Section 2.0 of the Los Angeles to San Diego via Inland Empire Alignment/Station Screening Evaluation Methodology

2.0 PARAMETERS/ASSUMPTIONS AND EVALUATION METHODOLOGY

Unless otherwise noted, the objectives, parameters, criteria, and methodologies described in this report are consistent with those applied in previous California high-speed train studies and documented in the *California High-Speed Train Program EIR/EIS, Task 1.5.2 – High-Speed Train Alignment/Station Screening Evaluation Methodology*[7].

2.1 PARAMETERS/ASSUMPTIONS

High-speed train alignment and station options were developed through consistent application of system, engineering, and operating parameters as described in Task 1.5.2. The parameters and assumptions applied are consistent with those applied in previous planning and engineering studies and are based on accepted engineering practice, the criteria and experiences of other railway and high-speed rail systems, and recommendations of VHS and maglev manufacturers.

2.1.1 Statewide Parameters/Assumptions

The design, cost, and performance parameters used in developing the alignment and station options are based on two technology groups (classified by speed) (Figure 2.1.1). The Very High Speed (VHS) group includes trains capable of maximum operating speeds near 220 mph (350 km/h) utilizing steel-wheel-on-steel-rail technology. Requirements for a VHS system include a dedicated, fully grade-separated right-of-way with overhead catenary for electric propulsion. It is possible to integrate a VHS system into existing conventional rail lines in congested urban areas given resolution of certain equipment and operating compatibility issues. The magnetic levitation (maglev) group utilizes magnetic forces to lift and propel the train along a guideway and is designed for maximum operating speeds above that of VHS technology. A maglev system requires a dedicated guideway and may share right-of-way but not track with conventional train systems.

Figure 2.1-1
VHS and Maglev Technology

VHS Train (Germany ICE)

Maglev (Transrapid)

[7] Parsons Brinckerhoff. *California High-Speed Train Program EIR/EIS, Task 1.5.2 – High-Speed Train Alignments/Stations Screening Evaluation Methodology*. Prepared for California High-Speed Rail Authority, May 2001.

High-speed train system engineering design parameters used in developing the alignments were documented in Task 1.5.2 and include speeds, geometry, and clearances for both steel-wheel-on-steel-rail (VHS) and maglev high-speed train technologies. The parameters and criteria, summarized in Table 2.1-1, are consistent with previous California high-speed train studies and are based on accepted engineering practice, the criteria and experiences of other railway and high-speed train systems, and recommendations of VHS and maglev manufacturers.

Table 2.1-1
Summary of Engineering Design Parameters

Parameter	Very High-Speed	Maglev
Double Track	Full	Full
Power Source	Electric	Electric
Grade Separations	Full	Full
Potential for Shared Use	Yes	No
Corridor Width ❑ **Desirable** ❑ **Minimum**	 100 ft (30.4 m) 50 ft (15.2 m)	 100 ft (30.4 m) 50 ft (15.2 m)
Top Speed	220 mph (350 km/h)	240 mph(1) (385 km/h)
Average Speed	125-155 mph (200-250 km/h)	145-175 mph (230-280 km/h)
Acceleration	0.4-1.3 mph/s[3] (0.6-2.1 km/h/s[4])	1.1-1.9 mph/s (1.8-3.2 km/h/s)
Deceleration	1.2 mph/s (1.9 km/h/s)	1.8 mph/s (2.9 km/h/s)
Minimum Horizontal Radius	500-650 ft (150-200 m)	1,150 ft (350 m) (2)
Minimum Horizontal Radius (at top speed)	15,600 ft @ 220 mph (4,750 m @ 350 km/h)	11,500 ft @ 240 mph (3,500 m @ 385 km/h)
Superelevation ❑ **Actual (Ea)** ❑ **Unbalanced (Eu)**	 7 in (180 mm) 5 in (125 mm)	 16° 5°
Grades ❑ **Desirable Maximum** ❑ **Absolute Maximum**	 3.5% 5.0%	 NA 10.0%
Minimum Vertical Radius Crest Curve (at top speed)	157,500 ft @ 220 mph (48,000 m @ 350 km/h)	205,700 ft @ 240 mph (62,700 m @ 385 km/h)
Minimum Vertical Radius Sag Curve (at top speed)	105,000 ft @ 220 mph (32,000 m @ 350 km/h)	137,100 ft @ 240 mph (41,800 m @ 385 km/h)
Horizontal Clearance (centerline of track to face of fixed object)	10 ft 4 in @ 220 mph (3.1 m @ 350 km/h)	9 ft 5 in @ 240 mph (2.8 m @ 385 km/h)
Vertical Clearance (top of rail to face of fixed object)	21 ft (6.4 m)	12 ft 2 in (3.7 m)
Track Centerline Spacing	15 ft 8 in @ 220 mph (4.7 m @ 350 km/h)	15 ft 9 in @ 240 mph (4.8 m @ 385 km/h)
Minimum Right-of-Way Requirements At-Grade/Cut-and-Fill/Retained Fill Aerial Structure Tunnel (Double Track) Tunnel (Twin Single Track) Trench/Box Section	 50 ft (15.2 m) 50 ft (15.2 m) 67 ft (20.4 m) 120 ft (36.6 m) 70 ft (21.3 m)	 47 ft (14.3 m) 49 ft (15 m) 67 ft (20.4 m) 120 ft (36.6 m) 73 ft (22.2 m)
Minimum Station Platform Length	1,300 ft (400 m)	1,300 ft (400 m)
Minimum Station Platform Width	30 ft (9 m)	30 ft (9 m)

Notes: 1- Top Speed Defined in Federal Maglev Deployment Plan
2- Transrapid USA, 1998.
3- mph/s – miles per hour-second
4- km/h/s – kilometers per hour-second

Based on the minimum requirements listed in Table 2.1-1, three general right-of-way parameters were utilized for the screening evaluation: (1) a minimum right-of-way corridor of 50 feet (15.2 meters) was assumed in congested corridors; (2) a 100-foot (30.4-meter) corridor was assumed in less developed areas to allow for drainage, future expansion and maintenance needs; and (3) a wider corridor was assumed in variable terrain to allow for cut and fill slopes and tunnels.

The overall operations strategy and conceptual service parameters that were assumed for high-speed train service in California are documented in Task 1.5.2. Specific scheduling and operations modeling analysis is currently underway and will be used in future detailed engineering and environmental analyses in the next phase of this study.

2.1.2 Los Angeles-to-San Diego-via-Inland Empire Corridor Parameter/Assumption Variances

No variances to engineering parameters were introduced.

2.2 EVALUATION METHODOLOGY

As listed in Table 2.2-1, a number of key evaluation objectives and criteria were developed based on previous studies with enhancements that reflect the Authority's high-speed train performance goals and criteria described in Task 1.5.2. These objectives and criteria have been applied in the screening of high-speed train alignment and station options developed as part of this process. Each of the evaluation criteria is discussed in Chapter 4.0, Alignment and Station Evaluation.

Table 2.2-1
High-Speed Train Alignment/Station Evaluation Objectives and Criteria

Objective	Criteria
Maximize Ridership/Revenue Potential	▪ Travel Time ▪ Length ▪ Population/Employment Catchment
Maximize Connectivity and Accessibility	▪ Intermodal Connections
Minimize Operating and Capital Costs	▪ Length ▪ Operational Issues ▪ Construction Issues ▪ Capital Cost ▪ Right-of-Way Issues/Cost
Maximize Compatibility with Existing and Planned Development	▪ Land Use Compatibility and Conflicts ▪ Visual Quality Impacts
Minimize Impacts to Natural Resources	▪ Water Resources ▪ Floodplain Impacts ▪ Threatened & Endangered Species Impacts
Minimize Impacts to Social and Economic Resources	▪ Environmental Justice Impacts (Demographics) ▪ Farmland Impacts
Minimize Impacts to Cultural Resources	▪ Cultural Resources Impacts ▪ Parks & Recreation/Wildlife Refuge Impacts
Maximize Avoidance of Areas with Geologic and Soils Constraints	▪ Soils/Slope Constraints ▪ Seismic Constraints
Maximize Avoidance of Areas with Potential Hazardous Materials	▪ Hazardous Materials/Waste Constraints

The engineering and environmental methodologies and assumptions used in evaluating the high-speed train alignment and station options are described in detail in Task 1.5.2.

2.2.1 Engineering Evaluation Criteria

The engineering evaluation criteria focus on cost and travel time as primary indicators of engineering viability and ridership potential. Items such as capital costs and travel times have been quantified for each of the alignment and station options considered. Other engineering criteria such as operational, construction, and right of way issues are presented qualitatively.

The evaluation criteria presented are consistent with the criteria applied in the previous corridor evaluation study and are based on accepted engineering practice, the criteria and experiences of other railway and high-speed train systems, and recommendations of VHS and maglev manufacturers.

A. LOS ANGELES UNION STATION-TO-SAN DIEGO-VIA-INLAND EMPIRE CORRIDOR ENGINEERING METHODOLOGY VARIANCES

No variances to the above-described evaluation criteria were introduced. All alignments were assessed using the same evaluation criteria.

2.2.2 Environmental Evaluation Criteria

The objectives related to the environment and the criteria used for evaluation are consistent with NEPA and CEQA. The environmental constraints and impacts criteria focus on environmental issues that can affect the location or selection of alignments and stations.

To identify potential impacts for the alignments and station locations, a number of readily available resource agency-approved Geographic Information System (GIS)-compatible digital data sources were used along with published information from federal, state, regional, and local planning documents and reports. For evaluation of alignments and stations, right-of-way widths dictated by engineering requirements were utilized to identify the amount of area within each segment containing certain characteristics. Some environmental issues required using various buffer widths that extended beyond the conceptual right-of-way for the segments. Where noted, field reconnaissance was required to view on-the-ground conditions and to provide relative values of certain resources.

A. LOS ANGELES UNION STATION-TO-SAN DIEGO-VIA-INLAND EMPIRE CORRIDOR ENVIRONMENTAL METHODOLOGY VARIANCES

Other than variances listed and discussed below, methodologies described in Task 1.5.2 were used in the evaluation of environmental issues.

<u>Visual Quality</u>

A series of visual simulations were created to gather opinions at public scoping meetings. The visual simulations were prepared to understand two primary points that would reveal how visual impacts should be evaluated.

1. How the public views the visual character of the infrastructure necessary for high-speed trains
2. The viewer's exposure and/or sensitivity to these structures

The objective of gathering responses to visual simulations is to understand the sensitivity of the community through which the train will be passing. In order to understand the perspective of the community, different construction types were superimposed on photographs of different landscape units.

There are no examples of very high-speed trains (maximum operating speeds near 220-mph [350]) within the United States. Therefore, it is difficult to assess how receptive the public would or would not be to a new high-speed train corridor.

There was considerable discussion among the members of the public about whether the impacts are to the viewer looking at the train or to the viewer on the train looking at the environment. Many respondents were enthusiastic about riding above grade so that the views from the train would be enhanced. Impacts to the community received more mention and more sensitivity. Therefore, the objective of gathering responses to visual simulations was to understand the sensitivity of the community through which the train would be passing. In order to understand the perspective of the community, different construction types were superimposed on photographs of different landscape units. A typical landscape unit might be a residential community, a commercial district, an open-space area, or natural landscape features such as a lake, a ravine, or a mountainside. In addition to these landscape units, another facet of sensitivity was analyzed: points of historical significance or recognized points of interest. These are smaller units, but contribute differently to the visual sensitivity. The following seven visual simulations were prepared and viewed by the public at the scoping meetings:

1. An at-grade facility in an industrial corridor
2. An aerial structure in front of a renovated historical train station (Pomona Station)
3. An aerial structure over a neighborhood to meet up with an existing rail corridor
4. An aerial structure in front of an historical landmark (San Gabriel Mission) (Figure 2.2-1)
5. An expanded rail trench in an existing residential neighborhood (Figure 2.2-2)
6. A new trench in an existing at-grade railroad corridor in a suburban environment
7. A tunnel into a natural hillside

Figure 2.2-1

Aerial Structure in Front of San Gabriel Mission

[Note: This is a characature of a high-speed train. More detailed engineering will be done at a later time.]

Figure 2.2-2
Expanded Rail Trench in Existing Residential Area
[Note: This is a characature of a high-speed train. More detailed engineering will be done at a later time.]

The visual assessment is based upon feedback received from public comments on the visual simulations on over 40 comment cards from members of the public at the following scoping meetings: Los Angeles, Riverside, and San Diego. The responses from each scoping meeting consistently rated aerial structures in front of historic buildings as a negative impact to the community. Respondents also preferred the trench-and-tunnel alternatives. Variances were found in how communities felt about at-grade facilities and aerials that passed by residential communities. However, opinions varied closely around a neutral impact.

Visual Character of Very High-Speed and Magnetic Levitation (Maglev) Trains

There are two technologies being considered along these corridors. The first is steel-wheel-on-steel-rail. There are examples of this type of train in Europe and Asia. Of the two technologies being evaluated, the steel-wheel–on-steel-rail is more familiar because it has been employed successfully in several countries. Because this system is electrified, there are catenaries, which appear similar to utility lines that connect with an electric pantograph on top of the train. These poles extend from the rail alignment upward 25 feet (7.6 meters). The trains are modern and have jet-like designs. If the elevated tracks were over existing transportation corridors, then the piers would support a platform a minimum of 20 feet (6.1 meters) in the air, placing the windows of the train approximately 30 feet (9.1 meters) in the air, the equivalent of a three-story building.

The second technology is called Magnetic Levitation (Maglev). The electrification of this technology is actually in the rail guideway and, therefore, there are no catenary poles. Maglev would likely require elevated structures for most of the alignment. The typical height would be similar to a steel-wheel-on-steel-rail in that the elevated structure would be a minimum of 20 feet (6.1 meters) high. Again, the passenger windows of the train would be approximately 30 feet (9.1 meters) from the ground. The appearance of the train is a metal shell that wraps around the rail line, like a monorail, thus appearing wider than most passenger rail trains (see Figure 2.1-1).

At the public meetings, the train technology and resulting visual effect have not been determining issues.

Visual Character of Station Locations

Specific station plans have not been developed. Stations will be designed and developed in cooperation with the hosting community and stakeholders in keeping with the local zoning ordinances and design standards. However, there are two factors that may serve as sensitive visual determinants:

- The environmental scale of the area where the station is being placed
- The historical context of the environment

High-speed train stations would be similar to a regional commercial airport in scale and the need to provide expedient through-movement of passengers. The station locations would likely need to include a 400-meter-long platform, substantial parking, internal circulation for passenger drop-off and pick-up for automobiles, buses, and taxis. Space would be needed for other services, such as rental cars, food, and other amenities. All these services would demand a relatively large land area. If a station location is being proposed in an older downtown location where blocks are typically 500 feet (152.0 meters) by 500 feet (152.0 meters), a station location could require many blocks, thereby introducing a new scale to the environment.

The other consideration is the historical context. While it is preferable to construct intermodal facilities in conjunction with existing train stations, it may be difficult to accommodate the addition of a grade separated system, and necessary support services, and still preserve the context of historic train stations. Public responses to the visual simulations of an aerial structure at an historic station underscored their preferences for maintaining the historical context of the station.

Based upon the visual simulation comment cards, Table 2.2-2 illustrates how construction type has varying degrees of receptability, depending on the landscape unit from the viewer of the train passing by low, medium, and high, with high meaning most negative impact.

Table 2.2-2
Key for Visual Impact of Train Passing by Viewer in Community by Construction Type and Landscape Unit

	Type of Construction			
Landscape Unit	**At-Grade**	**Aerial**	**Tunnel**	**Trench**
Urban-Residential	Medium	High	Low	Medium
Urban-Commercial	Medium	Low	Low	Low
Urban-Industrial	Low	Low	Low	Low
Downtown/City Center	Low	Medium/High	Low	Medium
Open Landscape	Medium	Medium	Low	N/A
Point of Interest	Medium/High	High	Low	Medium

This analysis has been completed for each alternative. An example of one corridor analysis is shown in Table 2.2-3, with high meaning most negative impact.

Table 2.2-3
Detailed Visual (Sample)

Alignment Alternative	Segment/ Construction Type	Landscape Unit Type	Landscape Unit Length	Visual Assessment
Alternative Alignment 1.a. UP Colton				
Union Station to El Monte	Urban- Aerial	Industrial	(From Union Stn. to Alhambra)	Low
	Urban- Aerial	Commercial	(From Alhambra to El Monte)	Medium
	Urban- Aerial	Special Feature	(From San Gabriel Mission)	High
	Urban-Depressed	Industrial	(From Union Stn. to Alhambra)	Low
	Urban-Depressed	Commercial	(From Alhambra to El Monte)	Low
	Urban-Depressed	Special Feature	(San Gabriel Mission)	Medium
El Monte to Pomona/At-Grade	At-Grade	Commercial/ Industrial	(From El Monte to Pomona)	Medium
	At-Grade	Special Feature	(From Pomona Metrolink Station)	High
Pomona to Ontario Airport/At-Grade	At-Grade	Commercial	(From Pomona to Ontario Airport)	Medium
Ontario Airport to Riverside	Urban- Aerial	Industrial	(From Ontario to Colton)	Low
	Aerial	Residential	(From Colton to Riverside)	High
	Depressed	Industrial	(From Ontario to Colton)	Low
	Depressed	Residential	(From Colton to Riverside)	Medium
Riverside to March ARB	Aerial	Residential	(From Riverside to UCR)	High
	At-Grade	Industrial	(From UCR to March ARB)	Low

Alignment Evaluation/Comparison—Los Angeles Union Station to March ARB: The visual impact assessment for alignment alternatives reflects on the compatibility with adjacent land uses (views of the project) and visual appeal for the user. However, it should be noted that frequently, the visual impact from the community's perspective is juxtaposed from that of the user. For instance, a tunnel may be very acceptable to the community to prevent cut/fill scars on the hillside, but the rider is in the dark and not able to take advantage of the terrain for vast viewshed opportunities. For screening purposes, the view of the train from the community's perspective was weighted higher value to avoid overly neutralizing visual impacts. A full description of the adjoining land uses is found in Section 4 (D) of this report and, therefore, the following highlights only a general description and those points of visual sensitivity for each alignment.

Screening for Alignment. Each alignment option was analyzed by rail construction type and primary landscape unit. The type of construction results in potential visual impacts such as cut and fill, aerial structures, water crossings, and loss of vegetation or urban development. The landscape unit communicates who the viewers will be, whether it is park users, residential units or commercial establishments. Considering these variables, each alignment has been broken into construction type, consisting of:

- At-grade
- Aerial
- Tunnel
- Urban grade-separated—aerial or depressed (trench)

For purposes of screening and in view of the length of this rail segment, the corridor is analyzed in segments of predominant landscape settings, as follows:

- Urban residential to high-density residential
- Urban commercial—retail and office land uses
- Urban industrial—light to heavy industrial uses
- Suburban residential—low density residential
- Center city or downtown environment—core business district of the community
- Open landscape—including natural terrain, community parks, and agricultural areas
- Special landscape features—historical significance, parks of particular significance, such as a state or national park

Visual Assessment Screening for Station Locations. For purposes of screening, the visual assessment of station locations is simply an evaluation of environmental context and the ability for a station location to incorporate design elements in order to blend into the environment. Station locations are categorized by scale and historical significance. Scale refers to the size of urban development blocks. Blocks can be small, medium, or large, often depending on the era in which they were developed. Urban design in older eras was a walkable scale; thus block sizes were smaller and more condensed. The visual impact of a high-speed train station within an area of small blocks is viewed as a high contrast, while an area that has been built with large urban blocks can more easily incorporate a station location. Historical significance refers to the presence of historical buildings and landmarks. For example, the Pomona Metrolink Station is a refurbished historic train station located near the traditional downtown commercial center. According to public responses, a high-speed train system at such a location would produce a high visual impact. The station locations were evaluated in terms of low, medium, and high compatibility to fit the scale and historical context of the surroundings.

Water Resources

The methodology established in Task 1.5.2[8] was utilized as a general guidance to identify the potential water resources that would be impacted by the proposed alignments. As a first step in the analysis, the *Environmental Summary Report* was reviewed to preliminarily list the water resources (water bodies) identified in the document that would potentially cross the proposed alignments and station locations and therefore be potentially impacted. In the next step, Thomas Guide maps were referenced to confirm the identity of the water bodies. Next, the project GIS database was utilized to further refine the list of water bodies by the hydrographic features.

The GIS database was supplemented with water quality data, where applicable, from the Regional Water Quality Control Plans (Basin Plans) to determine the potential for water quality degradation. The Basin Plan identifies beneficial uses for major water bodies or hydrological

[8] California High Speed Rail Authority (CHSRA) Task 1.5.2.report (March 23, 2001)

units. Some examples of beneficial use include municipal (MUN), Industrial (IND), Water Contact Recreation (REC1), WET (Wetland Habitat), WILD (wildlife habitat), etc. The designated beneficial uses were reviewed for the list of water bodies to determine the potential impacts to these uses, as a measure of potential water quality impairment.

A two-day "windshield" survey was also conducted to "ground truth" wetland resources potentially occurring along the proposed alignments. Information gathered from this field assessment was additionally utilized to further refine the analysis of potential water quality impairments.

The following are the sources of information utilized for the analysis:

- Previous project evaluations including Parsons Brinckerhoff (1996, 1999, 2000)
- Review of the hydrographic features from the project GIS database
- The Los Angles Water Quality Control (Basin) Plan, 1994
- Review of aerial photography
- Thomas Guides

Construction of all proposed alignments would result in some potential impairment to beneficial uses and thereby would result in some level of water quality impacts. Construction-related impacts to water quality would occur from: changes to topography, drainage patterns, devegetation, and increase in impermeable surfaces. These actions would result in increased runoff, erosion, and turbidity and pollutant loadings into the water bodies. Spills from vehicles and other chemicals related to construction would also result in water quality impairment.

The analysis focused on identifying channelized and unchannelized water resources within the right-of-way alignments under consideration or adjacent to the segments and station areas. The degree of impairment to beneficial uses of water bodies in urban settings, such as portions of Rio Hondo and the Los Angles River, is less severe than those located in nonurban areas (portions of Santa Ana River and San Luis Rey River). Based on the information gathered from the analysis described above, the following assumptions can be made to broadly differentiate the potential impacts to urban water resources from that of nonurban (natural) water resources occurring along the proposed alignments:

- Most of the urban water bodies are channelized. The channel bed and banks of these waterways are not as vulnerable as natural channels to erosion impacts from an increase in runoff, either during the construction or operational phase of the project. In addition, generally most of the urban water bodies identified are located in relatively flat topography, which reduces the potential for excessive runoff, erosion and subsequent degradation of water quality.

- Drainage patterns associated with most of the urban water resources are not natural due to severe hydromodifications. Therefore, disruption of natural drainage patterns is not anticipated with urban water resources.

- Most of the urban water bodies generally do not support sensitive beneficial uses such as wildlife and wetland habitats. Impermeable surfaces adjoining the channel banks and rapid conveyance of water generally preclude such water bodies from supporting wetland systems and wildlife habitat.

- Urban water bodies are generally assigned industrial and noncontact recreational uses. Temporary impacts to such uses as a result of the proposed project are not considered to be severe.

Potential impacts to water resources located in nonurban settings could create constraints to project implementation through requirements to avoid impacting such resources. However, even with such natural water resources, permanent impacts could, in most cases, be avoided by minor

adjustments to the alignment. In these situations, impacts were ranked as being slight or no apparent impact. In contrast, for some alignments, significant impacts to water quality appear to be unavoidable and are likely since the alignment traverses close to these resources and there are limited options for alternate alignment siting. One such constraint is the proposed alignment along SR-91 and the Santa Ana River.

In most circumstances, effective implementation of comprehensive Best Management Practices (BMPs) implemented through a Storm Water Pollution Prevention Plan (SW3P), required for a National Pollutant Discharge Elimination System (NPDES) Construction General Permit for the project, should greatly reduce the level of impairment to the impacted resources.

Parks and Recreation/Wildlife Refuge Impacts

The California HSR GIS database was not utilized or supplemented as part of this analysis. In order to identify and analyze the impacts to publicly owned parks, recreation areas, and preserves/wildlife refuges, the alignment and station alternatives were overlaid on maps from the following resources:

- Thomas Bros. Maps. *The Thomas Guide 2001: Los Angeles and Orange Counties*. 2000.[9]
- Thomas Bros. Maps. *The Thomas Guide 2001: San Bernardino and Riverside Counties*. 2000.[10]
- Thomas Bros. Maps. *The Thomas Guide 2001: San Diego County*. 2000.[11]

In addition to the Thomas Guides, United States Geologic Survey (USGS) maps and aerial photographs were analyzed.

Once the alignment and station locations were determined on the maps, parks, recreation areas, and preserves/wildlife refuges were identified within and along the right-of-way. The following criteria were used to assess the impacts of each alternative on parklands:

- Proximity to a park, recreational area, or preserve/wildlife refuge
- Size and type of area impacted
- Number of sites impacted

Intermodal Connections/Land Use Compatibility

The methodology employed was to examine land use data supplied from the Southern California Association of Governments (SCAG) to determine the existing and general plan land uses along a 0.25-mile (0.4 kilometer) buffer of each proposed route and within 0.25-mile (0.4 kilometer) of each proposed station. Also analyzed was the presence of sensitive land uses to determine the most feasible routes and station sites given prescribed criteria. The prescribed criteria were threefold: (1) maximize compatibility with existing and planned land uses, (2) minimize potential conflict with sensitive land uses, and (3) maximize intermodal connectivity. The first two criteria were applied to the rail alignments; all three were applied to stations. In assessing the applicability of these criteria, several measures were used as summarized in Table 2.2-4.

[9] Thomas Bros. Maps. *The Thomas Guide 2001: Los Angeles and Orange Counties*. 2000

[10] Thomas Bros. Maps. *The Thomas Guide 2001: San Bernardino and Riverside Counties*. 2000.

[11] Thomas Bros. Maps. *The Thomas Guide 2001: San Diego County*. 2000.

Table 2.2-4
Criteria for Land Use Analysis

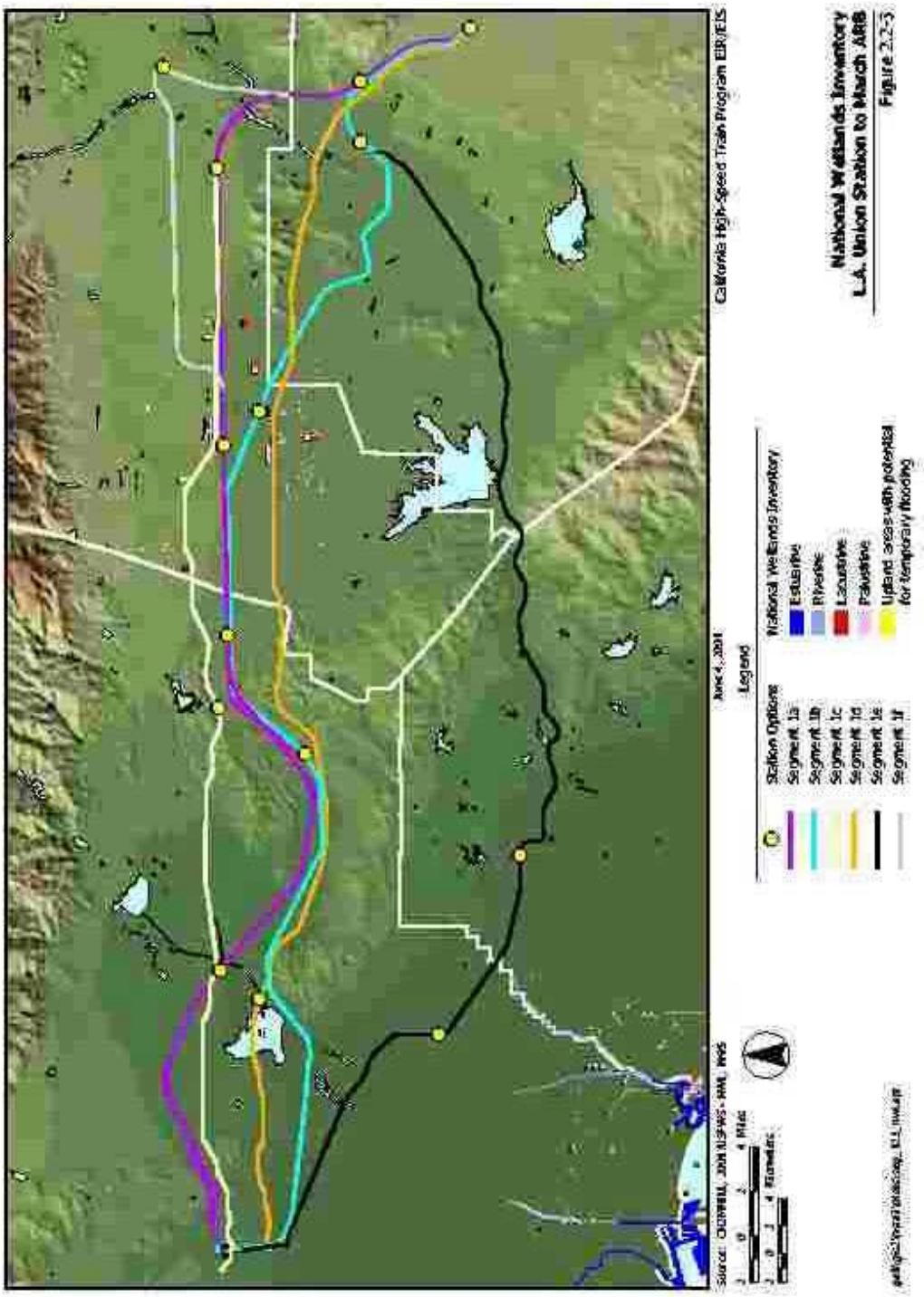
Criteria	Measures	Definitions	
1. Maximize Compatibility with Existing & Planned Land Uses	Land Uses	Mixed	No land use makes up more than 50% acreage
		Majority	One land use makes up more than 50% acreage
	Transition	Low	Less than 33% of land acreage will transition
		Medium	33 to 50% of land acreage will transition
		High	More than 50% of land acreage will transition
	Sensitive Uses	Noted as the presence of Parks/Recreation Area, Cultural Site, Hospital, Schools, Public Facilities, Cemetery, Regional Shopping Center, Military Base, Reservation, etc. within 0.25-mile of Alignment	
2. Minimize Conflict with Sensitive Land Uses	Environmental Justice	Low-Mod Income	More than 50% households earn less than 80% of mean family income
		High Minority	50% of pop is minority
		Both	Both a Low-Mod and high minority concentration
3. Maximize Intermodal Connectivity		Airports	Presence of site within 0.5-mile
		Transit	Presence of site within 0.5-mile
		Metrolink	Presence of site within 0.5-mile

Wetlands

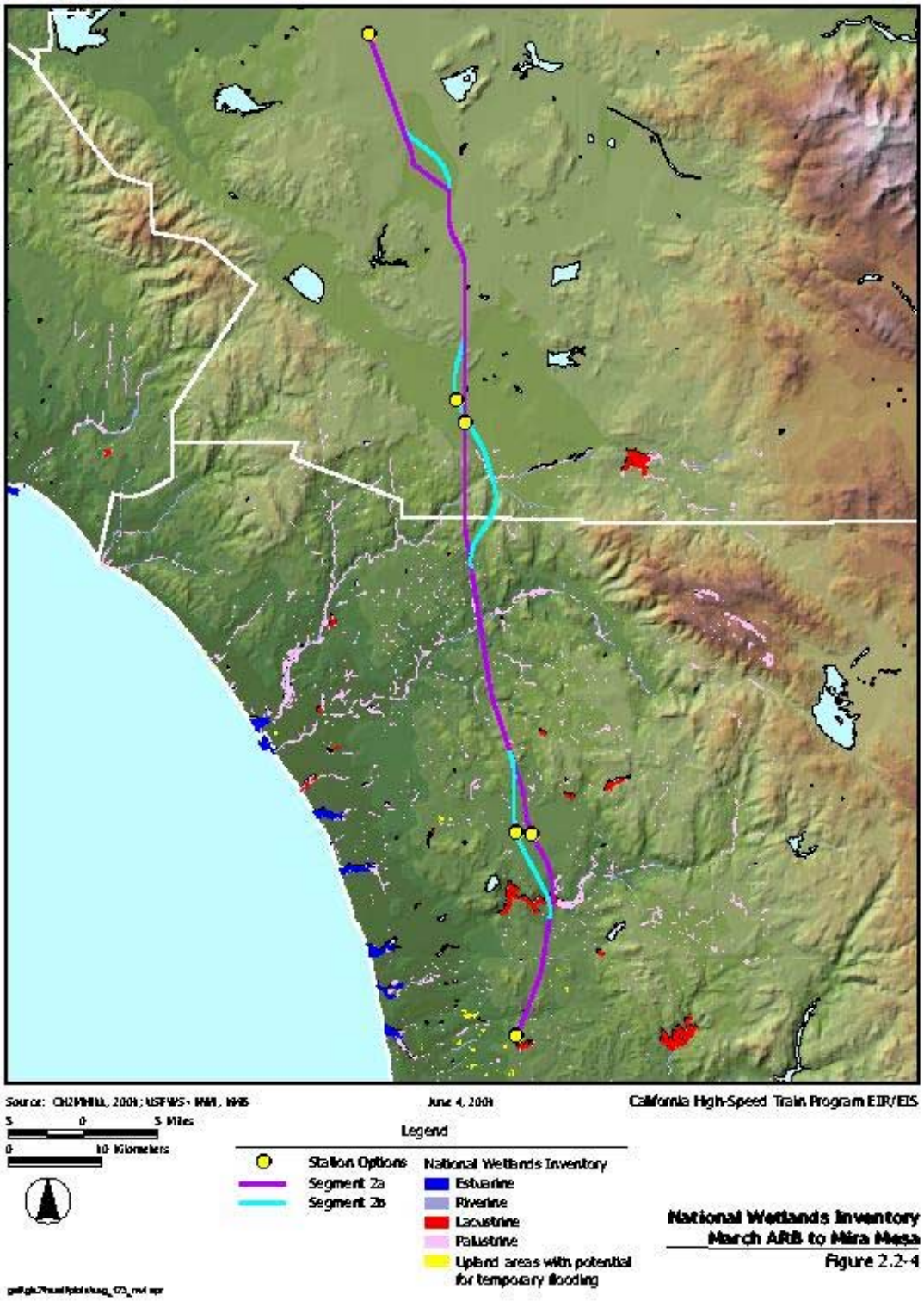
As a first step in the screening analysis, the methodology established in Task 1.5.2 was utilized as a general guidance to identify the potential wetland resources that the proposed alignments would impact. The *Environmental Summary Report*[12] also revealed information to further refine the scope of potential impacts to wetland resources. In the next step, CH2M HILL queried the National Wetlands Inventory (NWI) GIS database (Figures 2.2-3, 2.2-4, and 2.2-5). CH2M HILL performed a two-day "windshield" survey of the wetland resources potentially occurring along the proposed alignments to "ground truth" the wetland resources preliminarily identified as constraints because (a) the NWI maps are not entirely reliable sources of information as they do not reflect current field conditions and (b) the NWI database coverage provided for the analysis did not cover the entire project area. Relevant locations of wetlands were photographed and a few representative photographs are provided. See Figures 2.2-6 through 2.2-10.

Vernal pools are not indicated on the NWI database. Therefore, prior to initiating the field survey, we reviewed relevant maps to obtain information about potential vernal pools occurring in the project area, particularly in western Riverside County (Figure 2.2-11) and in MCAS Miramar (Figure 2.2-12).

12 (California HSR Authority, 2000)



National Wetlands Inventory
L.A. Union Station to March ARB
Figure 2.2-3


Source: CH2MHill, 2004; USFWS - NWI, NHD
June 4, 2004
California High-Speed Train Program EIR/EIS
5 0 5 Miles
0 10 Kilometers
Legend
Station Options
Segment 2a
Segment 2b
National Wetlands Inventory
Estuarine
Riverine
Lacustrine
Palustrine
Upland areas with potential for temporary flooding
National Wetlands Inventory
March ARB to Mira Mesa
Figure 2.2-4

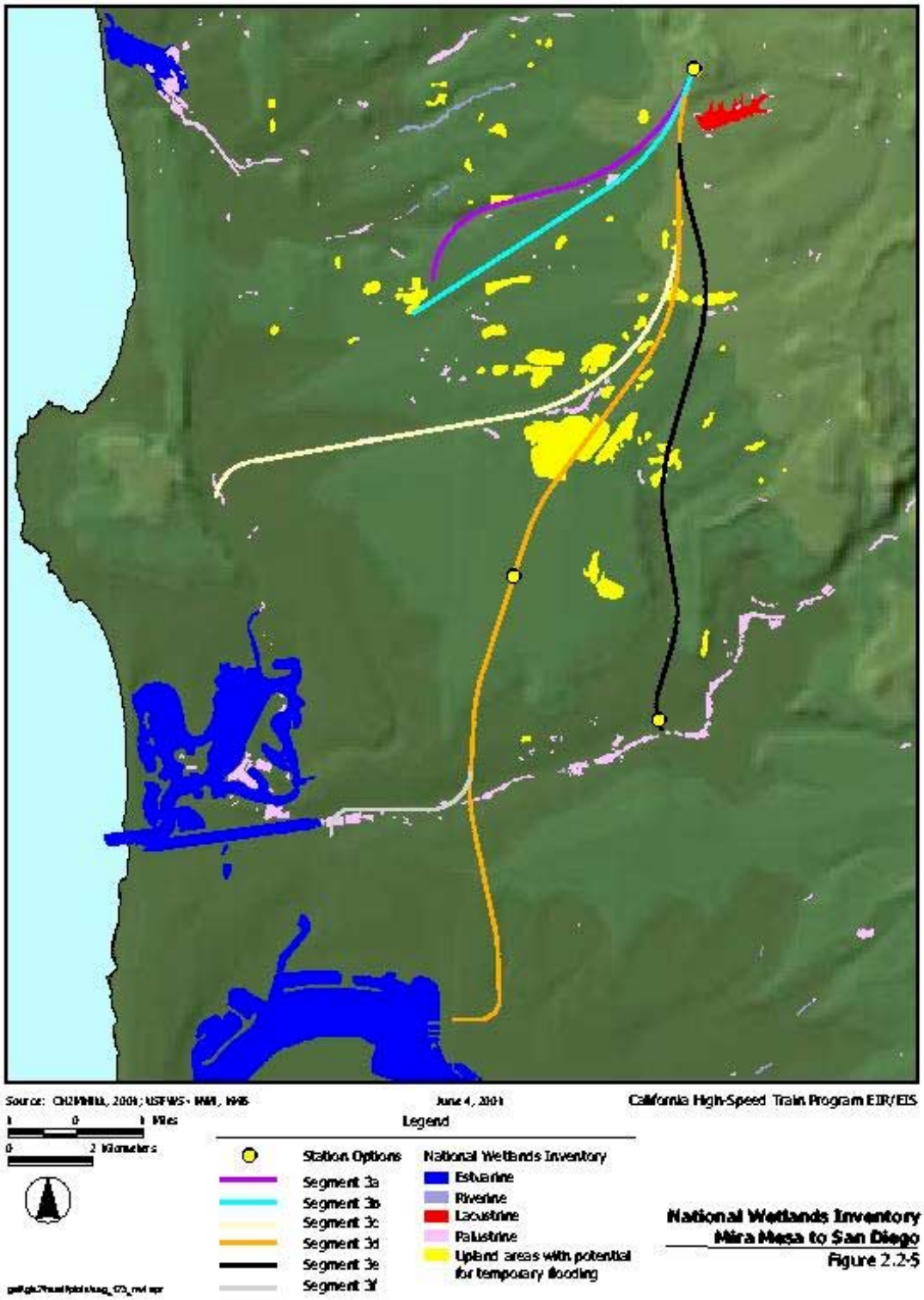

Source: CH2MHILL, 2004; USFWS - NWI, NHD
June 4, 2004
California High-Speed Train Program EIR/EIS
Miles
Kilometers
Legend
Station Options
Segment 3a
Segment 3b
Segment 3c
Segment 3d
Segment 3e
Segment 3f
National Wetlands Inventory
Estuarine
Riverine
Lacustrine
Palustrine
Upland areas with potential for temporary flooding
National Wetlands Inventory
Mira Mesa to San Diego
Figure 2.2-5

Figure 2.2-6
Riparian Habitat at San Luis Rey River, Off I-215

Figure 2.2-7
Marsh Wetland Habitat of San Dieguito River (Lake Hodges), Off I-215

Figure 2.2-8
Riparian Habitat Off San Clemente Canyon Road

Figure 2.2-9
Riparian Habitat of Santa Ana River Near Prado Basin, Off SR-91

Figure 2.2-10
Grasslands Off SR-91 in Riverside County,
Potential Vernal Pool Habitat and Habitat for Sensitive Flora and Fauna

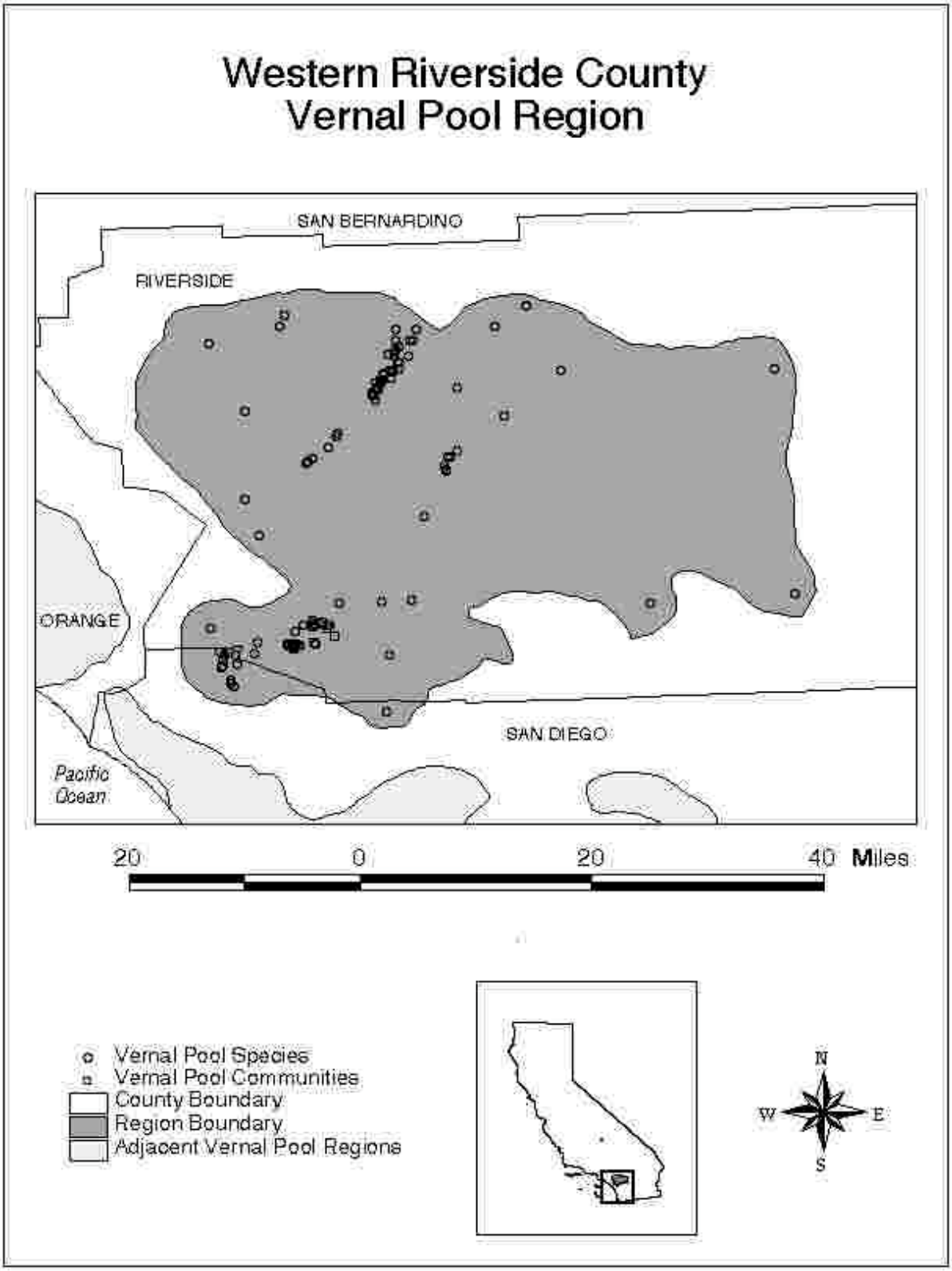

Western Riverside County
Vernal Pool Region
SAN BERNARDINO
RIVERSIDE
ORANGE
SAN DIEGO
Pacific Ocean
20
0
20
40 Miles
Vernal Pool Species
Vernal Pool Communities
County Boundary
Region Boundary
Adjacent Vernal Pool Regions
N
W
E
S

Figure 2.2-11

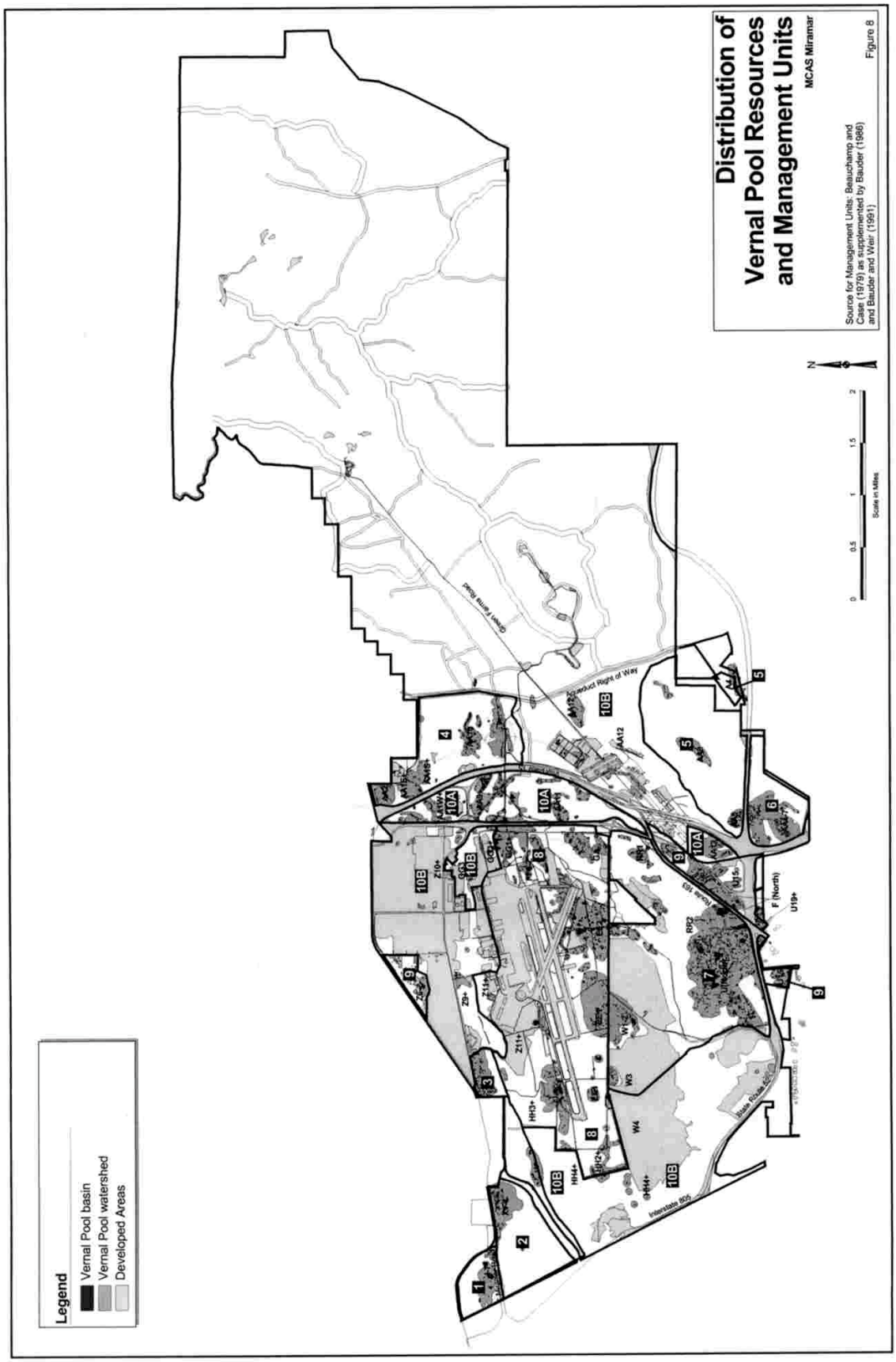

Distribution of
Vernal Pool Resources
and Management Units
MCAS Miramar
Figure 8
Source for Management Units: Beauchamp and Case (1979) as supplemented by Bauder (1986) and Bauder and Weir (1991)
Legend
Vernal Pool basin
Vernal Pool watershed
Developed Areas
Scale in Miles
Interstate 805
Aqueduct Right of Way

Figure 2.2-12

The following are the sources of information used in this screening evaluation:

- Previous project evaluations including Parsons-Brinckerhoff (1996[13], 1999[14], 2000[15])
- The California Natural Diversity Database (CNDDB)
- The California Department of Fish and Game (CDFG) Map of Vernal Pool locations in Western Riverside County[16]
- MCAS Miramar's Integrated Natural Resources Management Plan
- The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) [17]
- Review of general plans for several cities
- Review of aerial photography

The analysis focused on identifying only natural wetlands resources (unchannelized wetlands) within the right-of-way alignments under consideration or directly adjacent to the segments and station areas. These natural wetlands include riparian wetlands (associated with rivers, streams, creeks, etc.), vernal pools, and freshwater marsh habitats. Potential impacts to these habitats could create constraints to project implementation through requirements to avoid habitat or requirements for special mitigation or coordination with resource agencies.

Proximity of the alignment or station to the resource (i.e., potential habitat and/or known locations) and the sensitivity of the resource were the bases for determining the potential for impact. In many cases direct impacts easily could be avoided since habitat is not close to the alignment or minor adjustments to the alignment could avoid direct impacts. In these situations, impacts were ranked as being slight or no apparent impact. In contrast, for some alignments, direct impacts appear to be unavoidable and are likely to be significant since the alignment traverses high-value habitat occupied by sensitive, protected species of flora and fauna. In such circumstances, there is little opportunity for avoidance and limited options for mitigation.

Floodplains

The methodology established in Task 1.5.2 was utilized as a general guidance to identify floodplain crossings that potentially would be impacted by the proposed alignments. As a first step in the analysis, the *Environmental Summary Report*[18] was reviewed to preliminarily list the floodplain crossings. In the next step of the analysis, the project GIS database was utilized to determine the degree of impacts or encroachment into the floodplain for each proposed alignment, by using the floodplain attributes of the database. By definition, any construction activity (access roads, cut and fill, slope protection, etc.) within a base floodplain (the area subject to flooding by the base flood or a 100-year floodplain) is considered to be encroachment. By definition, a significant floodplain encroachment is defined in 23 Code of Federal Regulations (CFR) FR 650 subpart A, as an encroachment that would either interrupt emergency vehicles or evacuation routes, pose a significant risk, or create a significant adverse impact on natural and beneficial floodplain values during and following construction.

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13 Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation and Environmental Constraints Analysis*. California Intercity High-Speed Rail Commission, June 1996.

14 Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation*. Prepared for California High-Speed Rail Authority, December 1999.

15 Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation - Environmental Summary*. Prepared for California High-Speed Rail Authority, April 2000.

16 Western Riverside County Vernal Pool Region, http://maphost.dfg.ca.gov/wetlands/. Site accessed May 29, 2001

17 Western Riverside County Multiple Species Habitat Conservation Plan, http://ecoregion.ucr.edu/. Site accessed May 29, 2001.

18 (CHSRA, 2000)

The attributes of beneficial floodplain values, as defined by the Federal Highways Program Manual (FHPM) include, but are not limited to: wildlife, plants, wetlands, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

Based on the review of information and screening analysis, a general conclusion is made that construction of any of the proposed alignments would not result in emergency vehicle routes being hindered during construction or flooding. Further, the proposed project would not result in any significant new risks during construction or flooding, because the proposed high-speed train facility, for the most part, is above grade or in tunnel and, therefore, would result in Minimal increase in base flow; although this would depend on footing size and floodplain.

For this screening analysis, therefore, the proposed alignments were either identified as major (or significant) floodplain encroachment (high constraints) or minor floodplain encroachment (low constraints) based on the following criteria:

- Proposed alignments within the base floodplain with potential to impact natural and beneficial floodplain values.
- Proposed alignments located in Flood Zone A (The Federal Emergency Management Agency [FEMA] identifies projects located within Zone A [designated on the Flood Insurance Rate Maps or FIRMS] as potentially resulting in a higher degree of impact to the base floodplain and thereby resulting in impacts to the beneficial floodplain values.
- Proposed alignments resulting in a longitudinal encroachment (parallel to the floodplain) are identified as minor encroachment as opposed to a transverse encroachment (perpendicular to and crossing the floodplain). Longitudinal encroachments generally result in greater impacts to floodplain by virtue of their greater surface area of encroachment.
- Proposed alignments located within a flood zone designated as X were identified to be a minor encroachment (By definition, an alignment located in Zone X is anticipated to have minimum impact on the base floodplain and thereby would not substantially result in degradation of floodplain values.)

The following are the sources of information used for the analysis:

- Previous project evaluations including Parsons Brinckerhoff (1996[19], 1999[20], 2000[21])
- Review of the hydrographic features from the project GIS database
- Review of the FEMA Flood Insurance Rate Maps-Flood Zone Classification (GIS Database)
- Review of Aerial Photography
- Thomas Guides

Threatened and Endangered Species

The screening methodology for plant and animal species of special concern followed that established by Task 1.5.2. The analysis focused on identifying federally and state listed threatened and endangered species within the right-of-way or directly adjacent to the alignments and station areas, primarily using the GIS California Natural Diversity Database (CNDDB) (Figures 2.2-10, 2.2-11, and 2.2-12). Impacts to these species and their habitats could create constraints

[19] Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation and Environmental Constraints Analysis*. California Intercity High-Speed Rail Commission, June 1996.

[20] Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation*. Prepared for California High-Speed Rail Authority, December 1999.

[21] Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation - Environmental Summary*. Prepared for California High-Speed Rail Authority, April 2000.

to project implementation through requirements to avoid habitat or requirements for special mitigation or coordination with resource agencies.

The potential for impact was based on proximity of the alignment or station to the resource (i.e., potential habitat and/or known locations) and the sensitivity of the resource. In many cases, direct impacts easily could be avoided since habitat is not close to the alignment and minor adjustments to the alignment could avoid direct impacts. In these situations, impacts were ranked as being slight or no apparent impact. In contrast, for some alignments, direct impacts appear to be unavoidable and are likely to be significant since the alignment traverses high-value habitat occupied by protected species. In these circumstances, there is little opportunity for avoidance and limited options for mitigation. The full extent of this wont really be known until detailed surveys are conducted in the future.

Information sources used in this screening evaluation:

- Previous project evaluations including Parsons Brinckerhoff (1996[22], 1999[23], 2000[24])
- The California Natural Diversity Database (CNDDB)
- 2-day windshield survey of project area
- Integrated Natural Resources Management Plan for MCAS Miramar[25]
- The Western Riverside County Multiple Species Habitat Conservation Plan[26]
- Multiple Species Conservation Program for the City of San Diego
- Habitat Conservation Plan for the Stephens' Kangaroo Rat
- Review of General Plans for several cities
- Review of aerial photography

Cultural Resources Impacts

This analysis of potential project impacts to cultural resources was based on National Park Service (NPS) National Register site GIS database materials that included both mapping (Babel) and associated database files that list the names, addresses, and other pertinent information pertaining to known/recorded cultural resources. The database information includes historic properties actually listed in the National Register of Historic Places and also properties determined eligible for listing in the National Register. Each historic property listed in the database is given a "Reference Number" and the applicable Reference Numbers are used in the evaluation summary tables to designate the historic properties that are potentially impacted.

The GIS mapping was examined in conjunction with examination of the USGS base topographic maps with the alignment and station options superimposed. The methodology in Task 1.5.2 required that 50-foot (15.2-meter)-wide corridors (in urbanized/developed areas) and 100-foot (30.4-meter)-wide corridors (in less developed areas or areas where a large cut/fill might be needed) be screened for the presence/absence of historic properties.

Historic buildings/districts can be subject to adverse visual effects if a proposed aerial structure alters existing historic setting. Proposed high-speed train structures that would be visible from an entrance to a historic building could jeopardize the historic integrity of the building/ district's setting. Figures 2.2-13, 2.2-14, and 2.2-15 show the proximity of National Register sites to the proposed station options.

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22 Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation and Environmental Constraints Analysis*. California Intercity High-Speed Rail Commission, June 1996.

23 Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation*. Prepared for California High-Speed Rail Authority, December 1999.

24 Parsons-Brinckerhoff. *California High-Speed Rail Corridor Evaluation - Environmental Summary*. Prepared for California High-Speed Rail Authority, April 2000.

25 Dames & Moore. *Integrated Natural Resources Management Plan*. Prepared for Marine Corps Air Station Miramar, May 2000.

26 Western Riverside County Multiple Species Habitat Conservation Plan, http://ecoregion.ucr.edu/. Site accessed May 29, 2001.