WATER QUALITY ASSESSMENT REPORT

Interstate 10 Corridor Project

San Bernardino and Los Angeles Counties

07-LA-10 PM 44.9/48.3
08-SBD-10 PM 0.0/R37.0

EA 0C2500

May 2015

STATE OF CALIFORNIA
Department of Transportation

Water Quality Assessment Report

Interstate 10 Corridor Project
LOS ANGELES/SAN BERNARDINO COUNTIES, CALIFORNIA
District 08-I-10-PM 0.0 to PM 37.00
District 07-I-10-PM 44.9 to PM 48.3

EA# OC2500

May 2015

STATE OF CALIFORNIA
Department of Transportation

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Executive Summary

This report discusses how the project would increase the amount of impervious surface area and potentially increase runoff volumes and the amount of water percolating into the groundwater basin. It also discusses how the project may generate additional vehicle pollutants, such as oil and grease, which could be carried by surface flows into local surface drainages and groundwater basins.

The California Department of Transportation (Caltrans), in cooperation with the San Bernardino Associated Governments (SANBAG), proposes to add freeway lanes through all or a portion of the 33-mile segment of Interstate 10 (I-10) in San Bernardino County from the Los Angeles/San Bernardino (LA/SB) county line to Ford Street in Redlands. The project limits, including transition areas, extend from approximately 0.4 mile west of White Avenue in Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in Yucaipa at PM 37.0.

Alternative 1: No Build Alternative

Alternative 1 (No Build Alternative) would maintain the existing lane configuration of I-10 within the project limits with no additional mainline lanes or associated improvements to be provided.

Alternative 2: One High-Occupancy Vehicle Lane (HOV) in Each Direction

Alternative 2 (One HOV Lane in Each Direction) would extend the existing HOV lane in each direction of I-10 from the current HOV terminus near Haven Avenue in Ontario to Ford Street in Redlands, a distance of approximately 25 miles.

Alternative 3: Two Express Lanes in Each Direction

Alternative 3 (Two Express Lanes in Each Direction) would provide two Express Lanes in each direction of I-10 from the LA/SB county line to California Street (near State Route [SR] 210) in Redlands and one Express Lane in each direction from California Street to Ford Street in Redlands, a total of 33 miles. The Express Lanes would be priced managed lanes in which vehicles not meeting the minimum occupancy requirement would pay a toll. West of Haven Avenue, a single new lane would be constructed and combined with the existing HOV lane to provide two Express Lanes in each direction; east of Haven Avenue, all Express Lanes would be constructed by the project.

The proposed improvements are generally within San Bernardino County, with some improvements in Los Angeles County to facilitate transitioning between the existing HOV cross section in Los Angeles County and the proposed Express Lane cross section in San Bernardino County in Alternative 3.

The I-10 Corridor Project is classified as a Category 3 project according to the Caltrans Project Development Procedures Manual (PDPM). The project consists of existing freeway widening that involves changes to local roads and interchanges requiring new or revised freeway agreements. Caltrans is the lead agency for the project pursuant to the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

The project area is within the jurisdiction of the Los Angeles Regional Water Quality Control Board (RWQCB) and Santa Ana RWQCB. This project spans through multiple Hydrologic Units, Hydrologic Areas, and Hydrologic Subareas (HSAs), which are displayed in Table ES-1(Caltrans Water Quality Planning Tool, 2014).

The Los Angeles and Santa Ana RWQCBs have identified urban and stormwater runoff as a serious concern in both the dry and rainy seasons. Pollutants commonly found in stormwater runoff include heavy metals, pesticides, herbicides, fertilizer, animal droppings, trash, food wastes, and synthetic organic compounds such as fuels, waste oils, solvents, lubricants, and grease. Waters that flow over streets, parking lots, construction sites, and industrial facilities carry these pollutants through the storm drain network directly to the lakes, streams, and beaches of southern California (Los Angeles County Department of Public Works, 2002).

Table ES-1 I-10 Hydrologic Information

Hydrologic Unit	Hydrologic Area	Hydrologic Subarea	Hydrologic Subarea Name
San Gabriel River	Spadra	405.52	Pomona
San Gabriel River	Spadra	405.52	San Jose
Santa Ana River	Middle Santa Ana River	481.21	Chino (Split)
Santa Ana River	Middle Santa Ana River	801.21	Chino (Split)
Santa Ana River	Colton-Rialto	801.44	Colton
Santa Ana River	Upper Santa Ana River	801.52	Bunker Hill
Santa Ana River	Upper Santa Ana River	801.53	Redlands
Santa Ana River	Upper Santa Ana River	801.55	Reservoir
Santa Ana River	San Timoteo	801.61	Yucaipa

These compounds can have damaging effects on human health and aquatic ecosystems. In addition to pollutants, the high volumes of stormwater discharged from the storm drain system in areas of rapid urbanization have had significant impacts on aquatic ecosystems due to physical modifications such as bank erosion and widening of channels.

Water quality assessments conducted by the Los Angeles RWQCB identified impairments to many water bodies within Los Angeles County. Beneficial uses of certain water bodies specifically identified in these assessments are either impaired or threatened to be impaired. Pollutants identified include heavy metals, coliform bacteria, pH, enteric viruses, pesticides, nutrients, polycyclic aromatic hydrocarbons, polychlorinated biphenyls (PCBs), organic solvents, sediments, trash, debris, algae, scum, and odor (Los Angeles County Department of Public Works, 2002).

Water quality assessments conducted by the Santa Ana RWQCB have identified impairments to many of the water bodies located within San Bernardino County. Beneficial uses of certain water bodies are either impaired or threatened to be impaired. Pollutants include pathogens, coliform bacteria, total dissolved solids (TDS), heavy metals, hardness, chloride, total inorganic nitrogen (TIN), sulfate, and chemical oxygen demand (COD) (Santa Ana RWQCB, 2004).

Soil-disturbance activities include earth-moving activities such as excavation and trenching, soil compaction and moving, cut and fill activities, and grading. Disturbed soils are susceptible to high rates of erosion from wind and rain, resulting in sediment transport via stormwater runoff from the project area. Chemical contaminants, such as oils, fuels, paints, solvents, nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported to downstream drainages and ultimately into collecting waterways, contributing to the chemical degradation of water quality.

Excavation activities may occur that would require removal of groundwater from excavations during construction. Dewatering activities for excavations below the water table could result in the discharge of unsuitable and untreated water if discharged directly to the environment. If temporary excavations require dewatering, there is the potential of discharging pollutants (primarily by entraining silt and clay, but also from encountering chemicals and other contaminants) through release of construction water directly to the environment, which could possibly violate Los Angeles and Santa Ana RWQCBs water quality objectives (WQOs).

Operation of the proposed project would result in an increase in impervious surface areas, which could potentially increase stormwater runoff. Furthermore, potential pollutant sources associated with operation of the proposed project include motor vehicles, highway maintenance, illegal dumping, spills, and landscaping care.

By following the guidelines and regulations established by the National Pollutant Discharge Elimination System (NPDES) permits, which include the Caltrans statewide permit (Order No. 2012-0011-DWQ, NPDES No. CAS000003), the Construction General Permit (CGP) (Order No. 2009-0009-DWQ, NPDES No. CAS000002), and compliance with waste discharge requirements (WDRs) for stormwater discharges under (Order No. R4-2012-0175, NPDES No. CAS004001 for Los Angeles County and Order No. R8-2010-0036, NPDES No. CAS618036 for San Bernardino County) administered by the Los Angeles and Santa Ana RWQCBs, respectively, and with implementation of best management practices (BMPs), the effects to water quality from construction and operation of the proposed project would be minimized. A Storm Water Pollution Prevention Plan (SWPPP) would be prepared and implemented under the State's NPDES General Permit for Discharges Associated with Construction Activities. The SWPPP would identify BMPs to minimize erosion and ensure the proper handling and storage of materials that may have the potential to affect water quality. During construction, materials would be stored properly to avoid affecting the receiving waters. During the preliminary project design, various Treatment BMPs would be assessed to determine their applicability to the proposed project based on identified site-specific pollutants, project design features, and site conditions, including available right-of-way (ROW). The applicability of all nine Caltrans-approved Treatment BMPs would be analyzed as part of the Project Approval/Environmental Document (PA/ED) process, and the identification and applicability of Treatment BMPs would be finalized at various locations throughout the alignment during the Project Specifications and Estimate (PS&E) phase.

With the implementation of Treatment BMPs, Design Pollution Prevention BMPs, Maintenance BMPs, and Temporary Construction Site BMPs, the effects to water quality associated with construction and operation of the proposed project would be minimized. This project spans two different RWQCBs (Los Angeles and Santa Ana), but most of the project lies within the Santa Ana RWQCB, which has been designated as the RWQCB having jurisdiction over this project. A letter documenting this is provided in Appendix A.

Additional permits identified and anticipated for this project are a Section 401 Water Quality Certification from the Santa Ana RWQCB, a Section 404 permit from the United States Army Corps of Engineers (USACE), and a 1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife (CDFW), which would be obtained prior to construction.

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Table of Contents

List of Appendices

List of Figures

List of Tables

List of Acronyms

°F	degrees Fahrenheit
µg/L	micrograms per liter
AB	Assembly Bill
ASBS	Area of Special Biological Significance
BAT/BCT	Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology
BFE	base flood elevation
BMPs	Best Management Practices
BNSF	Burlington Northern Santa Fe
BODs	biological oxygen demand
BSA	Biological Study Area
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	*Code of Federal Regulations*
cfs	cubic feet per second
CGP	Construction General Permit
CHP	California Highway Patrol
COD	chemical oxygen demand
CRA	Colorado River Aqueduct

CWA	Clean Water Act
DSA	disturbed soil area
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRMs	Flood Insurance Rate Maps
FWC	Fontana Water Company
GP	general purpose
HOV	high-occupancy vehicle
HSA	Hydrologic Subarea
HSG	Hydrologic Soil Group
I/E	ingress/egress
I-10	Interstate 10
I-15	Interstate 15
I-215	Interstate 215
IBI	Index of Biotic Integrity
IRWM	Integrated Regional Water Management
ISA	Impervious Surface Area
kV	kilovolt
LA/SB	Los Angeles/San Bernardino
LACFCD	Los Angeles County Flood Control District
LACWD	Los Angeles County Waterworks Districts
LEDPA	least environmentally damaging practicable alternative

LOMR	Letter of Map Revision
LRT	light-rail transit
MBAS	methylene blue-activated substances
mg/L	milligrams per liter
MPN	most probable number
MS4	Municipal Separate Storm Sewer System
msl	mean sea level
NEPA	National Environmental Policy Act
NES	Natural Environment Study
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
OBT	Orange Blossom Trail
OH	Overhead
OHWM	Ordinary High Water Mark
PA/ED	Project Approval/Environmental Document
PCBs	polychlorinated biphenyls
PDPM	Project Development Procedures Manual
PM	Post Mile
PS&E	Plans, Specification, and Estimate
RCB	reinforced concrete box
RCTC	Riverside County Transportation Commission
ROW	right-of-way

RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SANBAG	San Bernardino Associated Governments
SAR	Santa Ana River
SBBA	San Bernardino Basin Area
SBCFCD	San Bernardino County Flood Control District
SBMWD	San Bernardino Municipal Water Department
SBVWCD	San Bernardino Valley Water Conservation District
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SR	State Route
SUSMP	Standard Urban Stormwater Mitigation Plan
SWAMP	Surface Water Ambient Monitoring Program
SWMP	Storm Water Management Plan
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDC	targeted design constituents
TDS	total dissolved solids
TIE	toxicity identification evaluation
TIN	total inorganic nitrogen
TMDLs	total maximum daily loads

TU	toxicity unit
UP	Underpass
UPRR	Union Pacific Railroad
U.S.	United States
USACE	United States Army Corps of Engineers
USAR	Upper Santa Ana River
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
v/c	volume to capacity
WDRs	Waste Discharge Requirements
WDRs	Waste Discharge Requirements
WPCP	Water Pollution Control Plan
WQAR	Water Quality Assessment Report
WQF	water quality flow
WQO	Water Quality Objective
WQV	water quality volume
YVWD	Yucaipa Valley Water District

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Chapter 1 Introduction

1.1 Project Description

The California Department of Transportation (Caltrans), in cooperation with the San Bernardino Associated Governments (SANBAG), proposes to add freeway lanes through all or a portion of the 33-mile segment of Interstate 10 (I-10) in San Bernardino County from the Los Angeles/San Bernardino (LA/SB) county line to Ford Street in Redlands. The project limits, including transition areas, extend from approximately 0.4 mile west of White Avenue in Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in Yucaipa at PM 37.0 (see Figure 1-1).

1.2 Alternatives

1.2.1 Alternative 1: No Build Alternative

Alternative 1 (No Build Alternative) would maintain the existing lane configuration of I-10 within the project limits with no additional mainline lanes or associated improvements to be provided.

1.2.2 Alternative 2: One High-Occupancy Vehicle (HOV) Lane in Each Direction

Alternative 2 (One HOV Lane in Each Direction) would extend the existing HOV lane in each direction of I-10 from the current HOV terminus near Haven Avenue in Ontario to Ford Street in Redlands, a distance of approximately 25 miles.

1.2.3 Alternative 3: Two Express Lanes in Each Direction

Alternative 3 (Two Express Lanes in Each Direction) would provide two Express Lanes in each direction of I-10 from the LA/SB county line to California Street (near State Route [SR] 210) in Redlands and one Express Lane in each direction from California Street to Ford Street in Redlands, a total of 33 miles. The Express Lanes would be priced managed lanes in which vehicles not meeting the minimum occupancy requirement would pay a toll. West of Haven Avenue, a single new lane would be constructed and combined with the existing HOV lane to provide two Express Lanes in each direction; east of Haven Avenue, all Express Lanes would be constructed by the project.

Figure 1-1 Project Location Map

The proposed improvements are generally within San Bernardino County, with some improvements in Los Angeles County to facilitate transitioning between the existing HOV cross section in Los Angeles County and the proposed Express Lane cross section in San Bernardino County in Alternative 3.

The I-10 Corridor Project is classified as a Category 3 project according to the Caltrans Project Development Procedures Manual (PDPM). The project consists of existing freeway widening that involves changes to local roads and interchanges requiring new or revised freeway agreements.

1.3 Purpose and Need

1.3.1 Purpose of Project

The purpose of the I-10 Corridor Project is to improve traffic operations on I-10 in San Bernardino County to reduce congestion, increase throughput, and enhance trip reliability for the planning design year of 2045.

The objectives of the project are to:

- Reduce volume-to-capacity (v/c) ratios along the corridor;
- Improve travel times within the corridor;
- Provide a facility that is compatible with transit and other modal options;
- Provide consistency with the Southern California Association of Governments (SCAG) Regional Transportation Plan (RTP);
- Provide a cost-effective project solution; and
- Minimize environmental impacts and right-of-way (ROW) acquisition.

1.3.2 Need for the Project

Deficiencies of I-10 within the project limits are summarized below:

- Substantial portions of the I-10 mainline general purpose (GP) lanes peak-period traffic demand currently exceeds capacity;
- Nearly all of the I-10 mainline GP lanes are projected to exceed capacity in future years; and
- The I-10 existing mainline HOV lanes operation is degraded during peak periods.

1.3.3 Existing Drainage Characteristics

The project must take into account onsite and offsite drainage. For the most part, offsite drainage is storm runoff generated outside of the freeway ROW but tributary to the project site. Onsite drainage is storm runoff generated within the project's ROW limits; however, once collected, it will discharge to a major offsite facility. There are also existing retention/detention facilities where onsite storage is provided.

Offsite

The existing offsite flow pattern generally is directed from the north to the south (west of San Timoteo Creek). East of San Timoteo Creek, the drainage pattern is toward the west and northwest. Major washes and rivers are conveyed under I-10 by culverts or bridges. Sheet flow directed towards I-10 is collected by parallel channels such as the I-10 Channel and Rialto Channel.

The Santa Ana River (SAR) Watersheds delineated by the Santa Ana Water Project Authority are associated with large offsite tributary areas that must be examined for this project. Some of the major washes include Day Creek Wash, Etiwanda Creek, and San Sevaine Creek located on the west side of the project and Lytle Creek, SAR, and San Timoteo Creek located on the east side of the project area (see Table 1-1). As mentioned earlier, these offsite systems are already conveyed under I-10.[1]

In addition to the facilities listed in Table 1-1, there are several minor stream crossings. These culverts will have to be extended to accommodate the freeway widening. Conceptual Drainage Layouts can be found in the Drainage Concept Report prepared for this project (Parsons, 2014).

Table 1-1 Major Flood Control Crossings and Peak Flows

Wash Name	Location of Crossing	Q 100 year (cfs)	Type of Existing Facility
Day Creek	Sta. 283+50	9,048	Bridge over Concrete Rectangular Channel
East Etiwanda Creek	Sta 329+00	Unknown	Bridge over Concrete Rectangular Channel with Soft Bottom
San Sevaine Creek	Sta 364+00	20,360	Bridge over Concrete Rectangular Channel
I-10 Channel	Sta 365+00 – Sta 620+00	60 to 6,819	Concrete Trapezoidal Channel
Rialto Channel	Sta 620+00 – Sta 799+00	9,749*	Concrete Trapezoidal Channel and RCB at Riverside Drive

[1] The Lytle Creek/Warm Creek confluence is upstream of the project, and Warm Creek crosses I-10.

Table 1-1 Major Flood Control Crossings and Peak Flows

Wash Name	Location of Crossing	Q 100 year (cfs)	Type of Existing Facility
Warm Creek	Sta 89+00	67,000	Bridge over Concrete Rectangular Channel
Santa Ana River	Sta 103+00	167,000** 70,000***	Bridge over Concrete Trapezoidal Channel
San Timoteo Wash	Sta 190+00	19,500	Bridge over Concrete Rectangular Channel
Mission-Zanja Channel	Sta 302+00	7,608	Bridge over Grouted Riprap Trapezoidal Channel
The Zanja	Sta 506+00	3,923	Bridge over Earthen Channel

* Q at reinforced concrete box (RCB) crossing east of Riverside Avenue.
** FEMA 100-year Discharge
*** Outflow from Seven Oaks Dam Study

Onsite

Roadway embankments and slopes are typically collected by ditches or channels. Other onsite facilities include down drains, slotted drains, edge drains, and median drop inlets. The onsite systems convey the flow to the offsite systems discussed above with the exception of the drainage systems adjacent to the Rialto Channel and I-10 Channel. For this section of I-10, the onsite systems generally flow south of I-10 to drainage swales located along the adjacent railroad yards.

1.3.4 Project Physical Footprint Description

The project corridor extends from the LA/SB county line to Ford Street in Redlands. The Disturbed Soil Area (DSA) would be based on which build alternative is selected. The I-10 HOV Alternative (Alternative 2) is estimated to disturb approximately 346 acres, and the I-10 Express Lane Alternative (Alternative 3) is estimated to disturb approximately 661 acres, as shown in Table 1-2. The existing impervious surface area was calculated as approximately 741 acres and 971 acres for Alternatives 2 and 3, respectively. Proposed impervious surface area was estimated at approximately 51 acres for Alternative 2 and 140 acres for Alternative 3. Therefore, the total proposed impervious surface area for each alternative is estimated at approximately 793 acres and 1,112 acres for Alternatives 2 and 3, respectively.

Table 1-2 Disturbed Soil Area, Existing Impervious Surface Area, Added Impervious Surface Area, and Post Project Impervious Surface Area per Build Alternative

Alternative	Disturbed Soil Area (acres)	Existing Impervious Surface Area (acres)	Added Impervious Surface Area (acres)	Post-Project Impervious Surface Area (acres)
2	346	741	51	793
3	661	971	140	1,112

1.3.5 Sediment Receiving Water Risk Level Determination

A Risk Level Determination was generated for the project for each planning watershed the project crosses (Appendix B). The construction risk level of a project is based on the sediment risk factor and the receiving water risk factor of each planning watershed. Sediment risk level factors range between medium and high, and the receiving water risk factor was determined as low throughout each planning watershed (Table 1-3). The combined risk level for each planning watershed was determined as Risk Level 2. As a Risk Level 2 project for disturbed areas, the discharger must comply with the requirements included in Attachment D of the Construction General Permit (CGP) (SWRCB, 2009).

Table 1-3 I-10 Corridor Project Risk Level Determination Information

Planning Watershed #	Sediment Risk Factor	Receiving Water Risk Level	Combined Risk Level
4405510000	Medium	Low	2
4481210000	Medium	Low	2
4801210000	Medium	Low	2
4801440000	Medium	Low	2
4801520000	Medium	Low	2
4801530000	Medium	Low	2
4801550000	Medium	Low	2
4801610000	High	Low	2

1.4 Alternatives

1.4.1 Alternative 1: No Build Alternative

The No Build Alternative would maintain the existing configuration of the I-10 corridor with no additional freeway lanes to be provided. Without additional freeway lanes, additional traffic congestion resulting from regional growth will further degrade the traffic condition along the corridor and worsen operational deficiencies, resulting in reduced travel speeds and longer commute times. Additionally, the No Build Alternative is inconsistent with the regional programs for transportation improvements and the Caltrans' goal of providing an efficient and effective interregional mobility system. Because there are no improvements anticipated within the project limits, there are no construction or ROW costs associated with this alternative.

The future (design year 2045) configuration under the No Build Alternative assumes the completion of improvements along the project corridor by SANBAG, Caltrans, and local agencies that are currently in planning or being implemented.

Planned Improvements along the Project Corridor

There are numerous projects in planning and included in the RTPs. Most of these projects are anticipated to occur before completion of the I-10 Corridor Project.

- I-10/Cedar Avenue interchange project (EA 1A8300) by 2016
- I-10/Pepper Avenue Bridge Replacement project (EA 1E030) by 2016
- SAR Bridge retrofit (EA 0Q910K) by 2016
- Ford Street signalization improvements by 2014
- I-10/Grove Avenue interchange construction and removal of I-10/4th Street interchange by 2018
- I-10/Beech Avenue interchange construction by 2023
- I-10/Alder Avenue interchange construction by 2030
- I-10/Mt. Vernon Avenue interchange improvements by 2025
- I-10/Mountain View Avenue interchange improvements by 2030
- I-10/California Avenue interchange improvements by 2030
- I-10/University Street interchange improvements by 2025
- I-10/Wabash Avenue interchange improvements by 2015
- Mountain Avenue widening from four to six lanes south of I-10 by 2018
- Vineyard Avenue widening from four to six lanes between Fourth Street and I-10 by 2030
- Etiwanda Avenue widening from four to six lanes south of I-10 by 2014
- Beech Avenue widening from two to four lanes north of I-10 by 2020
- Alder Avenue widening from two to four lanes north and south of I-10 by 2020

- Pepper Avenue widening from two to four lanes from Slover Avenue to Valley Boulevard by 2020
- Waterman Avenue widening from four to six lanes from Hospitality Lane to Redlands Boulevard by 2030
- California Street widening from five to six lanes from Redlands Boulevard to I-10 by 2020
- Cypress Avenue widening from two to four lanes from I-10 to Citrus Avenue by 2030
- Ford Street widening from two to four lanes north of I-10 by 2030
- Addition of HOV lanes on I-10 from Ford Street to Southbound/Riverside County Line by 2030

1.4.2 Alternative 2: One HOV Lane in Each Direction

The project traverses nine cities (Pomona, Montclair, Ontario, Fontana, Rialto, Colton, San Bernardino, Loma Linda, and Redlands) and unincorporated areas of San Bernardino County, including Etiwanda, Bloomington, and Bryn Mawr. Alternative 2 would extend the existing HOV lane in each direction of I-10 from the current HOV terminus near Haven Avenue to Ford Street, a distance of approximately 25 miles. The proposed improvements under Alternative 2 would involve construction work within the following routes and post miles:

- 08-SBd-10 PM 4.7/R37.0
- 08-SBd-15 PM 0.7/4.0
- 08-SBd-38 PM 0.0/0.3
- 08-SBd-83 PM 10.7/11.5
- 08-SBd-210 PM R33.0/R31.5
- 08-SBd-215 PM 2.1/5.7

In addition to the mainline widening, the project includes reconstruction and/or modification of interchange ramps, local arterials, and structures that are necessary to accommodate the proposed freeway widening, including new or reconstruction of retaining walls and soundwalls where appropriate. Existing concrete barrier, temporary railings, metal beam guardrails, and three-beam barriers in the median of I-10 would be replaced with concrete barrier Type 60G, and median lighting would be provided where required. Existing auxiliary lanes would be re-established in kind, and additional auxiliary lanes would be added where warranted.

Mainline Improvements

- Add one HOV lane in each direction from Haven Avenue to Ford Street
- Re-establish existing auxiliary lanes along the corridor
- Construct new westbound auxiliary lane between Rancho Avenue and La Cadena Drive

Interchange Improvements

Alternative 2 encompasses 3 system interchanges (I-10/Interstate 15 [I-15] interchange, I-10/Interstate 215 [I-215] interchange, and I-10/I-210 interchange) and 21 local street interchanges from Haven Avenue to Ford Street. Alternative 2 would require reconstruction of several interchange ramps to accommodate the I-10 widening.

Local Street Improvements

Richardson Street and its structure over I-10 would need to be replaced with a longer-span structure to accommodate the widened freeway.

Railroad Involvement

There are six railroad crossings over or under I-10 that would be impacted by the proposed freeway widening:

- Union Pacific Railroad (UPRR) Kaiser Spur Overhead (OH) east of Etiwanda Avenue in Fontana
- UPRR Slover Mountain Underpass (UP) east of Pepper Avenue in San Bernardino County
- UPRR Colton Crossing OH east Rancho Avenue in Colton
- UPRR Pavillion Spur OH west of Mt. Vernon Avenue in Colton
- Burlington Northern Santa Fe (BNSF) West Redlands OH east of Mountain View Avenue in Redlands
- BNSF Redlands OH west of University Avenue in Redlands

Structure Improvements

Alternative 2 would necessitate replacement of 2 structures, widening of 31 structures, partial reconstruction of 4 structures, and construction of tie-back walls at 2 overcrossing structures. Four structures are planned to be abandoned in place. Table 1-4 summarizes the proposed structure improvements under Alternative 2.

Table 1-4 Structures – Alternative 2

No.	Post Mile	Structure Name	Bridge No.	Proposed Work
1	8.16	Haven Ave OC (Lt)	54-1201L	Maintain
2	8.16	Haven Ave OC (Rt)	54-0560R	Maintain
3	9.17	Milliken Ave OC	54-0539	Maintain
4	9.87	E10-N15 Connector OC	54-0913G	Maintain
5	9.91	N15-W10 Connector OC	54-0908G	Maintain
6	9.92	W10-S15 Connector OC	54-1065F	Maintain
7	9.93	Route 15/10 Sep (Lt)	54-0909L	Maintain
8	9.94	Route 15/10 Sep (Rt)	54-0909R	Maintain
9	9.96	S15-E10 Connector OC	54-0910F	Maintain
10	9.98	W10-S15 Bridge over Day Canyon	54-0914F	Maintain
11	10.12	W10-N15 Bridge over Day Canyon	54-0927F	Maintain
12	10.13	Day Canyon Channel Bridge	54-0351	Widen
13	10.99	Etiwanda Wash Bridge (Lt)	54-0378L	Widen
14	10.99	Etiwanda Wash Bridge (Rt)	54-0378R	Widen
15	10.99	Etiwanda Wash Bridge (EB Off-Ramp)	54-0378S	Widen
16	11.13	Etiwanda Ave OC	54-0463*	Maintain
17	11.35	Valley Blvd WB On-Ramp OC	54-1214K	Maintain
18	11.50	Valley Blvd EB Off-Ramp UC (Lt)	54-0030L	Widen
10	11.50	Valley Blvd EB Off-Ramp UC (Rt)	54-0030R	Widen
20	11.64	Etiwanda-San Sevaine Channel (Lt)	54-0454L	Widen
21	11.64	Etiwanda-San Sevaine Channel (Rt)	54-0454R	Widen
22	11.64	Etiwanda-San Sevaine Channel (EB On-Ramp)	54-0454S	Widen
23	11.74	Kaiser Spur OH	54-0416	Widen
24	11.82	San Sevaine Creek Channel	54-0434	Abandon
26	13.17	Cherry Ave OC	54-0543	Maintain
27	15.18	Citrus Ave OC	54-0538	Maintain
28	15.70	Cypress Ave OC	54-1280	Maintain
29	16.22	Sierra Ave OC	54-1169	Maintain
30	18.49	Cedar Ave OC	54-0035	Maintain
31	19.90	Rialto Channel RCB Bridge	54-1116	Widen
32	19.97	Riverside Ave OC	54-0536	Maintain
33	20.97	Pepper Ave OC	54-0531	Maintain

Table 1-4 Structures – Alternative 2

No.	Post Mile	Structure Name	Bridge No.	Proposed Work
34	21.46	Slover Mountain UP	54-0835*	Maintain
35	21.96	Rancho Ave OC	54-0817	Tie-back wall
36	22.36	Colton OH (Rt)	54-0464R	Widen
37	22.38	Colton OH (Lt)	54-0464L	Widen
38	22.62	La Cadena Dr UC	54-0462	Widen
39	22.62	La Cadena Dr EB Off-Ramp UC	54-0462S	Widen
40	22.71	9th St UC	54-0461	Widen
41	22.82	Pavillion OH (9th WB Off-Ramp)	54-0861K	Abandon
42	22.86	Pavillion Spur OH	54-0460	Abandon
43	23.25	Mt. Vernon Ave OC	54-0459	Tie-back walls
44	23.60	Warm Creek Bridge (Lt)	54-0830L	Widen
45	23.60	Warm Creek Bridge (Rt)	54-0830R	Widen
46	23.80	Santa Ana River Bridge (E10-N/S215)	54-0292G	Widen
47	23.82	Santa Ana River Bridge (Rt)	54-0292R	Widen
48	23.83	Santa Ana River Bridge (Lt)	54-0292L	Widen
49	24.19	E10-N215 Connector OC	54-0823G	Maintain
50	24.23	Route 215/10 Sep (Lt)	54-0479L	Maintain
51	24.25	Route 215/10 Sep (Rt)	54-0479R	Maintain
52	24.27	W10-N215 Connector OC	54-1064F	Maintain
53	24.30	W10-S215 Connector OC	54-0822F	Maintain
54	24.57	Sunwest Ln WB On-Ramp UC	54-0821F	Maintain
55	24.76	Hunts Ln UC	54-0601	Widen
56	25.26	Waterman Ave UC	54-0600	Widen
57	25.46	San Timoteo Creek (Carnegie Dr WB On-Ramp)	54-1105K	Maintain
58	25.54	San Timoteo Creek	54-0599	Widen
59	26.27	Tippecanoe Ave UC	54-0598	Widen
60	26.81	Richardson St OC	54-0597*	Replace
61	27.30	Mountain View Ave UC	54-0596	Widen
62	27.64	West Redlands OH/Mission-Zanja Channel	54-0570	Widen
63	28.30	California St UC	54-0595	Widen
64	28.80	Nevada St UC	54-0594	Widen
65	29.31	Alabama St OC	54-0593	Maintain

Table 1-4 Structures – Alternative 2

No.	Post Mile	Structure Name	Bridge No.	Proposed Work
66	29.58	E210-W10/Alabama St WB Off-Ramp OC	54-0937G	Maintain
67	29.70	E10-W210 Connector OC	54-0938G	Maintain
68	29.76	E210-E10 Connector OC	54-0929G	Maintain
69	29.81	W10-W210/Lugonia Ave UC	54-0931H	Maintain
70	29.82	Tennessee St OC	54-0592*	Replace
71	29.83	W10-W210 over Tennessee St UC	54-0930F	Maintain
72	30.10	New York St/Colton Ave UC	54-0591	Maintain
73	30.38	Texas St UC	54-0583	Maintain
74	30.66	Eureka St UC	54-0580	Maintain
75	30.88	Orange Ave UC (Route 10/38 Sep)	54-0581	Maintain
76	31.01	6th St UC	54-0579	Reconstruct median
77	31.41	Church St UC	54-0578	Maintain
78	31.52	Mission Channel/Redlands OH	54-0472	Maintain
79	31.87	University St UC	54-0582	Maintain
80	31.99	Citrus Ave UC	54-0584	Reconstruct median
81	32.11	Cypress Ave UC	54-0585	Reconstruct median
82	32.36	Palm Ave UC	54-0586	Maintain
83	32.61	Highland Ave UC	54-0587	Reconstruct median
84	33.13	Ford St UC	54-0588	Widen
85	33.29	Redlands Blvd WB Off-Ramp UC	54-0589	Widen

*Structure to be replaced will be assigned a new bridge number.

Drainage Improvements

Several drainage structures along the project corridor would be improved as part of the proposed project, as shown in Table 1-5.

Table 1-5 Drainage Structures – Alternative 2

No.	Channel Facility	Approximate Location	Proposed Work
Crossing System			
1	Haven Ave Storm Drain	West of Haven Ave parallel Turner Ave	Extend RCB
2	Day Creek Channel	East of I-15	Widen I-10 bridges
3	East Etiwanda Creek	East of I-15	Widen I-10 bridges
4	San Sevaine Wash	East of Etiwanda Ave	Widen I-10 bridges
5	Rialto Channel RCB	East of Cedar Ave	Widen I-10 bridge
6	North 6th Street Storm Drain	West of La Cadena Dr	-
7	11th Street Storm Drain	East of La Cadena Dr	-
8	Warm Creek	East of Mt. Vernon Ave	Widen I-10 bridge
9	Santa Ana River	East of Mt. Vernon Ave	Widen I-10 bridges
10	San Timoteo Creek	East of Waterman Ave	Widen I-10 bridges
11	Mission-Zanja Channel	West of California St	Widen I-10 bridge
12	Mission Channel	West of University Ave	Widen I-10 bridge
Parallel System			
1	East of Haven Avenue	North side of I-10 at Haven Ave	Reconstruct
2	I-10 Channel	San Sevaine Wash to Sierra Ave	Reconstruct portions

1.4.3 Alternative 3: Two Express Lanes in Each Direction

Alternative 3 would provide two Express Lanes in each direction of I-10 from the LA/SB county line to California Street and one Express Lane from California Street to Ford Street. Between the LA/SB county line and Haven Avenue, the existing HOV lane in each direction of I-10 would be combined with an additional lane to provide two Express Lanes in each direction (see Figure 1-1). The Express Lanes would operate such that solo drives would be tolled and HOV with two occupants or more would utilize the Express Lanes free of charge.

The project traverses nine cities (Pomona, Montclair, Ontario, Fontana, Rialto, Colton, San Bernardino, Loma Linda, and Redlands) and unincorporated areas of San Bernardino County, including Etiwanda, Bloomington, and Bryn Mawr. The proposed improvements under Alternative 3 would involve construction work within the following routes and post miles:

- 07-LA-10 PM 44.9/48.3
- 08-SBd-10 PM 0.0/R37.0
- 08-SBd-15 PM 0.7/4.0
- 08-SBd-38 PM 0.0/0.3
- 08-SBd-83 PM 10.7/11.5
- 08-SBd-210 PM R33.0/R31.5
- 08-SBd-215 PM 2.1/5.7

Most of the improvements required in Los Angeles County are primarily associated with signing and striping to construct the Express Lane terminus and transition into the existing HOV cross section; however, one bridge widening is required at the Indian Hill Avenue Undercrossing.

In addition to the mainline widening, the project includes reconstruction and/or modification of interchange ramps, local arterials, and structures that are necessary to accommodate the proposed freeway widening, including new or reconstruction of retaining walls and soundwalls where appropriate. Existing concrete barrier, temporary railings, metal beam guardrails, and three-beam barriers in the median of I-10 would be replaced with concrete barrier Type 60G, and median lighting would be provided. Existing auxiliary lanes would be re-established in kind, and additional ones would be added where warranted. California Highway Patrol (CHP) enforcement areas would be provided in the I-10 median at selected locations.

Mainline Improvements

- Add one Express Lane in each direction from the LA/SB county line to Haven Avenue to operate jointly with existing HOV lanes as two Express Lanes in each direction
- Add two Express Lanes in each direction from Haven Avenue to California Street
- Add one Express Lane in each direction from California Street to Ford Street
- Re-establish existing auxiliary lanes along the corridor
- Construct new eastbound auxiliary lane between Mountain Avenue and Euclid Avenue
- Modify existing westbound auxiliary lane at Haven Avenue westbound on-ramp to begin at Haven Avenue westbound loop on-ramp
- Modify existing eastbound auxiliary lane at Haven Avenue eastbound on-ramp to begin at Haven Avenue eastbound loop on-ramp

- Extend westbound auxiliary lane preceding the Riverside Avenue off-ramp to Pepper Avenue
- Construct new westbound auxiliary lane between Rancho Avenue and La Cadena Drive
- Provide 10 ingress/egress (I/E) access points, 9 with additional weave lane and 1 as weave zone

Ingress/Egress Access Points

Ten at-grade I/E access points are proposed along the project corridor, as follows:

- Mountain
- 6^{th}
- Haven
- Etiwanda
- Citrus
- Cedar
- Pepper
- Tippecanoe
- California (transition from 2 to 1 Express Lane)
- Orange (weave zone)

All of the access points, except the easternmost point at Orange Avenue, are proposed with a weave or speed change lane. The Orange Avenue I/E is proposed as a weave zone. The California Avenue I/E is a transition point from two to one Express Lane, where the No. 1 eastbound Express Lane continues through the access area and the No. 2 Express Lane becomes a GP lane. The No. 2 Express Lane in the access area essentially operates as a weave lane.

Interchange Improvements

Alternative 3 encompasses 3 system interchanges (I-10/I-15 interchange, I-10/I-215 interchange, and I-10/SR 210 interchange) and 29 local street interchanges, including 1 interchange (Indian Hill Boulevard) in Los Angeles County. Alternative 3 would require reconstruction of several interchange ramps to accommodate the I-10 widening.

Local Street Improvements

Eight arterial streets crossing over I-10 would be reconstructed to accommodate the I-10 improvements, as listed below:

- San Antonio Avenue
- Euclid Avenue
- Sultana Avenue
- Campus Avenue
- 6th Street Avenue
- Vineyard Avenue
- Richardson Street
- Tennessee Street

Three arterials parallel to I-10 would be modified as part of the proposed project improvements:

- Palo Verde Street between Mills Avenue and Monte Vista Avenue
- 7th Street between Euclid Avenue and Euclid Avenue westbound hook ramps intersection
- J Street between 3rd Street and Pennsylvania Avenue (near Rancho and Colton Overhead)

Railroad Involvement

There are six railroad crossings over or under I-10 that would be impacted by the proposed freeway widening:

- UPRR Kaiser Spur OH east of Etiwanda Avenue in Fontana
- UPRR Slover Mountain UP east of Pepper Avenue in San Bernardino County
- UPRR Colton Crossing OH east Rancho Avenue in Colton
- UPRR Pavillion Spur OH west of Mt. Vernon Avenue in Colton
- BNSF West Redlands OH east of Mountain View Avenue in Redlands
- BNSF Redlands OH west of University Avenue in Redlands

Structure Improvements

Alternative 3 would necessitate replacement of 12 structures, widening of 44 structures, partial reconstruction of 4 structures, and construction of tie-back walls at

6 structures. Four structures are planned to be abandoned in place. Table 1-6 summarizes the proposed structure improvements under Alternative 3.

Table 1-6 Structures – Alternative 3

No.	Post Mile	Structure Name	Bridge No.	Proposed Work
1	46.40	Town Ave UC	53-0858	Maintain
2	46.72	San Antonio Ave UC	53-0859	Maintain
3	47.74	Indian Hill Blvd UC	53-0860	Widen
4	48.00	College Ave RCB Bridge	53-1019	Widen
5	0.00	Mills Ave UC	54-0453	Widen
6	0.32	San Antonio Wash Bridge	54-0451	Widen
7	0.68	Monte Vista Ave UC	54-0450*	Replace**
8	1.23	Central Ave UC	54-1186	Widen
9	1.75	Benson Ave UC	54-0448	Widen
10	2.37	Mountain Ave UC	54-1187	Widen
11	2.92	San Antonio Ave OC	54-0446*	Replace
12	3.47	Euclid Ave OC (Route 83/10 Sep)	54-0445*	Replace
13	3.75	Sultana Ave OC	54-0444*	Replace
14	4.02	Campus Ave OC	54-0443*	Replace
15	4.33	6th St OC	54-0442*	Replace
16	4.70	West Cucamonga Channel	54-1117	Widen
17	4.88	Grove Ave UC	54-0441	Replace**
18	5.24	4th St UC	54-0440	Widen
19	6.10	Vineyard Ave OC	54-0439*	Replace
20	6.70	Cucamonga Wash Bridge (Lt)	54-0438L	Widen
21	6.70	Cucamonga Wash Bridge (Rt)	54-0438R	Widen
22	6.80	Holt Blvd Off-Ramp UC (Lt)	54-0437L	Widen
23	6.80	Holt Blvd Off-Ramp UC (Rt)	54-0437R	Widen
24	6.90	Archibald Ave EB Off-Ramp/Holt Blvd UC	54-1107	Maintain
25	7.16	Archibald Ave OC	54-1166	Maintain
26	8.16	Haven Ave OC (Lt)	54-1201L	Tie-back wall
27	8.16	Haven Ave OC (Rt)	54-0560R	Tie-back wall
28	9.17	Milliken Ave OC	54-0539	Tie-back wall

Table 1-6 Structures – Alternative 3

No.	Post Mile	Structure Name	Bridge No.	Proposed Work
29	9.87	E10-N15 Connector OC	54-0913G	Maintain
30	9.91	N15-W15 Connector OC	54-0908G	Maintain
31	9.92	W10-S15 Connector OC	54-1065F	Maintain
32	9.93	Route 15/10 Sep (Lt)	54-0909L	Maintain
33	9.94	Route 15/10 Sep (Rt)	54-0909R	Maintain
34	9.96	S15-E10 Connector OC	54-0910F	Maintain
35	9.98	W10-S15 Bridge over Day Canyon	54-0914F	Widen
36	10.12	W10-N15 Bridge over Day Canyon	54-0927F	Widen
37	10.13	Day Canyon Channel Bridge	54-0351	Widen
38	10.99	Etiwanda Wash Bridge (Lt)	54-0378L	Widen
39	10.99	Etiwanda Wash Bridge (Rt)	54-0378R	Widen
40	10.99	Etiwanda Wash Bridge (EB Off-Ramp)	54-0378S	Widen
41	11.13	Etiwanda Ave OC	54-0463	Maintain
42	11.35	Valley Blvd WB On-Ramp OC	54-1214K	Maintain
43	11.50	Valley Blvd EB Off-Ramp UC (Lt)	54-0030L	Widen
44	11.50	Valley Blvd EB Off-Ramp UC (Rt)	54-0030R	Widen
45	11.64	Etiwanda-San Sevaine Channel (Lt)	54-0454L	Widen
46	11.64	Etiwanda-San Sevaine Channel (Rt)	54-0454R	Widen
47	11.64	Etiwanda-San Sevaine Channel (EB On-Ramp)	54-0454S	Widen
48	11.74	Kaiser Spur OH	54-0416	Widen
49	11.82	San Sevaine Creek Channel	54-0434	Abandon
51	13.17	Cherry Ave OC	54-0543	Maintain
52	15.18	Citrus Ave OC	54-0538	Maintain
53	15.70	Cypress Ave OC	54-1280	Maintain
54	16.22	Sierra Ave OC	54-1169	Maintain
55	18.49	Cedar Ave OC	54-0035	Tie-back wall
56	19.90	Rialto Channel RCB Bridge	54-1116	Widen
57	19.97	Riverside Ave OC	54-0536	Maintain
58	20.97	Pepper Ave OC	54-0531	Maintain
59	21.46	Slover Mountain UP	54-0835*	Replace

Table 1-6 Structures – Alternative 3

No.	Post Mile	Structure Name	Bridge No.	Proposed Work
60	21.96	Rancho Ave OC	54-0817	Tie-back wall
61	22.36	Colton OH (Rt)	54-0464R	Widen
62	22.38	Colton OH (Lt)	54-0464L	Widen
63	22.62	La Cadena Dr UC	54-0462	Widen
64	22.62	La Cadena Dr EB Off-Ramp UC	54-0462S*	Replace
65	22.71	9th St UC	54-0461	Widen
66	22.82	Pavillion OH (9th WB Off-Ramp)	54-0861K	Abandon
67	22.86	Pavillion Spur OH	54-0460	Abandon
68	23.25	Mt. Vernon Ave OC	54-0459	Tie-back wall
69	23.60	Warm Creek Bridge (Lt)	54-0830L	Widen
70	23.60	Warm Creek Bridge (Rt)	54-0830R	Widen
71	23.80	Santa Ana River Bridge (E10-N/S215)	54-0292G	Maintain
72	23.82	Santa Ana River Bridge (Rt)	54-0292R	Widen
73	23.83	Santa Ana River Bridge (Lt)	54-0292L	Widen
74	24.19	E10-N215 Connector OC	54-0823G	Maintain
75	24.23	Route 215/10 Sep (Lt)	54-0479L	Maintain
76	24.25	Route 215/10 Sep (Rt)	54-0479R	Maintain
77	24.27	W10-N215 Connector OC	54-1064F	Maintain
78	24.30	W10-S215 Connector OC	54-0822F	Maintain
79	24.57	Sunwest Ln WB On-Ramp UC	54-0821F	Maintain
80	24.76	Hunts Ln UC	54-0601	Widen
81	25.26	Waterman Ave UC	54-0600	Widen
82	25.46	San Timoteo Creek (Carnegie Dr WB On-Ramp)	54-1105K	Maintain
83	25.54	San Timoteo Creek	54-0599	Widen
84	26.27	Tippecanoe Ave UC	54-0598	Widen
85	26.81	Richardson St OC	54-0597*	Replace
86	27.30	Mountain View Ave UC	54-0596	Widen
87	27.64	West Redlands OH/Mission-Zanja Channel	54-0570	Widen
88	28.30	California St UC	54-0595	Widen
89	28.80	Nevada St UC	54-0594	Widen

Table 1-6 Structures – Alternative 3

No.	Post Mile	Structure Name	Bridge No.	Proposed Work
90	29.31	Alabama St OC	54-0593	Maintain
91	29.58	E210-W10/Alabama St WB Off-Ramp UC	54-0937G	Maintain
92	29.70	E10-W210 Connector OC	54-0938G	Maintain
93	29.76	E210-E10 Connector OC	54-0929G	Maintain
94	29.81	W10-W210/Lugonia Ave UC	54-0931H	Maintain
95	29.82	Tennessee St OC	54-0592*	Replace
96	29.83	W10-W210/Tennessee St UC	54-0930F	Maintain
97	30.10	New York St/Colton Ave UC	54-0591	Maintain
98	30.38	Texas St UC	54-0583	Maintain
99	30.66	Eureka St UC	54-0580	Maintain
100	30.88	Orange Ave UC (Route 10/38 Sep)	54-0581	Maintain
101	31.01	6th St UC	54-0579	Reconstruction median
102	31.41	Church St UC	54-0578	Maintain
103	31.52	Mission Channel/Redlands OH	54-0472	Maintain
104	31.87	University St UC	54-0582	Maintain
105	31.99	Citrus Ave UC	54-0584	Reconstruction median
106	32.11	Cypress Ave UC	54-0585	Reconstruction median
107	32.36	Palm Ave UC	54-0586	Maintain
108	32.61	Highland Ave UC	54-0587	Reconstruction median
109	33.13	Ford St UC	54-0588	Widen
110	33.29	Redlands Blvd WB Off-Ramp UC	54-0589	Widen

*Structure to be replaced will be assigned a new bridge number.
**Replacement of Monte Vista Avenue UC and Grove Avenue UC is necessary to avoid construction staging complication for the future interchange projects at these locations.

Drainage Improvements

Several drainage structures along the project corridor would be improved as part of the proposed project, as shown in Table 1-7.

Table 1-7 Drainage Structures – Alternative 3

No.	Channel Facility	Approximate Location	Proposed Work
Crossing System			
1	College Ave RCB	Near LA/SBd county line	Widen I-10 bridge
2	San Antonio Wash	East of Mills Ave	Widen I-10 bridge
3	West Cucamonga Channel	East of 6th St	Widen I-10 bridge
4	Cucamonga Wash	East of Vineyard Ave	Widen I-10 bridges
5	Haven Ave Storm Drain	West of Haven Ave parallel Turner Ave	Extend RCB
6	Day Creek Channel	East of I-15	Widen I-10 bridges
7	East Etiwanda Creek	East of I-15	Widen I-10 bridges
8	San Sevaine Wash	East of Etiwanda Ave	Abandoned
9	Rialto Channel RCB	East of Cedar Ave	Widen I-10 bridge
10	North 6th Street Storm Drain	West of La Cadena Dr	-
11	11th Street Storm Drain	East of La Cadena Dr	-
12	Warm Creek	East of Mt. Vernon Ave	Widen I-10 bridge
13	Santa Ana River	East of Mt. Vernon Ave	Widen I-10 bridges
14	San Timoteo Creek	East of Waterman Ave	Widen I-10 bridges
15	Mission-Zanja Channel	West of California St	Widen I-10 bridge
15	Mission Channel	West of University Ave	Widen I-10 bridge
Parallel System			
1	Monte Vista Channel	West of Monte Vista Ave to Central Ave	Reconstruct
2	East of Haven Avenue	North side of I-10 at Haven Ave	Reconstruct
3	I-10 Channel	San Sevaine Wash to Sierra Ave	Reconstruct portions

1.5 Approach to Water Quality Assessment

The purpose of the Water Quality Assessment Report (WQAR) is to fulfill the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), and to provide information, to the extent possible, for National Pollution Discharge Elimination System (NPDES) permitting. The document includes a discussion of the proposed project, the physical setting of the project area, and the regulatory framework with respect to water quality; it also provides data on surface water and groundwater resources within the project area and the water quality of these waters, describes water quality impairments and beneficial uses, identifies potential water quality impacts/benefits associated with the proposed project, and recommends avoidance and/or minimization measures for potentially adverse impacts.

This WQAR is based on an evaluation of the physical setting of the project area, along with the regulatory framework with respect to water quality. The initial approach entailed an evaluation of water resources based on their beneficial uses and impairments. Water quality impacts associated with highway runoff were determined by evaluating Caltrans' water quality data and comparing this data with the Water Quality Objectives (WQOs) established by the Los Angeles and Santa Ana Regional Water Quality Control Boards (RWQCB). Impacts associated with stormwater erosion were identified by evaluating the proposed DSA and the proposed impervious surface area within the project area. Project design features were then identified to minimize construction and postconstruction impacts to the maximum extent practicable.

Each of the build alternatives would include project design features such as the design and installation of Treatment Best Management Practices (BMPs) to the maximum extent practicable. The targeted design constituent (TDC) approach, outlined in the Caltrans Project Planning and Design Guide (Caltrans, 2010), would be used to determine the prioritization for potential Treatment BMPs. The applicability of all nine Caltrans-approved Treatment BMPs would be analyzed for the entirety of the I-10 Corridor Project from a water quality perspective in relation to the receiving water bodies within the proposed project limits. The proposed Treatment BMP strategy to compensate for potential pollutant sources associated with operation of the proposed project would be developed to treat the water quality volume (WQV) and/or water quality flow (WQF). For each of the build alternatives, the WQF and the WQV would be routed away from local drainage courses and into the appropriate Treatment BMP.

Chapter 2 Regulatory Setting

2.1 Federal Laws and Requirements

2.1.1 Clean Water Act

In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source unlawful unless the discharge is in compliance with an NPDES permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of stormwater from municipal and industrial/construction point sources to comply with the NPDES permit scheme. Important CWA sections are:

- Sections 303 and 304, which require states to promulgate water quality standards, criteria, and guidelines.
- Section 401, which requires an applicant for a federal license or permit to conduct any activity that may result in a discharge to waters of the U.S. to obtain certification from the State that the discharge will comply with other provisions of the act. (Most frequently required in tandem with a Section 404 permit request. See below).
- Section 402, which establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. RWQCBs administer this permitting program in California. Section 402(p) requires permits for discharges of stormwater from industrial/ construction and Municipal Separate Storm Sewer Systems (MS4s).
- Section 404, which establishes a permit program for the discharge of dredge or fill material into waters of the U.S. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”

USACE issues two types of Section 404 permits: Standard and General permits. For General permits, there are two types: Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to authorize a variety of minor project activities with no more than minimal effects.

There are also two types of Standard permits: Individual permits and Letters of Permission. Ordinarily, projects that do not meet the criteria for a Nationwide permit may be permitted under one of USACE's Standard permits. For Standard permits, the USACE decision to approve is based on compliance with U.S. Environmental Protection Agency's (EPA) Section 404 (b)(1) Guidelines (U.S. EPA Code of Federal Regulations [CFR] 40 Part 230), and whether permit approval is in the public interest. The 404(b)(1) Guidelines were developed by EPA in conjunction with USACE and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative that would have less adverse effects. The Guidelines state that USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA) to the proposed discharge that would have fewer effects on waters of the U.S. and not have any other significant adverse environmental consequences. Per Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from USACE, even if not subject to the 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4.

2.2 State Laws and Requirements

Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This Act requires a "Report of Waste Discharge" for any discharge of waste (i.e., liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the State. It predates the CWA and regulates discharges to waters of the State. Waters of the State include more than just waters of the U.S., such as groundwater and surface waters not considered waters of the U.S. Additionally, it prohibits discharges of "waste" as defined, and this definition is broader than the CWA definition of "pollutant." Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA, and regulating discharges to ensure compliance with the water quality standards. Details regarding water quality standards in a project area are contained in the applicable RWQCB Basin Plan. In California, RWQCBs designate beneficial uses for all water body segments in their jurisdictions and then set criteria necessary to protect these uses. Consequently, the water quality standards developed for particular water segments are based on the designated use and vary depending on such use. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants, which are then State-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-source point controls (NPDES permits or WDRs), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (i.e., point, non-point, and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB adjudicates water rights, sets water pollution control policy, and issues water board orders on matters of statewide application, and oversees water quality functions throughout the state by approving Basin Plans, TMDLs, and NPDES permits. RWQCBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

National Pollution Discharge Elimination System Program

Municipal Separate Storm Sewer Systems. Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of stormwater dischargers, including MS4s. EPA defines an MS4 as “any conveyance or system of conveyances (i.e., roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over stormwater, that are designed or used for collecting or conveying stormwater.” The SWRCB has identified Caltrans as an owner/operator of an MS4 pursuant to federal regulations. Caltrans’ MS4 permit covers all Caltrans ROWs, properties, facilities, and activities in the state. The SWRCB or the RWQCB issues NPDES permits for 5 years, and permit requirements remain active until a new permit has been adopted.

The Caltrans MS4 Permit, currently under revision, contains three basic requirements:

1. Caltrans must comply with the requirements of the CGP (see below);

2. Caltrans must implement a year-round program in all parts of the State to effectively control storm water and non-storm water discharges; and
3. Caltrans storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) Best Management Practices (BMPs) to the Maximum Extent Practicable, and other measures as the SWRCB determines to be necessary to meet the water quality standards.

To comply with the permit, Caltrans developed the Statewide Storm Water Management Plan (SWMP) to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities within Caltrans for implementing storm water management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices Caltrans uses to reduce pollutants in storm water and non-storm water discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of BMPs. The proposed project will be programmed to follow the guidelines and procedures outlined in the latest SWMP to address storm water runoff.

Construction General Permit. The CGP (Order No. 2009-009-DWQ, as amended by 2010-0014-DWG and 2012-0006-DWQ) became effective on July 1, 2010. The permit regulates stormwater discharges from construction sites that result in a DSA of 1 acre or greater, and/or are smaller sites that are part of a larger common plan of development. For all projects subject to the CGP, applicants are required to develop and implement an effective Storm Water Pollution Prevention Plan (SWPPP). In accordance with Caltrans' Standard Specifications, a Water Pollution Control Plan (WPCP) is necessary for projects with DSA less than 1 acre.

By law, all stormwater discharges associated with construction activity where clearing, grading, and excavation results in soil disturbance of at least 1 acre must comply with the provisions of the CGP. Construction activity that results in soil disturbances of less than 1 acre is subject to this CGP if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop SWPPPs; to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the CGP.

The CGP separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and they are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory stormwater runoff pH and turbidity monitoring, and pre- and post-construction aquatic biological assessments during specified seasonal windows.

Section 401 Permitting. Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the U.S. must obtain a 401 Certification, which certifies that the project will be in compliance with State water quality standards. The most common federal permit triggering 401 Certification is a CWA Section 404 permit, issued by USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before USACE issues a 404 permit.

In some cases, the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may issue a set of requirements known as Waste Discharge Requirements (WDRs) under the State Water Code (Porter-Cologne Act) that defines activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address permanent and temporary discharges of a project.

2.3 Regional and Local Requirements

As shown in Table 2-1, this project spans multiple Hydrologic Units under the jurisdiction of the Los Angeles and Santa Ana RWQCBs. As such, it would be subject to water quality controls that pertain to the receiving water bodies and tributaries of those water bodies. Many beneficial uses have been identified in the Los Angeles County Standard Urban Storm Water Mitigation Plan (SUSMP) (2002) and the Santa Ana River Basin Plan (1995).

**Table 2-1 I-10 Corridor Project
Receiving Hydrologic Units Hydrologic Subareas**

Hydrologic Unit	Hydrologic Area	Hydrologic Subarea #	Hydrologic Subarea Name
San Gabriel River	Spadra	405.52	Pomona
San Gabriel River	Spadra	405.51	San Jose
Santa Ana River	Middle Santa Ana River	481.21	Chino (Split)
Santa Ana River	Middle Santa Ana River	801.21	Chino (Split)
Santa Ana River	Colton-Rialto	801.44	Colton
Santa Ana River	Upper Santa Ana River	801.52	Bunker Hill
Santa Ana River	Upper Santa Ana River	801.53	Redlands
Santa Ana River	Upper Santa Ana River	801.55	Reservoir
Santa Ana River	San Timoteo	801.61	Yucaipa

Dewatering Permit

Care is required for the removal of nuisance water from a construction site (known as dewatering) because of the high turbidity and other pollutants associated with this activity. The Los Angeles RWQCB's permit for discharges of groundwater from construction and project dewatering to surface waters is identified as No. R4-2013-0095 (NPDES No.CAG994004). The Santa Ana RWQCB's Dewatering Permit Order is identified as R8-2005-0041 (NPDES NO. CAG998001). These permits cover the General WDRs for Discharges to Surface Water which Pose an Insignificant *(De Minimis)* Threat to Water Quality from dewatering activities.

Municipal Separate Storm Sewer System Permit

The Los Angeles RWQCB and the Santa Ana RWQCB have issued joint NPDES permits with the County of Los Angeles and the County of San Bernardino to prohibit non-stormwater discharges and to reduce pollutants in discharges to the "maximum extent practicable" to maintain and/or attain WQOs that are protective of beneficial uses or receiving waters (Order No. R4-2012-0175, NPDES No. CAS004001 and R8-2010-0036, NPDES No. CAS618036). Provisions of these permits require the implementation of Storm Water Management Plans (SWMPs)/SUSMPs to address stormwater runoff quality. The SWMP/SUSMP represent best practicable treatment and control of the discharge. In general, SUSMPs require structural controls to infiltrate or treat runoff from specified storm events and recommend or require other BMPs.

Flood Protection

The area of the San Bernardino County Flood Control District (SBCFCD) is included in the entire project area. It is anticipated that there would be some floodplain encroachment throughout the project corridor. Encroachment would vary at each location depending on the proposed improvement. An encroachment permit for this project would be required for one or more of the following reasons: (1) project is within federal flood control project levees and within a Board easement, (2) may have an effect on the flood control functions of project levees, (3) project is within a Board-designated floodway, or (4) project is within a regulated stream listed in Table 8.1 of Title 23 of the California Code of Regulations. Further discussion regarding proposed improvements and floodplain mitigation is provided in the draft Drainage Concept Report that was prepared for this project (Parsons, 2014).

California Department of Fish and Wildlife Section 1602 Streambed Alteration Agreement

Section 1602 of the California State Department of Fish and Wildlife (CDFW) Code requires a Streambed Alteration Agreement for any alteration to the bank or bed of a stream or lake or for any activity that substantially diverts or obstructs the natural flow of any river, stream, or lake. Further coordination with CDFW regarding potential project impacts is required, and a Section 1602 Streambed Alteration Agreement may be necessary for this project. As applicable, a Section 1602 Streambed Alteration Agreement would be obtained for the project prior to construction.

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Chapter 3 Affected Environment

3.1 Introduction

This section describes the affected environment for water quality and stormwater runoff. It includes a range of topics related to water resources, including receiving water bodies and water quality. Surface water resources are important for fish and wildlife habitat, urban and agricultural, industrial service water supply, navigation, hydropower generation, recreation, commercial and sport fishing, and conveying floodwaters. Groundwater is also an important source of urban water supply and groundwater recharge.

3.2 General Setting

The project is located within the San Gabriel River and SAR hydrologic units, and in the hydrologic subareas (HSAs) identified in Table 3-1 as identified by the Caltrans Water Quality Planning Tool (Caltrans, 2014). These HSAs cover approximately 377,084 acres or 589 square miles. Receiving water bodies within the project limits are identified in the Table 3-2.

Table 3-1 I-10 Corridor Project
Receiving Hydrologic Units Hydrologic Subareas

Hydrologic Unit	Hydrologic Area	Hydrologic Subarea #	Hydrologic Subarea Name
San Gabriel River	Spadra	405.52	Pomona
San Gabriel River	Spadra	405.51	San Jose
Santa Ana River	Middle Santa Ana River	481.21	Chino (Split)
Santa Ana River	Middle Santa Ana River	801.21	Chino (Split)
Santa Ana River	Colton-Rialto	801.44	Colton
Santa Ana River	Upper Santa Ana River	801.52	Bunker Hill
Santa Ana River	Upper Santa Ana River	801.53	Redlands
Santa Ana River	Upper Santa Ana River	801.55	Reservoir
Santa Ana River	San Timoteo	801.61	Yucaipa

Table 3-2 I-10 Corridor Project Receiving Water Bodies

Project Receiving Water Body
Day Creek Channel
Etiwanda Wash
Etiwanda Channel
San Sevaine Channel
I-10 Channel
Rialto Channel
Warm Creek
Santa Ana River (SAR, Reach 4)
San Timoteo Creek
Gage Canal
Mission Channel
Zanja Creek
Cucamonga Creek Reach 1 (Valley Reach)
San Antonio Creek
San Jose Creek Reach 2 (Temple to I-10 at White Avenue)
Montclair Storm Drain
West Cucamonga Channel
Cucamonga Channel
Deer Creek Channel
Speedway Storm Drain
Marigold Storm Drain
Randall Storm Drain
Rancho Avenue Storm Drain
Colton Northwest Storm Drain
Warm Creek Levee
Wilson Creek
Wildwood Creek

The project area rests above the Upper Santa Ana Valley groundwater basin and crosses the Chino, Riverside Arlington, Rialto-Colton, Bunker Hill, Yucaipa, and San Timoteo subbasins. The basin identification number and groundwater storage capacity are provided in Table 3-3.

Table 3-3 Groundwater Basins in Upper Santa Ana Region

Groundwater Basin	DWR Groundwater Basin Number	Surface Area (Acres)	Groundwater Storage Capacity (1,000 acre feet)
Upper Santa Ana Valley	8-02	NA	NA
Chino	8-02.01	154,000	5,325
Riverside Arlington	8-02.03	73,100	243
Rialto-Colton	8-02.04	30,100	2,517
Bunker Hill	8-02.06	89,600	5,976
Yucaipa	8-02.07	25,300	808
San Timoteo	8-02.08	73,100	2,010

3.2.1 Population and Land Use

Population

San Bernardino County is the largest county in the United States by area (20,205 square miles) and is the fifth largest in population (2,077,453) (United States Census Bureau, 2014). The I-10 Corridor Project navigates through the most populous areas starting near the Los Angeles county line, extending through what is known as the Riverside-San Bernardino-Ontario Metropolitan area known as the Inland Empire and then crossing through Pomona, Claremont, Montclair, Upland, Ontario, Rancho Cucamonga, Fontana, Rialto, Colton, Loma Linda, San Bernardino, Redlands, and Yucaipa. Population and land area of the individual cities is displayed in Table 3-4.

Table 3-4 I-10 Widening County/City Population and Land Area

Jurisdiction	Population	Land Area (square miles)
County of San Bernardino	2,077,453	20,205.00
Claremont	35,227	13.49
Colton	52,735	16.04
Fontana	201,817	42.40
Loma Linda	23,434	7.51
Montclair	37,208	5.50
Ontario	167,207	50.01
Bloomington	23,851	5.98
Pomona	150,817	22.96
Rancho Cucamonga	170,740	39.80
Redlands	69,908	36.40
Rialto	101,747	22.30
San Bernardino	213,298	59.65
Upland	75,208	15.65
Yucaipa	51,887	27.89

Land Use

The following narrative provides existing land use descriptions by jurisdictions and geographic/community area (Community Impact Analysis, 2014). The following information was summarized from the General Plans from the 12 cities of Pomona, Claremont, Montclair, Upland, Ontario, Fontana, Rialto, Colton, San Bernardino, Loma Linda, Redlands, and Yucaipa; the community of Bloomington; and the counties of Los Angeles and San Bernardino. For this analysis, the City and County General Plans were reviewed to understand the development trends, land use related goals, and specific policies that could affect or be affected by the proposed improvements to the I-10 corridor for Alternative 3, which is the project alternative with the largest footprint.

Pomona. Medical facilities dominate the western end of the city immediately adjacent to I-10. These facilities are also mixed with residential and typical highway commercial uses. Single-family residential uses dominate the east end of the city.

Claremont. The Claremont Center Shopping Center to the south of I-10 and multi-family residential uses are the primary land uses at the western end of the city. Immediately adjacent to I-10, the western end of the city consists of single-family residential uses mixed with retail uses.

Montclair. From Mills Avenue to Monte Vista Avenue, there are mostly residential and open space uses. There are three parks located immediately to the south of I-10 within Montclair. From Monte Vista Avenue to Central Avenue, there is a large mall to the north of I-10 and auto sales properties to the south. The north side of I-10 continues with commercial uses at the eastern end of the city, while the south side is mostly residential.

Upland. Upland is located north of I-10, and the western portion of this part of the city consists of larger commercial properties. Following this area, there are some light industrial uses, and the eastern end of the city within the study area consists primarily of multi-family and single-family residential properties.

Ontario. Residential neighborhoods dominate the land uses to the south of I-10, with commercial uses clustered at major intersections. There are also open space uses immediately adjacent to the southern side of I-10. The northern side is also dominated by residential uses until Vineyard Avenue. At this point, the Cucamonga-Guasti Regional Park occupies the area immediately adjacent to I-10. There are several business parks around the same area north of I-10. Several hotel properties and commercial/retail uses surround the Haven Avenue intersection, likely to accommodate the Citizens Business Bank Arena, an event center, located north of this area. Other commercial uses dominate the area northwest of the I-15 interchange. Business parks and light industrial encompass the eastern end of the city.

Fontana. The western end of Fontana is comprised of primarily industrial uses. There is a small patch of unincorporated San Bernardino County that also consists primarily of industrial uses. Industrial uses continue to dominate this part of Fontana, with some residential interspersed. At the eastern end of Fontana, there are three large commercial centers.

Bloomington. To the north of I-10, most of the land uses are industrial, with one patch of open space. Near the eastern end, there are mobile homes, single-family residential uses, and some commercial uses. Light industrial uses and the rail yard border the southern side of I-10 in the community of Bloomington.

Rialto. Light industrial uses line the portion of the city immediately north of I-10. Near the eastern end of the city limits, there is a concrete channel. The rail yard is located south of the freeway.

Colton. At the western limit of Colton, land uses consist primarily of industrial, with a rail yard to the south of I-10. There is a portion of unincorporated San Bernardino County south of I-10 from approximately Pepper Avenue to Rancho Avenue, where the recently closed Colton Cement Plant (or Mt. Slover) is located, which originally served as a marble quarry. North of I-10 and Mt. Slover is an unincorporated residential neighborhood. Back in incorporated Colton, there are mainly residential uses south of I-10 and residential, commercial, and light industrial uses north of I-10. Near the I-215 interchange, the SAR is also under the jurisdiction of unincorporated San Bernardino County.

San Bernardino. Immediately adjacent to I-10 within San Bernardino, there are some hotel uses north of I-10, as well as commercial use. The eastern end of the city consists primarily of single-family residential uses, including a planned development. South of I-10, there are large retail/commercial uses, along with fast food businesses.

Loma Linda. Strip malls, office uses, and light industrial uses exist along Redlands Boulevard at the west end of Loma Linda. Near Anderson Street, there are more commercial uses, including fast food chains. At this point, automobile sales uses begin to occupy Redlands Boulevard. Following the automobile uses, there are open space uses. Before Mountain View Avenue, there is a mobile home park. Office uses occupy most of the eastern end of Loma Linda within close proximity to I-10.

Redlands. Agricultural uses mixed with light industrial uses and office buildings exist north of I-10 at the western end of Redlands. Splash Kingdom Water Park is also located north of I-10 near California Street. There is a City-owned citrus grove immediately south of I-10 at California Street and the Pavilion at Redlands Shopping Center. More light industrial uses flank I-10, with some hotels near Alabama Street. Similar uses continue up until the I-210 interchange. After the interchange, the uses change to primarily residential with several freeway-adjacent open space uses, Redlands High School, and some commercial uses. Undeveloped hillside dominates the study area to the eastern end of the city limits.

Yucaipa. Low-density retail/commercial businesses and undeveloped land dominate the land uses within the project study area in Yucaipa. There are also small single-family residential neighborhoods within close proximity of the proposed project alignment.

3.2.2 Topography

The project area's topography is typical of low land valley areas with gentle slopes. The general slope of the area is from east to west towards the SAR with slopes ranging from 1 to 3 percent. Topographical features include residential and commercial development and some open space adjacent to I-10.

3.2.3 Hydrology

The following hydrology features exist in the regional and local project vicinity. Major surface water features include lakes, reservoirs, rivers, canals, and floodplains, as well as major groundwater aquifers. These features are described in the following subsections.

Regional Hydrology

The Santa Ana Region includes a group of connected inland basins and open coastal basins drained by surface streams that generally flow southwestward to the Pacific Ocean (Santa Ana RWQCB, 2004). The boundaries between California's nine regions are usually hydrologic divides that separate watersheds; however, the boundary between the Los Angeles region and the Santa Ana region is the Los Angeles county line. Because the Los Angeles county line only approximates the hydrologic divide, part of the Pomona area drains into the jurisdiction of the Santa Ana RWQCB and a portion of the La Habra area drains into the jurisdiction of the Los Angeles RWQCB.

Local Hydrology

Precipitation and Climate

Climate in the project area is characterized by relatively hot, dry summers and cool winters with intermittent precipitation. The largest portion (73 percent) of average annual precipitation occurs during December through March, and rainless periods of several months are common in the summer. Precipitation is nearly always in the form of rain in the lower elevations and mostly in the form of snow above approximately 6,000 feet mean sea level (msl) in the San Bernardino Mountains. Mean annual precipitation ranges from approximately 12 inches in the vicinity of Riverside to almost 20 inches at the base of the San Bernardino Mountains, to greater than 35 inches along the crest of the mountains. The long-term (water years 1883-84 through 2001-02) mean annual precipitation recorded at the San Bernardino County Hospital Gage is 16.4 inches. The historical record indicates that a period of above-average or below-average precipitation can last more than 30 years, such as the recent dry period that extended from 1947 to 1977. Historical stream flow statistics for the SAR at the Metropolitan Water District of Southern California crossing (Metropolitan Crossing) (located near the Riverside Narrows) show that flows vary widely from year to year. The median annual flow for SAR at the Metropolitan Crossing is 75,900 acre-feet per year. During water years 1969-1970 through 2000-2001, annual flows have ranged from a high of 301,000 acre-feet to a low of 9,800 acre-feet. These data are indicative of highly variable stream flows (Upper Santa Ana Water Resources Association, 2007).

Surface Streams

Surface hydrology within the project limits is comprised of the San Gabriel River, SAR, San Timoteo Creek, and their tributaries. The SAR originates in the San Bernardino Mountains, flows from northeast to southwest, and intersects the proposed project area near the I-10/I-215 interchange. San Timoteo Creek originates in the San Jacinto Mountains, flows from southeast to northwest, and intersects the proposed project area near I-10 and the Redlands city limits. Many surface reservoirs in the area are operated primarily for agricultural and urban water use, but they are also regulated for in-stream flows and recharge of groundwater basins. The following sections describe the surface hydrology within the proposed project area.

Flood Plains

In accordance with Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs), the following water bodies have been designated as flood hazard areas of varying degrees, with San Sevaine Creek mapped as a floodway and the others mapped as floodplains. FEMA maps, located in Appendix C, display areas within the project limits that may impact some of the higher flood hazard zones of A and AE. Zones A and AE are areas designated by FEMA as subject to flooding, having a 1 percent chance of being exceeded in a given year. Hydraulic modeling to evaluate the effect of proposed improvements in these areas, along with potential flood mitigation where necessary, would be required to minimize impacts on existing flooding levels. In general, a floodplain cannot be altered in any way until it has been shown that such alteration would pass the base flood without significant damage to either the floodplain or surrounding property. No bridge abutments or embankment shall encroach on a regulatory floodway.

Depending on the proposed roadway work in these flood hazard areas, additional studies for environmental permits, such as Section 401 certification from the Santa Ana RWQCB and a 404 permit from USACE may be necessary. A Location Hydraulic Study and Summary Floodplain Encroachment Report would also be required should any improvements encroach on floodplain areas. Floodplain encroachments would require approval from the SBCFCD and Caltrans.

In accordance with the federal policies for floodplain management, some of the basic guidelines are:

- To minimize impacts of highway agency actions that adversely affect base floodplains;
- To restore and preserve the natural and beneficial floodplain values that are adversely impacted by highway agency actions;
- To avoid support of incompatible floodplain development; and
- To be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program.

West Cucamonga Creek. The existing West Cucamonga Creek carries flows from Ontario. The upstream end of the channel is located north of Church Street, from where it continues in a southerly direction to the infiltration basins north of SR 60. The outfall for the basins is Cucamonga Creek.

The proposed improvements include roadway widening, grading, and retaining walls. The two existing culvert crossings under I-10 would be protected in place.

A Zone AO flood hazard designation is shown adjacent to the westbound roadbed. The floodplain spreads to the N. Grove Avenue underpass where it joins the Zone A designation south of I-10. It is determined that the proposed improvement would not significantly alter the floodplain.

There are no natural and beneficial uses for this floodplain except for drainage conveyance.

Cucamonga Creek. The Cucamonga Creek watershed is located in San Bernardino County and Riverside County and includes portions of the cities of Chino, Ontario, Rancho Cucamonga, and Upland. The upstream reach of the Cucamonga Creek Channel originates at the Cucamonga Debris Basin, from where it continues in a southeasterly direction having a confluence with a channel that brings flows from Thorpe Canyon Dam. From this confluence, the channel crosses SR 210, continuing for approximately 5 miles to the project area. The Deer Creek Channel is the largest tributary of Cucamonga Creek, where the confluence is located just south of the eastbound (right) I-10 bridge. From the confluence with the Deer Creek Channel, the Cucamonga Creek Channel continues to the south under Ontario International Airport to the confluence with Lower Deer Creek, approximately 3.4 miles downstream. Downstream of this confluence, the channel continues south for approximately 3.8 miles, where it discharges into Prado Basin.

The project proposes to widen the existing bridges over Cucamonga Creek/Deer Creek. The existing pier wall in the channel would be removed and replaced to support the proposed superstructure. According to the Preliminary Hydraulics Report for the Cucamonga Creek Bridges, the proposed improvements have no hydraulic impact to the channel. It is determined that the proposed improvement would not alter the floodplain.

Adjacent to the I-10 crossing, the channel is designated as Zone A with the 100-year discharge contained in the channel.

There are no natural and beneficial uses for this floodplain except for drainage conveyance.

Lower Deer Creek Channel. Lower Deer Creek Channel is located mainly in Ontario. The upstream reach begins at Deer Creek and continues south along Turner Avenue. South of SR 60, the channel travels in a southwesterly direction. The open channel transitions to an underground system and back to an open channel several times before finally discharging to Cucamonga Creek near Schaefer Avenue.

The project proposes to widen the roadway to the north and south, which would require extension of the existing 14 by 5-foot reinforced concrete box (RCB) within the designated floodplain.

FEMA designates the channel and culvert as a Zone A flood hazard, and it appears the flows are contained in the channel. It is determined that the proposed improvement would not significantly alter the floodplain.

There are no natural and beneficial uses for this floodplain except for drainage conveyance.

East of Haven Avenue. There is a strip of Zone AH floodplain just east of the Haven Avenue interchange along the westbound roadway. The flooding is primarily due to the inadequate carrying capacity of the ditch that parallels I-10 and backwater effects by the culvert that conveys flows across the freeway.

The proposed improvement is to widen the roadway, which would require some grading within the floodplain. The ditch would not be impacted, but it should be evaluated during the plans, specification, and estimate (PS&E) phase to accommodate the 100-year discharge.

There are no natural and beneficial uses for this floodplain except for drainage conveyance. It is determined that the proposed improvement would not significantly alter the floodplain.

East Etiwanda Creek. The channel north and south of the freeway is designated as flood hazard Zone A. Much of the historical flow has now been diverted to San Sevaine Channel north of Foothill Boulevard. The remaining East Etiwanda Creek flow comes from a smaller tributary from Foothill Boulevard to the I-10 crossing. A Letter of Map Revision (LOMR) was issued effective September 20, 2013, to reflect the above improvements. The western culvert under I-10 appears to be nonfunctional, which would need to be confirmed with Caltrans or the SBCFCD.

Project improvements along the floodplain include roadway widening and grading of the embankments. Structural improvements include closure of the median gap between the eastbound and westbound bridges and widening the Etiwanda Avenue eastbound off-ramp bridge to the south. The bridge widening would require extension of the rectangular reinforced concrete channel cross section into the natural channel, along with possible modifications to the upstream transition structure.

The I-10 HOV Alternative and Express Lanes Alternative improvements would have some impact on the floodplain. Mitigation shall be assessed during the design phase and should include a new hydrology study for East Etiwanda Creek to determine the new 100-year peak flows and floodplain limits.

Beneficial uses for East Etiwanda Creek include groundwater recharge, industrial process supply, water contact recreation, noncontact water recreation, municipal and domestic water supply, wildlife habitat, and rare, threatened, or endangered species (Santa Ana RWQCB, 1995).

It is determined that the proposed improvement would not significantly alter the floodplain.

San Sevaine Channel. San Sevaine Channel conveys storm runoff from the cities of Rancho Cucamonga and Fontana and unincorporated area of San Bernardino County. The channel discharges to the Santa Ana River in Corona. The channels under I-10 consist of the San Sevaine Channel and I-10 Channel, with the confluence occurring just downstream of the Etiwanda Avenue eastbound on-ramp. The proposed improvement would widen the mainline and Etiwanda Avenue eastbound on-ramp bridges over the channel. The bridge widening would not impact the two rectangular reinforced concrete channel cross sections, except for removal and replacement of the existing walls that separate them. The effective flow area and conveyance of the channel under the bridges will not change; therefore, they will not alter the floodplain.

The FIRM indicates the channel is a designated floodway and flood hazard Zone AE, with the 100-year storm event contained in the channel. A preliminary revised FIRM was issued February 1, 2014, to reflect current changes.

Intermittent beneficial uses for San Sevaine Channel include municipal and domestic water supply, groundwater recharge, noncontact water recreation, cold freshwater habitat, and wildlife habitat (Santa Ana RWQCB, 1995).

I-10 Channel. The I-10 Channel parallels I-10 on the north side. The high point of the channel is located approximately 300 feet east of Sierra Avenue and flows westerly, discharging into San Sevaine Channel. The channel conveys storm runoff from the cities of Rialto, Bloomington, and Fontana and unincorporated areas of San Bernardino County. The concrete trapezoidal channel varies in width from 12 to 50 feet and in depth from 3 to 9 feet.

The City of Fontana's I-10 Channel Capacity Study Report (Boyle Engineering, 2003) determined the channel to be deficient to convey the 100-year peak discharges and recommends widening the channel. A portion of the channel has been improved recently as part of the Cherry Avenue interchange improvement project.

There are two Zone A flood hazard designations for the I-10 Channel. The first area is located at the Caltrans maintenance property (old rest area) between Beech Avenue and Poplar Avenue. A field visit and topographic mapping indicate a sump area between the elevated section of I-10 and the I-10 Channel. Flows that overtop the channel would pond in the sump area.

The second floodplain area is located between Sierra Avenue and the upstream end of the channel. The source of flooding appears to be runoff from an area north of I-10 and the backwater effect of the I-10 Channel. The proposed improvement would encroach on the channel and floodplain. A portion of the existing channel would be replaced with a box or pipe system to accommodate realignment of the Sierra Avenue westbound on-ramp.

There are no natural and/or beneficial uses for the I-10 Channel and floodplain except for drainage conveyance. It is determined that the proposed improvement would not significantly alter the floodplain.

Colton Southwest Storm Drain. The area northwest of I-10 and the BNSF Railroad is designated as Zone AH. The existing storm drain system under 5th Street (Pennsylvania Avenue) does not have the capacity to convey the 100-year storm event, causing shallow flooding induced by backwater effect and concentrated street flow.

The FEMA floodplain delineation shows several single-family residences and businesses impacted by the floodplain.

The proposed I-10 improvements at the floodplain include roadway widening, retaining wall construction, and bridge widening.

There are no natural and/or beneficial uses for this floodplain. It is determined that the proposed improvement would not significantly alter the floodplain.

11th Street Storm Drain. The floodplain is located along the 11th Street alignment south of I-10. There is a double pipe culvert crossing I-10 that outlets into an open channel. The open channel is designated as a floodway and Zone AE floodplain.

The project's proposed improvement, which includes widening of the existing eastbound roadway and realignment of the 9th Street eastbound on-ramp, would encroach on the designated floodway and floodplain; however, it is expected that encroachment would be minimal and would not significantly alter the floodplain.

There are no natural and/or beneficial uses for this floodplain except for drainage conveyance.

Warm Creek. Warm Creek crosses I-10 just west of the I-215 interchange. Major water bodies within the project limits, such as Lytle Creek[2] and Cajon Creek, discharge to Warm Creek upstream of the project. Warm Creek confluences with the Santa Ana River approximately 0.25 mile downstream of I-10.

Warm Creek is designated as Zone AE flood hazard with base flood elevation (BFE) determination. An LOMR was published in November 2010 that revises the floodplain for Warm Creek and Lytle Creek. It also decreased the BFE from the previously published FIRM (August 28, 2008). Note that the FEMA map refers to Warm Creek as Lytle Creek at the I-10 crossing. The revised FIRM shows some channel overflow upstream and downstream of the I-10 crossing; however, the 100-year event appears to be contained in the channel several miles upstream of I-10.

The project proposes to widen the existing bridge over Warm Creek to accommodate additional lanes. For the Express Lanes Alternative, pier walls inside the channel would be extended by approximately 22 feet upstream and 20 feet downstream of I-10. Seismic retrofit would also require thickening of the pier walls. The Preliminary Hydraulic Report for Warm Creek Bridge indicates a slight increase in water surface elevation upstream and downstream of the I-10 crossing (Parsons, 2014a).

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2 Lytle Creek is listed under the Potential Wild & Scenic River Inventory list (Friends of the River, 2001).

Santa Ana River. The Santa Ana River bridge crossing is located west of the I-10/ I-215 interchange. The Santa Ana River headwater originates at the base of the San Bernardino Mountains east of Highland, and the 96–mile-long journey ends in the Pacific Ocean at Huntington Beach. The river accepts flows from other large tributaries, including runoff from several cities before crossing the project site. The Santa Ana River is a critical water resource for southern California, with many beneficial uses such as water consumption, natural habitat for many species, and a major flood control conveyance.

The project proposes to widen the I-10 bridges over the Santa Ana River to accommodate the additional lanes. For the Express Lanes Alternative, pier walls would have to be extended approximately 26 feet upstream of the westbound bridge, and the eastbound bridge would be widened 15 feet upstream and 7 feet downstream. The Preliminary Hydraulic Report for Santa Ana River Bridge indicates a negligible increase in water surface elevation upstream and downstream of the I-10 crossing (Parsons, 2008). The proposed improvement will not significantly alter the floodplain and BFE.

The Santa Ana River is designated as a floodway and Zone AE with BFE determination. The 100-year discharge is contained in the channel.

Beneficial uses for the Santa Ana River, Reach 4, include groundwater recharge, water contact recreation, noncontact water recreation, warm freshwater, and wildlife habitat (Santa Ana RWQCB, 1995).

San Timoteo Creek. The existing channel carries flow from a tributary area within Riverside and San Bernardino counties southeast of the project. The total drainage area of San Timoteo Creek at the Santa Ana River outfall is approximately 126 square miles.

San Timoteo Creek is formed at Beaumont by the confluence of Noble Creek with Little San Gorgonio Creek. San Timoteo Creek outlets into the Santa Ana River, approximately 10 miles northwest of the I-10 crossing. Upstream of the project area, the creek transitions into a natural channel through San Timoteo Canyon and then meanders through the cities of Redlands and Loma Linda.

The HOV Alternative and Express Lanes Alternative improvements include widening the existing mainline and Carnegie Avenue westbound on-ramp bridges. The center pier of the mainline bridge would be lengthened to accommodate the additional lanes.

The pier nose would be removed and replaced on the south side (upstream). The westbound on-ramp bridge widening would not impact the existing channel. The Preliminary Hydraulic Report for San Timoteo Bridge indicates a slight increase in water surface elevation upstream and downstream of the I-10 crossing (Parsons, 2014b). The proposed improvement would not significantly alter the floodplain.

FEMA designates San Timoteo Creek as Zone A with 100-year flows contained in concrete rectangular channel.

Intermittent beneficial uses for San Timoteo Creek include groundwater recharge and wildlife habitat (Santa Ana RWQCB, 1995).

Mission Zanja Channel. FEMA designates the Mission Zanja Channel as Zone A downstream of I-10 and Zone AO adjacent to the channel and I-10 with the 100-year storm event flow overtopping the channel upstream of the freeway as shown in the FIRM. The flooding area extends upstream of the West Redlands Bridge (where the channel approaches I-10, turns west in a wide curve, and runs parallel to the Interstate for approximately 1,500 feet) beyond Redlands Boulevard. The floodplain does not appear to encroach on the mainline roadbed, but the eastbound off-ramp embankment at Mountain View Avenue may be affected.

The HOV and Express improvements include widening the existing bridge by extending the abutments and adding pier walls at the top of channel. According to the Preliminary Hydraulics report for Mission Zanja Channel Bridge (Parsons, 2008a), hydraulic analysis indicates the bridge widening leads to a negligible change in water surface elevation and would not alter the floodplain.

There are no natural and/or beneficial uses for this floodplain except for drainage conveyance.

Zanja Creek. The Zanja Creek is a historical irrigation canal, which over several decades became a drainage conveyance. The Zanja Creek's floodplain spreads throughout downtown Redlands and joins the Mission Zanja Channel east of California Street. The floodplain is bounded by the I-10 freeway embankments with a designation of Zone A along the main channel and Zone AO (depths of 1 to 2 feet) at the overbanks adjacent to I-10. The I-10 roadbed is elevated adjacent to the floodplain; therefore, flood inundation is concentrated along the toe of freeway embankment.

The HOV Alternative and Express Lanes Alternative improvements include widening the existing roadway. Embankment slopes may encroach on the Zone AO floodplain but would not significantly alter the floodplain area.

There are no natural and/or beneficial uses for this floodplain except for drainage conveyance. It is determined that the proposed improvement would not significantly alter the floodplain.

Municipal Supply

Los Angeles and San Bernardino counties have a variety of water sources to provide clean and reliable drinking water to their customers. Los Angeles County Waterworks Districts (LACWD), a division of the County of Los Angeles Department of Public Works, provides water using groundwater and water imported through the State Water Project (SWP) and the Colorado River Aqueduct (CRA) (Los Angeles County Department of Public Works, 2014). San Bernardino County water purveyors also use a combination of groundwater resources, local streams, reservoirs, and imported water from the SWP (Water Education Foundation, 2014). Both counties use reservoirs, pump stations, storage facilities, power plants, and pipelines to convey water from the source to the end user.

The proposed project stretches along I-10 through Los Angeles County from PM 44.9 to PM 48.3 and in San Bernardino County from PM 0.0 to PM 37.0, spanning the cities of Pomona, Claremont, Montclair, Ontario, Rancho Cucamonga, Fontana, Colton, Loma Linda, Redlands, Rialto, San Bernardino, and Yucaipa. These cities all have different water purveyors with a variety of water sources. Below are narratives identifying the drinking water purveyors, describing their water sources and approximate customers.

City of Colton Public Utilities Department. The City of Colton’s Public Utilities Department (Colton Public Utilities) provides water service within Colton. Water sources include groundwater from the San Bernardino Basin Area (SBBA) and the Rialto-Colton subbasin. Colton Public Utilities serves water to approximately 9,000 customers.

City of Loma Linda. The City of Loma Linda obtains groundwater from within the Bunker Hill subbasin area. Production facilities include six production wells, four aboveground steel reservoirs, and two in-ground prestressed concrete storage reservoirs, with a combined storage capacity of 14 million gallons. The reservoirs provide storage to the city's five different pressure zones. There are six pressure-reducing stations in the distribution system that lower water pressure from one zone to another to provide constant regulated pressure. To transfer water between zones, there are six booster stations located in the different zones. Loma Linda also has an “emergency” connection to the city of San Bernardino to meet its supplemental needs.

City of Redlands. The City of Redlands provides drinking water to the Redlands and Mentone areas. Currently, the city has 21,000 water service connections. The City completed and adopted an Urban Water Management Plan (UWMP) in 2005. More than 75,000 residents in Redlands, Mentone, parts of Crafton Hills and San Timoteo Canyon, and a small part of San Bernardino depend on the Redlands Municipal Utilities Department to provide water service to their homes and businesses. By supplying a blend of local groundwater, local surface water, and water imported from the SWP, the Redlands Municipal Utilities Department meets its customers’ daily demands, which average 25 million gallons per day and peak at 48 million gallons per day.

City of Rialto. Residents of Rialto obtain water from three purveyors: the Utilities Department of the City of Rialto (Rialto), West Valley, and Fontana Water Company (FWC). Rialto provides water service for approximately 12,000 connections, and West Valley provides the water in the remaining areas. Rialto obtains water from the Rialto-Colton groundwater subbasin, Lytle Creek Groundwater subbasin, SBBA, and the “Chino wells” (these wells are not located within the adjudicated boundaries of Chino Basin).

San Bernardino Municipal Water Department (SBMWD). SBMWD produces all of its own water, using 60 wells located in 45 square miles of water service area and delivering it to more than 40,000 service connections through 551 miles of water mains.

Fontana Union Water Company. Fontana Union Water Company (Fontana Union) is a mutual water company and does not directly deliver water to domestic customers. Fontana Union has longstanding adjudicated vested rights to Lytle Creek surface and subsurface flows and Lytle Creek Basin groundwater, as well as groundwater rights in Rialto Basin, Chino Basin, and “No Man’s Land.” It delivers its available water to its shareholders in accordance with its Articles of Incorporation, Bylaws, and mutual water company law.

West Valley Water District. West Valley Water District (West Valley) is located primarily within southwestern San Bernardino County and to a lesser amount within northern Riverside County. It is part of the greater San Bernardino Riverside-Ontario metropolitan area. It is situated in the San Bernardino Valley and within the SAR watershed. The principal service area of West Valley is approximately 29.5 square miles, with an additional 5.2 square miles within its sphere of influence. Most of its service area lies within Valley District’s boundaries. West Valley currently has 18,000 water service connections.

Yucaipa Valley Water District (YVWD). YVWD currently satisfies most of its water demands from groundwater supplied through district-owned wells located throughout its service area. An extensive distribution system provides water storage and transmission throughout YVWD’s 18 pressure zones.

Groundwater Hydrology

The following discussion describes the location, quality and depth of the groundwater subbasins within the project area. A description of groundwater recharge facilities (i.e., spreading grounds or spreading basins) located within subbasins in the SBBA, Rialto-Colton, and Bunker Hill is also provided.

Riverside-Arlington Subbasin (DWR 8-02.03). The Riverside-Arlington subbasin underlies part of the SAR Valley in northwest Riverside County and southwest San Bernardino County. This subbasin is bounded by impermeable rocks of Box Springs Mountains on the southeast, Arlington Mountain on the south, La Sierra Heights and Mount Rubidoux on the northwest, and Jurupa Mountains on the north. The northeast boundary is formed by the Rialto-Colton Fault, and a portion of the northern boundary is a groundwater divide beneath the community of Bloomington. The SAR flows over the northern portion of the subbasin. Annual average precipitation ranges from approximately 10 to 14 inches.

The Rialto-Colton Fault to the northeast separates the Riverside-Arlington subbasin from the Rialto-Colton subbasin. The fault is a barrier to groundwater flow along its length, especially in its northern reaches (Wildermuth, 2000). A groundwater divide in the alluvium separates the Riverside portion from the Arlington portion of the subbasin (DPW, 1934). The Riverside Arlington subbasin is replenished by infiltration from SAR flow, underflow past the Rialto-Colton fault, intermittent underflow from the Chino subbasin, return irrigation flow, and deep percolation of precipitation (DPW, 1934; Wildermuth, 2000).

Rialto-Colton Subbasin (DWR 8-02.04). The Rialto-Colton subbasin underlies a portion of the upper Santa Ana Valley in southwestern San Bernardino County and northwestern Riverside County. This subbasin is approximately 10 miles long and varies in width from approximately 3.5 miles in the northwestern part to approximately 1.5 miles in the southeastern part. This subbasin is bounded by the San Gabriel Mountains on the northwest, the San Jacinto Fault on the northeast, the Badlands on the southeast, and the Rialto-Colton Fault on the southwest. The SAR cuts across the southeastern part of the basin. The basin generally drains to the southeast, toward the SAR. The Warm Creek and Lytle Creek drains join near the southeastern boundary of the basin and flow to meet the SAR near the center of the southeastern part of the subbasin.

The principal recharge areas are Lytle Creek, Reche Canyon in the southeastern part, and the SAR in the south-central part. Lesser amounts of recharge are provided by percolation of precipitation to the valley floor, underflow, and irrigation and septic returns (DWR, 1970; Wildermuth, 2000). Underflow occurs from fractured basement rock (DWR, 1970; Wildermuth, 2000) and through the San Jacinto Fault in younger SAR deposits at the south end of the subbasin (Dutcher and Garrett, 1958) and in the northern reaches of the San Jacinto fault system (Wildermuth, 2000). Groundwater recharge has been augmented through the use of two spreading basins: the Linden Ponds and the Cactus Basin.

Cactus Spreading and Flood Control Basin. The Cactus recharge basins are located within the central portion of the Rialto-Colton subbasin. The basins are operated by the SBCFCD. Artificial recharge operations have an active spreading area of approximately 46 acres. The estimated percolation rate for this site is 1.5 feet per day. The Cactus recharge basins are located approximately 4 miles north of the I-10 corridor (Upper Santa Ana Water Resources Association, 2007).

Bunker Hill Subbasin (DWR 8-02.06). The Bunker Hill subbasin consists of the alluvial materials that underlie the San Bernardino Valley. The basin is bordered on the northwest by the San Gabriel Mountains and Cucamonga Fault zone; on the northeast by the San Bernardino Mountains and San Andreas Fault zone; on the east by the Banning Fault and Crafton Hills; and on the south by a low, east-facing escarpment of the San Jacinto Fault and the San Timoteo Badlands. Alluvial fans extend from the base of the mountains and hills that surround the valley and coalesce to form a broad, sloping alluvial plain in the central part of the valley. Within the central portion of the valley, relatively continuous clay produces confining conditions to underlying water-bearing sediments, resulting in artesian flowing wells, high groundwater, and, historically, marshlands. The SAR, Mill Creek, and Lytle Creek are the main tributary streams in the subbasin (SBVMWD, 2000). Groundwater recharge in the Bunker Hill subbasin is performed by the San Bernardino Valley Water Conservation District (SBVWCD), Valley District, and others.

The City Creek Spreading Grounds. The spreading grounds located along City Creek, between SR 30 and Boulder Avenue, are operated by SBCFCD. These spreading grounds have an active spreading area of approximately 75 acres and an estimated percolation rate of approximately 1.5 feet per day, which results in a recharge rate of approximately 3,375 acre-feet per month, or about 57 cubic feet per second (cfs). The City Creek spreading grounds are located approximately 4 miles north of the I-10 corridor and recharge the Bunker Hill subbasin of the SBBA (Upper Santa Ana Water Resources Association, 2007).

Waterman Basins. The Waterman Basins are located northeast of Wildwood Park and north of 40th Street in the city of San Bernardino. These basins are operated by SBCFCD, have an active spreading area of approximately 120 acres, and have an estimated percolation rate of approximately 0.5 foot per day. This percolation rate equates to a recharge rate of approximately 810 acre-feet per month, or about 14 cfs. The Waterman Basins recharge the Bunker Hill subbasin of the SBBA and are located approximately 10 miles north of the I-10 corridor (Upper Santa Ana Water Resources Association, 2007).

East Twin Creek Spreading Grounds. The East Twin Creek spreading grounds are located south of 40th Street, immediately south of the Waterman Basins, and are operated by SBCFCD. These spreading grounds have an area of approximately 32 acres and an estimated percolation rate of approximately 1.5 feet per day, which results in a recharge rate of approximately 225 acre-feet per month, or about 4 cfs. The East Twin Creek spreading grounds are located approximately 5 miles north of the I-10 corridor and recharge the Bunker Hill subbasin of the SBBA (Upper Santa Ana Water Resources Association, 2007).

Yucaipa Subbasin (DWR 8-02.07). The Yucaipa subbasin underlies the southeast part of San Bernardino Valley. It is bounded on the northeast by the San Andreas Fault, on the northwest by the Crafton Fault, on the west by the Redlands Fault and the Crafton Hills, on the south by the Banning Fault, and on the east by the Yucaipa Hills. This part of the San Bernardino Valley is drained by Oak Glen, Wilson, and

Yucaipa creeks south and west into San Timoteo Wash, a tributary to the SAR. Groundwater is found chiefly in alluvium, with lesser quantities in the San Timoteo Formation and fractured bedrock beneath the alluvium (Moreland, 1970). Specific yield is estimated to vary from less than 4 percent northeast of Yucaipa to a maximum of approximately 10 percent in the southeastern part of the subbasin (DPW, 1934).

Dominant recharge to the subbasin is from percolation of precipitation and infiltration within the channels of overlying streams, particularly Yucaipa and Oak Glen creeks; underflow from the fractures within the surrounding bedrock beneath the subbasin; and artificial recharge at spreading grounds. Four artificial recharge facilities with a total capacity of approximately 56,500 acre-feet per year were noted in 1967 (DWR, 1967b). By increasing the spreading acreage along Oak Glen Creek by 25 to 50 acres, the capability exists to spread 7,000 to 14,000 acre-feet of surface water annually to recharge the Yucaipa subbasin (YVWD, 2000).

San Timoteo Subbasin (DWR 8-02.08). The San Timoteo subbasin underlies Cherry Valley and Beaumont in southwestern San Bernardino and northwestern Riverside counties. The subbasin is bounded to the north and northeast by the Banning Fault and impermeable rocks of the San Bernardino Mountains, Crafton Hills, and Yucaipa Hills; on the south by the San Jacinto Fault; on the west by the San Jacinto Mountains; and on the east by a topographic drainage divide with the Colorado River hydrologic region. The surface is drained by Little San Gorgonio Creek and San Timoteo Canyon to the SAR.

Groundwater is replenished by subsurface inflow and percolation of precipitation, runoff, and imported water. Runoff and imported water are delivered to streambeds and spreading grounds for percolation (DWR 1967a, 1970). Groundwater is found in alluvium in the San Timoteo Formation. Estimated specific yields in the subbasin range from 3 percent for fine materials to 35 percent for coarser materials (DWR, 1970), with an average of approximately 11 percent (DWR, 1967b).

3.2.4 Geology/Soils

Geology

Regional Geology

The project corridor traverses the Upper Santa Ana River (USAR) Valley from the Ontario area to the Redlands area (EMI, 2009). The USAR Valley is a relatively flat plain that slopes gently southerly from the San Gabriel Mountains within the Western

Transverse Ranges physiographic province in the north, to the Perris Highlands (Perris Block) and the Crafton Hills of the Peninsular Ranges physiographic province on the south (Figure 3-1). The USAR Valley is bounded by the Puente/Chino Hills and San Jose Hills on the west, and by the San Bernardino Mountains on the east. There are a few hills scattered across the USAR plain; these include Red Hill in the northwest, Norco Hills in the southwest, and Jurupa Hills in the south-central area. The nearest hill to the project is Slover Mountain just south of the corridor between Pepper and Rancho streets. The natural height of Slover Mountain has been reduced substantially due to mining.

The major river within the area is the SAR, which flows westerly from the San Bernardino Mountains along the southern margin of the USAR Valley. Major tributaries to the Santa Ana River are Lytle Creek and Cajon Wash, which flow from the north; Warm Creek, which is a tributary of Lytle Creek that flows from the San Bernardino Mountains in the east; and San Timoteo Creek, which flows from the south. Other smaller intermittent creeks flow into the USAR from the surrounding hills and mountains. Most of the natural stream and river channels have been modified to confine flow within concrete and riprap-lined aqueducts.

Stratigraphy

The surficial materials along the I-10 corridor consist of Quaternary alluvial sediments. In the west, the sediments are wind-blown sands that form a veneer over alluvial fan deposits of sand and gravel. Just east of the I-15 interchange, the sediments are comprised of alluvial fan deposits with local patches of older alluvium that form a series of north-south trending linear ridges. The deposits in the channels of Warm Creek and the SAR are loose sands and gravels deposited on a broad floodplain. East of the SAR, the surficial deposits are young stream-channel and fan alluvium. At Redlands, the surficial materials are generally dense, old alluvium that has been strongly oxidized to reddish-brown colors, hence the name Redlands.

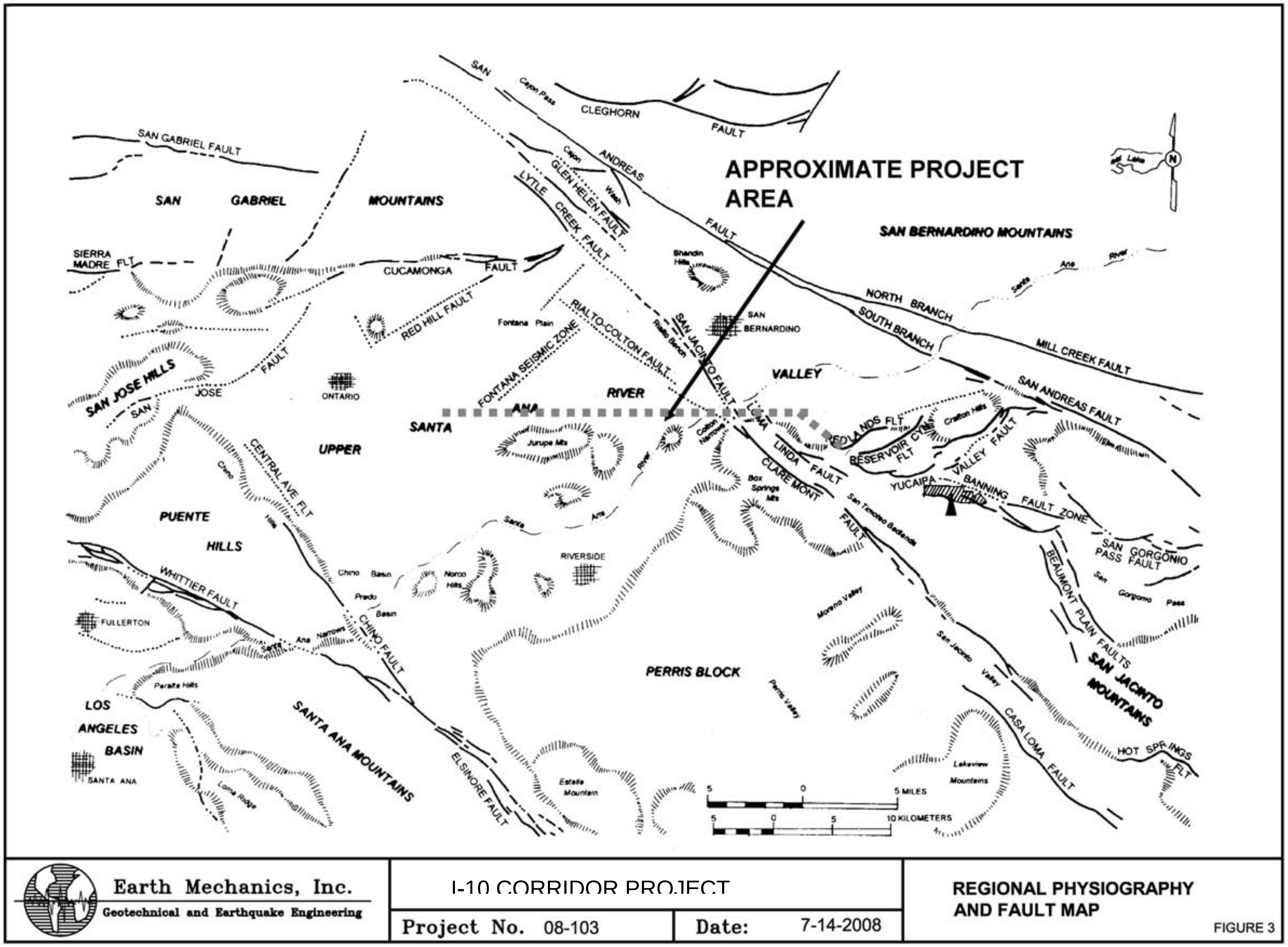

Figure 3-1 Regional Physiography and Fault Map

In general, the alluvial deposits along the corridor consist of loose to compact sand and gravel, except for the old alluvium in the Redlands area, which is comprised of dense to slightly indurated, clay-rich sands with gravel stringers.

The alluvium is underlain by crystalline igneous and metamorphic rocks generally assumed to be Mesozoic age. Based on the data of Dutcher and Garrett (1963) and Fife *et al. (*1976), the alluvium is approximately 1,100 feet thick in the west near Haven Avenue and gradually thins to approximately 900 feet at Sierra Avenue. Alluvium thins easterly from there to approximately 200 feet thick between Pepper Avenue and Rancho Avenue near Slover Mountain in the Colton area. Near the Rancho Avenue overcrossing, the alluvium abruptly thickens to 500 to 600 feet at a groundwater barrier. The thickness of alluvium increases to more than 800 feet at the I-215 interchange, where it crosses several groundwater barriers and increases to 1,000 feet at Richardson Street. The Quaternary alluvium east of I-215 may be underlain by Pliocene-age deposits of the San Timoteo Formation. The thickness remains approximately 1,000 feet to California Street and then thins gradually to 600 feet at the I-210 (SR 30) interchange. The thickness then varies from 600 to 800 feet to the end of the project corridor at Ford Street.

The thickness of alluvium and depth to basement rocks increases considerably east of the I-215 interchange. In contrast to the basement rocks to the west, which are primarily igneous rocks, the basement rock in the area to the east is generally Mesozoic metamorphic rocks of Pelona Schist.

Soil Erosion Potential

According to the Natural Resource Conservation Service soils maps (U.S. Department of Agriculture, 2014), soils within the project limits are classified predominantly into Hydrologic Soils Groups (HSG) A and C (see Appendix D). Soils classified into HSG A typically exhibit a low runoff potential coupled with a high transmission rate. Soils classified into HSG C exhibit a moderately high runoff potential and a restricted transmission rate.

3.2.5 Biological Communities

A Natural Environment Study (NES) (Caltrans, 2014a) was completed for the proposed project. This section summarizes information provided in that report.

Aquatic Habitat

Special-Status Plant Species

According to the NES prepared by Caltrans (November 2014a), the Biological Study Area (BSA) supports habitat suitable for a variety of plant communities. Twelve (12) special-status plant species were identified as being potentially present within the BSA. Of these species, none were found present within the BSA based on focused surveys, and there is no suitable habitat for any of the sensitive plant species within the BSA. Outside the BSA, however, and within the Santa Ana River, there is marginally suitable habitat for the Santa Ana River woolly-star and the slender-horned spine flower.

Special-Status Wildlife Species

Based on the literature review and database search of the Ontario, Guasti, Fontana, San Bernardino South, and Redlands USGS Quadrangles, 32 special-status wildlife species potentially occur within the region. Of those 32 species, 13 were found to have either a low or moderate potential to occur within the BSA. Of those 13 species, the only special-status wildlife species that would be associated with aquatic habitat were the tricolored blackbird, the orange-throated whiptail, the pallid bat, the western mastiff bat, and the western yellow bat.

Stream/Riparian Habitats

In the NES, vegetation communities were identified in the BSA. The following vegetation communities that could be considered stream/riparian habitat include:

- Freshwater Marsh
- Southern Willow Scrub
- Mule Fat Scrub

Wetlands

Five potential wetland areas were identified within the BSA. These potential features were evaluated pursuant to federal wetland delineation methods. It was determined that the features lacked one or more of the wetland indicators; therefore, no USACE-jurisdictional wetlands were identified within the BSA.

Fish Passage

According to the NES, there are no federal fisheries and no essential fish habitat within the BSA.

3.3 Water Quality Objectives/Standards and Beneficial Uses

3.3.1 Surface Water Quality Objectives/Standards and Beneficial Uses

As required by the Porter-Cologne Act, the Los Angeles and Santa Ana RWQCBs have established WQOs for waters within their jurisdiction to protect the beneficial uses of those waters and published them in their Basin Plan (Los Angeles RWQCB, 1994; SARWQCB, 1995). The Basin Plan also identifies implementation programs to achieve these WQOs and requires monitoring to evaluate the effectiveness of these programs. WQOs must comply with the State antidegradation policy (State Board Resolution No. 68-16), which is designed to maintain high quality waters while allowing some flexibility if beneficial uses are reasonably affected. The designated beneficial uses for receiving waters within the project corridor are displayed in Table 3-5. Tables 3-6 and 3-7 identify the narrative objectives for the Los Angeles and Santa Ana RWQCBs, respectively. In addition, the Basin Plans list numeric WQOs for the water bodies that the proposed project discharges to, namely San Antonio Creek in the Los Angeles RWQCB's jurisdiction and San Sevaine, Deer Creek, San Antonio Creek, Day Creek, and East Etiwanda Creek in the Santa Ana RWQCB's jurisdiction. Tables 3-8 and 3-9 summarize these numeric objectives noted in the Basin Plans.

Table 3-5 Beneficial Uses of Receiving Waters within Project Corridor

RWQCB	Inland Surface Stream	MUN	AGR	GWR	IND	PROC	REC1	REC2	WARM	LWRM	COLD	WILD	RARE
Los Angeles	San Jose Creek Reach 2 (Temple Avenue to Thompson Wash)	•		I					I			•	
Santa Ana	Etiwanda Wash (East Etiwanda Creek)	•		•		•	•	•			•	•	•
	Day Creek (Day Creek Channel)	•		•		•	•	•			•	•	
	Deer Creek Channel (Deer)	I		I			I	I			I	I	
	San Sevaine Channel (San Sevaine)	I		I			I	I			I	I	
	Santa Ana River, Reach 4	+		•			•*	•	•			•	
	San Timoteo Creek (Reach 1A – Santa Ana River Confluence to Barton Road)	+	I**				I*	I	I			I	
	San Timoteo Creek (Reach 1B – Barton Road to Gage at San Timoteo Canyon)	+	I**	I			I*	I	I			I	
	Cucamonga Creek Reach 1 - Confluence with Mill Creek to 23rd Street in Upland	+			•		•*	•	•			•	
	San Antonio Creek	•	•	•	•	•	•	•			•	•	

• Present or Potential Beneficial Use

I Intermittent Beneficial Use

+ Excepted from Municipal and Domestic Supply

* Access prohibited in some portions by San Bernardino County Flood Control District

** Intermittent Beneficial Use

Beneficial Use Definitions: MUN (Municipal and Domestic Supply); AGR (Agricultural Supply); IND (Industrial Service Supply); PROC (Industrial Process Supply); GWR (Groundwater Recharge); REC1 (Water Contact Recreation); REC2 (Non-Contact Water Recreation); WARM (Warm Freshwater Habitat); LWRM (Limited Warm Freshwater Habitat); COLD (Cold Freshwater Habitat); WILD (Wildlife Habitat); RARE (Rare, Threatened or Endangered Species).

Table 3-6 Los Angeles RWQCB Narrative Water Quality Objectives for Inland Surface Waters

Constituent Name	Narrative Objective
Ammonia	Ammonia concentrations in receiving waters shall not exceed the values listed for the corresponding instream conditions in Tables 3-1 to 3-4 of the Basin Plan.
Bioaccumulation	Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels that are harmful to aquatic life or human health.
Biological Oxygen Demand (BOD_5)	Waters shall be free of substances that result in increases in the BOD that adversely affect beneficial uses.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.
Chlorine, Total Residual	Chlorine residual shall not be present in surface water discharges at concentrations that exceed 0.1 milligram per liter (mg/L) and shall not persist in receiving waters at any concentration that causes impairment of beneficial uses.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.
Oxygen, Dissolved	At a minimum, the mean annual dissolved oxygen concentration of all waters shall be greater than 7 mg/L, and no single determination shall be less than 5 mg/L, except where natural conditions cause lesser concentrations. The dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 6 mg/L as a result of waste discharges. The dissolved oxygen content of all surface waters designated as COLD shall not be depressed below 6 mg/L as a result of waste discharges. The dissolved oxygen content of all surface waters designated as both COLD and SPWN shall not be depressed below 7 mg/L as a result of waste discharges.
Exotic Vegetation	Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects beneficial uses.
Floating Material	Waters shall not contain floating materials, including solids, liquids, foams, and scum in concentrations that cause nuisance or adversely affect beneficial uses.
pH	The pH of inland surface waters shall not be depressed below 6.5 nor raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed by more than 0.5 units from natural conditions as a result of waste discharge.
Chemical Constituents	Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water designated for use as Domestic or Municipal Supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits set forth in California Code of Regulations, Title 22, Table 64431-A of section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), and Table 64444-A of Section 64444 (Organic Chemicals). This incorporation by reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Basin Plan Tables 3-5, 3-6, and 3-7).
Methylene Blue-Activated Substances (MBAS)	Inland surface waters shall not have MBAS concentrations greater than 0.5 mg/L in waters designated MUN.

Table 3-6 Los Angeles RWQCB Narrative Water Quality Objectives for Inland Surface Waters

Constituent Name	Narrative Objective
Mineral Quality	Numerical mineral WQOs for individual surface waters are contained in Table 3-8 of the Basin Plan.
Nitrogen (Nitrate, Nitrite)	Waters shall not exceed 10 mg/L as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N) or as otherwise designated in Table 3-8.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, or which cause nuisance or which otherwise adversely affect beneficial uses.
Pesticides	Water designated for use as MUN shall not contain concentrations of pesticides in excess of the limiting concentrations specified in California Code of Regulations, Title 22, Table 64444-A of Section 64444 (Organic Chemicals), which is incorporated by reference into the Basin Plan. This incorporation by reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Basin Plan Table 3-7).
Polychlorinated Biphenyls (PCBs)	Pass-through or uncontrollable discharges to waters of the Region, or at locations where the waste can subsequently reach water of the Region, are limited to 70 mg/L (30-day average) for protection of human health and 14 mg/L and 30 mg/L (daily average) to protect aquatic life in inland fresh waters and estuarine waters, respectively.
Radionuclides	Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations, which is incorporated by reference into the Basin Plan. The incorporation by reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-9 in the Basin Plan).
Solid, Suspended, or Settleable Materials	Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.
Taste and Odor	Waters shall not contain taste or odor-producing substances in concentrations that produce undesirable tastes or odors to fish flesh or other edible aquatic resources, cause nuisance, or adversely affect beneficial uses.
Temperature	The natural receiving water temperature of regional waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses. Alterations that are allowed must meet the requirements below. For waters designated WARM, water temperature shall not be altered by more than 5 degrees Fahrenheit (°F) above the natural temperature. At no time shall these WARM-designated waters be raised above 80°F as a result of waste discharges. For waters designated COLD, water temperature shall not be altered by more than 5°F above the natural temperature.

Table 3-6 Los Angeles RWQCB Narrative Water Quality Objectives for Inland Surface Waters

Constituent Name	Narrative Objective
Toxicity	All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the RWQCB. The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, other control water. There shall be no acute toxicity in ambient waters, including mixing zones. The acute toxicity objective for discharges dictates that the average survival in undiluted effluent for any three consecutive 96-hour static or continuous flow bioassay tests shall be at least 90% with no single test having less than 70% survival when using an established EPA, State Board, or other protocol authorized by the RWQCB. There shall be no chronic toxicity in ambient waters, outside mixing zones. To determine compliance with this objective, critical life stage tests for at least three species with approved testing protocols shall be used to screen for the most sensitive species. The test species used for screening shall include a vertebrate, an invertebrate, and an aquatic plant. The most sensitive species shall then be used for routine monitoring. Typical endpoints for chronic toxicity tests include hatchability, gross morphological abnormalities, survival, growth, and reproduction. Effluent limits for specific toxicants can be established by the RWQCB to control toxicity identified under Toxicity Identification Evaluations.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits: • Where natural turbidity is between 0 and 50 nephelometric turbidity units (NTU), increases shall not exceed 20%. • Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%. Allowable zones of dilution within which higher concentrations may be tolerated may be defined for each discharge in specific WDRs.

Table 3-7 Santa Ana RWQCB Narrative Water Quality Objectives for Inland Surface Waters

Constituent Name	Narrative Objective
Algae	Waste dischargers shall not contribute to excessive algal growth in inland surface receiving waters.
Ammonia, Un-ionized	To prevent chronic toxicity to aquatic life in the SAR, Reaches 2, 3, and 4, Chino Creek, Mill Creek (Prado Area), Temescal Creek, and San Timoteo Creek, discharges to these water bodies shall not cause the concentration of un-ionized ammonia (as nitrogen) to exceed 0.098 mg/L (NH_3-N) as a 4-day average.
Bacteria, Coliform	MUN: Total coliform: less than 100 organisms/100 milliliters (mL). REC-1: Fecal coliform: log mean less than 200 organisms/100 mL based on 5 or more samples/30 day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period. REC-2: Fecal coliform: average less than 2,000 organisms/100 mL and not more than 10% of samples exceed 4,000 organisms/100 mL for any 30-day period.
Boron	Boron concentrations shall not exceed 0.75 mg/L in inland surface waters of the region as a result of controllable water quality factors.
Chemical Oxygen Demand (COD)	Waste discharges shall not result in increases in COD levels in inland surface waters that exceed the values shown in Table 4-1 of the Basin Plan or that adversely affect beneficial uses.
Chlorides	The chloride objectives listed in Table 4-1 of the Basin Plan shall not be exceeded as a result of controllable water quality factors.
Chlorine, Residual	To protect aquatic life, the chlorine residual in wastewater discharged to inland surface waters shall not exceed 0.1 mg/L.
Color	Waste discharges shall not result in coloration of the receiving waters that causes a nuisance or adversely affects beneficial uses. The natural color of fish, shellfish, or other inland surface water resources used for human consumption shall not be impaired.
Oxygen, Dissolved	The dissolved oxygen content of surface waters shall not be depressed below 5.0 mg/L for waters designated WARM, or 6.0 mg/L for waters designated COLD, as a result of controllable water quality factors. In addition, waste discharges shall not cause the median dissolved oxygen concentration to fall below 85% of saturation or the 95^{th} percentile concentration or fall below 75% of saturation within a 30-day period.
Floatables	Waste discharges shall not contain floating materials, including solids, liquids, foam, or scum, which cause a nuisance or adversely affect beneficial uses.
Fluoride	Fluoride concentrations shall not exceed values specified in the Basin Plan for inland surface waters designated MUN as a result of controllable water quality factors.
Hardness	The objectives listed in Table 4-1 of the Basin Plan shall not be exceeded as a result of controllable water quality factors. If no hardness objective is listed in Table 4-1, the hardness of receiving waters used for MUN shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.
pH	The pH of inland surface waters shall not be raised above 8.5 or depressed below 6.5 as a result of controllable water quality factors.
Metals	The equations listed in the Basin Plan represent the applicable Site-Specific Water Quality Objectives.

Table 3-7 Santa Ana RWQCB Narrative Water Quality Objectives for Inland Surface Waters

Constituent Name	Narrative Objective
Methylene Blue-Activated Substances (MBAS)	MBAS concentrations shall not exceed 0.05 mg/L in inland surface waters designated MUN as a result of controllable water quality factors.
Nitrate	Nitrate-nitrogen concentrations shall not exceed 45 mg/L (as NO_3) or 10 mg/L (as N) in inland surface waters designated MUN as a result of controllable water quality factors.
Nitrogen, Total Inorganic	The objectives in Table 4-1 of the Basin Plan shall not be exceeded as a result of controllable water quality factors.
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other material in concentrations that result in a visible film or in coating objects in the water, or that cause a nuisance or adversely affect beneficial uses.
Radioactivity	Radioactivity materials shall not be present in waters of the region in concentrations that are deleterious to human, plant, or animal life. Waters designated MUN shall meet the limits specified in Title 22 of the California Code of Regulations and listed in the Basin Plan.
Sodium	The sodium objectives listed in Basin Plan Table 4-1 shall not be exceeded as a result of controllable water quality factors.
Solids, Suspended and Settleable	Inland surface waters shall not contain suspended or settleable solids in amounts that cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors.
Sulfate	The objectives listed in Table 4-1 of the Basin Plan shall not be exceeded as a result of controllable water quality factors.
Sulfides	The dissolved sulfide content of inland surface waters shall not be increased as a result of controllable water quality factors.
Surfactants (surface-active agents)	Waste discharges shall not contain concentrations of surfactants that result in foam in the course of flow or use of the receiving water, or which adversely affect aquatic life.
Taste and Odor	The inland surface waters of the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations that cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish, or other regional inland surface water resources used for human consumption shall not be impaired.
Temperature	The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses. The temperature of waters designated COLD shall not be increased by more than 5°F as a result of controllable water quality factors. The temperature of waters designated WARM shall not be raised above 90°F June through October or above 78°F during the rest of the year as a result of controllable water quality factors. Lake temperatures shall not be raised more than 4°F above established normal values as a result of controllable water quality factors.
Dissolved Solids, Total (Total Filtrable Residue)	The dissolved mineral content of the waters of the region, as measured by the total dissolved solids test (Standard Methods for the Examination of Water and Wastewater, 16th Ed., 1985: 209B (180 °C), p. 95) shall not exceed the specific objectives listed in Table 4-1 as a result of controllable water quality factors.

Table 3-7 Santa Ana RWQCB Narrative Water Quality Objectives for Inland Surface Waters

Constituent Name	Narrative Objective
Toxic Substances	Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels that are harmful to human health. The concentration of contaminants in waters that are existing or potential sources of drinking water shall not occur at levels that are harmful to human health. The concentration of toxic pollutants in the water column, sediments, or biota shall not adversely affect beneficial uses.
Turbidity	Increases in turbidity that result from controllable water quality factors shall comply with the following: *Natural Turbidity* — *Maximum Increase* 0-50 NTU — 20% 50-100 NTU — 10 NTU *Greater than* 100 NTU — 10%

Table 3-8 Los Angeles RWQCB Numeric Water Quality Objectives

Watershed/Stream Reach[3]	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)
San Antonio Creek[4]	225	25	6

Table 3-9 Santa Ana RWQCB Numeric Water Quality Objectives

Inland Surface Stream	Total Dissolved Solids (mg/L)	Hardness (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Total Inorganic Nitrogen (mg/L)	Sulfate (mg/L)	Chemical Oxygen Demand (mg/L)
San Antonio Creek	225	150	20	6	4	25	5
Day Creek	200	100	15	4	4	25	5
East Etiwanda Wash	200	100	15	4	4	25	5
San Sevaine	200	+	+	+	+	+	+
Deer	200	+	+	+	+	+	+

+ Numeric objectives have not been established; narrative objectives apply

[3] All reference to watersheds, streams, and reaches include all tributaries. WQOs are applied to all waters tributary to those specifically listed in the table.

[4] This watercourse is primarily located in the Santa Ana region. The WQOs for this stream have been established by the Santa Ana RWQCB.

3.3.2 Groundwater Quality Objectives/Standards and Beneficial Uses

Beneficial uses for groundwater for the Los Angeles and Santa Ana RWQCBs jurisdictions are designated in their Basin Plans. Likewise, groundwater quality objectives for the Los Angeles RWQCB and Santa Ana RWQCB are also designated in their Basin Plans. The Santa Ana RWQCB and Los Angeles RWQCB have designated narrative and numeric groundwater quality objectives. Table 3-10 summarizes beneficial uses for groundwater. Tables 3-11 through 3-13 summarize the narrative and numeric groundwater objectives applicable within the proposed project boundary.

Table 3-10 Groundwater Beneficial Uses

RWQCB	Groundwater Management Zone	MUN	AGR	IND	PROC
Los Angeles	The basin plan indicates that groundwater quality objectives are applicable to all waters with the beneficial use of Groundwater Recharge.				
Santa Ana	Chino: (North “maximum benefit;” Chino 1 – “antidegradation;” Chino 2 – “antidegradation;” Chino 3 – “antidegradation;” Chino East; and Chino South)	•	•	•	•
	Rialto	•	•	•	•
	San Timoteo	•	•	•	•
	Yucaipa	•	•	•	•
	Arlington	•	•	•	•
	Riverside (A, B, C, D, E and F)	•	•	•	•
	Bunker Hill (A and B)	•	•	•	•
	Colton	•	•	•	•

Table 3-11 Water Quality Objectives for Groundwaters in the Santa Ana RWQCB

Constituent	Water Quality Objectives for Groundwater
Arsenic	Arsenic concentrations shall not exceed 0.05 mg/L in groundwater designated MUN as a result of controllable water quality factors.
Bacteria	Total coliform numbers shall not exceed 2.2 organisms/100 mL median over any 7-day period in groundwaters designated MUN as a result of controllable water quality factors.
Barium	Barium concentrations shall not exceed 1.0 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Boron	Boron concentrations shall not exceed 0.75 mg/L in groundwaters of the region as a result of controllable water quality factors.

Table 3-11 Water Quality Objectives for Groundwaters in the Santa Ana RWQCB

Constituent	Water Quality Objectives for Groundwater
Chloride	Chloride concentrations shall not exceed 500 mg/L in groundwaters of the region designated as MUN as a result of controllable water quality factors.
Color	Waste discharges shall not result in coloration of the receiving waters which causes a nuisance or adversely affects beneficial uses.
Cyanide	Cyanide concentrations shall not exceed 0.2 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Dissolved Solids, Total (Total Filtrable Residue)	The dissolved mineral content of the waters of the region, as measured by the total dissolved solids test (Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998: 2540C (180 °C), p. 2-56), shall not exceed the specific objectives listed in Table 4-1 as a result of controllable water quality factors.
Fluoride	Fluoride concentrations shall not exceed 1.0 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Hardness	The hardness of receiving waters used for MUN shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.
Metals	Metal concentrations shall not exceed the values listed in the Basin Plan in groundwaters designated MUN as a result of controllable water quality factors.
Methylene Blue Active Substances (MBAS)	MBAS concentrations shall not exceed 0.05 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Nitrate	Nitrate-nitrogen concentrations listed in Table 4-1 of the Basin Plan shall not be exceeded as a result of controllable water quality factors.
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other materials in concentrations that cause a nuisance or adversely affect beneficial uses.
pH	The pH of groundwater shall not be raised above 9 or depressed below 6 as a result of controllable water quality factors.
Radioactivity	Radioactivity materials shall not be present in the waters of the region in concentrations that are deleterious to human, plant, or animal life. Groundwaters designated MUN shall meet the limits specified in Title 22, California Code of Regulations and as listed in the Basin Plan.
Sodium	Groundwaters designated AGR shall not exceed the sodium absorption ratio of 9 as a result of controllable water quality factors.
Sulfate	Sulfate concentrations shall not exceed 500 mg/L in groundwaters of the region designated MUN as a result of controllable water quality factors.
Tastes and Odors	The groundwaters of the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations that cause a nuisance or adversely affect beneficial uses.
Toxic Substances	All waters of the region shall be maintained free of substances in concentrations that are toxic, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Table 3-12 Santa Ana RWQCB Groundwater Management Zone Water Quality Objectives (mg/L)

Groundwater Management Zone	Total Dissolved Solids	Hardness	Sodium	Chloride	Nitrate as Nitrogen	Sulfate
Bunker Hill - A	310	--	--	--	2.7	--
Bunker Hill - B	330	--	--	--	7.3	--
Chino – North “maximum benefit”[5]	420	--	--	--	5.0	--
Chino 1 – “antidegradation”	280	--	--	--	5.0	--
Chino 1 – “antidegradation”	250	--	--	--	2.9	--
Chino 1 – “antidegradation”	260	--	--	--	3.5	--
Chino – East	730	--	--	--	10.0	--
Chino - South	680	--	--	--	4.2	--
Rialto	230	--	--	--	2.0	--
San Timoteo “maximum benefit”	400	--	--	--	5.0	--
San Timoteo “antidegradation”	300	--	--	--	2.7	--
Yucaipa “maximum benefit”	370	--	--	--	5.0	--
Yucaipa “antidegradation”	320	--	--	--	4.2	--
Riverside - A	560	--	--	--	6.2	--
Riverside – B	290	--	--	--	7.6	--
Riverside – C	380	--	--	--	8.3	--
Riverside – D	810	--	--	--	10.0	--
Riverside – E	720	--	--	--	10.0	--
Riverside - F	660	--	--	--	9.5	--

[5] “Maximum benefit” objectives apply unless RWQCB determines that lowering of water quality is not of maximum benefit to the people of the state; in that case, “antidegradation” objectives apply (for Chino North, antidegradation objectives for Chino 1, 2, 3 would apply if maximum benefit is not demonstrated).

Table 3-13 Regional Objectives for Groundwaters in the Los Angeles RWQCB

Constituent	Water Quality Objectives for Groundwater
Bacteria	In groundwaters used for domestic or municipal supply, the concentration of coliform organisms over any 7-day period shall be less than 1.1/100 mL.
Chemical Constituents	Groundwaters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use.
Mineral Quality	Numerical mineral quality objectives for individual groundwater basins shall comply with the WQOs listed in Table 3-10 of the Basin Plan.
Nitrogen (Nitrate, Nitrite)	Groundwaters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen, 45 mg/L as nitrate, 10 mg/L as nitrate-nitrogen, or 1 mg/L as nitrite-nitrogen.
Tastes and Odor	Groundwaters shall not contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.
Toxic Substances	All waters of the region shall be maintained free of substances in concentrations that are toxic, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

3.4 Existing Water Quality

3.4.1 Regional Water Quality

California's Porter-Cologne Water Quality Control Act and the federal CWA direct that water quality protection programs are implemented to protect and restore the chemical, physical, and biological integrity of the State's waters. California Assembly Bill (AB) 982 (Statutes of 1999) required the SWRCB to assess and report on the State's water quality monitoring programs. AB 982 envisioned that ambient monitoring would be independent of other water quality regulatory programs and serve as a measure of: (1) the overall quality of the State's water resources, and (2) the overall effectiveness of the prevention, regulatory, and remedial actions taken by the SWRCB and the nine RWQCBs. To implement this directive, modest funding for ambient surface water quality monitoring was allocated to the SWRCB (and thereby to the RWQCBs) beginning in State Fiscal Year 2000–2001. AB 982 also required the SWRCB to prepare a proposal for a comprehensive surface water quality monitoring program. That proposal, entitled Proposal for a Comprehensive Ambient Surface Water Quality Monitoring Program, was transmitted to the State Legislature on November 30, 2000.

Using the available funding, the SWRCB created the Surface Water Ambient Monitoring Program (SWAMP). SWAMP is intended to provide a measure of the

State's ambient water quality and the effectiveness of the State's water quality protection programs. SWAMP relies primarily on contractors, such as the University of California, the U.S. Geological Survey (USGS), and others, to collect information on the quality of the State's waters. The following sections summarize SWAMP monitoring activities conducted within the hydrologic units applicable to the I-10 Corridor Project.

The Santa Ana RWQCB conducted a 6-year study (2006 – 2011) of the waterways within the SAR watershed (Surface Water Ambient Monitoring Program 2014). The purpose of the study was to determine the integrity of surface waters by sampling the biological (i.e., benthic macroinvertebrates), physical (i.e., in-stream habitat, surrounding riparian habitats), and chemical attributes. During the 2011 bioassessment sampling events, benthic macroinvertebrates were identified from 45 locations. Of the 45 locations, 2 are close to the I-10 corridor as indicated in Table 3-14.

Table 3-14 Santa Ana River Watershed Sampling Sites

SWAMP Code	Stream Name	RWQCB Jurisdiction	Latitude NAD 83	Longitude NAD 83	Distance from I-10 Corridor	Elevation (meters)	Collection Date
801RB8566	Cucamonga Creek	Santa Ana	33.99743	-117.59924	5 miles south	216	6/15/11
801RB8629	San Timoteo	Santa Ana	33.95681	-117.0647	2 miles southwest	650	7/14/11

Biological assessments provide a more familiar representation of the ecological health of a particular location. Locations can then be ranked by values and classified into qualitative categories of "very good," "good," "fair," "poor," and "very poor." This system of ranking and categorizing biological conditions is referred to as an Index of Biotic Integrity (IBI). Water chemistry, IBI metrics, and the overall rating for the two locations within the SAR Watershed are provided in Appendix D. To summarize, the overall rating for Cucamonga Creek and San Timoteo Creek was "Poor."

The Los Angeles County Department of Public Works monitors the water quality of all watersheds within its jurisdiction in accordance with the Municipal Stormwater Permit. All available data and monitoring locations were reviewed to determine if any monitoring data was available near the project limits. The closest monitoring station is approximately 20 miles west of the project and is displayed in Table 3-15.

Table 3-15 Los Angeles County Department of Public Works Monitoring Station

Watershed Management Area	Monitoring Station	RWQCB Jurisdiction
San Gabriel River	S14	Los Angeles

A summary of constituents that did not meet applicable WQOs at the San Gabriel River mass emission station during the 2012-2013 Wet Weather Monitoring Season are presented in Appendix F and are summarized in a narrative form in the following sections.

Water Quality Constituents

E. coli concentrations were above the WQO of 235 most probable number (MPN)/100 mL during all five storm events monitored for bacteria. E. coli concentrations ranged from 1,842 to 127,400 MPN/100 mL. During wet weather high-flow periods, San Gabriel River is subject to a suspension of the REC-1 beneficial use (i.e., water contact recreation – full immersion). As a result of this suspension, two of the five wet weather events did not meet the E. coli WQO.

Cyanide concentrations were above the WQO of 0.022 mg/L during one storm event at the San Gabriel River. Cyanide concentrations ranged from nondetect to 0.031 mg/L.

pH was not within the WQO range of 6.5 to 8.5 pH units for one of the five wet weather samples collected at the San Gabriel River. The water sample collected during one event had a pH value slightly above the upper limit of the WQO range.

The dissolved copper concentration was above the hardness-based WQO for two of the five wet weather samples from the San Gabriel River. Dissolved copper concentrations ranged from 8.53 to 32.7 micrograms per liter (µg/L), whereas hardness ranged from 90 to 210 mg/L.

The dissolved zinc concentration was above the hardness-based WQO for one of the five wet weather samples from the San Gabriel River. Dissolved zinc concentrations ranged from 69.9 to 286 µg/L.

All other applicable WQOs in the San Gabriel River were met during the 2012-2013 wet weather monitoring season.

Water Column Toxicity

Water column toxicity monitoring was performed at the San Gabriel mass emission station. Two wet weather samples were analyzed for toxicity; dry weather samples could not be collected due to absence of flow. At the San Gabriel River, IC_{25}[6], IC_{50}[7], and NOEC[8] were 50, 85.7, and 50 percent, and the toxicity unit (TU) was greater than 1. The initial component of the toxicity identification evaluation (TIE)[9] process is to conduct a "baseline" test to determine the final TIE test dilutions. The baseline test conducted on this sample resulted in an NOEC of 100 percent and a TU[10] less than 1. The initial toxicity may have been caused by volatile compounds that dissipated to nontoxic levels prior to the baseline TIE; therefore, the TIE was not initiated.

Caltrans has conducted runoff monitoring and characterization studies from a range of transportation facilities throughout California. The monitoring has various objectives, such as complying with the NPDES permit requirements; producing representative and scientifically credible runoff data from Caltrans facilities; and providing useful information to facilitate Caltrans' stormwater management strategies.

As part of their runoff and characterization monitoring studies, Caltrans identified pollutants that were discharged from Caltrans facilities with a load or concentration that commonly exceeded allowable standards and were still considered treatable by currently available Caltrans-approved Treatment BMPs. These pollutants, designated as TDCs, include sediment; metals (i.e., total and dissolved fractions of zinc, lead, and copper); nitrogen (e.g., ammonia); phosphorus; and general metals. Of the chemical impairments and established TMDLs associated with receiving water bodies within the proposed project's corridor, cadmium, copper, lead, and zinc are considered TDCs (see Section 3.4.2); therefore, they are treatable by Caltrans-approved Treatment BMPs.[11] During the construction phase, Temporary Construction Site BMPs would be

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[6] IC_{25} – (Inhibition concentration) A point estimate of the toxicant concentration that would cause a 25 percent reduction in a nonlethal biological measurement.

[7] IC_{50} – A point estimate of the toxicant concentration that would cause a 50 percent reduction in a nonlethal biological measurement.

[8] NOEC – No observed effect concentration; the highest tested concentration of an effluent or toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation.

[9] TIE – (toxicity identification evaluation) – A set of site-specific procedures used to identify the specific chemical(s) causing effluent toxicity.

[10] TU – Toxicity Unit. A TU is defined in the NPDES Municipal Permit as 100 divided by the calculated median test response (e.g., LC50). A TU value greater than or equal to 1 is considered substantially toxic and requires a Phase I TIE.

[11] Caltrans-approved Treatment BMPs include biofiltration systems, infiltration devices, detention devices, dry weather flow diversions, gross solid removal devices, multi-chambered treatment trains, wet basins, traction sand traps, and media filters.

implemented to treat stormwater and non-stormwater discharges to the Maximum Extent Practicable (MEP); therefore, runoff from the construction area would not likely create any surface water quality impacts. During the operational phase, runoff from the proposed project corridor would be conveyed to Caltrans-approved Treatment BMPs, would be treated to the MEP, and would not likely create any surface water quality impacts. Caltrans-approved Treatment BMPs and temporary Construction Site BMPs are considered project design features and are discussed in Section 4.5.1.

3.4.2 List of Impaired Waters

The drainage course of water from the proposed project to offsite areas was used to determine what water bodies could potentially be impacted by the project. Table 3-16 summarizes these water bodies by watershed, and lists the impairments and established TMDLs per the 2010 Integrated Report (Clean Water Act Section 303(d) List/305(b) Report) and the Caltrans Water Quality Planning Tool[12] (State Water Resources Control Board, 2011).

Table 3-16 Impaired Waters

Watershed	Water Body	Impairment	Source	Size (miles)	TMDL Status
Upper Santa Ana River	Santa Ana River Reach 4	Pathogens	Nonpoint	14.8	Required
Chino Creek	San Antonio Creek	pH	Unknown	23.29	Required
San Jose Creek	San Jose Creek Reach 2 (Temple to I-10 at White Avenue)	Coliform Bacteria	Point and Nonpoint Source	17.27	Required
Chino Creek	Cucamonga Creek Reach 1	Cadmium	Unknown	9.57	Required
		Coliform Bacteria	Unknown Point Source	9.57	Being addressed by an EPA-approved TMDL
		Copper	Unknown	9.57	Required
		Lead	Unknown	9.57	Required
		Zinc	Unknown	9.57	Required

3.4.3 Areas of Special Biological Significance

The project does not discharge to an Area of Special Biological Significance (ASBS).

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12 http://svctenvims.dot.ca.gov/wqpt/wqpt.aspx.

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Chapter 4 Environmental Consequences

4.1 Introduction

This section discusses the potential environmental effects related to water quality with implementation of the proposed project. Alternative 2 proposes to extend the existing HOV lane in each direction of I-10 from the current HOV terminus near Haven Avenue in Ontario to Ford Street in Redlands, a distance of 25 miles. Alternative 3 proposes to provide two Express Lanes in each direction of I-10 from the Los Angeles/San Bernardino county line to California Street in Redlands and one Express Lane in each direction from California Street to Ford Street in Redlands, a total of 33 miles. The proposed concept drainage system will maintain the existing drainage patters. Existing facilities will be either protected in place, reconstructed, or extended to the limits of the widening.

Construction and operation of the project has the potential to affect water quality. BMPs would be evaluated and implemented to address potential impacts during the construction and operational phases. A discussion regarding the potential impacts to water quality, along with the implementation of temporary (i.e., construction phase) and project design features, such as Design Pollution Prevention BMPs and Permanent (post-construction) BMPs, is provided in the following sections.

4.2 Potential Impacts to Water Quality

It is anticipated that construction of the proposed project and an increase in impervious surface areas associated with both alternatives would affect downstream water bodies. Construction of the project and the increase in runoff would potentially cause or contribute to an alteration in water quality and have the potential to affect the beneficial use of the water bodies within the project limits. Project construction and operation activities were reviewed for each alternative. The following discussion summarizes the results of each alternative’s potential to introduce pollutants into the environment, with a particular focus on stormwater runoff.

4.2.1 Anticipated Changes to the Physical/Chemical Characteristics of the Aquatic Environment

Substrate

Substrate relates to the nonliving material or base on which an organism lives or grows. From a water quality perspective, this would pertain to habitats, refuges, and nesting sites of aquatic life. During the construction phase, potential impacts to substrate would be associated with sedimentation. Soil disturbance activities include earth-moving activities such as excavation and trenching, soil compaction and moving, cut and fill activities, and grading. Disturbed soils are susceptible to high rates of erosion from wind and rain, resulting in sediment transport via stormwater runoff from the project area. Anticipated changes associated with sediment transport to receiving water bodies would be a decrease in water clarity, which would cause a decrease in aquatic plant production, and obscure sources of food, habitat, refuges, and nesting sites of fish. The deposition of sediment or silt in a water body can fill gravel spaces in stream bottoms, smothering fish eggs and juvenile fish.

Operation of the proposed corridor would result in an increase in impervious surface areas, which could potentially increase stormwater runoff. Potential pollutants associated with the operation of transportation facilities include sediment from natural erosion; nutrients, such as phosphorus and nitrogen, associated with freeway landscaping; mineralized organic matter in soils; nitrite discharges from automobile exhausts and atmospheric fallout; litter; and metals from the combustion of fossil fuels, the wearing of brake pads, and corrosion of galvanized structures (Caltrans, 2010). Pollutants associated with the operational phase also have the potential to impact areas on which organisms live and grow.

It is not anticipated that either alternative would cause a change to sedimentation in receiving water bodies within the project area because the proposed project would result in a very minor increase in runoff compared to the entire hydrologic area. The proposed slopes within the project would be stabilized with Temporary Construction BMPs, such as erosion and sediment control measures during construction, and with Design Pollution Prevention BMPs, such as slope/surface protection systems once the project is complete.

Currents, Circulation, or Drainage Patterns

Construction of either build alternative would generally impact existing drainage areas and streams by altering the natural flow patterns through the addition of impervious surface area and variations in contributing drainage area. The impacts would modify the natural timing of drainage in the watershed through changes in the time required for runoff to reach local streams and changes in peak runoff rates and runoff volumes.

A Conceptual Drainage Report (Parsons, 2014) evaluated potential impacts of the build alternatives on existing hydrology in local and regional drainage areas. The proposed project’s drainage design would maintain the existing drainage patterns.

Where possible, the existing facilities would be protected in place and others would either be reconstructed or extended to the limits of the widening. The roadway widening would also require relocation of existing inlets to the new edge of pavement. If feasible, storm drain laterals shall be protected in place to prevent unnecessary pavement cuts. Capping the existing inlets can be an alternative to complete removal and/or reconstruction. For information regarding changes to flow, volume, rate, depth, and seasonal changes, see the Drainage Report for this project.

Suspended Particulates (Turbidity)

Sediment is likely to occur as a result of constructing and operating the proposed project. Some pollutants can create turbidity in water bodies, which blocks light transmission and penetration, reduces oxygen levels, affects the food chain, and creates changes in water temperature; therefore, the turbidity in receiving water bodies may increase due to the additional impervious surface areas associated with each alternative. Moreover, sediment would be exposed in disturbed areas during roadway demolition and structure construction.

Oil, Grease, and Chemical Pollutants

Construction materials, waste handling, and the use of construction equipment could also result in stormwater contamination and affect water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination. Operation of vehicles during construction could also result in tracking of dust and debris. Staging areas can also be sources of pollutants because of the use of paints, solvents, cleaning agents, and materials containing metals that are used during construction. Pesticide use, including herbicides, fungicides, and rodenticides, associated with site preparation is another potential source of stormwater contamination. Larger pollutants, such as trash, debris, and organic matter, could also be associated with construction activities. As such, the discharge of stormwater may cause or threaten to cause violations of WQOs. These pollutants would occur in the stormwater discharges and non-stormwater discharges and could potentially cause chemical degradation and aquatic toxicity in the receiving waters.

Operation of the proposed project would result in an increase in impervious surface areas, which could potentially increase stormwater runoff. Potential pollutants associated with the operation of transportation facilities include sediment from natural erosion; nutrients, such as phosphorus and nitrogen, associated with freeway landscaping; mineralized organic matter in soils; nitrite discharges from automobile exhausts and atmospheric fallout; litter; and metals from the combustion of fossil fuels, the wearing of brake pads, and corrosion of galvanized structures (Caltrans, 2010).

Temperature, Oxygen Depletion, and Other Parameters

The proposed build alternatives would include freeway landscaping during the construction phase and landscape maintenance during the operational phase. The landscaping may require the application of fertilizers to promote vegetation establishment and maintenance; therefore, the nutrients associated with the fertilizers may cause oxygen depletion and an increase in ambient water body temperatures.

Flood Control Functions

For flood control facilities that would be modified, those facilities would be designed per project design criteria. Specifically, the proposed project would be designed to discharge to regional facilities or the local storm drain system and outlet to the receiving water bodies. All transitions between culvert outlets, headwalls, wingwalls, and channels would be smoothed to reduce turbulence and scour. Where appropriate, energy dissipation devices would be used. Offsite runoff would be handled by allowing flows to pass under or around the proposed facility. Offsite flows would be managed in a manner that would mimic the existing drainage network and would not inundate the roadway surface or any of the existing drainage system. The regional channel depths would not be measurably altered by either build alternative (Parsons, 2014).

Storm, Wave, and Erosion Buffers

Wetlands may serve as buffer zones, shielding upland areas from wave actions, storm damage, and erosion, per 40 CFR § 230.41. Per the Natural Environment Study (NES) developed for this project, no wetlands exist within the project corridor. Given that the project is being developed in an urban environment, project design features, such as Design Pollution Prevention BMPs discussed in Section 4.5, would be implemented to minimize erosion due to storm damage.

Erosion and Accretion Patterns

Under existing conditions, runoff and sediment discharges in a reach are in a state of equilibrium and a value can be applied to the ratio of the runoff and sediment hydrograph volumes. Under conditions that would occur as a result of either build alternative, sediment yield from the road would be negligible, because it would be paved, and final design and construction criteria includes cut and fill slopes, which would be revegetated after construction so that they would not provide additional sources of sediment. Alternative induced increases or decreases in sediment transport for a local watershed are based primarily on the grading of the build alternatives and the subsequent rerouting or diversion of flows. The project would be designed such that the proposed drainage system would maintain existing drainage patterns.

Aquifer Recharge/Groundwater

During construction, aquifer recharge or groundwater supply resulting from either alternative may be impacted if dewatering is necessary. Dewatering activities for excavations below the water table could result in the discharge of unsuitable and untreated water if discharged directly to the environment. If temporary excavations require dewatering, the project would comply with the Los Angeles RWQCB’s Dewatering Permit Order, which is identified as R4-2013-0095 (NPDES No.CAG994004), and/or the Santa Ana RWQCB’s Dewatering Permit Order, which is identified as R8-2005-0041 (NPDES NO. CAG998001).

During the operational phase, the addition of impervious surfaces as a result of implementation of the build alternatives would not interfere with groundwater recharge because the proposed project area is not located in an area used by local water districts for aquifer recharge. Recharge to the subbasins is predominantly accomplished at spreading grounds located outside of the proposed project area.

Baseflow

According to the Department of Water Resources (June 2014), depth to groundwater for some of the areas within the project corridor ranges from 50 to 100 feet below ground surface. USGS monitors stream flow conditions for the two receiving water bodies within the project corridor. Information provided by USGS is summarized in Table 4-1. Based on the USGS data, baseflow would have to be considered when conducting a Unit Hydrograph Analysis for a catchment, and changes in baseflow are anticipated with implementation of either build alternative. For the remaining areas within the project corridor, changes in baseflow are not anticipated with implementation of either build alternative.

Table 4-1 USGS Stream Flow Data

Stream	Discharge (cfs)	Stage (feet)
Santa Ana River at E Street	0.29	2.49
San Timoteo Creek near Loma Linda	1.9	1.01

4.2.2 Anticipated Changes to the Biological Characteristics of the Aquatic Environment

Special Aquatic Sites

Per 40 CFR Subpart E § 230.40-45, special aquatic sites include sanctuaries and refuges, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes. Vegetation communities, such as freshwater marsh, southern willow scrub, and mule fat scrub, are considered vegetated shallows. According to the NES, there would be temporary impacts to southern willow scrub and mule fat scrub (Table 4-2).

Table 4-2: Temporary Project Impacts to Riparian Vegetation Communities

Riparian Habitat Type	Alternative 2 Impacts (Acres)	Alternative 3 Impacts (Acres)
Southern Willow Scrub	0.06	0.08
Mule Fat Scrub	0.55	0.54

The temporary changes during construction may be due to minimal encroachment. During operation of the proposed project, the increase in impervious surfaces would cause an increase in stormwater discharge to special aquatic sites.

Habitat for Fish and Other Aquatic Organisms

Alternatives 2 and 3 were evaluated for the potential change they may cause to the habitat of fish and other aquatic organisms. Within the BSA, no suitable fish habitat was found. Minimally suitable habitat was identified for species that are dependent on the aquatic environment, such as the orange-throated whiptail. The NES states that Alternatives 2 and 3 would result in 0.56 and 1.53 acres of temporary impacts to USACE jurisdictional areas, respectively. There would be no permanent impacts to USACE jurisdictional areas given implementation of either alternative (Caltrans, 2014a). Impacts to Waters of the State and CDFW jurisdictional areas include 2.11 acres of temporary impacts and 0.47 acre of permanent impacts for Alternative 2. Alternative 3 would result in 3.05 acres of temporary impacts and 10.61 acres of permanent impacts. After construction of the proposed project, the increase in impervious surface area may result in an increase in stormwater discharge to the aquatic organisms' habitat and could result in higher concentrations of pollutants of concern depending on the effectiveness and type of BMPs and/or project design features employed along the corridor.

Fish Passage (Beneficial Uses)

According to the NES, there are no federal fisheries and no essential fish habitat within the BSA.

Wildlife Habitat

According to the NES, the proposed project's alternatives would result in permanent changes to riparian vegetation communities due to the disturbance and/or removal of existing vegetation and the construction of piling or footing locations below the ordinary high water mark (OHWM). Permanent indirect changes include bridge shading from full-span bridges over riparian habitat. Temporary changes associated with equipment access are anticipated; however, staging and equipment access are proposed outside of other jurisdictional areas. Temporary impacts to drainage features impacted by the project would be restored to their existing form and function after construction has been completed.

Wildlife Passage (Beneficial Uses)

Within the project area, several streams cross I-10, but all of them have been channelized. Even though these streams form a conduit across the entire urban landscape, their channelization limits wildlife interaction. Many of the channels, such as Day Creek Channel and Lower Deer Creek Channel, are completely concrete-lined and have vertical sidewalls greater than 15 feet in height and no natural vegetation to provide cover. Animal species using such features for movement would be very visible and exposed. Concrete channels with no vegetative cover are not considered to be adequate for wildlife movement. Some of the smaller streams in the east end of the project area, such as Mission Creek Channel and Zanja Creek Channel, are natural bottom streams that contain varying amounts of ruderal vegetation and are more conducive to wildlife movement (Caltrans, 2014a).

The Santa Ana River, the largest of these stream corridors, is approximately 600 feet wide within a distance of 0.75 mile through the project area. The channel is concrete-lined with trapezoidal concrete sides within the immediate vicinity of I-10, but to the north and south, the river is natural bottom with concrete sides. Natural vegetation occurs approximately 0.1 mile upstream and 0.3 mile downstream of I-10, but the river immediately near I-10 is sparse and devoid of substantial vegetative growth that could provide cover. Due to the extensive urban environment surrounding the project corridor, and because larger mammals such as deer are sensitive to the presence of urban environments, most wildlife use within the river across the project corridor is expected to be small- to medium-sized mammal species, riparian birds, common reptiles, and common amphibian species(Caltrans, 2014a).

The widening of the I-10 corridor may not cause a change to any wildlife movement that may occur within the streams, creeks, channels, and rivers because there is already a minimal amount of wildlife movement due to the extensive urban environment surrounding the project corridor.

Endangered or Threatened Species

The proposed project is not expected to directly or indirectly cause a change to any aquatic endangered or threatened species.

Invasive Species

Twelve (12) exotic plants on the California Invasive Plant Council's (Cal-IPC) California Invasive Plant Inventory were identified in the BSA. The project has the potential to spread invasive species to adjacent native habitat in the BSA by: (1) the activity of construction vehicles that enter and exit the project area; (2) the inclusion of invasive species in seed mixtures and mulch; and (3) the improper removal and disposal of invasive species such that seed spreads along the roadway. In compliance with Executive Order 13112, a weed abatement program would be developed to minimize the importation of non-native plant material during and after construction, and eradication strategies would be implemented should an infestation occur. Measures addressing invasive species abatement and eradication would be included in the project design and contract specifications, and they are provided in the Draft NES developed for this project (Caltrans, 2014a).

4.2.3 Anticipated Changes to the Human Use Characteristics of the Aquatic Environment

Existing and Potential Water Supplies; Water Conservation

The proposed project is not sited in a location used by a local water district for existing or potential water supplies, or water conservation; therefore, no changes to existing water supplies, potential water supplies, or water conservation are anticipated.

Recreational or Commercial Fisheries

No known commercial fishing is permitted in the receiving water bodies within the proposed project boundary; therefore, no changes to commercial fishing are anticipated. A Community Impact Assessment (Parsons, 2014c) was completed for the proposed project. This report identified 39 public parks, 34 public schools with recreation areas, and 4 trails within 0.5 mile of the existing I-10 corridor. Based on the facilities identified, the Santa Ana River Trail is the only facility located near a water resource; the Santa Ana River Trail is immediately east of the Santa Ana River. No changes are anticipated to the public's use of the Santa Ana River for recreational fishing because closure of the Santa Ana River Trail would only occur for brief, temporary periods during evening hours when the trail is normally closed (Parsons, 2014d).

The Orange Blossom Trail (OBT) is a Redlands City trail that will ultimately run west to east throughout much of the city. Currently, only two short segments of the trail have been constructed. Both existing segments are south of the project area. In the near future, construction would begin on the western segment of the OBT from Mountain View Avenue in the west to California Street in the east. Thereafter, the City intends to construct an additional eastern segment of the OBT from 6th Street in the west to Wabash Avenue in the east (Parsons, 2014d). The OBT would run along Mission Creek Channel, which is earthen with scattered riprap and a few patches of vegetation.

Outside bridge widening on both sides of the bridge above the proposed western segment of the OBT are proposed under Alternatives 2 and 3. If constructed prior to the I-10 widening, Alternatives 2 and 3 would require a temporary closure and detour of the western segment of the OBT to widen the I-10 mainline bridge, which covers the OBT trail (Parsons, 2014d). Therefore, changes would be anticipated for the public's use of Mission Creek Channel for recreational fishing.

Other Water Related Recreation

Based on current information (Parsons, 2014c), other water-related recreation (i.e., passive recreation such as birding, biking, and walking) has been identified for some of the receiving water bodies within the project corridor. No changes to the public's use of these water bodies for birding, walking, and biking are anticipated during construction because closure is only proposed for the Santa Ana River Trail. The closure, however, would only occur for brief, temporary periods during evening hours when the trail is normally closed (Parsons, 2014d).

If the OBT is constructed prior to the I-10 widening, Alternatives 2 and 3 would require a temporary closure and detour of the western segment of the OBT (Parsons, 2014d). Therefore, changes would be anticipated for the public's use of the OBT for birding, walking, and biking.

Aesthetics of the Aquatic Ecosystem

According to the NES, the proposed project would have direct permanent changes during construction to the aesthetics of the aquatic ecosystem through the disturbance and/or removal of existing riparian vegetation. After the proposed project is constructed, the remaining riparian vegetation would not be impacted by operation of the proposed project.

Parks, National and Historic Monuments, National Seashores, Wild and Scenic Rivers, Wilderness Areas

If the OBT is constructed prior to the I-10 widening, Alternatives 2 and 3 would require a temporary closure and detour of the western segment of the OBT (Parsons, 2014d). Therefore, changes would be anticipated for the public's use of the OBT. No national and historic monuments, national seashores, wild and scenic rivers, or wilderness areas would be impacted by construction or operation of the proposed project.

Traffic/Transportation Patterns

Under Alternatives 2 and 3, brief, temporary closures of the Santa Ana River Trail would be necessary to widen three I-10 mainline bridges that cross over the trail. The proposed trail closure would occur from South E Street to South Mount Vernon Avenue in Colton along the Santa Ana River Trail. The duration of occupancy would be temporary, no changes would occur to the protected resource, and the land would be fully restored to pre-project conditions (Parsons, 2014).

Service vehicles are permitted near the aquatic environment. During construction of the proposed project, service vehicle access may be impacted. During operation of the proposed project, it is not anticipated that traffic and transportation patterns would be impacted.

Energy Consumption or Generation

No energy consumption or generation uses in the aquatic environment would be impacted by the proposed project during construction or post-construction operation.

Navigation

None of the receiving water bodies within the proposed project area are considered navigable. No changes to navigation are anticipated because of construction or long-term operation of the proposed project.

Safety

Construction of the proposed project may cause changes to human safety within the aquatic environment. After construction of the proposed project, it is not anticipated that changes to safety would occur based on current information.

4.2.4 Short-Term Impacts during Construction

During construction, the total disturbed soil area for the proposed project is estimated to be 346 acres for Alternative 2 and 661 acres for Alternative 3, and would include the following elements:

- Mainline Improvements
- Interchange Improvements
- Local Street Improvements
- Structure Improvements
- Drainage Improvements

The following sections summarize the short-term impacts of Alternatives 2 and 3 to the physical/chemical characteristics, biological characteristics, and human use characteristics of the aquatic environment.

Physical/Chemical Characteristics of the Aquatic Environment

Construction of the proposed corridor has the potential to contribute pollutants to receiving water bodies. These pollutants include sediment and silt, associated with soil disturbance because of construction of the proposed corridor, and chemical pollutants associated with the construction materials that are brought onto the project site.

Soil disturbance activities include earth-moving activities such as excavation and trenching, soil compaction and moving, cut and fill activities, and grading. Disturbed soils are susceptible to high rates of erosion from wind and rain, resulting in sediment transport via stormwater runoff from the project area. Chemical contaminants, such as oils, fuels, paints, solvents, nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported to downstream drainages and ultimately into collecting waterways, contributing to the chemical degradation of water quality.

Some pollutants can create turbidity in water bodies, which blocks light transmission and penetration, reduces oxygen levels, affects the food chain, and creates changes in water temperature.

Construction materials, waste handling, and the use of construction equipment could also result in stormwater contamination and affect water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination. Operation of vehicles during construction could also result in tracking of dust and debris. Staging areas can also be sources of pollutants because of the use of paints, solvents, cleaning agents, and metals during construction. Pesticide use, including herbicides, fungicides, and rodenticides, associated with site preparation is another potential source of stormwater contamination. Larger pollutants, such as trash, debris, and organic matter, could also be associated with construction activities. As such, the discharge of stormwater may cause or threaten to cause violations of WQOs. These pollutants would occur in the stormwater discharges and non-stormwater discharges and could potentially cause chemical degradation and aquatic toxicity in the receiving waters.

Biological Characteristics of the Aquatic Environment

Erosion and sedimentation could affect the biological characteristics of the aquatic environment through interference with photosynthesis; oxygen exchange; and the respiration, growth, and reproduction of aquatic species. Sediment transport to receiving water bodies could decrease water clarity, which causes a decrease in aquatic plant production and obscures sources of food, habitats, refuges, and nesting sites of fish. The deposition of sediment or silt in a water body can fill gravel spaces in stream bottoms, smothering fish eggs and juvenile fish. Sediment can also carry nutrients, such as nitrogen and phosphorus, which may cause algal blooms. Pesticides that attach to soil particles and enter waterways have the potential to bioaccumulate within the food chain, which ultimately could affect the aquatic ecosystems. The transport of other toxic pollutants into receiving water bodies may introduce subtle, sublethal changes in plant and wildlife gene structure, nervous system function, immune response, and reproductive rates, which ultimately affects species survival, population, and ecosystem structure (DWR, 2005). Other anticipated temporary impacts to the biological characteristics of the aquatic environment include minimal encroachment in special aquatic sites, equipment access below the OHWM, and equipment access along numerous isolated ephemeral channels.

Human Use Characteristics of the Aquatic Environment

Short-term impacts to human use characteristics of the aquatic environment include:

- Service vehicle access
- Public use recreation (i.e., fishing, birding, walking, and biking)
- Changes to human safety within the aquatic environment

4.2.5 Long-Term Impacts during Operation and Maintenance

Operation of the proposed project would result in an increase in impervious surface areas, which would result in an increase in stormwater runoff. Potential pollutants associated with the operation of transportation facilities include sediment from natural erosion; nutrients, such as phosphorus and nitrogen, associated with freeway landscaping; mineralized organic matter in soils; nitrite discharges from automobile exhausts and atmospheric fallout; litter; and metals from the combustion of fossil fuels, the wearing of brake pads, and corrosion of galvanized structures (Caltrans, 2010). Alternative 2 would add 51 acres of new impervious surface area, and Alternative 3 would add 140 acres of new impervious surface area. The following sections summarize the long-term impacts of Alternatives 2 and 3 to the physical/ chemical characteristics, biological characteristics, and human use characteristics of the aquatic environment.

Physical/Chemical Characteristics of the Aquatic Environment

The anticipated impacts to the physical/chemical characteristics of the aquatic environment associated with operation of the proposed project include the following:

- Proposed slopes may be a source of sedimentation in downstream substrates
- Pollutants associated with the new roadway may create turbidity in receiving water bodies
- Pollutants, such as oil and grease and other pollutants associated with operation of the proposed project, may impair downstream receiving water bodies
- Nutrients associated with chemicals used in freeway landscaping may cause oxygen depletion and increased temperatures in the aquatic environment

Biological Characteristics of the Aquatic Environment

The anticipated impacts to the biological characteristics of the aquatic environment associated with operation of the proposed project include the following:

- Accidental deposition of fill material, disturbance and/or removal of existing vegetation, encroachment, and increase in stormwater discharge to special aquatic sites.
- Increase in stormwater discharge to the aquatic organisms' habitat and higher concentrations of pollutants of concern because of the increase in impervious surface area.
- Impacts to wildlife habitat through the disturbance and/or removal of existing vegetation, including complete removal and heavy encroachment.
- Changes to aquatic temperatures associated with bridge shading from full-span bridges over riparian habitat.

Human Use Characteristics of the Aquatic Environment

No long-term impacts to the human use characteristics of the aquatic environment are anticipated.

4.3 Impact Assessment Methodology

The proposed project's alternatives were assessed for their potential impacts to the physical/chemical, biological, and human use characteristics in the aquatic environment during construction (short-term) and operation and maintenance (long-term). Potential short-term impacts were analyzed by determining the amount of Disturbed Soil Area (DSA) for each of the build alternatives. Potential long-term impacts were analyzed by determining the proposed additional impervious surface area for each of the build alternatives, as well as comparing the proposed total impervious surface area within the project area with the total watershed area. Because no improvements are proposed to I-10 in Alternative 1, no short-term impacts to the characteristics of the aquatic environment are expected. The proposed improvements for Alternatives 2 and 3 are similar, except the greater amount of DSA and net new Impervious Surface Area (ISA) associated with Alternative 3 and the cost to implement any avoidance, minimization, and mitigation measures would be greater with Alternative 3. Tables 4-2 and 4-3 summarize the construction (short-term) and operation and maintenance (long term) activities, respectively, that were evaluated for their potential impact on downstream water bodies for Alternatives 2 and 3. No unique impacts were identified for either alternative.

Table 4-2 Summary of Construction (Short-Term) Impacts to the Aquatic Environment

Summary of Impacts
Physical/Chemical Characteristics
Excavation and trenching, soil compaction and moving, cut and fill activities, and grading could contribute sediment to downstream receiving water bodies.
Construction materials, waste handling, and the use of construction equipment could also result in stormwater contamination and affect water quality.
Chemical contaminants, such as oils, fuels, paints, solvents, nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported to downstream drainages and ultimately into collecting waterways contributing to the chemical degradation of water quality.
Biological Characteristics
Minimal encroachment in special aquatic sites.
Equipment access below the OHWM.
Equipment access along numerous isolated ephemeral channels.
Human Use Characteristics
Service vehicle access.
Public use recreation (i.e., fishing, birding, walking, and biking).
Changes to human safety within the aquatic environment.

Table 4-3 Summary of Operation/Maintenance (Long-Term) Impacts to the Aquatic Environment

Summary of Impacts
Physical/Chemical Characteristics
Proposed slopes may be a source of sedimentation in downstream substrates.
Pollutants associated with the new roadway may create turbidity in receiving water bodies.
Pollutants, such as oil and grease and other pollutants associated with operation of the proposed project, may impair downstream receiving water bodies.
Nutrients associated with chemicals used in freeway landscaping may cause oxygen depletion and increased temperatures in the aquatic environment.
Biological Characteristics
Accidental deposition of fill material.
Increase in stormwater discharge to the aquatic organisms' habitat and higher concentrations of pollutants of concern because of the increase in impervious surface area.
Impacts to wildlife habitat through the disturbance and/or removal of existing vegetation, including complete removal and heavy encroachment.
Changes to aquatic temperatures associated with bridge shading from full-span bridges over riparian habitat.
Human Use Characteristics
No long-term impacts to the human use characteristics of the aquatic environment are anticipated.

4.4 Alternative-Specific Impact Analysis

Table 4-4 displays the estimated temporary DSA for each build alternative within the proposed project corridor. Implementation of the SWPPP is expected to attenuate and minimize the amount of sediments released from the construction site. Short-term impacts caused by each of the build alternatives include potential increases in sediment loads because of removal of existing groundcover and disturbance of soil during grading. The temporary residual increase in sediment loads from construction areas is unlikely to alter the hydrologic response (i.e., erosion and deposition) downstream in the hydrologic subarea and, subsequently, the sediment processes in these areas would be reduced because all DSAs would be stabilized before completion of construction with permanent landscaping and/or permanent erosion control measures; therefore, with incorporation of Temporary and Permanent BMPs, no adverse impacts are expected with implementation of the proposed project.

Table 4-4 Temporary Disturbed Soil Area per Build Alternative

Alternative	2	3
Acres	346	661

Table 4-5 lists the watershed area for each HSA that would be potentially affected by the proposed Project. The area represented by each HSA is compared to the area of proposed total impervious surface area within the project limits. Based on the two alternatives proposed for the project, the maximum proposed impervious surface area contribution to each HSA is less than 1 percent.

Table 4-5 Estimated I-10 Corridor Project Contribution to the Watershed within the Project Limits

HSA	HSA Area (acres)	Proposed Total Impervious Surface Area per Alternative (acres)		Proposed Contribution to HSA per Alternative (%)	
		2	3	2	3
San Jose	6,639	0	0	0	0
Chino Split	190,515	0	14	0	0.01
Chino Split	190,515	341	612	0.18	0.32
Colton	17,765	142	161	0.80	0.91
Bunker Hill	124,791	238	253	0.19	0.20
Redlands	6,469	39	39	0.60	0.60
Reservoir	7,552	33	33	0.44	0.43
Yucaipa	7,729	0	0	0	0

Table 4-6 compares the existing and proposed impervious surface area for each of the build alternatives. Alternative 3 would add the most acreage (140 acres) of additional impervious surface area.

Table 4-6 Comparison of Existing and Proposed Impervious Surface Area per Alternative

Alternative	Existing Impervious Surface Area (acres)	Proposed Additional Impervious Surface Area (acres)	Total Impervious Surface Area (acres)
2	741	51	792
3	971	140	1,111

4.4.1 No Build Alternative

The proposed project would not be constructed under the No Build Alternative, but it would involve construction of other projects that have been defined in Section 4.5, Cumulative Impacts. Like Alternatives 2 and 3, these other projects would require implementing Temporary and Permanent BMPs to control potential pollutants during construction and operation. The amount of DSA during construction of these projects has not been determined for comparison to the build alternative because some of the proposed improvements for these projects are in the early planning phase and such information is not available at this time. Likewise, the tributary areas associated with these improvements are not available at this time for the same reasons. Regardless, the projects would include the implementation of BMPs to the maximum extent practicable.

4.4.2 Discharge of Highway Runoff on Surface Water Quality

During the construction phase, Construction Site BMPs would be implemented to treat stormwater and non-stormwater discharges to the maximum extent practicable; therefore, runoff from the construction area would not likely create any surface water quality impacts. During the operational phase, runoff from the proposed project corridor would be conveyed to Caltrans-approved Treatment BMPs, would be treated to the maximum extent practicable, and would not likely create any surface water quality impacts. Caltrans-approved Treatment BMPs and temporary Construction Site BMPs are considered project design features and are further discussed in the following section.

4.5 Project Design Features

Project design features for the selected alternative would include Construction Site, Maintenance, Design Pollution Prevention, and Treatment BMPs. These BMPs would be implemented to improve stormwater quality during construction and operation of the transportation facility to minimize potential stormwater and non-stormwater impacts to water quality. Caltrans' Statewide SWMP (Caltrans, 2003b) describes how Caltrans would comply with their Statewide NPDES Permit. The SWMP characterizes the program that Caltrans would implement to minimize the discharge of pollutants associated with storm drainage systems that serve highways, highway-related properties, facilities, and activities. Specifically, the SWMP identifies BMPs that shall be considered to meet the maximum extent practicable and the Best Available Technology Economically Available/Best Conventional Pollutant Control Technology (BAT/BCT) requirements and to address compliance with water quality standards. The BMPs are organized into four categories, as shown in Table 4-7.

Table 4-7 Caltrans BMP Categories

BMP	Description	Responsible Division for BMP Implementation
Construction Site BMP	Temporary soil stabilization and sediment control, non-stormwater management, and waste management	Division of Construction
Design Pollution Prevention BMP	Permanent soil stabilization and concentrated flow controls and slope protection systems, etc.	Division of Design
Treatment BMP	Permanent treatment devices and facilities	Divisions of Design, Construction, and Maintenance
Maintenance BMP	Litter pickup, toxics control, street sweeping, etc.	Division of Maintenance

Source: Caltrans, 2010.

Potential short-term water quality impacts associated with the construction phase would be minimized with the implementation of Construction Site BMPs. Potential long-term water quality impacts associated with operation and maintenance of the transportation facility would be minimized with the implementation of Maintenance, Design Pollution Prevention, and Treatment BMPs. Overall, with incorporation of temporary and permanent BMPs, no water quality impacts are expected with implementation of the proposed Project.

4.5.1 Construction Site BMPs

Construction Site BMPs would be applied during construction activities to minimize the pollutants in stormwater and non-stormwater discharges throughout construction. Construction Site BMPs would provide temporary erosion and sediment control, as well as control for potential pollutants other than sediment. Table 4-8 displays the six categories of Construction Site BMPs that Caltrans has identified as suitable for controlling potential pollutants on construction sites. Although specific Construction Site BMPs have not been identified, the following categories of BMPs would be implemented for the proposed project. Detailed information regarding the specific Construction Site BMPs associated with each category can be found in the Construction Site BMP Manual (Caltrans, 2003a).

Table 4-8 Construction Site BMP Categories

Category
Temporary Soil Stabilization
Temporary Sediment Control
Wind Erosion Control
Tracking Control
Non-Stormwater Management
Waste Management and Materials Pollution Control

Source: Caltrans, 2010.

Construction Site BMPs would be evaluated and identified through preparation of the SWDR and the SWPPP. The SWPPP would address all State and federal water quality control requirements and regulations. The SWPPP would address all construction-related activities, equipment, and materials that have the potential to affect water quality. The SWPPP would identify BMPs to minimize pollutants, sediment from erosion, stormwater runoff, and other construction-related impacts. In addition, the SWPPP would include a Construction Site Monitoring Program, which requires inspection and sampling and analysis procedures to ensure that the implemented Construction Site BMPs are effective in minimizing the exceedance of any water quality standard. The Construction Site BMPs identified in the SWPPP would be consistent; therefore, they would comply with the control practices required under the CGP.

4.5.2 Design Pollution Prevention BMPs

Design Pollution Prevention BMPs are permanent measures to minimize pollution discharges by retaining source materials and stabilizing soils. The three objectives associated with Design Pollution Prevention BMPs include maximizing vegetated surfaces; preventing downstream erosion; and stabilizing soil areas. These design objectives would be applied to the entire project. Without incorporation of Design Pollution Prevention BMPs, the project could affect downstream channel erosion processes, leading to increased channel scouring and sediment deposition through changes in peak discharges and runoff volumes. With implementation of Caltrans-approved Design Pollution Prevention BMPs, the runoff from the roadway would be attenuated and the pre-project flow regime would be maintained. Table 4-9 displays Caltrans-approved Design Pollution Prevention BMPs that would be incorporated, as appropriate, into the design of the proposed project.

Table 4-9 Design Pollution Prevention BMPs

Consideration of Downstream Effects Related to Potentially Increased Flow
Peak-Flow Attenuation Devices
Reduction of Paved Surface
Soil Modification
Energy Dissipation Devices
Preservation of Existing Vegetation
Concentrated Flow Conveyance Systems
Ditches, Berms, Dikes, and Swales
Overside Drains, Downdrains, Paved Spillways
Channel Linings
Flared Culvert End Sections
Outlet Protection/Velocity Dissipation Devices
Slope/Surface Protection Systems
Vegetated Surfaces
Slope Roughening, Terracing, Rounding/Stepping
Hard Surfaces

Source: Caltrans, 2010.

The following Design Pollution Prevention BMPs were identified as applicable to the proposed project and are discussed in the following subsections. As additional data becomes available during the PS&E process, other Design Pollution Prevention BMPs would be considered.

Consideration of Downstream Effects Related to Potentially Increased Flow

All transitions between culvert outlets, headwalls, wingwalls, and channels would be smoothed to minimize turbulence and scour. Offsite runoff would be handled by allowing flows to pass under or around the proposed project, and the existing drainage pattern would not be altered.

Offsite flows would be managed in a manner that would mimic the existing drainage network and not inundate the roadway surface or any of the existing drainage system. The proposed project would require evaluation of all drainages that would be affected, including those that are locally owned. Where possible, the runoff from all bridges would be conveyed to Treatment BMPs. No bridge runoff would be directly discharged into waterways.

Slope/Surface Protection Systems

The proposed project would modify existing slopes and create new slopes. The preservation of existing vegetation would be maximized to help minimize the amount of clearing and grubbing that would be required on slopes. To minimize concentrated flows, benches or terraces would be provided during original construction on high cut and fill slopes, and slopes would be rounded or shaped accordingly. Proposed slopes would generally be 4:1 (horizontal:vertical) or flatter. Disturbed slopes would be revegetated per the Erosion Control Plan, which would be approved by the District Landscape Architect.

Concentrated Flow Conveyance Systems

Because it would be necessary to direct or intercept surface runoff, the proposed project would modify ditches, dikes, berms, or swales. Risks because of erosion or washout would be minimized through the use of erosion control measures such as groundcover or mulch. Velocity dissipation devices, flared end outlets, headwalls, transition structures, and splash walls would be incorporated into the design, where necessary, at culvert inlets and outlets to prevent erosion. Ditches would be modified and box culverts would be extended to help intercept sheet flow, where necessary, and to convey it to facilities that cross under the roadway.

Preservation of Existing Vegetation

The project design would consider minimizing the footprint and matching the existing grading as close as possible to preserve as much of the existing vegetation as possible.

4.5.3 Treatment BMPs

Treatment BMPs are permanent measures that improve stormwater quality after construction is complete. Caltrans has approved nine Treatment BMPs for statewide use. These BMPs must be considered for the proposed project, pursuant to Section 4 of the Project Planning and Design Guide (Caltrans, 2010), to minimize the long-term potential impacts from Caltrans facilities or activities. Table 4-10 displays the Caltrans-approved Treatment BMPs.

Table 4-10 Caltrans-Approved Treatment BMPs

Treatment BMPs	
Biofiltration System	Multi-Chambered Treatment Train
Infiltration Device	Wet Basin
Detention Device	Traction Sand Traps
Dry Weather Flow Diversion	Media Filters
Gross Solid Removal Device	

Source: Caltrans, 2010.

Alternatives 2 and 3 would include project design features such as the design and installation of Treatment BMPs to the maximum extent practicable. The TDC approach, outlined in the Project Planning and Design Guide (Caltrans, 2010), would be used to determine the prioritization for potential Treatment BMPs. The applicability of all nine Caltrans-approved Treatment BMPs would be analyzed for the entirety of the proposed project from a water quality perspective in relation to the receiving water bodies within the proposed project limits.

4.5.4 Maintenance BMPs

Caltrans's Maintenance Division is responsible for conducting maintenance activities at different facilities throughout the State to ensure that the maximum benefits associated with constructed facilities are available to the traveling public. Most of these activities are handled by small crews with a minimal amount of soil disturbance.

The purpose of applying Maintenance BMPs is to implement water quality controls that will minimize pollutant discharges during highway maintenance activities.

Maintenance activities, along with the application of Maintenance BMPs, would be ongoing throughout the lifespan of the facility. All of the Maintenance BMPs implemented would be consistent with the specifications and guidelines presented in the Maintenance Staff Guide (Caltrans, 2003). The Maintenance Staff Guide provides detailed instructions regarding the application of approved Maintenance BMPs for maintenance highway activities. Table 4-11 displays typical highway maintenance activities, along with some of the Maintenance BMPs that would be implemented.

Table 4-11 Caltrans Maintenance BMPs

Maintenance Activity	Maintenance BMP
Non-landscaped Mechanical Vegetation Control/ Mowing	Solid Waste Management; Preservation of Existing Vegetation; Vehicle and Equipment Operations
Drainage Ditch and Channel Maintenance	Sediment Control; Material Use; Compaction
Drain and Culvert Maintenance	Scheduling and Planning; Stockpile Management; Tire Inspection and Sediment Removal
Sweeping Operations	Liquid Waste Management; Safer Alternative Products
Litter and Debris Removal	Anti-Litter Signs; Litter and Debris; Solid Waste Management
Graffiti Removal	Material Use; Safer Alternative Products; Storm Drain Inlet Protection

Source: Caltrans, 2003.

4.6 Cumulative Impacts

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of this project. A cumulative effect assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor, but collectively substantial, impacts taking place over a period of time.

Cumulative impacts to resources in the project area may result from residential, commercial, industrial, and highway development. This analysis considers known projects identified within the project area. Each of these projects would have its own environmental document. Appendix G provides a list of projects that have the potential to influence cumulative impacts and were considered for this analysis.

4.6.1 Water Quality

The geographic context for the analysis of cumulative impacts associated with water quality is the area covered by the hydrologic subareas within the proposed project corridor. Development of the proposed project, in combination with all other development that would occur in the watershed areas, would involve construction activities, increases in stormwater runoff from new impervious surface area, and possibly reduction in groundwater recharge areas. Construction of new development throughout the watershed areas could result in the erosion of soil, thereby cumulatively degrading water quality. In addition, the increase in impervious surface area resulting from future development may also adversely affect water quality by increasing the amount of stormwater runoff, transportation-related pollutants, and associated TDCs entering the storm drain system. New development, however, would have to comply with existing regulations regarding construction practices that minimize risks of erosion and runoff. Among the various regulations are the applicable provisions of the Statewide NPDES Permit; County and municipal codes related to control of stormwater quality for new development and significant redevelopment, roads and highways, and public works projects; municipal grading permits; and other NPDES permits. This would minimize degradation of water quality at individual project construction sites. Consequently, cumulative water quality impacts would be minimized during the construction and operational phases. Compliance with applicable SWRCB and Santa Ana RWQCB and Los Angeles RWQCB regulations would ensure that water quality is maintained to the maximum extent practicable for potential development projects within the watershed areas; therefore, there would be no water quality impacts associated with implementation of the project, and the proposed project would not have a cumulatively considerable contribution to the cumulative effects related to water quality.

4.6.2 Groundwater

The geographic context for the analysis of cumulative impacts associated with groundwater is the area underlain by the groundwater basins and subbasins within the project corridor. The proposed project is not located within an identified recharge area. Pile driving, dewatering, and other construction activities that would encounter groundwater could potentially occur. While the insertion of support and foundation structures in the groundwater may reduce the storage capacity of groundwater, the displaced volume would not be substantial relative to the volume of the basins. Likewise, the volume of water used during construction for dust control and other uses would be nominal; therefore, construction activities would not substantially deplete groundwater supplies nor interfere substantially with groundwater recharge. Thus, there would be no potential impacts to groundwater recharge in the area of the proposed project. Although implementation of the project would not have a cumulatively considerable contribution to the adverse effects on groundwater recharge in the basins, the overall development associated with transportation infrastructure projects that may be planned within the basins could directly and/or indirectly result in the loss of groundwater volume and recharge areas. This loss would be mitigated by groundwater recharge programs that have already been designed and implemented within the basin areas to ensure that groundwater will continue to be a viable water supply in the future. In addition, all of the projects would be required to implement Treatment BMPs to the maximum extent practicable. Treatment BMPs, such as infiltration devices, augment groundwater by retaining stormwater runoff, which subsequently infiltrates into the groundwater regime.

Due to the volume of traffic and the nature of materials that are transported on roadways, sources of groundwater contamination would be associated with hazardous and nonhazardous materials that are transported through the area that could result in accidental spills, leaks, toxic releases, fire, or explosion. The transport of hazardous materials is regulated by the CHP. Hazardous materials and waste transporters are responsible for complying with all applicable packaging, labeling, and shipping regulations, which reduce the potential for a spill to impact water quality. The Office of Emergency Services also provides emergency response services involving hazardous material incidents. The United States Department of Transportation Office of Hazardous Materials Safety prescribes strict regulations for the safe transportation of hazardous materials, as described in Title 49 of the CFR and implemented by Title 13 of the California Code of Regulations. Appropriate documentation for all hazardous waste that is transported would be provided as required for compliance with existing hazardous materials regulations codified in Titles 8, 22, and 26 of the California Code of Regulations, and their enabling legislation set forth in Chapter 6.95 of the California Health and Safety Code. Compliance with all applicable federal and State laws related to the transportation of hazardous materials would reduce the likelihood and severity of accidents during transit. Furthermore, any spill (i.e., hazardous and nonhazardous) would generate an immediate, local response to report, contain, and mitigate the incident.

Caltrans has identified pollutants associated with highway runoff that are considered treatable by Caltrans-approved Treatment BMPs. These pollutants, designated as TDCs, include sediment, metals (i.e., total and dissolved fractions of zinc, lead, and copper), nitrogen (e.g., ammonia), phosphorus, and general metals. Stormwater runoff from the project ROW would be conveyed to Treatment BMPs; therefore, highway runoff conveyed to Caltrans-approved Treatment BMPs would be treated to the maximum extent practicable and not create any groundwater quality impacts.

Furthermore, Caltrans' Maintenance Division conducts highway activities (i.e., Sweeping Operations; Litter and Debris Removal; and Emergency Response and Cleanup Practices) on a regular basis to correct situations that could cause water pollution; therefore, implementation of these maintenance activities would reduce the discharge of potential pollutants to the stormwater drainage system and watercourses and not create any groundwater quality impacts.

Therefore, there would be no groundwater impacts associated with the I-10 Corridor Project, and the proposed project would not have a cumulatively considerable contribution to the cumulative effects related to groundwater.

Chapter 5 Avoidance and Minimization Measures

5.1 Impact: Stormwater Erosion

Minimization Measures. The I-10 Corridor Project would require the following measures, to minimize potential water quality and hydrological impacts associated with construction and operation.

- **WQ-1: Implement Stormwater BMPs.** The project will be required to conform to the requirements of the Caltrans Statewide NPDES Storm Water Permit, Order No. 2012-0011-DWQ, NPDES No. CAS000003, adopted by the SWRCB on September 19, 2012, and any subsequent permit in effect at the time of construction. In addition, the project will be required to comply with the requirements of the NPDES Permit for Construction Activities, Order No. 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ, NPDES No. CAS000002, as well as implementation of the BMPs specified in Caltrans' Storm Water Management Plan (Caltrans, 2003b).
- **WQ-2: Prepare and Implement an SWPPP.** The Contractor will be required to develop an acceptable SWPPP. The SWPPP shall contain BMPs that have demonstrated effectiveness at reducing stormwater pollution. The SWPPP shall address all construction-related activities, equipment, and materials that have the potential to affect water quality. All Construction Site BMPs will follow the latest edition of the Storm Water Quality Handbooks, Construction Site BMPs Manual to control and minimize the impacts of construction-related pollutants. The SWPPP shall include BMPs to control pollutants, sediment from erosion, stormwater runoff, and other construction-related impacts. In addition, the SWPPP shall include implementation of specific stormwater effluent monitoring requirements based on the project's risk level to ensure that the implemented BMPs are effective in preventing discharges from exceeding any of the water quality standards.
- **WQ-3: Comply with Local Jurisdiction Requirements.** The project will be subject to Los Angeles County and San Bernardino County conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution associated with street and road construction, as appropriate. These conditions and approvals are referenced in the WDRs associated with the MS4 permits per Order No. R4-2012-0175 for the coastal

watersheds of Los Angeles County (NPDES Permit No. CAS004001) and Order No. R8-2010-0036, NPDES No. CAS618036 for the County of San Bernardino and the incorporated cities of the County of San Bernardino.

5.2 Impact: Construction Discharges

Minimization Measures. If construction of the project requires the discharge of groundwater to the environment or dredged or fill material, the project would require the following measures to minimize potential water quality and hydrological impacts associated with construction.

- **WQ-4: Discharge of Construction Water.** If dewatering is expected for the preferred alternative, the contractor shall fully conform to the requirements specified in the Los Angeles RWQCB Order R4-2013-0095 (NPDES No. CAG994004) (if dewatering occurs in Los Angeles) or the Santa Ana RWQCB's dewatering permit Order R8-2005-0041 (NPDES No. CAG998001).
- **WQ-5: Discharge of Dredged or Fill Material.** Because the proposed project involves work over Waters of the U.S. (i.e., SAR), a Section 404 Permit may be required for the discharge of dredged or fill material into Waters of the U.S.
- **WQ-6: Discharge of Pollutants into Waters of the U.S.** A Section 401 Certification from the State is required in tandem with a Section 404 Permit; therefore, a 401 Certification from the State may be required to ensure that the discharge will comply with applicable federal and State effluent limitations and water quality standards.

5.3 Impact: Bank or Streambed Alteration

Minimization Measures. For any proposed construction activity in any river, stream, or lake, the project would require the following measure to minimize potential water quality and hydrological impacts.

- **WQ-6: Streambed Alteration Agreement.** Per Section 1602 of the Fish and Game Code, the I-10 Corridor Project will be required to notify CDFW and obtain a Section 1600 Streambed Alteration Agreement for any proposed activity that impacts "waters of the State."

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6.2 Preparer(s) Qualifications

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Appendix A Santa Ana RWQCB Participation Agreement

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Santa Ana Regional Water Quality Control Board

November 20, 2012

Aaron Burton, Branch Chief
Environmental Studies "B"
California Department of Transportation, District 8
464 W. Fourth Street, MS 829
San Bernardino, CA 92401-1400

CALTRANS REQUEST FOR REGIONAL BOARD PARTICIPATION IN INTERSTATE 10 CORRIDOR PROJECT, EASTERN LOS ANGELES COUNTY/SOUTHWEST SAN BERNARDINO COUNTY, SCH# 2012101082

Dear Mr. Burton:

We have received and considered your October 29, 2012 request for the Santa Ana Regional Water Quality Control Board (RWQCB) to become a participating and cooperating agency in the environmental review of the Interstate 10 (I-10) Corridor Project (Project). We understand that the California Department of Transportation, District 8, will be the lead agency for compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). As a responsible agency under CEQA, the RWQCB looks forward to contributing to this process as resources allow.

The Project proposal is to widen I-10 along a 35-mile corridor between Pomona (within the jurisdiction of the Los Angeles RWQCB) and Ford Street in the City of Redlands (within the Santa Ana RWQCB's jurisdiction). We concur with the October 29, 2012 letter that a Clean Water Act Section 401 Water Quality Standards Certification will likely be required for the Project. We note that while the project takes place within the jurisdiction of two regional boards, we have confirmed that all impacts to waters of the U.S. that will require certification are in the Santa Ana Region.

Please contact Glenn Robertson of our Regional Planning Programs Section at (951) 782-3259 or at Glenn.Robertson@waterboards.ca.gov, or Mark Adelson, Chief of our Regional Planning Programs Section, at (951) 782-3234 or at Mark.Adelson@waterboards.ca.gov with any questions.

Sincerely,

Kurt Berchtold
Executive Officer
Santa Ana Regional Water Quality Control Board

Cc: SWRCB 401 Certifications Unit – Bill Orme

CAROLE H. BESWICK, CHAIR | KURT V. BERCHTOLD, EXECUTIVE OFFICER

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Appendix B Construction Risk Analysis

I-10 Widening Project Risk Analysis

The California Department of Transportation (Caltrans), in cooperation with the San Bernardino Associated Governments (SANBAG), proposes to add freeway lanes through all or a portion of the 33-mile segment of Interstate 10 (I-10) in San Bernardino County from the Los Angeles/San Bernardino (LA/SB) County Line to Ford Street in Redlands. The project limits including transition areas extend from approximately 0.4 miles west of White Avenue in Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in Yucaipa at PM 37.0.

The project is currently in the Project Approval/Environmental Document (PA/ED) phase, with the circulation of the draft environmental document anticipated in late 2015. A No Build and two build alternatives are being considered for this project and are described below.

- Alternative 1 (No Build) would maintain the existing lane configuration of the I-10 corridor with no additional mainline lanes or associated improvements to be provided.
- Alternative 2 (High Occupancy Vehicle Lane Alternative) proposes to extend the existing High Occupancy Vehicle (HOV) lane in each direction of I-10 from the current HOV terminus near Haven Avenue in Ontario to Ford Street in Redlands, a distance of approximately 25 miles. Alternative 2 traverses seven cities (Ontario, Fontana, Rialto, Colton, San Bernardino, Loma Linda, and Redlands) and unincorporated areas of San Bernardino County including Etiwanda, Bloomington, and Bryn Mawr.
- Alternative 3 (Express Lanes Alternative) proposes to provide two Express Lanes in each direction of I-10 from the LA/SB County Line to California Street in Redlands and one Express Lane in each direction from California Street to Ford Street in Redlands, a total of 33 miles. Alternative 3 traverses nine cities (Pomona, Montclair, Ontario, Fontana, Rialto, Colton, San Bernardino, Loma Linda, and Redlands) and unincorporated areas of San Bernardino County including Etiwanda, Bloomington, and Bryn Mawr.

The proposed improvements are generally within San Bernardino County with some improvements in Los Angeles County to facilitate transitioning between the existing HOV cross section in Los Angeles and the proposed Express Lane cross section in San Bernardino in Alternative 3.

The project is currently in the Project Approval/Environmental Document (PA/ED) phase, with circulation of the draft environmental document anticipated in late 2015. The project is expected to proceed to final design upon approval of the Final Project Report and a Record of Decision (ROD)/Notice of Determination (NOD) for the final environmental document. Construction of the project is anticipated to begin in 2019, with estimated completion date of 2024. A design-build project delivery method may be utilized for either build alternative. For Alternative 3, a design-build-operate strategy utilizing public-private partnership may be utilized.

The I-10 Corridor project is classified as a Category 3 project according to the Caltrans Project Development Procedures Manual (PDPM). The project consists of existing freeway widening that involves changes to local roads and interchanges requiring new or revised freeway agreements.

This project spans 8 different Planning Watershed Areas (Table 1. I-10 Widening Planning Watersheds). A Risk Level determination has been completed for each of the 8 Planning Watersheds. The project Risk Level is based on findings of the construction site sediment and receiving water risk determination. The assumptions and input parameters used to determine the risk level are described below.

I-10 Widening Project Risk Analysis

Table 1. I-10 Widening Project Planning Watersheds.

Planning Watershed #	Hydrologic Sub-Area	Post Miles
4405510000	San Jose	44.9 to 45.546
4481210000	Chino (Split)	45.546 to 48.3
4801210000	Chino (Split)	0 to 18.492
4801440000	Colton	18.492 to 24.24
4801520000	Bunkerhill	24.24 to 30.377
4801530000	Redlands	30.377 to 32.364
4801550000	Reservoir	32.364 to 35.5
4801610000	Yucaipa	35.5 to 37.029

I-10 Widening Project Planning Watersheds

Sediment Risk

The R factor for the construction sediment risk factor was determined using the EPA newly updated Erosivity Calculator. Input parameters and results for the R-factor calculation are displayed in Table 2.

Table 2. EPA Erosivity Calculator Results for the I-10 Planning Watersheds.

Planning Watershed #	Latitude	Longitude	EPA WebsiteRainfall Erosivity Factor
4405510000	34^0 04' 18.06" N	117^0 47' 10.59" W	290.60
4481210000	34^0 04' 39.88" N	117^0 44' 18.35" W	290.60
4801210000	34^0 03' 53.79" N	117^0 31' 08.66" W	225.55
4801440000	34^0 03' 53.78" N	117^0 31' 08.66" W	225.55
4801520000	34^0 03' 55.10" N	117^0 13' 19.15" W	179.89
4801530000	34^0 03' 18.32" N	117^0 10' 04.90" W	200.96
4801550000	34^0 01' 33.99" N	117^0 07' 32.79" W	212.59
4801610000	34^0 01' 18.22" N	117^0 06' 48.45" W	212.59

The soil erodibility factor, K, was determined using the RUSLE K Factor map option available by the Caltrans Water Quality Planning Tool. As indicated on the map, the weighted average K factor for all soils within each planning watershed area are indicated for each individual watershed is shown in Table 3.

I-10 Widening Project Risk Analysis

Table 3. K-Factor Parameters for I-10 Planning Watersheds.

Planning Watershed #	Average K-Factor Per Watershed
4405510000	0.24
4481210000	0.20
4801210000	0.14
4801440000	0.23
4801520000	0.32
4801530000	0.32
4801550000	0.30
4801610000	0.32

The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. The length of sheet flow and slope were determined using the Caltrans Water Quality Planning Tool. According to the online map, the average LS factor for each planning watershed is shown in Table 4.

Table 4. LS-Factor Parameters for I-10 Widening Project Planning Watersheds.

Planning Watershed #	Average LS Factor Per Watershed
4405510000	0.88
4481210000	0.76
4801210000	0.94
4801440000	0.71
4801520000	0.99
4801530000	0.82
4801550000	2.67
4801610000	4.45

Each Planning Watershed's calculated Sediment Risk Factor is listed below in Table 5.

Table 5. I-10 Widening Project Planning Watersheds Sediment Risk Factor.

Planning Watershed #	Watershed Erosion Estimate Tons/Acre	Sediment Risk Factor
4405510000	61.37472	Medium
4481210000	44.1712	Medium
4801210000	29.68238	Medium
4801440000	29.68238	Medium
4801520000	29.376037	Medium
4801530000	63.664128	Medium
4801550000	55.783616	Medium
4801610000	302.72816	High

I-10 Widening Project Risk Analysis

Receiving Water Risk
Based on Caltrans Water Quality Planning Tool and a review of the 2010 integrated 305(b)/303(d) list the disturbed area within the I-10 Widening Projects 8 Planning Watershed's do not discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment nor does it discharge to a waterbody with a US EPA approved TMDL for sedimentation/siltation. Also, these 8 Watersheds don't drain to a waterbody with designated beneficial uses of Spawn and Cold and Migratory. Based on these findings, the Receiving Water Risk Factor for each Planning Watershed is **Low**.

Based on each Planning Watershed's Sediment Risk Factor listed above and a Receiving Water Risk Factor of Low, each Watershed's combined risk level was determined and can be found below (Table 6).

Table 6. I-10 Widening Project Planning Watersheds Sediment Risk Level, Receiving Water Risk Factor, and Combined Risk Level.

Planning Watershed #	Sediment Risk Factor	Receiving Water Risk Level	Combined Risk Level
4405510000	Medium	Low	2
4481210000	Medium	Low	2
4801210000	Medium	Low	2
4801440000	Medium	Low	2
4801520000	Medium	Low	2
4801530000	Medium	Low	2
4801550000	Medium	Low	2
4801610000	High	Low	2

At Risk Level 2, for disturbed areas within the I-10 Widening Project Planning Watersheds, the discharger must comply with the requirements included in Attachment D of the General Permit.

Planning Watershed No. 4405510000

Location and Risk Factor Worksheets

EPA United States Environmental Protection Agency

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » Stormwater » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.0716
Longitude:	-117.7861

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **290.60** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		290.6
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.24
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.88
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	61.37472	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	**Entry**	**Score**
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp	No	Low

Combined Risk Level Matrix

<table>
<tr><th></th><th></th><th colspan="3">Sediment Risk</th></tr>
<tr><th></th><th></th><th>Low</th><th>Medium</th><th>High</th></tr>
<tr><th rowspan="2">Receiving Water Risk</th><th>Low</th><td>Level 1</td><td colspan="2">Level 2</td></tr>
<tr><th>High</th><td colspan="2">Level 2</td><td>Level 3</td></tr>
</table>

Project Sediment Risk:	**Medium**
Project RW Risk:	**Low**
Project Combined Risk:	**Level 2**

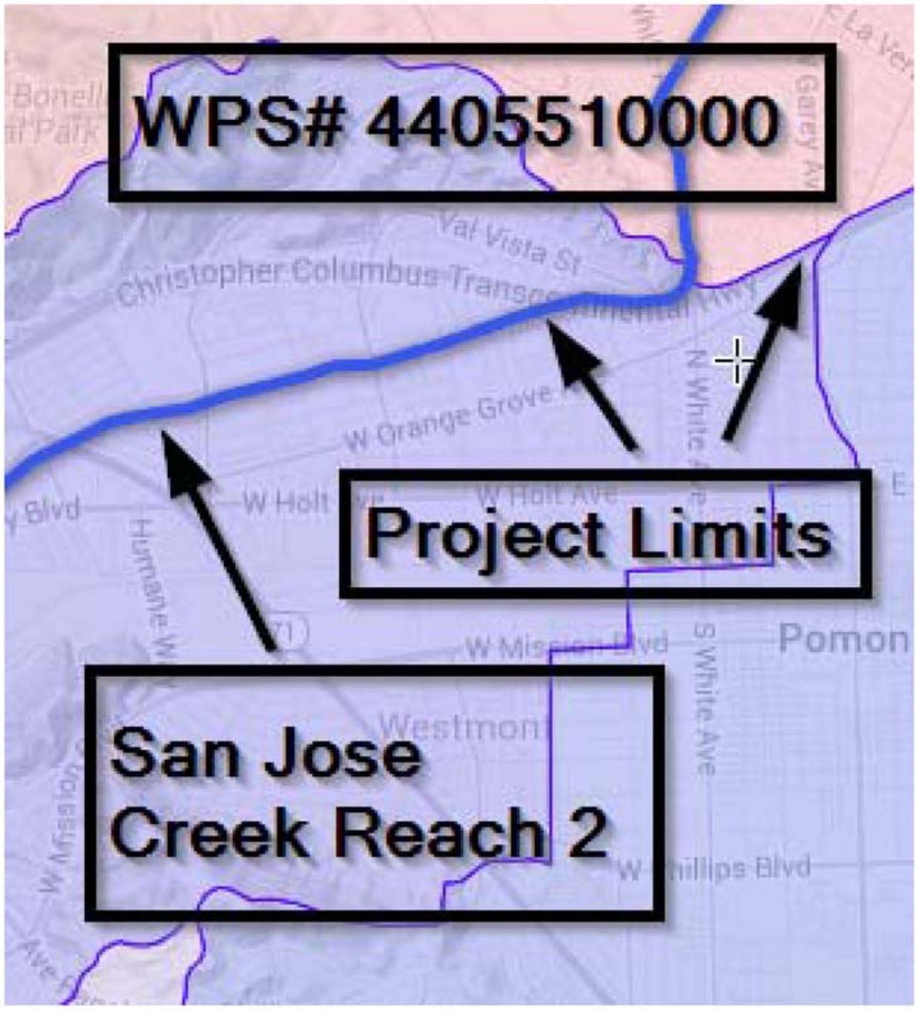


Figure 1. I-10 Widening Water Planning Shed (WPS#) 4405510000.

Planning Watershed No. 4481210000

Location and Risk Factor Worksheets

EPA United States Environmental Protection Agency

Water: Stormwater

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.0775
Longitude:	-117.7383

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **290.60** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		290.6
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.2
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.76
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	44.1712	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below:	No	
2006 Approved Sediment-impared WBs Worksheet		
http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml		
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY?		
http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		

Combined Risk Level Matrix

<table>
<tr><th></th><th></th><th colspan="3">Sediment Risk</th></tr>
<tr><th></th><th></th><th>Low</th><th>Medium</th><th>High</th></tr>
<tr><th rowspan="2">Receiving Water Risk</th><th>Low</th><td>Level 1</td><td colspan="2">Level 2</td></tr>
<tr><th>High</th><td colspan="2">Level 2</td><td>Level 3</td></tr>
</table>

Project Sediment Risk:	**Medium**
Project RW Risk:	**Low**
Project Combined Risk:	**Level 2**

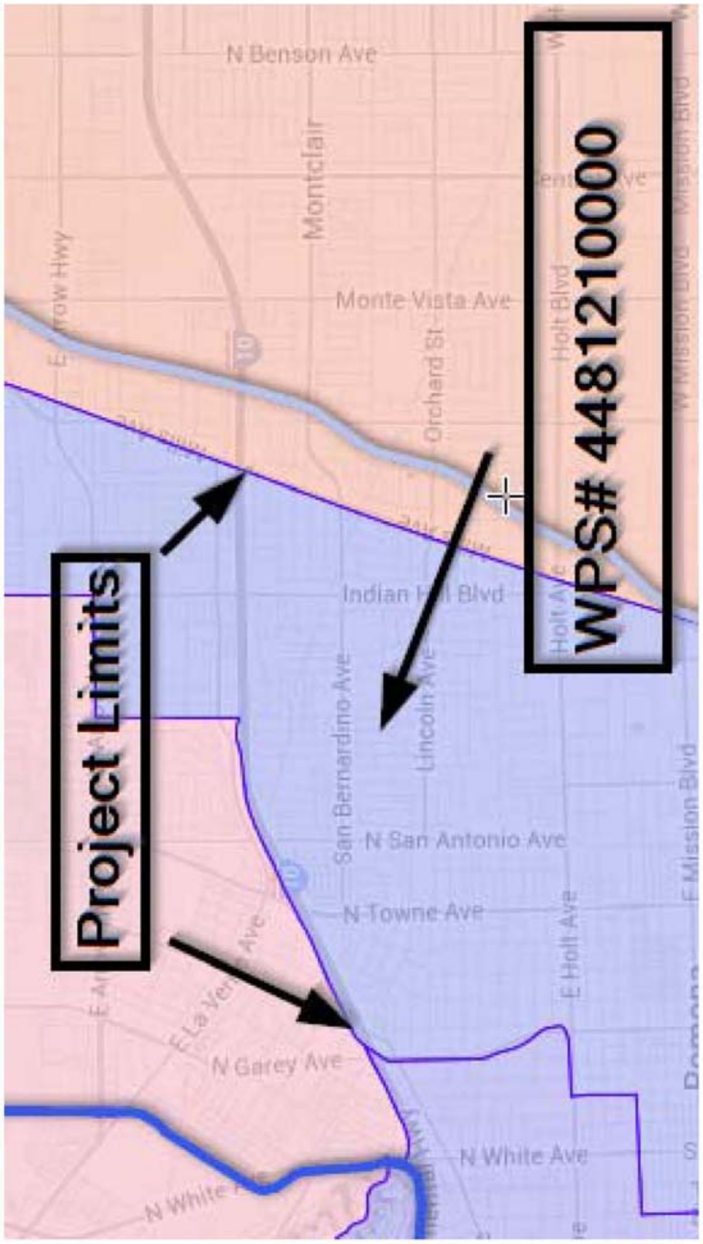


Figure 2. I-10 Widening Water Planning Shed (WPS#) 4481210000.

Planning Watershed No. 4801210000

Location and Risk Factor Worksheets

EPA United States Environmental Protection Agency

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » Stormwater » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.0647
Longitude:	-117.5188

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **225.65** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		225.55
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.14
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.94
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	29.68238	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	**Entry**	**Score**
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp	No	Low

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1		
High	Level 2		Level 3

Project Sediment Risk:	**Medium**
Project RW Risk:	**Low**
Project Combined Risk:	**Level 2**

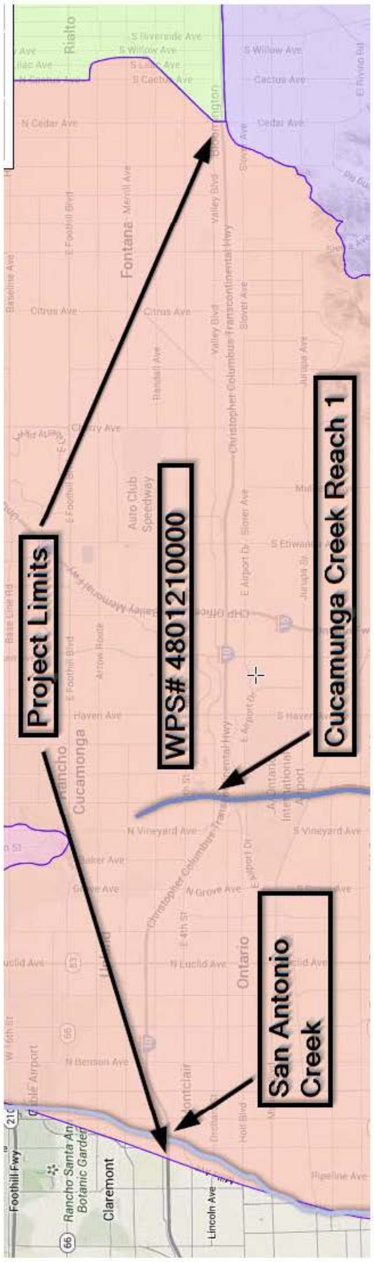


Figure 3. I-10 Widening Water Planning Shed (WPS#) 4801210000.

Planning Watershed No. 4401440000

Location and Risk Factor Worksheets

EPA United States Environmental Protection Agency

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » **Stormwater** » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.0647
Longitude:	-117.5188

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **225.55** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

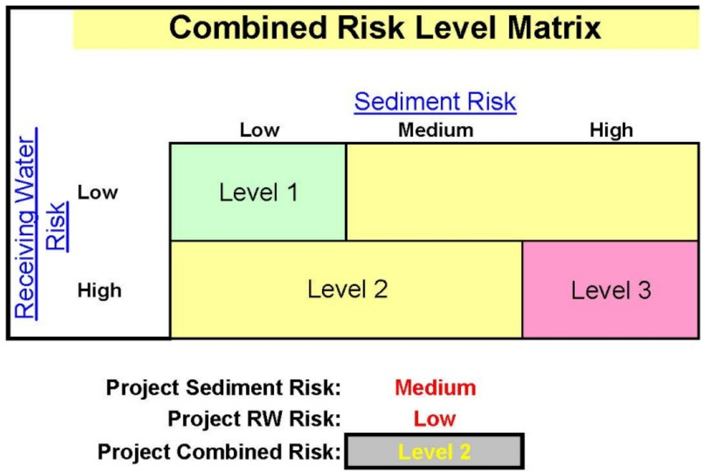
A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		225.55
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.14
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.94
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	29.68238	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	**Entry**	**Score**
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp	No	Low


Combined Risk Level Matrix
Sediment Risk
Low
Medium
High
Receiving Water Risk
Low
High
Level 1
Level 2
Level 3
Project Sediment Risk: Medium
Project RW Risk: Low
Project Combined Risk: Level 2

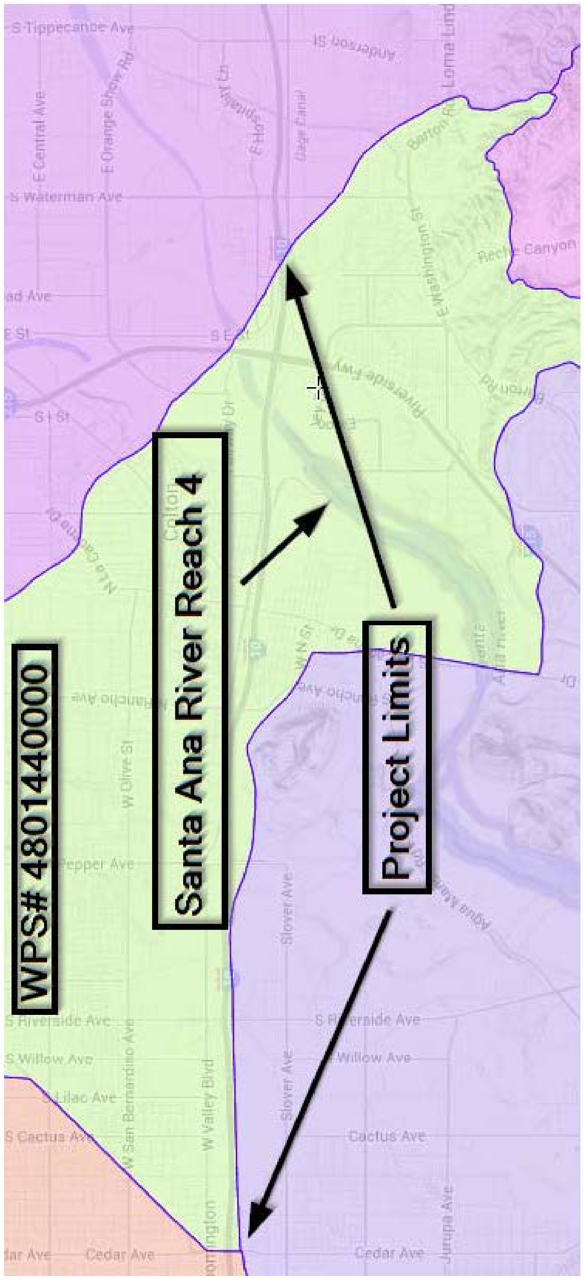


Figure 4. I-10 Widening Water Planning Shed (WPS#) 4801440000.

Planning Watershed No. 44801520000

Location and Risk Factor Worksheets

EPA United States Environmental Protection Agency

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » **Stormwater** » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.0652
Longitude:	-117.2219

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **179.89** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		179.89
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.23
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.71
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	29.376037	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	**Entry**	**Score**
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbguse.asp	No	

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: Medium
Project RW Risk: Low
Project Combined Risk: Level 2

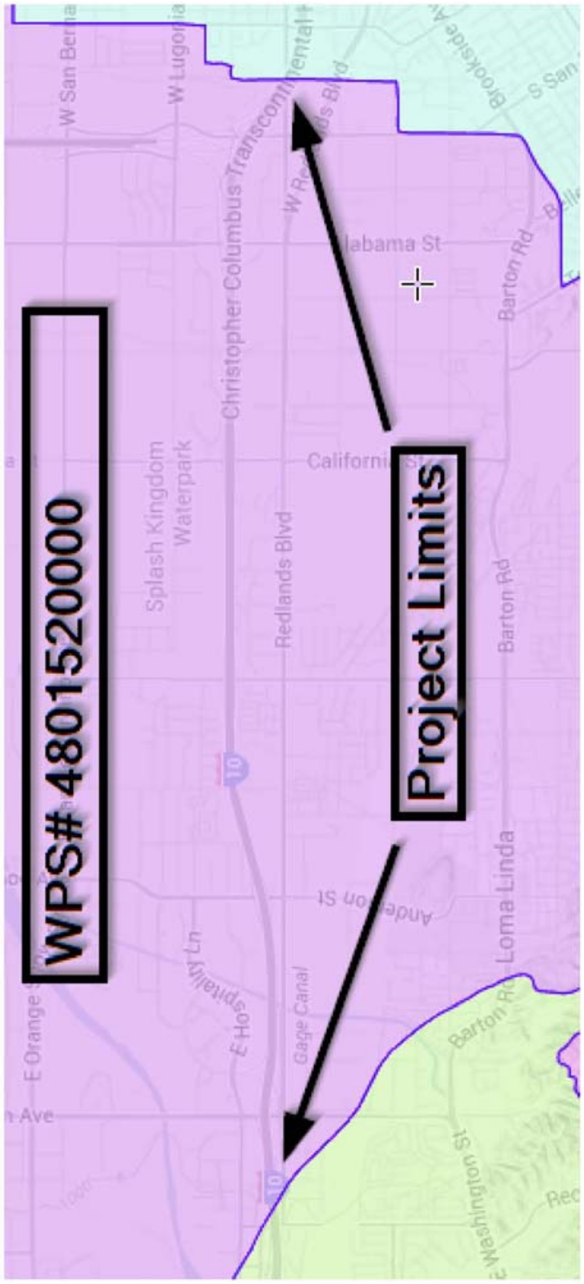


Figure 5. I-10 Widening Water Planning Shed (WPS#) 4801520000.

Planning Watershed No. 44801530000

Location and Risk Factor Worksheets

EPA United States Environmental Protection Agency

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » Stormwater » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.055
Longitude:	-117.1677

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **200.96** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

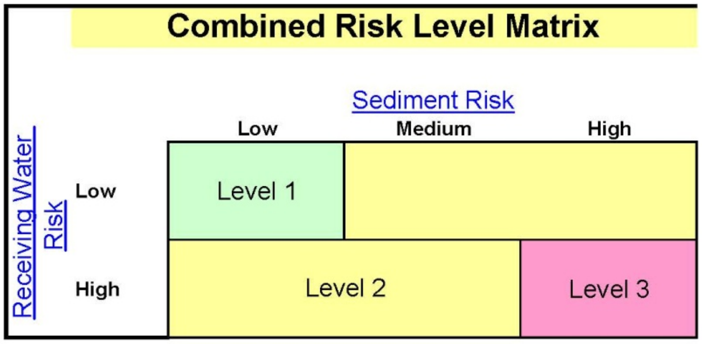
A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements.**

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		200.96
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.32
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.99
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	63.664128	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	**Entry**	**Score**
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp	No	Low



Project Sediment Risk: **Medium**
Project RW Risk: **Low**
Project Combined Risk: **Level 2**

Figure 6. I-10 Widening Water Planning Shed (WPS#) 4801530000.

Planning Watershed No. 44801550000

Location and Risk Factor Worksheets

EPA United States Environmental Protection Agency

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » Stormwater » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.0258
Longitude:	-117.1255

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **212.59** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		212.59
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.32
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.82
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	55.783616	
16	**Site Sediment Risk Factor**	**Medium**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below:	No	Low
2006 Approved Sediment-impared WBs Worksheet		
http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml		
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY?		
http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: Medium
Project RW Risk: Low
Project Combined Risk: Level 2

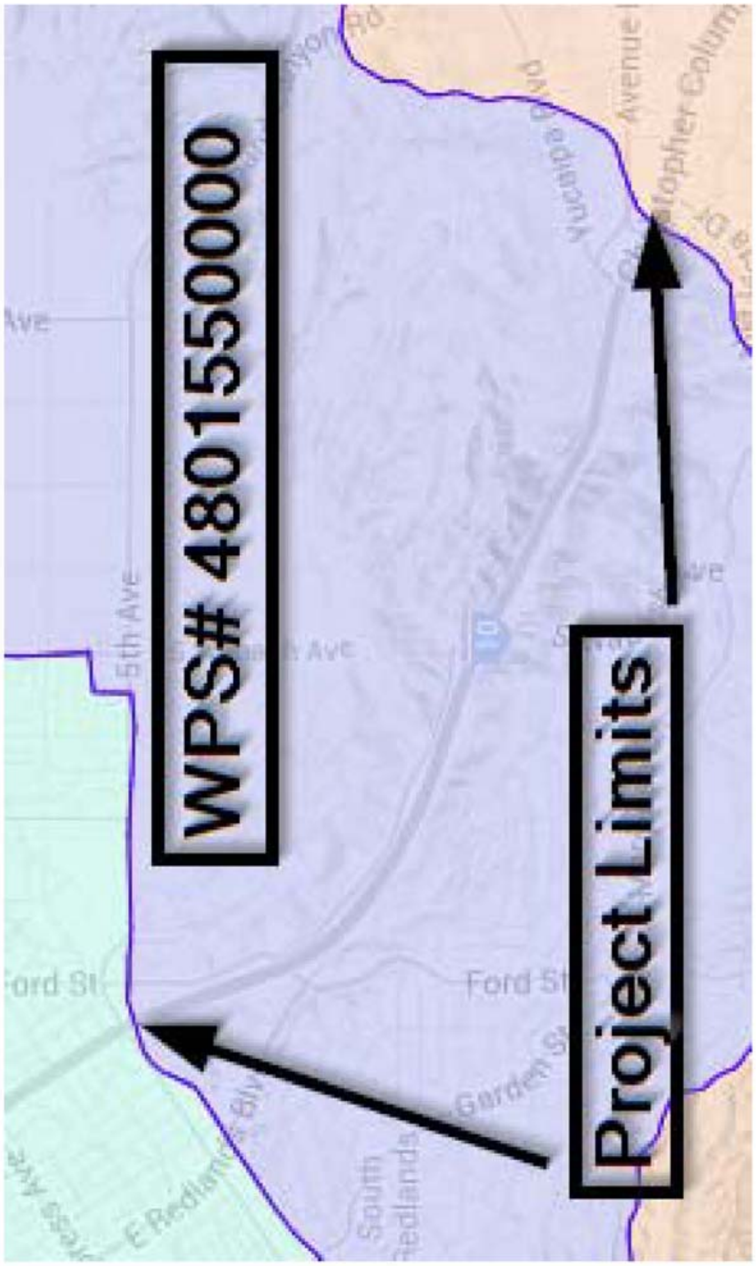


Figure 7. I-10 Widening Water Planning Shed (WPS#) 4801550000.

Planning Watershed No. 44801610000

Location and Risk Factor Worksheets

Water: Stormwater

You are here: Water » Pollution Prevention & Control » Permitting (NPDES) » Stormwater » LEW Results

LEW Results

Rainfall Erosivity Factor Calculator for Small Construction Sites

Facility Information

Start Date:	01/01/2019
End Date:	01/01/2024
Latitude:	34.0216
Longitude:	-117.1133

Erosivity Index Calculator Results

AN EROSIVITY INDEX VALUE OF **212.59** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **01/01/2019 - 01/01/2024**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do NOT qualify for a waiver from NPDES permitting requirements**.

Start Over

Last updated on Monday, July 28, 2014

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		212.59
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.32
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		4.45
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	302.72816	
16	**Site Sediment Risk Factor**	**High**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	**Entry**	**Score**
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp	No	Low

Combined Risk Level Matrix

<table>
<tr><td rowspan="2" colspan="2"></td><td colspan="3">Sediment Risk</td></tr>
<tr><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td rowspan="2">Receiving Water Risk</td><td>Low</td><td>Level 1</td><td colspan="2">Level 2</td></tr>
<tr><td>High</td><td colspan="2">Level 2</td><td>Level 3</td></tr>
</table>

Project Sediment Risk: High
Project RW Risk: Low
Project Combined Risk: Level 2

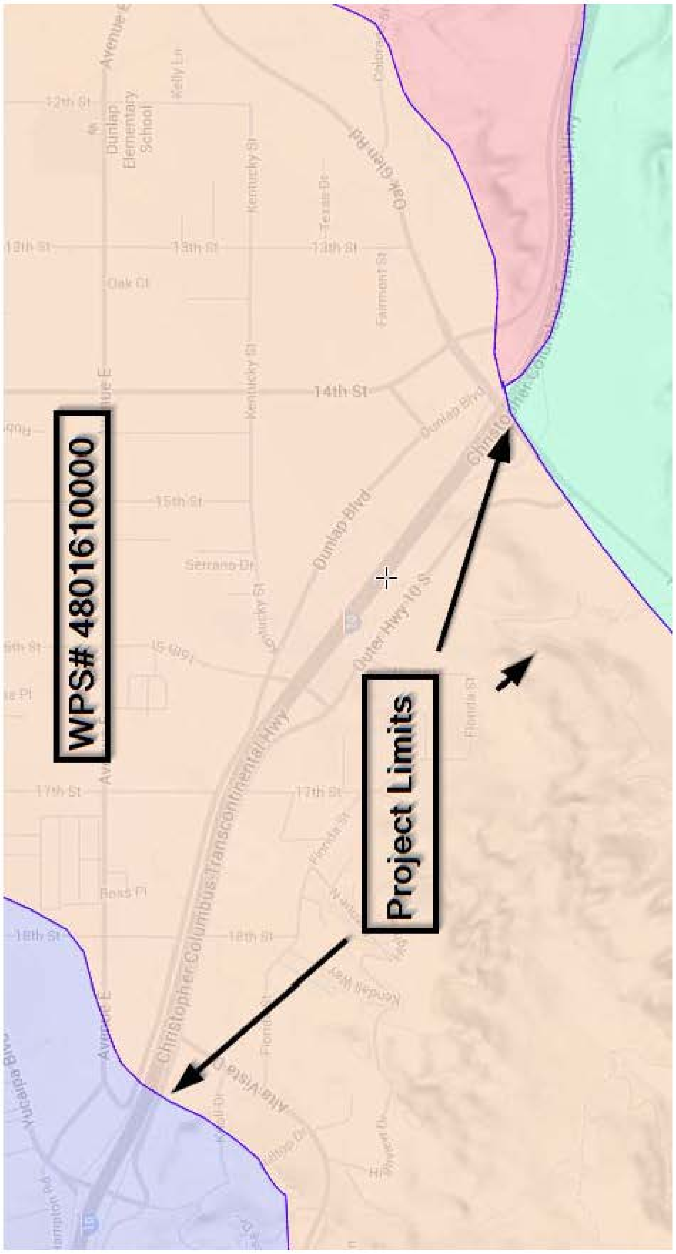


Figure 8. I-10 Widening Water Planning Shed (WPS#) 4801610000.

K-Value Determination

Beginning of Post Miles	Post Miles End Point	Post Mile Length	K Value	Watershed	Watershed K Value
44.9	45.546	0.646	0.24	4405510000	0.24
45.546	48.3	2.754	0.2	4481210000	0.20
0	4.879	4.879	0.17	4801210000	0.14
4.879	8.165	3.286	0.2		
8.165	9.936	1.771	0.2		
9.936	11.132	1.196	0.2		
11.132	12.132	1	0.17		
12.132	13.169	1.037	0.2		
13.169	18.492	5.323	0.2		
18.492	19	0.508	0.2	4801440000	0.23
19	19.972	0.972	0.32		
19.972	21.961	1.989	0.2		
21.961	22.705	0.744	0.32		
22.705	24.24	1.535	0.17		
24.24	26.27	2.03	0.32	4801520000	0.32
26.27	27.2	0.93	0.32		
27.2	28.3	1.1	0.32		
28.3	30.377	2.077	0.32		
30.377	32.364	1.987	0.32	48015300000	0.32
32.364	33.128	0.764	0.32	4801550000	0.30
33.128	34.288	1.16	0.32		
34.288	35	0.712	0.24		
35	35.5	0.5	0.32		
35.5	37.029	1.529	0.32	4801610000	0.32
	Total	**40.4**	Average K Factor		

LS Value Determination

Beginning of Post Miles	Post Miles End Point	Post Mile Length	LS Value	Weighted LS Value	Planning Watershed
44.9	45.546	0.646	0.88	0.88	4405510000
45.546	48.3	2.754	0.76	0.76	4481210000
0	18.492	18.492	0.94	0.94	4801210000
18.492	24.24	5.748	0.71	0.71	4801440000
24.24	30.377	6.137	0.99	0.99	4801520000
30.377	32.364	1.987	0.82	0.82	4801530000
32.364	33.128	0.764	1.25	2.67	4801550000
33.128	35.5	2.372	3.13		
35.5	37.029	1.529	4.45	4.45	4801610000

Appendix C Floodplain Locations

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography collected by the U.S. Department of Agriculture Farm Service Agency. This imagery was flown in 2005 and was produced with a 1-meter ground sample distance.

This map may reflect more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

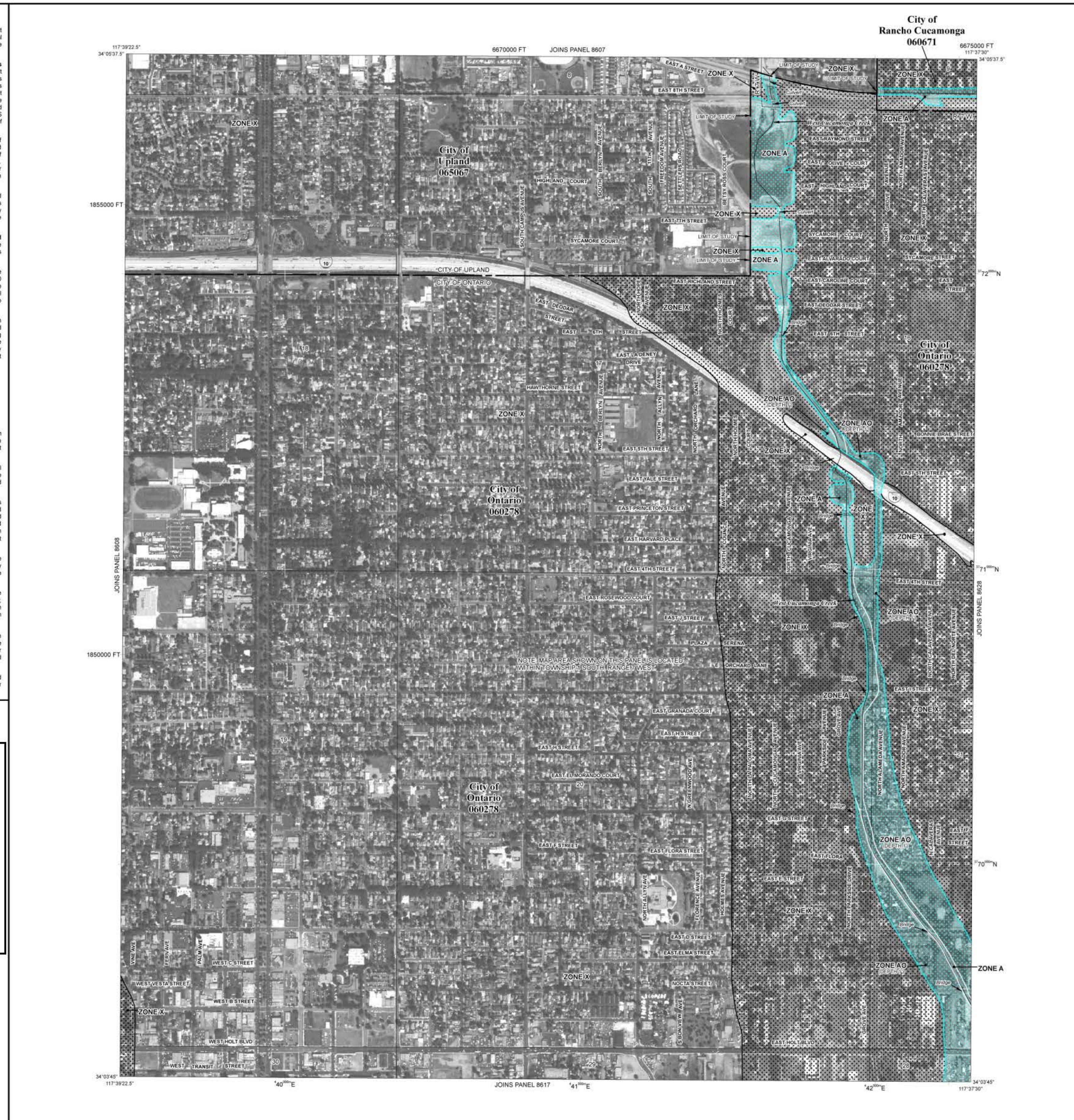
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

WEST CUCAMONGA CREEK



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23)- - - - -(23)	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000}$N	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
March 18, 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 28, 2008 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8609H

FIRM
FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 8609 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ONTARIO, CITY OF	060278	8609	H
RANCHO CUCAMONGA, CITY OF	060671	8609	H
UPLAND, CITY OF	065067	8609	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C8609H

MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography collected by the U.S. Department of Agriculture Farm Service Agency. This imagery was flown in 2005 and was produced with a 1-meter ground sample distance.

This map may reflect more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

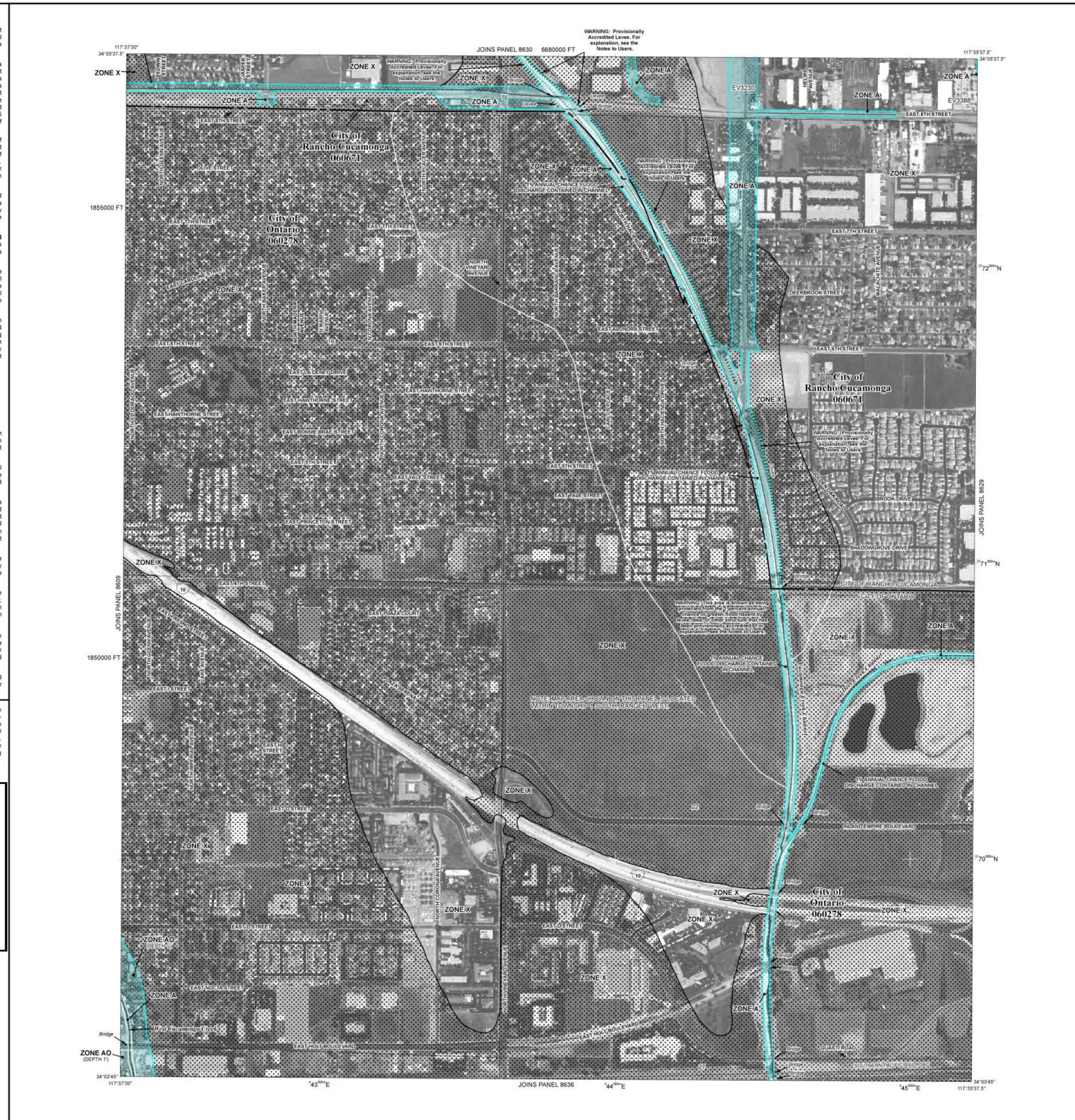
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

WARNING: This map contains levees, dikes, or other structures that have been provisionally accredited and mapped as providing protection from the 1-percent-annual-chance flood. To maintain accreditation, the levee owner or community is required to submit documentation necessary to comply with 44 CFR Section 65.10 by August 8, 2009. Because of the risk of overtopping or failure of the structure, communities should take proper precautions to protect lives and minimize damages in these areas, such as issuing an evacuation plan and encouraging property owners to purchase flood insurance.

CUCAMONGA CREEK



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
76N	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
March 18, 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 28, 2008 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8628H

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 8628 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ONTARIO, CITY OF	060278	8628	H
RANCHO CUCAMONGA, CITY OF	060671	8628	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C8628H

MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

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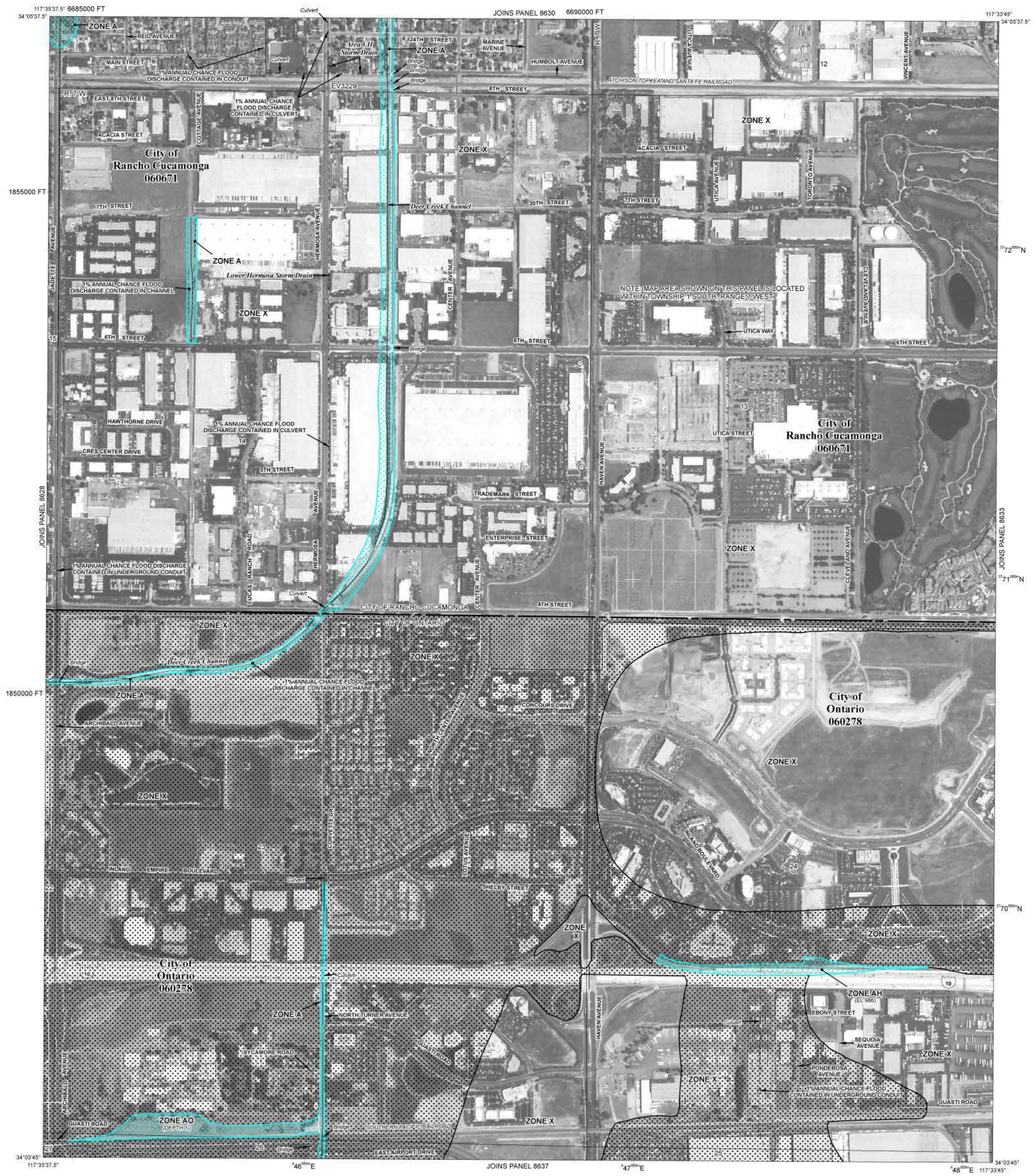
LOWER DEER CREEK CHANNEL



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~ 513 ~~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23)- - - - -(23)	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
2476000mN	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
March 18, 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 28, 2008 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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N

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8629H

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 8629 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ONTARIO, CITY OF	060278	8629	H
RANCHO CUCAMONGA, CITY OF	060671	8629	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C8629H

MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

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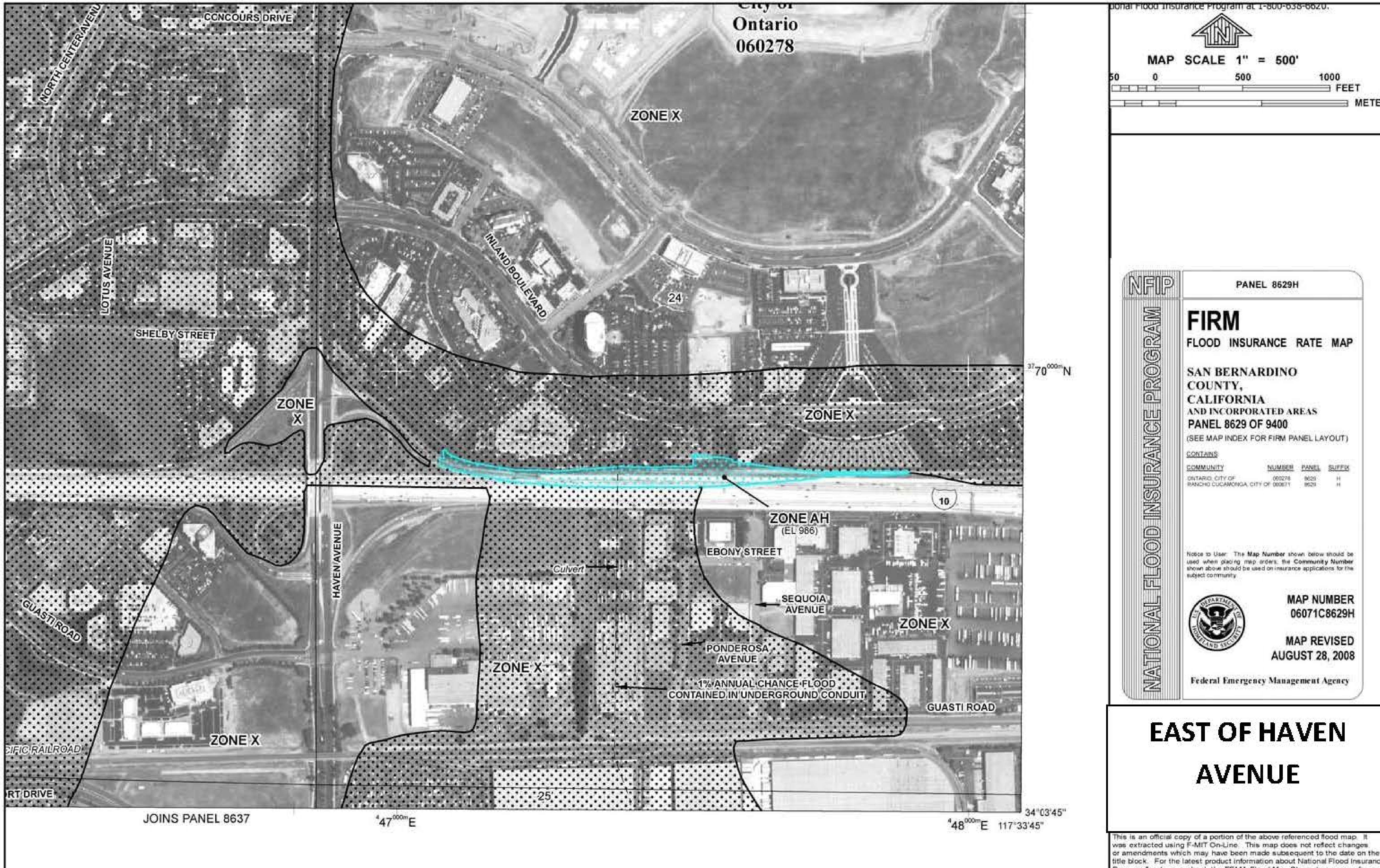

EAST OF HAVEN AVENUE

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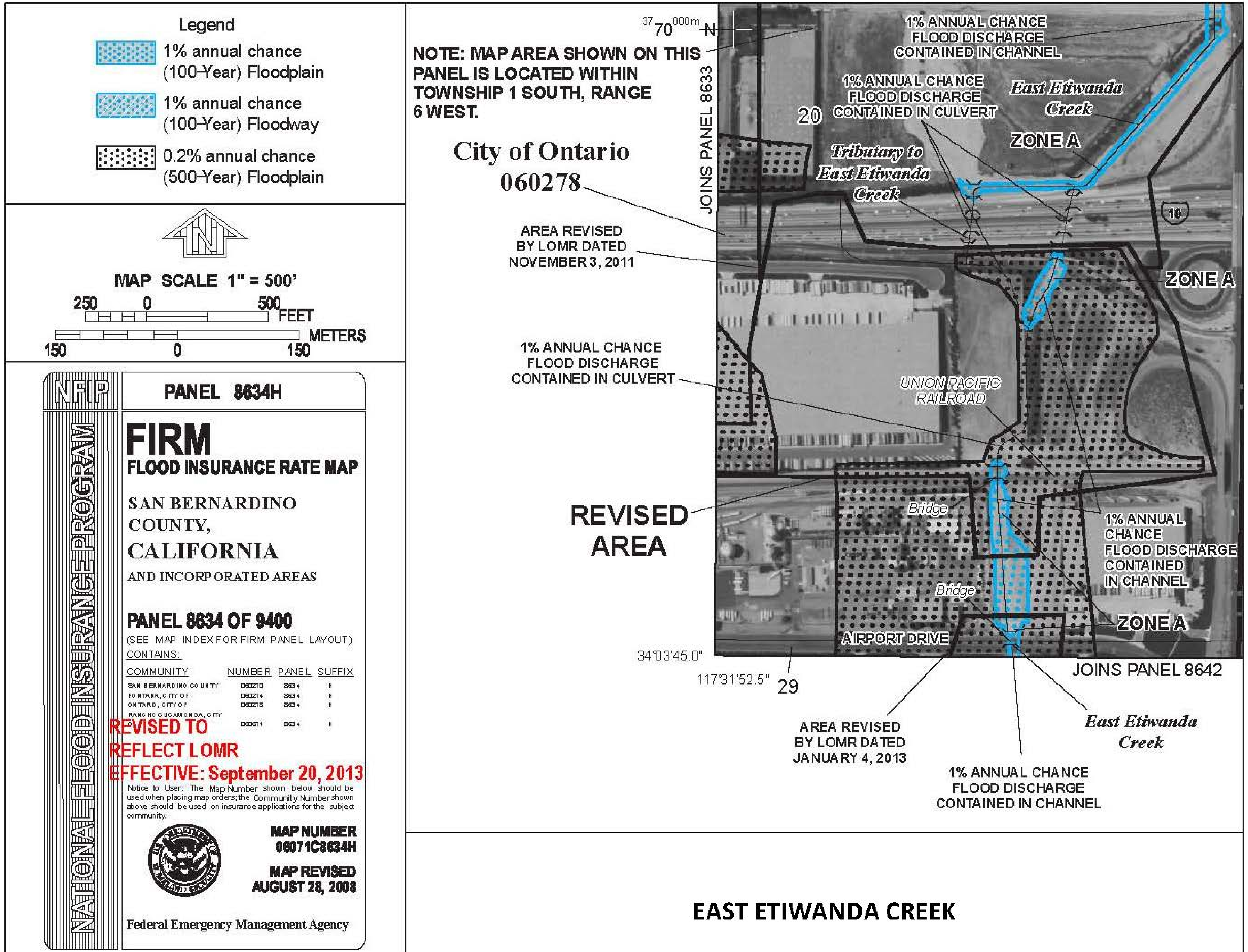

EAST ETIWANDA CREEK

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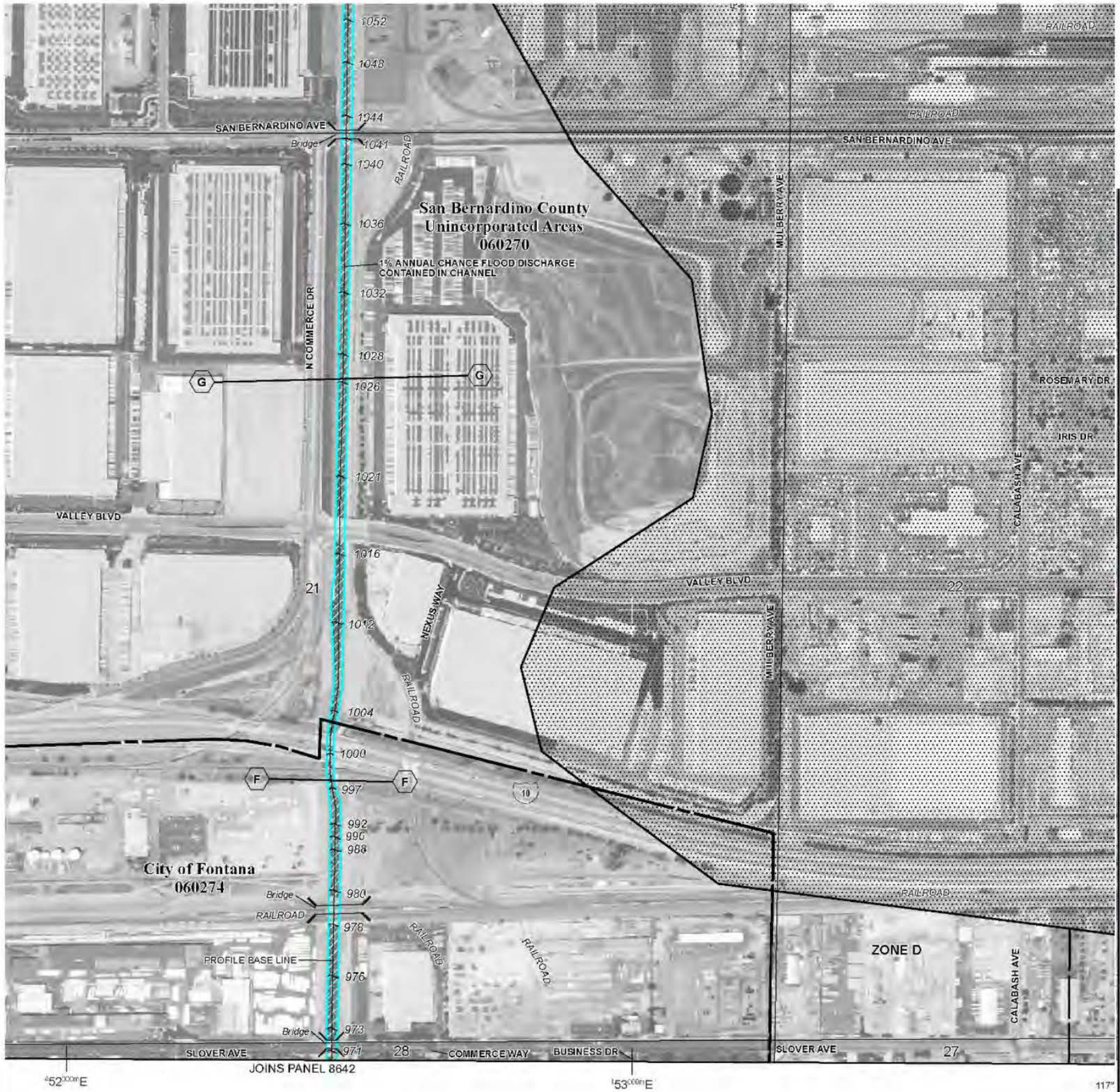

MAP SCALE 1" = 500'

250 0 500 1000 FEET

50 0 150 300 METERS

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)—(A) Cross section line

(23)- - -(23) Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

$^{24}76^{000m}$N — 1000-meter Universal Transverse Mercator grid values, zone 11N

DX5510 x — Bench mark (see explanation in Notes to Users section of this FIRM panel)

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 8634J

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 8634 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FONTANA, CITY OF	060274	8634	J
ONTARIO, CITY OF	060278	8634	J
RANCHO CUCAMONGA, CITY OF	060671	8634	J
SAN BERNARDINO COUNTY	060270	8634	J

PRELIMINARY
FEB 01 2013

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C8634J

MAP REVISED

Federal Emergency Management Agency

SAN SEVAINE CHANNEL

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

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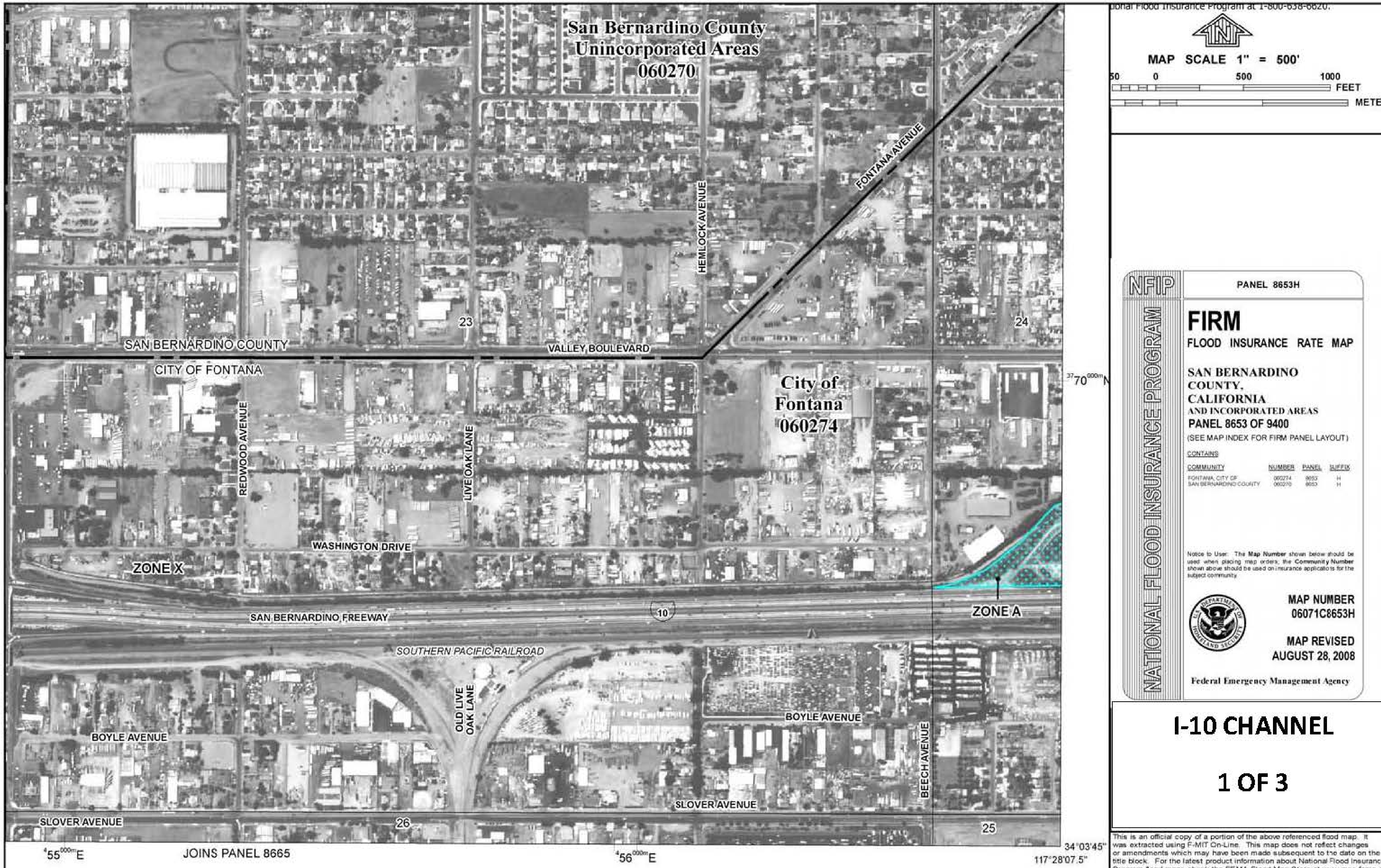
San Bernardino County
Unincorporated Areas
060270
FONTANA AVENUE
HEMLOCK AVENUE
23
24
SAN BERNARDINO COUNTY
VALLEY BOULEVARD
CITY OF FONTANA
City of
Fontana
060274
REDWOOD AVENUE
LIVE OAK LANE
WASHINGTON DRIVE
ZONE X
SAN BERNARDINO FREEWAY
10
ZONE A
SOUTHERN PACIFIC RAILROAD
OLD LIVE OAK LANE
BOYLE AVENUE
BOYLE AVENUE
BEECH AVENUE
SLOVER AVENUE
SLOVER AVENUE
26
25
455000mE
JOINS PANEL 8665
456000mE
3770000mN
34°03'45"
117°28'07.5"
MAP SCALE 1" = 500'
0
500
1000
FEET
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 8653H
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO
COUNTY,
CALIFORNIA
AND INCORPORATED AREAS
PANEL 8653 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
FONTANA, CITY OF 060274 8653 H
SAN BERNARDINO COUNTY 060270 8653 H
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MAP NUMBER
06071C8653H
MAP REVISED
AUGUST 28, 2008
Federal Emergency Management Agency
I-10 CHANNEL
1 OF 3
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

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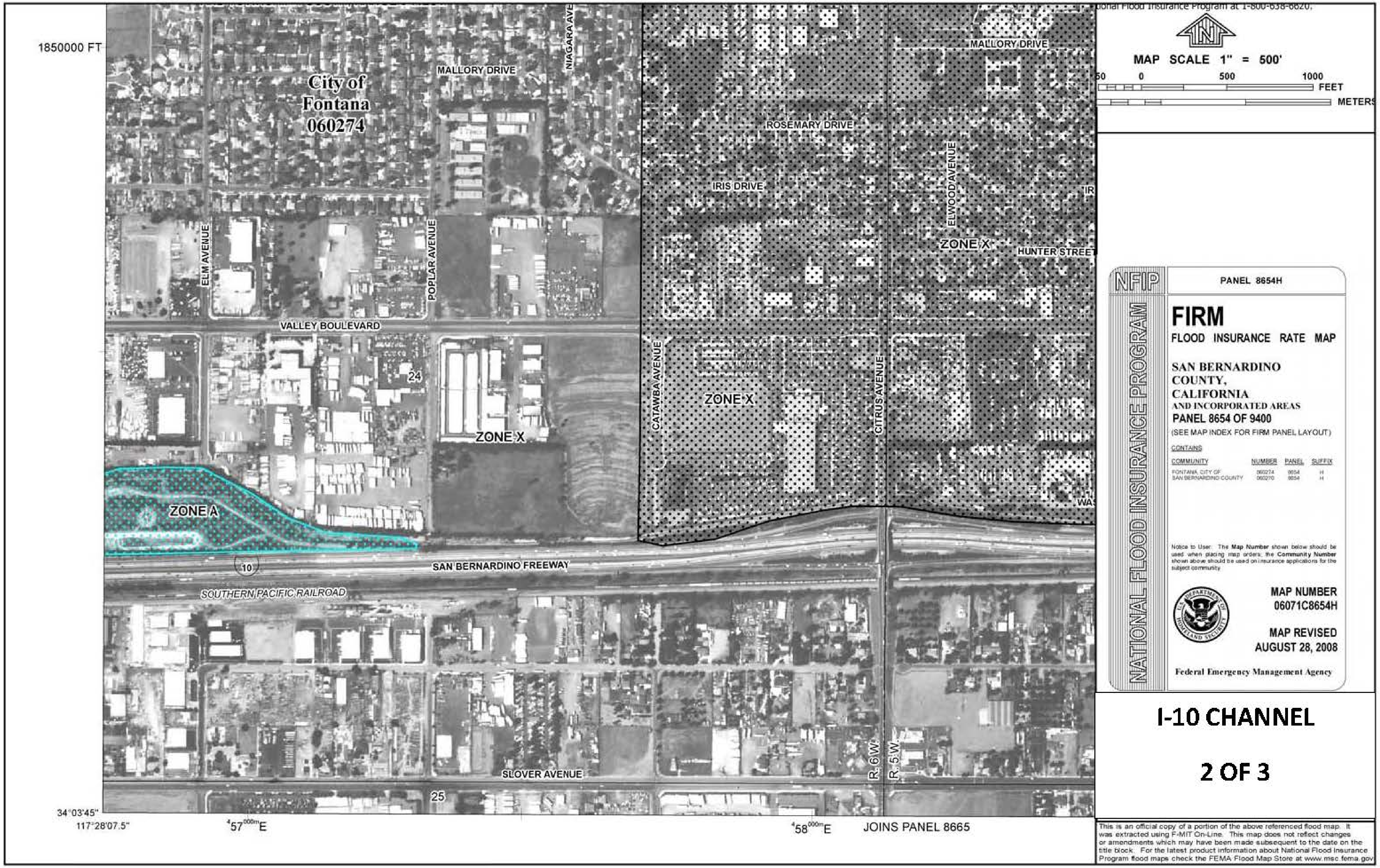
1850000 FT
City of
Fontana
060274
MALLORY DRIVE
NIAGARA AVE
ROSEMARY DRIVE
IRIS DRIVE
ELWOOD AVENUE
ZONE X
HUNTER STREET
ELM AVENUE
POPLAR AVENUE
VALLEY BOULEVARD
24
CATAWBA AVENUE
CITRUS AVENUE
ZONE X
ZONE X
ZONE A
10
SAN BERNARDINO FREEWAY
SOUTHERN PACIFIC RAILROAD
SLOVER AVENUE
R. 6 W.
R. 5 W.
25
34°03'45"
117°28'07.5"
457000mE
458000mE
JOINS PANEL 8665
MAP SCALE 1" = 500'
500
0
500
1000
FEET
METERS
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
PANEL 8654H
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO
COUNTY,
CALIFORNIA
AND INCORPORATED AREAS
PANEL 8654 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS
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SAN BERNARDINO COUNTY 060270 8654 H
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MAP NUMBER
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MAP REVISED
AUGUST 28, 2008
Federal Emergency Management Agency
I-10 CHANNEL
2 OF 3
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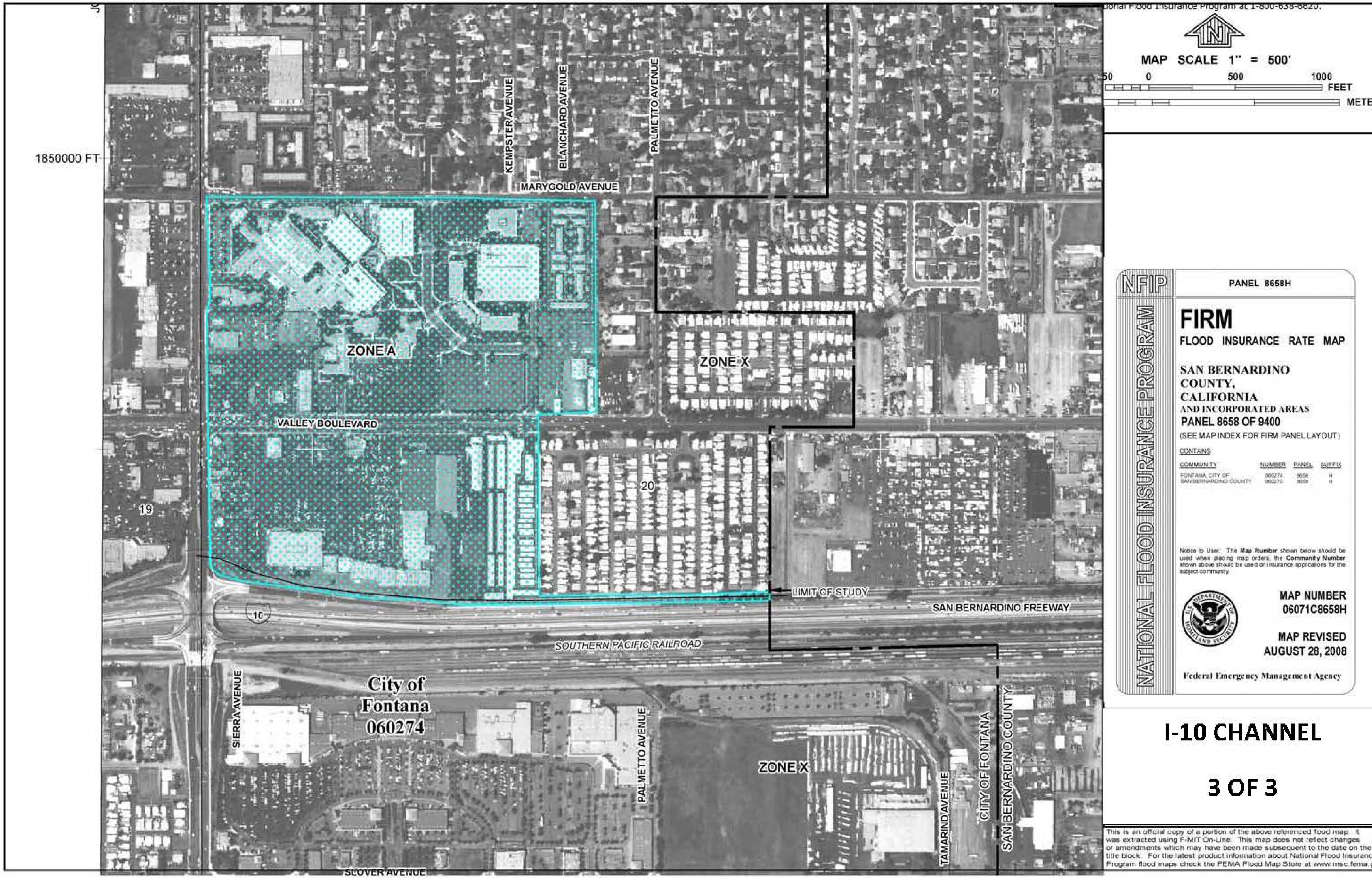
MAP SCALE 1" = 500'
250 0 500 1000
FEET
METERS
1850000 FT
KEMPSTER AVENUE
BLANCHARD AVENUE
PALMETTO AVENUE
MARYGOLD AVENUE
ZONE A
ZONE X
VALLEY BOULEVARD
20
19
LIMIT OF STUDY
SAN BERNARDINO FREEWAY
10
SOUTHERN PACIFIC RAILROAD
City of Fontana 060274
SIERRA AVENUE
PALMETTO AVENUE
ZONE X
TAMARIND AVENUE
CITY OF FONTANA
SAN BERNARDINO COUNTY
SLOVER AVENUE
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 8658H
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 8658 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
FONTANA, CITY OF 060274 8658 H
SAN BERNARDINO COUNTY 060270 8658 H
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER 06071C8658H
MAP REVISED AUGUST 28, 2008
Federal Emergency Management Agency
I-10 CHANNEL
3 OF 3
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MAP SCALE 1" = 500'
0 500 1000
FEET
METERS
NFIP
PANEL 8679H
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 8679 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
NATIONAL FLOOD INSURANCE PROGRAM
MAP NUMBER 06071C8679H
MAP REVISED AUGUST 28, 2008
Federal Emergency Management Agency
Colton Southwest Strom Drain and 11th Street Storm Drain
City of Colton 060273
ZONE X
ZONE AH
(EL 984)
ZONE AE
LIMIT OF STUDY
LIMIT OF DETAILED STUDY
PROFILE BASELINE
Culvert
EV1088
EV1085
EV1090
EV3458
EV3365
EV1099
EV1167
975
973
971
970
969
968
963
960
SOUTHERN PACIFIC RAILROAD
EAST COLTON AVENUE
EAST VALLEY BOULEVARD
NORTH MOUNT VERNON AVENUE
WEST D STREET
WEST E STREET
WEST F STREET
WEST G STREET
WEST H STREET
WEST J STREET
WEST K STREET
WEST L STREET
EAST C STREET
EAST E STREET
SONG BIRD CIRCLE
CAROLE COURT
NORTH 2ND STREET
NORTH 3RD STREET
NORTH 4TH STREET
NORTH 7TH STREET
NORTH 9TH STREET
NORTH 10TH STREET
NORTH 11TH STREET
LA CADENA
SOUTH 3RD STREET
SOUTH 4TH STREET
SOUTH 5TH STREET
SOUTH 7TH STREET
SOUTH 9TH STREET
SOUTH 10TH STREET
M STREET
W M ST
JOINS PANEL 8687
470000mE
471000mE
11th Street Storm Drain

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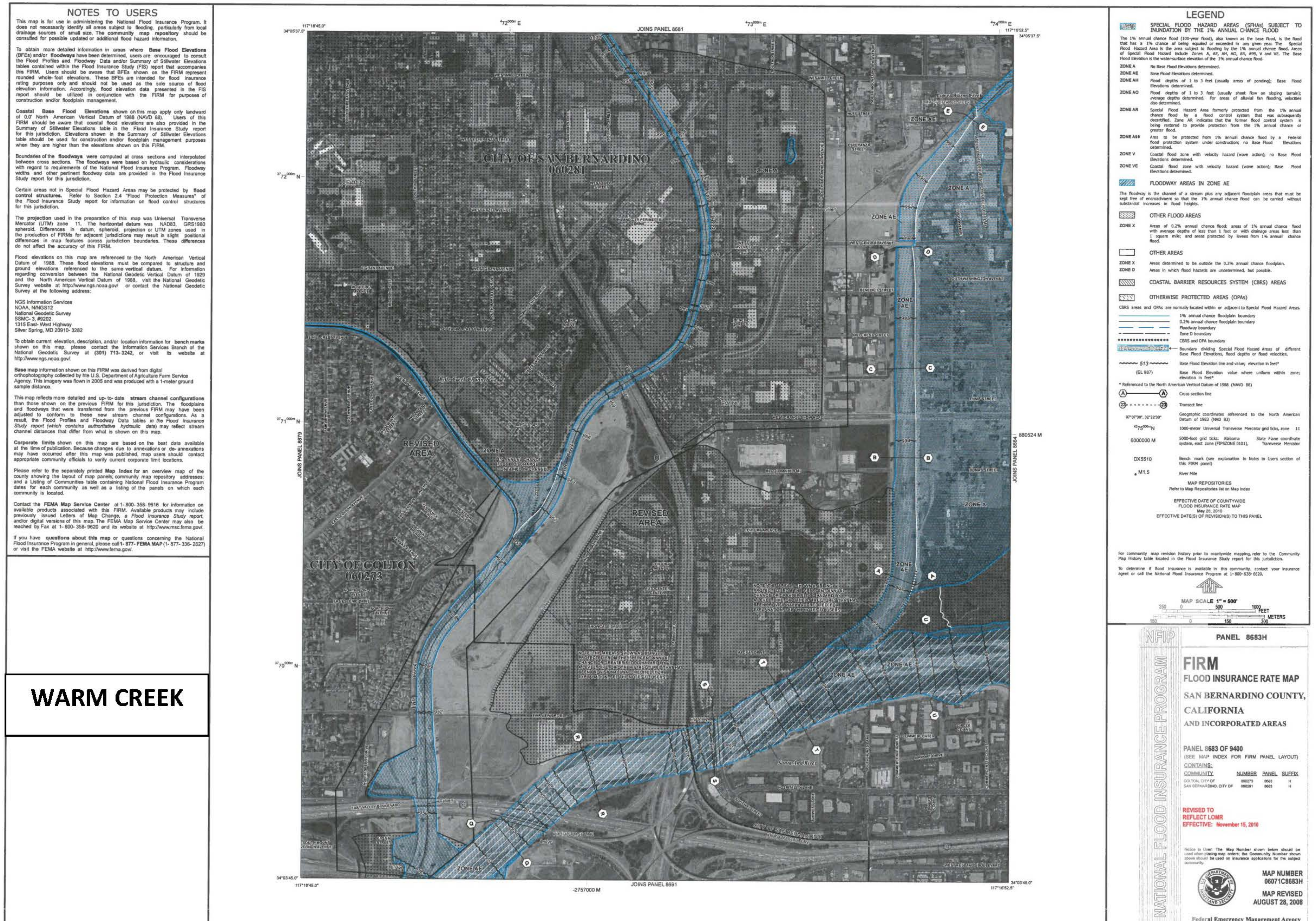
NOTES TO USERS
WARM CREEK
JOINS PANEL 8681
CITY OF SAN BERNARDINO
060281
CITY OF COLTON
060273
REVISED AREA
REVISED AREA
JOINS PANEL 8679
JOINS PANEL 8684
JOINS PANEL 8691
LEGEND
PANEL 8683H
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 8683 OF 9400
REVISED TO REFLECT LOMR EFFECTIVE: November 15, 2010
MAP NUMBER 06071C8683H
MAP REVISED AUGUST 28, 2008
Federal Emergency Management Agency

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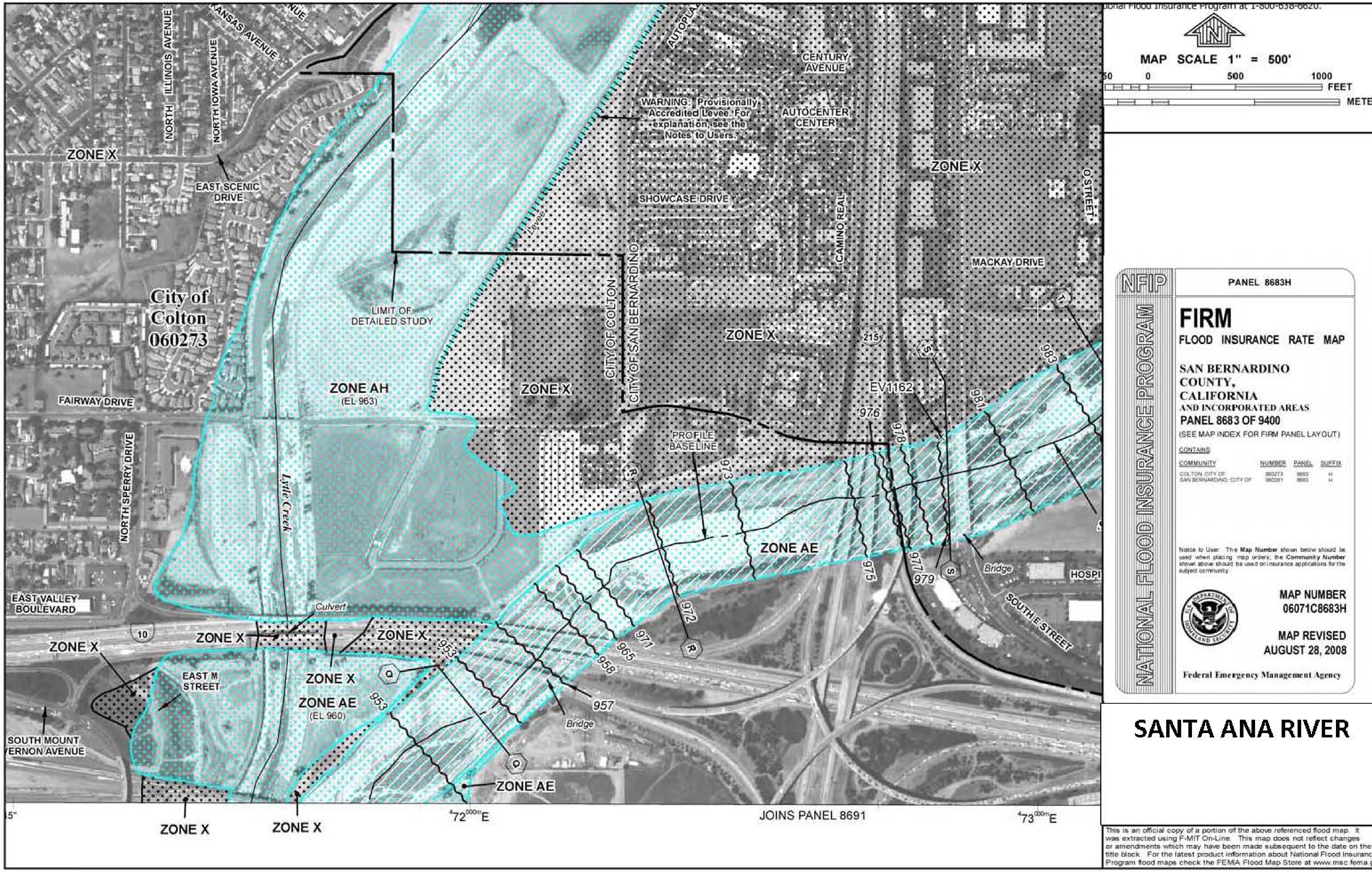
MAP SCALE 1" = 500'
FEET
METERS
ZONE X
EAST SCENIC DRIVE
City of Colton 060273
LIMIT OF DETAILED STUDY
ZONE AH
(EL 963)
FAIRWAY DRIVE
NORTH SPERRY DRIVE
NORTH ILLINOIS AVENUE
NORTH IOWA AVENUE
KANSAS AVENUE
Lytle Creek
EAST VALLEY BOULEVARD
Culvert
ZONE X
ZONE AE
(EL 960)
EAST M STREET
SOUTH MOUNT VERNON AVENUE
WARNING: Provisionally Accredited Levee. For explanation, see the Notes to Users.
CENTURY AVENUE
AUTOCENTER CENTER
SHOWCASE DRIVE
CAMINO REAL
CITY OF COLTON
CITY OF SAN BERNARDINO
PROFILE BASELINE
MACKAY DRIVE
O STREET
EV1162
Bridge
SOUTH E STREET
JOINS PANEL 8691
NFIP
PANEL 8683H
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS
PANEL 8683 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
NATIONAL FLOOD INSURANCE PROGRAM
MAP NUMBER 06071C8683H
MAP REVISED AUGUST 28, 2008
Federal Emergency Management Agency
SANTA ANA RIVER
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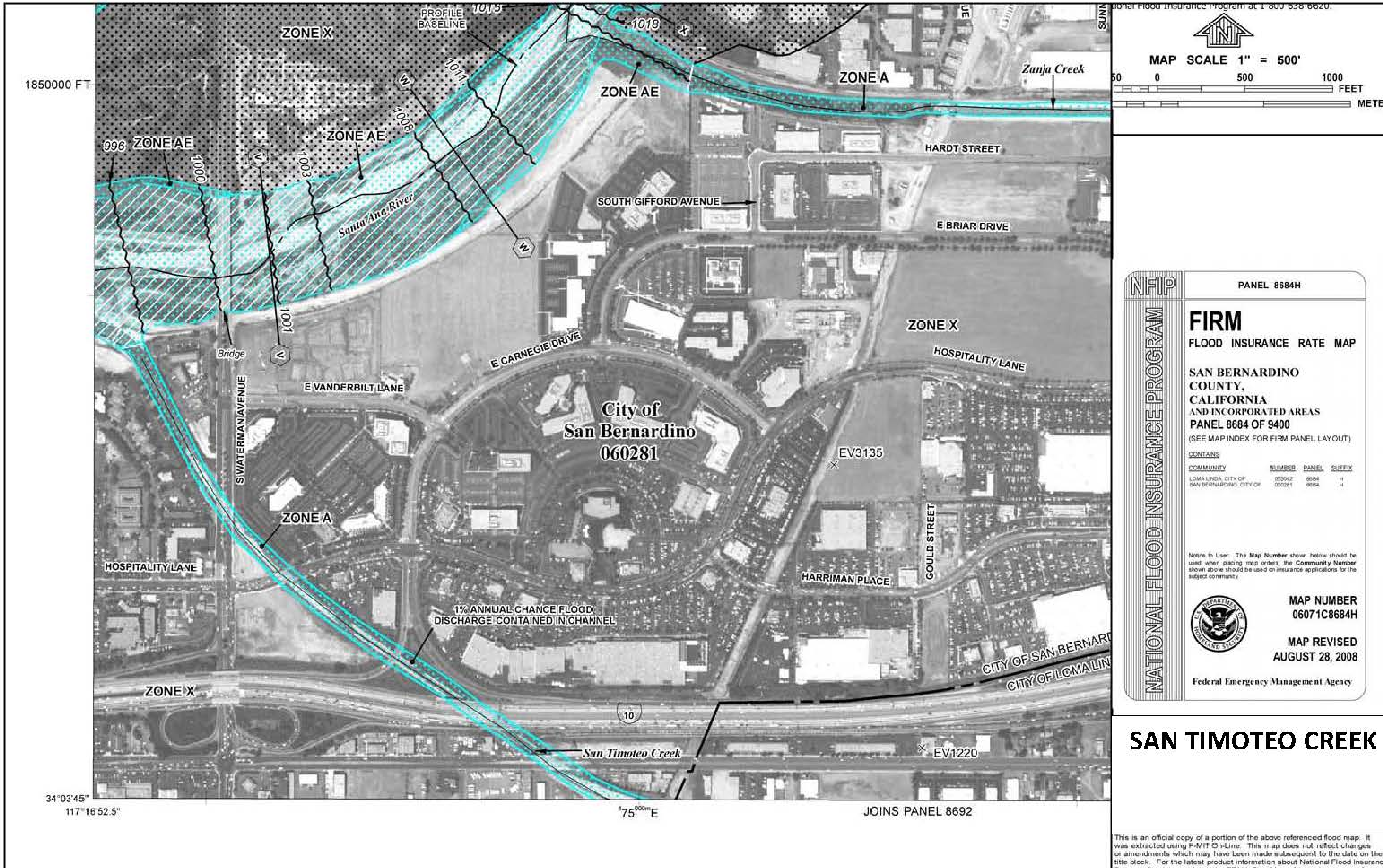
ZONE X
PROFILE BASELINE
1016
1018
1850000 FT
ZONE AE
ZONE A
Zanja Creek
1011
1008
996
ZONE AE
1000
1003
ZONE AE
Santa Ana River
HARDT STREET
SOUTH GIFFORD AVENUE
E BRIAR DRIVE
1001
Bridge
E CARNEGIE DRIVE
ZONE X
HOSPITALITY LANE
E VANDERBILT LANE
S WATERMAN AVENUE
City of
San Bernardino
060281
EV3135
ZONE A
GOULD STREET
HOSPITALITY LANE
HARRIMAN PLACE
1% ANNUAL CHANCE FLOOD
DISCHARGE CONTAINED IN CHANNEL
CITY OF SAN BERNARD
CITY OF LOMA LIN
ZONE X
10
San Timoteo Creek
EV1220
34°03'45"
117°16'52.5"
475000m E
JOINS PANEL 8692
MAP SCALE 1" = 500'
0
500
1000
FEET
METERS
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
PANEL 8684H
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 8684 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
LOMA LINDA, CITY OF 060042 8684 H
SAN BERNARDINO, CITY OF 060281 8684 H
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
06071C8684H
MAP REVISED
AUGUST 28, 2008
Federal Emergency Management Agency
SAN TIMOTEO CREEK
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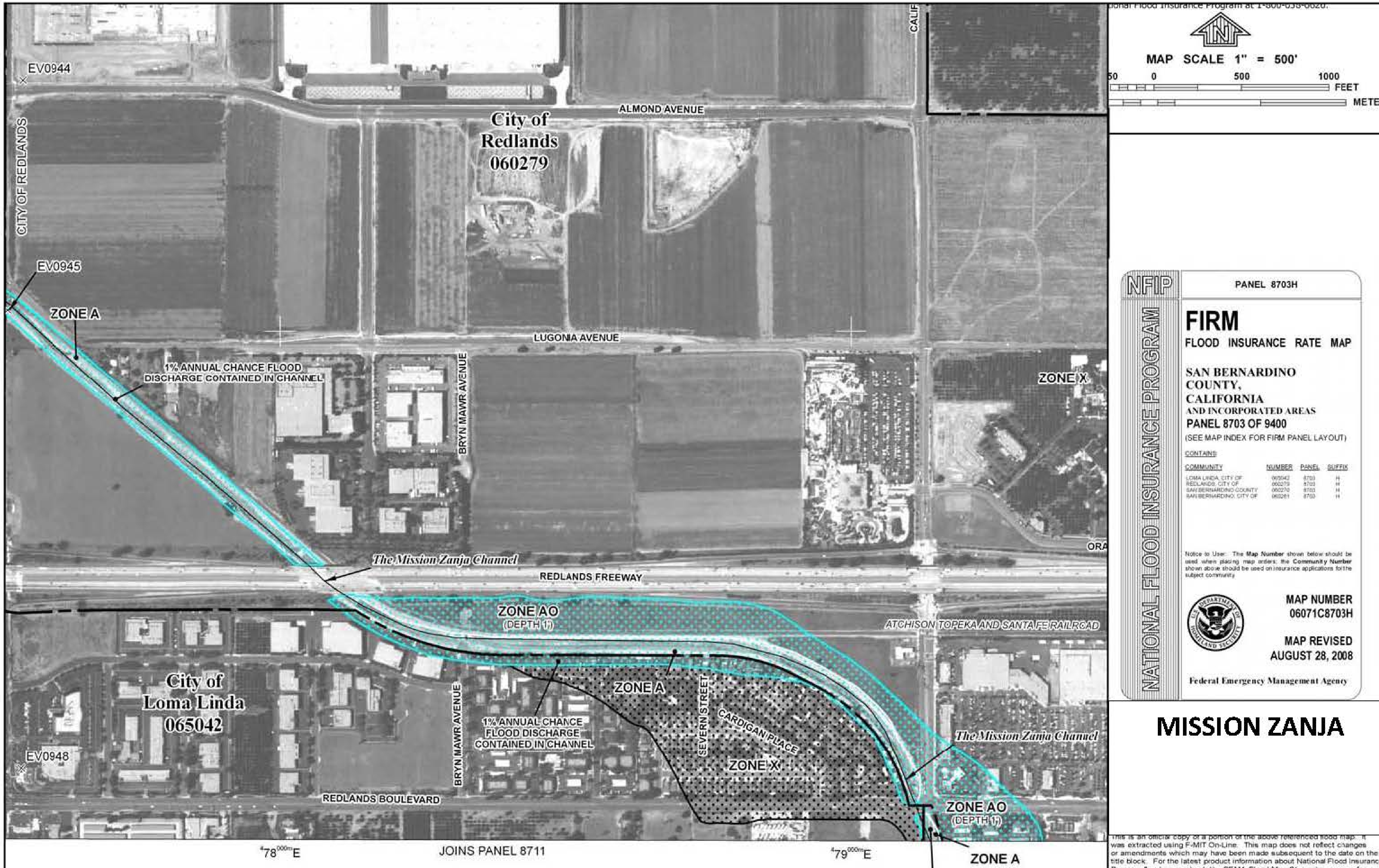
MAP SCALE 1" = 500'
500
0
500
1000
FEET
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 8703H
FIRM
FLOOD INSURANCE RATE MAP
SAN BERNARDINO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 8703 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
MAP NUMBER
06071C8703H
MAP REVISED
AUGUST 28, 2008
Federal Emergency Management Agency
MISSION ZANJA
EV0944
ALMOND AVENUE
City of Redlands 060279
CITY OF REDLANDS
EV0945
ZONE A
LUGONIA AVENUE
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
BRYN MAWR AVENUE
ZONE X
The Mission Zanja Channel
REDLANDS FREEWAY
ZONE AO
(DEPTH 1')
ATCHISON TOPEKA AND SANTA FE RAILROAD
City of Loma Linda 065042
ZONE A
SEVERN STREET
CARDIGAN PLACE
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
ZONE X
EV0948
The Mission Zanja Channel
REDLANDS BOULEVARD
ZONE AO
(DEPTH 1')
^{4}78^{000m}E
JOINS PANEL 8711
^{4}79^{000m}E
ZONE A
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

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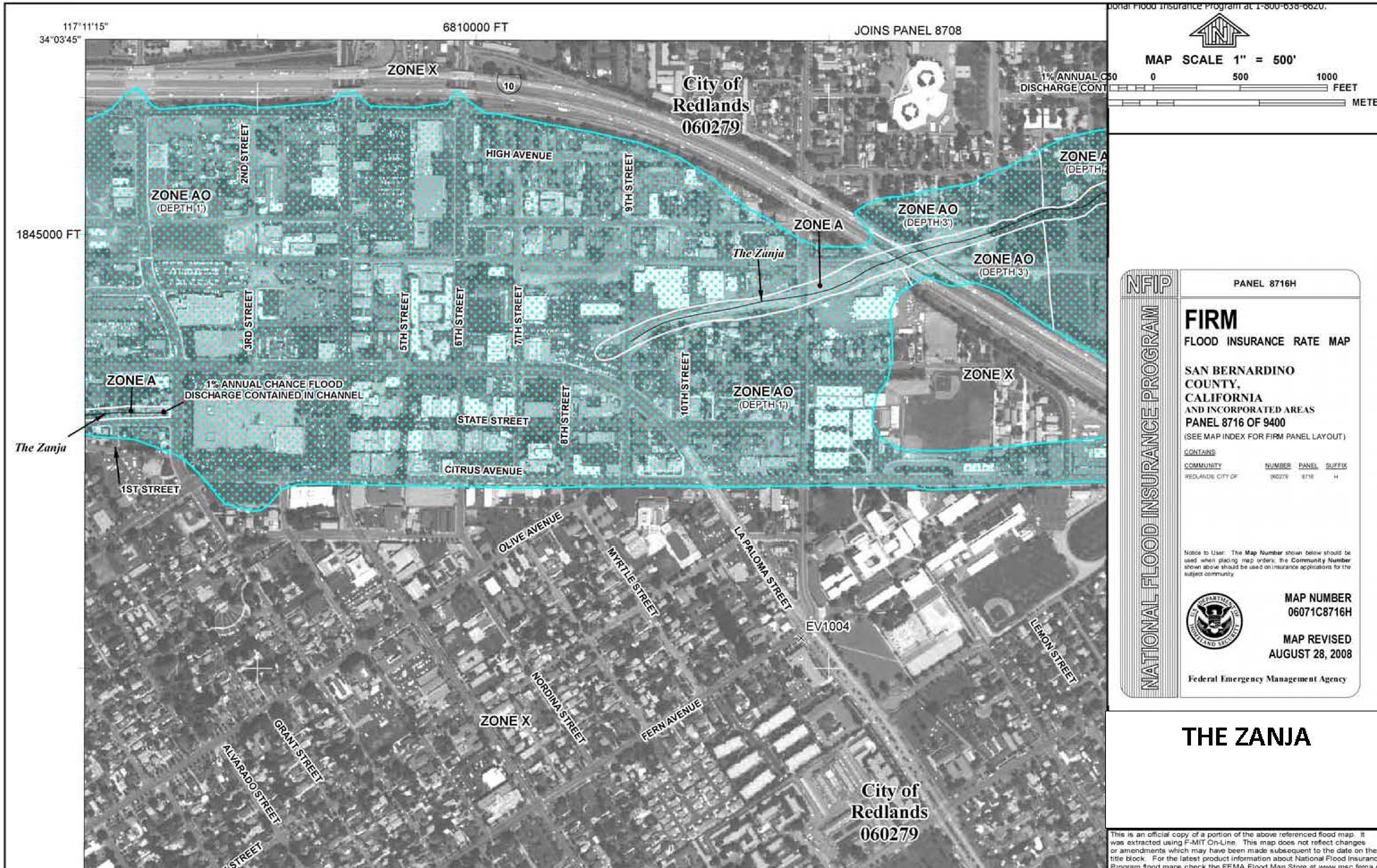

THE ZANJA

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

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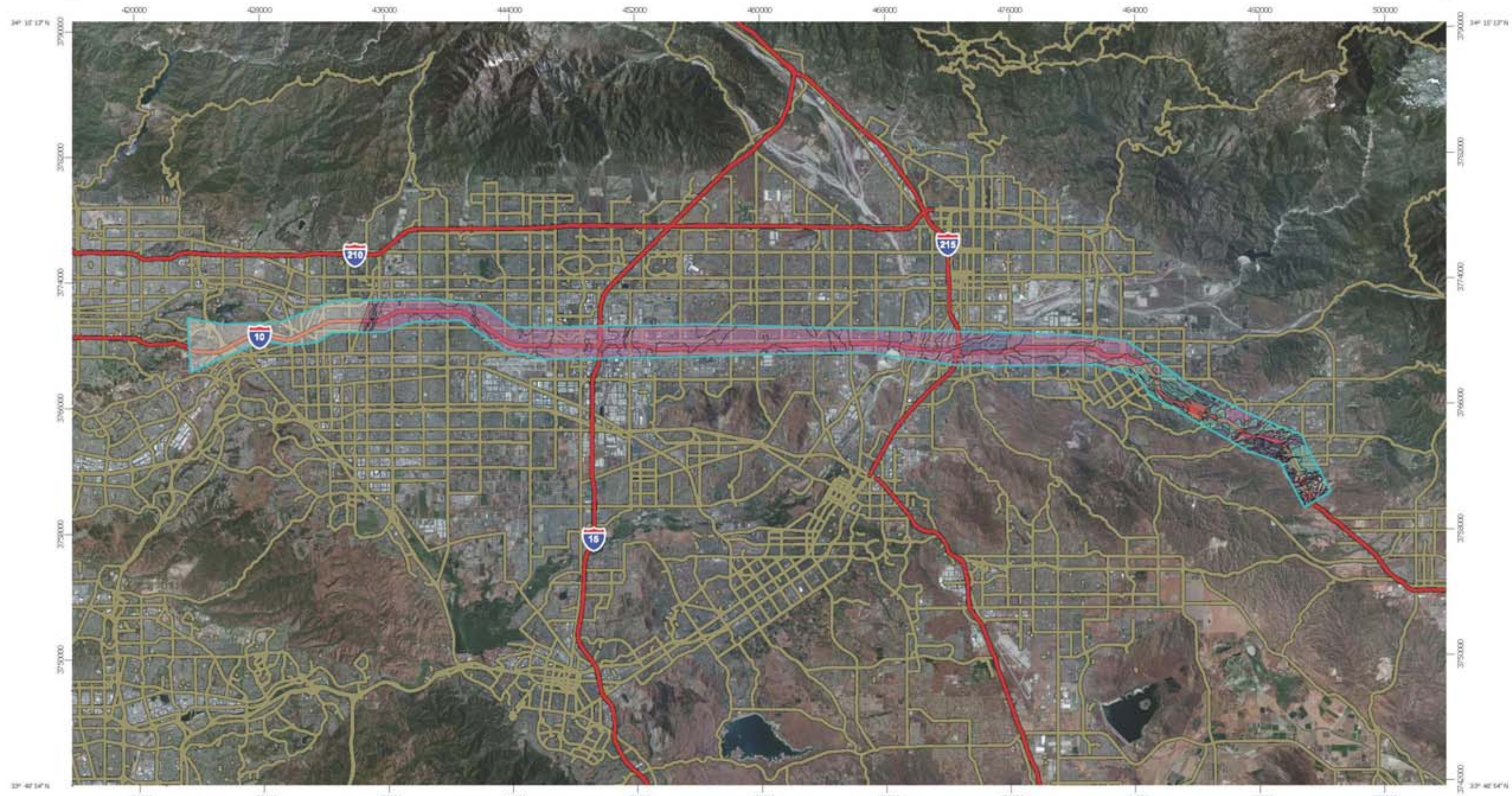
Appendix D Soil/HSG Map

Hydrologic Soil Group—Los Angeles County, California, Southeastern Part; San Bernardino County Southwestern Part, California; and Western Riverside Area, California
(I-10 Hydrologic Soils Group)



Map Scale: 1:237,000 if printed on B landscape (17" x 11") sheet.

Meters: 0, 3500, 7000, 14000, 21000

Feet: 0, 10000, 20000, 40000, 60000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

4/25/2014
Page 1 of 6

Hydrologic Soil Group—Los Angeles County, California, Southeastern Part; San Bernardino County Southwestern Part, California; and Western Riverside Area, California
(I-10 Hydrologic Soils Group)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Los Angeles County, California, Southeastern Part
Survey Area Data: Version 1, Jan 2, 2014

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 5, Dec 17, 2013

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 6, Dec 9, 2013

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2001—Oct 29, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Los Angeles County, California, Southeastern Part (CA696)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
NOTCOM	No Digital Data Available		5,560.0	15.5%
Subtotals for Soil Survey Area			**5,560.0**	**15.5%**
Totals for Area of Interest			**35,918.4**	**100.0%**

Hydrologic Soil Group— Summary by Map Unit — San Bernardino County Southwestern Part, California (CA677)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cr	Cieneba-Rock outcrop complex	D	288.4	0.8%
Db	Delhi fine sand	A	3,223.8	9.0%
GP	Quarries and Pits soils		128.8	0.4%
Gr	Grangeville fine sandy loam	A	261.5	0.7%
Gs	Grangeville fine sandy loam, saline-alkali	B	616.6	1.7%
GtC	Greenfield sandy loam, 2 to 9 percent slopes	A	454.5	1.3%
HaC	Hanford coarse sandy loam, 2 to 9 percent slopes	A	2,475.9	6.9%
HaD	Hanford coarse sandy loam, 9 to 15 percent slopes	A	8.0	0.0%
HbA	Hanford sandy loam, 0 to 2 percent slopes	A	1,360.8	3.8%
Ps	Psamments, Fluvents and Frequently flooded soils	A	485.0	1.4%
RmC	Ramona sandy loam, 2 to 9 percent slopes	C	1,929.9	5.4%
RmD	Ramona sandy loam, 9 to 15 percent slopes	C	683.3	1.9%
RmE2	Ramona sandy loam, 15 to 30 percent slopes, eroded	C	662.1	1.8%
SaD	San Emigdio sandy loam, 9 to 15 percent slopes	A	103.8	0.3%
SbC	San Emigdio gravelly sandy loam, 2 to 9 percent slopes	A	117.9	0.3%
ScA	San Emigdio fine sandy loam, 0 to 2 percent slopes	A	1,039.1	2.9%

Hydrologic Soil Group— Summary by Map Unit — San Bernardino County Southwestern Part, California (CA677)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ScC	San Emigdio fine sandy loam, 2 to 9 percent slopes	A	279.2	0.8%
SgF2	San Timoteo loam, 30 to 50 percent slopes, eroded	C	280.1	0.8%
ShF	Saugus sandy loam, 30 to 50 percent slopes	B	547.3	1.5%
SoC	Soboba gravelly loamy sand, 0 to 9 percent slopes	A	113.3	0.3%
SpC	Soboba stony loamy sand, 2 to 9 percent slopes	A	148.5	0.4%
TuB	Tujunga loamy sand, 0 to 5 percent slopes	A	8,210.4	22.9%
TvC	Tujunga gravelly loamy sand, 0 to 9 percent slopes	A	5,364.3	14.9%
W	Water		23.4	0.1%
Subtotals for Soil Survey Area			**28,806.0**	**80.2%**
Totals for Area of Interest			**35,918.4**	**100.0%**

Hydrologic Soil Group— Summary by Map Unit — Western Riverside Area, California (CA679)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Ce	Chino silt loam, drained	C/D	0.5	0.0%
GpB	Grangeville sandy loam, drained, saline-alkali, 0 to 5 percent slopes	A/D	10.8	0.0%
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	A	2.6	0.0%
GyD2	Greenfield sandy loam, 8 to 15 percent slopes, eroded	A	13.7	0.0%
GyE2	Greenfield sandy loam, 15 to 25 percent slopes, eroded	A	2.5	0.0%
HaC	Hanford loamy fine sand, 0 to 8 percent slopes	A	15.1	0.0%
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	A	203.3	0.6%
HcD2	Hanford coarse sandy loam, 8 to 15 percent slopes, erod ed	A	54.3	0.2%
PIB	Placentia fine sandy loam, 0 to 5 percent slopes	D	23.5	0.1%

Hydrologic Soil Group— Summary by Map Unit — Western Riverside Area, California (CA679)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
PID	Placentia fine sandy loam, 5 to 15 percent slopes	D	10.6	0.0%
RaB2	Ramona sandy loam, 2 to 5 percent slopes, eroded	C	324.0	0.9%
RaB3	Ramona sandy loam, 0 to 5 percent slopes, severely erod ed	C	2.1	0.0%
RaC3	Ramona sandy loam, 5 to 8 percent slopes, severely erod ed	C	33.7	0.1%
RaD2	Ramona sandy loam, 8 to 15 percent slopes, eroded	C	10.4	0.0%
RaD3	Ramona sandy loam, 8 to 15 percent slopes, severely ero ded	C	5.6	0.0%
RdD2	Ramona sandy loam, moderately deep, 8 to 15 percent slo pes, eroded	D	21.4	0.1%
RdE3	Ramona sandy loam, moderately deep, 15 to 25 percent sl opes, severely eroded	D	3.0	0.0%
ReC2	Ramona very fine sandy loam, 0 to 8 percent slopes, ero ded	C	264.5	0.7%
RfC2	Ramona very fine sandy loam, moderately deep, 0 to 8 pe rcent slopes, eroded	D	0.2	0.0%
SeC2	San Emigdio fine sandy loam, 2 to 8 percent slopes, ero ded	A	5.0	0.0%
SeD2	San Emigdio fine sandy loam, 8 to 15 percent slopes, er oded	A	2.1	0.0%
SgC	San Emigdio loam, 2 to 8 percent slopes	A	5.9	0.0%
SgD2	San Emigdio loam, 8 to 15 percent slopes, eroded	A	1.1	0.0%
ShF	Saugus sandy loam, 30 to 50 percent slopes	B	8.5	0.0%
SmE2	San Timoteo loam, 8 to 25 percent slopes, eroded	B	1.5	0.0%
SmF2	San Timoteo loam, 25 to 50 percent slopes, eroded	B	105.5	0.3%

Hydrologic Soil Group— Summary by Map Unit — Western Riverside Area, California (CA679)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
TeG	Terrace escarpments		381.1	1.1%
TvC	Tujunga loamy sand, channeled, 0 to 8 percent slopes	A	40.1	0.1%
Subtotals for Soil Survey Area			**1,552.4**	**4.3%**
Totals for Area of Interest			**35,918.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix E Santa Ana RWQCB Bioassessment

Table 4. SCC-IBI metrics and overall rating for each location sampled during the 2011 bioassessment survey. The eight sites shown in italics had fewer than 450 BMIs collected.

Site/Replicate	EPT Taxa	Predator Taxa	Coleoptera Taxa	Percent Non-Insect Taxa	Percent Intolerant Individuals	Percent Tolerant Taxa	Percent Collector Individuals	IBI	IBI (100)	IBI Rating
802SWC020 (rep 1)	7	9	4	8	8	9	7	52	74	Good
801NLC105 (rep 1)	1	0	0	10	4	8	2	25	36	Poor
802SJR116 (rep 1)	0	0	0	0	0	0	0	0	0	Very Poor
801RB8197(rep 1)	1	0	0	8	0	6	0	15	21	Poor
801RB8254 (rep 1)	7	6	5	8	10	8	5	49	70	Good
801RB8254 (rep 2)	4	2	0	7	7	8	5	33	47	Fair
801RB8312 (rep 1)	2	1	7	7	0	5	10	32	46	Fair
801RB8339 (rep 1)	3	1	0	4	0	6	5	19	27	Poor
801RB8404 (rep 1)	0	0	0	2	0	5	0	7	10	Very Poor
801RB8418 (rep 1)	0	3	2	2	0	0	2	9	13	Very Poor
801RB8439 (rep 1)	0	0	0	0	0	0	1	1	1	Very Poor
802SJC453 (rep 1)	0	2	8	8	1	4	1	24	34	Poor
801RB8467 (rep 1)	4	1	0	1	0	1	6	13	19	Very Poor
801RB8483 (rep 1)	0	6	4	8	0	5	0	23	33	Poor
801RB8494 (rep 1)	3	2	7	9	0	7	4	32	46	Fair
801RB8501 (rep 1)	0	0	0	8	1	7	0	16	23	Poor
801RB8511 (rep 1)	2	3	4	4	0	2	1	16	23	Poor
801RB8512 (rep 1)	3	3	4	7	0	7	0	24	34	Poor
801RB8512 (rep 2)	3	2	4	6	0	7	0	22	31	Poor
801RB8521 (rep 1)	1	0	0	2	0	2	0	5	7	Very Poor
801SAR528 (rep 1)	3	0	0	4	0	7	0	14	20	Poor
801RB8533 (rep 1)	1	0	0	8	1	9	0	19	27	Poor
801RB8549 (rep 1)	1	0	0	1	0	0	0	2	3	Very Poor
801RB8558 (rep 1)	1	0	0	1	0	2	1	5	7	Very Poor
801RB8566 (rep 1)	3	0	0	7	0	5	8	23	33	Poor
801RB8566 (rep 2)	1	0	0	4	0	5	5	15	21	Poor
801RB8575 (rep 1)	2	1	0	10	1	9	0	23	33	Poor
801RB8590 (rep 1)	5	1	0	9	2	9	0	26	37	Poor
801RB8593 (rep 1)	0	0	0	0	0	0	5	5	7	Very Poor
801RB8594 (rep 1)	3	0	2	8	0	7	2	22	31	Poor
801RB8607 (rep 1)	5	7	2	7	4	8	1	34	49	Fair
801RB8618 (rep 1)	5	5	2	5	5	7	6	35	50	Fair
801RB8622 (rep 1)	1	1	0	2	0	2	10	16	23	Poor
801RB8629 (rep 1)	1	0	2	6	0	4	1	14	20	Poor
845RB8633 (rep 1)	0	0	0	0	0	0	2	2	3	Very Poor
801S00791 (rep 1)	1	0	2	10	0	7	0	20	29	Poor
801S00791 (rep 2)	0	0	2	9	0	6	0	17	24	Poor
801S00903 (rep 1)	5	3	0	9	3	10	0	30	43	Fair
801S01367 (rep 1)	6	10	5	8	8	6	6	49	70	Good

Table 5. Physical habitat characterization and overall rating for each location sampled during the 2011 bioassessment survey.

Site	Epifaunal substrate	Sediment Deposition	Channel Alteration	Dominant landuse/landcover	Overall Habitat Characterization score (0 to 60)	Overall Habitat Characterization Score Rating	IBI (100)
802SWC020	19	19	20	Forest	58	Optimal	74
801NLC105	6	7	15	Suburban/Town	28	Marginal	36
802SJR116	13	18	14	Other	45	Suboptimal	0
801RB8197	2	19	1	Urban/Industrial	22	Marginal	21
801RB8254	18	16	20	Forest	54	Optimal	70
801RB8312	8	8	11	Suburban/Town	27	Marginal	46
801RB8339	16	15	18	Forest	49	Optimal	27
801RB8404	1	19	0	Urban/Industrial	20	Marginal	10
801RB8418	6	5	7	Suburban/Town	18	Marginal	13
801RB8439	5	19	0	Suburban/Town	24	Marginal	1
802SJC453	10	10	18	Forest	38	Suboptimal	34
801RB8467	12	11	15	Other	38	Suboptimal	19
801RB8483	17	12	20	Other	49	Optimal	33
801RB8494	14	15	12	Suburban/Town	41	Suboptimal	46
801RB8501	14	12	12	Forest	38	Suboptimal	23
801RB8511	11	16	16	Range	43	Suboptimal	23
801RB8512	16	18	20	Forest	54	Optimal	34
801RB8521	2	20	0	Urban/Industrial	22	Marginal	7
801SAR528	12	12	11	Suburban/Town	35	Suboptimal	20
801RB8533	9	15	16	Forest	40	Suboptimal	27
801RB8549	6	8	0	Suburban/Town	14	Poor	3
801RB8558	5	19	0	Suburban/Town	24	Marginal	7
801RB8566	1	20	0	Range	21	Marginal	33
801RB8575	12	16	20	Forest	48	Optimal	33
801RB8590	18	19	20	Forest	57	Optimal	37
801RB8593	9	5	0	Suburban/Town	14	Poor	7
801RB8594	14	16	11	Suburban/Town	41	Suboptimal	31
801RB8607	19	19	20	Forest	58	Optimal	49
801RB8618	11	19	20	Forest	50	Optimal	50
801RB8622	17	12	19	Suburban/Town	48	Optimal	23
801RB8629	18	13	19	Suburban/Town	50	Optimal	20
845RB8633	0	19	0	Urban/Industrial	19	Marginal	3
801S00791	8	10	16	Forest	34	Suboptimal	29
801S00903	19	9	19	Forest	47	Optimal	43
801S01367	19	17	20	Forest	56	Optimal	70
801S01523	11	14	20	Forest	45	Suboptimal	27
801S01559	9	15	13	Forest	37	Suboptimal	26
801S01655	12	15	15	Forest	42	Suboptimal	33
801S02123	8	6	8	Urban/Industrial	22	Marginal	14
801S02464	18	15	18	Forest	51	Optimal	39

Appendix C1. Water chemistry data from IIRMES (including field and lab analyses). "DUP" denotes a field replicate; red values indicate a "Not Detectable" reading, and blue values indicate a"Detectable, but Not Quantifiable" reading. Dissolved oxygen, pH, water temperature, and specific conductance were measured in the field while the rest of the analytes were measured in the lab.

Site	Lab Replicate	Field Replicate	Dissolved O2 (mg/L)	Field pH	Water Temp. (°C)	Conductivity (µS/cm)	Alkalinity (T)	Ammonia-N (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Dissolved Orthophosphate (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)
Reporting Limits						1	5	0.03	0.05	0.05	0.01	5	2
802SWC020	1	1	12.06	6.93	9.9	700	28.6	0.05	0.03	0.08	0.02	4.8	-88
801NLC105	1	1	10.61	7.93	13.66	393	146.9	-88	0.3	0.02	-88	13.8	3.9
802SJR116	1	1	8.84	7.62	20.53	2011	299.9	-88	0.23	-88	0.28	10	6.3
801RB8197	1	1	20.65	9.45	31.18	453	44.9	0.4	0.03	-88	0.15	30	3.9
801RB8254	1	1	15.48	6.55	14.61	170	91.8	-88	0.04	-88	-88	7.5	5.2
801RB8254 DUP	1	2	15.48	6.55	14.61	170	89.8	-88	0.04	-88	-88	2.6	2.9
801RB8312	1	1	8.84	8.06	21.68	1034	191.8	-88	11.26	-88	2.09	58.4	6.9
801RB8339	1	1	16.97	7.28	23.1	1188	222.4	-88	0.33	-88	0.44	5.3	4.4
801RB8404	1	1	7.1	9.83	34.78	279	80	0.05	0.25	0.02	0.09	9	-88
801RB8418	1	1	9.3	8.43	25.12	978	167.3	0.19	7.84	0.42	0.02	6.5	1.1
801RB8439	1	1	8.12	8.07	26.14	1171	134	0.2	0.82	0.21	0.1	11.2	11.3
802SJC453	1	1	9.56	7.57	29.05	279	108.1	0.1	10.19	0.39	0.1	-88	-88
801RB8467	1	1	9.95	6.89	19.65	117	204	-88	0.87	-88	0.4	2	3.3
801RB8483	1	1	9.25	6.92	15.33	699	224	-88	2.04	0.17	0.08	2.8	1.6
801RB8494	1	1	6.72	7.59	28.76	1012	200	0.03	6.87	0.01	1.8	62	1.8
801RB8501	1	1	13.05	5.1	16.24	184	80	-88	0.18	-88	-88	1.4	-88
801RB8511	1	1	7.36	7.07	21.38	788	230	-88	0.62	0.16	0.13	1.6	1
801RB8512	1	1	16.82	5.34	14.41	177	83.6	-88	0.08	-88	-88	-88	2.1
801RB8512 DUP	1	2	16.82	5.34	14.41	177	87.7	-88	0.09	-88	-88	2	2.7
801RB8521	1	1	8.95	10.2	29.26	1000	58	0.25	0.3	0.1	0.23	15.2	23.5
801SAR528	1	1	7.87	7.39	23.28	864	175.4	-88	2.87	0.12	0.54	162.8	2.5
801RB8533	1	1	13.46	6.34	15.23	255	112	-88	0.31	0.06	0.25	2.2	1.7
801RB8549	1	1	11.94	7.61	23.65	2603	246	-88	2.79	0.13	-88	4	1.2
801RB8558	1	1	13.54	8.34	23.45	1175	132	0.11	0.8	-88	0.12	20.4	20.3
801RB8566	1	1	22.2	10.13	29.28	604	124	0.3	0.76	0.04	0.16	13.1	2.3
801RB8566 DUP	1	2	22.2	10.13	29.28	604	126	0.32	0.73	0.04	0.14	12.4	2.2
801RB8575	1	1	97.1	5.07	17.4	220	100	-88	0.3	0.06	0.16	1.8	2.4
801RB8590	1	1	28.47	6.24	8.54	96	46.9	-88	-88	-88	-88	6.7	3.6
801RB8593	1	1	12.77	6.67	19.49	342	302	-88	3.62	0.46	-88	29.8	4.7
801RB8594	1	1	7.1	7.14	24.8	528	210	-88	7.02	0.02	1.46	209.4	2.6
801RB8607	1	1	16.2	7.8	10.21	117	51	-88	-88	-88	-88	9.5	3
801RB8618	1	1	10.34	5.69	12.99	420	216.2	-88	0.02	-88	0.01	14.4	7.4
801RB8622	1	1	9.61	6.97	14.41	2021	456	-88	0.96	0.12	0.08	3.6	-88
801RB8629	1	1	10.56	7.62	18.09	728	230.5	-88	0.84	-88	0.76	12.8	7.7
845RB8633	1	1	13.29	9.97	34.37	1346	34.7	0.22	1.51	0.05	0.01	38.2	12.8

Appendix F Los Angeles County DPW Monitoring Data

Table 4-1. Summary of Hydrologic Data for Mass Emission Stations

Event ID	Station Name	WRD RAIN GAUGE	WRD FLOW GAUGE	Total Precipitation (in.)	Rainfall Duration (hrs)	Avg. Rainfall Intensity (in./hr)	Base Flow Volume (acre-ft)	Total Runoff Volume (acre-ft)	High Flow Suspension of Bacteria WQO***
2012-13Event04	L.A. River at Wardlow (S10)	314	F319-R	0.77	11:59	0.06	488.8	6,685.9	Yes
2012-13Event04	Dominguez Channel (S28)	315	manual*	0.80	21:37	0.04	7.9	39.6	Yes
2012-13Event04	Malibu Creek (S02)	319	F130-R	0.19	0:15	0.76	NS	NS	NA
2012-13Event04	Coyote Creek (S13)	1140**	F354-R	0.04	5:52	0.01	49.0	182.5	No
2012-13Event04	San Gabriel River (S14)	416	F263C-R	0.39	3:24	0.11	3.1	172.2	No
2012-13Event04	Ballona Creek (S01)	370	F38C-R	NA	NA	NA	NS	NS	NA
2012-13Event04	Santa Clara River (S29)	406	F92C	0.03	10:58	0.00	NS	NS	NA
2012-13Event05	L.A. River at Wardlow (S10)	375	F319-R	0.20	4:10	0.05	898.8	5,632.7	No
2012-13Event05	Dominguez Channel (S28)	315	manual*	0.14	11:56	0.01	11.3	69.0	No
2012-13Event05	Malibu Creek (S02)	319	F130-R	0.87	39:44	0.02	4.0	19.8	NA
2012-13Event05	Coyote Creek (S13)	326	F354-R	0.08	40:13	0.00	64.1	491.7	No
2012-13Event05	San Gabriel River (S14)	416	F263C-R	0.38	16:33	0.02	5.0	32.8	No
2012-13Event05	Ballona Creek (S01)	370	F38C-R	0.20	0.52	0.02	66.1	553.1	No
2012-13Event05	Santa Clara River (S29)	406	F92C	0.48	22:23	0.02	NS	NS	NA
2012-13Event06	L.A. River at Wardlow (S10)	375	F319-R	0.51	23:09	0.02	883.9	8,337.4	Yes
2012-13Event06	Dominguez Channel (S28)	315	manual*	0.66	43:31	0.02	20.2	318.0	Yes
2012-13Event06	Malibu Creek (S02)	319	F130-R	0.90	38:26	0.02	5.4	68.7	NA
2012-13Event06	Coyote Creek (S13)	326	F354-R	0.55	33:51	0.02	150.7	1,381.4	No
2012-13Event06	San Gabriel River (S14)	416	F263C-R	0.63	35:35	0.02	NS	NS	NA
2012-13Event06	Ballona Creek (S01)	370	F38C-R	0.83	1.45	0.02	53.5	1,710.2	Yes
2012-13Event06	Santa Clara River (S29)	406	F92C	0.39	37:30	0.01	NS	NS	NA
2012-13Event07	L.A. River at Wardlow (S10)	375	F319-R	0.20	8:32	0.02	812.6	6,998.7	No
2012-13Event07	Dominguez Channel (S28)	315	manual*	0.20	10:08	0.02	7.1	145.4	No
2012-13Event07	Malibu Creek (S02)	319	F130-R	0.28	36:27	0.01	38.9	79.7	NA
2012-13Event07	Coyote Creek (S13)	326	F354-R	0.71	11:41	0.06	64.6	2,238.8	Yes
2012-13Event07	San Gabriel River (S14)	416	F263C-R	0.71	15:46	0.05	146.0	409.4	Yes
2012-13Event07	Ballona Creek (S01)	370	F38C-R	0.27	0.42	0.03	53.6	703.6	No
2012-13Event07	Santa Clara River (S29)	406	F92C	NA**	NA**	N/A	NS	NS	NA
2012-13Event08	L.A. River at Wardlow (S10)	375	F319-R	0.08	1:35	0.05	481.7	2,727.3	No
2012-13Event08	Dominguez Channel (S28)	315	manual*	0.16	8:15	0.02	3.1	20.5	No
2012-13Event08	Malibu Creek (S02)	319	F130-R	0.51	5:38	0.09	NS	NS	NA
2012-13Event08	Coyote Creek (S13)	326	F354-R	0.39	8:11	0.05	13.4	957.8	No
2012-13Event08	San Gabriel River (S14)	416	F263C-R	1.37	9:23	0.15	32.4	537.6	Yes
2012-13Event08	Ballona Creek (S01)	370	F38C-R	0.12	0:45	0.16	47.4	179.2	No
2012-13Event08	Santa Clara River (S29)	406	F92C	0.20	4:57	0.04	2.7	14.7	NA
2012-13Event11	L.A. River at Wardlow (S10)	375	F319-R	0.43	10:15	0.04	452.3	3,602.6	No
2012-13Event11	Dominguez Channel (S28)	315	manual*	0.12	5:53	0.02	4.4	79.3	No
2012-13Event11	Malibu Creek (S02)	319	F130-R	0.23	8:11	0.03	NS	NS	NA
2012-13Event11	Coyote Creek (S13)	326	F354-R	0.12	1:29	0.08	40.1	433.4	No
2012-13Event11	San Gabriel River (S14)	416	F263C-R	0.95	11:17	0.08	NS	NS	NA
2012-13Event11	Ballona Creek (S01)	370	F38C-R	0.43	27:03	0.02	43.4	932.9	No
2012-13Event11	Santa Clara River (S29)	406	F92C	0.19	31:03	0.01	NS	NS	NA
2012-13Event12	L.A. River at Wardlow (S10)	375	F319-R	0.31	2:24	0.13	587.9	7,902.8	No
2012-13Event12	Dominguez Channel (S28)	315	manual*	0.69	8:15	0.08	4.6	661.7	Yes
2012-13Event12	Malibu Creek (S02)	319	F130-R	1.42	41:37	0.03	47.6	217.0	NA
2012-13Event12	Coyote Creek (S13)	326	F354-R	0.51	28:15	0.02	42.7	1,716.2	Yes
2012-13Event12	San Gabriel River (S14)	416	F263C-R	0.35	5:01	0.07	NS	NS	NA
2012-13Event12	Ballona Creek (S01)	370	F38C-R	0.95	11:11	0.08	NS	NS	NA
2012-13Event12	Santa Clara River (S29)	406	F92C	0.20	35:16	0.01	NS	NS	NA

2012-2013 Annual Stormwater Monitoring Report | Page 1 of 2

Table 4-1. Summary of Hydrologic Data for Mass Emission Stations

Event ID	Station Name	WRD RAIN GAUGE	WRD FLOW GAUGE	Total Precipitation (in.)	Rainfall Duration (hrs)	Avg. Rainfall Intensity (in./hr)	Base Flow Volume (acre-ft)	Total Runoff Volume (acre-ft)	High Flow Suspension of Bacteria WQO***
2012-13Event13	L.A. River at Wardlow (S10)	375	F319-R	0.32	3:43	0.09	NS	NS	NA
2012-13Event13	Dominguez Channel (S28)	315	manual*	0.13	5:37	0.02	9.2	126.4	No
2012-13Event13	Malibu Creek (S02)	319	F130-R	0.16	2:56	0.05	NS	NS	NA
2012-13Event13	Coyote Creek (S13)	326	F354-R	0.08	0:23	0.21	NS	NS	NA
2012-13Event13	San Gabriel River (S14)	416	F263C-R	0.28	3:05	0.09	NS	NS	NA
2012-13Event13	Ballona Creek (S01)	370	F38C-R	0.19	3:24	0.06	73.6	644.7	No
2012-13Event13	Santa Clara River (S29)	406	F92C	0.12	1:00	0.12	NS	NS	NA
2012-13Event14	L.A. River at Wardlow (S10)	375	F319-R	0.63	8:43	0.07	573.8	10,196.3	Yes
2012-13Event14	Dominguez Channel (S28)	315	manual*	0.85	42:31	0.02	7.2	348.0	Yes
2012-13Event14	Malibu Creek (S02)	319	F130-R	1.03	11:08	0.09	5.5	200.9	NA
2012-13Event14	Coyote Creek (S13)	326	F354-R	0.67	38:55	0.02	25.3	1,735.3	Yes
2012-13Event14	San Gabriel River (S14)	416	F263C-R	1.10	39:08	0.03	12.7	306.4	Yes
2012-13Event14	Ballona Creek (S01)	370	F38C-R	0.70	8:16	0.08	43.0	1,787.1	Yes
2012-13Event14	Santa Clara River (S29)	406	F92C	0.82	12:40	0.06	NS	NS	NA
2012-13Event15	L.A. River at Wardlow (S10)	375	F319-R	0.16	20:18	0.01	645.5	3,931.1	No
2012-13Event15	Dominguez Channel (S28)	315	manual*	0.12	6:47	0.02	12.7	155.2	No
2012-13Event15	Malibu Creek (S02)	319	F130-R	0.71	19:37	0.04	8.3	238.5	NA
2012-13Event15	Coyote Creek (S13)	326	F354-R	0.04	6:28	0.01	53.5	899.0	No
2012-13Event15	San Gabriel River (S14)	416	F263C-R	0.08	1:47	0.04	18.1	267.3	No
2012-13Event15	Ballona Creek (S01)	370	F38C-R	0.40	27:09	0.01	100.9	428.2	No
2012-13Event15	Santa Clara River (S29)	406	F92C	0.14	18:20	0.01	3.5	19.2	No
2012-13Event17	L.A. River at Wardlow (S10)	375	F319-R	0.16	1:48	0.09	589.3	3,252.7	No
2012-13Event17	Dominguez Channel (S28)	315	manual*	0.08	9:21	0.01	6.9	53.8	No
2012-13Event17	Malibu Creek (S02)	319	F130-R	0.15	1:25	0.11	3.9	22.9	NA
2012-13Event17	Coyote Creek (S13)	326	F354-R	0.04	1:00	0.04	191.4	516.8	No
2012-13Event17	San Gabriel River (S14)	416	F263C-R	0.59	8:48	0.02	57.0	359.6	Yes
2012-13Event17	Ballona Creek (S01)	370	F38C-R	0.12	0:38	0.19	44.1	254.1	No
2012-13Event17	Santa Clara River (S29)	406	F92C	0.12	7:04	0.02	3.5	9.0	No
2012-13Event18	L.A. River at Wardlow (S10)	375	F319-R	0.47	3:20	0.14	1379.8	11,757.4	No
2012-13Event18	Dominguez Channel (S28)	315	manual*	0.62	23:44	0.03	7.1	349.0	Yes
2012-13Event18	Malibu Creek (S02)	319	F130-R	0.83	18:29	0.04	10.5	181.7	NA
2012-13Event18	Coyote Creek (S13)	326	F354-R	0.47	4:10	0.11	136.9	1,406.2	No
2012-13Event18	San Gabriel River (S14)	416	F263C-R	0.51	25:33	0.02	47.2	198.7	No
2012-13Event18	Ballona Creek (S01)	370	F38C-R	0.63	5:50	0.11	162.5	2,222.2	Yes
2012-13Event18	Santa Clara River (S29)	406	F92C	0.83	6:24	0.13	40.4	297.4	No
2012-13Event21	L.A. River at Wardlow (S10)	314	F319-R	0.77	32:12	0.02	1,203.5	9,169.6	No
2012-13Event21	Dominguez Channel (S28)	315	manual*	0.60	32:26	0.02	7.1	97.8	No
2012-13Event21	Malibu Creek (S02)	319	F130-R	0.55	3:03	0.18	20.9	46.5	NA
2012-13Event21	Coyote Creek (S13)	326	F354-R	0.63	6:03	0.10	56.1	1,028.6	Yes
2012-13Event21	San Gabriel River (S14)	416	F263C-R	0.31	7:09	0.04	22.2	79.4	No
2012-13Event21	Ballona Creek (S01)	370	F38C-R	0.75	7:30	0.10	254.8	617.1	Yes
2012-13Event21	Santa Clara River (S29)	406	F92C	0.44	5:48	0.08	NS	NS	NA

NS - No sampling conducted druing this event

* Manual = Flow measured by Watershed Management Division auto sampler. Water Resources Division has no flow gauge here.

** Orange County Rain Gage: Fullerton Airport

**** High flow suspension of the REC-1 and REC-2 bacteria water quality objectives does not apply to Malibu Creek and Santa Clara River MES.

2012-2013 Annual Stormwater Monitoring Report Page 2 of 2

TABLE 4-2a. 2012-13 Annual Monitoring Report
Number of Sampling Events

WET WEATHER								
Site ID/ Station Name	Grab Samples		Composite Samples					
	Conventional Pollutants	Bacteria	General Minerals	Heavy Metals	Semi-Volatiles	Pesticides	TSS	Toxicology
Mass Emisions								
S01 - Ballona Creek at Sawtelle	6	6	7	7	7	7	11	2
S13 - Coyote Creek*	6	6	7-8	8	8	7	11	2
S28 - Dominguez Channel at Artesia Blvd	7	7	8	8	8	8	13	2
S02 - Malibu Creek at Piuma Rd	5	5	6	6	6	6	9	2
S10 - Los Angeles River at Wardlow Rd	7	7	8	8	8	8	12	2
S14 - San Gabriel River at SGR Pkwy	5	5	5	5	5	5	8	2
S29 - Santa Clara River at Old Road	4	4	4	4	4	4	4	2
Malibu Creek Tributaries								
Upper Las Virgenes at Parkmor (TS25)	5	5	6	6	6	6	6	0
Cheseboro Canyon (TS26)*	5	5	6-7	7	7	6	6	0
Lower Lindero Canyon (TS27)	5	5	6	6	6	6	6	0
Medea Creek (TS28)*	5	5	6-7	7	7	6	6	0
Liberty Canyon Channel (TS29)	5	5	6	6	6	6	6	0
PD 728 at Foxfield Dr (TS30)	5	5	6	6	6	6	6	0

*During 2012-13Event04 enough sample was collected to analyze only a subset of the composite sample analytes.

Table 4-6: Total Suspended Solids Concentration at Mass Emissions Stations (mg/L)

Event Code	Ballona Creek at Sawtelle Blvd. S01	Malibu Creek at Piuma Rd. S02	Los Angeles River at Wardlow Rd. S10	Coyote Creek at Spring St. S13	San Gabriel River at SGR Parkway S14	Dominguez Channel at Artesia Blvd. S28	Santa Clara River S29
DRY WEATHER							
2012-13Event03 (10/09/2012)	44	4	136	48	NF	47	9
2012-13Event20	2	>1&<2	34	10	NF	18	<1
WET WEATHER							
2012-13Event04 (10/11/2012)	NS	NS	134	NS*	220	122	NS
2012-13Event05 (11/17/2012)	152	17	498	1280	81	323	NS
2012-13Event06 (11/30/2012)	116	16	122	278	NS	122	NS
2012-13Event07 (12/02/2012)	56	22	214	314	NS**	89	NS
2012-13Event08 (12/13/2012)	162	NS	341	442	50	166	75
2012-13Event11 (12/18/2012)	397	NS	163	173	NS	227	NS
2012-13Event12 (12/23/2012)	NS	167	379	115	NS	147	NS
2012-13Event13 (12/26/2012)	91	NS	NS	NS	NS	69	NS
2012-13Event14 (01/24/2013)	137	40	175	97	145	109	NS
2012-13Event15 (01/25/2013)	190	12	125	48	19	66	15
2012-13Event17 (02/19/2013)	149	1.2	71	118	13	314	8.8
2012-13Event18 (03/07/2013)	223	61	272	189	20	215	269
2012-13Event21 (05/08/2013)	132	5	210	321	16	155	NS

NS - Not sampled
NF - No flow
* Due to limited sample quantity TSS was not analyzed at S13 during 2012-13Event04
**Composite samples were not collected due to equipment malfunction.

Table 4-8. Total Suspended Solid Loads at Mass Emissions Stations (pounds)

Event Code	Ballona Creek at Sawtelle Blvd. S01	Malibu Creek at Piuma Rd. S02	Los Angeles River at Wardlow Rd. S10	Coyote Creek at Spring Street S13	San Gabriel River at SGR Parkway S14	Dominguez Channel at Artesia Blvd. S28	Santa Clara River S29
DRY WEATHER							
2012-13Event03	8,193.797	28.751	153,074.267	1,370.899	NF	1,048.559	24.301
2012-13Event20	387.430	4.762	42,168.822	1,614.975	NF	404.590	1.561
WET WEATHER							
2012-13Event04	NS	NS	2,436,296.842	NS	103,025.432	13,142.171	NS
2012-13Event05	228,614.683	915.586	7,628,017.052	1,711,421.057	7,221.905	60,572.044	NS
2012-13Event06	539,461.481	2,990.971	2,766,014.962	1,044,277.565	NS	105,499.147	NS
2012-13Event07	107,153.368	4,411.551	4,072,823.765	1,911,636.263	NS	35,190.514	NS
2012-13Event08	78,963.838	NS	2,528,992.054	1,151,218.973	73,095.728	9,245.220	3,007.280
2012-13Event11	1,007,183.173	NS	1,596,851.802	203,875.174	NS	48,950.749	NS
2012-13Event12	NS	98,553.078	8,144,804.368	536,695.174	NS	264,507.039	NS
2012-13Event13	159,540.420	NS	NS	NS	NS	23,709.850	NS
2012-13Event14	665,798.977	21,853.175	4,852,258.396	457,730.383	120,806.508	103,135.082	NS
2012-13Event15	221,228.593	7,781.655	1,336,236.081	117,345.163	13,809.497	27,849.825	781.270
2012-13Event17	102,966.707	74.758	628,008.493	165,824.158	12,712.613	45,978.125	215.796
2012-13Event18	1,347,560.538	30,140.146	8,696,502.170	722,714.486	10,805.195	204,031.340	217,552.454
2012-13Event21	221,518.980	632.417	5,236,396.595	897,875.319	3,454.462	41,215.505	NS

NS= Not Sampled
NF=No Flow

2012-2013 Annual Stormwater Monitoring Report

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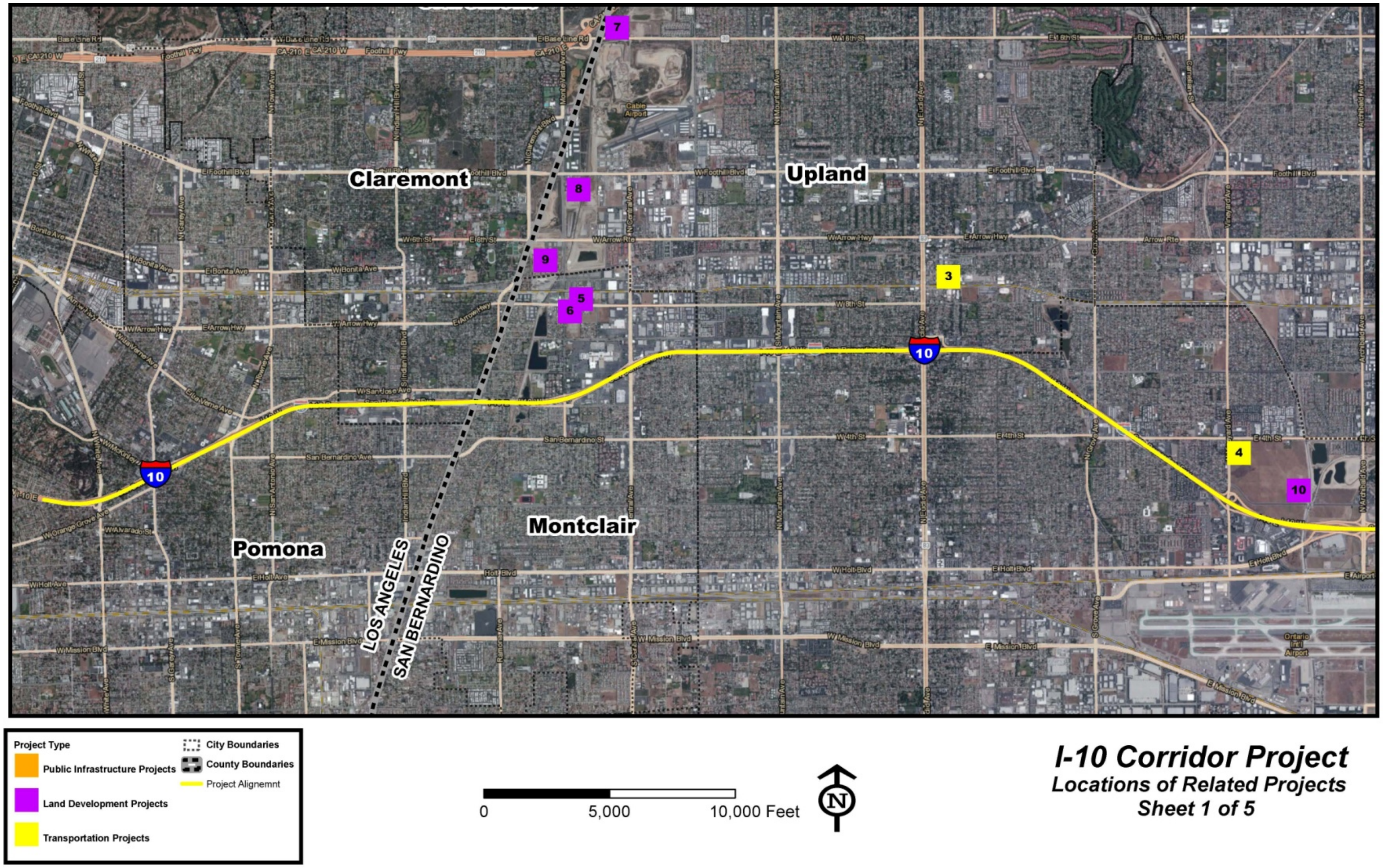
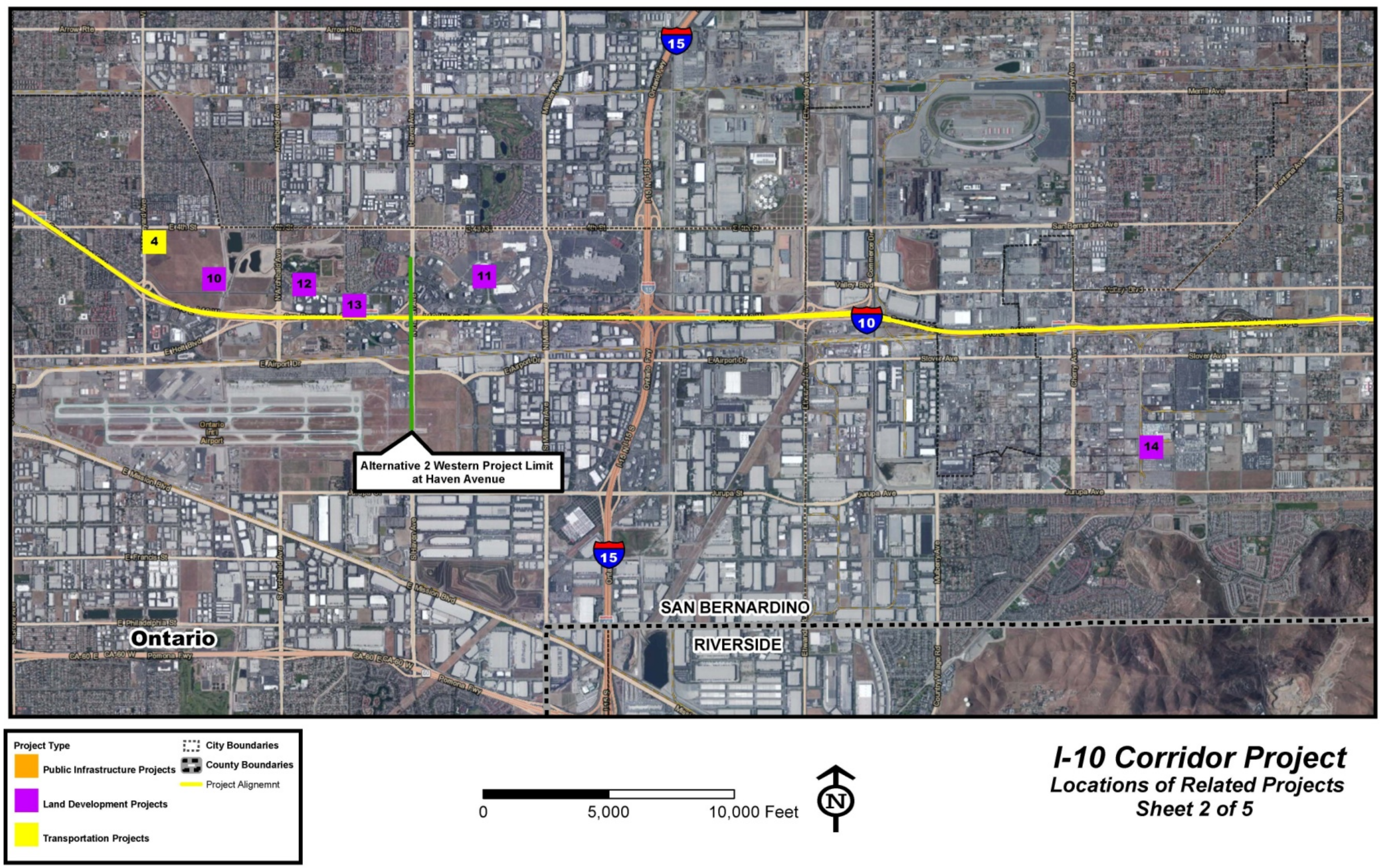
Appendix G Related Projects



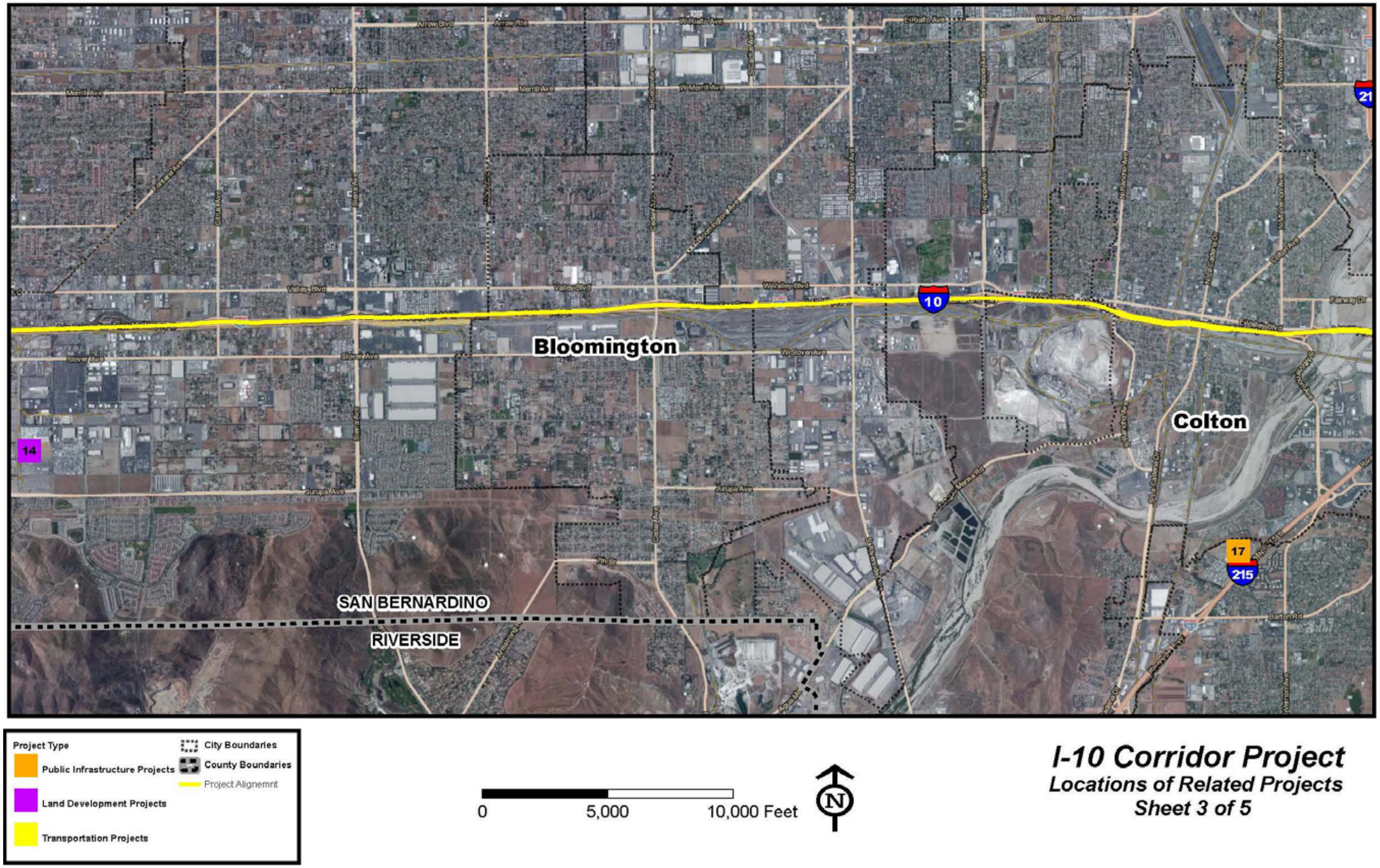
Sources: US Census 2013; CalAtlas 2013; Parsons 2014.

Figure G-1. Related Projects, Sheet 1 of 5



Sources: US Census 2013; CalAtlas 2013; Parsons 2014.

Figure G-1. Related Projects, Sheet 2 of 5



Sources: US Census 2013; CalAtlas 2013; Parsons 2014.

Figure G-1. Related Projects, Sheet 3 of 5

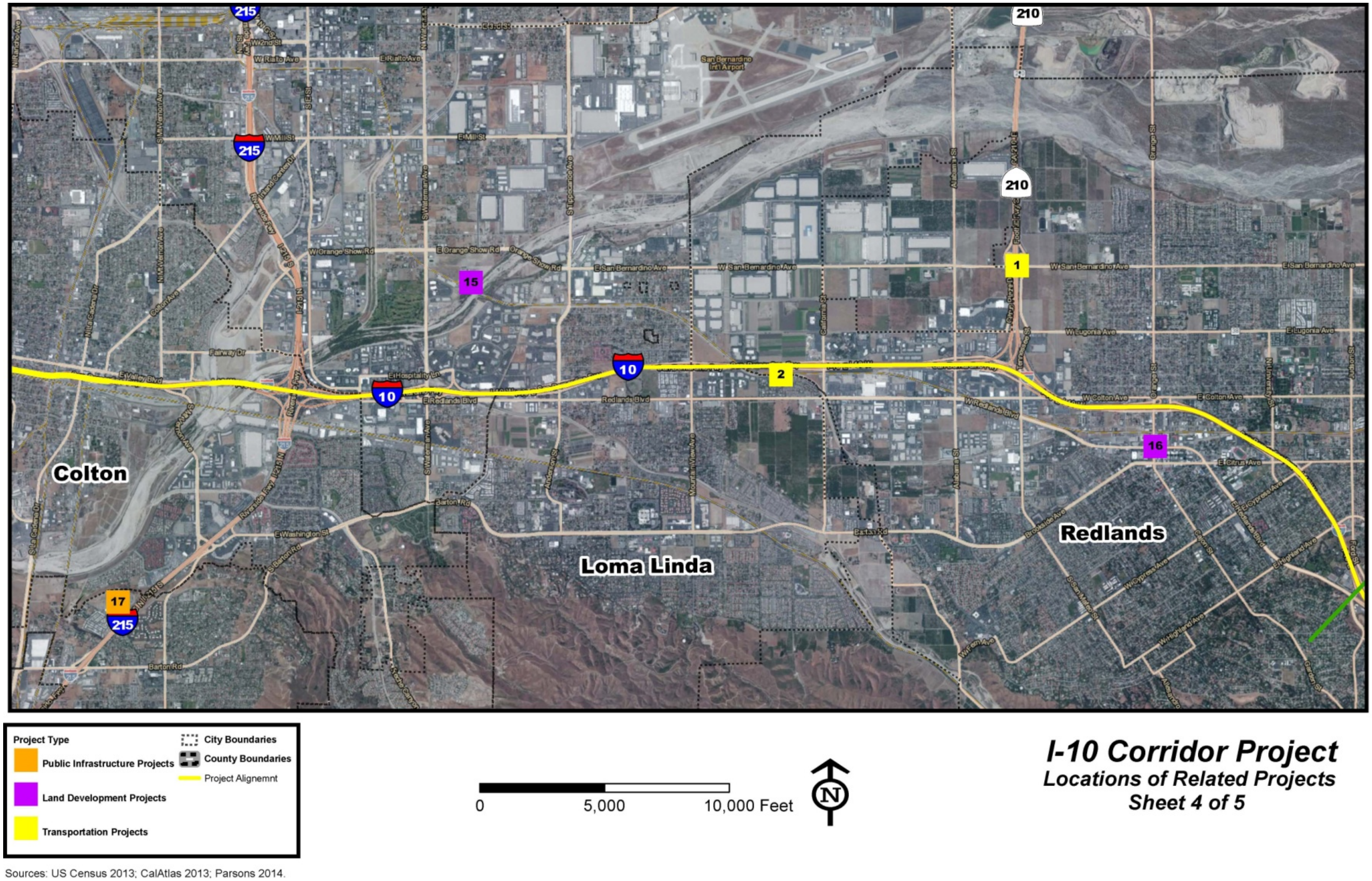
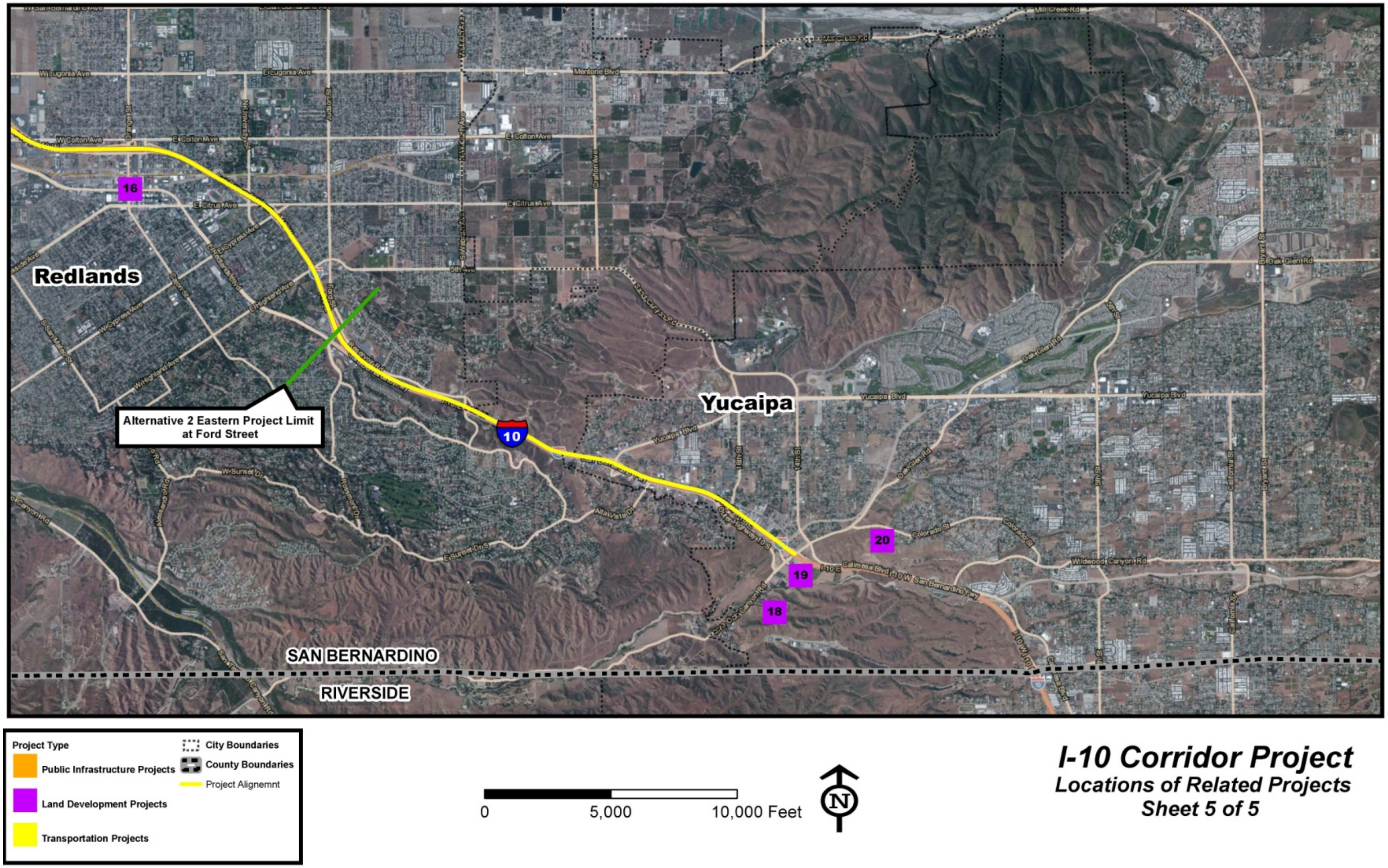


Figure G-1. Related Projects, Sheet 4 of 5



Sources: US Census 2013; CalAtlas 2013; Parsons 2014.

Figure G-1. Related Projects, Sheet 5 of 5

Table G-1. Related Projects

<table>
<tr><th>Project Name, Status, and ID Number
(Refer to Figure G-1)</th><th>Project Description</th></tr>
<tr><td colspan="2">Transportation Projects</td></tr>
<tr><td>I-15 Corridor Improvement Project
Located in the cities of Jurupa Valley, Eastvale, Norco, Corona, and Riverside
Riverside County Transportation Commission (RCTC) and Caltrans project
(This project is south of the I-10 Corridor Project and is not shown in Figure G-1.)</td><td>RCTC, in partnership with Caltrans District 8, is proposing the addition of one to two Tolled Express Lanes in each direction from Cajalco Road where it crosses I-15 in Corona to just south of the I-15 and SR 60 interchange at Riverside Drive. The resizing of this project has an estimated construction cost of $415 million.</td></tr>
<tr><td>State Route 210 Foothill Freeway Planned Construction Activity –
ID Number 1 (Sheet 4)
Located in the cities of La Verne, Claremont, Upland, Rancho Cucamonga, Fontana, Rialto, and San Bernardino
SANBAG and Caltrans Project
Future planned project; timeline is uncertain
Construction/approval dates range for the varying activities; see Project Description column</td><td>Future work on SR 210 would include:
Freeway landscaping is planned for the final 8 miles (Segment 11) of SR 210 ending at the I-10 interchange. Landscaping construction contract awarded to Kasa Construction in June 2013.
Seismic retrofit of the UPRR bridge in San Bernardino.
Construction of an interchange at Pepper Avenue in Rialto. SANBAG built a bridge at this location. Once the City of Rialto extends Pepper Avenue north to SR 210, SANBAG will build on-ramps and off-ramps at this location. Preliminary engineering and preparation of the environmental document are underway now through the City’s consultants.
SR 210 to I-215 high-speed connectors.</td></tr>
<tr><td>Redlands Passenger Rail Project –
ID Number 2 (Sheet 4)
Located in the cities of San Bernardino, Loma Linda, Redlands, and unincorporated areas of San Bernardino County.
Federal Transit Administration, SANBAG, Omnitrans, Metrolink, and the City of San Bernardino Project
Project construction is expected to begin in late 2015</td><td>The Redlands Passenger Rail Project is proposed to run along existing railroad ROW from E Street just before Stoddard Avenue in San Bernardino to Rialto Avenue in Redlands, roughly a 9-mile extension of passenger rail service. The project is proposing to build five new stations. The project will incorporate track improvements, including redesign of the existing track alignment, track ballast, and subgrade foundation. Additional project components include the replacement or strengthening of five bridges; additional traffic and rail signals; utility replacement and relocation; and culvert replacements, extensions, and relocations.</td></tr>
<tr><td>Metro Gold Line Foothill Extension Construction Activity:
Azusa to Montclair –
ID Number 3 (Sheet 1)
Located in the cities of Glendora, San Dimas, La Verne, Pomona, Claremont, and Montclair
Metro Project
Starting in early 2014, the project will begin advanced conceptual engineering</td><td>The Metro Gold Line light-rail transit (LRT) system extension is proceeding in two phases. Construction of the first phase from the Pasadena Sierra Madre Villa Madre Station, located at Raymond Avenue and Del Mar, to the Azusa-Citrus Station, located between Palm Drive and Citrus Avenue, began in late 2011, and construction is anticipated to be completed in late 2015. The Foothill extension from Vermont Avenue in Azusa to just east of Monte Vista Avenue and north of Arrow Highway in Montclair will extend the Metro Gold Line 12.3 miles and add six stations in the cities of Glendora, San Dimas, La Verne, Pomona, Claremont, and Montclair.</td></tr>
</table>

Table G-1. Related Projects

Project Name, Status, and ID Number (Refer to Figure G-1)	Project Description
Metro Gold Line Foothill Extension Construction Activity: **Ontario Airport Extension – ID Number 4 (Sheets 1 and 2)** • Located in the cities of Montclair, Upland, and Ontario • Metro Project • Funding for the Ontario Airport Extension has not been identified; project timeline is uncertain • The Alternatives Analysis process will begin in 2014	The Ontario Airport Extension will extend the Gold Line approximately 8 miles – from the TransCenter in Montclair, located just east of Monte Vista Avenue and north of Arrow Highway, to Ontario – and terminate the line at the Los Angeles/Ontario International Airport. Although not formally part of the Foothill Extension Project, the Construction Authority completed a study to understand the feasibility of extending the line from Montclair to the airport in 2008. The initial study concluded that extending the line was feasible and provided many potential route options.
Land Development Projects	
The Paseos – ID Number 5 (Sheet 1) • Located in the city of Montclair • GLJ Partners and Alliance Project • Specific Plan approved in 2010	The proposed project would construct a 385-unit multi-family residential development at the northeast corner of Monte Vista Avenue and Moreno Street.
Arrow Station – ID Number 6 (Sheet 1) • Located in the city of Montclair • Hutton Companies Project • The project is expected to commence construction in late 2014	The Specific Plan proposes a 129-unit residential development consisting of 99 urban-style multi-family units and 30 single-family detached homes, which was approved by the City Council in December 2010. Arrow Station is to be located on the north side of Arrow Highway just east of Monte Vista Avenue.
Park View Specific Plan – ID Number 7 (Sheet 1) • Located in the city of Upland • City of Upland Housing Element – Specific Plan • To be implemented between 2013 and 2021	The Park View Specific Plan is envisioned as a mixed-use village that will be located in between east Baseline Road, SR 210, and Cajon Road. The plan calls for the development of up to 100,000 square feet of commercial/ retail space, 32 acres of residential land, and 57 acres of open space for a city park, flood control facilities, and spreading grounds. When built to capacity, the Specific Plan will add 400 housing units to Upland, most of which will be single-family housing.
Upland Crossing Specific Plan – ID Number 8 (Sheet 1) • Located in the city of Upland • City of Upland Housing Element – Specific Plan • To be implemented between 2013 and 2021	This Specific Plan area is composed of a residential development with a small commercial-retail component. The Specific Plan proposes a high-quality development of detached single-family units, condominiums, and mixed-use multi-family units. The area is bounded by Foothill Boulevard, Monte Vista Avenue, and west Arrow Route, just below Central Avenue.
College Park Specific Plan – ID Number 9 (Sheet 1) • Located in the city of Upland • City of Upland Housing Element – Specific Plan • To be implemented between 2013 and 2021	In 2004, the City adopted the College Park Specific Plan to encourage mixed-use development in southwest Upland and provide housing opportunities for the Claremont Colleges. The planning area includes 25 acres of residential land that can accommodate approximately 500 housing units. A total of 450 apartment units have been built. An additional 92 small-lot, detached single-family units are planned at a density of 10 units per acre.

Table G-1. Related Projects

Project Name, Status, and ID Number (Refer to Figure G-1)	Project Description
Meredith International Center Specific Plan – ID Number 10 (Sheets 1 and 2) • Located in the city of Ontario • City of Ontario Specific Plan • An Initial Study was prepared for the project in 2014.	The Meredith International Centre Specific Plan Amendment Project proposes a mix of industrial, commercial, and residential land uses on approximately 257 acres located in the southeast portion of Ontario within San Bernardino County. The site, which is generally located north of I-10, between Vineyard Avenue on the west, and Archibald Avenue and Cucamonga Creek Channel, is formed by 4th Street. The project area is located in between the Southern Pacific Trail and west Arrow Route.
Ontario Center Specific Plan – ID Number 11 (Sheet 2) • Located in the city of Ontario • City of Ontario Specific Plan • An amendment to the Ontario Specific Plan was approved in 2006.	The Ontario Center site consists of approximately 88 acres of vacant land located at the northerly boundary of the eastern portion of Ontario, south of Fourth Street, between Haven Avenue and Milliken Avenue, and less than 0.25 mile north of I-10. The Ontario Center will include urban commercial, urban residential, garden commercial, and open space elements.
Ontario Festival Specific Plan – ID Number 12 (Sheet 2) • Located in the city of Ontario • City of Ontario Specific Plan • Approved in 2012.	The Ontario Festival Specific Plan is a comprehensive plan for the development of a planned residential site that could accommodate up to 472 dwelling units on approximately 37.6 acres. This project will be located along Inland Empire Boulevard between Archibald Avenue and Turner Avenue, just below Guasti Regional Park.
Wagner Properties Specific Plan – ID Number 13 (Sheet 2) • Located in the city of Ontario • City of Ontario Specific Plan • Approved in 2010	The Specific Plan addresses the development of 11 parcels, totaling 54.57 acres located in eastern Ontario.
Southwest Industrial Park – ID Number 14 (Sheets 2 and 3) • Located in the city of Fontana • City of Fontana Specific Plan • Latest Specific Plan amendment approved in 2009	The Southwest Industrial Park (SWIP) Specific Plan is expected to promote economic development and provide opportunities for existing property owners and new businesses. A total of 1,101 acres have been included in the plan since its adoption in 1977. The project area spans both sides of I-10 and is roughly between Etiwanda Avenue and Citrus Avenue.
Alliance California Gateway South Building 3 – ID Number 15 (Sheet 4) • Located in the city of San Bernardino • City of San Bernardino Project • Approved September 2013	The proposed project involves construction and operation of an industrial warehouse building consisting of 1,199,360 square feet of interior floor space and 215 loading bays on a 49.65-acre portion of a 62.65-acre property located south of and adjacent to East Orange Show Road and approximately 450 feet east of South Waterman Avenue in the south-central portion of San Bernardino.
Downtown Redlands Specific Plan (Amendment No. 15) – ID Number 16 (Sheets 4 and 5) • Located in the city of Redlands • City of Redlands Project • Plan approved in 2011	The Specific Plan area extends from Texas Street in the west to North Church Street in the east, and from the south side of I-10 in the north to San Gorgonio Drive, Brookside Avenue, West Vine Street, South 6th Street, East Olive Avenue, and East Citrus Avenue in the south. Rail tracks cut through the site, just south of Stuart Avenue.

Table G-1. Related Projects

Project Name, Status, and ID Number (Refer to Figure G-1)	Project Description
Freeway Corridor Specific Plan – ID Number 18 (Sheet 5) • Located in the city of Yucaipa • City of Yucaipa Project • Plan approved in 2007	The Specific Plan site encompasses 1,234.3 acres and is located in the southwestern corner of Yucaipa within San Bernardino County. The Specific Plan site is bisected by I-10 and abuts the Riverside county line to the south. The proposed Specific Plan is composed of three distinct neighborhoods. Each neighborhood includes residential, commercial, business park, public facilities, and open space land uses. Local access to the location is provided by Live Oak Canyon Road, County Line Road, Oak Glen Road, Wildwood Canyon Road, and Calimesa Boulevard.
Oak Hills Marketplace Specific Plan – ID Number 19 (Sheet 5) • Located in the city of Yucaipa • City of Yucaipa Project • Plan approved in 2007	The Oak Hills Marketplace (OHM) property occupies approximately 63.66 acres located in southern Yucaipa. The site is located adjacent to eastbound I-10, immediately east of Live Oak Canyon Road. Wildwood Creek traverses the project site, and several unnamed hills are located along the southern border of the property. The proposed project aims to provide a regional shopping destination, including dining and shopping opportunities, and approximately 1,000 new jobs to area residents.
Robinson Ranch Planned Development – ID Number 20 (Sheet 5) • Located in the city of Yucaipa • City of Yucaipa Project • Plan approved in 2011	The Planned Development area covers 522 acres in the southwest portion of Yucaipa. The planned development area is divided into the following three primary planning areas: Robinson Ranch North, West Oak Center, and Wildwood Ranch. In total, the planned development envisions 4,159 multi- and single-family attached and detached dwelling units distributed throughout 385 acres, 109 acres of general commercial uses, and 28 acres of business park uses. Approximately 119 acres of improved open space and 49 acres of natural open space areas would be included within these land uses. I-10 separates the Robinson Ranch North Planning Area on the north side of the freeway and the Wildwood Ranch and Wildwood Center planning areas to the south of the freeway.
Public Infrastructure Project	
West of Devers Project – ID Number 17 (Sheet 4) • Located within incorporated and unincorporated areas of Riverside and San Bernardino counties, cities of Banning, Beaumont, Calimesa, Colton, Grand Terrace, Loma Linda, and Redlands • Southern California Edison (SCE) Project • Project construction scheduled to begin in 2016	This project will consist of removing and replacing approximately 48 miles of existing 220-kilovolt (kV) transmission lines with new double-circuit 220-kV transmission lines, between the existing Devers Substation (near Palm Springs), Vista Substation (in Grand Terrace), and San Bernardino Substation. This project will consist of removing and replacing approximately 48 miles of existing 220-kV transmission lines with new double-circuit 220-kV transmission lines, between the existing Devers Substation (located on 10th Avenue and Diablo Road, near Palm Springs), Vista Substation (in Grand Terrace), and San Bernardino Substation (located on San Bernardino Avenue in between Mountain View Avenue and California Street).

Note: Information was collected from each project's Web site in 2014.

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