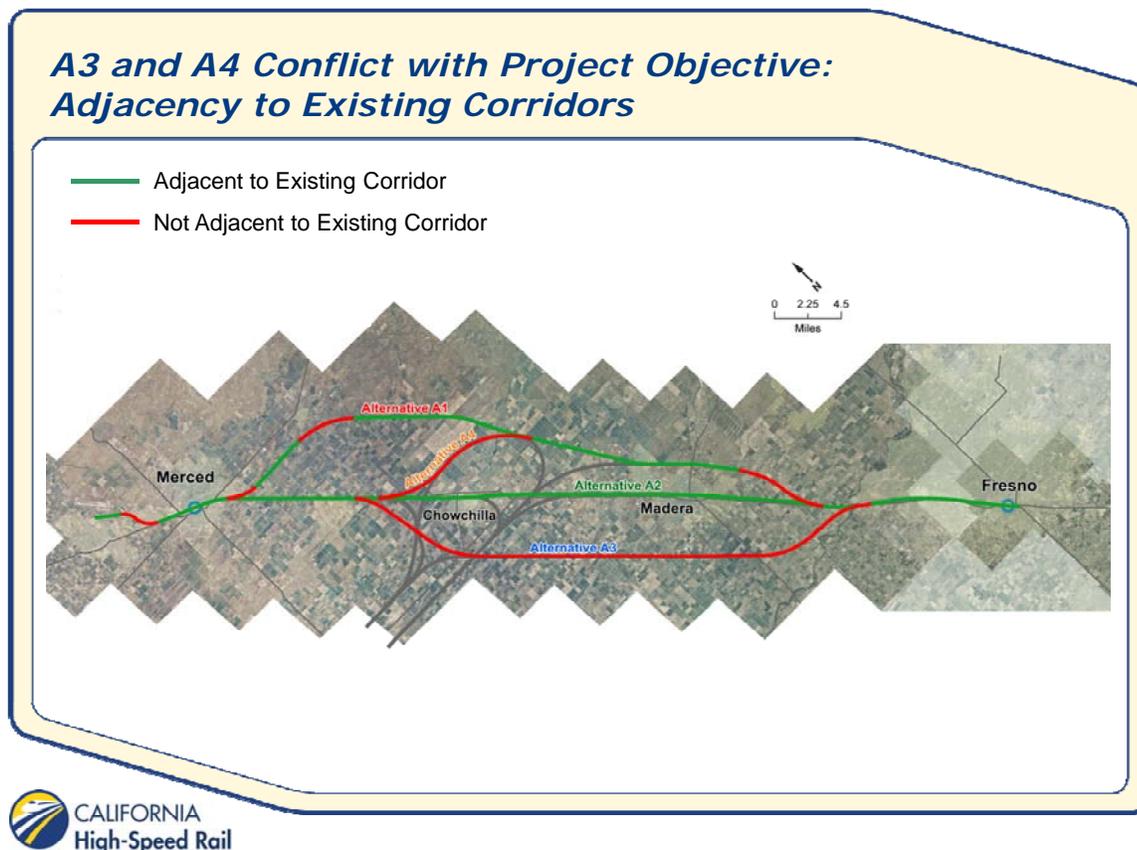
Alternative A3 – Western Madera is one of the shortest alternatives when adding the wye connection, and it is comparable with the UPRR travel time between the San Luis Reservoir and Fresno Station. Because there are no existing barriers blocking roadways, this alternative and wye connection also results in the highest number of potential road closures, if remaining at-grade. This alternative does not follow the commitment in the 2008 Bay Area to Central Valley Program EIR/EIS Record of Decision for the California HST to follow existing transportation corridors. The alternative parallels the diagonal direction of the UPRR/SR 99 corridor in order to provide a more direct route between the Merced and Fresno HST stations; however, this would bifurcate many farm properties—which like the state and county highways are set up on a north-south grid—in a prime agricultural area of the Central Valley. While the Authority is committed to minimizing and mitigating impacts, the bifurcation of small 40-acre farms may reduce the viability of the remnant pieces, resulting in larger impacts on the farming community and the possibility of the conversion of farmland to other uses. This may be quite important to Madera County because, according to the 2008 Madera County Agricultural Crop Report, gross production value of Madera County agricultural production was \$1.3 billion in 2008 (Madera County Department of Agriculture 2008). The latest CA EDD Labor Market information shows Madera with 42,300 total employees and 9,000 agricultural sector employees (21.2% of total employment). Conversely, Alternative A3 – Western Madera would avoid the urban and commercial impacts in Chowchilla and Madera that the other alternatives would cause, and for these reasons, it is supported by the City of Chowchilla.

Alternative A4 – UPRR/BNSF Crossover with Ave 24 Wye

Despite its slow travel time, Alternative A4 – UPRR/BNSF Crossover with the Ave 24 Wye is one of the shortest alternatives due to its wye configuration, which would have much shorter north and south legs than the wyes connecting to the other alternatives. While the alternative appears to take advantage of both UPRR and BNSF rights-of-way, Alternative A4 – UPRR/BNSF Crossover would deviate from existing transportation corridors to cross from the UPRR corridor to the BNSF and back, and it would join with the Ave 24 Wye by going north around Chowchilla before returning southbound. Alternative A4 – UPRR/BNSF Crossover would also have the most elevated track (28.1 miles), primarily needed in the vicinity of Chowchilla. Both of the wye connections would be elevated to accommodate the existing and planned transportation network near Chowchilla. Because the alternative would require the train to travel north before proceeding southeast, it would provide the slowest travel time on the critical route between San Francisco and Los Angeles, taking up to 2 minutes longer than the fastest alternative and would provide the second slowest travel time between Merced and Fresno.

Alternative A4 – UPRR/BNSF Crossover would have fewer impacts on private property and important farmlands than Alternatives A1 – BNSF and A3 – Western Madera, but it would have the second highest impacts on residential land use. Alternative A4 – UPRR/BNSF Crossover would continue to affect residential portions of eastern Madera. Regulatory agencies have expressed concern over the possibility of affecting sensitive vernal pool resources, possibly highest impacts on other wetlands, and longer crossings of waterways than other alternatives would have. Noise from construction may affect many residents along the BNSF corridor.

The theme of remaining adjacent to transportation corridors became a determining factor in the Authority's screening because it is directed by the purpose and need of the project.



The Authority's project purpose and need objectives include maximizing the use of existing transportation corridors and rights-of-way, to the extent feasible. The alternatives considered and recommended in the Authority's 2005 Statewide Final Program EIR/EIS and 2008 Bay Area to Central Valley Final Program EIR/EIS for the "Central Valley Alignment" followed the two existing freight corridors of the UPRR and the BNSF. These program environmental documents also considered alignment alternatives that deviate from the existing transportation corridors, notably the Western Alternative, which resembles the current Alternative A3 – Western Madera.

The reason for screening out alignment alternatives that do not closely follow existing transportation corridors is that they generally result in greater direct and indirect environmental impacts and have greater growth potential than alignment alternatives that closely follow existing transportation corridors. As shown in the graphic above, this is the case in the Merced to Fresno Section of the HST Project, where Alternatives A3 – Western Madera and A4 – UPRR/BNSF Crossover depart from existing transportation corridors. These alternatives would sever agricultural lands at a diagonal, causing hardship for farmers, but more dramatic would be the creation of a new transportation corridor, which may attract additional infrastructure and subsequent development resulting in another barrier for agricultural and wildlife corridors.

In the Merced to Fresno Section, departing from existing transportation corridors not only directly impacts highly productive farmlands but also has the potential to reduce the viability of surrounding farmlands, giving way to other uses, such as other infrastructures including transportation and utility systems, that may result in unwanted and unplanned growth patterns. This is particularly alarming to the counties of Merced and Madera, which rely heavily on their unique, rich soil resources for their primary industry. California's rich agricultural is slowly being diminished on the edges of urban communities.

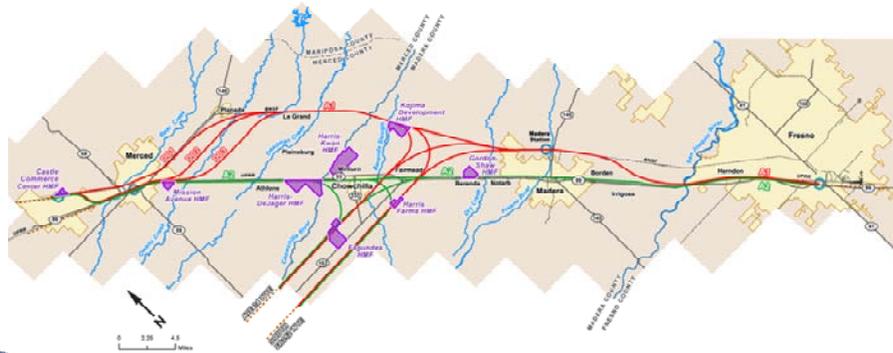
Alternatives that Support Project Objectives – Carry Forward

Alternative **A2 – UPRR/SR 99**

- Competitive travel time
- Adjacent to UPRR
- Fewest resident/habitat impacts
- strong community/regulatory support

Alternative **A1 – BNSF**

- Meets travel time
- Potential for sharing BNSF ROW
- Fewest commercial impacts



- **Carry forward Alternative A2 – UPRR/SR 99 with Ave 24 and South SR152 Wye.** Alternative A2 – UPRR/SR 99 optimizes travel time and minimizes environmental impacts at the cost of more elevated profile and potentially more community impacts than other alternatives. The cities of Chowchilla and Madera expressed concerns about the impacts of the project through their central business districts, but others, such as the City and County of Merced, City of Atwater, transportation agencies, water districts, and the farming communities in both counties, have expressed support for this route compared to the BNSF and other alternatives that do not use existing transportation corridors. However, UPRR has expressed reluctance to collaborate with HST alternatives that infringe either on its right-of-way or on its access to current and future freight customers along its right-of-way throughout the Central Valley. Because areas in Merced, Madera, and Fresno are constrained portions in this corridor, UPRR's resistance may delay property access and hinder timely design solutions that would enable the HST Project to meet its design objectives. The Authority Executive Staff continues to meet with UPRR on a regular basis in an effort to resolve concerns, and the project team is working to design around this limitation, which will require cooperation from UPRR. Lack of cooperation from UPRR could result in delay and make this alternative more expensive to construct.
- **Carry forward the Alternative A1 – BNSF with Ave 24 and South SR152 Wye.** Alternative A1 – BNSF provides a viable alternative to Alternative A2 – UPRR/SR 99 that meets the project purpose and need while also adhering to all the project objectives. It was selected as the Preferred Alternative over the UPRR Route in the 2005 Statewide Program EIR/EIS primarily because “the BNSF alignment avoids most of the urban areas between Modesto and Fresno and would have substantially less constructability issues, would have fewer potential noise, cultural, property, and community impacts, and is estimated to cost about \$400 million less than the UPRR alignment” (2005). Alternative A1 – BNSF is the longest route by 10 miles and still involves crossings of SR 99 and UPRR that are similar to Alternative A2 – UPRR, but it maintains the legislatively mandated travel time of 2 hours and 40 minutes between San Francisco and Los Angeles and provides a viable alternative to the UPRR corridor while remaining adjacent to existing corridors.

The benefit of Alternative A1 – BNSF over Alternative A2 – UPRR/SR 99, is that it may be able to take advantage of the BNSF right-of-way to avoid some residential, critical habitat, and farmland impacts. Remaining adjacent to the BNSF, even if not within the BNSF right-of-way, would also minimize the amount of severance on agricultural fields. The alignment's greater distance from several community centers may allow the alternative to remain at-grade for most of its distance and have a lower level of impacts on commercial centers, compared to Alternative A2 – UPRR/SR 99. The Cities of Chowchilla and Madera, continue to echo the sentiments that the BNSF route may result in fewer community impacts compared to Alternative A2 – UPRR/SR 99. The project team is reviewing avoidance options for the community of Le Grand and Planada.

- **Carry forward the Downtown Merced Intermodal Transit Center Station.** This station best satisfies purpose and need, has the best access to the regional highway and public transit system, and has fewer residential impacts. It would be located adjacent to the UPRR right-of-way in Downtown Merced and would be served by either Alternative A2 – UPRR/SR 99 or Alternative A1 – BNSF.

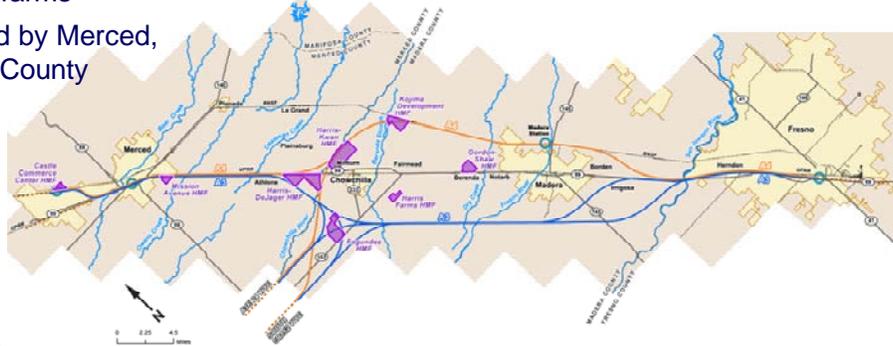
Alternatives that Do Not Support Project Objectives – Do Not Carry Forward

☒ Alternative A3 – Western Madera

- Green field alternative
- Not adjacent to existing transportation corridors
- Bifurcates large number of small farms
- Opposed by Merced, Madera County

☒ Alternative A4 – UPRR/BNSF Crossover

- Slower travel time
- Less adjacent to existing transportation corridors
- Bifurcates small farms
- Residential and critical habitat impacts
- Low agency support



- **Do not carry forward Alternative A3 – Western Madera.** While Alternative A3 – Western Madera provides the fastest travel time between San Francisco and Los Angeles by 30 seconds, it presents considerable controversy because it is a Greenfield alternative and does not meet the Authority’s key project objective to maximize the use of existing transportation corridors. Alternative A3’s deviation from existing transportation corridors in Madera County would result in the high impacts on private properties, agricultural properties, and important farmlands. The high level of impacts is a result of the orientation of the HST and UPRR/SR 99 alignment in relation to the surrounding transportation network. Alternative A3 parallels the diagonal direction of the UPRR/SR 99 corridor in order to provide a more direct route between the Merced and Fresno station. Alternative A3 affects the most acres of prime, unique, and important farmlands (555 acres for the north-south alignment), would bifurcate farmlands, and would potentially lead to unwanted development patterns that may erode the economic viability of these agricultural lands in Madera County. While the Authority is committed to minimizing and mitigating impacts, the bifurcation of small 40-acre farms may reduce the viability of the remnant pieces, resulting in larger impacts on the farming community and the possibility of the conversion of farmland to other uses. This impact on Madera may have a more dramatic effect than elsewhere in the state since, according to the 2008 Madera County Agricultural Crop Report, gross production value of Madera County agricultural production was \$1.3 billion in 2008. The latest California Economic Development Department Labor Market information shows Madera with 42,300 total employees and 9,000 agricultural sector employees (21.2 % of total employment). Additionally, this alternative has received strong opposition from the City and County of Merced and the County of Madera, and it has received strong resistance from members of the agriculture community.
- **Do not carry forward Alternative A4 – UPRR/BNSF Crossover.** Alternative A4 – UPRR/BNSF Crossover would not outperform the other alternatives in any criteria measure. It is the slowest alternative in the critical travel time between San Francisco and Los Angeles, taking more than a minute longer than the next slowest alternative. It would potentially result in the highest level of impacts on wetlands, and it would involve most and longest water crossings. Alternative A4 – UPRR/BNSF Crossover was suggested as a route to modify

Alternative A1 – BNSF to avoid Le Grand by traveling a greater distance along the Alternative A2 – UPRR/SR 99 alignment, then shifting eastward to avoid Chowchilla and Madera. However, like Alternative A3 – Western Madera, this alignment results in similar conflict with the Authority's key project objective to use existing transportation corridors and results in a high level of impacts on agricultural lands (436 acres for the north-south alignment) even while trying to remain adjacent to existing transportation corridors. In order to avoid Chowchilla, the alignment requires a large northward curve from Avenue 24 around Chowchilla to link up to the BNSF corridor in a southbound direction. This is not efficient HST design and is not suited to follow existing transportation corridors through prime, unique, and important farmlands. It would result in a series of awkward parcels, reducing economic viability and possibly leading to undesirable development patterns

- **Do not carry forward the Castle Commerce Center Station.** This station is more limited in its ability to serve as a multimodal center. The Castle Commerce Center Station offers limited residential density opportunities, which would also limit the potential for the HST station as a multimodal center, and its access may be constrained due to limited arterial roadways available to the site.
- **Do not carry forward the Merced BNSF/Amtrak Station.** While this station does off a seamless connectivity with other transit services, it is located within a low-density, well-established residential community. Arterial access from SR 99 would involve traveling through the City of Merced, which would degrade the roadway system. There is no support from Merced for this station, and it would conflict with the local plans for this area.



There are multiple design features in rail that can be used to refine, improve, and help develop the alternatives to avoid and minimize impacts of the project. These include:

- Different profiles can help avoid some impacts: at-grade, retained fill, elevated or bridges, and retained-cut/trench. Several of these are pictured above.
- Other adjacent infrastructure can be made to accommodate rail projects – for example, roadways can be grade-separated over or under the rail project.
- Drainages and wildlife crossings can be bridged, or large, frequent culverts can be installed to facilitate continued movement under the railway.

Regarding community impacts, rail projects are associated with noise, constraining land use development, and safety concerns. For safety purposes, an HST cannot have any at-grade crossings. Rail corridors are typically aligned with other transportation corridors to minimize impacts on land use and natural environments. However, transportation corridors typically include urban developed areas and locating a railway can be highly controversial with local communities. Balancing these mutually exclusive goals can take several iterations. Based on this the alternatives have continued to evolve beyond the initial screening. The next few pages provides an overview of a Supplemental Alternatives Analysis that was required and the results thereof.

Supplemental Alternatives Analysis – Step 2 Project Refinements Increase Number of Alternatives

As design development continues and public and agency input are incorporated, further alternatives are considered. The following slides will demonstrate:

1. Project developed to avoid and minimize impacts on known resources
2. Additional Alternative development to balance community concerns
3. Review Heavy Maintenance Facility proposals

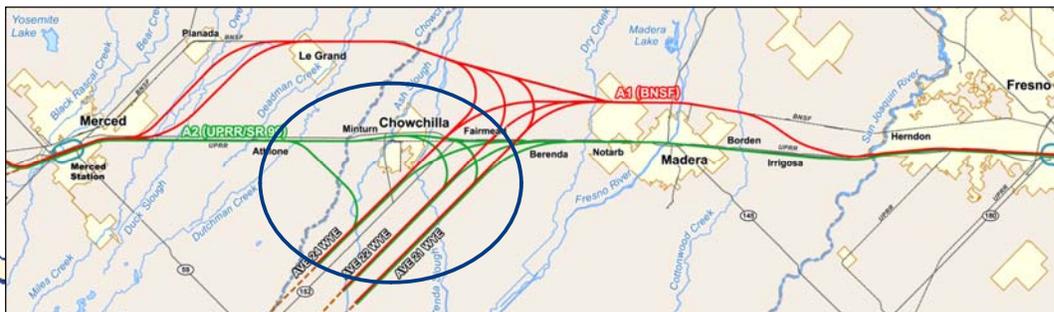


The Supplemental Alternatives Analysis Report was brought forward because of a series of evaluations, developments, and refinements of previously concurred-upon design options, and heavy maintenance facilities (HMFs). These revisions include the following:

- The alternatives coming from the San Jose to Merced Section that joins as a wye junction with the Merced to Fresno Section have been revised. The two wye options, the Ave 24 Wye and the South SR152 Wye, have been refined and better reflect input from some affected stakeholders. The Ave 24 Wye is expanded to avoid encroaching on Chowchilla and reduce farmland severance. The SR152 Wye is developed further to avoid a number of local resources and, through these refinements and discussions, Ave 21 Wye has evolved from the previously identified Ave 22 Wye alignment.
- In reaction to the BNSF Alternative (A1), two design options were requested by Merced County and the community of Le Grand to avoid/reduce associated impacts. For the A1 Alternative, design options around the City of Le Grand were developed.
- Similarly, to avoid the City of Chowchilla on the UPRR/SR 99 Alternative (A2), a design option to the west of Chowchilla, which takes advantage of the Ave 24 Wye tracks, is under consideration. This design option will reduce total length of alignment, minimize elevated guideway, reduce the number of UPRR and SR 99 crossings, and facilitate options to connect to either the A1 or A2 alternatives between Chowchilla and Fresno.
- Finally, the Merced to Fresno Section has conducted a screening analysis of the proposed HMFs between Merced and Fresno.

Henry Miller/Ave 24 Wye Refinement

| Original Ave 24 Wye | Refined Ave 24 Wye (to be carried forward) |
|----------------------------------|---|
| Smaller Triangle | Larger Triangle |
| Constrain Chowchilla | Further from Growth Plans |
| Curved Align/ Farmland Impact | N-S Tangent Alignment/Aligned to Farm Grids/Less Impact |



The previously concurred-upon Preliminary Alternatives Analysis Report introduced and evaluated different alternative connections to the San Jose to Merced routes. Two of the wye connection alternatives along Henry Miller/Avenue 24 (see above slide) and the South SR 152 Wye (vicinity of Avenue 21 and Avenue 22) were identified (shown on following page).

An extensive cooperative study of the two wyes (Ave 24 and Ave 21) by both the Merced to Fresno and the San Jose to Merced Section teams established that the general impacts are very similar and, therefore, both wyes are recommended to remain for further evaluation in the EIR/EIS. The actual legs of the Ave 24 Wye do result in more prime and unique farmlands impacts than the Ave 21 Wye, although not a substantial amount. It is therefore recommended that the revised Ave 24 Wye be carried forward into the Draft EIR/EIS.

The preferred Program EIR/EIS alignment in the Merced to Fresno Section from the San Jose to Merced Section follows Henry Miller Road in Merced County. Henry Miller becomes Avenue 24 as it nears the City of Chowchilla. This alignment has presented many concerns for the community of Chowchilla and the farming community within Merced and Madera counties. The original wye legs encroached on the City of Chowchilla on two sides and the north-south alignment resulted in the third side, creating a triangle around Chowchilla. In efforts to reduce the encroachment on the city and minimize farmland impacts, a larger wye is proposed. The refined Ave 24 Wye begins to diverge farther west of Chowchilla, resulting in longer track legs that avoid the Chowchilla growth boundary. However, because the wye is larger, the HST track can be designed to follow section grid lines adjacent to farmlands with smaller curved portions of HST, resulting in fewer oddly shaped remnant lands.

South SR152 Wyes Refinement

| Issues with Ave 22 Wye Option (Not to be Carried Forward) | Ave 21 Option (to be Carried Forward) |
|--|--|
| 1-Chowchilla Airport Conflict 2- Adjacent to Fairmead Landfill 3-Adjacency to Museum 4-Conflicts with SR 99 Interchange | Similar performance without landfill, museum, interchange or airport conflicts |

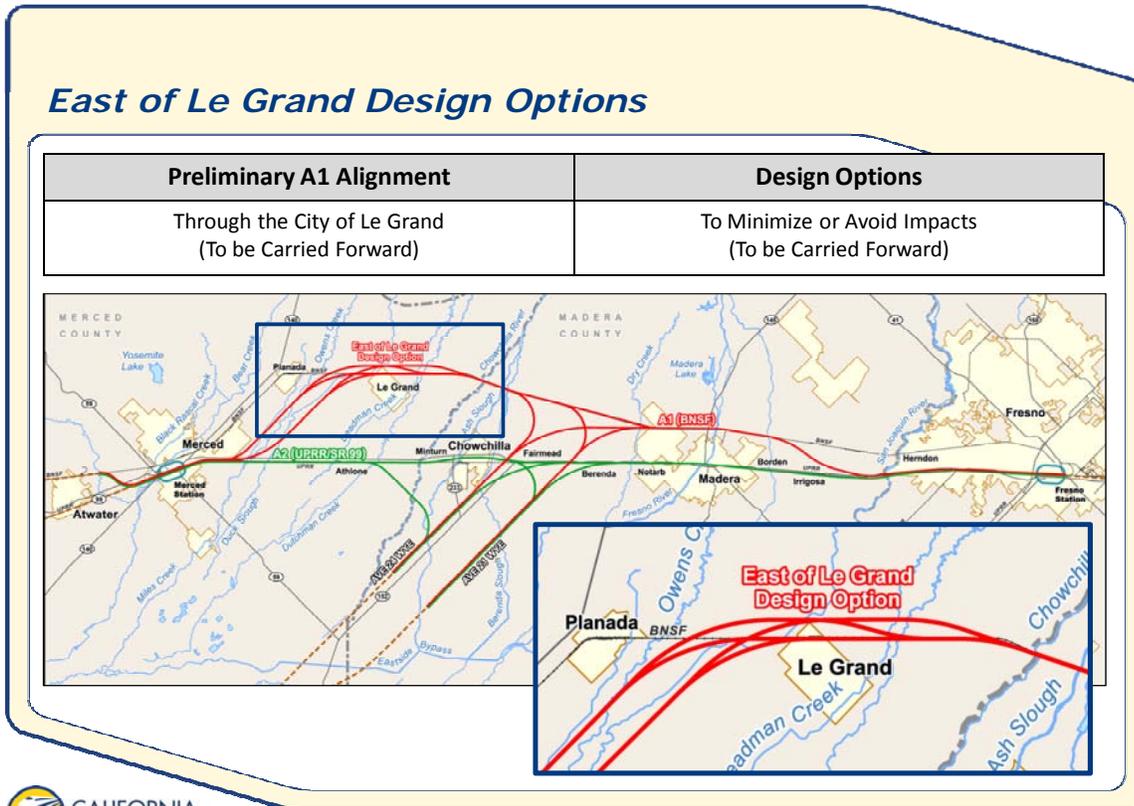


The South SR152 Wye was initially considered along Avenue 22 (therefore the initial screening data included this wye), but design development revealed that the north and southbound legs potentially interfered with valuable resources, such as:

- Interference with the Chowchilla air space contours
- An new paleontological museum
- A new landfill
- Community impacts on the town of Fairmead

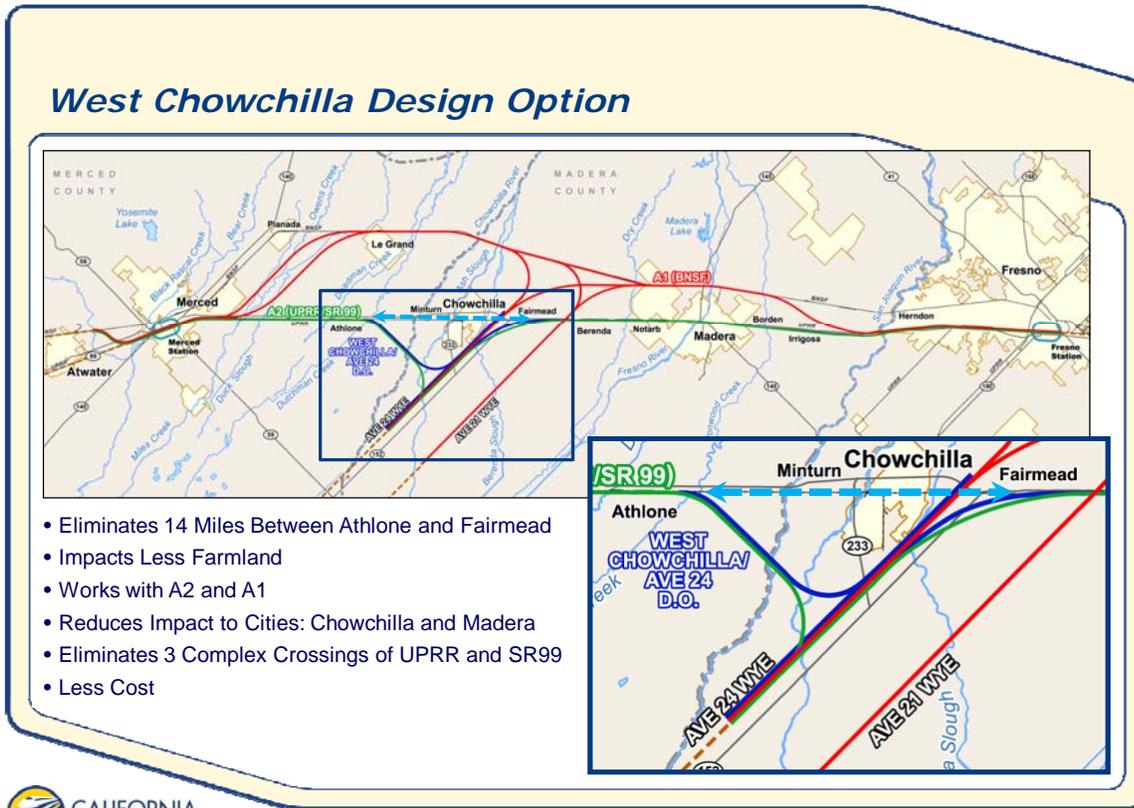
Additional community and agency input and concerted design effort led to general support from the cities of Merced, Chowchilla, and Madera, and Merced County and Madera County on the wye alignment along Avenue 21. Madera County has proposed the possibility of relinquishment of the roadway to further reduce farmland impacts. The Ave 22 Wye alignment is recommended to be eliminated from further consideration, while the Ave 21 option is recommended to be carried forward.

Even without this offer from the County, the Ave 21 Wye does not substantially alter the results of the environmental measures during the initial screening and therefore this change does not result in any new findings on the primary alternatives – BNSF, UPRR/SR99, Western Madera, or the UPRR/BNSF Crossover alternatives.



The original BNSF - A1 Alternative passes through the City of Le Grand along the east side of the BNSF. This alternative is supported by the County of Merced and the communities of Planada and Le Grand. However, the county requested to avoid Le Grand by passing just east of the Le Grand town limits. These options connect to both the previously concurred-upon design options along Mission Avenue and Mariposa Way. Therefore, there would be four design options in the vicinity of Le Grand, as described below:

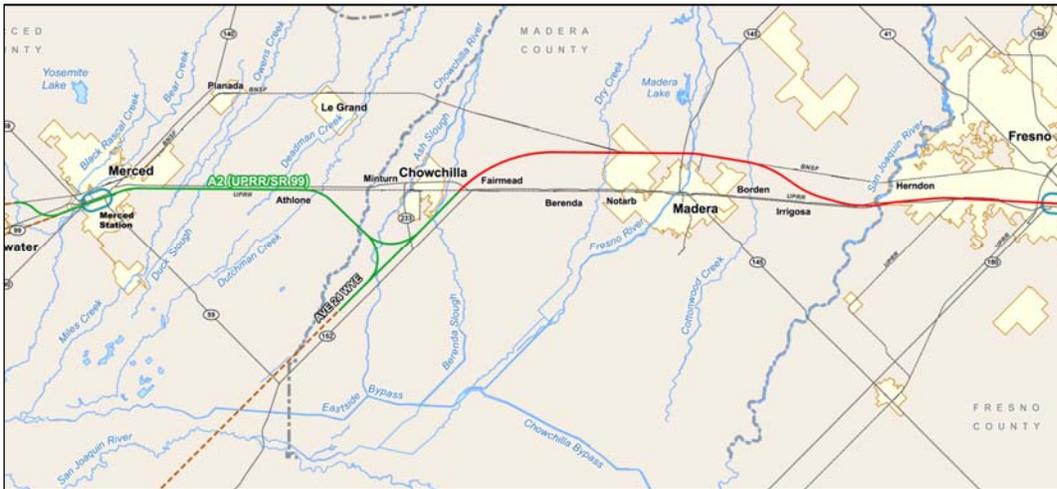
- **Mission Ave Design Option** – Just south of the SR 99/East Childs Avenue interchange, the alternative would cross SR 99 and UPRR once more as it begins to curve to the east, crossing over East Mission Avenue and continuing south of East Mission Avenue.
- **Mission Ave East of Le Grand Design Option** – This design option varies from the Mission Ave design option by traveling farther east approximately 1 mile before turning southeast to cross Santa Fe Avenue and the BNSF railroad south of Mission Avenue to parallel the BNSF railroad one-half mile to the east, avoiding the urban limits of Le Grand. Then it crosses Santa Fe Avenue and the BNSF railroad again approximately one-half mile north of Marguerite Road to continue adjacent to the west side of the BNSF railroad.
- **Mariposa Way Design Option** – This design option would travel an additional mile to the southeast before crossing SR 99 near Vassar Road and turning east to the BNSF along the south side of Mariposa Way. East of Simonson Road, the alternative turns to the southeast. Just prior to Savana Road in Le Grand, the design option transitions from at-grade to elevated to pass through Le Grand on a 1.7-mile-long elevated guideway adjacent to and along the west side of the BNSF railroad.
- **Mariposa Way East of Le Grand Design Option** – This design option varies from the Mariposa Way design option by traveling farther east approximately 1 mile before turning southeast to cross Santa Fe Avenue and the BNSF railroad less than one-half mile south of Mariposa Way and paralleling the BNSF railroad one-half mile to the east, avoiding the urban limits of Le Grand. Then it crosses Santa Fe Avenue and the BNSF railroad again approximately one-half mile north of Marguerite Road to continue adjacent to the west side of the BNSF railroad.



Similar to Le Grand, the City of Chowchilla remains concerned that the UPRR/SR 99 Alternative would travel through its community along SR 99. The Authority evaluated a design option to the UPRR/SR 99 Alternative in the vicinity of Chowchilla that may have multiple benefits to the project, as well as effectively avoid the City of Chowchilla (see above slide). Upon reviewing the pros and cons of the various wye options, the team found that if the UPRR/SR 99 Alternative followed west along the Ave 24 Wye alignment, going westerly around Chowchilla, then returning to the UPRR/SR 99 corridor, the design option could possibly eliminate 10 miles of HST track construction compared to the UPRR/SR 99 – A2 Alternative. Fewer miles of track could similarly reduce associated impacts. The disadvantage of this design option is an increase in travel time between Los Angeles and Sacramento, but travel time for Los Angeles to San Francisco and San Francisco to Sacramento would be maintained. However, the mandatory turnout from a main line to a secondary rail line is 150 miles per hour maximum design criteria. The mainline is the San Jose to Fresno southbound route. The eastbound to northbound toward the direction of Merced required at the wye is a 150-mph curve, which is why this alternative remains a practicable alternative. This was asked at the last meeting and responded to, but it should be included in this summary document.

By designing the track to allow north-south movements west of Chowchilla, the addition of a 4-mile additional curve to the proposed Ave 24 Wye alignment results in reducing the total area inside the wye, and Chowchilla would not have tracks along the SR 99 corridor, which lie east of the downtown (15 miles of track).

**Combination of A2 (UPRR/SR 99) / A1 (BNSF) –
Ave 24 Wye results in “Hybrid Alternative”**



Additionally, this West Chowchilla design option could also work with the UPRR/SR 99 – A2 Alternative to connect with the BNSF via the Ave 24 Wye southbound leg. Benefits of this Hybrid Alternative would eliminate duplicative track, avoid the Chowchilla urban growth boundary, and provide Madera with an avoidance alternative other than the BNSF Alternative (A1).

This combined alternative is referred to from here on as the Hybrid Alternative.

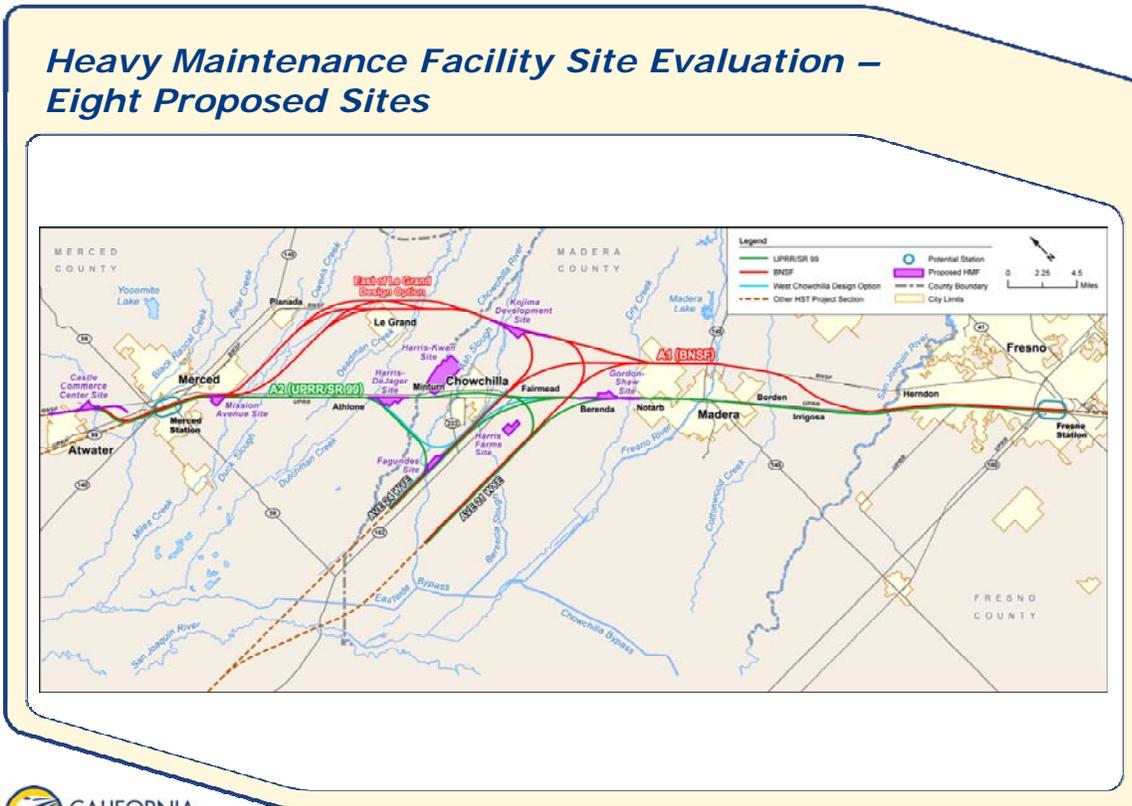
West Chowchilla Design Option – Preliminary Consideration/Early Feedbacks

| <u>Pros</u> | Involved Agencies | Early Feedbacks |
|--|--|---|
| <ul style="list-style-type: none"> • Potential to avoid/reduce impact to Cities of Chowchilla, Fairmead, and Madera • Works with both A1 and A2 • 10 miles shorter than A2 • Eliminates 3 complex structure crossings of SR 99 and UPRR • Less cost • Less impact to farmlands <p><u>Cons</u></p> <ul style="list-style-type: none"> • Increased travel time from Los Angeles to Sacramento | Merced City and County | Merit to explore, Some concerns on Impact to Local Farmland |
| | Le Grand | Merit to explore, Some concerns on Impact to Local Farmland |
| | Madera County | Merit & Explore, No Commitment |
| | City of Madera | No Commitment Some opposition |
| | Chowchilla (officials and Others) | Opposed, Constrain Growth, Farmland Impact compared to A1 |
| | Merced Farm Bureau Madera Farm Bureau | Not Supporting, Advocate A2 and SR 152 Wye |



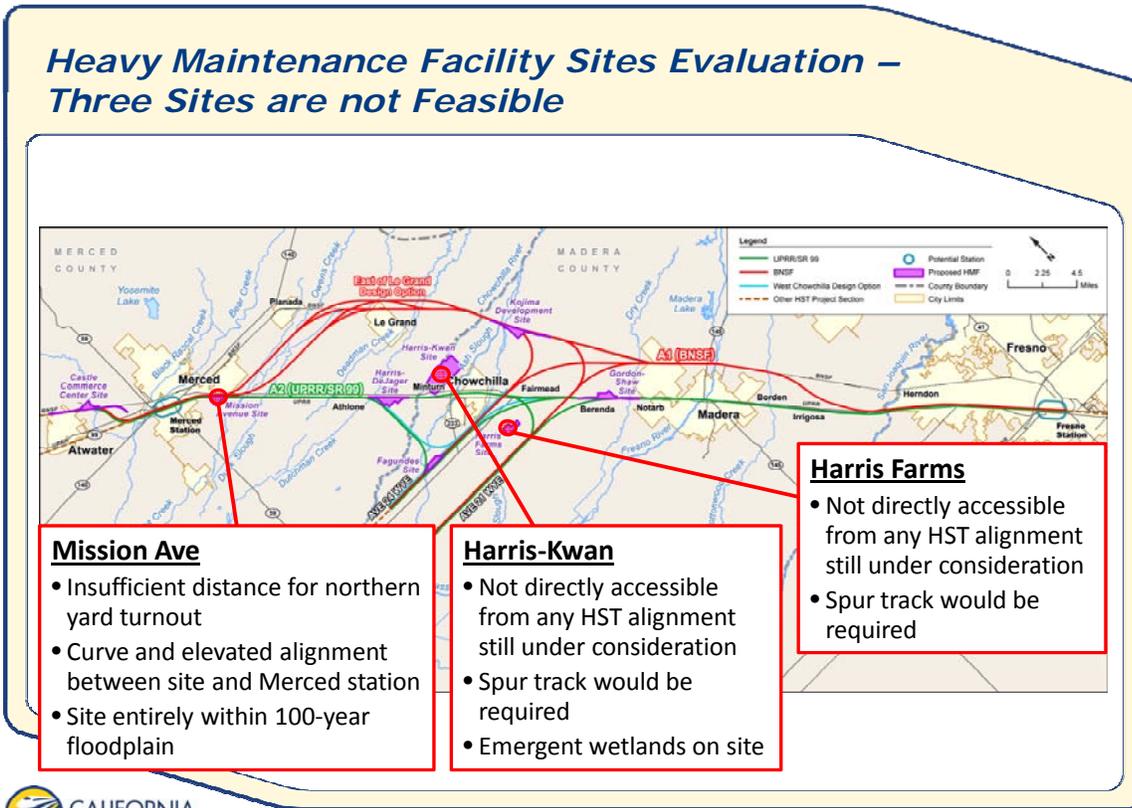
This slide lists the summary of pros and cons and some of the initial feedback received through early outreach in the development of this design option to the UPRR/SR 99 Alternative and Hybrid Alternative. It should be noted that early discussions with involved cities and farms bureaus have already taken place. While this design option is new, there are mixed reactions as noted in the above slide.

While there was feedback regarding impacts on farmlands, the Ave 24 Wye has already been designed to balance farmland impacts against encroaching on the City of Chowchilla’s urban growth boundary. The larger wye does reduce impacts on both Chowchilla and Fairmead and it allows the trackway to minimize curves which tend to split farmlands. This wye follows, to the extent feasible, existing rural roadway, thus reducing the amount of farm bifurcation.



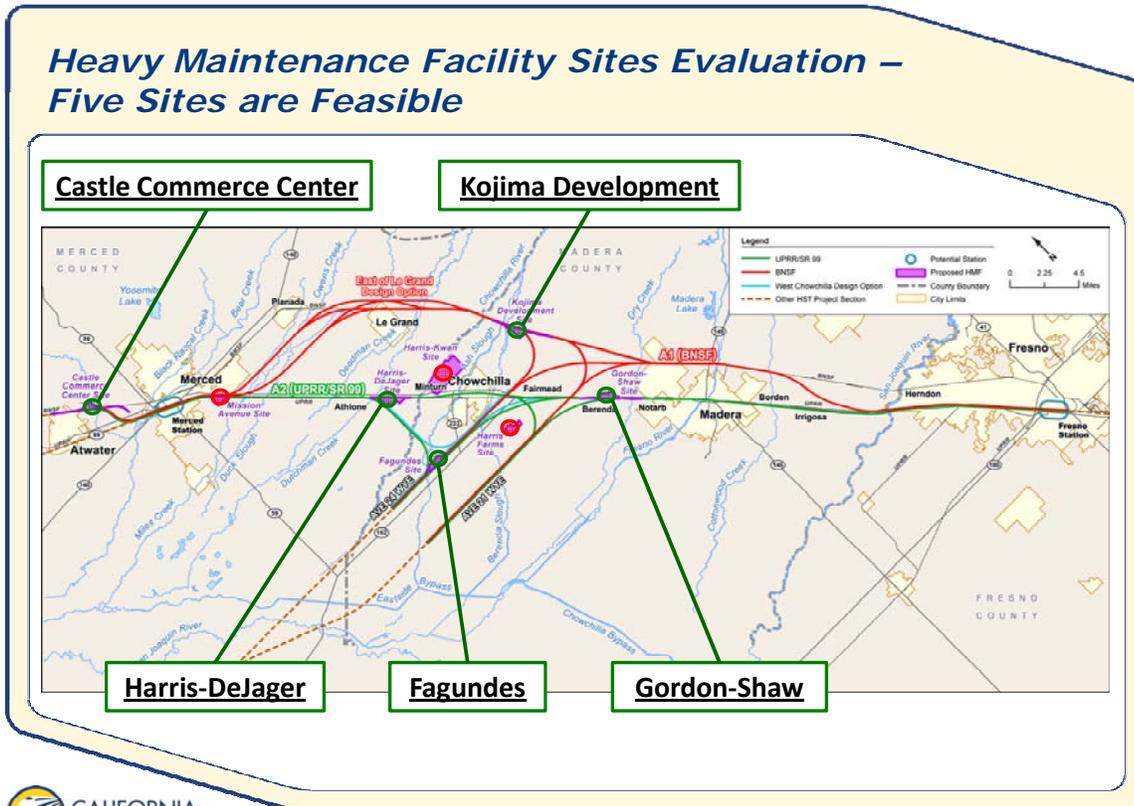
For the Merced to Fresno Section, eight potential HMF sites were identified in proposals submitted in response to the Request for Expressions of Interest. The sites were reviewed to identify those that were feasible and practical to construct. Key analysis criteria included:

- Proximity to HST north-south alignment alternatives still under consideration.
- Feasibility of providing yard-track connections at both ends of the yard with a minimum length of spur.
- Potential environmental factors evident by the sites' proximity to streams and wetlands.



The primary reason for recommending the Harris-Kwan and Harris Farms sites to be dropped is that they would each require spur tracks exceeding 5 miles in length for access. The additional 5 miles of spur track would have other environmental or farmland impacts.

The primary reason for dropping the Mission Avenue site is the difficulty in providing access to the site from the north. The Mission Avenue site is approximately 3 miles south of the proposed Downtown Merced Station. Most of the distance along the HST alignment between the site and the station consists of a high-speed curve on a high aerial structure above SR 99. Design objectives require that yard turnouts be placed on straight sections of track. In this case, the nearest location for a yard turnout would be north of the Merced station. Therefore, the Mission Avenue site would require a north yard spur running at a high elevation through Downtown Merced.

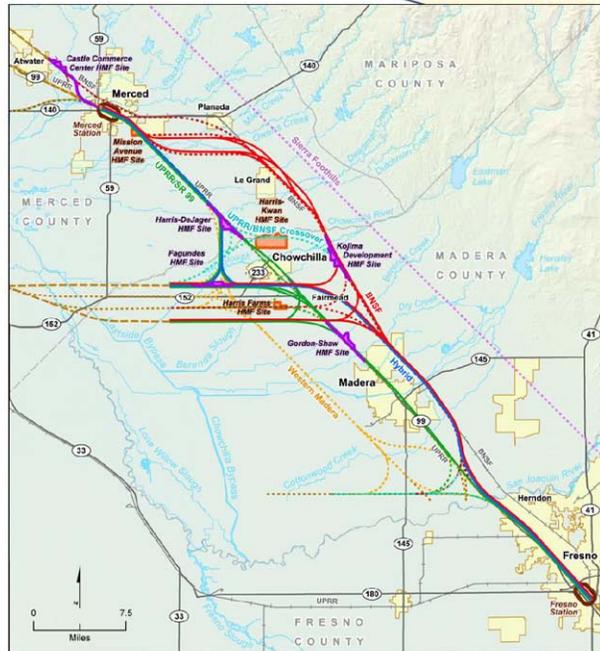


There are five sites recommended to be carried forward for evaluation in the Draft EIR/EIS. It is important to note that they do not all work with each alternative. Those that are being recommended, with the following alternatives, to be studies further are as follows:

- Castle Commerce Center – Provides access to both alternatives, with access only in and out of south side in Phase 1. North access could be provided in Phase 2.
- Harris-DeJager – Access is only possible with BNSF Alternative (A1) with the Ave 21 Wye.
- Fagundes – Provides access to both alternatives via Ave 24 Wye (A2).
- Gordon-Shaw - Access is only possible with UPRR/SR 99 Alternative with the Ave 24 Wye.
- Kojima - Access is only possible with BNSF Alternative (A1) with the Ave 21 Wye.

Alternatives UPRR/SR 99 (A2) and BNSF (A1) Advanced

-  City Limit
 -  County Boundary
 -  Railroad
 -  State Route
- Alternatives Carried Forward**
-  BNSF Alternative
 -  UPRR/SR 99 Alternative
 -  Hybrid Alternative
 -  Connection to Other Section
 -  Station Study Area
 -  Heavy Maintenance Facility
- Alternatives Not Carried Forward**
-  Sierra Foothills Alternative
 -  Western Madera Alternative
 -  UPRR/BNSF Hybrid Alternative
 -  Connection to Other Section
 -  Heavy Maintenance Facility



The results of the Authority's Alternatives Analysis are shown above.

Three Primary Alternatives:

- UPRR/SR99 – with East and West Chowchilla design options and two Wyes: Ave 24 Wye and Ave 21 Wye
- BNSF – with the four northern design options traveling along Mission and Mariposa and either east or through Le Grand and two Wyes: Ave 24 Wye and Ave 21 Wye
- Hybrid – only functions with the Ave 24 Wye

Five Heavy Maintenance Facilities:

- Castle Commerce Center – Access is possible with all alternatives
- Harris-DeJager – Access is only possible with BNSF Alternative (A1) with the Ave 21 Wye.
- Fagundes – Provides access to both alternatives via Ave 24 Wye (A2).
- Gordon-Shaw – Access is only possible with UPRR/SR 99 Alternative with the Ave 24 Wye.
- Kojima – Access is only possible with BNSF Alternative (A1) with the Ave 21 Wye

Regional Context – Environmental Resources and Constraints

- Surface hydrology
- 100-year floodplains
- Listed sensitive species and habitats
- Open space lands and reserves

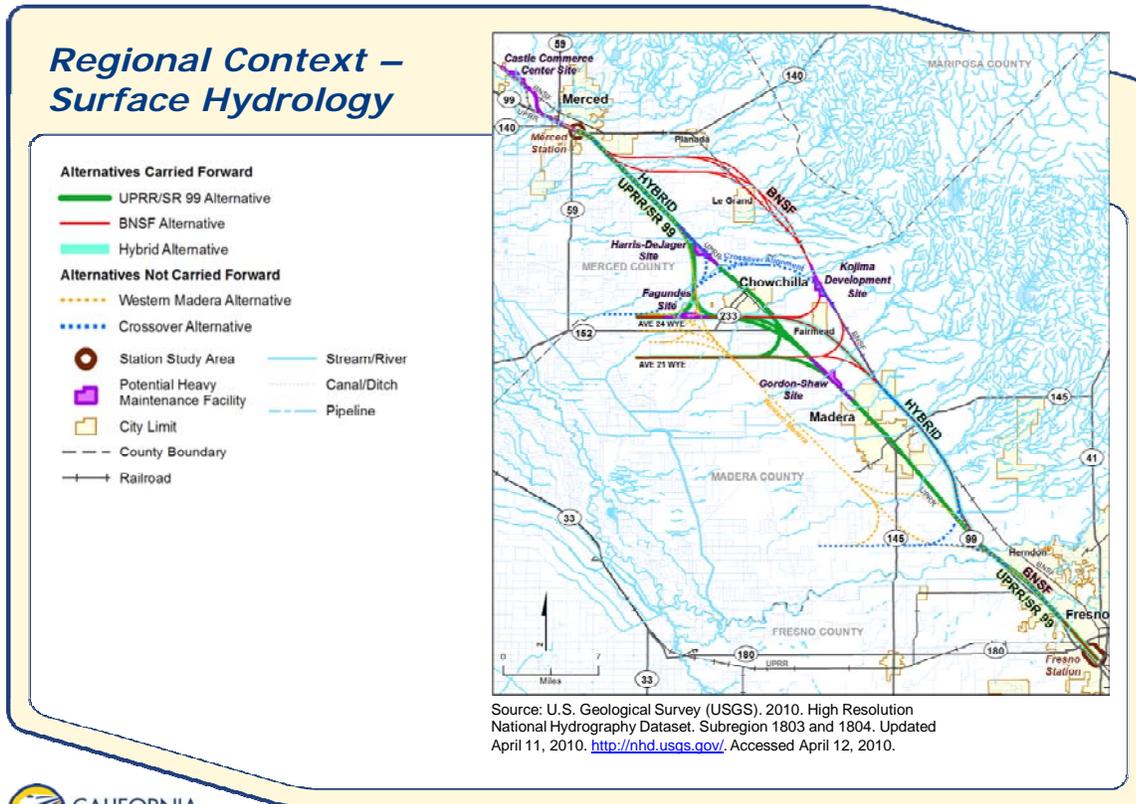


The remainder of this presentation will provide a cross walk for the 404 alternatives analysis process. These next few slides demonstrate a general context for the Merced to Fresno Section of the High Speed Rail Project. True to the focus of the 404 process, the context focuses on the natural systems that would be affected by this project, beginning with the surface hydrology, 100-year floodplains, sensitive species and habitats, and open space lands and reserves.

More than 80% of the land is covered by farms and ranches (Natural Resources Conservation Service [NRCS] 2006). Large areas of Northern Hardpan Clay Vernal Pool habitat occur east of SR 99 and along the Eastman Lake-Bear Creek Environmental Connectivity Area (ECA), which extends in an east-west direction crossing SR 99 between Merced and Chowchilla (Spencer et al. 2010). Camp Pashayan (within the San Joaquin Ecological Reserve), which is located just east of the UPRR bridge on the south side of the San Joaquin River in Fresno, is a California Department of Fish and Game (CDFG)-owned property designated as an ecological reserve. Developed areas within or near the habitat study area include Merced, Chowchilla, Madera, Fresno, and Le Grand. Special-status plant communities are uncommon within the habitat study area and are limited to uncultivated areas supporting coastal and valley freshwater marsh, and narrow bands of riparian habitat along rivers, creeks, and sloughs.

Six special-status plant communities and other natural communities described within the California Natural Diversity Database (CNDDDB) are reported to occur in the region: Great Valley mixed riparian forest, northern hardpan clay vernal pool, northern claypan vernal pool, valley sacaton grassland, valley sink scrub, sycamore alluvial woodland, and coastal and valley freshwater marsh (CNDDDB 2010).

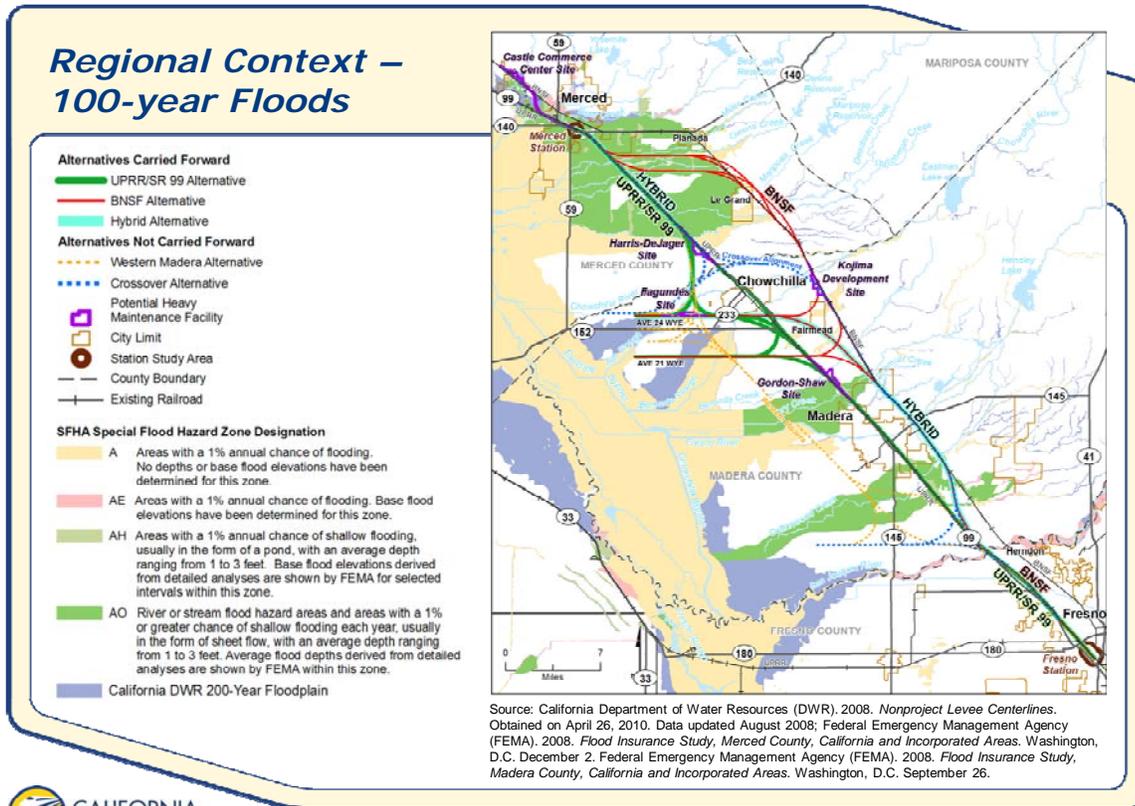
Hydrologic features (rivers, creeks, canals, etc.) in the region generally flow to the west and southwest, with a greater density of features occurring at the northern end of the project near Merced.



The waterways and wetland maps and Attachment 3, the *Aquatic Sites and Waters of the U.S. Potentially Affected by Alternatives Considered Technical Memorandum*, provide additional information. The image above only provides an overview of the natural and created waterways (i.e., surface hydrology). The project lies in the San Joaquin River Basin, which drains to the Sacramento-San Joaquin Delta via the San Joaquin River and its major tributaries, the Fresno, Merced, Tuolumne, and Stanislaus rivers (Department of Water Resources [DWR] 2004). Approximately 17 natural watercourses in the project area drain from east to west and eventually join the San Joaquin River. However, waterways include improved flood control or drainage channels, river and stream channels, and sloughs. Each alternative crosses the same waterways, but some alternatives cross the natural waterways more than once due to the wyes or north-south alignment design options. The differences can be that the place where the alternatives cross may vary in their degree of habitat value.

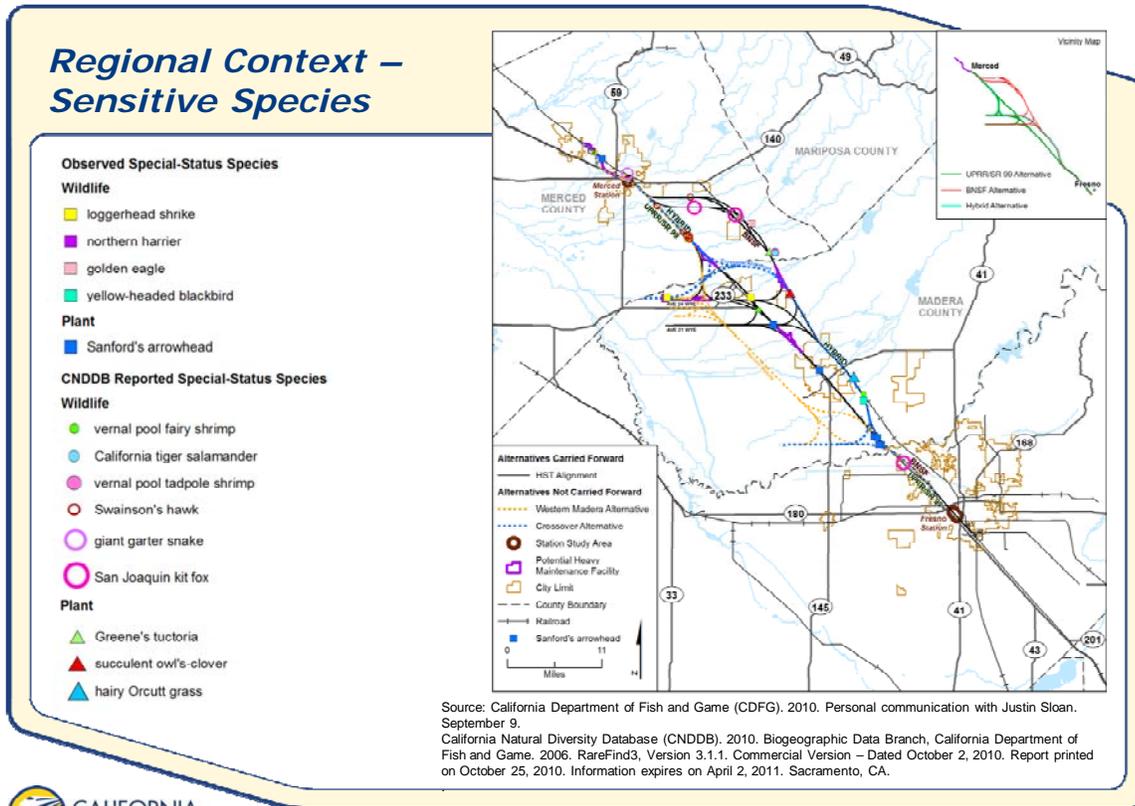
Currently, two water bodies are impaired—Bear Creek and San Joaquin River (Friant Dam to Mendota Pool)—because of mercury from resource extraction and exotic species, respectively. Proposed 303(d) listings indicate impairments due to herbicides and pesticides from agriculture, bacteria from urban areas and/or agriculture, and toxicity from unknown sources (Central Valley Regional Water Quality Control Board [RWQCB] 2008).

Farmers and other agricultural producers pump groundwater and surface water to and from numerous canals and drains delivering irrigation water to and from agricultural fields. Composed of packed earth or concrete-lined, canals generally lack the meanders, vegetation, biota, and other features of natural streams. Merced Irrigation District, Chowchilla Water District, Madera Irrigation District, and Fresno Irrigation District act as purveyors of irrigation water in the project vicinity.



Much of the region is in a floodplain, which has a relatively flat gradient that generally slopes slowly to the west or southwest. When the stream channels overflow, shallow, 1- to 3-foot-deep overland flooding occurs that tends to pond against linear obstacles such as canal levees and road and railroad embankments lying perpendicular to the land gradient. If these facilities lack sufficient culverts or other means of cross drainage, the overland flows can be diverted for long distances before finally overflowing

Two types of events trigger floods in the San Joaquin Valley: 1) rainfall occurring in the late fall and winter in the foothills and on the valley floor; and 2) snowmelt from the Sierra Nevada Mountains occurring in the late spring and early summer (Merced County 1990). Floodplains provide floodwater storage (which reduces the risk of downstream flooding). Within most urban areas, levees and upstream dams control floods. Many rural areas, however, are subject to shallow flow or ponding, which is typically 1 to 3 feet deep and spreads out over extensive areas. Shallow flooding occurs primarily due to overflows of stream channels when flows exceed the capacity of the channels.



There are 35 special-status plant species and 56 special-status wildlife species, as cited by CNDDDB and the California Native Plant Society (CNPS), reported to occur in the region (CNDDDB 2010, CNPS 2010). A list was compiled of the special-status plant species with potential to occur in the region based on CNDDDB and CNPS occurrence data, and the potential for a particular special-status plant and wildlife species to occur was assessed based on the presence or absence of suitable habitat identified in the habitat study area. Each special-status species was ranked as having no potential, unlikely potential, low potential, moderate potential, or high potential to occur in the habitat study area.

Wetland Feature/Water of the U.S. with Moderate/High Value and/or Protected Species

| Common Name | Mixed Riparian | Vernal Pool | Freshwater Marsh | | Constructed Basins Retention Basin | Natural Watercourses Stream Channel | Constructed Watercourses Ditch/Canal |
|-------------------------------------|----------------|-------------|------------------|----------------------|---------------------------------------|--|---|
| | | | Wet Meadow | Fresh Emergent Marsh | | | |
| Conservancy fairy shrimp | | X | | | | | |
| Vernal pool fairy shrimp | | X | | | | | |
| Vernal pool tadpole shrimp | | X | | | | | |
| Valley elderberry longhorn beetle | X | | | | | | |
| California tiger salamander | | X | | | | | |
| Western spadefoot toad | | | | | | | |
| Western pond turtle | X | | | | | X | X |
| White-tailed kite | X | X | X | X | | X | |
| Bald eagle | X | | | | | X | |
| Northern harrier | | X | X | X | | | |
| Swainson's hawk | X | X | X | X | | X | |
| Golden eagle | | X | X | X | | | |
| Lesser sandhill crane | | | X | X | X | | |
| Greater sandhill crane | | | X | X | X | | |
| Snowy plover | | | | | X | X | |
| Loggerhead shrike | | | | | X | | X |
| Yellow warbler | X | | X | | | | |
| Yellow-breasted chat | X | | | | | | |
| Belding's savannah sparrow | | X | X | | X | | |
| Song sparrow ("Modesto" population) | X | X | X | X | | | |
| Tricolored blackbird | X | X | | X | X | | |
| Western red bat | X | | | X | X | X | X |
| Pallid bat | X | | | X | X | | X |
| Western mastiff bat | X | | | X | X | X | X |
| San Joaquin kit fox | | | | X | | | |
| American badger | X | | | | | | |

Source: U.S. Fish and Wildlife Service (USFWS), 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. Region 1. Portland, OR. December 15, 2005.
 U.S. Fish and Wildlife Service (USFWS), 1998. *Recovery Plan for Upland Species of the San Joaquin Valley, California*. Region 1. Portland, OR.

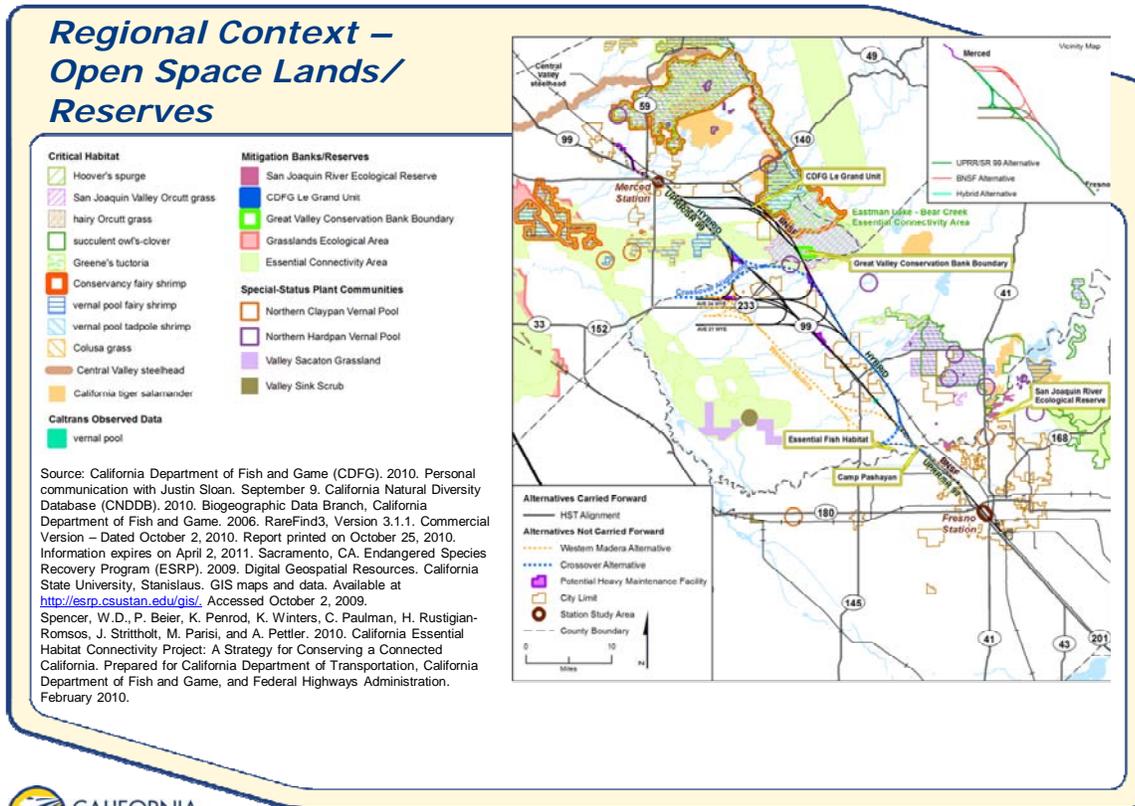


Regional Context – Sensitive Species

Likelihood of Occurrence of Sensitive Species by Alternatives

| Alternative | UPRR/SR 99 | BNSF | Hybrid | Western Madera | UPRR/SR 99 Crossover |
|---------------------------------|------------|------|----------|----------------|----------------------|
| Species | | | | | |
| <i>Likelihood of Occurrence</i> | | | | | |
| Loggerhead shrike | | | | | |
| Northern harrier | High | High | High | High | High |
| Sanford's arrowhead | High | High | High | High | High |
| Golden eagle | Low | High | Moderate | High | Low |
| Vernal pool fairy shrimp | Low | High | Moderate | High | Low |
| Vernal pool tadpole shrimp | Low | High | Moderate | High | Low |
| California tiger salamander | Low | High | Moderate | High | Low |
| Swainson's hawk | High | High | High | High | High |
| Giant garter snake | Low | Low | Low | Low | Low |
| San Joaquin kit fox | High | High | High | High | High |
| Greens tuctoria | Low | High | Moderate | High | Low |
| Succulent owl's clover | Low | High | Moderate | High | Low |
| Hairy orcutt grass | Low | High | Moderate | High | Low |
| Blunt nose leopard lizard | Low | Low | Low | High | Low |





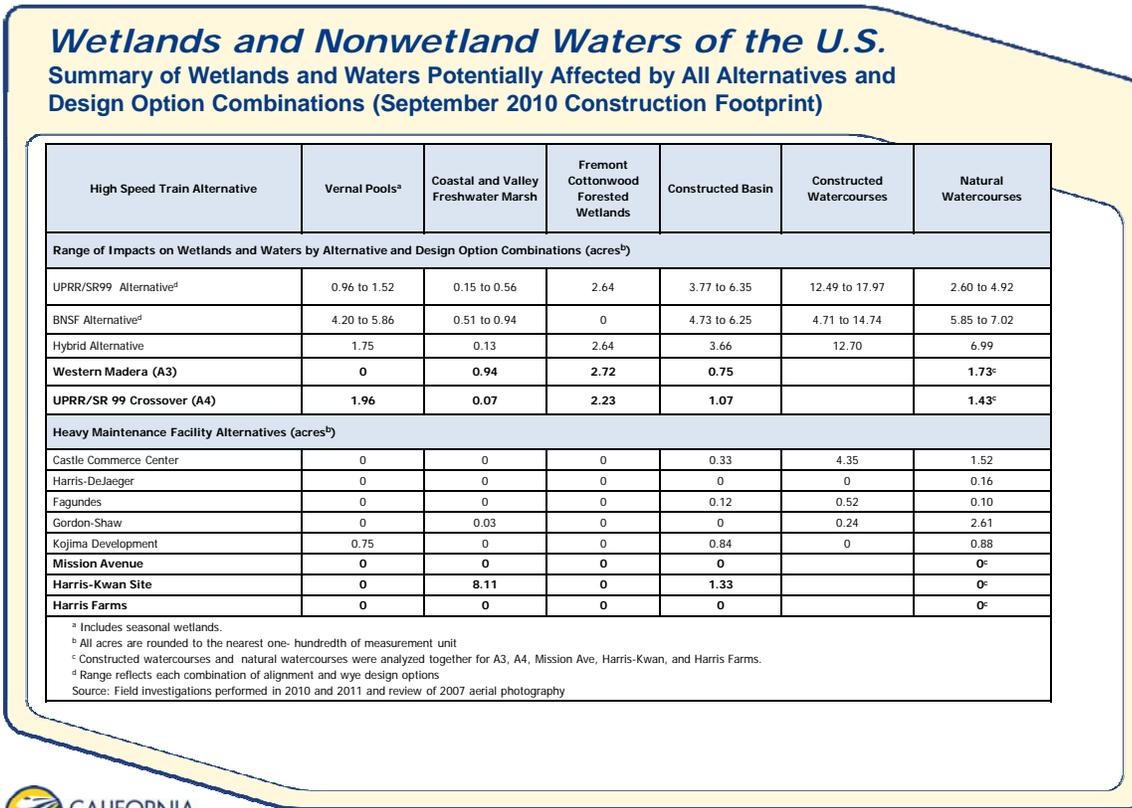
Habitats of concern in the habitat study area receive special protection by federal, state, and local regulations.

Essential Fish Habitat for Chinook salmon. NOAA Fisheries Service has designated the Middle San Joaquin-Lower Chowchilla hydrologic unit (HU 18040001) (Pacific Fisheries Management Council 2003), which, while potentially suitable for Chinook salmon, is largely unoccupied due to habitat degradation and managed fish barrier. The San Joaquin River Restoration Program is intended to restore flows and Chinook salmon to the San Joaquin River from Friant Dam to the confluence of the Merced River. Spring-run Chinook salmon are scheduled to be reintroduced to the San Joaquin River no later than December 2012 (Bureau of Reclamation et al. 2010).

The Sandy Mush Road wildlife linkage would connects an isolated habitat on the San Joaquin Valley floor and natural lands in the surrounding foothills (ESRP 2009, USFWS 1997) for the kit fox (*Vulpes macrotis mutica*) per the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) The Fresno kangaroo rat is unlikely to occur in the habitat study area and is not further addressed in this section. Potential habitat for the Blunt-nosed leopard lizard is only along the Western Madera Alternative (A3).

The Great Valley Conservation Bank covers a portion of the BNSF Alternative, and is located southeast of Le Grand near Santa Fe Ave and Marguerite Roads. This 1,067-acre bank site includes existing vernal pools and California annual grassland within critical habitat for San Joaquin Valley Orcutt grass and vernal pool tadpole shrimp. Special-status species that are found include California tiger salamander, vernal pool tadpole shrimp, vernal pool fairy shrimp, western spadefoot toad, western burrowing owl, and San Joaquin kit fox.

Camp Pashayan (within the San Joaquin Ecological Reserve) is a 31-acre property located just east of the UPRR bridge on the south side of the San Joaquin River in Fresno, within each of the HST alternatives. Sensitive species such as Sanford's arrowhead (*Sagittaria sanfordii*), white-tailed kite, and loggerhead shrike are reported to occur on the property. Riparian habitat along the San Joaquin River is adjacent to the property.



The slide provides summary information for all the alternatives and the HMF sites. The following slides provide additional information on the UPRR/SR 99 and the BNSF alternatives. These alternatives have a range of impacts because they can combine alignment and wye design options. As noted in the *HST Merced to Fresno Section, Aquatic Sites and Waters of the United States Potentially Affected by Alternatives Considered Technical Memorandum*, the analysis for the three alternatives and five HMF sites carried forward differs from the analysis performed for the alternatives and HMF sites not carried forward. All of the alternatives used aerial imagery from 2007; however, the alternatives that have been carried forward have included additional field verification completed in early 2011. Additionally, the UPRR/BNSF Crossover would cross the Chowchilla River two times. This crossing and nearly every Western Madera crossing would be in areas where no other transportation corridor currently exists, as opposed to UPRR/SR 99, BNSF, and Hybrid alternatives, which typically are adjacent to existing crossings.

Each alternative and the HMF sites impact wetlands and/or non-wetland waters to various degrees. Overall, the BNSF Alternative results in a greater level of impacts on vernal pools, no matter which design option or wye is selected because the vernal pools are located near the north-south alignment of the BNSF, but over the 90 plus miles, it has less than 5 acres of impact. The Western Madera Alternative is the only alternative that does not result in any impacts on vernal pools, and the other alternatives have similar impacts. All the alternatives result in less than 1 acre of impact on Coastal and Valley Freshwater Marshes and, except the BNSF, have the same level of impact on Fremont Cottonwood Forested Wetlands. The BNSF does not result in any impacts.

Of the HMF sites that have been carried forward, there are small impacts on wetlands and three of the alternatives do not result in any impacts. The Harris-Kwan site, which is no longer under consideration as described previously, would have the greatest wetland impacts. The Castle Commerce Center results in the greatest level of impact on Constructed Watercourses and Gordon-Shaw has the greatest impact on natural watercourse.

Direct Effects on Wetlands and Waterways by Option

Wetlands and Waters Potentially Affected by the UPRR/SR 99 Alternative (September 2010 Construction Footprint)

| UPRR/SR 99 Alternative | Vernal Pools ^a | Coastal and Valley Freshwater Marsh | FCFW ^c | Constructed Basin | Constructed Watercourses | Natural Watercourses |
|---|---------------------------|-------------------------------------|---------------------|---------------------|--------------------------|----------------------|
| Impacts by Project Alternative, Wyes, and Design Option Combinations (acres^b) | | | | | | |
| UPRR/SR99 with East Chowchilla DO & Ave 24 Wye | 0.88 | 0.10 | 2.64 | 3.70 | 9.44 | 3.65 |
| UPRR/SR99 with West Chowchilla DO & Ave 24 Wye | 0.80 | 0.05 | 2.54 | 3.94 | 6.77 | 2.97 |
| UPRR/SR99 with East Chowchilla DO & Ave 21 Wye | 1.08 | 0.12 | 2.64 | 2.65 | 12.42 | 2.23 |
| Total Range of Impacts | 0.80 to 1.08 | 0.05 to 0.12 | 2.54 to 2.64 | 2.65 to 3.94 | 6.77 to 12.42 | 2.23 to 3.65 |
| ^a Includes seasonal wetlands. ^b All acres are rounded to the nearest one-hundredth of measurement unit ^c Fremont Cottonwood Forested Wetlands Source: May 2009 Field Investigations and review of aerial photography (Mapcon Mapping, Ltd. 2007. Aerial imagery of California South San Joaquin Project flown February and March, 2007 using a Leica RC-30 Camera. NAD 83, UTM Zone 10. Prepared September 17, 2007.) | | | | | | |



Direct Effects on Wetlands and Waterways by Option

Wetlands and Waters Potentially Affected by the BNSF Alternative (September 2010 Construction Footprint)

| BNSF Alternatives | Vernal Pools ^a | Coastal and Valley Freshwater Marsh | FCFW ^c | Constructed Basin | Constructed Watercourses | Natural Watercourses |
|--|---------------------------|-------------------------------------|-------------------|---------------------|--------------------------|----------------------|
| Impacts by Project Alternative, Wyes, and Design Option Combinations (acres) | | | | | | |
| BNSF north-south with Ave 24 Wye | 1.65 | 0.06 | 0 | 4.2 | 2.22 | 3.89 |
| BNSF north-south with Ave 21 Wye | 1.68 | 0.07 | 0 | 3.95 | 4.69 | 3.41 |
| Le Grand Design Options (acres^b) | | | | | | |
| Mission Ave | 1.36 | 0 | 0 | 0.11 | 1.09 | 1.23 |
| Mission Ave East of Le Grand | 2.81 | 0 | 0 | 0.11 | 2.27 | 1.13 |
| Mariposa Way | 1.34 | 0 | 0 | 0 | 0.97 | 1.42 |
| Mariposa Way East of Le Grand | 1.63 | 0 | 0 | 0.51 | 1.14 | 1.81 |
| Impact of Components Combined (acres^b) | | | | | | |
| BNSF Alternative, Ave 24 Wye | 2.99 to 4.46 | 0.06 | 0 | 4.2 to 4.71 | 3.19 to 4.49 | 5.02 to 5.70 |
| BNSF Alternative, Ave 21 Wye | 3.02 to 4.49 | 0.07 | 0 | 3.95 to 4.46 | 5.66 to 6.96 | 4.54 to 5.22 |
| Total Range of Impacts | 2.99 to 4.49 | 0.06 to 0.07 | 0 | 3.95 to 4.71 | 3.19 to 6.96 | 4.54 to 5.70 |
| ^a Includes seasonal wetlands. ^b All acres are rounded to the nearest one-hundredth of measurement unit ^c Fremont Cottonwood Forested Wetland Source: May 2009 Field Investigations and review of aerial photography (Mapcon Mapping, Ltd. 2007. Aerial imagery of California South San Joaquin Project flown February and March, 2007 using a Leica RC-30 Camera. NAD 83, UTM Zone 10. Prepared September 17, 2007.) | | | | | | |



Types of Wetlands and Waters of the U.S. in the Corridor



Agricultural Irrigation Ditch

Agricultural irrigation ditch adjacent to alfalfa field; UPRR/SR 99 and Hybrid alternatives; north of Deadman Creek. March 12, 2009

Typical Irrigation Canal along UPRR.
November 18, 2009



Types of Wetlands and Waters of the U.S. in the Corridor



Irrigation Canals

Russell Lateral looking north; UPRR/SR 99 and Hybrid alternatives. April 28, 2010

Russell Lateral looking south; UPRR/SR 99 and Hybrid alternatives. April 28, 2010



Types of Wetlands and Waters of the U.S. in the Corridor



Ash Slough at Hwy 99 overcrossing (UPRR/SR 99 Alternative); Looking east. December 8, 2009

Creek Crossings

Canal Creek at the Castle Commerce Center HMF overcrossing; looking to the northeast. December 8, 2009



Types of Wetlands and Waters of the U.S. in the Corridor



Stormwater retention basin west of Duck Slough; UPRR/SR 99 and Hybrid alternatives. April 28, 2010.

Retention Basin near Duck Slough

Dairy Waste Ponds; UPRR/SR 99 and Hybrid alternatives; south of Owens Creek. April 27, 2010



Dairy Waste Ponds



Types of Wetlands and Waters of the U.S. in the Corridor



Stormwater retention basin at almond hull processing plant near Road 24; UPRR/SR 99 Alternative. April 28, 2009

Stormwater Ponds (to left is almond hull processing plant)

Stormwater retention basin near Sharron Blvd; UPRR/SR 99 Alternative. April 28, 2010



Types of Wetlands and Waters of the U.S. in the Corridor

Vernal Pools



Vernal pool at the Kojima Development
HMF along the BNSF Alternative.
May 25, 2010

Vernal pool along the BNSF Alternative.
May 26, 2010



Next Steps

- Obtain EPA and USACE Concurrence on Range of Alternatives
- Submit Wetland Delineation for USACE review
- Seek guidance on permit preparation and submission
- Collaborate with engineering team to further avoid and minimize impacts

