CALIFORNIA HIGH-SPEED TRAIN

Program Environmental Impact Report/Environmental Impact Statement

Los Angeles to San Diego via Inland Empire

Hydrology and Water Quality 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

Task 2.4

Los Angeles to San Diego
via
Inland Empire

Hydrology and Water Quality
Technical Evaluation

Prepared by:

HNTB

in association with

CH2MHILL

JANUARY 2004

TABLE OF CONTENTS

TABLES

FIGURES

ACRONYMS

°F	degrees Fahrenheit
ARB	Air Reserve Base
Authority	California High-Speed Rail Authority
BMP	best management practice
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CWA	Clean Water Act
DLG	digital line graphs
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GIS	Geographic Information System
HST	high-speed train
I	Interstate
km/h	kilometers per hour
LACDPW	Los Angeles County Department of Public Works
LF	linear feet
LOSSAN	rail corridor from Los Angeles to San Diego through Orange County
mph	miles per hour
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System

NWI	National Wetlands Inventory Database
RTP	Regional Transportation Plans
RWQCB	Regional Water Quality Control Board
SFHA	Special Flood Hazard Areas
SR	State Route
STATSGO	State Soil Geographic
STIP	State Transportation Improvement Program
SWPPP	Stormwater Pollution and Prevention Plan
SWRCB	State Water Resources Control Board
TMDL	total maximum daily loads
U.S.	United States
UP	Union Pacific
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WRCC	Western Regional Climatic 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 6 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 transportation infrastructure in California. 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 in turn will 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 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 decisionmaking, 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 segments and stations in those segments of the system that are ready for implementation.

The decisions of federal agencies, particularly the 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 United Stated (U.S.) Environmental Protection Agency (EPA), the U.S. Army 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.

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

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, 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 that 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 discipline-specific *Hydrology and Water Quality Technical Evaluation* for the Los Angeles to San Diego via the Inland Empire region is one of five such reports being prepared for each of the regions on the topic. It is 1 of 11 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 UNDER CONSIDERATION

1.1.1 No-Project Alternative

The No-Project Alternative serves as the baseline for the comparison of Modal and High-Speed Train Alternatives. 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 (Figure 1.1-1). 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 5- and 20-Year Plans)

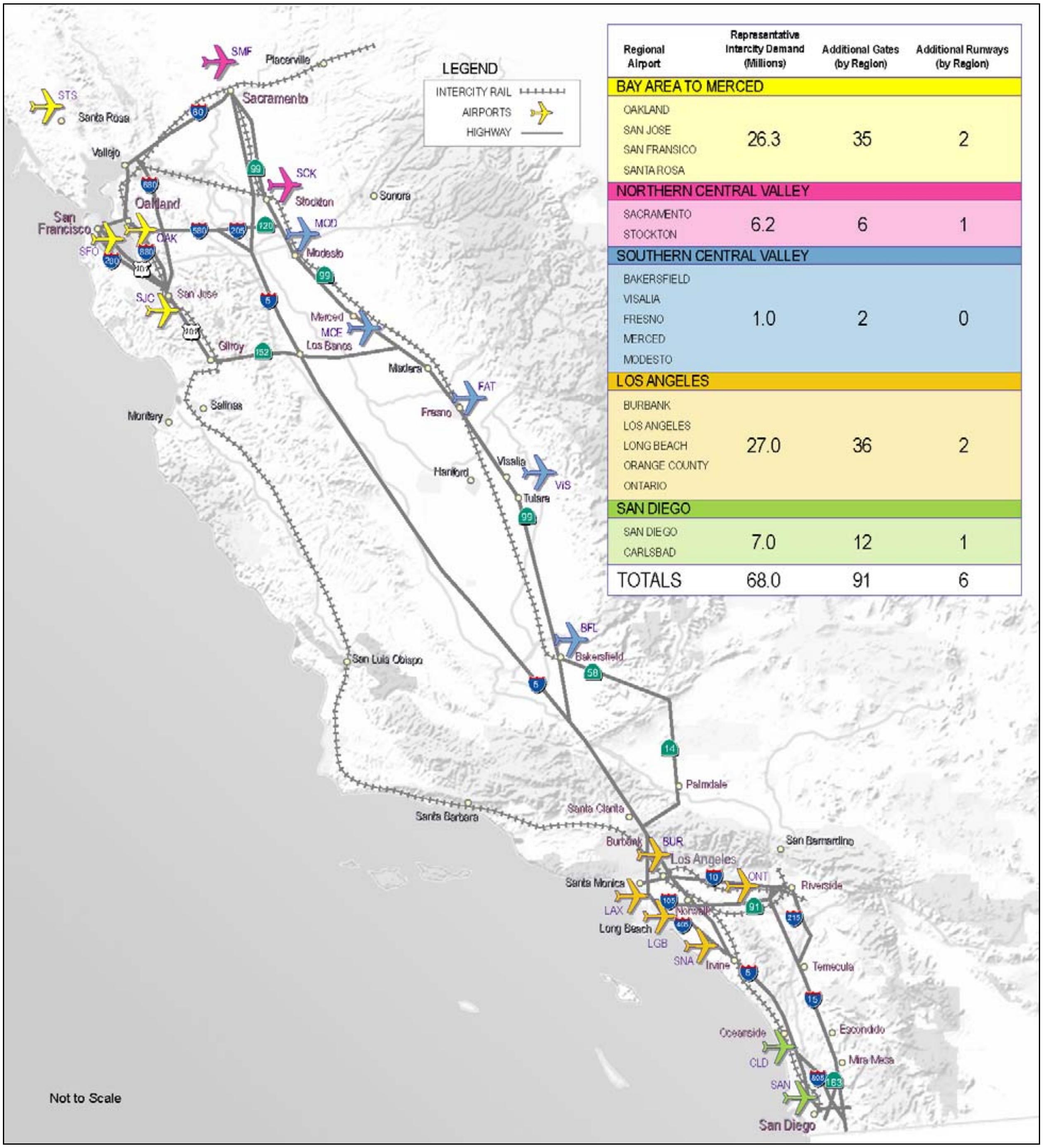
As with all of the alternatives, the No-Project Alternative will be assessed against the purpose and need topics/objectives for congestion, safety, air pollution, reliability, and travel times.

1.1.2 Modal Alternative

There are currently 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 Alternative consists of expansion of highways, airports, and intercity and commuter rail systems serving the markets identified for the High-Speed Train Alternative (Figures 1.1-2 and 1.1-3). The Modal Alternative uses the same intercity 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, airports, and passenger rail described under the No-Project Alternative.

Figure 1.1-1 No-Project Alternative – California Transportation System

Figure 1.1-2 Modal Alternative – Highway 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

Figure 1.1-3 Modal Alternative – Aviation Component

The additional improvements or expansion of facilities are 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 to San Diego via the Inland Empire region consists of two major proposed improvements:

- Improvements to Highways: Consisting of additional highway lanes to provide sufficient highway capacity and associated interchange reconfiguration, crossing bridge widening, ramp widening, cross street and intersection widening (Figure 1.1-2). Within the study area corridor, these improvements, therefore, would occur along proposed portions of Interstates (I-) 10, 215, 15, and State Route (SR) 163. Table 1.1-1 lists the proposed highway improvements along the Los Angeles to San Diego via the Inland Empire corridor.

Table 1.1-1 Proposed Modal Alternative Highway Improvements Los Angeles to San Diego via the Inland Empire

Highway Corridor	Segment (From – To)	No. of Additional Lanes[1] (Total – Both Directions)	No. of Existing Lanes (Total- both directions)	Type of Improvement
I-10	I-5 to East San Gabriel Valley	2	10	widening
I-10	East San Gabriel Airport to Ontario Airport	2	8	widening
I-10	Ontario Airport to I-15	2	8	widening
I-10	I-15 to I-215	2	8	widening
I-15	I-10-I-215	2	8	widening
I-215	Riverside to I-15	2	4	widening
I-215	I-10 to Riverside	2	6	widening
I-15	I-215 to Temecula	2	10	widening
I-15	Temecula to Escondido	2	8	widening
I-15	Escondido to Mira Mesa	2	10	widening
I-15	Mira Mesa to SR-163	2	10	widening
SR-163	I-15 to I-8	2	8	widening

[1] Represents the number of through lanes in addition to the total number of existing lanes that approximate an equivalent level of capacity to serve the representative demand

- Improvements to Airports: Primarily consisting of improvements to terminal gates and runways to provide sufficient landside and airside capacity and associated taxiways, ground access, parking, terminal and support facilities and airports that can serve the same geographic area and demand as the proposed High-Speed Train (HST) Alternative. Within the study area corridor, these proposed improvements would occur at Ontario International Airport (ONT) and the San Diego International Airport (SAN) (Figure 1.1-3). Table 1.1-2 lists the airport improvements associated with the Ontario and San Diego airports.

Table 1.1-2 Proposed Modal Alternative Airport Improvements – Year 2020 Los Angeles to San Diego via the Inland Empire

Airport Name	Additional Gates	Additional runways
Ontario International Airport	8	1
San Diego International Airport	12	1

Source: Parsons Brinckerhoff, November 2002

1.1.3 High-Speed Train Alternative

The Authority has defined a statewide high-speed train 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 1.1-4).

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 “nonelectric” improvements are also being considered along the existing rail corridor from Los Angeles to San Diego through Orange County (LOSSAN). The train track would be at grade, in an open trench or tunnel, or on an elevated guideway, depending on terrain and physical constraints.

For purposes of comparative analysis the high-speed train corridors will be described from station to station within each region, except where a bypass option is considered when the point of departure from the corridor will define the end of the corridor segment.

As described in the introduction, the study area is broadly defined by the Los Angeles to San Diego via Inland Empire corridor segment, which may be broadly divided into three regional segments. Each segment has several alternative alignments for all or a portion of the length of the segment. For example, Segment 1 has three alternative alignments, listed as 1A, 1B, and 1C. Each segment is further subdivided into subsegments for analyzing and reporting potential impacts. The various segment options and subsegments, along with station locations, are described below and shown in Figure 1.1-5.

1.1.3.1 Regional Segment 1 – Union Station to March Air Reserve Base Segment

Segment 1A

Subsegment 1A1: Union Station to Pomona
Subsegment 1A2: Pomona to Ontario (beginning of Segment 1C)
Subsegment 1A3: Ontario (beginning of Segment 1C) to Colton (end of Segment 1C)
Subsegment 1A4: Colton to March Air Reserve Base (ARB)

Segment 1B

Subsegment 1B1: Union Station to Pomona

Segment 1C

Subsegment 1C1: Ontario (beginning of Segment 1C) to Colton (end of Segment 1C)

Station Locations: El Monte (1A1), Pomona (1A2), Ontario (1A2), Colton (1A3), University of California at Riverside (1A4), South El Monte (1B1), City of Industry (1B1), and San Bernardino (1C1)

1.1.3.2 Regional Segment 2 – March ARB to Mira Mesa Segment

Segment 2A

Subsegment 2A1: March ARB to Escondido (beginning of Segment 2B)
Subsegment 2A2: Within Escondido (beginning to end of Segment 2B)
Subsegment 2A3: Escondido to Mira Mesa

Figure 1.1-4 High-Speed Train Alternative – Corridors and Stations for Continued Investigation

Figure 1.1-5 High-Speed Train and Modal Alternatives
Los Angeles to San Diego via Inland Empire

Segment 2B

Subsegment 2B1: Within Escondido (Beginning to end of Segment 2B)

Station Locations: March ARB (2A1), Temecula (2A2), Escondido (2A2), and Escondido Transit Center (2B1)

1.1.3.3 Regional Segment 3 – Mira Mesa to San Diego Segment

Segment 3A

Subsegment 3A1: Mira Mesa to Qualcomm Stadium

Segment 3B

Subsegment 3B1: Within Mira Mesa (beginning and end of Segment 3C)
Subsegment 3B2: Mira Mesa (end of Segment 3C) to Downtown San Diego

Segment 3C

Subsegment 3C1: Within Mira Mesa (end of Segment 3C)

Station Locations: Mira Mesa (3A1), Qualcomm Stadium (3A1), Transit Center (3B2), San Diego International Airport (3B2), and Downtown San Diego (3B2)

2.0 AFFECTED ENVIRONMENT

2.1 STUDY AREA

The study area for hydrology and water quality is defined as:

- A 100-foot buffer zone from the centerline of the proposed alignments for the HST Alternative and the direct footprint of new station facilities, including a 100-foot buffer zone from new station facilities; and
- A 100-foot buffer zone from the direct corridor footprint for the Modal Alternative and/or direct footprint of facilities, including corridors and facilities that would undergo upgrades/expansions.

2.2 REGULATORY ENVIRONMENT

2.2.1 Federal Regulations

2.2.1.1 Clean Water Act of 1977 and 1987

The purpose of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters through prevention and elimination of pollution. It is applicable to any discharge of a pollutant into waters of the United States. Key sections of the CWA include:

- Section 404 permits for dredge or fill materials from USACE
- Section 402 permits (NPDES permit) for all other discharges are obtained from EPA or appropriate state agency, which in most cases in the appropriate Regional Water Quality Control Board (RWQCB)
- Section 401 water quality certification from the appropriate RWQCBs

All projects must be consistent with the state Nonpoint Source Pollution Management Program (Section 319).

Section 401 (33 U.S.C. 1341 and 40 CFR 121): Section 401 of the CWA requires a water quality certification from the State Water Resources Control Board (SWRCB) or RWQCBs whenever a project requires a federal license or permit (a Section 404 permit is the most common federal permit for highway or rail projects).

Certification also is required when a project will result in a discharge to waters of the United States. Such certification may be conditioned. Construction and subsequent operation of a facility typically result in a discharge subject to Section 401 water quality certification.

The SWRCB revised the state regulations for the 401 Water Quality Certification Program. These revisions went into effect on June 24, 2000. The likelihood of a passive waiver has been reduced by the revised regulations that certification must be issued or denied before any federal deadline.

Section 402 (33 U.S.C. 1342 and 40 CFR 122): This section of the CWA establishes a permitting system for the discharge of any pollutant (except dredge or fill material) into waters of the United States. An NPDES permit is required for all point discharges of pollutants to surface waters. A point source is a discernible, confined, and discrete conveyance, such as by pipe, ditch, or channel.

Section 404 (33 U.S.C. 1344, 33 CFR Part 323, and 40 CFR Part 230): Section 404 of the CWA establishes a permit program administered by the USACE, which regulates the discharge of dredged or fill material into waters of the United States (including wetlands). The Section 404(b)(1) guidelines allow the discharge of dredged or fill material into the aquatic system only if there is no practicable alternative that would have less adverse impacts.

2.2.1.2 Wild and Scenic Rivers Act of 1968, as Amended

(16 U.S.C. 1271-1287; 36 CFR251, 297; 43 CFR 8350)

The purpose of the Wild and Scenic Rivers Act is to preserve and protect wild and scenic rivers and immediate environments for benefit of present and future generations. It is applicable to all projects that affect designated wild, scenic, and recreational rivers and immediate environment and rivers under study for inclusion into the system. The Act prohibits federal agencies from undertaking activities that would affect adversely the values for which the river was designated. The Act is administered by a variety of state and federal agencies. Designated river segments flowing through federally managed lands are administered by the land-managing agency (e.g., U.S. Forest Service, Bureau of Land Management, or the National Park Service). River segments flowing through private lands are administered by the state in conjunction with local government agencies. On projects that affect designated rivers or their immediate environments, consultation will occur through the NEPA process between the state lead agency and the land-managing agencies.

2.2.1.3 Safe Drinking Water Act of 1944, as Amended (42 U.S.C. 300[f])

The purpose of the Safe Drinking Water Act is to ensure public health and welfare through safe drinking water. The Act is applicable to all public drinking water systems and reservoirs (including rest area facilities). It is also applicable to actions that may have a significant impact on an aquifer or wellhead protection area that is the sole or principal drinking water. This act requires coordination with EPA when an area designated as a principal or sole-source aquifer may be impacted by a proposed project. In California, EPA has designated the following sole-source aquifers: Campo-Cottonwood, Fresno, Ocotillo-Coyote Wells, Santa Margarita, and Scotts Valley.

2.2.1.4 Executive Order 11988 – Floodplain Management

(U.S. DOT Order 5650.2; 23 CFR 650, Subpart A)

Executive Order 11988 directs all federal agencies to avoid all short-term and long-term adverse impacts associated with floodplain modification and to avoid direct and indirect support of development within 100-year floodplains whenever there is a reasonable alternative available.

Projects that encroach upon 100-year floodplains must be supported with additional specific information. The U.S. Department of Transportation Order 5650.2, titled "Floodplain Management and Protection," prescribes "policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of adverse floodplain impacts in agency actions, planning programs, and budget requests." The order does not apply to areas with Zone C (areas of minimal flooding as shown on Federal Emergency Management Agency [FEMA] Flood Insurance Rate Maps [FIRM]). The order requires that attention be given and findings made in environmental review documents indicating any risks, impacts, and support from the proposed transportation facility.

2.2.1.5 Flood Disaster Protection Act

(42 U.S.C. 4001-4128; DOT Order 5650.2, 23 CFR 650 Subpart A; and 23 CFR 771)

The purpose of the Flood Disaster Protection Act is to identify flood-prone areas and provide insurance. The Act requires purchase of insurance for buildings in special flood-hazard areas. The Act is applicable to any federally assisted acquisition or construction project in an area identified as having special flood hazards. Projects should avoid construction in, or develop a design to be consistent with, FEMA-identified flood-hazard areas.

2.2.2 State Regulations

2.2.2.1 California Department of Fish and Game

(Sections 1601-1603 [Streambed Alteration])

Under Sections 1601-1603 of the Fish and Game Code, agencies are required to notify the California Department of Fish and Game (CDFG) prior to any project that would divert, obstruct or change the natural flow or bed, channel or bank of any river, stream, or lake. Preliminary notification and project review generally occurs during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, the CDFG is required to propose reasonable project changes to protect the resource. These modifications are formalized in a "streambed alteration agreement," which becomes part of the plans, specifications, and bid documents for a project.

2.2.2.2 Porter-Cologne Water Quality Act

(Water Code sections 13000 et seq.)

The Porter-Cologne Act is the basic water quality control law for California. The act is implemented by the SWRCB and the nine RWQCBs. The boards implement the permit provisions (Section 402), certain planning provisions (Sections 205, 208, and 303 of the federal CWA). This means that the state issues one discharge permit for purposes of both state and federal law. Under state law, the permit is officially called waste discharge requirement. Under federal law, the permit is officially called an NPDES permit. The Porter-Cologne Act requires that any entity that is discharging waste or proposing to discharge waste that could affect the quality of the state's water must file a "report of waste discharge" with that RWQCB.

2.2.3 Other Permitting Agencies (provided for informational purposes only)

2.2.3.1 County of San Diego

The County of San Diego, Land Use and Environment Group, Department of Public Works, Land Development Division may require a Watercourse Permit for activities that involve construction, alteration, or placement or removal of any structure in, upon, or across a watercourse, or for acts that would impair, impede, or accelerate the flow of water in a watercourse. Watercourse Permits are subject to review by the Flood Control District to ensure that facilities meet county standards. The Flood Control District also provides review of other County of San Diego, Department of Public Works permits, including Grading Permits and Excavation Permits, for possible diversion or damages to property and appropriate flood protection (County of San Diego, 2002).

Under federal CWA provisions (and regulations promulgated pursuant to that act), the state water code, and county ordinances, the County of San Diego also requires the development of a Stormwater Management Plan to accompany all Grading Permit applications. The purpose of this plan is to document BMPs that will be implemented to prevent pollutants (including sediments) from entering stormwater conveyances and receiving waters (County of San Diego, 2002).

2.2.3.2 County of San Bernardino

The County of San Bernardino, Department of Public Works, Flood Control District maintains a right-of-way in flood channels, conservation basins, storm drains, and dams for flood control purposes, and may require permits for activities within its jurisdiction. The Flood Control Operations Division – Permit Section is responsible for review and issuance of Encroachment Permits or other relevant permits for activities within the jurisdictional right-of-way (County of San Bernardino, 2002).

Under the federal CWA (and regulations promulgated pursuant to that act), the County of San Bernardino, including the Flood Control District and 16 incorporated cities within the county, was issued a municipal stormwater permit under NPDES in 2002. The permit has required public education and the development of guidelines for new developments for implementation of BMPs, and construction regulatory requirements. Individual co-permittees must enforce guidelines with issuance of planning, building, grading, or other development permits (County of San Bernardino, 2002).

2.2.3.3 County of Riverside

The County of Riverside, Flood Control and Water Conservation District may require an Encroachment Permit for activities that involve excavation, construction and/or otherwise encroach on Riverside County Flood Control and Water Conservation District right-of-way. Encroachment Permits are subject to review by the District's Encroachment Permit Engineer for proposed uses and activities. The Flood Control and Water Conservation District also provides review of other proposed projects in unincorporated areas referred to them from the County Planning Department (County of Riverside, 2002).

Under the federal CWA (and regulations promulgated pursuant to that act), the County of Riverside along with other Riverside County city and municipal governments joined forces to apply for a joint NPDES Municipal Permit. Under this joint permit, stormwater management programs and local regulatory control measures have been developed for activities that can pollute the storm drain system. The county has developed documents, including guidelines for new developments, that individual co-permittees must enforce with issuance of planning, building, grading, or other development permits; this includes the inclusion of specified BMPs for water quality protection (County of Riverside, 2002).

2.2.3.4 County of Los Angeles

The County of Los Angeles, Department of Public Works, Flood Control District may require a Flood Permit for any activities within or affecting Flood Control District facilities. Permit applications are subject to review and revision by the Flood Control District. A Connection Permit is required for any discharge or construction of discharge facilities into Flood Control District facilities. The application for this permit includes a Water Quality Agreement (County of Los Angeles, 2002).

Under the federal CWA (and regulations promulgated pursuant to that act), the County holds an NPDES Permit along with 84 incorporated cities. The NPDES Permit requires the development and implementation of a Stormwater Management Program including guidelines for BMPs for development projects. The individual permittees (cities and the county) must develop programs to ensure that BMPs and other stormwater quality protection measures are incorporated into grading and building permits, consistent with the county program, and develop regulatory and site inspection programs (County of Los Angeles, 2002).

2.2.3.5 Individual Cities

Under the federal CWA (and regulations promulgated pursuant to that act), communities greater than 100,000 in population were required to apply for a municipal permit under the NPDES program. In nearly all cases within the project area, individual cities joined forces with counties, water districts, and flood control districts to apply for joint permits. This includes 84 cities in Los Angeles County, all the cities in Orange County, all cities except Blythe in Riverside County, and cities in San Diego County. Cities that are joint permittees with counties are required to implement programs to ensure that city permitted projects adhere to conditions of NPDES permits; this may include programs to ensure that BMPs and other stormwater quality protection measures are incorporated into grading and building permits, and that regulatory and site inspection programs are developed. Individual water quality protection measures, including BMPs, are developed at the county level; hence the counties and cities become jointly responsible for ensuring compliance.

2.3 Regional Climate

The study area spans a four-county area in coastal Southern California, a broad geographic area with generally semi-arid conditions and mild temperatures. It generally lies along low-elevation basins and valleys, which are either developed or vegetated with open grasslands or shrublands. Forested land cover is restricted to streams and watercourses. The climate is Mediterranean, characterized by a regime of moderate to hot summer drought and winter rain. Winter rain occurs as a result of low-pressure depressions that move in off the Pacific coast. Precipitation in the region averages about 13 inches per year on the coastal plain, 10 inches a year in inland valleys, and up to 30 to 55 inches a year in the mountainous areas. Precipitation is generally rain except in high mountainous areas where snow may fall. The daily high temperature in the region ranges on average from 48 to 84 degrees Fahrenheit (°F) on the coastal plain to 35° to 86°F in the mountains. In the inland valleys, the average daily high temperature ranges from 50° to 96°F; however, temperatures of over 100°F are common in summer (Los Angeles County Department of Public Works [LACDPW, 2001]; Western Regional Climatic Center [WRCC], 2001).

2.4 FLOODPLAINS

Floodplains, for the purposes of this document, are Special Flood Hazard Areas (SFHA) as defined by the FEMA on FIRMs, with the following zone designations:

Zone A: Areas of 100-year flood; base flood elevations and flood hazard factors not determined.

Zone AO: Areas of 100-year shallow flooding where depths are between 1 and 3 feet; average depths of inundation are known, but no flood hazard factors are determined.

Zone AH: Areas of 100-year shallow flooding where depths are between 1 and 3 feet; base flood elevations are known, but no flood hazard factors are determined.

Zone A1-A30: Areas of 100-year flood; base flood elevations known and flood hazard factors determined.

Zone V: Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.

Zone V1-V30: Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

Areas with the following designations are not considered floodplains for the purposes of this analysis: Zone B (generally includes areas above the 100-year flood but below the 500-year flood except on small drainages where areas below the 100-year flood may be included); Zone C (areas of minimal flooding); Zone D (areas of undetermined, but possible flood hazard); and Zone X (areas of unknown flood hazard).

Floodplains are important for the following reasons: (1) they provide floodwater storage and attenuation of downstream flooding risk; (2) they typically provide important native species habitat; (3) they provide water quality improvement through deposition of sediments and other contaminants and natural treatment; and (4) they may provide locations for groundwater recharge.

Most floodplains within the study area are associated with significant drainage channels or riparian areas, or are within coastal areas. Figures 2.4-1 through 2.4-3 provide maps showing SFHAs within the general vicinity of the study area.

2.5 SURFACE WATERS

2.5.1 Hydrologic Units

The project study area lies within three regions of the California RWQCB; Los Angeles, Santa Ana, and San Diego. Within these jurisdictional regions, the study area includes 11 hydrologic units recognized by the RWQCB. Each unit generally consists of individual watersheds or subwatersheds, or in some cases contains more than one watershed. Table 2.5-1 lists the hydrologic units by RWQCB jurisdiction. Figure 2.5-1 shows the boundaries of the hydrologic units.

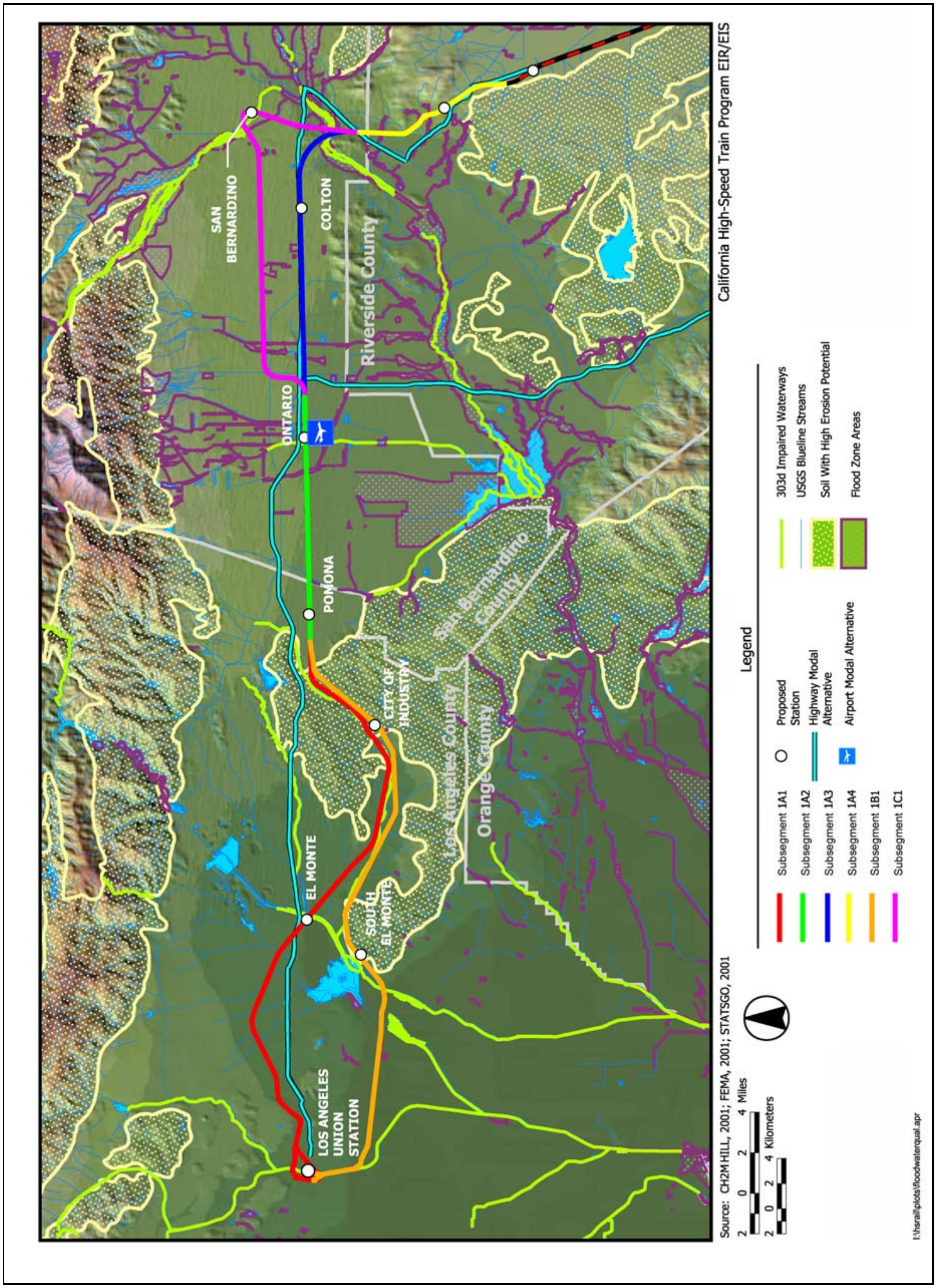


Figure 2.4-1 Hydrologic Constraints Union Station to March ARB

Figure 2.4-2 Hydrologic Constraints, March ARB to Mira Mesa

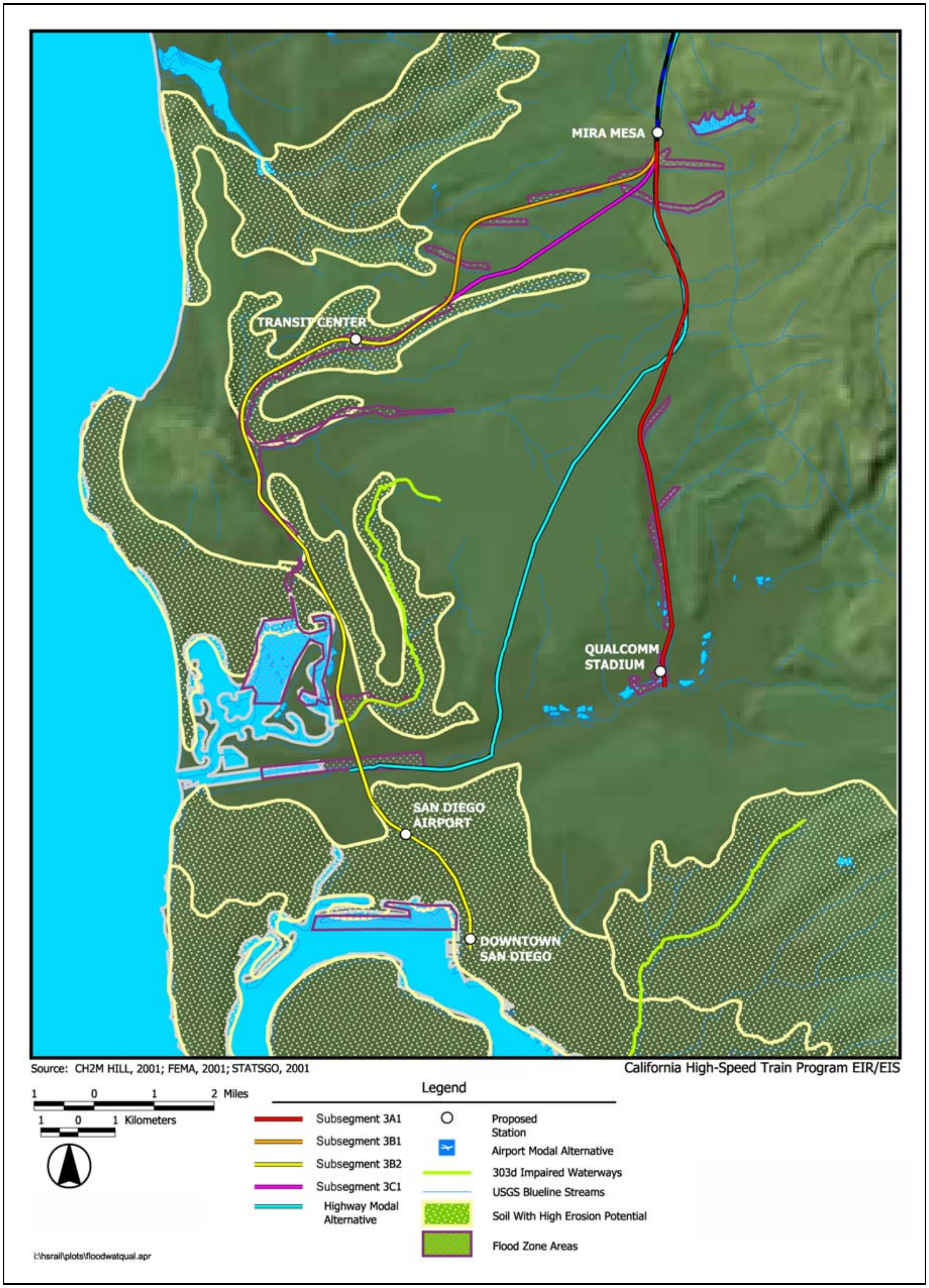


Figure 2.4-3 Hydrologic Constraints Mira Mesa to San Diego

Figure 2.5-1 Map of Study Area Showing Hydrologic Units

Table 2.5-1 Summary of Hydrologic Units

Regional Water Quality Control Board	Hydrologic Unit
Los Angeles	Los Angeles River
Los Angeles	San Gabriel River
Santa Ana	Santa Ana River
Santa Ana	San Jacinto Valley
San Diego	Santa Margarita River
San Diego	San Luis Rey River
San Diego	Carlsbad
San Diego	San Dieguito River
San Diego	San Diego River
San Diego	Los Penasquitos Creek
San Diego	Pueblo San Diego

The California Coastal Conservancy (Southern California Wetlands Recovery Project) provides the following description for the hydrologic units (California Coastal Conservancy, 2001).

- Los Angeles River Hydrologic Unit – The Los Angeles River watershed encompasses approximately 835 square miles and 801 linear miles of waterways. There are 51 dams in this watershed. The Los Angeles River enters San Pedro Bay at Queensway Bay in the southeastern corner of the City of Long Beach. Virtually the entire river has been channelized and lined with concrete.
- San Gabriel River Hydrologic Unit – The San Gabriel River watershed encompasses 709 square miles and 828 linear miles of waterways. There are 26 dams in this watershed. Most of these dams were built in the 1930s, such as the Cogswell Dam (1934), San Gabriel Dam (1939), and Morris Dam (1934), among others. Six additional dams are located on tributaries to the San Gabriel River. The lower San Gabriel River is channelized and developed for much of its length. The Los Cerritos Channel encompasses 28 square miles of the 709 square miles of the San Gabriel River watershed.
- Santa Ana River Hydrologic Unit – This hydrologic unit includes the San Diego Creek watershed that flows to Newport Bay, and the Santa Ana River watershed. Both are described below as distinct hydrological units.

  The San Diego Creek Watershed encompasses about 154 square miles, has approximately 146 miles of naturally occurring waterways, and has 19 dams. San Diego Creek is the largest drainage system in the watershed, draining roughly 118 square miles, including a number of cities and unincorporated areas. Bonita Creek is the other major tributary in the watershed, which along with smaller drainages, drain about 20 percent of the watershed. All of the channels empty into Newport Bay, a coastal estuary of ecological significance known as the Upper Newport Bay Ecological Reserve. San Diego Creek accounts for over 90 percent of the sediment delivered to Newport Bay.

  The Santa Ana River watershed encompasses 2,800 square miles and has approximately 2,033 miles of naturally occurring waterway and 52 dams. The Santa Ana River is one of the largest rivers in Southern California. Channelization with high levee banks and other flood control measures upstream have greatly reduced the river as a source of seasonal floodwaters to marshes. A major tributary, the Greenville-Banning Channel, joins the Santa Ana River. Flows are composed of stormwater discharge and urban runoff. The two major dams within this watershed are Prado Dam (1941) and Seven Oaks Dam (1998).

- San Jacinto Valley Hydrologic Unit – The California Coastal Conservancy profile for the San Jacinto Valley Hydrologic Unit was not available at the time of this study. However, a general description of the watershed was provided as part of the Santa Ana River Watershed Subprofiles. The San Jacinto River is the major river within the watershed and begins in the San Jacinto Mountains. This drainage receives tributary runoff from several small streams coming out of the local mountains and foothills. The river flows through the northern and western portion of the watershed, essentially terminating at Railroad Canyon Reservoir. There are three reservoirs in the region: Lake Hemet, Perris Reservoir, and Railroad Canyon Reservoir. These reservoirs contain water for municipal, industrial, and agricultural use.

- Santa Margarita River Hydrologic Unit – The watershed encompasses 750 square miles and is drained largely by the Santa Margarita River, Murrieta Creek, and the Temecula River. The watershed has over 1,000 miles of naturally occurring waterways. Lake O'Neill is an offline impoundment but receives much of its water from seasonal river diversions. Two dams are located in the upper watershed along the two streams that join to form the Santa Margarita River. The river is included in the list of impaired water bodies.

  The Santa Margarita River is the least disturbed river system south of the Santa Ynez River in Santa Barbara County, and contains some of the largest remaining populations of several bird species, including least Bell's vireo (*Vireo pusillus bellii*), and the largest concentration of least terns (*Sterna antillarium brownii*) in the world at the mouth of the river on the coast. Unlike most of the rivers of the South Coast, the riparian habitat is of particularly high quality and is essential for the protection of riparian birds and a number of endangered plants and animals. As late as 1958, steelhead trout were reported near the mouth of the estuary.

- San Luis Rey River Hydrologic Unit – The watershed encompasses 565 square miles. The San Luis Rey River is a major stream system and is interrupted by Lake Henshaw, which is one of the subregion's largest water storage areas. The headwaters are located on Palomar Mountain. Henshaw Dam, built in 1922, controls 36 percent of the watershed and three small reservoirs. The mouth of the San Luis Rey River is not listed as an impaired water body.

- Carlsbad Hydrologic Unit – The watershed encompasses 210 square miles, and extends from Lake Wohlford to the Pacific Ocean. The watershed is drained by Buena Vista, Agua Hedionda, San Marcos, and Escondido Creeks. The Buena Vista Creek watershed encompasses 19 square miles; Escondido Creek watershed encompasses 77 square miles; and the Agua Hedionda Creek watershed encompasses 29 square miles. The San Marcos Creek watershed encompasses 52 square miles and includes the San Marcos Dam, constructed in 1952, which controls approximately 53 percent of the watershed.

  Urban development (and associated flood control activities), sedimentation from agriculture, erosion, eutrophication of lagoon systems, the presence of exotic species in the watershed, water pollution, and general habitat degradation are major threats to the area.

  The watershed includes four major coastal lagoons: Buena Vista, Agua Hedionda, Batiguitos (at the mouth of San Marcos Creek), and San Elijo (at the mouth of Escondido Creek). There are numerous special-status species within these lagoons or on coastal areas, including light-footed clapper rail (*Rallus longirostris levipes*), California least tern, and western snowy plover (*Charadrius alexandrinus nivosus*).

- San Dieguito River Hydrologic Unit – The watershed encompasses 350 square miles, 302 of which are behind dams. Lake Hodges (completed in 1919) and Lake Sutherland (completed in 1954) are formed by the two major dams that block the river. Three tributaries join the San Dieguito River below the dams while two other small drainages empty directly into the lagoon basin. San Dieguito River flow is intermittent and the riverbed upstream of tidal influence is often dry. The channel is not substantially armored except for a concrete block revetment along the upper bank.

- San Diego River Hydrologic Unit – The San Diego River drains approximately 440 square miles. There are four dams within the San Diego River watershed: El Capitan on the main river and San Vicente, Lake Jennings, and Cuyamaca on tributaries. The reservoirs along the river are major water storage facilities for the San Diego metropolitan area, storing water transported from the Colorado River. The Famosa Slough is a tidal salt water marsh at the mouth of the river; it receives water via the San Diego River Flood Control Channel. Numerous special-status species are found throughout the watershed.
- Los Penasquitos Creek Hydrologic Unit – The watershed encompasses 170 square miles, and extends from Poway (inland) to La Jolla. The tributaries of the watershed, Los Penasquitos Creek and Carmel Creek, flow year-round due to development and urban runoff in the watershed. Miramar Reservoir is the major water storage facility within the watershed, and contains water transported from the Colorado River. Numerous special-status species are found along the watershed.
- Pueblo San Diego Hydrologic Unit – The Pueblo San Diego Hydrologic Unit is one of three hydrologic units within the watershed of San Diego Bay. The other two are the Otay River and the Sweetwater River. The Pueblo San Diego watershed includes several small urban creeks, of which Chollas Creek and Paradise Creek are the largest.

  San Diego Bay constitutes the largest estuary along the San Diego coastline and has been extensively developed as a port. San Diego Bay covers 10,532 acres of water and 4,419 acres of tidelands. Only 17 to 18 percent of the original bay floor remains undisturbed by dredge or fill. Ninety percent of the original salt marshes and 50 percent of the original mudflats have been filled or dredged for port and urban development. Over 200 storm drain outfalls are located in San Diego Bay. Two rivers and five creeks provide natural drainages into the bay in addition to the artificial storm drainage system. Stormwater outfalls provide some flows and nutrients to the bay, but not with natural seasonality, timing, frequency, or content. Sedimentary organic matter is no longer provided to the system except what is available from below the dams on each stream system. How this has affected functioning of the bay ecosystem has not been examined.

2.5.2 Surface Waters

Surface waters and associated channels are sensitive resource areas for the following reasons: (1) they convey floodwaters and may enhance adjacent flooding or may attenuate downstream flooding risk by storing floodwater; (2) they typically provide important native species habitat and may support wetland and riparian habitats; (3) they provide direct pathways of contamination to downstream ecological or human resources; and (4) they provide locations for groundwater recharge.

Surface waters, for the purposes of this document, include lakes, rivers, and streams identified using USGS 1:24,000 scale digital line graphs (DLGs). Blue-line streams and bodies of water on the DLGs are generally under jurisdiction of the USACE. Most surface waters within the study area are associated with significant drainage channels or areas or are within coastal areas. This includes improved flood control or drainage channels, intermittent river and stream channels, permanent river and stream channels, ponds, lakes, and reservoirs, coastal estuaries and lagoons, and intertidal sloughs. Table 2.5-2 provides a summary of surface waters along the proposed segments for the Modal and High-Speed Train Alternatives. Figures 2.4-1 through 2.4-3 provide maps showing surface waters within the general vicinity of the study area.

Table 2.5-2 Summary of Surface Waters Potentially Crossed by the Proposed Modal and High-Speed Train Alternatives[(a)]

Names of Surface Waters	
Alberhill Creek	Perris Valley Storm Drain
Alhambra Wash	Rainbow Creek
Arlington Channel	Reche Canyon

Table 2.5-2 Summary of Surface Waters Potentially Crossed by the Proposed Modal and High-Speed Train Alternatives[(a)]

Names of Surface Waters	
Bedford Wash	Reidy Canyon
Big Dalton Wash	Rio Hondo
Carroll Canyon	Riverside Canal Aqueduct
Coldwater Canyon	Rose Canyon
Cucamonga Creek	Rubio Wash
Cypress Canyon	San Antonio Wash
Day Creek Channel	San Clemente Canyon
East Branch Lytle Creek	San Diego Aqueduct
East Branch of the California Aqueduct	San Diego River
Escondido Creek	San Diego River Floodway
Etiwanda Creek Channel	San Dieguito River
Etiwanda-San Sevaine Flood Control Channel	San Gabriel River
Gage Canal	San Jacinto River
Horsethief Canyon	San Jose Creek
Indian Canyon	San Luis Rey River
Joseph Wash	San Marcos Creek
Keys Creek	Santa Ana River
Lake Hodges	Santa Gertrudis Creek
Lee Lake	Santa Ysabel Creek
Los Angeles River	Second San Diego Aqueduct
Los Penasquitos Canyon	Siphon Vista Canal
Lower Deer Creek Channel	Sycamore Canyon Creek
Lower Etiwanda Creek Channel	Tecolote Creek
Lytle Creek Wash	Temescal Wash
Lytle-Cajon Channel	Val Verde Tunnel-Colorado River Aqueduct
McBride Canyon	Walnut Creek
Mulberry Creek	Warm Springs Creek
Murrieta Creek	West Cucamonga Channel

(a) Surface water summary generated from USGS maps

2.5.3 Listed Section 303(d) Impaired Waters

Section 303(d) of the federal CWA (33 USC 1250, et seq., at 1313(d)), requires states to identify waters that do not meet water quality standards after applying certain required technology-based effluent limits ("impaired" bodies of water). States are required to compile this information in a list and submit the list to EPA for review and approval. This list is known as the Section 303(d) list of impaired waters. As part of this listing process, states are required to prioritize waters/watersheds for future development of total maximum daily loads (TMDLs). The SWRCB and RWQCBs have ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, and subsequently to develop TMDLs. California's most recent Section 303(d) list was approved in 1998 and contains 509 bodies of water, many listed as being impaired for multiple pollutants. The update to this is in draft format and expected to be finalized in

2003. The 303(d) list can identify areas where there already is a significant degradation of water quality, providing an indication of where additional contaminants resulting from the proposed project and alternatives potentially would have the most impact.

Table 2.5-3 provides a list of Section 303(d) waters along the Modal and High-Speed Train Alternatives. Figures 2.4-1 through 2.4-3 provide maps showing listed 303(d) waters within the general vicinity of the study area based on review of the STATSCO database.

Table 2.5-3 Summary of Listed Section 303(d) Waters

Name of the Body of Water	RWQCB Region
Los Angeles River Reach 2 (Carson to Figueroa Street)	Los Angeles
San Gabriel River Reach 2 (Firestone to Whittier Narrows Dam)	Los Angeles
San Gabriel River Reach 3 (Whittier Narrows to Ramona)	Los Angeles
San Jose Creek Reach 2 (Temple to I-10 at White Avenue)	Los Angeles
Walnut Creek Wash (Drains from Puddingstone Reservoir)	Los Angeles
Cucamonga Creek, Valley Reach	Santa Ana
Lytle Creek	Santa Ana
Santa Ana River, Reach 3	Santa Ana
Santa Ana River, Reach 4	Santa Ana
Rainbow Creek	San Diego
Tecolote Creek 906.50	San Diego

2.6 EROSION

Soils susceptible to erosion within the study area may include soils with a high soil erodibility factor and steep slopes, which, when disturbed, may result in suspension and transport of materials, slumping, or landslides, and consequent erosion. Regional soil data in the State Soil Geographic (STATSGO) Database provides information on susceptibility to erosion. Soil erosion is influenced by a number of factors including soil texture, slope, climate, and vegetative cover. The STATSGO database includes an erodibility factor (kfact) and slope (slopeh) for each individual soil map unit. For the purpose of this analysis, susceptibility of soils to erosion is evaluated based on kfact and slopeh. Soil map units with a kfact times slopeh value greater than or equal to 3.0 are considered to represent areas of high soil erosion potential. Table 2.6-1 provides a listing of STATSGO soil types along the proposed segments for the Modal and High-Speed Train Alternatives and identifies potential high soil erosion conditions. Figures 2.4-1 through 2.4-3 provide maps showing potential high soil erosion areas within the general vicinity of the study area.

Table 2.6-1 Summary of Soils Potentially Crossed by the Proposed Modal and High-Speed Train Alternatives

STATSGO Map Unit ID	Map Unit Name	kfact[a]	slopeh[b]	kfact times slopeh	Potentially Susceptible to Erosion[c]
CA624	Friant-San Miguel-Exchequer	0.00	50	0.0	no
CA655	Hambright-Castaic-Urban Land	0.00	30	0.0	no
CA607	Redding-Olivenhain-Urban Land	0.00	9	0.0	no
CA609	Ramona-Greenfield-Linne	0.20	2	0.4	no
CA638	Urban Land-Hanford-Sorrento	0.20	2	0.4	no
CA620	Cieneba-Rock Outcrop-Sesame	0.24	2	0.5	no

Table 2.6-1 Summary of Soils Potentially Crossed by the Proposed Modal and High-Speed Train Alternatives

STATSGO Map Unit ID	Map Unit Name	kfact[a]	slopeh[b]	kfact times slopeh	Potentially Susceptible to Erosion[c]
CA645	Urban Land-Ramona-Zamora	0.24	2	0.5	no
CA616	Domino-Traver-Willows	0.28	2	0.6	no
CA613	Monserate-Arlington-Exeter	0.32	2	0.6	no
CA611	Elder-Tujunga-Salinas	0.24	5	1.2	no
CA614	Greenfield-Hanford-Gorgonio	0.15	8	1.2	no
CA639	Tujunga-Urban Land-Hanford	0.32	5	1.6	no
CA612	Marina-Chesterton-Urban Land	0.24	9	2.2	no
CA608	Redding-Olivenhain-Urban Land	0.15	15	2.3	no
CA633	Cajalco-Temescal-Las Posas	0.32	8	2.6	no
CA610	Urban Land-Stockpen-Antioch	0.32	9	2.9	no
CA622	Fallbrook-Vista-Cieneba	0.24	15	3.6	yes
CA623	Las Posas-Rock Outcrop-Wyman	0.24	15	3.6	yes
CA630	Las Flores-Antioch-Gaviota	0.24	30	7.2	yes
CA632	Rock Outcrop-Lithic Torriorthents-Omstott	0.15	75	11.3	yes
CA642	Anaheim-Soper-Fontana	0.32	50	16.0	yes

[a]A soil erodibility factor, which is adjusted for the effect of rock fragments.

[b]The maximum value for the range of slope of a soil component within a map unit.

[c]Soils with kfact times slopeh values greater than or equal to 3.0 are potentially susceptible to erosion.

2.7 GROUNDWATER

Intermontane basins occur in the coastal mountains of California, consisting of structure troughs or depressions that parallel the coastline and were formed as a result of folding and faulting. Most of the folds and faults trend northwestward and result from the deformation of older rocks by the intense tectonic pressures that exist along the western coast of North America. Within these basins, freshwater is contained in aquifers of continental deposits of sand and gravel that may be interbedded with confining units of fine-grained material such as silt and clay. Water enters a typical coastal-basin aquifer through: (1) runoff in surrounding mountains that infiltrates permeable streambed sediments in the valley floors; (2) precipitation on valley floors with direct recharge, although in the coastal basins, most precipitation is evaporated or transpired; and (3) lateral subsurface flow from an adjacent basin. Runoff from the mountains and percolation through streambeds provide the largest amounts of water to coastal aquifers (USGS, 2002).

Natural movement of water in coastal aquifers is generally parallel to the long axis of the basin, which is typically parallel to the coastline. However, in the Los Angeles-Orange County coastal plain basin, where there is no impermeable barrier between the groundwater basin and the sea, natural flow is perpendicular to the long axis of the basin or from the mountains to the sea. Groundwater historically discharged at the ocean or into bays of the ocean; however, with present urbanization, most groundwater is currently withdrawn by wells in the basins (USGS, 2002).

Coastal plain aquifer systems have been identified along coastal Southern California, each system typically comprises numerous locally named aquifers. Coastal basin systems include the Los Angeles-

Orange County coastal plain basin, which extends over an 860 square mile area, and comprises up to 11 individual aquifers. Each aquifer consists of a distinct layer of water-yielding sand and gravel usually separated from other beds by clay and silt confining units. Over much of the area, a surface layer of clay and silty clay of marine and continental origin is present and is a competent confining unit. In areas near Santa Monica and San Pedro Bays, this layer is absent, and groundwater is unconfined (USGS, 2002).

Because of the complexity of water storage layers and adjacent confining units found throughout Southern California coastal basins, areas of surface discharge of groundwater exist. These areas occur where groundwater is locally high and/or forced to the surface by confining layers. Areas of groundwater discharge also may be present where drainages intersect local groundwater elevations. Areas of groundwater recharge are found throughout the region and include infiltration basins operated for the purpose of groundwater recharge or areas of natural recharge along river channels that are permeable.

3.0 METHODOLOGY FOR IMPACT EVALUATION

The methodology employed for impact evaluation consists of a combination of qualitative and quantitative assessments. A qualitative assessment was used for general comparisons of the three alternatives on a segment-by-segment basis when discussing issues such as runoff rates, sedimentation, or other items that require a more detailed approach than what is warranted for this document. Based on each alternative, general conclusions are generated to support the relative change in impacts between the alternatives. The No-Project Alternative is the primary basis of comparison. The impacts as a result of the Modal and High-Speed Train Alternatives would be characterized as High, Medium, or Low compared to the No-Project Alternative.

A High impact to hydrology and/or water quality would have the following characteristics.

- Proposed project will result in substantial alteration in hydrology, including increased stormwater runoff, increased groundwater discharge, or reduction of groundwater recharge.
- Proposed project will result in violations of federal, state, or local water quality standards or will contribute to violation when evaluated cumulatively with other projects in the region.
- Provisions to prevent contamination of surface waters and/or aquifers are not adopted as a part of the proposed project.
- Proposed project will result in a substantial encroachment on a floodplain as defined in Executive Order 11998 for Floodplain Management (40 CFR 6.302(a)), or is located in a 100-year floodplain without adequate mitigation measures.

For Medium or Low impacts, the results are proportionately less for the hydrology and water quality information presented above. Additional potential impacts to hydrology and water quality include increased/decreased runoff and stormwater discharge from alteration in the amount of paved surfaces, increased or decreased contribution of automotive-based nonpoint source contamination, and impacts on areas of groundwater discharge or infiltration.

For the quantitative assessment, readily available information such as wetland areas, stream locations, impacts on areas with existing water quality problems, flood zones, and soil information is used to assess the magnitude of the impact. For the purposes of this analysis, the study area is defined to include the following: (1) for the High-Speed Train Alternative, direct corridors proposed for alternative segments, including up to a 100-foot buffer from the corridors, the direct footprint of new station facilities, including a 100-foot buffer from new station facilities; and (2) for the Modal Alternative, direct corridors for facilities that would undergo upgrades, including up to a 100-foot buffer from the upgraded facilities.

To evaluate the quantitative impacts to water quality from the proposed Modal and High-Speed Train Alternatives, the following activities were conducted.

- The acreage of floodplains defined as SFHAs (as defined by the FEMA on FIRMs) within the study area was determined.
- The acreage of surface waters (lakes) or linear feet (rivers or streams) within the study area was determined. For the purpose of this analysis, surface waters are defined as lakes, rivers, and streams identified using USGS 1:24,000 scale DLGs. Surface water linear feet were calculated as the flow-path length of rivers and streams that lie within the study area. Lake surface areas represent the impoundment at maximum capacity.
- The location of impaired waters defined as waters identified on the CWA 303(d) list (as distributed by the RWQCBs) within the study area was determined.

- The location of potential erosive conditions was identified as those areas with a combination of erosive soils and high slopes, evaluated as the product of kfact and slopeh (per STATSGO soil database). Those conditions where kfact times slopeh is greater than 3.0 are potentially susceptible to erosion, and acreage of these areas within the study area was determined.

4.0 HYDROLOGY AND WATER QUALITY IMPACTS

4.1 NO-PROJECT ALTERNATIVE

4.1.1 Floodplains

Under the No-Project Alternative, construction of transportation systems within floodplains may be implemented, so impacts to floodplains would occur to the extent that floodplains would be encountered. The extent of impacts would be addressed in project-specific environmental reviews.

4.1.2 Surface Waters

Under the No-Project Alternative, construction of new facilities within surface waters may occur, and impacts resulting from construction in surface waters are anticipated. Despite these improvements, additional congestion and intensity of use of existing roadways and facilities would be anticipated, resulting in a general increase in the amount of automobile-generated nonpoint source contamination, including petroleum products and brake linings. This material will be washed to local drainages via the storm drain system where it will have an effect on receiving water quality. The quantity and location of this effect is unknown at this time, but potentially would result in a high water quality impact over the current travel levels as the pollutants density produced per passenger mile travel density would be greater. The extent of impacts would be addressed in project-specific environmental reviews.

4.1.3 Runoff

Under the No-Project Alternative, construction of transportation systems would occur, resulting in additional runoff and the need for stormwater management. As a result, runoff-related impacts are anticipated. The extent of impacts would be addressed in project-specific environmental reviews.

4.1.4 Erosion

Under the No-Project Alternative, the construction of transportation systems would occur and would result in erosion-related impacts to water quality. The extent of impacts would be addressed in project-specific environmental reviews.

4.1.5 Groundwater

Under the No-Project Alternative, construction of transportation systems would occur and would result in impacts to shallow groundwater. The extent of impacts would be addressed in project-specific environmental reviews.

4.2 MODAL ALTERNATIVE

4.2.1 Floodplains

Table 4.2-1 provides a summary of potential impacts to SFHAs (100-year floodplain) for the Modal Alternative, including the acreage of 100-year floodplains located within the 100-foot buffer areas. Figures 2.4-1 through 2.4-3 show the location of potential impacts.

Table 4.2-1 Special Flood Hazard Areas (100-year Floodplain) Within Modal Alternative 100-Foot Buffer Representing Potential Impacts

Segment	Location	Number of Areas	Area (Acres)
1	Union Station to March ARB	58	35
2	March ARB to Mira Mesa	40	169
3	Mira Mesa to San Diego	4	34
	Total	102	239

Potential impacts may result where facilities intercept and are constructed within floodplains. This may include direct filling of floodplain areas, with consequent alteration in 100-year flood elevations or impeding flood flows over existing conditions. The alteration in flood elevations where it results in a potentially greater flood risk elsewhere would represent a high adverse impact requiring mitigation.

4.2.2 Surface Waters

Table 4.2-2 provides a summary of potential impacts to surface waters (lakes, rivers, and streams) located within the 100-foot buffer area of the Modal Alternative. This includes acreage of surface waters (lakes) or linear feet (rivers or streams) within the study area and linear feet for listed Section 303(d) waters. Figures 2.3-1 through 2.3-3 show the location of potential impacts.

Table 4.2-2 Surface Waters Within Modal Alternative 100-Foot Buffer Representing Potential Impacts

Segment	Location	Number of Features Impacted	Streams and Rivers (Linear Feet)	Section 303(d) Waters (Linear Feet)	Lakes and Reservoirs (Acres)
1	Union Station to March ARB	63	20,729	5,828	0
2	March ARB to Mira Mesa	94	33,652	2,818	7.2
3	Mira Mesa to San Diego	21	9,454	0	0
	Total	178	63,834	8,646	7.2

Potential impacts may result where Modal Alternative facilities intercept and are constructed within surface waters. Impacts may include the following:

- Loss of flood conveyance potential and alteration of flood elevations
- Short- and long-term alteration in coastal hydrology/hydraulics in tidal lagoons where facilities are constructed within coastal surface waters; may include short-term construction dewatering as well as long-term effects resulting from permanent placement of structures
- Short- or long-term loss of native habitats and wetlands resulting from construction and/or permanent installation of facilities within surface waters, resulting in loss of water quality remediation and water storage potential of native habitats

Potential impacts to water quality may also result from the Modal Alternative.

- An increase in intensity of use of existing roadways and facilities would be anticipated over the High-Speed Train Alternative, including a greater amount of impervious surface, resulting in a general increase in the amount of automobile-generated nonpoint source contamination, including petroleum products and brake linings. This material would be transported to surface waters, resulting in a potential water quality impact.

- Short-term increase in sediments and reduction in water quality or flow resulting during construction activities, where material is transported to surface water channels or coastal lagoons

The extent of impacts in these areas currently is not completely known, but may represent high adverse impacts, requiring mitigation.

4.2.3 Runoff

With construction of the Modal Alternative components, additional hard surface would be constructed within the four-county area. In many cases, this would occur in existing urbanized areas, resulting in no new impervious surfaces. However, where segments or facilities occur in areas that have pervious surfaces or native soils, increased runoff will result. The quantity of increased runoff has not been determined, but if substantial, it would result in increased surface flows downstream and potentially greater flooding risk. The increase in impervious surface and resultant increased runoff would represent a high adverse impact, requiring mitigation.

4.2.4 Stormwater Management

To be provided by PM.

4.2.5 Erosion

Table 4.2-3 provides acres of potentially erosive areas within the Modal Alternative 100-foot buffer, which represents areas of potential impacts to surface waters. Since the erosive index is slope-sensitive, only areas that exceed slope thresholds within the indicated acreage meet criteria for erosive areas; this is considered a conservative estimate. Figures 2.4-1 through 2.4-3 show the location of potential impacts.

Table 4.2-3 Erodible Areas Within Modal Alternative 100-foot Buffer Representing Potential Impacts

Segment	Location	Area (Acres)
1	Union Station to March ARB	150
2	March ARB to Mira Mesa	465
3	Mira Mesa to San Diego	0
	Total	615

With construction of the facilities for the Modal Alternative in areas with potentially erosive conditions, short- to long-term increases in suspension and transport of materials, slumping, or landslides may occur in areas disturbed by construction activities. The length of these impacts will depend on the types of soil encountered, slope steepness and slope aspect. The resulting reduction in surface water quality potentially would represent a highly adverse impact, requiring mitigation.

4.2.6 Groundwater

Construction of the Modal Alternative facilities within areas of existing shallow groundwater may result in increased or diminished discharge and alteration of existing hydrology, depending on the nature of proposed facilities. This potentially would represent a high adverse impact, requiring mitigation.

Construction of the Modal Alternative facilities in areas of significant infiltration may result in alteration of infiltration rates, and/or introduction of contaminants into the groundwater. These effects would represent potentially high adverse impacts, requiring mitigation.

With construction of the Modal Alternative, an increase in intensity of use of existing roadways and facilities would be anticipated over the High-Speed Train Alternative, resulting in a general increase in the amount of automobile-generated nonpoint source contamination, including petroleum products and brake linings. Under normal conditions some of this material would be dissolved in surface water and infiltrated into groundwater, resulting in water quality impacts to groundwater. The extent of this effect is not known at this time.

4.3 HIGH-SPEED TRAIN ALTERNATIVE

4.3.1 Floodplains

Table 4.3-1 provides a summary of potential impacts to SFHAs (100-year floodplain) for the High-Speed Train Alternative, including the acreage of 100-year floodplains located within the 100-foot buffer areas. Figures 2.4-1 through 2.4-3 show the locations of potential impacts.

Table 4.3-1 Special Flood Hazard Areas (100-Year Floodplain) Within High-Speed Train Alternative 100-Foot Buffer Representing Potential Impacts

Subsegment	Location	Number of Areas	Area (Acres)
Segment 1A			
1A1	Union Station to Pomona	4	93
1A2	Pomona to beginning of Segment 1C	10	16
1A3	Beginning of Segment 1C to End of Segment 1C, but on Segment 1A	12	19
1A4	End of Segment 1C to March ARB	4	4
1A1	El Monte Station	2	1
1A2	Pomona Station	0	0
1A2	Ontario Station	0	0
1A3	Colton Station	0	0
1A4	UC Riverside Station	0	0
Segment 1B			
1B1	Union Station to Pomona	2	18
1B1	South El Monte Station	0	0
1B1	City of Industry Station	0	0
Segment 1C			
1C1	Beginning of Segment 1C to End of Segment 1C	44	77
1C1	San Bernardino Station	0	0
Segment 2A			
2A1	March ARB to Beginning of Segment 2B	20	112
2A2	Beginning of Segment 2B to End of Segment 2B	*	*
2A3	End of Segment 2B to Mira Mesa	*	*
2A1	March ARB Station	0	0
2A2	Temecula Station	*	*
2A2	Escondido Station	*	*
Segment 2B			
2B1	Beginning of Segment 2B to End of Segment 2B	*	*
2B1	Escondido Transit Center Station	*	*

Table 4.3-1 Special Flood Hazard Areas (100-Year Floodplain) Within High-Speed Train Alternative 100-Foot Buffer Representing Potential Impacts

Subsegment	Location	Number of Areas	Area (Acres)
Segment 3A			
3A1	Mira Mesa to Qualcomm Stadium	7	40
3A1	Mira Mesa Station	0	0
3A1	Qualcomm Stadium Station	2	15
Segment 3B			
3B1	Mira Mesa to End of Segment 3C	8	47
3B2	End of Segment 3C to Downtown San Diego	9	115
3B2	Transit Center Station	2	13
3B2	San Diego International Airport Station	0	0
3B2	Downtown San Diego Station	0	0
Segment 3C			
3C1	Mira Mesa to End of Segment 3C	4	15

* Floodplain coverage not available in STATSGO database for these segments at the time of this study.

Potential impacts may result where facilities intercept and are constructed within floodplains. This may include direct filling of floodplain areas, with consequent alteration in 100-year flood elevations, or impeding flood flows over existing conditions. The alteration in flood elevations where it results in a potentially greater flood risk elsewhere would represent a high adverse impact, requiring mitigation.

4.3.2 Surface Waters

Table 4.3-2 provides a summary of potential impacts to surface waters (lakes, rivers, and streams) located within the 100-foot buffer area of the High-Speed Train Alternative. This includes acreage of surface waters (lakes) or linear feet (rivers or streams) within the study area, and linear feet for listed Section 303(d) waters. Figures 2.4-1 through 2.4-3 show the locations of potential impacts.

Table 4.3-2 Surface Waters Within High-Speed Train Alternative 100-Foot Buffer Representing Potential Impacts

Subsegment	Location	Number of Features Impacted	Streams and Rivers (Linear Feet)	Section 303(d) Waters (Linear Feet)	Lakes and Reservoirs (Acres)
Segment 1A					
1A1	Union Station to Pomona	20	5,751	4,901	1.6
1A2	Pomona to beginning of Segment 1C	4	804	200	0
1A3	Beginning of Segment 1C to End of Segment 1C, but on Segment 1A	20	8,307	242	0
1A4	End of Segment 1C to March ARB	10	5,885	0	0
1A1	El Monte Station	0	0	0	0
1A2	Pomona Station	0	0	0	0
1A2	Ontario Station	0	0	0	0
1A3	Colton Station	1	1,328	0	0

Table 4.3-2 Surface Waters Within High-Speed Train Alternative 100-Foot Buffer Representing Potential Impacts

Subsegment	Location	Number of Features Impacted	Streams and Rivers (Linear Feet)	Section 303(d) Waters (Linear Feet)	Lakes and Reservoirs (Acres)
1A4	UC Riverside Station	1	692	0	0
Segment 1B					
1B1	Union Station to Pomona	28	23,123	728	2.9
1B1	South El Monte Station	2	951	0	0
1B1	City of Industry Station	0	0	0	0
Segment 1C					
1C1	Beginning of Segment 1C to End of Segment 1C	13	3,028	843	0
1C1	San Bernardino Station	0	0	0	0
Segment 2A					
2A1	March ARB to Beginning of Segment 2B	56	28,546	360	0
2A2	Beginning of Segment 2B to End of Segment 2B	3	685	0	0.5
2A3	End of Segment 2B to Mira Mesa	7	1,866	0	6.9
2A1	March ARB Station	0	0	0	0
2A2	Temecula Station	2	643	0	0
2A2	Escondido Station	0	0	0	0
Segment 2B					
2B1	Beginning of Segment 2B to End of Segment 2B	7	1,853	0	0.5
2B1	Escondido Transit Center Station	1	190	0	0
Segment 3A					
3A1	Mira Mesa to Qualcomm Stadium	16	9,960	0	0
3A1	Mira Mesa Station	0	0	0	0
3A1	Qualcomm Stadium Station	0	0	0	0
Segment 3B					
3B1	Mira Mesa to End of Segment 3C	2	314	0	0
3B2	End of Segment 3C to Downtown San Diego	8	4,812	200	0
3B2	Transit Center Station	1	288	0	0
3B2	San Diego International Airport Station	0	0	0	0
3B2	Downtown San Diego Station	0	0	0	0
Segment 3C					
3C1	Mira Mesa to End of Segment 3C	3	1,043	0	0

Potential impacts may result where High-Speed Train Alternative facilities intercept and are constructed within surface waters. Impacts may include the following.

- Loss of flood conveyance potential and alteration of flood elevations
- Short- and long-term alteration in coastal hydrology/hydraulics in tidal lagoons where facilities are constructed within coastal surface waters; may include short-term construction dewatering as well as long-term effects resulting from permanent placement of structures
- Short- or long-term loss of native riparian habitats caused by construction and/or permanent installation of facilities within surface waters, resulting in loss of water quality remediation and water storage potential of native habitats

Potential impacts to water quality may also result from the High-Speed Train Alternative:

- Assuming the High-Speed Train Alternative results in a general reduction in motor vehicle use over what would occur in the No-Project or Modal Alternatives, a potential beneficial impact to water quality in downstream watercourses would be realized. This benefit would result due to less impervious parking and roadways, a general reduction in the amount of automobile-generated nonpoint source contamination, including petroleum products and brake linings. This would be a net effect over the region because construction of station facilities associated with the High-Speed Train Alternative, including supporting parking lots, would result in some local increase in impervious surfaces.
- Short-term increase in sediments and reduction in water quality or flow may result during construction activities, where material is transported to surface water channels or coastal lagoons.

At a program-level analysis, the extent of impacts is currently not completely known, but may represent high adverse or beneficial impacts; where adverse, impacts may require mitigation.

4.3.3 Runoff

With construction of the High-Speed Train Alternative, additional impervious surface associated with the stations would be constructed within the four-county area. Most rail construction would use permeable material, so the alignments would not be expected to contribute to runoff. In many cases, the improvements would occur in existing urbanized areas, resulting in no increase in impervious surfaces. However, where segments or facilities are constructed in undeveloped areas, increased runoff will result. The quantity of increased runoff has not been determined, but if substantial, would result in increased surface flows downstream and potentially greater flooding risk. This increase may be offset due to less automotive usage and related improvements. It would be anticipated that there would be less requirement for impervious surfaces for parking lots and roadways overall in the region (compared to the Modal Alternative) if the HST Alternative is implemented, resulting in a net beneficial impact to runoff. To further reduce the potential for an adverse impact to runoff from the High-Speed Train Alternative, facility designs would include measures to reduce impervious surfaces or provide onsite retention.

4.3.4 Erosion

Table 4.3-3 provides acres of potentially erosive areas within the High-Speed Train Alternative 100-foot buffer, which represents areas of potential impacts to surface waters. Since the erosive index is slope sensitive, only areas that exceed slope thresholds within the indicated acreage meet criteria for erosive areas; this is considered a conservative estimate. Figures 2.3-1 through 2.3-3 show the locations of potential impacts.

Table 4.3-3 Erosive Areas Within High-Speed Train Alternative 100-Foot Buffer Representing Potential Impacts

Subsegment	Location	Area[(a)] (acres)
Segment 1A		
1A1	Union Station to Pomona	119
1A2	Pomona to beginning of Segment 1C	0
1A3	Beginning of Segment 1C to End of Segment 1C, but on Segment 1A	0
1A4	End of Segment 1C to March ARB	0
1A1	El Monte Station	0
1A2	Pomona Station	0
1A2	Ontario Station	0
1A3	Colton Station	0
1A4	UC Riverside Station	0
Segment 1B		
1B1	Union Station to Pomona	184
1B1	South El Monte Station	42
1B1	City of Industry Station	47
Segment 1C		
1C1	Beginning of Segment 1C to End of Segment 1C	0
1C1	San Bernardino Station	0
Segment 2A		
2A1	March ARB to Beginning of Segment 2B	219
2A2	Beginning of Segment 2B to End of Segment 2B	90
2A3	End of Segment 2B to Mira Mesa	108
2A1	March ARB Station	0
2A2	Temecula Station	0
2A2	Escondido Station	0
Segment 2B		
2B1	Beginning of Segment 2B to End of Segment 2B	44
2B1	Escondido Transit Center Station	0
Segment 3A		
3A1	Mira Mesa to Qualcomm Stadium	0
3A1	Mira Mesa Station	0
3A1	Qualcomm Stadium Station	0
Segment 3B		
3B1	Mira Mesa to End of Segment 3C	3
3B2	End of Segment 3C to Downtown San Diego	131
3B2	Transit Center Station	14
3B2	San Diego International Airport Station	0
3B2	Downtown San Diego Station	0
Segment 3C		
3C1	Mira Mesa to End of Segment 3C	3

[(a)]Areas presented have kfact times slopeh values of 3.0 or greater

With construction of the facilities for the High-Speed Train Alternative in areas with potentially erosive conditions, short- to long-term increases in suspension and transport of materials, slumping, or landslides may occur in areas disturbed by construction activities. The length of these impacts will depend on the types of soil encountered, slope steepness, and slope aspect. The resulting reduction in surface water quality potentially would represent a high adverse impact, requiring mitigation.

4.3.5 Groundwater

Construction of the High-Speed Train Alternative facilities within areas of existing shallow groundwater may result in increased or diminished discharge and alteration of existing geohydrology, depending on the nature of proposed facilities. This potentially would represent a high adverse impact, requiring mitigation.

Constructing the High-Speed Train Alternative facilities in areas of significant infiltration or shallow groundwater may result in alteration of infiltration rates and/or direct introduction of contaminants into the groundwater. These effects would represent potentially high adverse impacts, requiring mitigation.

With construction of the High-Speed Train Alternative, a reduction in congestion and intensity of use of existing roadways and facilities would be anticipated over the No-Project or Modal Alternatives, resulting in a general decrease in the amount of automobile-generated nonpoint source contamination, including petroleum products and brake linings. Under normal conditions some of this material would be dissolved in surface water and infiltrated into groundwater. The reduction in the amount of this material may result in an beneficial impact on groundwater quality, resulting in a slight improvement.

4.4 SUMMARY OF POTENTIAL IMPACTS

Potential impacts may occur to hydrology and water quality under the proposed project and alternatives. Under the No-Project Alternative, construction of new and expanded highways would result in impacts to the extent that those future projects encounter floodplains and surface waters. This report does not include a detailed evaluation of the No-Project impacts, because those impacts would be evaluated in project-specific environmental reviews associated with each No-Project project. Potential direct impacts for the Modal and High-Speed Train Alternatives study areas are summarized in Table 4.4-1. Potential impacts for the High-Speed Train Alternative are summarized by geographic location to allow comparison of alternative segments and stations.

Table 4.4-1 Potential Impacts to Hydrology and Water Quality for the No-Project, Modal, and High-Speed Train Alternatives

Segment or Subsegment	Description of Alternative or Segment Location	Impacts to Floodplains (Acres)	Surface Waters (Linear Feet of Streams and Rivers / Acres of Lakes and Reservoirs)	Potential Erodible Areas (Acres)
No-Project Alternative*				
Highways		Expected, but not quantifiable at this time	Expected, but not quantifiable at this time	Expected, but not quantifiable at this time
Airports		Not quantifiable at this time	Not quantifiable at this time	Not quantifiable at this time

Table 4.4-1 Potential Impacts to Hydrology and Water Quality for the No-Project, Modal, and High-Speed Train Alternatives

Segment or Subsegment	Description of Alternative or Segment Location	Impacts to Floodplains (Acres)	Surface Waters (Linear Feet of Streams and Rivers / Acres of Lakes and Reservoirs)	Potential Erodible Areas (Acres)
Modal Alternative				
Union Station to March ARB	Improvements to I-10, I-15, I-215, and Ontario Airport	35	20,729/0	150
March ARB to Mira Mesa	Improvements to I-215 and I-15	169	33,652/7.2	465
Mira Mesa to San Diego	Improvements to I-15, SR-163, and San Diego Airport	34	9,454/0	0
High-Speed Train Alternative				
Union Station to Pomona				
1A1	Union Station to Pomona	93	5,751/1.6	119
1A1	El Monte Station	1	0/0	0
1B1	Union Station to Pomona	18	23,123/2.9	184
1B1	South El Monte Station	0	951/0	42
1B1	City of Industry Station	0	0/0	47
Pomona to Ontario				
1A2	Pomona to Ontario	16	804/0	0
1A2	Pomona Station	0	0/0	0
1A2	Ontario Station	0	0/0	0
Ontario to Colton				
1A3	Ontario to Colton along Segment 1A	19	8,307/0	0
1A3	Colton Station	0	1,328/0	0
1C1	Ontario to Colton along Segment 1C	77	3,028/0	0
1C1	San Bernardino Station	0	0/0	0
Colton to March Air Reserve Base				
1A4	Colton to March ARB	4	5,885/0	0
1A4	UC Riverside Station	0	692/0	0
March Air Reserve Base to Escondido				
2A1	March ARB to Escondido	112	28,546/0	219
2A1	March ARB Station	0	0/0	0
Within Escondido				
2A2	Beginning of Segment 2B to End of 2B, along 2A	**	685/0.5	90
2A2	Temecula Station	**	643/0	0
2A2	Escondido Station	**	0/0	0

Table 4.4-1 Potential Impacts to Hydrology and Water Quality for the No-Project, Modal, and High-Speed Train Alternatives

Segment or Subsegment	Description of Alternative or Segment Location	Impacts to Floodplains (Acres)	Surface Waters (Linear Feet of Streams and Rivers / Acres of Lakes and Reservoirs)	Potential Erodible Areas (Acres)
2B1	Beginning of Segment 2B to End of 2B, along 2B	**	1,853/0.5	44
2B1	Escondido Transit Center Station	**	190/0	0
Escondido to Mira Mesa				
2A3	Escondido to Mira Mesa	**	1,866/6.9	108
Mira Mesa to Qualcomm Stadium				
3A1	Mira Mesa to Qualcomm Stadium	40	9,960/0	0
3A1	Mira Mesa Station	0	0/0	0
3A1	Qualcomm Stadium Station	15	0/0	0
Within Mira Mesa				
3B1	Beginning of Segment 3C to End of 3C, along 3B	47	314/0	3
3C1	Beginning of Segment 3C to End of 3C, along 3C	15	1,043/0	3
Mira Mesa to Downtown San Diego via San Diego Airport				
3B2	End of Segment 3C to Downtown San Diego	115	4,812/0	131
3B2	Transit Center Station	13	288/0	14
3B2	San Diego International Airport Station	0	0/0	0
3B2	Downtown San Diego Station	0	0/0	0

Notes:

*The No-Project Alternative represents a future baseline condition at year 2020, by which time certain currently programmed and funded projects will be implemented. Therefore, these impacts are not quantifiable at present. A list of the proposed projects to be implemented by 2020 is provided in Appendixes A and C of the *System Alternatives Definition Report* (Parsons Brinckerhoff, 2002). Impacts from these proposed projects will be identified and addressed on a case-by-case basis, as part of the project environmental review process.

** Data not available for these subsegments

In general, impacts may include the following:

No-Project, Modal, and High-Speed Train Alternatives

- Potential impacts may result where facilities intercept and are constructed within floodplains. This may include direct filling of floodplain areas, with consequent alteration in 100-year flood elevations, or impeding flood flows over existing conditions, a potentially high impact.
- Short- and long-term alteration in coastal hydrology/hydraulics in tidal lagoons where facilities are constructed within coastal surface waters; may include short-term construction dewatering, as well as long-term effects caused by permanent placement of structures, a potentially high impact.

- Short-term increase in sediments and reduction in water quality or flow may result during construction activities in surface water channels or coastal lagoons, a potentially high impact.
- Short- or long-term loss of native habitats may result from construction and/or permanent installation of facilities within surface waters and may result in loss of water quality remediation and water storage potential of native habitats, a potentially high impact.
- Where segments or facilities occur in areas that have pervious surfaces or native soils, there will be increased runoff, resulting in potential cumulative impacts to regional increases in runoff and potential increased flooding risk, a potential cumulative impact.
- During construction, short-term increases in suspension and transport of materials, slumping, or landslides may occur in areas disturbed by construction activities, resulting in water quality impacts.
- In areas with existing shallow groundwater, alteration in existing hydrology with increased or diminished discharge may occur with facility construction, a potentially high impact.
- In areas of significant infiltration, facility construction may result in alteration of infiltration rates and/or introduction of contaminants into the groundwater, potentially high impacts.

No-Project and Modal Alternatives

- An increase in intensity of use of existing roadways and facilities would be anticipated over the High-Speed Train Alternative, which would impact a greater amount of impervious surface, resulting in a general increase in the amount of automobile-generated nonpoint source contamination including petroleum products and brake linings. This material could be transported to surface waters, resulting in a potential water quality impact.

High-Speed Train Alternative

- With construction of the High-Speed Train Alternative, a reduction in congestion and intensity of use of existing roadways and facilities may result in less automobile generated non-point source contamination, a potential beneficial impact to regional water quality.

5.0 REFERENCES

California Coastal Conservancy. *http://eureka.regis.berkeley.edu/wrpinfo/index.html.* Accessed January 2003.

California Department of Transportation. *Standard Environmental Reference, Environmental Handbook Volume I.* Accessed from website, http://www.dot.ca.gov/ser/vol1/vol1.htm. January 14, 2003.

California High-Speed Rail Authority. *Building a High-Speed Train System for California, Final Business Plan*, 2000.

County of Los Angeles. *http://ladpw.org/wmd/npdes/*. Accessed January 2003.

County of Orange. *http://www.oc.ca.gov/pfrd/*. Accessed January 2003.

County of Riverside. *http://www.co.riverside.ca.us/depts/flood/*. Accessed January 2003.

County of San Bernardino. *http://www.co.san-bernardino.ca.us/flood/*. Accessed January 2003.

County of San Diego. *http://www.sdcounty.ca.gov/dpw/*. Accessed January 2003.

FEMA. Floodplains Database. FEMA Flood Hazard Zone. 1995.

Los Angeles County Department of Public Works (LACDPW). *http://dpw.co.la.ca.us/*. Accessed January 2003.

Parsons Brinckerhoff. *Final Draft Environmental Analysis Methodologies.* Prepared for California High-Speed Rail Authority. November 7, 2002.

Parsons Brinckerhoff. *Plans and Profiles.* Prepared for California High-Speed Rail Authority. November 2002.

Parsons Brinckerhoff. *Screening Report.* Prepared for California High-Speed Rail Authority. April 2002.

U.S. Department of Agriculture, Natural Resources Conservation Service, National Cartography and Geospatial Center. State Soil Geographic (STATSGO) database for California. 1994.

United States Geological Survey (USGS). *Groundwater Atlas of the United States, California, Nevada*. Posted at *http://capp.water.usgs.gov/gwa/ch_b/B-text2.html*. Accessed January 2003.

Western Regional Climatic Center (WRCC). *http://www.wrcc.dri.edu/summary/climsmsca.html*. Accessed January 2003.

6.0 PREPARERS

6.1 HNTB CORPORATION

Linda Bohlinger
Vice President
HNTB Corporation

Doctoral course work, Public Administration, University of Southern California; M.P.A., Public Administration, University of Southern California; B.A., Spanish, University of California, Santa Barbara. 25 years of experience in the transportation industry. Currently a National Vice President, Rail Services, with the HNTB Corporation. Most recent position was as the Executive Director of South Florida's Tri-County Commuter Rail Authority (Tri-Rail). Held previous positions as the CEO for the Los Angeles County Metropolitan Transportation Authority and other positions in California state and regional government.

- Project Principal

John S. Kulpa
Chief Transportation Planner
HNTB Corporation

Ph.D., Business Management, LaSalle University; M.S., Urban and Environmental Studies, Rensselaer Polytechnic Institute; B.A., Political Science, New York University. 22 years of experience in transportation planning and engineering.

- Project Manager

6.2 CH2M HILL

Brian Hausknecht
Senior Planner
CH2M HILL

M.S., Environmental Engineering, University of Florida; B.A., Biology, Jacksonville University. 20 years of experience in hazardous materials management and environmental analysis.

- Project Manager

Richard Burke
Transportation
Environmental Specialist
CH2M HILL

M.S., Technology Policy, Washington University; B.S., Architecture, Stanford University. More than 25 years of national and international experience in directing environmental projects that comply with requirements of NEPA, CEQA, and other governmental regulations.

- Senior Reviewer

Winthrop Allen
Water Quality Specialist
CH2M HILL

M.S., Land Reclamation, Montana State University, Bozeman; B.S., Chemistry, Washington and Lee University, Lexington, Virginia. Five years of experience in analysis of water resources.

- Hydrology and Water Quality Analysis

James Gorham
Water Quality Specialist
CH2M HILL

Graduate Studies, Resource Management, San Francisco State University; B.S. Wildlife Management, Humboldt State University. Over 20 years of experience in analysis of water resources.

- Water Quality and Hydrology Analysis

Steve Cooke Water Resources Engineer CH2M HILL	M.S., Civil Engineering, University of Arizona; B.S., Watershed Science, Utah State University. 18 years of experience in analysis of water resources. • Water Quality and Hydrology Analysis