CALIFORNIA HIGH-SPEED TRAIN

Program Environmental Impact Report/Environmental Impact Statement

Los Angeles – Orange County – San Diego

BIOLOGICAL RESOURCES TECHNICAL EVALUATION

January 2004

Prepared for:

California High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

CALIFORNIA HIGH SPEED RAIL AUTHORITY

U.S. Department of Transportation
Federal Railroad Administration

CALIFORNIA HIGH-SPEED TRAIN PROGRAM EIR/EIS

Los Angeles – Orange County – San Diego
Biological Resources
Technical Evaluation

Prepared by:

HDR

for

IBI Group

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ACRONYMS

Authority	California High-Speed Rail Authority
BVL	Buena Vista Lagoon
CCA	California Coastal Act of 1976
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
COG	Council of Governments
Conservancy	California Coastal Conservancy
CSS	Diegan Coastal Sage Scrub
CZMA	Coastal Zone Management Act
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HST	High Speed Train
JPC	Joint Powers Committee
LOSSAN	Los Angeles to San Diego Conventional Rail Corridor
NWI	National Wetlands Inventory
MTA	Metropolitan Transportation Authority
NEPA	National Environmental Policy Act
ROW	Right-of-Way
RTP	Regional Transportation Plan
SCE	Southern California Edison
STIP	State Transportation Improvement Program
UASCE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UTC	University Town Center

1.0 INTRODUCTION

The California High-Speed Rail Authority (Authority) was created by the Legislature in 1996 to develop a plan for the construction, operation, and financing of a statewide, intercity high-speed passenger train system.[1] After completing a number of initial studies over the past six years to assess the feasibility of a high-speed train system in California and to evaluate the potential ridership for a variety of alternative corridors and station areas, the Authority recommended the evaluation of a proposed high-speed train system as the logical next step in the development of California's transportation infrastructure. The Authority does not have responsibility for other intercity transportation systems or facilities, such as expanded highways, or improvements to airports or passenger rail or transit used for intercity trips.

The Authority adopted a *Final Business Plan* in June 2000, which reviewed the economic feasibility of a 1,127-kilometer-long (700-mile-long) high-speed train system. This system would be capable of speeds in excess of 321.8 kilometers per hour (200 miles per hour [mph]) on a dedicated, fully grade-separated track with state-of-the-art safety, signaling, and automated train control systems. The system described would connect and serve the major metropolitan areas of California, extending from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego. The high-speed train system is projected to carry a minimum of 42 million passengers annually (32 million intercity trips and 10 million commuter trips) by the year 2020.

Following the adoption of the Business Plan, the appropriate next step for the Authority to take in the pursuit of a high-speed train system is to satisfy the environmental review process required by federal and state laws which will in turn enable public agencies to select and approve a high speed rail system, define mitigation strategies, obtain necessary approvals, and obtain financial assistance necessary to implement a high speed rail system. For example, the Federal Railroad Administration (FRA) may be requested by the Authority to issue a *Rule of Particular Applicability*, which establishes safety standards for the high-speed train system for speeds over 200 mph, and for the potential shared use of rail corridors.

The Authority is both the project sponsor and the lead agency for purposes of the California Environmental Quality Act (CEQA) requirements. The Authority has determined that a Program Environmental Impact Report (EIR) is the appropriate CEQA document for the project at this conceptual stage of planning and decision-making, which would include selecting a preferred corridor and station locations for future right-of-way preservation and identifying potential phasing options. No permits are being sought for this phase of environmental review. Later stages of project development would include project-specific detailed environmental documents to assess the impacts of the alternative alignments and stations in those segments of the system that are ready for implementation.

The decisions of federal agencies, particularly the Federal Railroad Administration (FRA) related to high-speed train systems, would constitute major federal actions regarding environmental review under the National Environmental Policy Act (NEPA). NEPA requires federal agencies to prepare an Environmental Impact Statement (EIS) if the proposed action has the potential to cause significant environmental impacts. The proposed action in California warrants the preparation of a Tier 1 Program-level EIS under NEPA, due to the nature and scope of the comprehensive high-speed train system proposed by the Authority, the need to narrow the range of alternatives, and the need to protect/preserve right-of-way in the future. FRA is the federal lead agency for the preparation of the Program EIS, and the Federal Highway Administration (FHWA), the U.S. Environmental Protection Agency (EPA), the U.S. Corps of Engineers (USACE), the Federal Aviation Administration (FAA), the U.S. Fish and Wildlife Service (USFWS), and the Federal Transit Administration (FTA) are cooperating federal agencies for the EIS.

A combined Program EIR/EIS is to be prepared under the supervision and direction of the FRA and the Authority in conjunction with the federal cooperating agencies. It is intended that other federal, state,

[1] Chapter 796 of the Statutes of 1996; SB 1420, Kopp and Costa

regional, and local agencies will use the Program EIR/EIS in reviewing the proposed program and developing feasible and practicable programmatic mitigation strategies and analysis expectations for the Tier 2 detailed environmental review process which would be expected to follow any approval of a high speed train system.

The statewide high-speed train system has been divided into five regions for study: Bay Area-Merced, Sacramento-Bakersfield, Bakersfield-Los Angeles, Los Angeles-San Diego via the Inland Empire, and Los Angeles-Orange County-San Diego. This Biological Resources Technical Evaluation for the Los Angeles – Orange County – San Diego Region is one of five such reports being prepared for each of the regions on the topic, and it is one of fifteen technical reports for this region. This report will be summarized in the Program EIR/EIS and it will be part of the administrative record supporting the environmental review of alternatives.

1.1 ALTERNATIVES

1.1.1 No-Project Alternative

The No-Project Alternative serves as the baseline for the comparison of Modal and High-Speed Train alternatives (Figure 1-1). The No-Project Alternative represents the state's transportation system (highway, air, and conventional rail) as it existed in 1999-2000 and as it would be after implementation of programs or projects currently programmed for implementation and projects that are expected to be funded by 2020. The No-Project Alternative addresses the geographic area serving the same intercity travel market as the proposed high-speed train (generally from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego). The No-Project Alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed.

The No-Project Alternative defines the existing and future statewide intercity transportation system based on programmed and funded (already in funded programs/financially constrained plans) improvements to the intercity transportation system through 2020, according to the following sources of information:

- State Transportation Improvement Program (STIP)
- Regional Transportation Plans (RTPs) for all modes of travel
- Airport plans
- Intercity passenger rail plans (California Rail Plan 2001-2010, Amtrak Five- and Twenty-year Plans)

The No-Project Alternative for the Los Angeles-Orange County-San Diego Region includes highway expansion as well as conventional rail improvements to the existing LOSSAN corridor that are programmed and funded for implementation through 2020. Table 1-1 summarizes the infrastructure components of the No-Project Alternative for this Region. As with all of the alternatives, the No-Project Alternative will be assessed against the purpose and need topics/objectives for congestion, safety, air pollution, reliability, and travel times.

FIGURE 1-1

No-Project Alternative – California Transportation System

TABLE 1-1

PROGRAMMED IMPROVEMENTS INCLUDED IN THE NO-PROJECT ALTERNATIVE
LOS ANGELES-ORANGE COUNTY-SAN DIEGO REGION
(from 1998 and 2000 Regional Transportation Plans)

County	Type of Project	Description
INTERCITY HIGHWAY PROJECTS		
Los Angeles	HOV	HOV Project on SR-14 (Ave P-8 to Ave-L)
Los Angeles	HOV	HOV Project on I-710 (I-10 to I-210
Los Angeles	HOV	HOV Project on I-5 (SR-19 to I-710)
Los Angeles	Highway Widening	I-710 (I-10 to I-210) Additional Mixed Flow Lane
Los Angeles	Highway Widening	I-5 (Rosecrans to Orange Co) Additional Mixed Flow Lane
Los Angeles	Highway Widening	I-405 (US-101 to I-105) Additional Mixed Flow Lane
Los Angeles	Highway Widening	SR-57 (SR-60 to Orange Co) Additional Mixed Flow Lane
Orange	HOV	HOV Project on I-5 (SR-1 to Avenida Pico)
Orange	Highway Widening	I-5 (SR-91 to Los Angeles Co) Additional Mixed Flow Lane
Orange	Highway Widening	SR-91 (westbound auxiliary lane SR-57 to I-5) Additional Mixed Flow La
Orange	Highway Widening	SR-91 (auxiliary lanes SR-241 to SR-71) Additional Mixed Flow Lane
Orange	Highway Widening	SR-57 (auxiliary lanes Los Angeles Co to SR-91) Additional Mixed Flow Lane
San Diego	Highway Interchange/Widening	I-5 at I-805 – New interchange with 10 freeway and 2 HOV lanes.
San Diego	Highway Widening	I-5 from Mission Bay Drive to SR-52 – Addition of a northbound auxiliary lane.
San Diego	Highway Widening	I-5 at SR-78 Interchange: NB-EB Connector – Widen auxiliary lane and ramp.
San Diego	Highway Widening	I-15 from SR-163 to SR 78 – Addition of auxiliary lanes and meters. Bridge widening
San Diego	Highway Widening	I-15 from SR-56 to Centre City Parkway – Addition of 4 HOV/Managed lanes
San Diego	Highway Widening/HOV	I-5 from Del Mar Heights Road to Birmingham Drive – Upgrade from existing lane freeway to 12-lane freeway and 2 HOV lanes.
San Diego	Highway Interchange	I-15/SR-56 Interchange Ramp (EB-NB) – Loop ramp.
San Diego	Highway Widening/HOV	I-5 from Del Mar Heights Road to Encinitas Boulevard – Upgrade from 8-lane freeway to 12-lane freeway and 2 HOV lanes.
San Diego	Highway	I-5 from Encinitas Boulevard to La Costa Boulevard – Upgrade from 8-lane freeway to 10-lane freeway and 2 HOV lanes.
San Diego	Highway	I-15 from SR-163 to SR-56 – Addition of 4 HOV/Managed lanes.
San Diego	TSM	Intelligent Transportation Systems: Enhanced Incident/Emergency Response, Traveler/Commercial Vehicle Operations Information, and Management Syste Software.
CONVENTIONAL RAIL IMPROVEMENTS		
Los Angeles	Conventional Rail	Run through tracks at L.A. Union Station
Los Angeles	Conventional Rail	Continuous third main track from Union Station to Fullerton
Orange	Conventional Rail	Double tracking along Lincoln Avenue in Santa Ana
San Diego	Conventional Rail	Extension of Double-Track at San Onofre
San Diego	Conventional Rail	Extension of Double-Track in Oceanside
San Diego	Conventional Rail	Sorrento-Miramar Double-Tracking and Curve Realignment
San Diego	Conventional Rail	O'Neil to Flores Double-Tracking
San Diego	Conventional Rail	Santa Margarita River Bridge Replacement and Double-Tracking
San Diego	Conventional Rail	Fallbrook Junction Track Upgrades
San Diego	Conventional Rail	Del Mar Bluffs Stabilization
San Diego	Conventional Rail	False Bay Passing Track
San Diego	Conventional Rail	Tecolote Creek Track Improvements and Bridge Replacement

Source: Parsons Brinckerhoff, California High-Speed Train Program Environmental Impact Report/Environmental Impact Statement, *System Alternatives Definition,* November 18, 2002

1.1.2 Modal Alternative

There are currently only three main options for intercity travel between the major urban areas of San Diego, Los Angeles, the Central Valley, San Jose, Oakland/San Francisco, and Sacramento: vehicles on the interstate highway system and state highways, commercial airlines serving airports between San Diego and Sacramento and the Bay Area, and conventional passenger trains (Amtrak) on freight and/or commuter rail tracks. The Modal/System Alternative consists of expansion of highways, airports, and intercity and commuter rail systems serving the markets identified for the High-Speed Train Alternative. (Figures 1-2 and 1-3). The Modal Alternative uses the same inter-city travel demand (not capacity) assumed under the high-end sensitivity analysis completed for the high-speed train ridership in 2020. This same travel demand is assigned to the highways and airports and passenger rail described under the No-Project Alternative, and the additional improvements or expansion of facilities is assumed to meet the demand, regardless of funding potential and without high-speed train service as part of the system.

The Modal Alternative for the Los Angeles-Orange County-San Diego Region is defined as further expansion of Interstate 5 (beyond the expansion planned under the No-Project Alternative), as well as expansion at the Long Beach Airport. Table 1-2 summarizes the highway expansion components of the Modal Alternative for this Region.

TABLE 1-2

Modal Alternative: Highway Capacity Improvement Options for Year 2020
Los Angeles – Orange County – San Diego Region
(2020 Intercity Travel Demand with Highway Expansion only)

Highway Corridor	Segment (To-From)	No. of Additional Lanes[1] (Total – Both Directions)
I-5	L.A. Union Station to I-10	4
I-5	I-10 to Norwalk	2
I-5	Norwalk to Anaheim	2
I-5	Anaheim to Irvine	2
I-5	Irvine to I-405	2
I-5	I-405 to SR-78	2
I-5	SR-78 to University Towne Centre	2
I-5	University Towne Centre to San Diego Airport	2

Source: Parsons Brinckerhoff, California High-Speed Train Program Environmental Impact Report/ Environmental Impact Statement, *System Alternatives Definition,* November 18, 2002

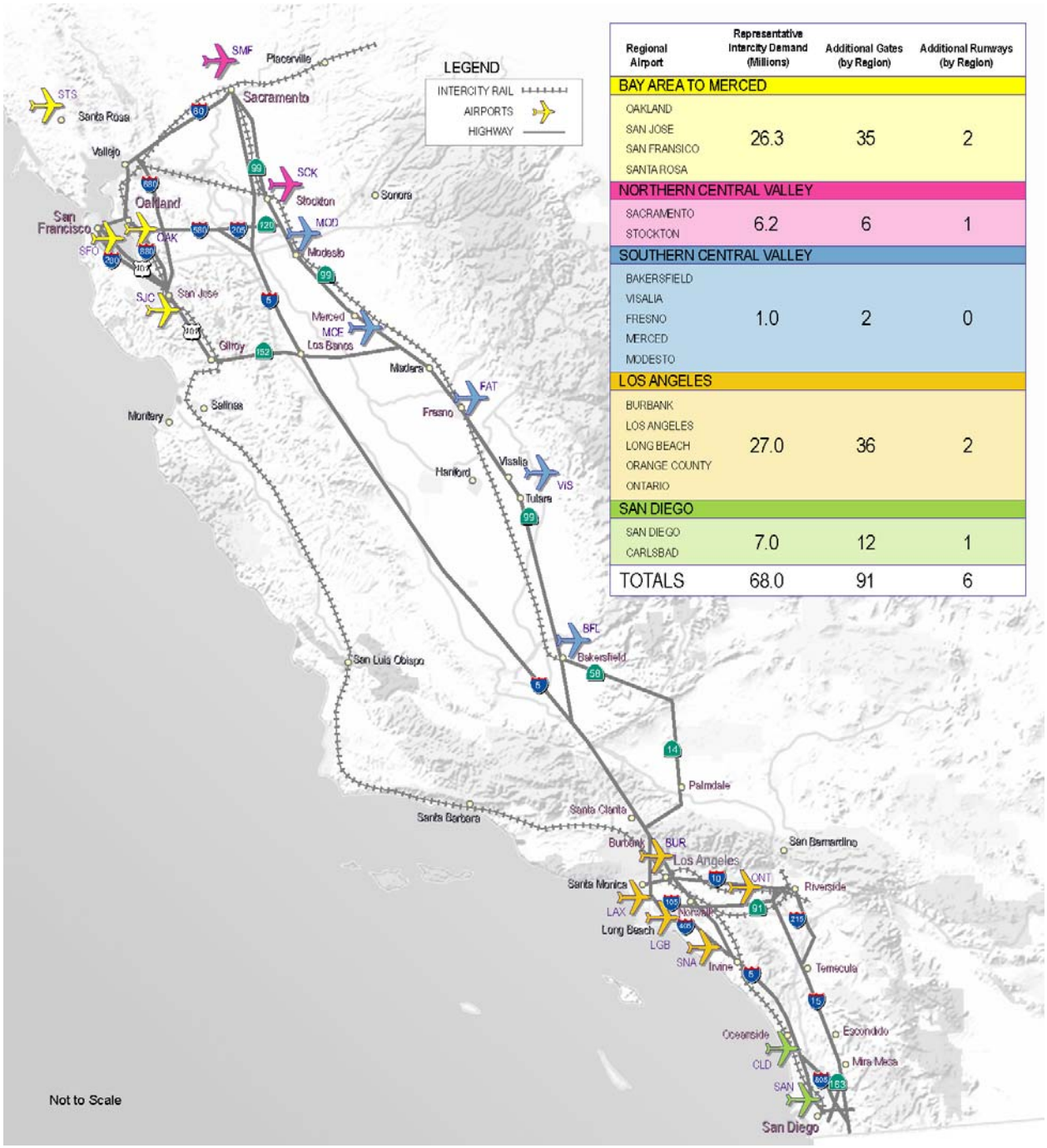
1. Represents the number of through lanes, in addition to the total number of lanes in the No-Project Highway Network, that approximate an equivalent level of capacity to serve the representative demand.

FIGURE 1-2

Modal Alternative – Highway Component

FIGURE 1-3

Modal Alternative – Aviation Component



Regional Airport	Representative Intercity Demand (Millions)	Additional Gates (by Region)	Additional Runways (by Region)
BAY AREA TO MERCED			
OAKLAND SAN JOSE SAN FRANSICO SANTA ROSA	26.3	35	2
NORTHERN CENTRAL VALLEY			
SACRAMENTO STOCKTON	6.2	6	1
SOUTHERN CENTRAL VALLEY			
BAKERSFIELD VISALIA FRESNO MERCED MODESTO	1.0	2	0
LOS ANGELES			
BURBANK LOS ANGELES LONG BEACH ORANGE COUNTY ONTARIO	27.0	36	2
SAN DIEGO			
SAN DIEGO CARLSBAD	7.0	12	1
TOTALS	68.0	91	6

1.1.3 High Speed Train Alternative

The Authority has defined a statewide high speed train (HST) system capable of speeds in excess of 200 miles per hour (mph) (320 kilometers per hour [km/h]) on dedicated, fully grade-separated tracks, with state-of-the-art safety, signaling, and automated train control systems. State of the art high speed steel-wheel-on-steel-rail technology is being considered for the system that would serve the major metropolitan centers of California, extending from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego (Figure 1-4).

The High-Speed Train Alternative includes several corridor and station options. A steel-wheel on steel-rail, electrified train, primarily on exclusive right-of-way with small portions of the route on shared track with other rail is planned. Conventional "non-electric" improvements are also being considered along the existing LOSSAN rail corridor from Los Angeles to San Diego. The train track would be either at-grade, in an open trench or tunnel, or on an elevated guideway, depending on terrain and physical constraints.

In the Los Angeles-Orange County-San Diego Region, the High-Speed Train Alternative consists of electrified rail options north of Irvine (described in this report as High-Speed Rail or HSR), and improvements and options for the existing LOSSAN rail corridor between Los Angeles and San Diego (described in this report as Conventional Rail).

For purposes of comparative analysis, the HST corridors will be described from station-to-station within each region, except where a by-pass option is considered when the point of departure from the corridor will define the end of the corridor segment. Table 1-3 summarizes the segments, improvements, and alignment and station options evaluated for the Los Angeles-Orange County-San Diego Region. The alignment segments are shown (north to south) in Figures 1-5A, B and C. These figures also show the proposed construction type for each alignment option (open trench, covered trench, tunnel, at-grade, or elevated), and where the alignment options would be located outside of an existing rail corridor.

LOSSAN Corridor Screening Process

A strategic planning process was undertaken as part of the evaluation of Conventional Rail improvements in the LOSSAN Corridor. This process was used to gain additional public input on the various rail improvement options being considered, and to reduce the number of alternatives to those that most reasonably and feasibly can meet the objectives, purpose, and need for the project. There are four locations within the LOSSAN Corridor where the initial range of alternatives was sufficiently broad to allow for the screening, or narrowing, of the alternatives to be carried forward in the Program EIR/EIS: San Juan Capistrano, Dana Point/San Clemente, Encinitas, and Del Mar.

Based on public and agency input, and technical, environmental and economic evaluations, a number of alternatives described in this technical report were subsequently eliminated from further consideration. The alternatives eliminated are shown in Table 1-3 in italics and gray shading. The environmental evaluation of these alternatives is included in this technical report, and was considered in the screening process. More detail on the screening process for the LOSSAN Corridor can be found in the final *Los Angeles to San Diego via Orange County Conventional Improvements Screening Repo*rt (Authority, 2003).

FIGURE 1-4

High-Speed Train Alternative – Corridors and Stations for Continued Investigation

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
HIGH-SPEED RAIL (HSR) & STATION OPTIONS	
LAX To Union Station	Construction of an electrified, grade-separated, dedicated track within an existing rail corridor. The train would be on an elevated structure from Union Station to Alameda Street, then transition into a trench that ends at LAX.
Stations	
LAX	New underground station.
Union Station To Anaheim Station via UPRR	Construction of an electrified, grade-separated, dedicated track within an existing rail corridor. Train would be on an elevated structure from Union Station, go into a trench at Slauson Avenue, move to at-grade across San Gabriel River, return to a trench up to La Canada Verde Creek, then become an aerial structure to Edison Field where it would go underground to a depressed station.
Stations	
Norwalk	New elevated station.
Anaheim	New underground station, built beneath existing station.
Union Station To Irvine Station via LOSSAN	Construction of fully grade-separated tracks within existing rail corridor, to be shared by electrified and conventional trains.
Stations	
Norwalk	Existing station. Proposed improvements include bypass tracks and additional parking.
Fullerton	Existing station. Proposed improvements include bypass tracks and additional parking.
Anaheim	Existing station. Proposed improvements include bypass tracks and additional parking.
Santa Ana	Existing station. Proposed improvements include bypass tracks and additional parking.
Irvine	Existing station. Expanded platform and parking, "terminal" tracks.
CONVENTIONAL RAIL (LOSSAN CORRIDOR) & STATION OPTIONS	
Union Station To Fullerton Station 4th Main Track	Construction of fourth main track in existing rail corridor between Commerce and Fullerton. Improvements can probably be accommodated within existing LOSSAN ROW except between Rio Hondo River and San Gabriel River.
Fullerton Station To Irvine Station	
Alignment Options:	
AT-GRADE between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Grade separations at street intersections between Walnut Ave. (in Orange) and E. 17th Street in Santa Ana. At-grade curve straightening between Batavia Street and Walnut Ave. Improvements would be in existing rail corridor ROW, except for the curve realignment.
TRENCH between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Fully grade-separate existing rail corridor in a covered trench (same alignment as above), including curve straightening.
Stations	
Fullerton	Existing station. Proposed improvements include bypass tracks, platform reconfiguration, and additional parking.
Anaheim	Existing station. Proposed improvements include bypass tracks and additional parking.
Santa Ana	Existing station. Proposed improvements include bypass tracks and additional parking.
Irvine	Existing station. Proposed improvements include bypass tracks and additional parking.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region (continued)

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
Irvine Station To San Juan Capistrano City Limits (no improvements)	No improvements are proposed for this conventional rail segment under the High-Speed Train Alternative.
San Juan Capistrano (City Limits to Avenida Aeropuerto)	
Alignments	
Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking	*Double-tracking via an open trench along the approach to and departure from the San Juan Capistrano Station (relocated from the existing track location on the west side of the station to the east side of the station), and a covered trench under the parking area at the station. This option would include curve realignment at San Juan Creek*
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	Double-tracking in a tunnel running the length of the City of San Juan Capistrano under Interstate 5.
AT-GRADE and Open TRENCH along east side of Trabuco Creek	Double-tracking at grade and in an open trench along the east side of Trabuco Creek, west of the existing rail alignment.
Stations	
San Juan Capistrano	Existing station (for Covered Trench alignment only): Proposed improvements include double tracking (by-pass tracks) and parking expansion. New station would be constructed with the At-Grade/Open Trench option along Trabuco Creek. New station would be below-grade in open trench. No station would be included in San Juan Capistrano for the I-5 tunnel option.
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)	
Alignments	
Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking	*Double-tracking and straightening existing curve at Dana Point between San Juan Creek and Avenida Aeropuerto along the existing rail corridor; double-tracking in existing rail alignment in San Clemente in a covered trench for about 1,000 feet either side of the pier.*
Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking	*Double-tracking and straightening existing curve at Dana Point between San Juan Creek and Avenida Aeropuerto along the existing rail corridor; double-tracking generally along existing rail corridor through San Clemente in a covered trench from about one mile north of San Mateo Creek to about 4,000 feet north of the pier. This trench option includes one section that leaves the existing corridor and goes underneath residences located west of the corridor between the municipal pier and North El Camino Real.*
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking	Double-tracking and straightening existing curve at Dana Point in existing rail corridor; double-tracking via a short tunnel that follows Interstate 5 between Palm Drive and San Onofre State Beach, north of the power plant. The short tunnel alignment leaves the Interstate 5 corridor at Avenida Palizada, turns toward the coast and runs underneath residential, industrial and vacant areas, connecting with the existing rail corridor just south of Camino Capistrano.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region (continued)

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
San Clemente - LONG ONE-SEGMENT TUNNEL ; Double Tracking (crosses San Mateo and San Onofre Creeks)	*Double-tracking via a long, one- segment tunnel following Interstate 5 from San Onofre State Beach to Avenida Aeropuerto in San Juan Capistrano. This option precludes the need for curve realignment at Dana Point. The existing rail corridor along the coast between southern San Clemente city limits to approximately Avenida Aeropuerto in San Juan Capistrano would be removed from service (or at least not be further improved from its existing condition).*
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	Double-tracking via a long, two- segment tunnel following Interstate 5 from San Onofre State Beach to Avenida Aeropuerto in San Juan Capistrano. This option precludes the need for curve realignment at Dana Point. This tunnel would have the same alignment as the one-segment long tunnel above except in a one-mile stretch near Avenida Pico, it would veer to the east edge of I-5 and daylight into an open trench for about 1,000 feet. The existing rail corridor along the coast between southern San Clemente city limits to approximately Avenida Aeropuerto in San Juan Capistrano would be removed from service (or at least not be further improved from its existing condition).
Stations	
San Clemente	The trench options for this segment would include a proposed below-grade station south of the municipal pier to replace the existing San Clemente Station. The tunnel options would eliminate the need for a train station downtown; a new below-grade station would be constructed along the tunnel alignment where the tunnel transitions to a trench.
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses San Mateo, San Onofre, and Santa Margarita Creeks)	Construction of an at-grade second main track, in portions of this segment covering about six miles, that are not already double-tracked or will be under the conventional rail improvements included in the No-Project Alternative.
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits)	
Alignments	
Carlsbad - AT-GRADE; double tracking; crosses San Luis Rey, Buena Vista , Aqua Hedionda, and Batiquitos Lagoons	Double-tracking through Carlsbad in existing rail alignment at grade.
Carlsbad -TRENCH; double-tracking; crosses San Luis Rey, Buena Vista, Aqua Hedionda, and Batiquitos Lagoons	Double-tracking through Carlsbad in existing rail alignment in trench.
Stations	
Oceanside	Existing station. Proposed improvements include bypass tracks and parking expansion.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region (continued)

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)	
Alignments	
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	Double-tracking primarily at-grade, with a short trench segment for the rail corridor on either side of Birmingham Drive. This option would include reconfiguring the street intersection at Birmingham Drive and San Elijo Avenue, and close Chesterfield Drive at San Elijo Avenue. Another grade separation would occur at Leucadia Boulevard where the tracks would be depressed. Pedestrian undercrossings would be placed along the route.
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	Double-tracking in same alignment as at-grade option above, but with an additional covered trench under Encinitas Boulevard and a transitional open trench about 1,500 feet either side of Encinitas Boulevard.
Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	*Double-tracking in same alignment as options described above. Tracks would be in an open trench south of the Batiquitos Lagoon, then drop into a covered trench as they approach the downtown area, then return to an open trench up to the north end of the San Elijo Lagoon, where they transition to at-grade. Chesterfield Drive at San Elijo Avenue would be closed. Pedestrian crossings would be placed along the route.*
Stations	
Solana Beach	Existing station. Proposed improvements include platform modifications and parking expansion.
Del Mar(Solana Beach Station to I-5/805 Split)	
Alignments	
COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons	*Double-tracking in a covered trench in the existing rail corridor alignment along the bluffs.*
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	Double-tracking via a tunnel underneath Camino Del Mar. Tunnel would begin at Jimmy Durante Boulevard, and daylight at Carmel Valley Road where tracks would then connect with the existing alignment across Los Penasquitos Lagoon. The existing rail track on the bluffs would be removed from service.
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons	Double-tracking via a tunnel that would run under Interstate 5 and daylight along the southern boundary of San Dieguito Lagoon. Tracks would reconnect with the existing rail at-grade near the Del Mar race track. The existing rail track on the bluffs would be removed from service.
I-5/805 Split To Hwy 52	
Alignments	
Miramar Hill Tunnel	Double-tracking via a tunnel through Miramar Hill.
I-5 Tunnel	Double-tracking via a tunnel under Interstate 5.
Stations	
UTC (Only applies to Miramar Hill Tunnel)	New station, proposed only with the Miramar Hill tunnel option. Station would be constructed underground.
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)	Double-tracking in existing rail corridor for full length of segment. An existing curve just south of Highway 52 would be straightened, requiring two new bridges over wetlands in San Clemente Canyon. New bridges would also be constructed over Tecolote Creek and San Diego River. Tracks would be placed in a trench between Sassafras Street and Cedar Street.
Stations	
Santa Fe Depot	Existing station. Proposed improvements include bypass tracks and parking expansion.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

FIGURE 1-5A

High-Speed Train Alternative: Alignment and Construction Type by Segment (Los Angeles to Irvine)

FIGURE 1-5B

High-Speed Train Alternative: Alignment and Construction Type by Segment (Irvine to Oceanside)

FIGURE 1-5C

High-Speed Train Alternative: Alignment and Construction Type by Segment (Oceanside to San Diego)

2.0 BASELINE/AFFECTED ENVIRONMENT

2.1 STUDY AREA

The study area for biological resources is defined by the following limits:

- 1,000 feet on either side of alignment centerlines (2,000 feet total) and around stations in urbanized areas,
- 0.25 mile on either side of alignment centerlines (0.50 mile total) and around stations in undeveloped areas, and
- 0.50 mile on either side of alignment centerlines (1.0 mile total) in undeveloped areas and in sensitive areas.

In the Los Angeles – Orange County – San Diego Region, all stations (existing and proposed) are located within urbanized areas. Other than the undeveloped area of Camp Pendleton and several other small open areas, the majority of study area is designated by census data as urbanized. Therefore, most of the analysis was completed using the 2,000-foot study area. Because of the sensitive nature of six lagoons, the areas surrounding lagoons were analyzed using a 1.0-mile study area. In addition, all undeveloped areas within this study area are considered sensitive and therefore were analyzed using the 1.0-mile study area.

2.2 GENERAL DESCRIPTION OF REGIONAL PHYSICAL CHARACTERISTICS AND VEGETATION

The entire study area lies within the South Coast Bioregion, an area of contrasting landscapes ranging from coastal mountains, canyons, streams and river valleys, rolling hills, and beaches to densely populated cities. The region more specifically lies within the Peninsular Range Physiographic Province. This area is characterized by a Mediterranean climate with winter rainfalls and summer droughts. Average annual rainfall ranges from 9 inches in the San Diego region to 15 inches in the Los Angeles Basin.

The vegetation types/communities found in the study area include Urban-Agricultural and Diegan Coastal Sage Scrub communities. Urban-Agricultural vegetation is highly disturbed and widespread within existing residential/commercial, farming, and landscaped areas and may include flower farms, strawberry and vegetable farms, vineyards, and other irrigated uses. Diegan Coastal Sage Scrub (Figure 2-1) is the most commonly found sage scrub community in coastal southern California, its distribution ranging from Los Angeles to Baja. This coastal sage scrub community is dominated by low soft-leaved, drought-tolerant, deciduous shrubs and is typically found on drier sites and steeper slopes.

The San Diego County study area is further characterized by the presence of large coastal wetlands areas, including six lagoons located in the northern region of the county. These lagoons and the associated open space around them provide vital habitat for resident and migratory birds and other wildlife. Sensitive plant and animal species are found here in substantial numbers despite increasing urbanization, hydrological changes in the watershed, and limited tidal action.

FIGURE 2-1

Coastal Sage Scrub

2.3 SENSITIVE VEGETATION COMMUNITIES

Although Urban-Agricultural vegetation is likely to provide foraging habitat for some species of wildlife (e.g., red-tailed hawks, coyotes, etc.), it is not considered to be a sensitive vegetation community. The other, primary vegetation community found in the study area, Diegan coastal sage scrub, is considered to be sensitive and provides habitat for many endangered and threatened species. Due to spreading urbanization, this vegetation community has suffered severe reductions. For the purposes of this report and the programmatic level of analysis, Diegan coastal sage scrub is considered the dominant sensitive vegetation in the study area. The distribution of this vegetation type in the study area is shown on Figure 2-2. Other sensitive vegetation communities expected to occur in the study area are listed in Table 2-1. Specific locations and quantities of these communities will be addressed in project-level environmental documentation.

TABLE 2-1

Sensitive Vegetation Communities

Diegan Coastal Sage Scrub
Southern Maritime Chaparral
Succulent Sage Scrub
Southern Riparian Scrub
Southern Riparian Forest
Southern Cottonwood Willow Riparian
Torrey Pine Forest
Southern Dune Scrub
Southern Foredunes
Southern Coastal Salt Marsh
Coastal Brackish Marsh
San Diego Mesa Hardpan Vernal Pool

Lagoons and other wetlands are also considered to encompass sensitive vegetation. Some of the vegetation associated with lagoons and other wetlands is included in Table 2-1. Wetlands vegetation is addressed in this report as part of the discussion of jurisdictional waters and wetlands, rather than sensitive vegetation.

The mosaic of vegetation communities that make up Diegan coastal sage scrub and the lagoon/wetlands supports a variety of sensitive plant species (Table 2-2). The plant species included in Table 2-2 are federally and state-listed species and California Native Plant Society (CNPS) 1B species.

FIGURE 2-2

Distribution of Diegan Coastal Sage Scrub

TABLE 2-2

Sensitive Plant Species

Common Name	Scientific Name	Fed List	Cal List	CNPS
CHAPARRAL SAND-VERBENA	ABRONIA VILLOSA VAR AURITA			1B
APHANISMA	APHANISMA BLITOIDES			1B
DEL MAR MANZANITA	ARCTOSTAPHYLOS GLANDULOSA SSP CRASSIFOLIA	E		1B
COASTAL DUNES MILK-VETCH	ASTRAGALUS TENER VAR TITI	E	E	1B
COULTER'S SALTBUSH	ATRIPLEX COULTERI			1B
SOUTH COAST SALTSCALE	ATRIPLEX PACIFICA			1B
PARISH'S BRITTLESCALE	ATRIPLEX PARISHII			1B
INTERMEDIATE MARIPOSA LILY	CALOCHORTUS WEEDII VAR INTERMEDIUS			1B
LAKESIDE CEANOTHUS	CEANOTHUS CYANEUS			1B
SOUTHERN TARPLANT	CENTROMADIA PARRYI SSP AUSTRALIS			1B
SMOOTH TARPLANT	CENTROMADIA PUNGENS SSP LAEVIS			1B
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
ORCUTT'S SPINEFLOWER	CHORIZANTHE ORCUTTIANA	E	E	1B
SAN FERNANDO VALLEY SPINEFLOWER	CHORIZANTHE PARRYI VAR FERNANDINA		E	1B
SUMMER HOLLY	COMAROSTAPHYLIS DIVERSIFOLIA SSP DIVERSIFOLIA			1B
SALT MARSH BIRD'S-BEAK	CORDYLANTHUS MARITIMUS SSP MARITIMUS	E	E	1B
DEL MAR MESA SAND ASTER	CORETHROGYNE FILAGINIFOLIA VAR LINIFOLIA			1B
BLOCHMAN'S DUDLEYA	DUDLEYA BLOCHMANIAE SSP BLOCHMANIAE			1B
SHORT-LEAVED DUDLEYA	DUDLEYA BREVIFOLIA		E	1B
MANY-STEMMED DUDLEYA	DUDLEYA MULTICAULIS			1B
VARIEGATED DUDLEYA	DUDLEYA VARIEGATA			1B
STICKY DUDLEYA	DUDLEYA VISCIDA			1B
SAN DIEGO BUTTON-CELERY	ERYNGIUM ARISTULATUM VAR PARISHII	E	E	1B
PENDLETON BUTTON-CELERY	ERYNGIUM PENDLETONENSIS			1B
DECUMBENT GOLDENBUSH	ISOCOMA MENZIESII VAR DECUMBENS			1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
ROBINSON'S PEPPER-GRASS	LEPIDIUM VIRGINICUM VAR ROBINSONII			1B
NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
SAN DIEGO GOLDENSTAR	MUILLA CLEVELANDII			1B
SPREADING NAVARRETIA	NAVARRETIA FOSSALIS	T		1B
PROSTRATE NAVARRETIA	NAVARRETIA PROSTRATA			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B
CALIFORNIA ORCUTT GRASS	ORCUTTIA CALIFORNICA	E	E	1B
BRAND'S PHACELIA	PHACELIA STELLARIS			1B
TORREY PINE	PINUS TORREYANA SSP TORREYANA			1B
NUTTALL'S SCRUB OAK	QUERCUS DUMOSA			1B
OIL NESTSTRAW	STYLOCLINE CITROLEUM			1B

E = Endangered
T = Threatened
1B = Plants rare, threatened or endangered in California or elsewhere as determined by the California Native Plant Society (CNPS)

2.4 SENSITIVE WILDLIFE

2.4.1 Sensitive Wildlife Species

Wildlife species potentially present within the study area include sensitive invertebrates, fish, reptiles and amphibians, birds and mammals (Table 2-3). Included in Table 2-3 are federally and state-listed species, and state species of concern.

TABLE 2-3

Sensitive Wildlife Species

Common Name	Scientific Name	Fed List	Cal List	CDFG
INVERTEBRATES				
SAN DIEGO FAIRY SHRIMP	BRANCHINECTA SANDIEGONENSIS	E		
RIVERSIDE FAIRY SHRIMP	STREPTOCEPHALUS WOOTTONI	E		
FISH				
TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC
ARROYO CHUB	GILA ORCUTTI			SC
SOUTHERN STEELHEAD TROUT	ONCORHYNCHUS MYKISS IRIDEUS	E		SC
REPTILES-AMPHIBIANS				
ARROYO TOAD	BUFO CALIFORNICUS	E		SC
ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
COASTAL WESTERN WHIPTAIL	CNEMIDOPHORUS TIGRIS MULTISCUTATUS			
NORTHERN RED-DIAMOND RATTLESNAKE	CROTALUS EXSUL			SC
SAN DIEGO HORNED LIZARD	PHRYNOSOMA CORONATUM BLAINVILLEI			SC
WESTERN SPADEFOOT	SCAPHIOPUS HAMMONDII			SC
BIRDS				
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
COASTAL CACTUS WREN	CAMPYLORHYNCHUS BRUNNEICAPILLUS COUESI			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
NORTHERN HARRIER	CIRCUS CYANEUS			SC
CALIFORNIA BLACK RAIL	LATERALLUS JAMAICENSIS COTURNICULUS		T	
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
BANK SWALLOW	RIPARIA RIPARIA		T	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	
LEAST BELL'S VIREO	VIREO BELLII PUSILLUS	E	E	
MAMMALS				
NORTHWESTERN SAN DIEGO POCKET MOUSE	CHAETODIPUS FALLAX FALLAX			SC
STEPHENS' KANGAROO RAT	DIPODOMYS STEPHENSI	E	T	
SAN DIEGO DESERT WOODRAT	NEOTOMA LEPIDA INTERMEDIA			SC
PACIFIC POCKET MOUSE	PEROGNATHUS LONGIMEMBRIS PACIFICUS	E		SC

E = Endangered T = Threatened SC = Species of Concern

Within the study area, all sensitive vegetation communities and lagoons are assumed to provide wildlife habitat.

The following sensitive species may also have designated critical habitat within the study area, as defined by U.S. Fish and Wildlife Service (USFWS):

- Coastal California Gnatcatcher
- Least Bells Vireo
- Tidewater Goby
- San Diego Fairy Shrimp

2.4.2 Wildlife Movement Corridors

There was no available GIS database identifying specific wildlife corridors for the Los Angeles – Orange County – San Diego Region. For the purposes of this study, only large open areas, lagoons and surrounding park or reserve areas, and riparian areas in undeveloped areas are considered as potential wildlife movement corridors. These areas are listed in Table 2-4.

TABLE 2-4
Potential Wildlife Movement Corridors

San Juan Creek
Camp Pendleton Marine Corps Base (includes San Mateo Creek, San Onofre Creek, and Santa Margarita River)
San Luis Rey River
Buena Vista Lagoon
Aqua Hedionda Lagoon
Batiquitos Lagoon
San Elijo Lagoon
San Dieguito River and Lagoon
Los Peñasquitos Lagoon
Peñasquitos Creek and Canyon
Sorrento Valley
Rose Canyon
San Clemente Canyon

2.5 JURISDICTIONAL WATERS AND WETLANDS

Jurisdictional waters or "Waters of the U.S." is a broad classification that includes waters used in interstate or foreign commerce, waters subject to the ebb and flow of tides, all interstate waters, including wetlands, lagoons, and other waters such as rivers, streams, mudflats, wet meadows, etc. In

this study, Waters of the U.S. have been further distinguished as non-wetland waters (usually consisting of streams and rivers), and wetlands.

Non-Wetland Waters

The U.S. Army Corps of Engineers (USACE) has the jurisdictional authority over protection of Waters of the U.S. under the provisions of the federal Clean Water Act. California Department of Fish and Game (CDFG) also has authority to protect fish and wildlife in non-wetland waters. The streams and rivers in the study area (Table 2-5) are a mix of natural and channelized water bodies. Both the natural and some of the channelized streams and rivers support wetland or riparian habitat.

TABLE 2-5

Non-Wetland Waters

Los Angeles River
Rio Hondo
San Gabriel River
Coyote Creek (multiple branches)
La Mirada Creek
Brea Creek
Fullerton Creek
Carbon Creek
Santa Ana River
Santiago Creek
San Diego Creek
Peters Canyon Wash
Oso Creek
Trabuco Creek
San Juan Creek
San Mateo Creek
San Onofre Creek
Santa Margarita River
San Luis Rey River
Loma Alta Creek
San Dieguitio River
Soledad Creek
Los Peñasquitos Creek
Mission Bay
Tecolote Creek
San Diego River
San Diego Bay

Wetlands

In order to classify an area as a wetlands per the USACE, three jurisdictional criteria must be met: presence of wetland hydrology, predominance of hydrophytic plants, and presence of hydric soils. The CDFG currently utilizes a definition that requires only one of these criteria be met in order to classify an area as a wetlands.

Wetlands found in the "coastal zone" are also regulated under the California Coastal Act of 1976 (CCA) and the federal Coastal Zone Management Act (CZMA), and are within jurisdiction of the California Coastal Commission. Under the CCA, wetlands are defined as land within the coastal zone that may be covered periodically or permanently with shallow water, and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens.

The estuarine lagoons of northern San Diego County are within the coastal zone (Figure 2-3). They are a unique biological resource and are the focus of many resource agencies and other entities interested in the quality of these areas. The six lagoons in the study area are described below. Where restoration plans have been developed for the lagoons, these were reviewed and the primary goals of those plans are also summarized.

Buena Vista Lagoon

The Buena Vista Lagoon, approximately 223 acres in size, lies within the cities of Carlsbad and Oceanside in northern San Diego County. The lagoon consists of both state and privately owned lands with the majority owned by the CDFG. The CDFG property is a designated Ecological Reserve as described in Title 14, Section 630 of the California Administrative Code, due to the unique habitat and number of wildlife species that use the area, including threatened and endangered species. The reserve permits fishing and passive recreation. The lagoon is also designated as Open Space per the 1995 amended City of Oceanside zoning ordinance and 1991 City of Carlsbad zoning ordinance. In March 2001, CDFG purchased a 10-acre parcel adjacent to the north shore of the lagoon with funding from the Wildlife Conservation Board. CDFG anticipates using this land as buffer and, in the short-term, as a staging area for restoration activities (Wootten 2002).

Habitats present in or within the vicinity of Buena Vista Lagoon include, but are not limited to, open water, seasonal sand/mud flats, brackish/freshwater marsh, some coastal salt marsh, a small riparian corridor, and Diegan coastal sage scrub.

Since the mid-1970s, urban development immediately surrounding Buena Vista Lagoon and on the Buena Vista Creek floodplain has put considerable pressure on the hydrology and ecological features of the lagoon. The lagoon has suffered declining water quality, accelerated sedimentation, diminished biological productivity, and constraints on water circulation caused by structures across the lagoon, including a weir at the mouth. Formerly, tidal influence occurred periodically when winter floods breached the barrier beach at the mouth. Over time, however, particularly since the installation of the weir in 1948, the lagoon has slowly become more of a freshwater system. The lagoon was also included on the 1998 303(d) list of impaired water bodies due to exceeding standards for nutrients, sediment and coliform bacteria. Several plans have been prepared to address these issues.

The problem of accumulated sedimentation in the Buena Vista Lagoon resulted in the California Coastal Conservancy (Conservancy) initiating a sediment control program in the Buena Vista Creek Watershed (Browne and Vogt 1982). A Joint Powers Committee (JPC) was established by the cities of Oceanside, Carlsbad, and Vista in 1983. That same year, a $1 million project administered by the City of Carlsbad was initiated to excavate excess sediment in the eastern end of the lagoon and create two least tern nesting islands (Buena Vista Lagoon Foundation 1983). All three jurisdictions adopted an erosion control ordinance in 1984.

The Buena Vista Lagoon (BVL) Foundation prepared a plan in 1983 to structure implementation of their founding objectives which include conserving and restoring the lagoon marsh and wetlands and act as ongoing guardian of the lagoon. The plan identifies a range of actions including monitoring water quality, sedimentation rates and vegetation. The plan also includes acquiring small aquatic habitat areas not in the ecological reserve.

CDFG developed an interim management plan in 1991 for the lagoon that outlines the purposes and objectives of the ecological reserve, identifies fish and wildlife resources and public access facilities, and describes intended management objectives and activities.

FIGURE 2-3

Lagoons of North San Diego County

The Buena Vista Lagoon JPC prepared a Strategic Plan (Buena Vista JPC Lagoon 1996) to improve the environmental conditions within the lagoon. Among the action items are several strategies to enhance and protect fish, wildlife and their habitat. Also included is a proposal to dredge the organic burden from the bed of the lagoon and to modify the weir to reduce freshwater discharge flows across the beach and provide greater ability to manage floods. One design would enable some tidal infusion of seawater into the lagoon to create local brackish water conditions.

To date enhancement proposals have been constrained by the lack of a comprehensive plan for a sustainable hydrologic system and conflicting assumptions about what such a system should include (Wootten 2002). Currently, the BVL Foundation is conducting a restoration feasibility analysis to identify feasible, cost-effective, and ecologically beneficial restoration scenarios for the lagoon. Alternatives include various hydrological regimes including leaving the lagoon in its current condition, implementing minimal structural changes to maintain a freshwater regime, implementing structural changes that would result in a brackish regime, or implementing structural changes that would result in a saltwater regime.

Agua Hedionda Lagoon

The Agua Hedionda Lagoon, approximately 330 acres in size, lies within the City of Carlsbad, off Carlsbad Boulevard. In the 1950s, San Diego Gas and Electric constructed the Encina Power Plant and a tidal basin to provide its cooling water. The tidal basin, currently owned by NRG Cabrillo Power as of the year 2001 (Soczka pers. comm. 2002) is the Agua Hedionda Lagoon. Cabrillo Power leases a portion of their acres to the YMCA, the City of Carlsbad, and private businesses. The area is designated as open space in both the general plan and zoning ordinance for the City of Carlsbad.

Habitats present in or within the vicinity of the Agua Hedionda Lagoon include, but are not limited to, open water, brackish/freshwater, mudflats, estuarine flats, patchy salt marsh areas, riparian, and Diegan coastal sage scrub.

The lagoon is subject to full tidal influence. The original slough was only occasionally open to the sea. An inlet channel of riprap jetties, which keeps the mouth permanently open, was built in 1954. The lagoon consists of three basins that are connected via openings under I-5 and the railroad. However, the berms for these crossings may limit the reach of tidal action (CERES website 2002). Freshwater enters the lagoon from urban runoff along the northern shore, agricultural runoff from along the southern shore, and 23 storm drains.

Pressures on the Agua Hedionda Lagoon include sedimentation from agricultural and urban development in the watershed, sedimentation entering the outer areas of the lagoon due to longshore drift, potential impacts on habitats and wildlife from active recreation and adjacent development, and impacts to water circulation from the power plant and structures across the lagoon (CERES website 2002). The lagoon was included on the 1998 303(d) list of impaired water bodies due to exceeding standards for sediment and coliform bacteria.

In 1985, a mitigation project involving restoration of several wetland habitats was undertaken but considered unsuccessful (CERES website 2002). Although no major restoration program is currently operating in or near the lagoon (Soczka pers. comm. 2002), several activities have been implemented in an attempt to improve lagoon conditions. The City of Carlsbad has a Master Drainage and Stormwater Quality Management Plan and implements an erosion control ordinance for all construction projects. There is no formal program to address sediment from agricultural activities. To remove sediment, dredging is an ongoing activity and is the responsibility of NRG Cabrillo Power. The frequency of dredging activities may need to increase due to a nearby beach nourishment project (Soczka pers. comm. 2002). Cabrillo Power has also been responsible for the planting and monitoring of eelgrass as mitigation for their dredging activities (Soczka pers comm. 2002). Recently, the Aqua Hedionda Lagoon Foundation, in partnership with NRG Cabrillo Power, CDFG, the National Marine Fisheries Service, and the regional Water Quality Control Board implemented a program to eradicate a non-native, highly invasive tropical algae (*Caulerpa taxifolia*) from the Agua Hedionda Lagoon (EPA website 2002). Because of the ability of

Caulerpa to rapidly spread, continual surveillance is planned over the next several years in an attempt to detect small patches of this algae.

Batiquitos Lagoon

The Batiquitos Lagoon, approximately 600 acres in size, is located at the southern edge of the City of Carlsbad. The California State Lands Commission owns the majority of the lagoon acreage although property is leased to CDFG which also owns a smaller lagoon parcel. Currently the Port of Los Angeles also owns approximately 30-40 acres that will be conveyed to the state as part of an enhancement program. In 1983, the lagoon was made a CDFG State Ecological Reserve. Passive recreation is the predominant use, with two trails along the north shore of the lagoon. The area is designated as Open Space in the general plan for the City of Carlsbad.

Habitats present in or within the vicinity of Batiquitos Lagoon include, but are not limited to, open water, estuarine flats, coastal salt marsh, brackish emergent marsh, riparian, and Diegan coastal sage scrub.

Once a tidal system, the lagoon has largely been non-tidal since the 1900s. By the early 1980s, the lagoon had achieved an advanced state of sedimentation and eutrophication resulting in natural habitat declines. Local recognition of the accelerating decline of the system led to establishment of an enhancement group and initiation of restoration planning through funding by the Conservancy. In 1987 the Port of Los Angeles (Port), City of Carlsbad, U.S. Fish and Wildlife Service, National Marine Fisheries Service, CDFG, and State Lands Commission signed an interagency agreement pertaining to the restoration of Batiquitos Lagoon for mitigation credits to be applied to impacts associated with Outer Los Angeles Harbor development by the Port (Merckel & Associates 1999). In 1989, the City of Carlsbad and the Port completed a sediment load study that concluded that inadequate tidal flushing was a greater factor in the rapid filling of the lagoon than sedimentation from upland sources.

The lagoon restoration spanned three years (1994-1996) and consisted of dredging, jetty construction, and infrastructure improvements. Work was completed with the permanent mouth opening in 1996. Upon final construction the lagoon was turned over to CDFG. CDFG is responsible for long-term maintenance using a maintenance account provided by the Port (Merckel & Associates 1999). Long-term biological monitoring of biological resources and water quality is being carried out by the City of Carlsbad and the Port. A report summarizing the success over the last five years of the enhancement work is to be released in 2003.

San Elijo Lagoon

The San Elijo Lagoon, approximately 600 acres in size, is located between the cities of Encinitas and Solana Beach. Primary ownership of the lagoon is retained by San Diego County Parks and Recreation (County), CDFG, and California State Lands Commission (Enriquez pers. comm. 2003). The area is designated as Open Space and Reserve in the general plan for the City of Encinitas. CDFG, with the assistance of the County, manages the San Elijo Lagoon as an Ecological Reserve. The Reserve, including the wetlands acreage, encompasses approximately 900 acres and includes five miles of trails. The Reserve also accommodates passive recreation and fishing in selected areas.

Habitats present in or within the vicinity of San Elijo Lagoon include, but are not limited to, open water (estuarine and fresh), sand/mudflats, coastal salt marsh, fresh/brackish marsh, riparian, and Diegan coastal sage scrub. I-5, the railroad, and Highway 101 divide the lagoon into three basins that are then connected by narrow channels confined by bridge abutments. Over the past several decades, the biological resources of the San Elijo Lagoon have deteriorated because of severely limited tidal action, hydrological and land use changes to the watershed, urbanization, sedimentation, poor water quality, introduction of exotic species, and increased visitor usage and off-road vehicle activity. The lagoon was included on the 1998 303(d) list of impaired water bodies due to exceeding standards for eutrophication, sediment and coliform bacteria.

A draft Enhancement Plan, prepared by the County in 1995, recommended methods to preserve and augment a gradient of self-sustaining habitats that range from salt marsh to freshwater marsh. The long-range plan for the area is to continue to provide for the habitat needs of wildlife while maximizing passive recreational and educational opportunities for the public. The plan recommends opening the mouth regularly or to maintain an opening permanently and increase tidal circulation to the lagoon, all of which would greatly restore tidal and salt marsh habitat. Enrichment of brackish and freshwater marsh areas, removal of exotic species, revegetation of degraded areas, and closing of unnecessary trails through sensitive habitats are proposed to maximize existing values. (County of San Diego 1995).

San Dieguito Lagoon

The San Dieguito Lagoon, approximately 260 acres in size, is located at the northern edge of the City of Del Mar and at the western end of the San Dieguito River Valley (see Figure 2-4). Primary ownership of the lagoon is retained by CDFG, San Dieguito River Park Joint Powers Authority, Southern California Edison (SCE), the cities of Del Mar and San Diego, and the 22nd Agricultural District. A major portion of the area owned by CDFG is a State Ecological Reserve, located in the southern corner of the historic wetlands just west of I-5. The lagoon is designated as Open Space in the City of San Diego general plan.

Habitats present in or within the vicinity of San Dieguito Lagoon include, but are not limited to, open water, estuarine/palustrine flats, salt marsh, brackish/freshwater marsh, coastal salt marsh, riparian scrub, and Diegan coastal sage scrub.

The San Dieguito Lagoon was once the largest of the six San Diego County coastal lagoons. A constrained ocean inlet, the railroad berm, and I-5 significantly restrict tidal flow. San Dieguito River flow is intermittent and the riverbed is often dry; however this intermittent flow of freshwater occurs upstream of the tidal influence. Concerns over structural constraints on the reach of tidal flow, retention of freshwater flows, flood control, sedimentation, and exotic vegetation resulted in the San Dieguito Lagoon Resource Enhancement Program of 1979. In 1983, a portion of the enhancement program was implemented using a grant from the Conservancy and involving dredging a new tidal basin just south and west of I-5. The river mouth was also opened to restore tidal influence, at least temporarily, to the entire coastal wetland (San Dieguito River Park Joint Powers Authority 2000).

Since the initial restoration effort was completed, the restoration goal has been expanded to address both the west and east sides of I-5 with the stated goal of restoring what remains of the historically significant San Dieguito Lagoon System. In 1992, the California Coastal Commission approved the San Dieguito Lagoon as the site for SCE to implement mitigation required for the San Onofre Nuclear Generating Station's new permit conditions. Mitigation includes the creation or substantial restoration of 150 acres of tidal wetlands. Additional acreage will be restored to fulfill the conditions of a compromise settlement between SCE and Earth Island Institute, Inc. The San Dieguito Wetland Restoration Project EIR/EIS (September 2000) addresses both of these restoration efforts and identifies the Mixed Habitat Alternative as the preferred alternative. The proposal to restore coastal wetlands is the predominant element of a larger restoration and public access plan for all of the public open-space lands within the San Dieguito River Valley. The entire restoration planning area encompasses 440 acres. Beneficial impacts identified in the EIR/EIS include, but are not limited to, opening the tidal channel and maintaining tidal exchange between the ocean and wetland, and improvement of habitat for associated species.

Los Peñasquitos Lagoon

The Los Peñasquitos Lagoon, approximately 640 acres in size, is located in the northwestern corner of the City of San Diego, directly south of the City of Del Mar (Figure 2-4). The California Department of Parks and Recreation is the primary owner of the lagoon with smaller parcels being held by the State Coastal Conservancy and the City of San Diego. Beaches to the north and south of the mouth are state recreation areas, Los Peñasquitos Canyon Preserve extends to the southeast, and Torrey Pines State Park lies atop the bluffs to the south. The lagoon is designated as Open Space in the City of San Diego general plan. Recently, the status of Los Peñasquitos Lagoon was raised from "State Park" to "State Reserve" and then to "State Preserve" which has the most restricted usage.

Habitats present in or within the vicinity of Los Peñasquitos Lagoon include, but are not limited to, open water (estuarine and fresh), sand/mudflats, coastal salt marsh, fresh/brackish marsh, riparian, and Diegan coastal sage scrub.

In 1985, the Los Peñasquitos Lagoon Foundation and the State Coastal Conservancy prepared the Los Peñasquitos Lagoon Enhancement Plan and Program to describe measures for restoring and enhancing the natural environmental qualities of the lagoon (Coppock *et al.* 1985). Many of the existing conditions identified in the 1985 plan, such as lagoon mouth closures, presence of Pacific Highway 101 and the railroad berm which impede tidal flow, and exotic vegetation intrusion, still affect the environmental qualities of the lagoon. Dramatic changes in the watershed resulting from increased urbanization since 1985 have introduced new issues that will be addressed in a revised enhancement plan (Hastings pers. comm. 2003), including increased year-round freshwater input, accelerated sedimentation, reduced tidal mixing, and water contamination. In 2000, the Los Peñasquitos Lagoon Foundation prepared *A Summary Analysis of Existing Conditions Affecting Los Peñasquitos Lagoon and Watershed* to highlight existing conditions that affect the health of the lagoon and future enhancement efforts. Currently, it is expected that an ongoing hydrology study (Hastings pers. comm. 2003) will fill in data gaps and will help to reprioritize enhancement objectives for the 1985 enhancement plan which is in the process of revision. Although the issue of accelerated sedimentation in the lagoon has become a major enhancement focus, the issues of lagoon mouth closures and the need for more tidal circulation are still major objectives (Hastings pers. comm. 2003).

FIGURE 2-4

Del Mar Area Lagoons and Alternatives

Vernal Pools

Vernal pools, a potential component of coastal sage scrub or chaparral landscapes, is also considered another type of wetlands under California Wildlife Protection Act (Fish & Game Code §2785). Vernal pools are seasonally ponded areas that support a variety of specialized plant and animals, including federally and state-listed species. Vernal pools are likely to exist within the study area, particularly on the Camp Pendleton Marine Corps Base. The confirmation of the presence of vernal pools will be addressed in detail in Tier 2 project-level environmental analyses.

2.6 EXISTING AND FUTURE BASELINE CONDITIONS

The No-Project Alternative includes the implementation of programmed improvements to highways, airports, and conventional rail infrastructure by the year 2020. These improvements will likely result in impacts to biological resources beyond those that exist today, due to continued encroachment into areas containing sensitive vegetation communities and wildlife habitat. It is also likely that new habitat areas such as wetlands will be created or restored as a result of mitigation and restoration programs. The extent of potential reductions and additions/restoration of sensitive biological resources between now and 2020 cannot be quantified. However, based on the likelihood that both will occur, the magnitude of the overall change in resources by 2020 is not expected to significantly alter the evaluation of impacts in this document. The program-level evaluation in this report of potential impacts to the existing (2002) environment is also considered valid for the future baseline condition in 2020.

3.0 METHODOLOGY FOR BIOLOGICAL RESOURCES ANALYSIS

Conducting biological resource analysis involved the use of a project Geographic Information Systems (GIS) database to identify various existing and mapped resources in the Los Angeles – Orange County – San Diego region for the High Speed Train and Modal Alternatives. The extent of the biological resources impact analysis conducted for the project, including the various proposed alignments and station locations, was defined by the following limits:

- 1,000 feet on either side of alignment centerlines (2,000 feet total) and around stations in urbanized areas,
- 0.25 mile on either side of alignment centerlines (0.50 mile total) and around stations in undeveloped areas, and
- 0.50 mile on either side of alignment centerlines (1.0 mile total) in undeveloped areas and in sensitive areas.

These limits constitute the study area and "zone of potential impact" biological resources. Census data (U.S. Bureau of the Census 2000) was used to determine what areas were characterized as being urban versus undeveloped. In the Los Angeles – Orange County – San Diego Region, all stations (existing and proposed) are located within urbanized areas. Other than the undeveloped area of Camp Pendleton and several other small open areas, the majority of study area is designated by census data as urbanized. Therefore, most of the analysis was completed using the 2,000-foot study area. Because of the sensitive nature of six lagoons, the areas surrounding lagoons were analyzed using a 1.0-mile study area. In addition, all undeveloped areas within this study area are considered sensitive and therefore were analyzed using the 1.0-mile study area.

Various GIS layers including those depicting California Natural Diversity Database (CNDDB) information on sensitive species, wetlands communities (National Wetlands Inventory Database or NWI), water bodies (blue lines), and vegetative communities, were overlaid on the alignments to display natural resources potentially present within the study area. The extent of these resources (acres of wetlands and linear distance of non-wetlands waters of the U.S.) and numbers of sensitive plant and animal species occurring within the study area were quantified.

In the Los Angeles – Orange County – San Diego Region, the existing, conventional LOSSAN rail corridor extends the length of the study area from Los Angeles to San Diego, and many of the improvements proposed in the High-Speed Train Alternative would occur within the rail corridor. In accordance with the methodology established for this program-level study, biological resources were mapped and quantified within the defined study area. However, due to the presence in this region of an established, disturbed rail corridor, the potential for impacts indicated by that quantification is almost certainly overstated. More information is provided in the discussion of impacts in Section 4.0 of this report.

4.0 IMPACTS TO BIOLOGICAL RESOURCES AND JURISDICTIONAL WATERS

Table 4-1 shows the comparison of alternatives, by segment, based on the GIS-mapped data within the study area for biological resources. In the Los Angeles – Orange County – San Diego Region, the existing, conventional LOSSAN rail corridor extends the length of the study area from Los Angeles to San Diego, and many of the improvements proposed in the High-Speed Train Alternative would occur within the rail corridor. In accordance with the methodology established for this program-level study, biological resources were mapped and quantified within the defined study area. However, due to the presence in this region of an established rail corridor, the potential for impacts indicated by the quantification shown in Table 4-1 is almost certainly overstated.

Many of the biological resources mapped within the study area width around the existing rail corridor are not expected to be present within the established, highly disturbed rail corridor, particularly within the urbanized areas. For many proposed improvements in the LOSSAN corridor, construction and operational impacts would be confined to the rail right-of-way. In addition, certain resources were shown to be present within the GIS-mapped study area that are probably too far from the rail corridor to be adversely affected by LOSSAN improvements. (For example, a stream in an urbanized area that runs for a distance of 10,000 linear feet parallel to, but 900 feet away from, the existing rail corridor would be picked up in the GIS-mapped study area as 10,000 feet of jurisdictional waters that could be affected by the rail improvements. Impacts to this stream would be highly unlikely for improvements confined to the existing rail right-of-way.

These types of limitations of the program-level, quantified data in Table 4-1 are taken into account in the discussion of potential impacts in this report. Where appropriate, local knowledge and an understanding of the design options under consideration are used to modify the estimated extent or magnitude of potential impacts to sensitive resources, and to adjust the overall estimate of impact potential for the alternatives.

The key biological resources within the study area of each alternative are described by alignment segment and station area in this section. Potential impacts to those sensitive resources from the build alternatives (High-Speed Train and Modal Alternatives) include both construction and operational impacts. Potential impacts include direct effects of permanent habitat loss from infrastructure installation, and temporary loss or disturbance from construction access, staging and lay-down areas; degradation of habitat by fragmentation or introduction of invasive, exotic species; and impacts resulting from the alteration of hydrologic conditions or water quality.

In lagoon areas, there are alignment options that would involve constructing a second track along the existing rail corridor. The project design for these alternatives includes the commitment that there will be no net increase in the footprint of rail structure in the lagoon. This could be accomplished by constructing retaining walls along the existing structure, or by replacing the structure. Because there is existing rail service utilizing this corridor, the double-tracking would need to be done in a manner that allows rail service to continue during construction. This would likely require that construction be done at night, which could have some temporary disruption and/or displacement impacts on area wildlife.

Areas where tunneling is proposed were assumed to have approximately 75% less potential for surface disturbance than at-grade sections. Surface impacts of tunneling would include staging areas at portals, spoils areas, and construction lay-down areas. Tunnel segments under waters and wetlands would have no impact on those resources. Trenching segments were assumed to have approximately 10 percent more surface disturbance than at-grade improvements, due to the slope of trench walls and the areas used for spoils and equipment staging.

Potential impacts related to noise in habitat areas are addressed in a separate technical report for the project (Noise and Vibration Technical Evaluation). Hydrologic information pertinent to the study area lagoons is discussed further in another technical report for the project, Hydrology and Water Quality.

TABLE 4-1

Detailed Comparison Table
Impacts to Biology/Wetlands
Los Angeles - Orange County - San Diego

	Sensitive Vegetation Communities Impacted (acres)	Wildlife Habitat Impacted (acres)	Wildlife Movement Corridors Impacted (yes/no)	T&E Species Impacted Fed./State (# of species impacted)	Species of Concern Impacted (# of species impacted); Includes CNPS 1b list	Wetlands Impacted (acres)	Non-Wetland Waters (linear feet)	Marine/ Anadramous Fish Resources (# of populated streams impacted)
NO-PROJECT								
MODAL ALTERNATIVE (I-5 and Airport Expansion)								
LAX to Union Station	There are no Modal improvements proposed in this segment.							
Union Station To Fullerton Station	Urb-Agr only	0	NO	0/0	3	0	6,720	0
Fullerton Station To Irvine Station	Urb-Agr only	0	NO	0/1	3	2	7,260	0
Irvine Station To San Juan Capistrano City Limits	Urb-Agr only	0	NO	0/0	2	0	12,350	0
San Juan Capistrano	14 of CSS	14 of CSS	NO	2/0	4	12	7,150	0
Dana Point/San Clemente	27 of CSS	27 of CSS	YES	8/2	9	167	9,355	1
Camp Pendleton	5800 of CSS	5800 of CSS	YES	12/8	21	4873	45,380	0
Oceanside/Carlsbad	Urb-Agr only	(lagoon vegetation)[1]	YES	10/6	16	840	9,000	0
Encinitas/Solana Beach	Urb-Agr only	(lagoon vegetation)[1]	YES	8/7	13	240	2,310	0
Del Mar	225 of CSS	225 of CSS (plus lagoon vegetation)[1]	YES	8/9	23	430	4,850	0
I-5/805 Split To Hwy 52	Urb-Agr only	0	YES	4/4	6	14	5,100	0
Hwy 52 To Santa Fe Depot	Urb-Agr only	0	YES	5/3	12	180	10,050	0

TABLE 4-1

Detailed Comparison Table
Impacts to Biology/Wetlands
Los Angeles - Orange County - San Diego (continued)

	Sensitive Vegetation Communities Impacted (acres)	Wildlife Habitat Impacted (acres)	Wildlife Movement Corridors Impacted (yes/no)	T&E Species Impacted Fed./State (# of species impacted)	Species of Concern Impacted (# of species impacted); Includes CNPS 1b list	Wetlands Impacted (acres)	Non-Wetland Waters (linear feet)	Marine/ Anadramous Fish Resources (# of populated streams impacted)
HIGH-SPEED RAIL CORRIDORS AND STATION OPTIONS								
Union Station to LAX	Urb-Agr only	0	NO	2/1	5	0	2,960	0
Stations								
LAX	Urb-Agr only	0	NO	1/1	1	0	0	0
Union Station To Anaheim Station via UPRR	Urb-Agr only	0	NO	1/2	6	1	6,920	0
Stations								
Norwalk	Urb-Agr only	0	NO	0/0	1	0	0	0
Anaheim	Urb-Agr only	0	NO	0/1	1	0	600	0
Union Station To Irvine Station via LOSSAN	Urb-Agr only	0	NO	0/1	5	2	20,800	0
Stations								
Norwalk	Urb-Agr only	0	NO	0/0	1	0	0	0
Fullerton	Urb-Agr only	0	NO	0/0	1	0	0	0
Anaheim	Urb-Agr only	0	NO	0/1	1	0	600	0
Santa Ana	Urb-Agr only	0	NO	0/1	2	0	0	0
Irvine	Urb-Agr only	0	NO	0	0	0	1,140	0
CONVENTIONAL RAIL (LOSSAN) CORRIDORS & STATION OPTIONS								
Union Station To Fullerton Station (4th main track)	Urb-Agr only	0	NO	0/0	2	0	7,350	0

TABLE 4-1

Detailed Comparison Table
Impacts to Biology/Wetlands
Los Angeles - Orange County - San Diego (continued)

	Sensitive Vegetation Communities Impacted (acres)	Wildlife Habitat Impacted (acres)	Wildlife Movement Corridors Impacted (yes/no)	T&E Species Impacted Fed./State (# of species impacted)	Species of Concern Impacted (# of species impacted); Includes CNPS 1b list	Wetlands Impacted (acres)	Non-Wetland Waters (linear feet)	Marine/ Anadramous Fish Resources (# of populated streams impacted)
Fullerton Station To Irvine Station								
Alignments								
AT-GRADE between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Urb-Agr only	0	NO	0/1	5	2	13,430	0
TRENCH between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Urb-Agr only	0	NO	0/1	5	2	13,430	0
Stations								
Fullerton	Urb-Agr only	0	NO	0/0	1	0	0	0
Anaheim	Urb-Agr only	0	NO	0/1	1	0	600	0
Santa Ana	Urb-Agr only	0	NO	0/1	2	0	0	0
Irvine	Urb-Agr only	0	NO	0	0	0	1,140	0
Irvine Station To San Juan Capistrano City Limits	There are no rail improvements proposed in this segment.							
San Juan Capistrano(City Limits to Avenida Aeropuerto)								
Alignments								
A) Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (structures over Trabuco and San Juan Creeks); Double tracking	26 of CSS	26 of CSS	NO	2/0	4	11	8,510	0
B) TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco and San Juan Creeks); Double tracking	10 of CSS	10 of CSS	NO	2/0	4	6	3,080	0

TABLE 4-1

Detailed Comparison Table
Impacts to Biology/Wetlands
Los Angeles - Orange County - San Diego (continued)

	Sensitive Vegetation Communities Impacted (acres)	Wildlife Habitat Impacted (acres)	Wildlife Movement Corridors Impacted (yes/no)	T&E Species Impacted Fed./State (# of species impacted)	Species of Concern Impacted (# of species impacted); Includes CNPS 1b list	Wetlands Impacted (acres)	Non-Wetland Waters (linear feet)	Marine/ Anadramous Fish Resources (# of populated streams impacted)
C) AT-GRADE and Open TRENCH along east side of Trabuco Creek	Urb-Agr only	0	NO	2/0	4	< 1	8,400	0
Stations								
San Juan Capistrano	Urb-Agr only	0	NO	0/0	1	0	450	0
Dana Point/San Clemente(Avenida Aeropuerto To San Onofre Power Plant)								
Alignments								
A) Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking (crosses San Mateo and San Onofre Creeks)	Urb-Agr only	0	YES	6/2	7	93	18,760	1
A) Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking (crosses San Mateo and San Onofre Creeks)	Urb-Agr only	0	YES	6/2	7	93	18,760	1
B) Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	Urb-Agr only	0	YES	8/2	10	3	7,850	1
C) San Clemente - LONG ONE-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	Urb-Agr only	0	YES	8/2	10	29	1,950	1

TABLE 4-1

Detailed Comparison Table
Impacts to Biology/Wetlands
Los Angeles - Orange County - San Diego (continued)

	Sensitive Vegetation Communities Impacted (acres)	Wildlife Habitat Impacted (acres)	Wildlife Movement Corridors Impacted (yes/no)	T&E Species Impacted Fed./State (# of species impacted)	Species of Concern Impacted (# of species impacted); Includes CNPS 1b list	Wetlands Impacted (acres)	Non-Wetland Waters (linear feet)	Marine/ Anadramous Fish Resources (# of populated streams impacted)
C) San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	Urb-Agr only	0	YES	8/2	10	29	1,950	1
Stations								
San Clemente	Urb-Agr only	0	YES	0/0	0	0	0	0
Camp Pendleton(San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses Santa Margarita River)	CSS likely to be present[2]	CSS likely to be present[2]	YES	3/1	2	6	1,075	0
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits)								
Alignments								
Carlsbad - AT-GRADE; double tracking; crosses San Luis Rey, Buena Vista , Aqua Hedionda, and Batiquitos Lagoons	Urb-Agr only	(lagoon vegetation) [1]	YES	8/5	14	367	9,800	0
Carlsbad -TRENCH; double-tracking; crosses San Luis Rey, Buena Vista, Aqua Hedionda, and Batiquitos Lagoons	Urb-Agr only	(lagoon vegetation) [1]	YES	8/5	14	367	9,800	0
Stations								
Oceanside	Urb-Agr only	0	YES	1/1	4	4	550	0

TABLE 4-1

Detailed Comparison Table
Impacts to Biology/Wetlands
Los Angeles - Orange County - San Diego (continued)

	Sensitive Vegetation Communities Impacted (acres)	Wildlife Habitat Impacted (acres)	Wildlife Movement Corridors Impacted (yes/no)	T&E Species Impacted Fed./State (# of species impacted)	Species of Concern Impacted (# of species impacted); Includes CNPS 1b list	Wetlands Impacted (acres)	Non-Wetland Waters (linear feet)	Marine/ Anadramous Fish Resources (# of populated streams impacted)
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)								
Alignments								
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	Urb-Agr only	(lagoon vegetation) [1]	YES	5/5	9	214	10,640	0
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	Urb-Agr only	(lagoon vegetation) [1]	YES	5/5	9	229	11,400	0
Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	Urb-Agr only	(lagoon vegetation) [1]	YES	5/5	9	229	11,400	0
Stations								
Solana Beach	Urb-Agr only	0	NO	1/1	3	2	600	0
Del Mar(Solana Beach Station to I-5/805 Split)								
Alignments								
A) COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons	Urb-Agr only	(lagoon vegetation) [1]	YES	8/8	17	319	15,875	0
B) TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	Urb-Agr only	(lagoon vegetation) [1]	YES	8/8	17	302	13,980	0
C) TUNNEL along I-5; crosses San Dieguito Lagoon and avoids Los Penasquitos Lagoon	88 acres of CSS	88 acres of CSS (plus lagoon vegetation)[1]	YES	6/5	16	269	21,192	0

TABLE 4-1

Detailed Comparison Table
Impacts to Biology/Wetlands
Los Angeles - Orange County - San Diego (continued)

	Sensitive Vegetation Communities Impacted (acres)	Wildlife Habitat Impacted (acres)	Wildlife Movement Corridors Impacted (yes/no)	T&E Species Impacted Fed./State (# of species impacted)	Species of Concern Impacted (# of species impacted); Includes CNPS 1b list	Wetlands Impacted (acres)	Non-Wetland Waters (linear feet)	Marine/ Anadramous Fish Resources (# of populated streams impacted)
I-5/805 Split To Hwy 52								
Alignments								
A) Miramar Hill Tunnel	96 of CSS	96 of CSS	possibly	5/5	9	9	4,140	0
B) I-5 Tunnel	0	0	possibly	5/5	9	16	6,615	0
Stations								
UTC (Only applies to Miramar Hill Tunnel)	2 of CSS	2 of CSS	YES	1/1	2	8	300	0
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)	Urb-Agr only	0	YES	5/3	12	0	7,430	0
Stations								
Santa Fe Depot	Urb-Agr only	0	NO	1/1	2	0	2000	0

CSS = Diegan coastal sage scrub; Urb-Agr = urban agriculture

[1] Wildlife habitat associated with lagoon vegetation is assumed to be present in this segment. Available GIS data does not allow quantification of lagoon vegetation, so no acreages are noted.

[2] Available GIS data indicates that no Diegan coastal sage scrub is present within the study area in the Camp Pendleton area. However, local knowledge of the area indicates that it is likely to be present, but no estimate of acreage is available from existing databases. Further analysis in Tier 2 studies would be required to determine presence or absence of both coastal sage scrub and wildlife habitat.

4.1 NO-PROJECT ALTERNATIVE

The No-Project Alternative includes the implementation of programmed improvements to highways, airports, and conventional rail infrastructure by the year 2020 (refer to Table 1-1). The impacts of these improvements have been or will be addressed in environmental and permit documents completed for those projects. The No-Project improvements will likely result in impacts to biological resources beyond those that exist today, due to continued encroachment into areas containing sensitive vegetation communities and wildlife habitat. It is also likely that new habitat areas such as wetlands will be created or restored as a result of mitigation and restoration programs. The extent of potential reductions and additions/restoration of sensitive biological resources between now and 2020 cannot be quantified. However, based on the likelihood that both will occur, the magnitude of the overall change in resources by 2020 is not expected to be significantly different overall from the existing baseline against which potential impacts of the proposed project is evaluated in this document.

The No-Project Alternative includes widening projects along Interstate 5 that would be expected to use most or all of the existing right-of-way and, in some areas, would likely require additional right-of-way. In areas where the No-Project highway projects would encroach beyond the existing right-of-way, some naturally vegetated hillsides and open areas would be affected. In lagoon areas, bridge widening for additional lanes would also create additional impacts in these potential habitat areas. The increase in impervious surface (pavement) would increase the amount of urban runoff which could increase the pollutant burden and sedimentation in these lagoons.

The No-Project Alternative also includes improvements to the existing LOSSAN rail corridor. Because these projects would be confined to the rail corridor, it is expected that impacts to high-quality vegetation, wildlife habitat, and jurisdictional waters would be low.

4.2 MODAL ALTERNATIVE

Key resources and potential impacts of the Modal Alternative are summarized below.

4.2.1 LAX to Union Station

There are no I-5 expansion projects planned for this segment of the Modal Alternative, so there would be no impacts of this alternative.

4.2.2 Union Station to Fullerton Station to Irvine Station

Expansion along this section of Interstate 5 includes the addition of 4 lanes from Union Station to where I-5 crosses Interstate 10 (I-10), and 2 lanes from the I-10 crossing to Irvine. The Modal Alternative also includes the addition of nine gates at the existing Long Beach Airport.

Sensitive Vegetation

Impacts to sensitive vegetation communities would not be expected to occur in this section because the only vegetation recorded here is Urban-Agricultural. However, the CNDDB records the following five sensitive plant species in this segment:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS LIST
CHAPARRAL SAND-VERBENA	ABRONIA VILLOSA VAR AURITA			1B
PARISH'S BRITTLESCALE	ATRIPLEX PARISHII			1B
SOUTHERN TARPLANT	CENTROMADIA PARRYI SSP AUSTRALIS			1B
SAN FERNANDO VALLEY SPINEFLOWER	CHORIZANTHE PARRYI VAR FERNANDINA	E		
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B

Due to the dense urbanization of this area and the lack of sensitive vegetation communities, it is unlikely that these sensitive species occur in or near the highway corridor or the site of the Long Beach Airport.

Sensitive Wildlife

Based on a review of the CNDDB, only one species was recorded in this section, the San Diego horned lizard (*Phyrynosoma coronatum blanvillei*) which is designated by the state as a species of concern. Due to the dense urbanization of this area and the lack of wildlife habitat or movement corridors, it is unlikely that this species exists in or near the highway corridor or the site of the Long Beach Airport.

Jurisdictional Waters

Available GIS data indicates potential impacts to approximately 2 acres of wetlands and approximately 14,000 linear feet of non-wetland waters within the study corridor. Waters potentially affected in this section may include the Los Angeles River, Rio Hondo, Coyote Creek, Santa Ana River, and San Diego Creek. Due to dense urbanization and the channelization of most the waters present in this section, impacts are expected to be minimal.

4.2.3 Irvine Station to San Juan Capistrano City Limits

Expansion of Interstate 5 in this section includes the addition of 2 lanes.

Sensitive Vegetation

Impacts to sensitive vegetation communities are not expected to occur in this section as the only vegetation recorded here is Urban-Agricultural. However, the CNDDB records one sensitive plant species in this section, the intermediate mariposa lily (*Calchortus weedii var intermedius*) which is listed as a 1B species by the CNPS. Due to the dense urbanization of this area and the lack of sensitive vegetation communities, it is unlikely that this sensitive species occurs in or near the highway corridor.

Sensitive Wildlife

The CNDDB records only one sensitive wildlife species in this section, the Arroyo chub (*Gila orcuti*) that is designated by the state as a species of concern. Due to the dense urbanization of this area and the lack of wildlife habitat or movement corridors, it is unlikely that this species exists in or near the highway corridor

Jurisdictional Waters

Available GIS data do not indicate the presence of wetlands in this section but do indicate potential impacts to approximately 12,350 linear feet of non-wetland waters within the study corridor. Due to

dense urbanization and the channelization of most the waters present in this section, impacts are expected to be minimal.

4.2.4 San Juan Capistrano

Expansion of Interstate 5 in this section includes the addition of 2 lanes. This would potentially require bridge expansions over Trabuco Creek and San Juan Creek.

Sensitive Vegetation

Sensitive vegetation recorded in this section includes approximately 14 acres of Diegan coastal sage scrub, and small areas of southern cottonwood willow riparian forest. The only CNDDB recorded sensitive plant species is Coulters Saltbrush (*Atriplex coulteri*), listed as a 1B species by the CNPS.

Sensitive Wildlife

The CNDDB records three sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC
ARROYO CHUB	GILA ORCUTTI			SC
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC

The presence of 14 acres of Diegan coastal sage scrub indicates that there would also be a similar acreage of wildlife habitat present in this section of the study corridor. USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher would potentially be impacted in this section. There are no identified wildlife movement corridors expected in this section. However, wildlife may use the channelized portions of San Juan Creek to move to and from the coastal area.

Jurisdictional Waters

Available GIS data shows approximately 12 acres of wetlands and 7,150 linear feet of non-wetland waters within the study corridor. Waters potentially impacted here would include Trabuco Creek and San Juan Creek.

4.2.5 Dana Point/San Clemente

Expansion of Interstate 5 in this section includes the addition of 2 lanes. This section of the alignment extends into Camp Pendleton Marine Corps Base and would potentially require bridge expansions over San Mateo Creek and San Onofre Creek.

Sensitive Vegetation

Potential impacts to sensitive vegetation communities would include approximately 27 acres of Diegan coastal sage scrub and some impacts to southern cottonwood willow riparian forest, southern coastal salt marsh, southern dune scrub, and southern foredunes. The CNDDB records two plant species in this section listed as CNPS 1B species:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
BLOCHMAN'S DUDLYEA	DUDLYEA BLOCHMANIAE SSP BLOCHMANIAE			1B
PROSTRATE NAVARRETIA	NAVARRETIA PROSTRATA			1B

Sensitive Wildlife

The CNDDB records ten sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
SAN DIEGO FAIRY SHRIMP	BRANCHINECTA SANDIEGONENSIS	E		
TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC
SOUTHERN STEELHEAD TROUT	ONCORHYNCHUS MYKISS IRIDEUS	E		SC
ARROYO TOAD	BUFO CALIFORNICUS	E		SC
ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
SAN DIEGO HORNED LIZARD	PHRYNOSOMA CORONATUM BLAINVILLEI			SC
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LEAST BELL'S VIREO	VIREO BELLII PUSILLUS	E	E	
PACIFIC POCKET MOUSE	PEROGNATHUS LONGIMEMBRIS PACIFICUS	E		SC
STEPHENS' KANGAROO RAT	DIPODOMYS STEPHENSI	E	T	

The presence of 27 acres of Diegan coastal sage scrub indicates that there would be a similar acreage of wildlife habitat in this section of the study corridor. USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher, tidewater goby, and San Diego fairy shrimp would potentially be impacted in this section. With the presence of San Mateo Creek and San Onofre Creek, there may be some narrow wildlife movement corridors. San Mateo Creek is also known to support a small population of southern steelhead trout.

Jurisdictional Waters

Available GIS data shows approximately 167 acres of wetlands and approximately 9,355 linear feet of non-wetland waters within the study corridor. Waters potentially impacted in this section include San Mateo Creek and San Onofre Creek.

4.2.6 Camp Pendleton

Expansion of Interstate 5 in this section includes the addition of 2 lanes. This would potentially require bridge expansion over the Santa Margarita River.

Sensitive Vegetation

Sensitive vegetation communities in the study area include approximately 5,800 acres of Diegan coastal sage scrub and some coastal brackish marsh, southern coastal salt marsh, and San Diego mesa hardpan vernal pool. In addition, the CNDDB records 14 sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
APHANISMA	APHANISMA BLITOIDES			1B
COASTAL DUNES MILK-VETCH	ASTRAGALUS TENER VAR TITI	E	E	1B
SMOOTH TARPLANT	CENTROMADIA PUNGENS SSP LAEVIS			1B
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
BLOCHMAN'S DUDLEYA	DUDLEYA BLOCHMANIAE SSP BLOCHMANIAE			1B
MANY-STEMMED DUDLEYA	DUDLEYA MULTICAULIS			1B
STICKY DUDLEYA	DUDLEYA VISCIDA			1B
SAN DIEGO BUTTON-CELERY	ERYNGIUM ARISTULATUM VAR PARISHII	E	E	1B
PENDLETON BUTTON-CELERY	ERYNGIUM PENDLETONENSIS			1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
PROSTRATE NAVARRETIA	NAVARRETIA PROSTRATA			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B
BRAND'S PHACELIA	PHACELIA STELLARIS			1B

Sensitive Wildlife

The CNDDB records 16 sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
SAN DIEGO FAIRY SHRIMP	BRANCHINECTA SANDIEGONENSIS	E		
RIVERSIDE FAIRY SHRIMP	STREPTOCEPHALUS WOOTTONI	E		
TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC
WESTERN SPADEFOOT	SCAPHIOPUS HAMMONDII			SC
COASTAL CACTUS WREN	CAMPYLORHYNCHUS BRUNNEICAPILLUS COUESI			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
NORTHERN HARRIER	CIRCUS CYANEUS			SC

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
WHITE-TAILED KITE	ELANUS LEUCURUS			
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
BANK SWALLOW	RIPARIA RIPARIA		T	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	
LEAST BELL'S VIREO	VIREO BELLII PUSILLUS	E	E	
PACIFIC POCKET MOUSE	PEROGNATHUS LONGIMEMBRIS PACIFICUS	E		SC
STEPHENS' KANGAROO RAT	DIPODOMYS STEPHENSI	E	T	

The presence of 5,800 acres of Diegan coastal sage scrub indicates that there would also be a similar acreage of wildlife habitat present in this section of the study corridor. USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher, Least Bells vireo, tidewater goby, and San Diego fairy shrimp would potentially be impacted in this section. Due to the recorded presence of the San Diego fairy shrimp, there may be some vernal pool habitat present in this section of the study area. Because of the vast open and undeveloped areas of Camp Pendleton, this section would be considered to be a wildlife movement corridor, with most wildlife movement toward the coast associated with bridges over coastal drainages and creeks.

Jurisdictional Waters

Available GIS data indicates approximately 4,870 acres of wetlands and over 45,000 linear feet of non-wetland waters within the study corridor. Waters potentially affected in this section include the Santa Margarita River.

4.2.7 Oceanside/Carlsbad

Expansion of Interstate 5 in this section includes the addition of 2 lanes.

Sensitive Vegetation

GIS vegetation data did not indicate the presence of sensitive vegetation within this section of the Modal Alternative. However, the CNDDB records some areas of southern coastal salt marsh for this section. In addition, the CNDDB recorded nine sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
SMOOTH TARPLANT	CENTROMADIA PUNGENS SSP LAEVIS			1B
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
STICKY DUDLEYA	DUDLEYA VISCIDA			1B

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
SAN DIEGO BUTTON-CELERY	ERYNGIUM ARISTULATUM VAR PARISHII	E	E	1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
SPREADING NAVARRETIA	NAVARRETIA FOSSALIS	T		1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B
CALIFORNIA ORCUTT GRASS	ORCUTTIA CALIFORNICA	E	E	1B

Sensitive Wildlife

The CNDDB records 12 sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
RIVERSIDE FAIRY SHRIMP	STREPTOCEPHALUS WOOTTONI	E		
TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC
ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
NORTHERN RED-DIAMOND RATTLESNAKE	CROTALUS EXSUL			SC
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
COASTAL CACTUS WREN	CAMPYLORHYNCHUS BRUNNEICAPILLUS COUESI			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	
LEAST BELL'S VIREO	VIREO BELLII PUSILLUS	E	E	

USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher, Least Bells vireo, tidewater goby, and San Diego fairy shrimp would potentially be impacted in this section. Wildlife habitat, and possibly wildlife movement corridors, would potentially be impacted at the San Luis Rey River, Buena Vista Lagoon and Ecological Reserve, Agua Hedionda Lagoon and surrounding open areas, and the Batiquitos Lagoon and Ecological Reserve.

Jurisdictional Waters

Available GIS data indicates approximately 840 acres of wetlands and over 9,000 linear feet of non-wetland waters within the study corridor. Potential areas of impact could include the San Luis Rey River, Buena Vista Lagoon, Agua Hedionda Lagoon, and Batiquitos Lagoon.

4.2.8 Encinitas/Solana Beach

Expansion of Interstate 5 in this section includes the addition of 2 lanes.

Sensitive Vegetation

GIS vegetation data did not indicate the presence of sensitive vegetation within this section of the Modal Alternative. However, the CNDDB records some areas of southern coastal salt marsh and southern maritime chaparral for this section. In addition, the CNDDB records 10 sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
SAN DIEGO THORN-MINT	ACANTHOMINTHA ILICIFOLIA	T	E	1B
DEL MAR MANZANITA	ARCTOSTAPHYLOS GLANDULOSA SSP CRASSIFOLIA	E		1B
ENCINITAS BACCHARIS	BACCHARIS VANESSAE	T	E	1B
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
ORCUTT'S SPINEFLOWER	CHORIZANTHE ORCUTTIANA	E	E	1B
DEL MAR MESA SAND ASTER	CORETHROGYNE FILAGINIFOLIA VAR LINIFOLIA			1B
DECUMBENT GOLDENBUSH	ISOCOMA MENZIESII VAR DECUMBENS			1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B

Sensitive Wildlife

The CNDDB records seven sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
COASTAL CACTUS WREN	CAMPYLORHYNCHUS BRUNNEICAPILLUS COUESI			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
CALIFORNIA BLACK RAIL	LATERALLUS JAMAICENSIS COTURNICULUS		T	
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	

USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher would potentially be impacted in this section. Wildlife habitat, and possibly wildlife movement corridors, may potentially be affected at the San Elijo Lagoon and Ecological Reserve.

Jurisdictional Waters

Available GIS data indicates approximately 240 acres of wetlands and over 2,300 linear feet of non-wetland waters within the study corridor in this section. Sensitive areas where potential impacts could occur include the San Elijo Lagoon.

4.2.9 Del Mar

Expansion of Interstate 5 in this section includes the addition of 2 lanes.

Sensitive Vegetation

Approximately 225 acres of Diegan coastal sage scrub occur in study area in this section, and some areas of southern coastal salt marsh, southern maritime chaparral, southern riparian forest, and Torrey pine forest could potentially be affected. In addition, the CNDDB records 14 sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
DEL MAR MANZANITA	ARCTOSTAPHYLOS GLANDULOSA SSP CRASSIFOLIA	E		1B
COASTAL DUNES MILK-VETCH	ASTRAGALUS TENER VAR TITI	E	E	1B
ENCINITAS BACCHARIS	BACCHARIS VANESSAE	T	E	1B
LAKESIDE CEANOTHUS	CEANOTHUS CYANEUS			1B
SOUTHERN TARPLANT	CENTROMADIA PARRYI SSP AUSTRALIS			1B
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
ORCUTT'S SPINEFLOWER	CHORIZANTHE ORCUTTIANA	E	E	1B
SUMMER HOLLY	COMAROSTAPHYLIS DIVERSIFOLIA SSP DIVERSIFOLIA			1B
SAN DIEGO SAND ASTER	CORETHROGYNE FILAGINIFOLIA VAR INCANA			1B
DEL MAR MESA SAND ASTER	CORETHROGYNE FILAGINIFOLIA VAR LINIFOLIA			1B
SHORT-LEAVED DUDLEYA	DUDLEYA BREVIFOLIA		E	1B

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B
TORREY PINE	PINUS TORREYANA SSP TORREYANA			1B

Sensitive Wildlife

The CNDDB records thirteen sensitive wildlife in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
WESTERN SPADEFOOT	SCAPHIOPUS HAMMONDII			SC
ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
SAN DIEGO HORNED LIZARD	PHRYNOSOMA CORONATUM BLAINVILLEI			SC
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
LEAST BELL'S VIREO	VIREO BELLII PUSILLUS	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
CALIFORNIA BLACK RAIL	LATERALLUS JAMAICENSIS COTURNICULUS		T	
NORTHWESTERN SAN DIEGO POCKET MOUSE	CHAETODIPUS FALLAX FALLAX			SC
SAN DIEGO BLACK-TAILED JACKRABBIT	LEPUS CALIFORNICUS BENNETTII			SC
SAN DIEGO DESERT WOODRAT	NEOTOMA LEPIDA INTERMEDIA			SC

The presence of Diegan coastal sage scrub indicates a similar acreage of wildlife habitat. Additional wildlife habitat, and possibly wildlife movement corridors, would potentially be impacted at the San Dieguito Lagoon and surrounding open areas, and Los Penasquitos Lagoon and Preserve.

Jurisdictional Waters

Available GIS data indicates approximately 430 acres of wetlands and over 4,850 linear feet of non-wetland waters within the study corridor. Sensitive areas where impacts could occur include the San Dieguito River/Lagoon and Los Peñasquitos Lagoon.

4.2.10 I-5/805 Split to Highway 52 (I-5 to 52)

Proposed expansion of Interstate 5 in this section includes the addition of 2 lanes.

Sensitive Vegetation

Available GIS vegetation data did not indicate the presence of sensitive vegetation within this section of the Modal Alternative. However, the CNDDB records some areas of southern riparian scrub in this section. In addition, the CNDDB records three sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
SUMMER HOLLY	COMAROSTAPHYLIS DIVERSIFOLIA SSP DIVERSIFOLIA			1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
NUTTALL'S SCRUB OAK	QUERCUS DUMOSA			1B

Sensitive Wildlife

The CNDDB records seven sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
CALIFORNIA BLACK RAIL	LATERALLUS JAMAICENSIS COTURNICULUS		T	
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	

Wildlife movement corridors may be present in areas associated with Peñasquitos Creek and the north facing slopes of Los Peñasquitos Canyon and Sorrento Valley.

Jurisdictional Waters

Available GIS data indicates approximately 14 acres of wetlands and over 5,100 linear feet of non-wetland waters within the study corridor.

4.2.11 Highway 52 to Santa Fe Depot

Proposed expansion of Interstate 5 in this section includes the addition of 2 lanes.

Sensitive Vegetation

Available GIS vegetation data did not indicate the presence of sensitive vegetation within this section of the modal alternative. However, the CNDDB records some areas of southern cottonwood willow riparian forest and southern riparian forest in this section. In addition, the CNDDB records 12 sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
SUMMER HOLLY	COMAROSTAPHYLIS DIVERSIFOLIA SSP DIVERSIFOLIA			1B
SALT MARSH BIRD'S-BEAK	CORDYLANTHUS MARITIMUS SSP MARITIMUS	E	E	1B
VARIEGATED DUDLEYA	DUDLEYA VARIEGATA			1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
ROBINSON'S PEPPER-GRASS	LEPIDIUM VIRGINICUM VAR ROBINSONII			1B
NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
SAN DIEGO GOLDENSTAR	MUILLA CLEVELANDII			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B
BRAND'S PHACELIA	PHACELIA STELLARIS			1B
NUTTALL'S SCRUB OAK	QUERCUS DUMOSA			1B
OIL NESTSTRAW	STYLOCLINE CITROLEUM			1B

Sensitive Wildlife

The CNDDB records five sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	

Wildlife movement corridors may be present in Rose and San Clemente Canyons adjacent to the proposed Modal construction activities.

Jurisdictional Waters

Available GIS data indicates approximately 180 acres of wetlands and over 10,050 linear feet of non-wetland waters within the study corridor. Waters potentially impacted in this section may include Mission Bay, San Diego River, Rose and Sycamore Canyons, and associated wetlands.

4.3 HIGH SPEED TRAIN ALTERNATIVE – HIGH-SPEED RAIL OPTIONS

Sensitive vegetation, sensitive wildlife, and jurisdictional waters potentially affected by the High-Speed Train Alternative within the study area are summarized below. The construction and operation of the HST alternative (both high-speed and conventional rail) would primarily occur within an already highly disturbed, existing rail corridor and within densely urbanized areas.

4.3.1 LAX to Union Station High Speed Rail

Construction along this section includes elevated areas of the rail line, trenching and some at-grade improvements. A new, underground station is proposed at Los Angeles International Airport.

Sensitive Vegetation

Impacts to sensitive vegetation communities would not be expected to occur in this section as the only vegetation recorded here is Urban-Agricultural. However, within this section, the CNDDB records five sensitive plant species:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
COASTAL DUNES MILK-VETCH	ASTRAGALUS TENER VAR TITI	E	E	1B
SOUTHERN TARPLANT	CENTROMADIA PARRYI SSP AUSTRALIS			1B
COULTERS GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
SPREADING NAVARRETIA	NAVARRATIA FOSSALIS	T		1B
PROSTRATE NAVARRETIA	NAVARRETIA PROSTRATA			1B

Sensitive Wildlife

Only one sensitive wildlife species was recorded in this section in the CNDDB, the San Diego horned lizard (*Phyrynosoma coronatum blanvillei)*. This species is designated by the state as a species of concern. No wildlife movement corridors are present in this section.

Jurisdictional Waters

Available GIS data did not indicate the presence of wetlands in this section but did indicate approximately 2,960 linear feet of non-wetland waters within the study corridor. Waters impacted in this section may include the Los Angeles River. Due to dense urbanization and the channelization of most the waters present in this section, impacts are expected to be minimal.

4.3.2 Union Station to Irvine Station via LOSSAN Corridor (High-Speed Rail)

Construction along this section includes an at-grade track within the existing LOSSAN corridor, to be shared by high-speed and conventional rail service. Multiple grade separations would be needed along

this section for safety purposes. Station improvements are proposed at Norwalk, Fullerton, Anaheim, Santa Ana, and Irvine.

Sensitive Vegetation

Impacts to sensitive vegetation communities would not be expected to occur in this section as the only vegetation recorded here is Urban-Agricultural. However, the CNDDB records four sensitive plant species within this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
CHAPARRAL SAND-VERBENA	ABRONIA VILLOSA VAR AURITA			1B
SOUTHERN TARPLANT	CENTROMADIA PARRYI SSP AUSTRALIS			1B
SAN FERNANDO VALLEY SPINEFLOWER	CHORIZANTHE PARRYI VAR FERNANDINA		E	1B
MANY-STEMMED DUDLEYA	DUDLEYA MULTICAULIS			1B

Sensitive Wildlife

The CNDDB records indicate there are no sensitive wildlife species in this section. No potential wildlife corridors exist in this section of the study area.

Jurisdictional Waters

Available GIS data indicates approximately 2 acres of wetlands and 20,800 linear feet of non-wetland waters within the study corridor. Waters potentially impacted in this section include the Los Angeles River, Rio Hondo, Coyote Creek, Santa Ana River, and San Diego Creek. In addition, data indicates potential impacts of 1,740 linear feet of non-wetland waters at the Anaheim and Irvine Stations. Due to dense urbanization and the channelization of most the waters present in this section, impacts are expected to be minimal.

4.3.3 Union Station to Anaheim via Union Pacific Railroad Corridor (High-Speed Rail)

Construction along this section includes trenching/tunneling, three bridges, and elevated areas along the existing Union Pacific Railroad corridor. Proposed construction also includes a new, elevated station at Norwalk and a new underground station at Anaheim.

Sensitive Vegetation

Impacts to sensitive vegetation communities would not be expected to occur in this section as the only vegetation recorded here is Urban-Agricultural. However, the CNDDB records six sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
CHAPARRAL SAND-VERBENA	ABRONIA VILLOSA VAR AURITA			1B
SAN FERNANDO VALLEY SPINEFLOWER	CHORIZANTHE PARRYI VAR FERNANDINA		E	1B
COULTERS GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
PROSTRATE NAVARRETIA	NAVARRETIA PROSTRATA			1B
CALIFORNIA ORCUTT GRASS	ORCUTTA CALIFORNICA	E	E	1B
BRANDS PHACELIA	PHACELIA STELLARIS			1B

Sensitive Wildlife

No sensitive wildlife species were recorded in the CNDDB for this section. No potential wildlife corridors exist in this section of the study area.

Jurisdictional Waters

Available GIS data indicate less than one acre of wetlands and approximately 6,920 linear feet of non-wetland waters within the study corridor. Due to dense urbanization and the channelization of most the waters present in this section, impacts are expected to be minimal.

4.4 HIGH-SPEED TRAIN ALTERNATIVE - CONVENTIONAL RAIL OPTIONS

4.4.1 Union Station to Fullerton Station to Irvine Station

Rail improvements along this section involve adding a fourth main track in the existing rail corridor from Union Station to the Fullerton Station. Adding a fourth main track would also involve proposed bridge crossings over or under roads as necessary. From Fullerton Station to the Irvine Station, the proposed alignment alternatives include double-tracking at grade or trenching. This section also includes station improvements at Fullerton, Anaheim, Santa Ana, and Irvine.

Sensitive Vegetation

Impacts to sensitive vegetation communities are not expected to occur in this section as the only vegetation recorded here is Urban-Agricultural. However, the CNDDB records four sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
CHAPARRAL SAND-VERBENA	ABRONIA VILLOSA VAR AURITA			1B
SOUTHERN TARPLANT	CENTROMADIA PARRYI SSP AUSTRALIS			1B
SAN FERNANDO VALLEY SPINEFLOWER	CHORIZANTHE PARRYI VAR FERNANDINA		E	1B
MANY-STEMMED DUDLEYA	DUDLEYA MULTICAULIS			1B

Due to the dense urbanization of this area and the lack of sensitive vegetation communities, it is unlikely that these sensitive species occur in or near the rail corridor. In addition, rail improvements would occur within a highly disturbed, existing rail corridor making the possibility of impacts more unlikely.

Sensitive Wildlife

The CNDDB records only one sensitive wildlife species in this section, the San Diego horned lizard *Phyrynosoma coronatum blanvillei*, designated by the state as a species of concern. Due to the dense

urbanization of this area and the lack of wildlife habitat and movement corridors, it is unlikely that this species exists in or near the rail corridor. In addition, rail improvements would occur within a highly disturbed existing rail corridor making the possibility of impacts more unlikely.

Jurisdictional Waters

Available GIS data indicates the presence of approximately 2 acres of wetlands and 20,800 linear feet of non-wetland waters within the study corridor. Waters potentially impacted in this section would include the Los Angeles River, Rio Hondo, Coyote Creek, Santa Ana River, and San Diego Creek. In addition, the data indicates the presence of 1,740 linear feet of non-wetland waters at the Anaheim and Irvine Stations. Due to dense urbanization and the channelization of most the waters present in this section, impacts are expected to be minimal. Rail improvements would occur only within an already highly disturbed existing rail corridor.

4.4.2 Irvine Station to San Juan Capistrano City Limits

No rail projects are planned for this section of the conventional rail improvements alternative.

4.4.3 San Juan Capistrano

Rail improvement alternatives in this section include double-tracking along several alignment options. One option involves a cut and covered trench between Trabuco Creek and Avenida Aeropuerto that would involve bridging over Trabuco Creek and San Juan Creek. A second option involves a tunnel along I-5 between Trabuco Creek and Avenida Aeropuerto that would run underneath Trabuco Creek and San Juan Creek. A third alignment option would include both open trenching and at-grade sections through the City of San Juan Capistrano, along the east side of Trabuco Creek. This option would leave the existing LOSSAN corridor alignment just south of Trabuco Creek, and would include a new structure over San Juan Creek and an expansion of the existing structure over Trabuco Creek. A new below-grade station is proposed as part of this option.

Sensitive Vegetation

For the cut and cover trench option, sensitive vegetation communities present would include approximately 26 acres of Diegan coastal sage scrub and some small southern cottonwood willow riparian forest. For the I-5 tunnel option, sensitive vegetation along the alignment includes 10 acres of Diegan coastal sage scrub and the presence of southern cottonwood willow riparian forest. Most or all of this vegetation would be avoided by tunneling. Although there would be no impacts to Diegan coastal sage scrub resulting from the open trench/at-grade option east of Trabuco Creek, some southern cottonwood willow riparian does exist in the study area. The only sensitive plant species recorded in the CNDDB for this section and present within the study area for all three alignment options is Coulters Saltbrush (*Atriplex coulteri*), listed as a 1B species by the CNPS.

Sensitive Wildlife

The CNDDB records three sensitive wildlife species for all three alignment options in this section. They include the following::

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC
ARROYO CHUB	GILA ORCUTTI			SC
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC

The presence of Diegan coastal sage scrub indicates that there would also be a similar acreage of wildlife habitat for the cut and cover trench and the tunnel alignment options. USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher would potentially be affected in this section. There are no known wildlife movement corridors although some wildlife movement could occur down the San Juan Creek drainage to and from the coast.

Jurisdictional Waters

For the trench option, available GIS data indicates approximately 11 acres of wetlands and approximately 8,510 linear feet of non-wetland waters within the study area. GIS data for the tunnel option indicates the presence of approximately 6 acres of wetlands and 3,080 linear feet of non-wetland waters. The study area for the open trench/at-grade option east of Trabuco Creek includes less than one acre of wetlands and approximately 8,400 linear feet of non-wetland waters. In addition, data indicates the presence of 450 linear feet of non-wetland waters at the existing San Juan Capistrano Station. Waters potentially impacted in this section of the rail corridor would include Trabuco Creek and San Juan Creek with impacts being reduced using the tunnel option.

4.4.4 Dana Point/San Clemente

Five options for rail improvements were evaluated in this section: short trench, long trench, short tunnel, one continuous long tunnel, and one long tunnel divided into two segments. The two trench options, which share the same alignment (Option A), and the short tunnel (Option B) would necessitate curve realignments at Dana Point. The long tunnel option (Option C), whether in one segment or two, begins north of the Dana Point curve realignment project and would therefore make the curve realignment unnecessary. The two-segment tunnel would include a new station located between the tunnel segments.

Sensitive Vegetation

Available GIS vegetation data indicates that no sensitive vegetation occurs in this section of the study area. However, the CNNDB records some areas of southern cottonwood willow riparian forest, southern coastal salt marsh and southern dune scrub in this section. Southern foredunes have also been recorded within the study area of the trench alignment (Option A). In addition, three sensitive plant species are recorded in this section of the study area and are listed below with alignment option specified:

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
A	SOUTH COAST SALTSCALE	ATRIPLEX PACIFICA			1B
A,B,C	BLOCHMAN'S DUDLYEA	DUDLYEA BLOCHMANIAE SSP BLOCHMANIAE			1B
A,B,C	PROSTRATE NAVARRETIA	NAVARRETIA PROSTRATA			1B

Sensitive Wildlife

The CNDDB records eleven sensitive wildlife species in this section. They include the following and are listed with alignment option specified:

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
A,B,C	SAN DIEGO FAIRY SHRIMP	BRANCHINECTA SANDIEGONENSIS	E		
A,B,C	TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
A,B,C	ARROYO CHUB	GILA ORCUTTI			SC
A,B,C	SOUTHERN STEELHEAD	ONCORHYNCHUS MYKISS IRIDEUS	E		SC
B,C	ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
B,C	ARROYO TOAD	BUFO CALIFORNICUS	E		SC
B,C	SAN DIEGO HORNED LIZARD	PHRYNOSOMA CORONATUM BLAINVILLEI			SC
A,B,C	COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
A,B,C	LEAST BELLS VIREO	VIREO BLLII PUSILLUS	E	E	
B,C	PACIFIC POCKET MOUSE	PEROGNATHUS LONGIMEMBRIS PACIFICUS	E		SC
A,B,C	STEPHENS' KANGAROO RAT	DIPODOMYS STEPHENSI	E	T	

USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher, tidewater goby, and San Diego fairy shrimp would potentially be affected in all alignments in this section. With the presence of San Mateo Creek and San Onofre Creek, there may be some narrow wildlife movement corridors impacted all alignment options. The long tunnel option would be expected to result in the fewest impacts.

Jurisdictional Waters

Available GIS data indicates the presence of approximately 93 acres of wetlands and 18,760 linear feet of non-wetland waters within the trenching alignment of the study corridor. For the short tunnel alignment, data includes 3 acres of wetlands and 7,850 linear feet of non-wetland waters. For the long tunnel alignment, data indicates the presence of 29 acres of wetlands and 1,950 linear feet of non-wetland waters. Waters potentially impacted in this section would include San Juan Creek, San Mateo Creek, and San Onofre Creek.

Potential impacts to jurisdictional waters are shown in the available GIS data as being greater with the trenching alignment options than with the tunneling options. Trench options would require bridge structures over both San Mateo Creek and San Onofre Creek. All three tunnel options would run under San Mateo Creek but would end and become at-grade just north of San Onofre Creek and require a bridge structure over the creek. Because the long tunnel would run under areas of potential impacts at San Mateo Creek, this option would be expected to result in the fewest impacts to all biological resources, particularly since the at-grade Dana Point curve realignment would not be needed.

San Juan Creek runs parallel to the Dana Point curve realignment. However, construction would be far enough from the creek that impacts would be unlikely.

4.4.5 Camp Pendleton

Rail improvements in this section would consist of double-tracking in areas that are not planned as part of the No-Project Alternative.

Sensitive Vegetation

Available GIS vegetation data indicates that no sensitive vegetation occurs in this section of the study area. Although the reaches of this section that would be double-tracked as part of this project are small, some impacts would still be expected to occur on scattered patches of Diegan coastal sage scrub. The CNDDB records only one sensitive plant species in this section, the Prostrate navarretia (*Navarretia prostrata*) which is listed as a 1B species by the CNPS.

Sensitive Wildlife

The CNDDB records three sensitive wildlife species in this section:

SCIENTIFIC NAME	COMMON NAME	FED LIST	CAL LIST	CDFG
SAN DIEGO FAIRY SHRIMP	BRANCHINECTA SANDIEGOENSIS	E		
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
STEPHENS' KANGAROO RAT	DIPODOMYS STEPHENSI	E	T	

USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher and San Diego fairy shrimp would potentially be affected in this section. Due to the recorded presence of the San Diego fairy shrimp, there may be some vernal pool habitat present in this section of the study area. Because of the large open and undeveloped areas of Camp Pendleton, this section would be considered to be a wildlife movement corridor.

Jurisdictional Waters

Available GIS data indicates the presence of approximately 6 acres of wetlands and approximately 1,075 linear feet of non-wetland waters within the study area. A rail bridge replacement project over the Santa Margarita River is part of the planned and approved projects included in the No-Project Alternative. Therefore, the proposed rail improvements under the High-Speed Train Alternative would not have any additional impacts to the river.

4.4.6 Oceanside/Carlsbad

Rail improvement alternatives in this section include two construction options that both fall within the same alignment: at-grade double-tracking, or double-tracking that would also involve trenching. This section also includes station improvements at Oceanside. There would be no net increase in the footprint of rail infrastructure within the three lagoons in this section.

Sensitive Vegetation

Available GIS vegetation data does not indicate the presence of sensitive vegetation within this section of the study area. However, the CNDDB records some areas of southern coastal salt marsh and other vegetation associated with lagoons in this section. In addition, seven sensitive plant species are recorded in this section per the CNDDB:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
SMOOTH TARPLANT	CENTROMADIA PUNGENS SSP LAEVIS			1B
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
STICKY DUDLEYA	DUDLEYA VISCIDA			1B
SAN DIEGO BUTTON-CELERY	ERYNGIUM ARISTULATUM VAR PARISHII	E	E	1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B

Sensitive Wildlife

The CNDDB records twelve sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
RIVERSIDE FAIRY SHRIMP	STREPTOCEPHALUS WOOTTONI	E		
TIDEWATER GOBY	EUCYCLOGOBIUS NEWBERRYI	E		SC
ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
NORTHERN RED-DIAMOND RATTLESNAKE	CROTALUS EXSUL			SC
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
COASTAL CACTUS WREN	CAMPYLORHYNCHUS BRUNNEICAPILLUS COUESI			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	
LEAST BELL'S VIREO	VIREO BELLII PUSILLUS	E	E	

USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher, Least Bells vireo, tidewater goby, and San Diego fairy shrimp would potentially be impacted in this section. Wildlife habitat, and possibly wildlife movement corridors, would potentially be impacted at the San Luis Rey River, Buena Vista Lagoon and Ecological Reserve, Agua Hedionda Lagoon and surrounding open areas, and the Batiquitos Lagoon and Ecological Reserve. A wildlife movement corridor would not be expected in this reach of the San Luis Rey River as is the area is highly urbanized.

Jurisdictional Waters

GIS data shows the presence of approximately 367 acres of wetlands and over 9,800 linear feet of non-wetland waters within the study area. Some of these resources include the San Luis Rey River, Buena

Vista Lagoon, Agua Hedionda Lagoon, and Batiquitos Lagoon. In addition, the available data indicates the presence of 4 acres of wetlands and 550 linear feet of non-wetland waters within the Oceanside Station study area.

4.4.7 Encinitas/Solana Beach

Rail improvement alternatives in this section include three construction options that all fall within the same alignment: at-grade double-tracking, double tracking with a short trench, or double-tracking with a long trench. This section also includes station improvements at Solana Beach. There would be no net increase in the footprint of the rail infrastructure within the San Elijo Lagoon.

Sensitive Vegetation

GIS vegetation data did not indicate the presence of sensitive vegetation within this section of the study area. However, the CNDDB records some areas of southern coastal salt marsh and southern maritime chaparral in this section. In addition, the CNDDB records seven sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
ORCUTT'S SPINEFLOWER	CHORIZANTHE ORCUTTIANA	E	E	1B
DEL MAR MESA SAND ASTER	CORETHROGYNE FILAGINIFOLIA VAR LINIFOLIA			1B
DECUMBENT GOLDENBUSH	ISOCOMA MENZIESII VAR DECUMBENS			1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B

Sensitive Wildlife

The CNDDB records six sensitive wildlife species in this section

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
CALIFORNIA BLACK RAIL	LATERALLUS JAMAICENSIS COTURNICULUS		T	
BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	

USFWS overlays indicate that designated critical habitat for the Coastal California gnatcatcher would potentially be impacted in this section, including impacts on critical habitat near the Solana Beach Station. The area surrounding the station is urbanized making impacts to critical habitat in this location unlikely. Wildlife habitat, and possibly wildlife movement corridors, would potentially be impacted at the San Elijo Lagoon and Ecological Reserve.

Jurisdictional Waters

GIS data indicates potential impacts to approximately 214 acres of wetlands and 10,640 linear feet of non-wetland waters for the at-grade option, and approximately 229 wetlands acres and 11,400 linear feet of non-wetland waters for the trench options. Some of these jurisdictional waters include the San Elijo Lagoon. In addition, the data indicates potential impacts on 2 acres of wetlands and 600 linear feet of non-wetland waters at the Solana Beach Station. The area surrounding the station is urbanized thus making impacts to jurisdictional waters unlikely.

4.4.8 Del Mar

Rail improvement alternatives in this section include three alignment options: covered trench on the coastal bluffs (Option A), tunnel under Camino Del Mar (Option B), or tunnel along I-5 (Option C). No station improvements occur in this section. With these options, there will be no net increase in the footprint of the rail infrastructure within the two lagoons in this section.

Option C in this section would involve a new bridge structure over San Dieguito Lagoon and the removal of existing track where it currently crosses Los Peñasquitos Lagoon. Impacts associated with this option are primarily expected to occur only at the portal areas of the tunnel.

Sensitive Vegetation

GIS vegetation data did not indicate the presence of sensitive vegetation within this section of the study area for Options A and B. However, available GIS data did indicate the presence of 88 acres of CSS along the alignment for Option C. In addition, the CNDDB records some areas of southern coastal salt marsh, southern maritime chaparral, southern riparian forest, and Torrey pine forest within all three alignment options for this section. The CNDDB records 16 sensitive plant species in this section shown with the alignment option specified.

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
A,B,C	DEL MAR MANZANITA	ARCTOSTAPHYLOS GLANDULOSA SSP CRASSIFOLIA	E		1B
A,B,C	COASTAL DUNES MILK-VETCH	ASTRAGALUS TENER VAR TITI	E	E	1B
A,B,C	LAKESIDE CEANOTHUS	CEANOTHUS CYANEUS			1B
C	SOUTHERN TARPLANT	CENTROMADIA PARRYI SSP AUSTRALIS			1B
A,B	ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
A,B,C	ORCUTT'S SPINEFLOWER	CHORIZANTHE ORCUTTIANA	E	E	1B
A,B,C	SUMMER HOLLY	COMAROSTAPHYLIS DIVERSIFOLIA SSP DIVERSIFOLIA			1B

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
C	SAN DIEGO SAND ASTER	CORETHROGYNE FILAGINIFOLIA VAR INCANA			1B
A,B,C	DEL MAR MESA SAND ASTER	CORETHROGYNE FILAGINIFOLIA VAR LINIFOLIA			1B
A,B,C	SHORT-LEAVED DUDLEYA	DUDLEYA BREVIFOLIA		E	1B
C	ENCINITAS BACCHARIS	BACCHARIS VANESSAE	T	E	1B
A,B,C	COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
A,B,C	NUTTALL'S LOTUS	LOTUS NUTTALLIANUS			1B
A,B,C	COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B
A,B,C	TORREY PINE	PINUS TORREYANA SSP TORREYANA			1B
A,B	NUTTALL'S SCRUB OAK	QUERCUS DUMOSA			1B

Options B and C involve construction of a tunnel and would therefore reduce or avoid most the associated impacts to sensitive vegetation and sensitive plant species.

Sensitive Wildlife

The CNDDB records nine sensitive wildlife species in this section:

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
A,B	ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
A,B,C	SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
A,B	WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
A,B	CALIFORNIA BLACK RAIL	LATERALLUS JAMAICENSIS COTURNICULUS		T	
A,B	BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
A,B,C	COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
A,B	LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
A,B,C	CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	
A,B	LEAST BELL'S VIREO	VIREO BELLII PUSILLUS	E	E	

For all three alignment options, wildlife habitat, and possibly wildlife movement corridors, would potentially be affected at the San Dieguito Lagoon and surrounding open areas, and Los Peñasquitos Lagoon and Preserve. In addition, the study area for Option C contains approximately 88 acres of coastal sage scrub which indicates a similar amount of wildlife habitat. However, Option C involves construction of a tunnel and would therefore reduce or avoid many of the potential impacts to sensitive wildlife species and to wildlife habitat.

Jurisdictional Waters

Available GIS data indicates the presence of approximately 319 acres of wetlands and over 15,875 linear feet of non-wetland waters within the study area for the covered trench on the coastal bluffs. For the tunnel alignment under Camino Del Mar, the data indicates the presence of approximately 302 acres of wetlands and 13,980 linear feet of non-wetland waters. Some of this wetlands acreage includes the San Dieguito River/Lagoon and Los Peñasquitos Lagoon.

The tunnel alignment along I-5 would require a new structure over the San Dieguito Lagoon thus resulting in new impacts to this lagoon. However, this tunnel would reduce impacts to Los Peñasquitos Lagoon. Available GIS data indicates the presence of approximately 269 acres wetlands and approximately 21,192 linear feet of non-wetland waters. Potential impacts would only be expected to occur at and near the portal areas, thus reducing these impact estimates with the tunnel option.

4.4.9 I-5/805 Split to Highway 52

Rail improvement alternatives in this section include two tunnel alignment options: one running through Miramar Hill (Option A) and one running along and under Interstate 5 (Option B). A new underground station is proposed at University Towne Centre (UTC) but would only be constructed as part of the Miramar Hill tunnel alignment option. Although impacts are indicated within this section, both options involve tunneling, so impacts would be expected to occur only at the portal areas.

Sensitive Vegetation

For the Miramar Hill (UTC) tunnel, available GIS data for sensitive vegetation communities indicates approximately 96 acres of Diegan coastal sage scrub within the study area and some pockets of southern riparian forest and southern riparian scrub. No sensitive vegetation was recorded in the available GIS data for the I-5 tunnel. Two acres of coastal sage scrub are present near the UTC Station site, where the station would be underground. In addition, the CNDDB records six sensitive plant species in this section shown within the study area of the option specified:

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
A,B	LAKESIDE CEANOTHUS	CEANOTHUS CYANEUS			1B
A,B	ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
A,B	SUMMER HOLLY	COMAROSTAPHYLIS DIVERSIFOLIA SSP DIVERSIFOLIA			1B
B	SAN DIEGO BUTTON-CELERY	ERYNGIUM ARISTULATUM VAR PARISHII	E	E	1B
A,B	COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
A,B	NUTTALL'S SCRUB OAK	QUERCUS DUMOSA			1B

Sensitive Wildlife

The CNDDB records seven species in this section:

OPTION(s)	COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
A,B	ORANGE-THROATED WHIPTAIL	CNEMIDOPHORUS HYPERYTHRUS			SC
A,B	WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
A,B	CALIFORNIA BLACK RAIL	LATERALLUS JAMAICENSIS COTURNICULUS		T	
A,B	BELDING'S SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS BELDINGI		E	
A	COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
A,B	LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
A,B	CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	

The presence of 96 acres of Diegan coastal sage scrub indicates that there would also be a similar acreage of wildlife habitat within the study area of the Miramar Hill tunnel alignment. Portals at the ends of either of the tunnels may affect the movement of wildlife along north facing slopes above Peñasquitos Creek and Sorrento Valley, and in the canyons south of UTC.

Jurisdictional Waters

GIS data indicates the presence of approximately 9 acres of wetlands and 4,140 linear feet of non-wetland waters within the study area for the Miramar Hill (UTC) tunnel. Approximately 16 acres of wetlands and 6,615 linear feet of non-wetland waters are present within the study area for the I-5 tunnel alignment. Potential impacts associated with tunnels would occur at the portal areas only. In addition, GIS data indicates the presence of 8 acres of wetlands and 300 acres of non-wetland waters within the study area around the underground UTC Station. Construction impacts would potentially occur on the surface; however, the area surrounding the UTC station is urbanized making impacts from this station unlikely.

4.4.10 Highway 52 to Santa Fe Depot

Rail improvements in this section include double-tracking, curve realignment, San Diego River bridge, and a trench between Sassafras Street and Cedar Street. Station improvements are proposed at Santa Fe Depot.

Sensitive Vegetation

GIS vegetation data did not indicate the presence of sensitive vegetation within this section. However the CNDDB records some areas of southern cottonwood willow riparian forest and southern riparian forest in this section. In addition, the CNDDB records nine sensitive plant species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CNPS
ORCUTT'S PINCUSHION	CHAENACTIS GLABRIUSCULA VAR ORCUTTIANA			1B
SALT MARSH BIRD'S-BEAK	CORDYLANTHUS MARITIMUS SSP MARITIMUS	E	E	1B
VARIEGATED DUDLEYA	DUDLEYA VARIEGATA			1B
COULTER'S GOLDFIELDS	LASTHENIA GLABRATA SSP COULTERI			1B
ROBINSON'S PEPPER-GRASS	LEPIDIUM VIRGINICUM VAR ROBINSONII			1B
SAN DIEGO GOLDENSTAR	MUILLA CLEVELANDII			1B
COAST WOOLLY-HEADS	NEMACAULIS DENUDATA VAR DENUDATA			1B
BRAND'S PHACELIA	PHACELIA STELLARIS			1B
OIL NESTSTRAW	STYLOCLINE CITROLEUM			1B

Sensitive Wildlife

The CNDDB records five sensitive wildlife species in this section:

COMMON NAME	SCIENTIFIC NAME	FED LIST	CAL LIST	CDFG
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW	AIMOPHILA RUFICEPS CANESCENS			SC
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	T		SC
COASTAL CALIFORNIA GNATCATCHER	POLIOPTILA CALIFORNICA	T		SC
LIGHT-FOOTED CLAPPER RAIL	RALLUS LONGIROSTRIS LEVIPES	E	E	
CALIFORNIA LEAST TERN	STERNA ANTILLARUM BROWNI	E	E	

Wildlife movement corridors may be present in Rose Canyon and San Clemente Canyon adjacent to the proposed rail improvements.

Jurisdictional Waters

Available GIS data indicates the presence of approximately 7,430 linear feet of non-wetland waters within the study corridor. No wetlands would be impacted by various construction activities within this section. In addition, the GIS data indicates the presence of 2,000 acres of non-wetland waters in the study area around the Santa Fe Depot. However, the Santa Fe Depot is surrounded by heavy urbanization making impacts to jurisdictional waters unlikely. Waters potentially impacted in this section would include Mission Bay and the San Diego River.

5.0 PREPARERS

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APPENDIX A

Appendix A
Conventional Rail Route Combinations for Impact Comparison

As described in Chapter 1 of this Technical Evaluation, there are numerous alignment and construction options in the Conventional Rail portion of the High-Speed Train Alternative for the Los Angeles – Orange County – San Diego Region. To allow a reasonable comparison of impacts among the No-Project, Modal, and High-Speed Train Alternative, the Conventional Rail improvement options are summarized by showing a range of potential impacts (Table 1-4, Chapter 1). This range is represented by two of many possible route combinations between Union Station and San Diego: (1) a Higher Level Infrastructure route, and (2) a Lower Level Infrastructure route. The Higher Level route is based on combining the alignment/construction options (one from each sub-segment) that would involve the most extensive infrastructure investment and/or construction complexity. For example, where a sub-segment has both an at-grade option and a trenching option in the same general alignment, the trenching option was used for the Higher Level route, and the at-grade option was used in the Lower Level route. Where two tunnel options are the only options in one sub-segment, the longer tunnel was included in the Higher Level route. In this way, a range of potential impacts could be bracketed to allow a valid comparison of the High-Speed Train Alternative to the No-Project and the Modal Alternative.

The specific alignment and construction options included in both the Higher and the Lower Level routes are shown in Tables A-1 and A-2. These representative routes do not include any of the options that were eliminated from further consideration during the LOSSAN screening process. It must be emphasized that these routes serve only to provide a reasonable range of impacts for comparative purposes. They do *not* represent any selection of a particular option as preferred. No selection of preferred alignment options will be done until subsequent stages of this project.

Table A-1
LOWER LEVEL INFRASTRUCTURE IMPROVEMENTS

CONVENTIONAL RAIL (LOSSAN) & STATION OPTIONS
Union Station To Fullerton Station (4th main track)
Fullerton Station To Irvine Station
Alignment
AT-GRADE between Walnut Ave (Orange) and E. 17th St. (Santa Ana)
Stations
Fullerton
Anaheim
Santa Ana
Irvine
Irvine Station To San Juan Capistrano City Limits(no improvements)
San Juan Capistrano (City Limits to Avenida Aeropuerto)
Alignment
AT-GRADE and Open TRENCH along east side of Trabuco Creek
Stations
San Juan Capistrano (New, below-grade station)
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)
Alignment
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking (crossing San Mateo and San Onofre Creeks)
Stations
San Clemente (New Station – location to be determined)
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses Santa Margarita River)
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits)
Alignments
Carlsbad - AT-GRADE; double tracking; crosses San Luis Rey, Buena Vista , Aqua Hedionda, and Batiquitos Lagoons
Stations
Oceanside
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)
Alignment
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon
Stations
Solana Beach
Del Mar(Solana Beach Station to I-5/805 Split)
Alignment
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons
I-5/805 Split To Hwy 52
Alignment
I-5 Tunnel
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)
Stations
Santa Fe Depot

Table A-2
HIGHER LEVEL INFRASTRUCTURE IMPROVEMENTS

CONVENTIONAL RAIL (LOSSAN) & STATION OPTIONS
Union Station To Fullerton Station (4th main track)
Fullerton Station To Irvine Station
Alignment
TRENCH between Walnut Ave (Orange) and E. 17th St. (Santa Ana)
Stations Fullerton Anaheim Santa Ana Irvine
Irvine Station To San Juan Capistrano City Limits(no improvements)
San Juan Capistrano (City Limits to Avenida Aeropuerto)
Alignment
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)
Alignment
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)
Stations
San Clemente (New below-grade station between tunnel segments)
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses Santa Margarita River)
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits) Alignment
Carlsbad -TRENCH; double-tracking; crosses San Luis Rey, Buena Vista, Aqua Hedionda, and Batiquitos Lagoons
Stations
Oceanside
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)
Alignment
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon
Stations Solana Beach
Del Mar(Solana Beach Station to I-5/805 Split)
Alignment
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons
I-5/805 Split To Hwy 52
Alignment
Miramar Hill Tunnel
Stations UTC
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)
Stations
Santa Fe Depot