Water Quality Assessment Report

High Desert Corridor (HDC)
Palmdale to Apple Valley (State Route 14 to State Route 18)

June 2014

PARSONS
Parsons Transportation Group Inc.
100 West Walnut Street
Pasadena, CA 91124

Contract No.: 07A2912
Caltrans Project No.: 0700000080 (EA: 16720)

Caltrans

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Water Quality Assessment Report

High Desert Corridor (HDC) Project

LOS ANGELES and SAN BERNARDINO COUNTIES, CALIFORNIA
District 07 – LOS ANGELES – NEW 138 - PM 42.4 to PM 74.9
District 08 – SAN BERNARDINO – NEW 138 - PM 0.0 to PM 35.0
Caltrans Project No.: 0700000080 (EA: 16720)

June 2014

STATE OF CALIFORNIA
Department of Transportation

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EXECUTIVE SUMMARY

The objectives of the Water Quality Assessment Report (WQAR) are to describe existing water resources, determine if potential Project impacts on water resources would be adverse based on preliminary Project information, and identify feasible mitigation measures. This WQAR 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 WQAR also discusses issues related to hydromodification such as changes to drainage patterns or discharge volume.

The County of San Bernardino, County of Los Angeles, and the cities of Adelanto, Victorville, Town of Apple Valley, Lancaster, and Palmdale have formed a Joint Powers Authority (JPA) to develop a new freeway/expressway from State Route (SR)-14 to Interstate (I)-15, which is referred to as the High Desert Corridor (HDC). The California Department of Transportation (Caltrans) and the Los Angeles Metropolitan Transportation Authority (Metro) are the lead agencies for this Project and have partnered and coordinated with JPA and other agencies to perform environmental studies and preliminary engineering and design of the proposed HDC Project. 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 proposes the construction of a new, approximately 63-mile long, east-west freeway/expressway linking SR-14 in Palmdale with SR-18 in Apple Valley. The HDC will follow an alignment within about ½ mile and parallel to Avenue P-8 in Palmdale and Air Expressway in Victorville. The HDC is envisioned as an 8 lane freeway segment at its western end in Palmdale. Farther east of 50th Street, the HDC transitions to 6 lane expressway, and farther east from 100th Street into a 4 lane expressway as it passes through the rural areas of the high desert areas of Los Angeles and San Bernardino counties.

The HDC will be generally constructed as a new fill approximately 12 feet above existing terrain with multiple bridges and structures spanning over drainages or over and under local roads including the construction of several major structures such as freeway-to-freeway connectors/interchanges (i.e., SR-14 and I-15) and bridges crossing Little Rock Wash, Big Rock Wash, and the Mojave River.

Several project alternatives and design variations have been considered and evaluated. A No-Build Alternative and four build alternatives were selected for detailed evaluation in the Draft Environmental Impact Report/Environmental Impact Statement. The following is a list of current alternatives that are evaluated in this report:

- No Build Alternative;
- Freeway/Expressway Alternative (Avenue P-8, I-15 and SR-18)

- Freeway/Tollway Alternative (Avenue P-8, I-15 and SR-18)
- Freeway/Expressway Alternative with High-Speed Rail (HSR) Feeder/Connector Service
- Freeway/Tollway Alternative with High-Speed Rail Feeder/Connector Service

A hydrological and/or water quality construction impact would occur if construction activities related to the proposed Project substantially affected surface water or groundwater quality or altered surface runoff rates, thereby contributing to flooding or erosion hazards.

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 during construction of the proposed corridor, and chemical pollutants associated with construction materials that are brought onto the Project site.

Soil disturbance activities include earth-moving activities such as excavation and trenching, soil compaction, cut and fill activities, and grading. Disturbed soils are susceptible to high rates of erosion from wind and rain, resulting in sediment transport via storm water 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.

The proposed Project would result in an increase in impervious surface areas, which could potentially increase storm water runoff. Once the new facility is completed, potential pollutant sources would be associated with motor vehicle operations, highway maintenance activities, illegal dumping, accidental spills, and landscaping care.

The effects to water quality from construction and operation of the proposed Project would be minimized by following the guidelines and regulations established by the NPDES permits. These include the Caltrans statewide permit (Order No. 2012-0011-DWQ, CAS 000003)[1] and compliance with waste discharge requirements for storm water discharges under Order No. 2003-0005-DWQ, NPDES No. CAS000004, as administered by the State Water Resources Control Board (SWRCB), and with associated implementation of best management practices (BMPs), A Storm Water Pollution Prevention Plan (SWPPP) would be prepared and implemented under the Construction General Permit for Discharges Associated

[1] On September 19, 2012, the Caltrans permit, Order No. 99-06-DWQ was re-issued as Order No. 2012-0011-DWQ and became effective on July 1, 2013.

with Construction Activities, Order No. 2009-0009-DWQ (Construction General Permit). 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. The applicability of all nine Caltrans-approved Treatment BMPs were 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. A table summarizing Treatment BMP characteristics along with a location map for the proposed Treatment BMP strategy are provided in Appendix A. 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. No specific agreements have been negotiated with the Lahontan RWQCB or any local agency at this time. Additional permits identified and anticipated for this Project are a 401 Water Quality Certification from the Lahontan Regional Water Quality Control Board (RWQCB), a Section 404 permit from the United States Army Corps of Engineers, and a 1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife. These additional permits would be obtained upon completion of the PS&E phase.

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LIST OF ABBREVIATED TERMS

af	acre-feet
AFY	acre-feet per year
AVEK	Antelope Valley – East Kern Water Agency
AVRWC	Antelope Valley Ranchos Water Company
BAP	Base Annual Production
BMP	Best Management Practice
BSA	Biological Study Area
CADD	computer-assisted design and drafting
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CWA	Clean Water Act
DSA	Disturbed Soil Area
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FPA	Free Production Allocation
HDC	High Desert Corridor
HSA	Hydrologic Sub-area
HSR	High-Speed Rail
HU	Hydrologic Unit
H:V	horizontal:vertical
MCL	Maximum Contaminant Level
Metro	Los Angeles County Metropolitan Transportation Authority

µg/L	micrograms per liter
mg/L	milligrams per liter
MRG	Mojave River Groundwater
MWA	Mojave Water Agency
NEPA	National Environmental Policy Act
NES	Natural Environment Study
NPDES	National Pollutant Discharge Elimination System
PA/ED	Project Approval/Environmental Document
PS&E	Plans, Specifications and Estimate
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
SR	State Route
SUSMP	Standard Urban Stormwater Mitigation Plan
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TSM/TDM	Transportation System Management/Transportation Design Management
U.S.	United States
UWMP	Urban Water Management Plan
VWD	Victorville Water District
WOC	Waters of the State of California
WUS	Waters of the United States

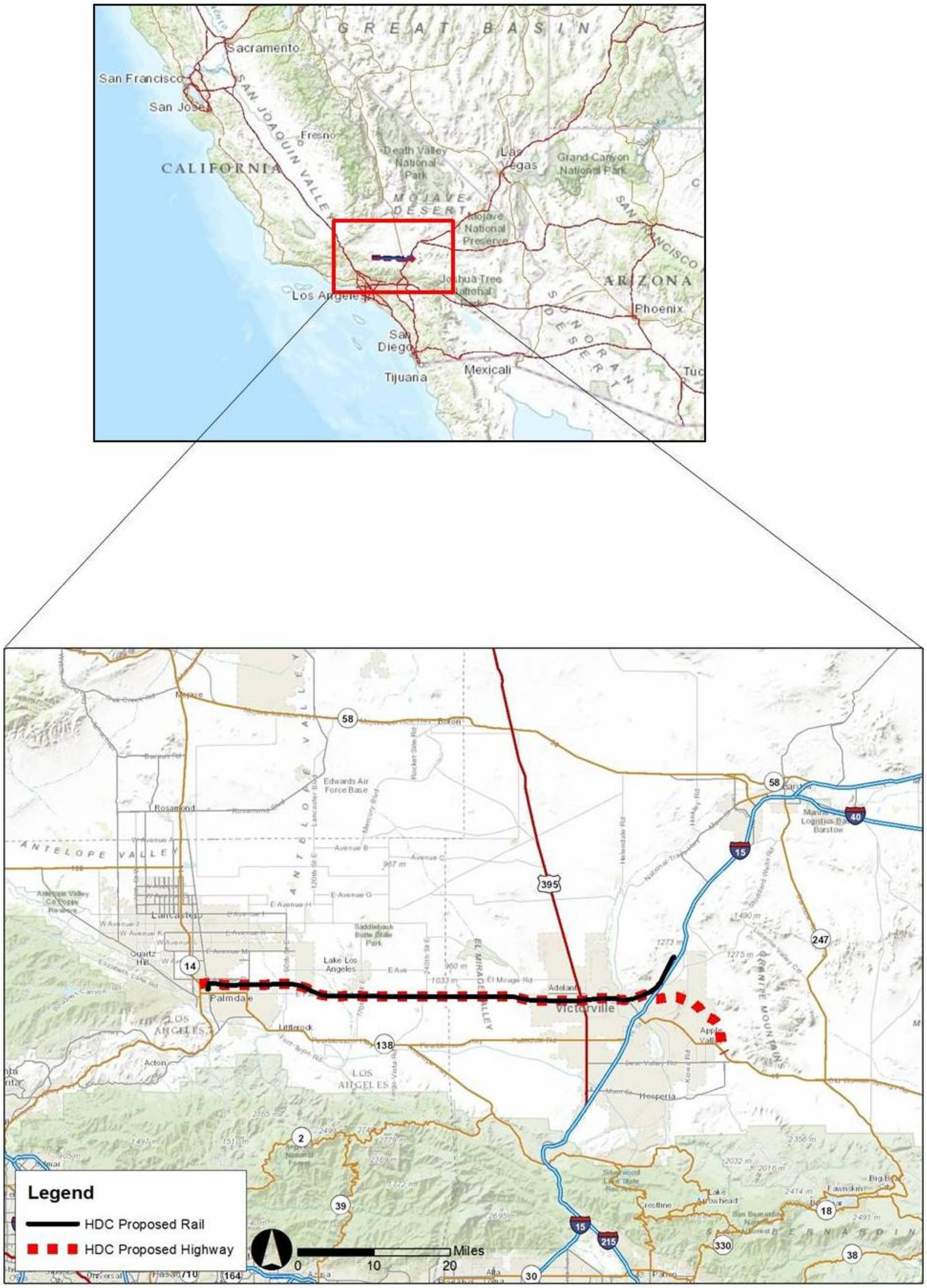
WQO	Water Quality Objective
WQPT	Water Quality Planning Tool

1 INTRODUCTION

1.1 Project Description

The California Department of Transportation (Caltrans), in cooperation with the Los Angeles County Metropolitan Transportation Authority (Metro), proposes construction of the High Desert Corridor (HDC) as a new transportation facility in the High Desert region of Los Angeles and San Bernardino counties. The proposed 63-mile-long west-east facility would provide route continuity and relieve traffic congestion between State Route (SR) 18 and United States Highway 395 (US 395) in San Bernardino County with SR-14 in Los Angeles County. The project would be comprised of one or more of the following major components, including highway, rail transit, bikeway, and recommendation for green energy facilities. Figures 1-1 and 1-2 are project vicinity and location maps, respectively.

Figure 1-1 Project Vicinity Map



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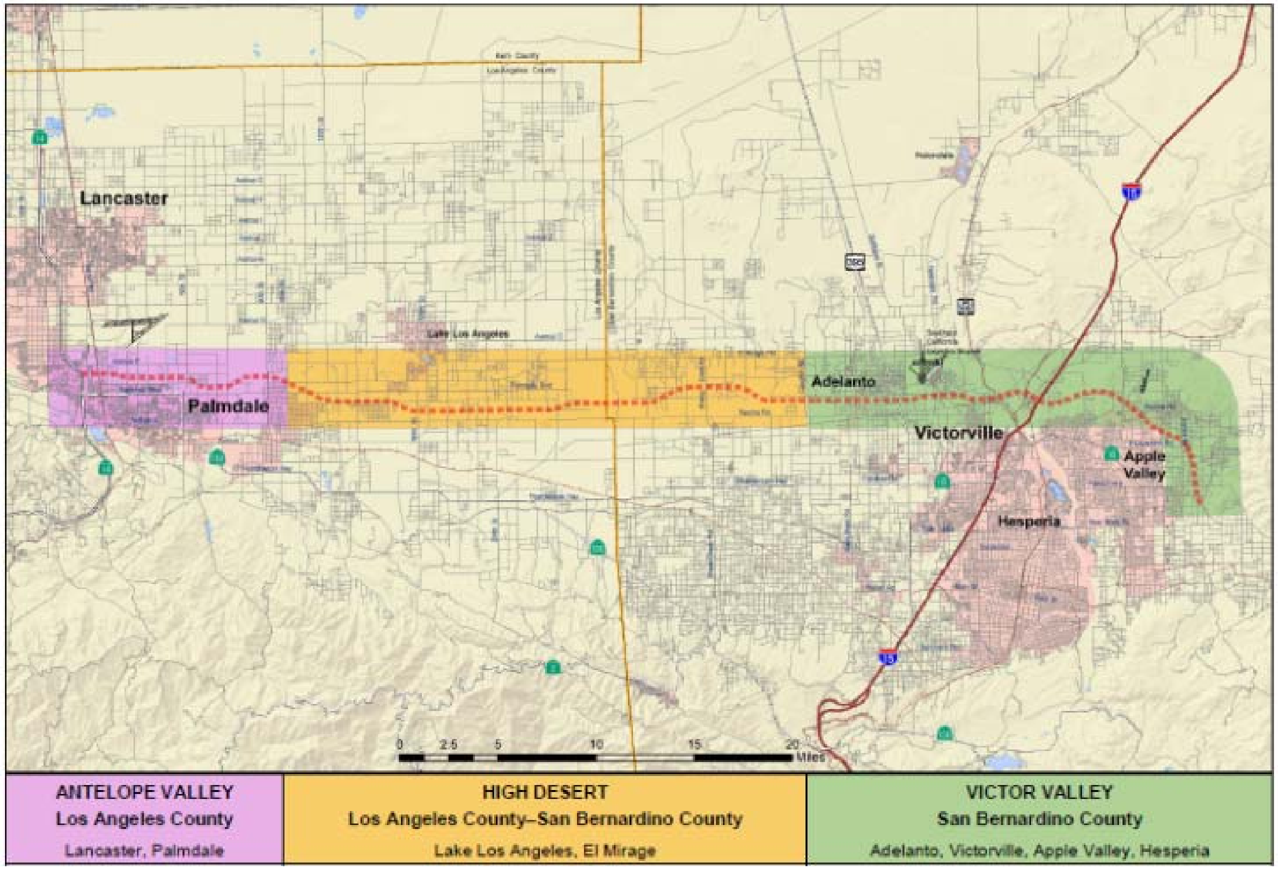

Figure 1-2. Project Location Map

1.2 Purpose and Need

The purpose of the proposed action is to improve west-east mobility through the High Desert region of southern California by addressing present and future travel demand and mobility needs within the Antelope and Victor valleys. The proposed action is intended to achieve the following objectives:

- Increase capacity of west-east transportation facilities to accommodate existing and future transportation demand
- Improve travel safety and reliability within the High Desert region
- Improve the regional goods movement network
- Provide improved access and connectivity to regional transportation facilities, including airports and existing and future passenger rail systems, which include the proposed California HSR system and the proposed XpressWest HSR system
- Contribute to state greenhouse gas (GHG) reduction goals through the use of green energy features

The specific needs to be addressed by the proposed action include:

- Recent and future planned population growth within the High Desert region
- Limited and unreliable west-east connectivity within the High Desert region
- Regional demands for goods movement to support the growth of the regional economy
- Future demands for the use of green energy, including sustainability and green energy provisions in state law and policy

1.3 Existing and Proposed Drainage

For the majority of Project alignment that crosses undeveloped land, there are no man-made drainage systems. Existing drainage for most of the area west of Adelanto flows northerly across the proposed Project corridor before discharge to dry lakebeds or playas in the region. Rogers Dry Lake on Edwards Air Force Base is the most well-known of the playas.

The proposed drainage system would include infiltration at most of the intersections to treat all onsite flow and to partially contain flows from pavement runoff before discharging off site. Numerous channels and ditches would be placed at the edge of the right-of-way (ROW) along the alignment to convey flows to the bridge crossings and cross culverts.

The proposed Project would modify existing slopes and create new slopes. Existing slopes, on an average basis, are relatively flat, i.e., less than 2 percent. Proposed slopes would generally follow existing grade. Proposed slopes would not be steeper than 2:1 (horizontal

[H]: vertical [V]) and would be constructed at 4:1 (V:H) or flatter to the maximum extent practicable. The disturbed surface area (DSA) and net impervious surface are quantified for each alternative in the following sections.

1.4 Project Risk Level

Pursuant to Section VIII of the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002 (Construction General Permit), "for any site that spans two or more planning watersheds, the discharger shall calculate a separate Risk Level for each planning watershed." Accordingly, the Risk Level within the Antelope Valley Watershed and the Mojave Watershed was determined as Risk Level 1 based on findings of the construction site sediment and receiving water risk determination (Caltrans 2012).

On April 12, 2012 members of the Project team along with the District Storm Water Coordinator, met with a representative from the Lahontan Regional Water Quality Control Board (RWQCB). The Lahontan RWQCB representative indicated that the Lahontan RWQCB will issue a letter indicating that the area where the Project corridor crosses the Mojave River in Victorville (Figure 1-2) shall be designated as Risk Level 2 in recognition for the site's significance and its sensitivity to disturbances and sedimentation.

Figure 1-2. Mojave River Crossing

1.5 Project Alternatives

Several project alternatives and design variations have been considered and evaluated. A No Build Alternative and four build alternatives were selected for detailed evaluation in the Draft Environmental Impact Report/Environmental Impact Statement. The following is a list of current alternatives under evaluation.

1.5.1 No Build Alternative

Under the No Build alternative, no new transportation infrastructure would be built within the project area to connect Los Angeles and San Bernardino Counties aside from existing SR-138 safety corridor improvements in Los Angeles County and SR-18 corridor improvements in San Bernardino County. Traffic circulation and congestion currently experienced on Palmdale Boulevard, Air Expressway, and Happy Trails Highway (existing SR-18) would remain. The no action alternative functions as a baseline to compare against all of the proposed build alternatives.

1.5.2 Freeway/Expressway Alternative (Avenue P-8, I-15 and SR-18)

This alternative would consist of a combination of a controlled-access freeway and an expressway. It generally would follow Avenue P-8 in Los Angeles County and just south of El Mirage Road in San Bernardino County. This alternative then extends east to Air Expressway Road near I-15 and curves south, terminating at Bear Valley Road. The incorporation of green energy technologies and a bike path along segments of the alternative would also be considered.

Four physical alignment variations are being considered, including:

- Variation A: Near Palmdale, the freeway/expressway would dip slightly south of the main alignment, approximately between 15th Street East and Little Rock Wash.
- Variation B (south): East of the county line, the freeway/expressway would flare out slightly south of the main alignment between Oasis Road and Coughlin Road. Variation B1 would be at the same location, but it would flare out a little less and pass through the Krey airfield.
- Variation D: Near the community of Lake Los Angeles, the freeway/expressway would dip slightly south of the main alignment, just south of Avenue R approximately between 180th St. East and 230th Street East.
- Variation E: Near Adelanto and Victorville, the freeway/expressway would dip south of the federal prison.

1.5.3 Freeway/Tollway Alternative (Avenue P-8, I-15 and SR-18)

This alternative would follow the same physical alignment as the Freeway/Expressway Alternative (including Variations A, D, B and E), but it would have a section between 100th Street East and US 395 operate as a tollway. Details of this operating feature are being evaluated as part of an ongoing P3 analysis. The incorporation of green energy technologies and a bike path would also be considered.

1.5.4 Freeway/Expressway Alternative with High-Speed Rail (HSR) Feeder/Connector Service

This alternative would be the same as the Freeway/Tollway Alternative except that it would also include an HSR Feeder/Connector Service between the cities of Palmdale and Victorville. The HSR Feeder/Connector Service would utilize proven steel wheel-on-steel track technology and have a design speed of 180 miles per hour (mph) with an operating speed of 160 mph. Additional details of this operating feature, including the type of train technology (electric vs. diesel-electric), its location in relation to the HDC (median-running alignment), and its connections to existing and proposed rail stations are being evaluated as part of an ongoing Rail Alternatives Analysis. The incorporation of green energy technologies and a bike path would also be considered.

1.5.5 Freeway/Tollway Alternative with High-Speed Rail Feeder/Connector Service

This alternative would be the same as the Freeway/Expressway Alternative except that it would also include an HSR Feeder/Connector Service between the cities of Palmdale and Victorville. The incorporation of green energy technologies and a bike path would also be considered.

1.6 Approach to Water Quality Assessment

The purpose of the WQAR is to fulfill the requirements of the NEPA and the CEQA, and to provide information, to the extent possible, for NPDES permitting. This WQAR includes a discussion of the proposed Project, its physical setting, and the regulatory framework with respect to water quality. The report 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.

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 waters of the United States (U.S.) from any point source unlawful unless the discharge is in compliance with a NPDES Permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/ construction point sources to comply with the NPDES Permit scheme. Important CWA sections are:

- Sections 303 and 304 require states to promulgate water quality standards, criteria, and guidelines.
- Section 401 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 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 storm water from industrial/construction and Municipal Separate Storm Sewer Systems.
- Section 404 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.

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

The U.S. Army Corps of Engineers issues two types of 404 permits: Standard and General permits. The two General permits are either Regional or Nationwide permits. Regional permits are issued for a general category of activities when the activities 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 using one of the U.S. Army Corps of Engineers’ Standard permits. For Standard permits, approval by the U.S. Army Corps of Engineers is based on compliance with U.S. Environmental Protection Agency’s Section 404 (b)(1) Guidelines (U.S. Environmental Protection Agency *Code of Federal Regulations* 40 Part 230), and whether permit approval is in the public interest. The 404(b)(1) Guidelines were developed by the U.S. Environmental Protection Agency in conjunction with the U.S. Army Corps of Engineers 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 the U.S. Army Corps of Engineers may not issue a permit if there is a least environmentally damaging practicable alternative 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 the 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 the U.S. Army Corps of Engineers, even if not subject to the 404(b)(1) Guidelines, must meet general requirements per 33 *Code of Federal Regulations* 320.4.

2.2 State Laws and Requirements

2.2.1 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 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 (i.e., 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, Regional Boards 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 or non-point source controls (i.e., NPDES permits or Waste Discharge Requirements), then the CWA requires the establishment of Total Maximum Daily Loads (TMDLs), which specify allowable pollutant loads from all sources (i.e., point, non-point, and natural) for a given watershed.

2.2.2 State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB adjudicates water rights, sets water pollution control policy, issues water board orders on matters of statewide application, and it 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 POLLUTANT DISCHARGE ELIMINATION SYSTEM PROGRAM

Municipal Separate Storm Sewer Systems (MS4)

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of storm water dischargers, including municipal separate storm sewer systems. The U.S. Environmental Protection Agency defines a municipal separate storm sewer system (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 storm water, that are designed or used for collecting or conveying storm water." The SWRCB has identified Caltrans as an owner/operator of a MS4 pursuant to federal regulations. The Caltrans MS4 permit covers all Caltrans rights-of-way, 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.

Caltrans' MS4 permit, Order No. 2012-0011-DWQ, adopted on September 19, 2012, becomes effective on July 1, 2013, and contains three basic requirements:

- Caltrans must comply with the requirements of the Construction General Permit (see below);
- Caltrans must implement a year-round program in all parts of the state to effectively control storm water and non-storm water discharges; and
- Caltrans' storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) best management practices 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 to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The Storm Water Management Plan 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 Storm Water Management Plan 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 best management practices (BMPs).

Construction General Permit

Construction General Permit (Order No. 2009-009-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ), adopted on September 2, 2009, became effective on July 1, 2010. The permit regulates storm water discharges from construction sites that result in a disturbed soil area 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 Construction General Permit, applicants are required to develop and implement an effective SWPPP. In accordance with Caltrans' Standard Specifications, a Water Pollution Control Plan is necessary for projects with a disturbed soil area less than 1-acre. By law, all storm water 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 Construction General Permit. Construction activity that results in soil disturbances of less than 1-acre is subject to this Construction General Permit 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 Construction General Permit.

The Construction General Permit 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 storm water runoff pH and turbidity monitoring, and preconstruction and post-construction aquatic biological assessments during specified seasonal windows (SWRCB 2009).

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 the U.S. Army Corps of Engineers. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before the U.S. Army Corps of Engineers 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 under the State Water Code (Porter-Cologne Act) that define 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. Waste Discharge Requirements can be issued to address permanent and temporary discharges of a project.

California Department of Fish and Wildlife Section 1602 Streambed Alteration Agreement

Section 1602 of the California State Department of Fish and Game Code requires a Streambed Alteration Agreement for any alteration to the bank or bed of a stream or lake.

2.3 Regional and Local Requirements

The Project corridor lies within the jurisdiction of the Lahontan RWQCB. Two major watershed areas have been identified within the Project limits. These are the Antelope Valley and the Mojave watersheds. In 2003 Los Angeles County submitted an application for coverage under State Board Order No. 2003-0005-DWQ, NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), for that portion of Los Angeles County under the jurisdiction of the Lahontan RWQCB. In 2005, the Lahontan RWQCB issued a letter stating that the RWQCB does not intend to regulate the City of Palmdale or unincorporated portions of Los Angeles County within the Lahontan region, because the General Permit applies to small MS4s that discharge to waters of the U.S. and according to the Non-Jurisdictional Determination for the Amargosa Creek watershed (which is outside of the Project limits), the U.S. Army Corps of Engineers determined that Amargosa Creek is a non-navigable isolated water body that does not exhibit substantial interstate commerce and, therefore is no longer subject to the Corps jurisdiction with the SWANCC Supreme Court decision. On December 31, 2012 the Los Angeles RWQCB adopted Order No. R4-2012-0175 (Los Angeles County MS4 NPDES No. CAS004001) for MS4 discharges and urban runoff discharges within the County of Los Angeles. The requirements of Order No. R4-2012-0175 covers 84 cities and the unincorporated areas of Los Angeles County, with the exception of the portion of Los Angeles County in the Antelope Valley including the City of Palmdale. Therefore, the portion of the corridor within Los Angeles County is not within a MS4 area (Caltrans 2012).

On February 5, 2013, the proposed final draft of the Phase II Small MS4 General Permit (Order No. 2013-0001-DWQ, NPDES Permit No. CAS000004) was adopted and became effective on July 1, 2013. This general permit regulates storm water discharges from small MS4s. This MS4 General Permit also requires regulated small MS4s to develop a planning and development program that addresses construction site storm water runoff control and post-construction storm water management. To comply with the MS4 General Permit, the Town of Apple Valley, city of Hesperia, city of Victorville and County of San Bernardino (which are located within the Mojave watershed) developed a Storm Water Management Plan (SWMP) to limit, to the MEP, the discharge of pollutants from the storm sewer system (Town of Apple Valley et al. 2003). The development and implementation of their SWMP fulfills the requirements of storm water discharges from Small MS4 operators in accordance with Section 402(p) of the federal CWA.

All projects within the Lahontan region are also subject to the requirements of the Lahontan RWQCB. The Lahontan RWQCB has prepared the *Water Quality Control Plan for the Lahontan Region* (Basin Plan) to help preserve and enhance water quality and to protect the beneficial uses of State waters. The Basin Plan designates beneficial uses for surface and ground waters, and it sets qualitative and quantitative objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy. The Basin Plan also describes implementation programs to protect the beneficial uses of all waters in the region, as well as surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan (Lahontan RWQCB 1995).

To protect beneficial uses, the RWQCB has set forth water quality objectives (WQOs) that are described in the Basin Plan (Lahontan RWQCB 1995). WQOs are intended (1) to protect public health and welfare; and (2) to maintain or enhance water quality in relation to the designated existing and potential beneficial uses of the water.

No contacts were made with local jurisdictions during the development of this WQAR. Internet searches yielded manuals from several of the jurisdictions that appeared to be almost 10 years old. As shown in Section 2, storm water requirements have changed significantly at the state level, and it is expected that the requirements of local jurisdictions will need to be modified in the near future to comply with state requirements. It is recommended that a copy of this WQAR be submitted to agency and municipal representatives along the corridor, as appropriate. Each representative should then be contacted and interviewed during the next design phase for the purpose of acquiring up-to-date information on specific jurisdictional requirements for complying with the revised NPDES permits and information on how to obtain a connection permit or approval for any proposed connection to the jurisdiction's storm drain system.

3 AFFECTED ENVIRONMENT

3.1 Introduction

This section describes the affected environment for water quality and storm water runoff. This section includes a range of topics related to water resources, including the receiving water bodies and water quality. Surface water resources are important for fish and wildlife habitat, urban and agricultural water supply, and conveying floodwaters. Groundwater is also an important source of urban and agricultural water supply.

3.2 General Setting

The Project corridor traverses two watersheds (Antelope Valley and Mojave River), and according to Caltrans' Water Quality Planning Tool (WQPT) (Caltrans 2006a), the HDC Project crosses the following hydrologic area/hydrologic sub-area: Lancaster/626.50; Rock Creek/626.80; El Mirage/628.10 and Upper Mojave/628.20 (Figure 3-1). The receiving water bodies within the Project corridor include Big Rock Creek, Little Rock Creek, Bell Mountain Wash, Fremont Wash, Mescal Wash, Little Rock Wash, Big Rock Wash, Turner Wash, Ossam Wash, Desert Knolls Wash and the Mojave River. The Little Rock Wash, Big Rock Wash, Fremont Wash, Bell Mountain Wash and Mojave River have perennial low flow channels with riparian vegetation located along the water's edge.

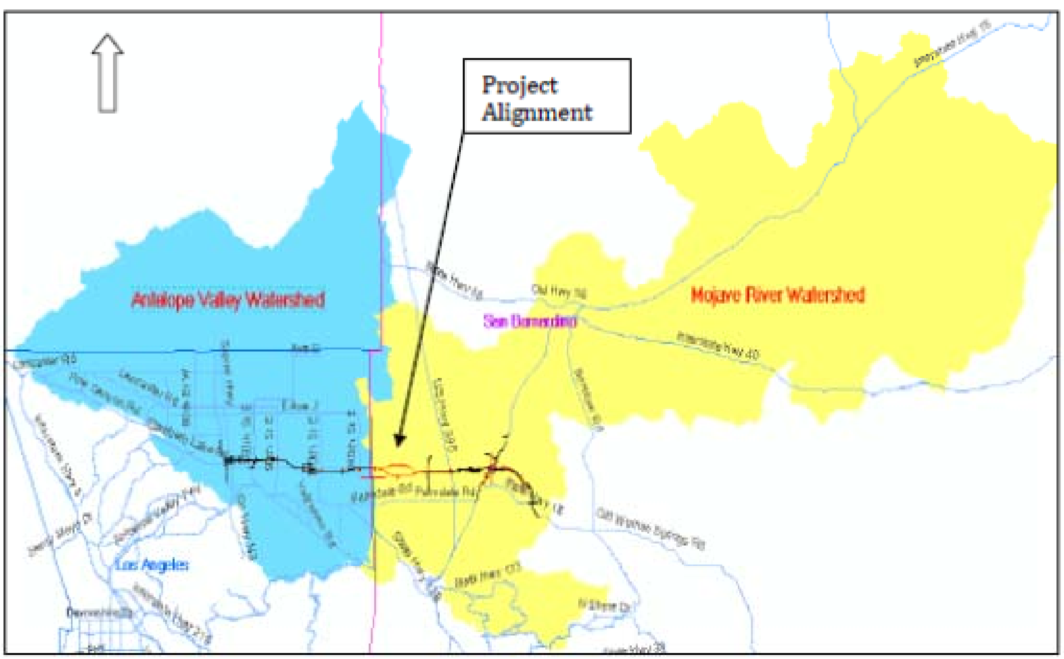

Figure 3-1. Antelope Valley and Mojave River Watersheds

The Antelope Valley Groundwater Basin is located in the western Mojave Desert. Recharge to this basin is primarily accomplished by perennial runoff from the surrounding mountains and hills. Most recharge occurs at the foot of the mountains and hills by percolation through the head of alluvial fan systems. The Big Rock and Little Rock Creeks, in the southern part of the basin, contribute about 80 percent of runoff into the basin. The Mojave River Groundwater Basin is managed by the Mojave Water Agency (MWA). The basin is divided into a number of subareas, including the Alto Subarea. Recharge facilities within the Alto subarea include the Oro Grande Demonstration Recharge site (approximately 3 miles from the Project corridor) and the Rock Springs Recharge Site and the Proposed Antelope Wash Recharge Site, both of which are located approximately 10 miles from the Project corridor.

3.2.1 Population and Land Use

POPULATION

Population data has been obtained from a number of sources and is displayed in Table 3-1.

Table 3-1. Population within HDC Corridor

Area	Population	Reference
Adelanto	31,765	City of Adelanto Urban Water Management Plan
Hesperia	88,041	City of Hesperia Urban Water Management Plan
Lancaster	156,633	2010 Demographic Profile Data, U.S. Census Bureau
Palmdale	152,750	2010 Demographic Profile Data, U.S. Census Bureau
Town of Apple Valley	74,266	Claritas Population Facts Demographic Snapshot Report, April 6, 2009; www.applevalley.org
Unincorporated San Bernardino County	291,776	Local Profiles Report 2011 – Unincorporated area of San Bernardino County, Southern California Association of Government, May 2011
Victorville	106,121	Forecasted for 2010 by ESRI, April 13, 2011

LAND USE

Lands within the Project watersheds are largely undeveloped, and the majority of the terrain is brush-covered. A typical ground cover is shown in Figure 3-2. Some of the undeveloped land is used for rangeland or agricultural purposes. The second highest land use is residential/office buildings. All washes (i.e. Big Rock Wash, Little Rock Wash, Turner Wash, etc.) within the Project corridor are considered environmentally sensitive areas. A brief description of the major streams within the Project corridor is provided in the Section 3.2.3.

Figure 3-2. Typical Ground Cover

3.2.2 Topography

The topography within the proposed Project corridor is dominated by large and gently sloping valleys. They include Antelope, Victor, and Apple valleys. Existing slopes are relatively flat, less than 2 percent on average (Caltrans 2012).

3.2.3 Hydrology

The following hydrology features exist in the regional and local Project vicinity: major surface water features, including lakes, reservoirs, rivers, canals, and floodplains; and major groundwater aquifers. These features are described in the following subsections.

CALIFORNIA AQUEDUCT

The California Aqueduct is located between approximately 3 miles south on the east end of the HDC alignment to about 10 miles south on the west end. A photograph of the aqueduct is shown in Figure 3-3.

Figure 3-3. California Aqueduct near Sierra Highway

Portions of the watershed tributary to the HDC are located upstream of the California Aqueduct, which traverses along the south side of the Antelope Valley. This facility is generally placed above grade, which causes it to act as a dam to some of the flows generated upstream. During the assessment of the sub-basin areas, however, it was determined that sufficient culvert and channel crossings under the aqueduct (and railroad tracks) exist to prevent flow diversions and impeded flows within the sub-basins.

From its beginning until its first branch, the aqueduct passes through parts of Contra Costa, Alameda, San Joaquin, Stanislaus, Merced, Fresno, and Kings Counties. The aqueduct then divides into three branches: the Coastal Branch in the Central Valley and the East and West Branches after passing over the Tehachapi Mountains.

The West Branch continues through Kern County into Los Angeles County to its terminus at Pyramid Lake and Castaic Lake in the Angeles National Forest. This branch supplies the western Los Angeles basin.

LITTLE ROCK WASH

The Project alignment across Little Rock Wash, an intermittent stream, is located approximately 5 miles downstream of the California Aqueduct. Figure 3-4 shows the bridge over Little Rock Wash on East Palmdale Boulevard, 1-mile south of the alignment. The California Aqueduct was built such that there was no interference with the natural flow path of Little Rock Wash in the area just west of 72nd Street E, as well as in the area near Magda Street (Figure 3-5).

Figure 3-4. Little Rock Bridge on SR 138

Figure 3-5. Crossings over the California Aqueduct near Little Rock Wash

Runoff in Little Rock Wash is generated from the San Gabriel Mountains and its northern foothills that outlet into the Antelope Valley. The wash conveys flow to a closed basin at Rosamond Lake. Northeast of Rosamond Lake is Rogers Lake, which is also a closed basin, located east of Rosamond Lake in the northern part of Antelope Valley.

A hydraulic feature associated with Little Rock Wash is the Little Rock Dam. The Little Rock Dam, with a tributary drainage area of 49.2 square miles, is located 8 miles upstream of the alignment and 3 miles south of the California Aqueduct. The Little Rock Dam plays a role in reducing peak flows, as well as serving as a storage feature in the watershed.

BIG ROCK WASH

Big Rock Wash, a perennial stream, crosses the alignment east of Little Rock Wash. The wash curves to the northeast past Lovejoy and Alpine buttes, and it eventually forms a common hydrologic system with its sister drainage, flowing to the Rosamond and Rogers Dry Lake Basin.

Big Rock Wash is approximately 7.5 miles downstream of the California Aqueduct. Figure 3-6 displays the existing SR 138 Bridge over Big Rock Wash, 5 miles south of the proposed Project alignment.

Figure 3-6. Big Rock Wash near SR 138

TURNER WASH

Turner Wash crosses the proposed Project alignment east of Phantom E, before it drains to the Mojave River, as depicted in Figure 3-7.

Figure 3-7. Turner Wash, Ossam Wash and Mojave River

OSSAM WASH

Ossam Wash crosses the alignment east of Turner Wash before it drains to the Mojave River, as also shown in Figure 3-7.

MOJAVE RIVER

The Mojave River is, for the most part, an intermittent river that conveys runoff northerly from the eastern San Bernardino Mountains into the Mojave Desert in San Bernardino County. The Mojave River is the largest drainage system in the Mojave Desert. The east portion of the Project area is located in the Mojave River Watershed, contributing flow to the River at the “Narrows” of the river where the water body has perennial flow. The Mojave River includes perennial low flow channels along the bed of the waterway with riparian vegetation located along the water's edge. This is the location of the proposed crossing of the HDC, as shown in Figure 3-8.

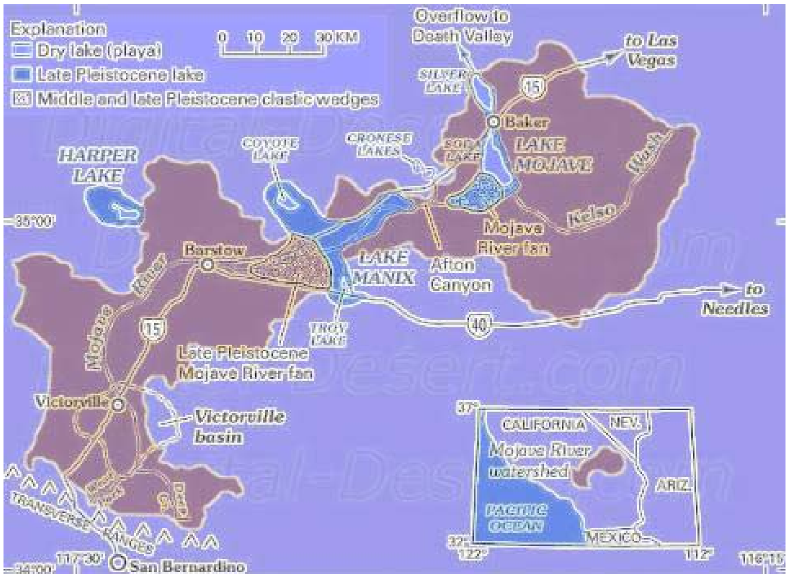

Figure 3-8. Mojave River

Figure 3-9 shows the bridge over the Mojave River on SR 18 (D Street) near I-15, 1.2 miles south of the alignment.

Figure 3-9. Mojave River at SR 18

BELL MOUNTAIN WASH

Bell Mountain Wash crosses the alignment just west of I-15, east of Turner Wash, before it drains to the Mojave River, as depicted in Figure 3-10.

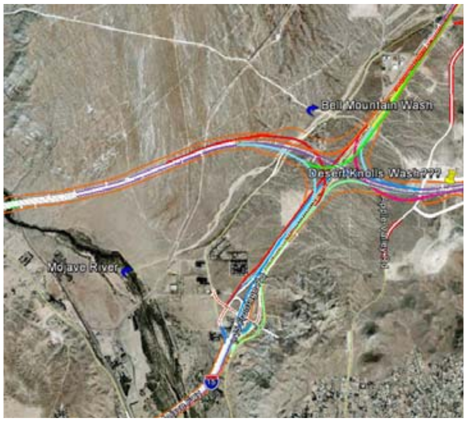

Figure 3-10. Bell Mountain Wash

In general, the hydrologic regime along the entire corridor exhibits the characteristics of an alluvial fan with several incised streams and channels that cross the Project alignment such as Mojave River, Bell Mountain Wash, Fremont Wash, Mescal Wash, Big Rock Creek and Little Rock Creek. These are considered the largest waterways within the Project area and generally run north across the Project site with the exception of Bell Mountain Wash. Figure 3-11 shows the flow direction within the vicinity of the river and includes the Fremont Wash tributary and the Apple Valley Dry Lake located east of the Mojave River at the very eastern side of the corridor.

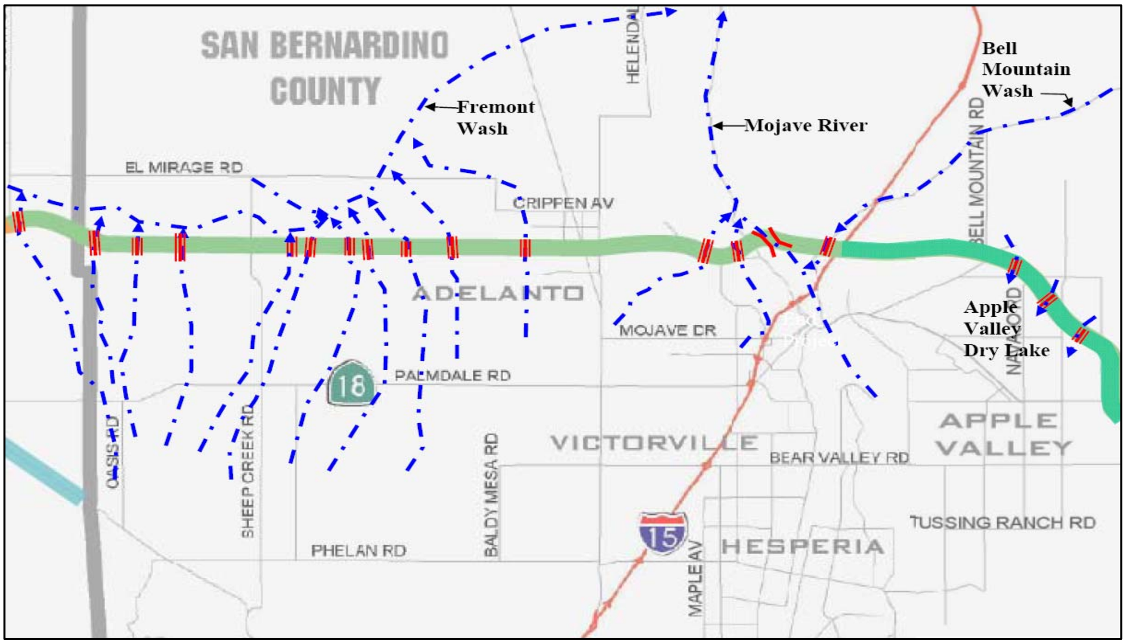

Figure 3-11. East Portion of High Desert Corridor in Mojave River Watershed

The west portion of the Project area is located in the Antelope Valley as shown in Figure 3-12. The watershed encompasses approximately 1,220 square miles within Los Angeles

County and 143 square miles in San Bernardino County. Numerous streams originating in the mountains and foothills flow across the valley floor and eventually pond in Rosamond Lake and Rogers Dry Lake to the north. Within the limits of the City of Palmdale, the corridor traverses the northern side of the City. Culverts will be placed to accommodate the existing offsite runoff under current conditions.

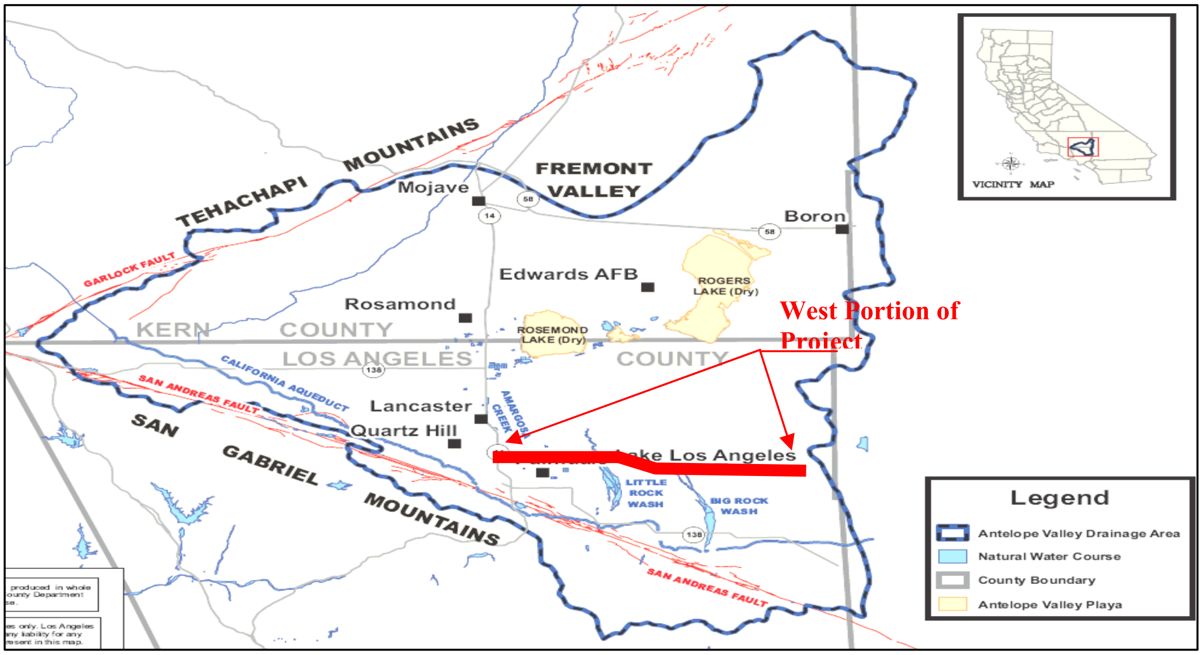

Figure 3-12. West Portion of High Desert Corridor in Antelope Valley

The offsite drainages crossing the corridor are described in more detail below and are shown in Figures 3-13, 3-14, and 3-15, which are referred to as Hydrology Maps 1, 2 and 3 respectively.

Off-site Hydrology Map 1 (Figure 3-13), shows the western portion of the project alignment. As shown, the tributary area within the City of Palmdale (from SR-14 to Little Rock Wash) drains in a northerly direction across the Project alignment. The off-site watershed depicted in this area has been divided into 11 sub-watersheds (labeled as drainage areas 1 to 11).

As depicted in Map 1 (Figure 3-13), the tributary area from Little Rock Wash to Big Rock Wash drains northwesterly through Antelope Valley in an alluvial fan formation toward the Rosamond and Rogers dry lakes. This watershed area has been divided into 10 sub-watersheds, labeled as drainage areas 12 to 21.

As shown in Maps 1 and 2 (Figure 3-13 and Figure 3-14), the tributary area from Big Rock Wash to Fremont Wash drains northerly and flows across the Project alignment. East of Big Rock Wash, there are numerous streams traversing the Project alignment that are tributary to Mescal Creek, which flows northwesterly to a dry lake referred to as Lake Los Angeles. Sub-watersheds contributing flow to Mescal Creek include drainage areas labeled 22 to 43.

Farther east, the runoff generally flows in a northeasterly alignment to Fremont Wash within the City of Adelanto. Drainage areas contributing flow to this stream include those labeled 44 to 55. This wash eventually drains to the Mojave River.

As shown in Map 2 (Figure 3-14), from Fremont Wash to I-15, the offsite drainage areas flow to larger streams such as Turner Wash (sub-watershed 56) and Ossam Wash (drainage area 57) which both drain to the Mojave River farther to the north. The Mojave River (drainage area 58) also flows northerly across the alignment.

Map 3 (Figure 3-15) shows that runoff generated east of I-15 is conveyed to Bell Mountain Wash (drainage areas 59 and 60) which flows southerly across the alignment to the Mojave River. Finally, at the east end of the Project site, the off-site drainage flows in a southwesterly to westerly direction across the Project alignment to Apple Valley Dry Lake (drainage areas 61 to 64).

PRECIPITATION AND CLIMATE

The Project area has a high desert type climate, characterized by long, dry, hot summers and cold and windy winters. In the Antelope River and Mojave River valleys, the summer months are hot with little or no precipitation and all areas within this region can be affected by summer monsoonal thunderstorms. For example, in the El Mirage region of the proposed Project corridor, the hottest month was reported as July with an average maximum temperature of 96.9 °F. December was reported as the month with the lowest temperature with a minimum average temperature of 27.1 °F.

Precipitation occurs as rainfall, with snow common in the high mountains. Table 3-2 displays the average annual rainfall (Caltrans 2006a) within the hydrologic areas of the corridor.

Table 3-2. Average Annual Precipitation per Hydrologic Area

Hydrologic Unit	Antelope	Antelope	Mojave	Mojave
Hydrologic Area	Lancaster	Rock Creek	El Mirage	Upper Mojave
Hydrologic Sub-Area (acres)	626.50	626.80	628.10	628.20
Watershed Area (acres)	557,620	265,344	106,382	556,821
Average Annual Rainfall (inches)	7.3	13.3	7.9	12

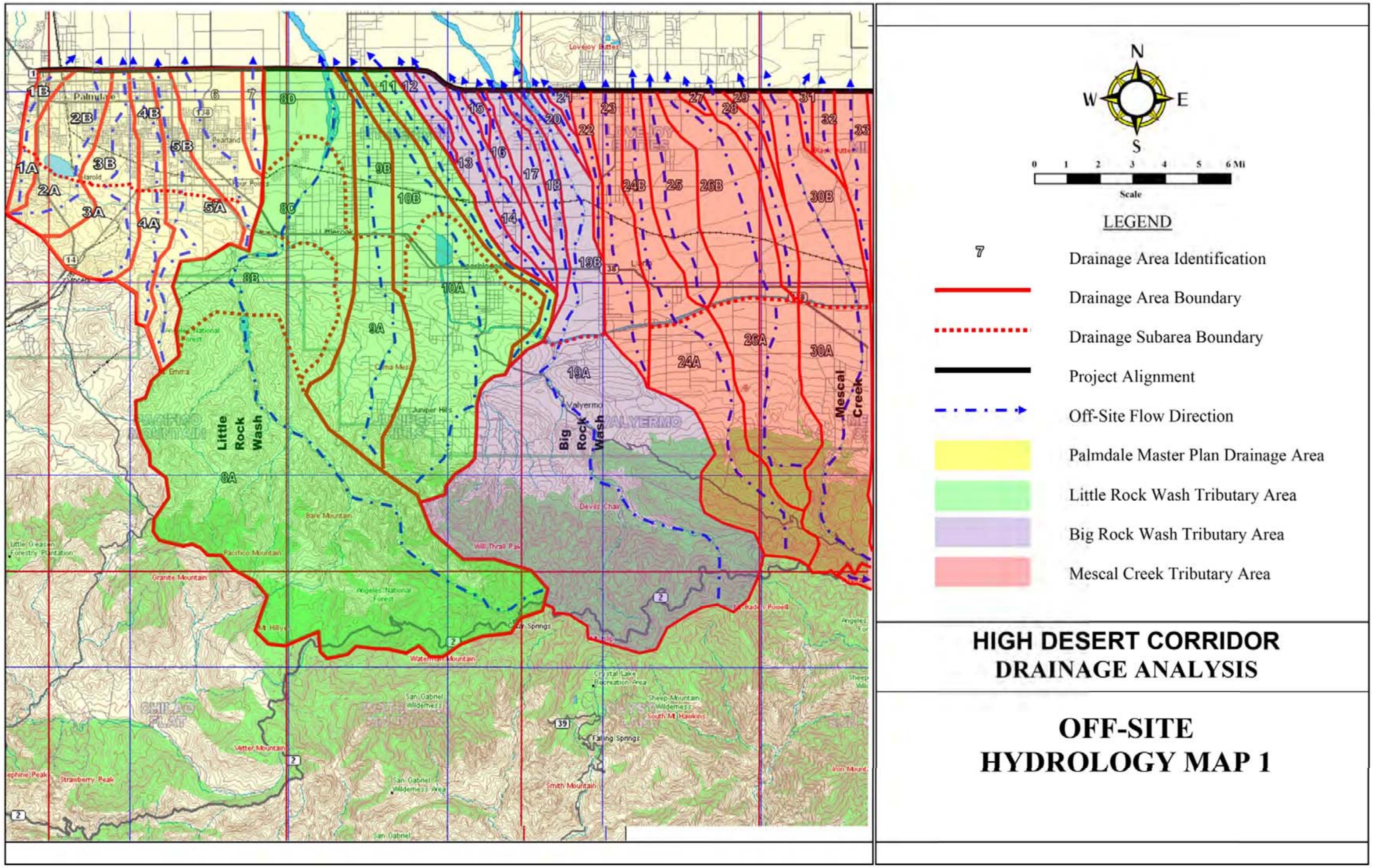

Figure 3-13. Off-Site Hydrology Map 1 – Drainage Pattern West Segment of Project

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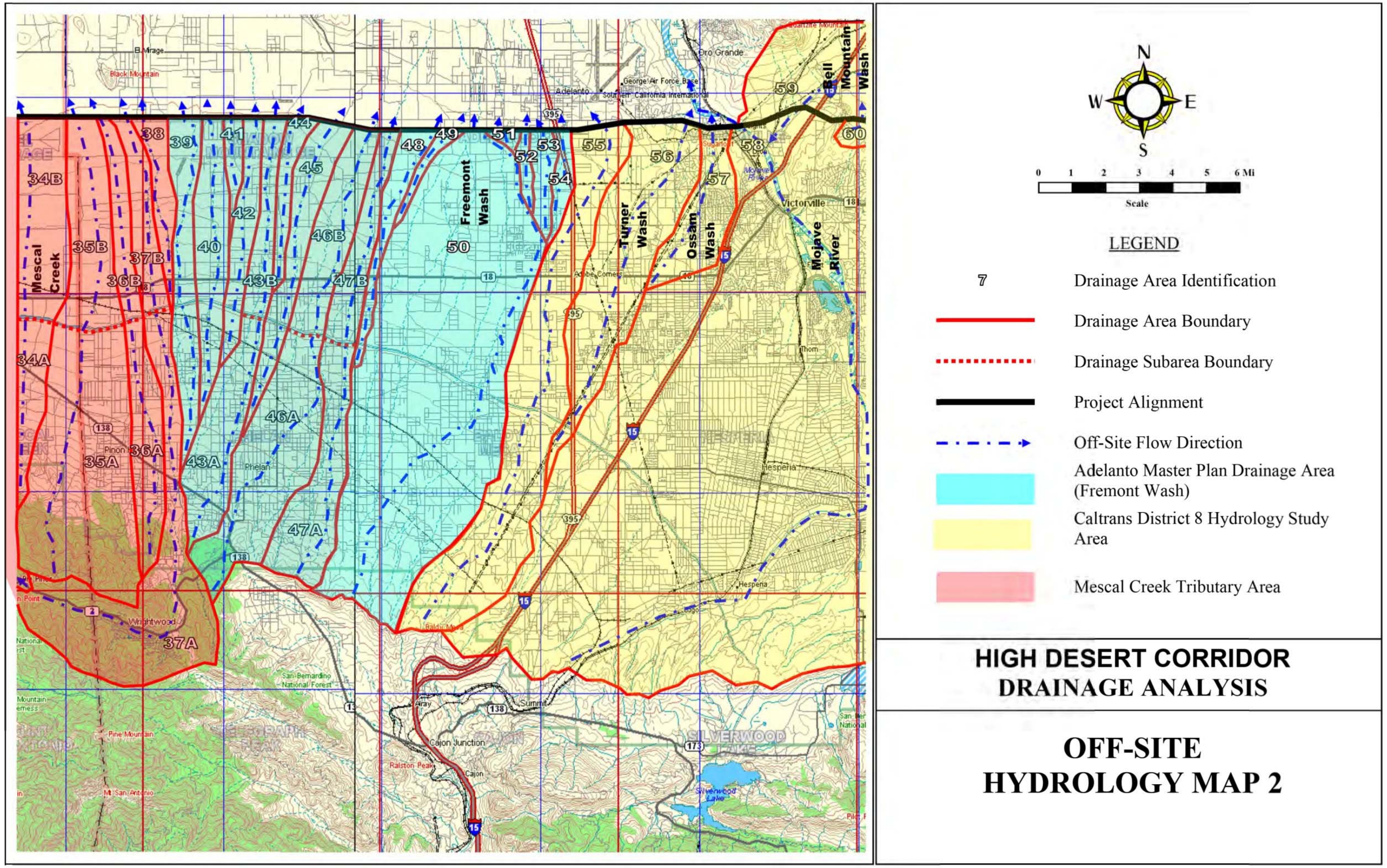

Figure 3-14. Off-Site Hydrology Map 2 – Drainage Pattern Central Segment of Project

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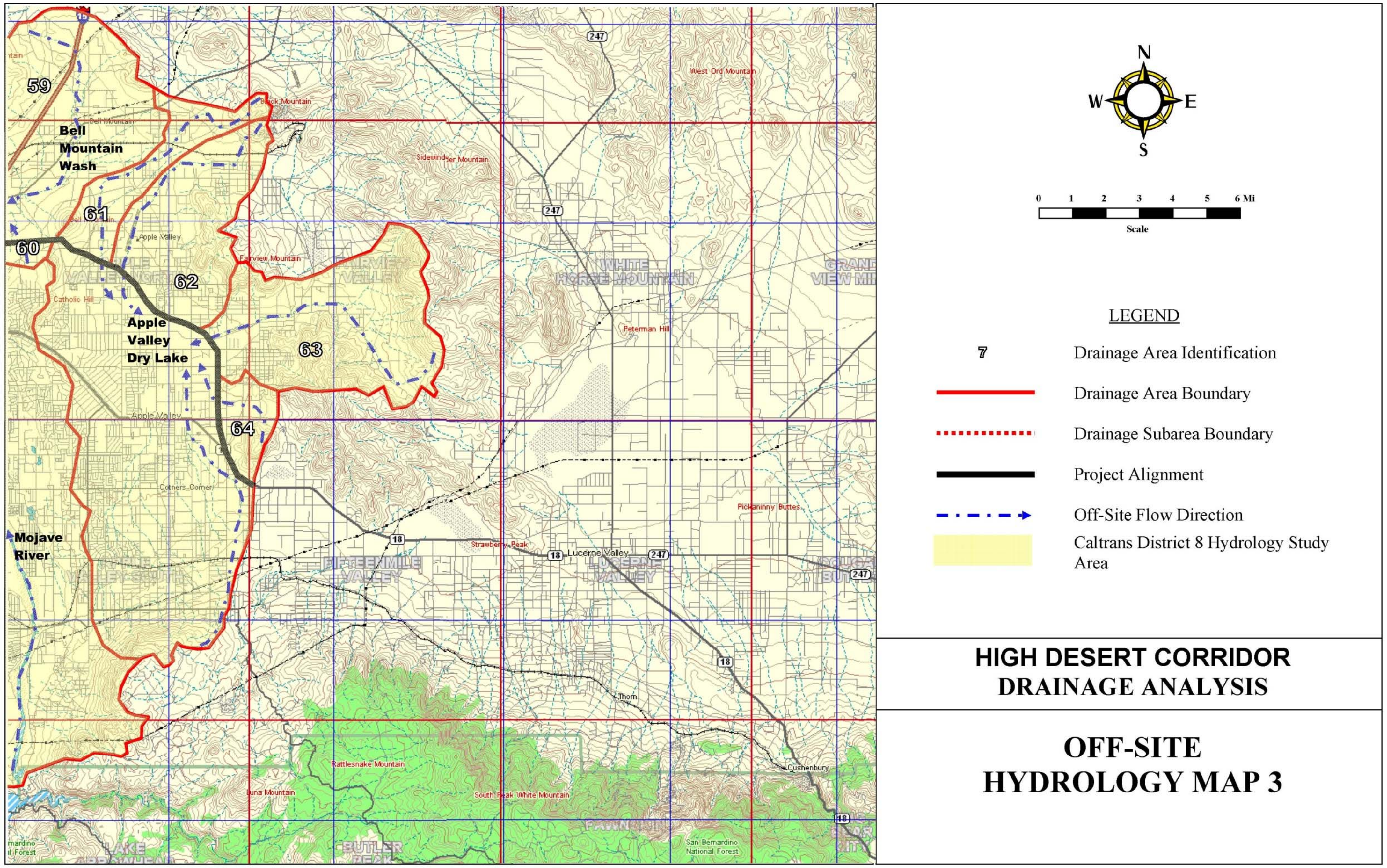

Figure 3-15. Off-Site Hydrology Map 3 – Drainage Pattern East Segment of Project

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FLOODPLAINS

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs), which generally define the 100-year based floodplain, consider only major streams with drainage areas greater than 1-square mile (sq mi). Streams with tributary areas larger than 1-sq mi have floodplains designated as Zone A (an area inundated by 100 year flooding, for which no base flood elevations [BFEs] have been established), and flood insurance is generally required for at-risk structures in the floodplain. Streams with smaller tributary areas have floodplains designated as Zone B or X and generally do not require flood insurance. A Draft Hydrology and Hydraulics Report (Parsons 2013) was completed for the proposed Project. This section summarizes information provided in that report.

As displayed in Figure 3-16, near the western terminus of the Project, the proposed roadway is located in Flood Zone AO (an area inundated by shallow 100-year flooding for which flood depths range from 1 to 3 feet). Specifically, this zone extends from approximately Division Street to Sierra Highway, and between Avenue P-4 and Avenue P-8. Here, the Project alignment would be elevated more than 6 feet above grade.

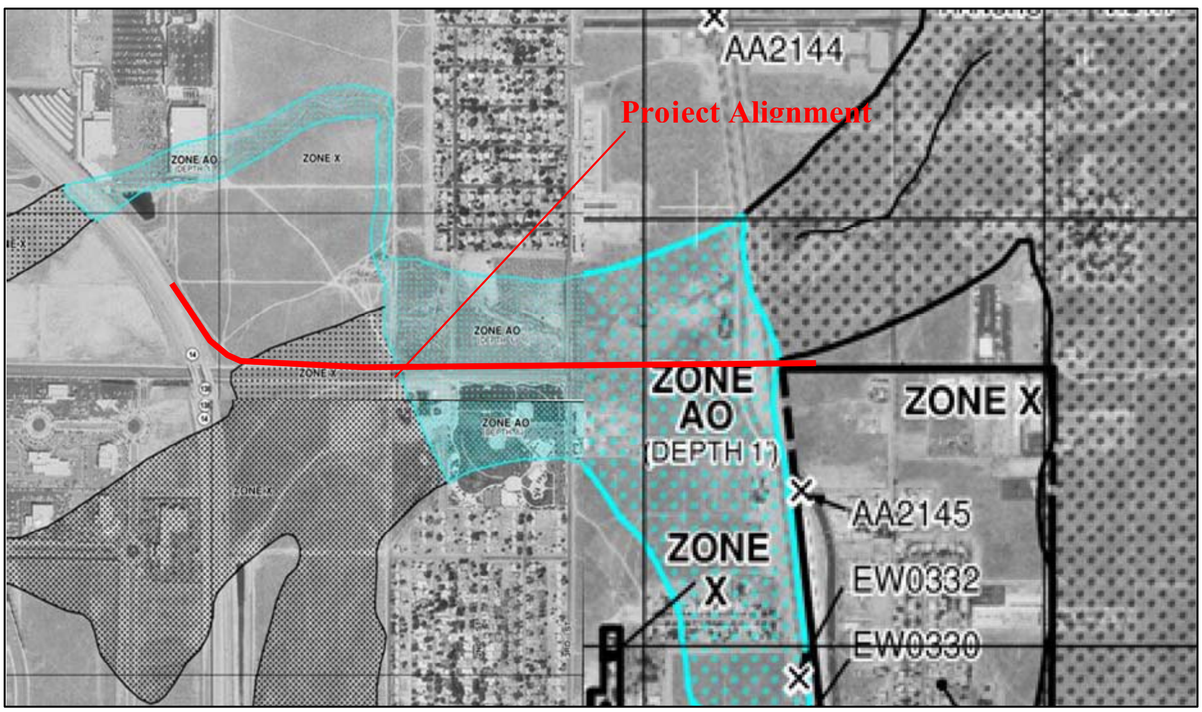

Figure 3-16 Flood Map 06037C0700F, 06037C0659F and 06037C0657F

The alignment between SR-14 and Division Street is located within Zone X. The alignment from Sierra Highway east to 53rd Street E also traverses Zone X.

According to FIRM Panel 06037C0701F as shown in Figure 3-17, the Project alignment between 70th Street E and east of Little Rock Wash is within Flood Zone A. The alignment is located within Zone X from east of Little Rock Wash to 90th Street E.

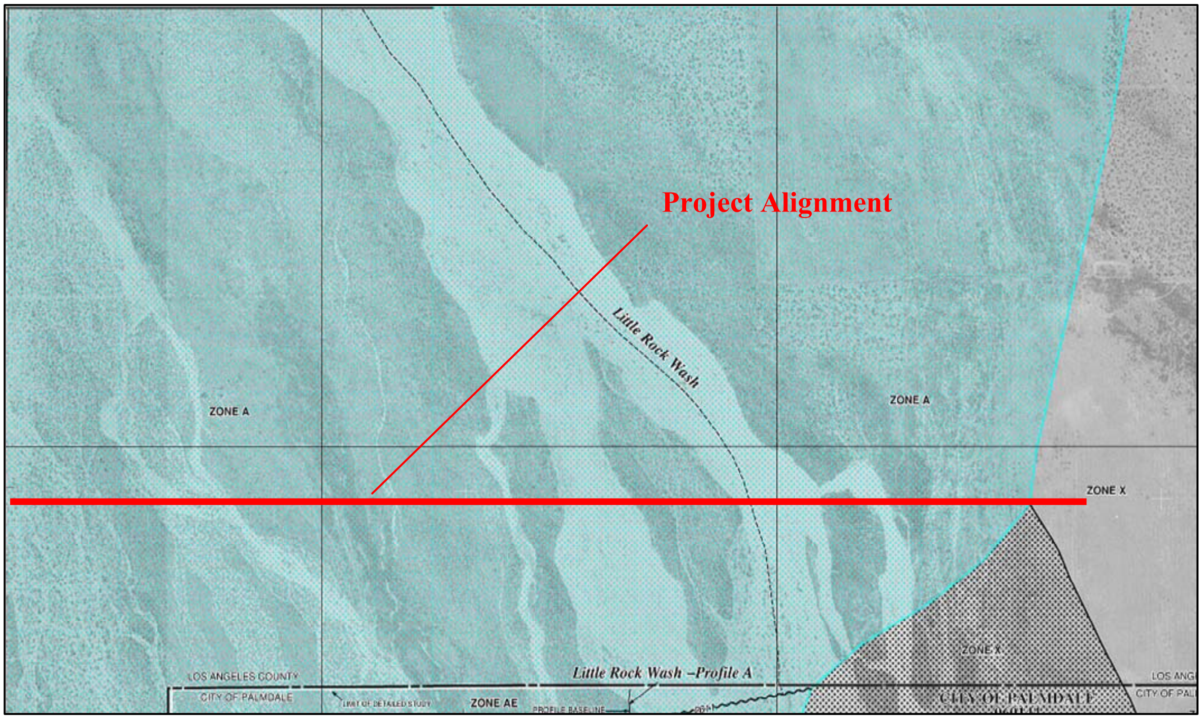

Figure 3-17 Flood Map 06037C0701F

According to FIRM Panel 06037C0750F, as shown in Figure 3-18, the Project alignment extending east from south of E Palmdale Boulevard to Big Rock Wash is located within Zone A.

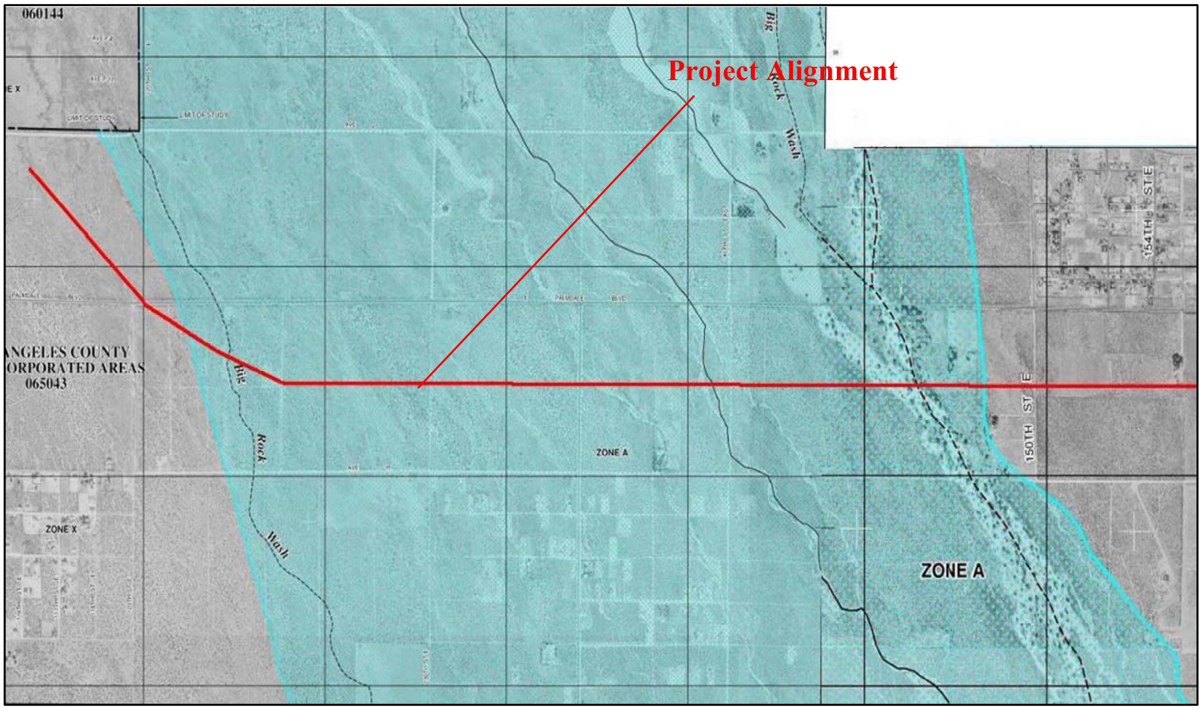

Figure 3-18 Flood Map 06037C0750F

The alignment east of the Los Angeles County/San Bernardino County line to Richardson Road is within Zone D (an area of undetermined but possible flood hazards). The alignment from Richardson Road to Adelanto Airport Road is within Zone X. The alignment from Adelanto Airport Road to Phantom E is within Zone D.

FIRM Panel 06071C5805H, provided in Figure 3-19, indicates the alignment from Adelanto Airport Road to Phantom E is within Zone D.

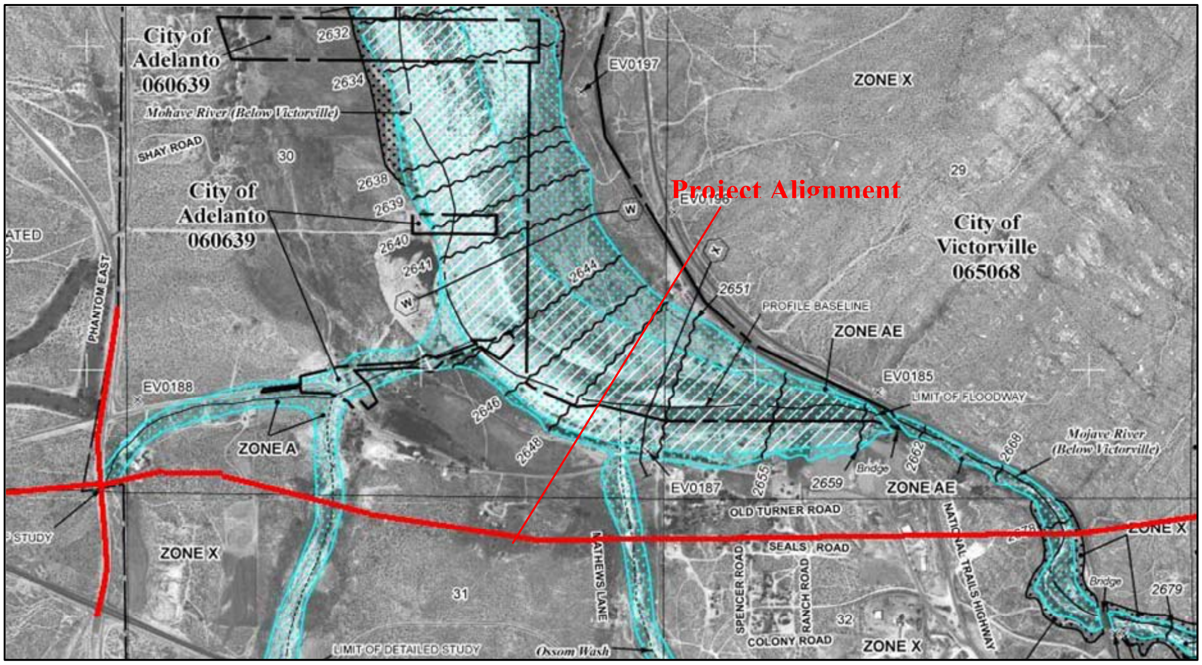

Figure 3-19 Flood Map 06071C5805H

FIRM Panel 06071C5805H also indicates Zone A where the Project alignment crosses both Turner Wash and Ossam Wash. Where the alignment crosses the Mojave River is labeled Zone AE (a Special Hazard Area inundated by 100 year flooding, for which BFEs have been established).

As shown in FIRM Panel 06071C5810H, Figure 3-20, the Project alignment across the Bell Mountain Wash to the west of I-15 is within Zone A.

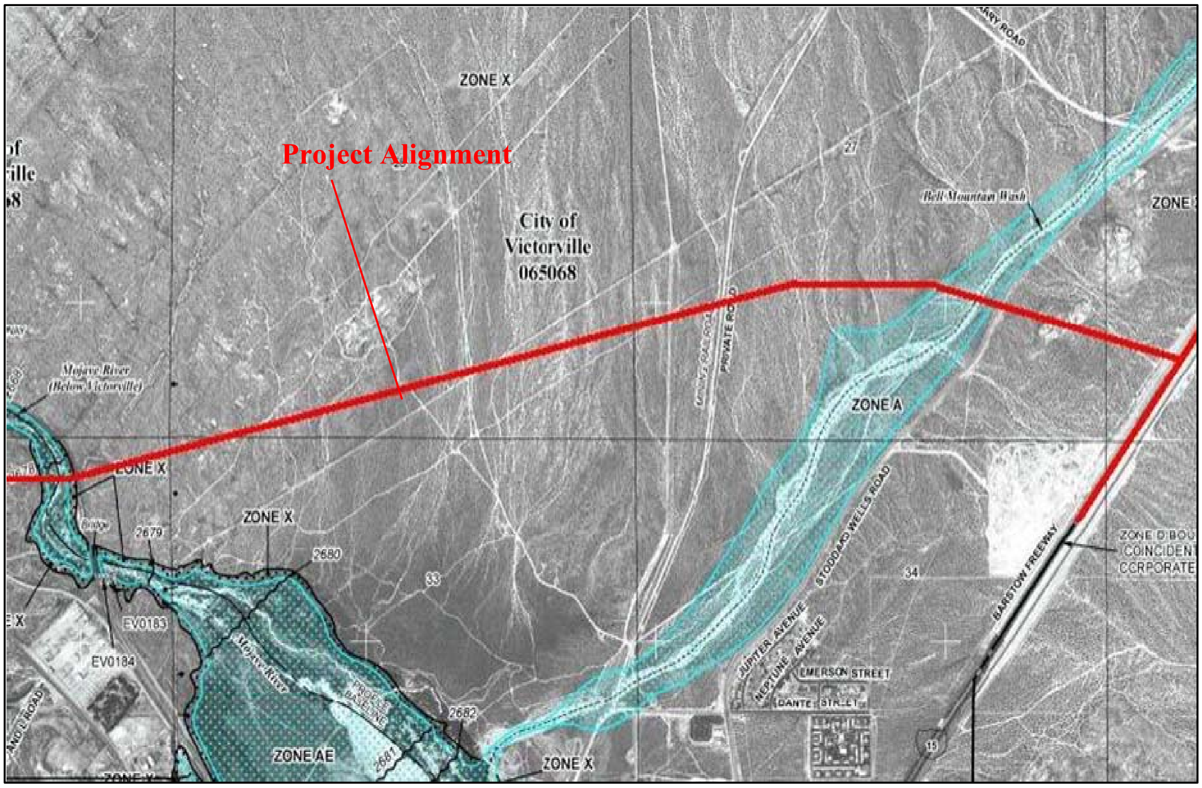

Figure 3-20 Flood Map 06071C5810H

Figure 3-21 shows FIRM Panel 06071C5820H overlain by a Project alignment along I-15 where direct connectors would be constructed as part of the proposed freeway-to-freeway interchange. The alignment crosses the Mojave River within Zone AE in the vicinity of I-15.

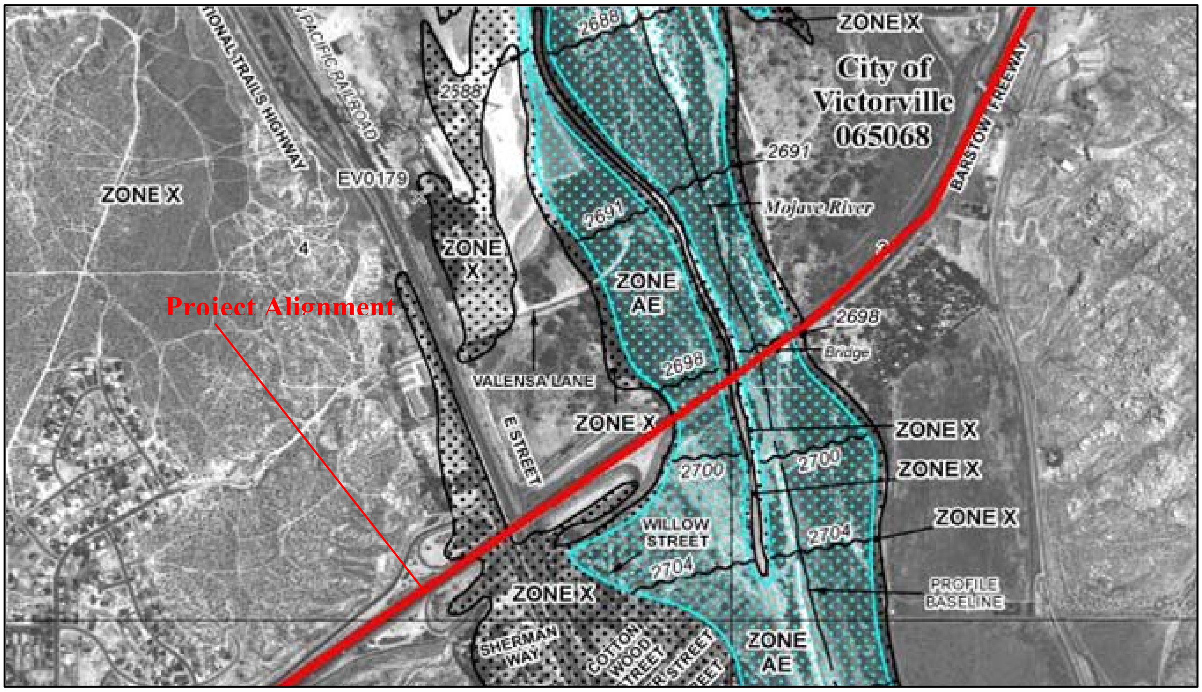

Figure 3-21 Flood Map FM06071C5820H

The alignment from I-15 to Waalew Road is within Zone D. The alignment from south of S Road to Candlewood Road (west of Joshua Road) is within Zone A. The alignment from Joshua Road to where the Project terminates at SR-18 is within Zone D.

3.2.4 Municipal Supply

The California Urban Water Planning Act (California Water Code § 10610 et seq.) requires urban water suppliers to describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs. This information is used by the water agencies to carry out their long term resource planning responsibilities. Urban Water Management Plans (UWMPs) are completed in accordance with the UWMP Act. These plans are updated every 5 years with current versions dated 2010. Table 3-3 summarizes existing and potential water supplies within the Project area and the following sections summarize drinking water and water recharge facility information provided in the UWMPs associated with the Project corridor.

Table 3-3. Existing and Potential Water Supplies within the Project Corridor

Water District (WD)	Existing (E) and Potential (P) Water Supplies							
	State Water Project (SWP)	Ground-water	Recharge					
			Storm Water	SWP	Natural Surface Water Flows	Natural Sub-Surface Water Flows	Waste-water Imports	Ground-water Return Flow/ Recharge
Antelope Valley – East Kern Agency	**E**	**P**		**P**				
Victorville WD		**E**		**P**				
Apple Valley Ranchos WD		**E**		**E**				
Mojave Water Agency	**E**	**E**	**P**	**E**	**E**	**E**	**E**	**E**
City of Adelanto		**E**						
City of Hesperia		**E**						

ANTELOPE VALLEY-EAST KERN WATER AGENCY

The Antelope Valley-East Kern Water Agency (AVEK) encompasses 2,300 square miles in the Mojave Desert area of California, northeast of Los Angeles. AVEK is a wholesale supplier of California State Water Project (SWP) to incorporated and unincorporated areas of Antelope Valley (which includes Palmdale and Lancaster). Because groundwater resources were severely over drafted, AVEK contracted for a supplemental supply of municipal and industrial water (141,400 acre-feet [af]) from the California SWP. AVEKs only source of water is SWP water, however, based upon their planning efforts other sources will be available as displayed in Table 3-4 and described in the following sections.

Table 3-4. AVEK Current and Planned Water Supplies

Water Supply Sources	2010	2015	2020	2025	2030
SWP Allocation	141,400	141,400	141,400	141,400	141,400
Projected Delivery Percentages[1]	80%	62%	62%	62%	62%
Projected Delivery by DWR	113,120	87,688	87,688	87,688	87,688
Recoverable banked groundwater	0	20,000	20,000	20,000	20,000
Totals	113,120	107,688	107,688	107,688	107,688

[1]AVEK 2010 UWMP

Of the 141,400 acre-foot annual SWP entitlement, the municipal and industrial, and agricultural water customers are currently using about 75,000 AF per year. Municipal and Industrial water is provided by four potable water treatment plants with capacities from 4 to 90 million gallons per day. As municipal and industrial demands increase, existing treatment plants will be expanded, and additional plants will be needed (Antelope Valley – East Kern Water Agency 2010).

AVEK does not have production groundwater wells but may include groundwater pumping as a water supply in the future. For example, AVEK is implementing a groundwater banking project to improve the reliability of the Antelope Valley Region's water supplies through construction of the necessary infrastructure to store excess water available from the SWP during wet periods and recover and serve it to customers during dry and high demand periods or during a disruption in deliveries from the SWP.

AVEK has also constructed a Domestic Agricultural Water Network (DAWN), which consists of four water treatment plants with clear water storage and more than 100 miles of pipelines. Four, 8-million gallon water storage reservoirs near Mojave and one, 3-million gallon reservoir at Vincent Hill Summit complete the DAWN network. The bulk of the imported water is treated and distributed to customers throughout its service area.

MOJAVE WATER AGENCY

MWA serves an area of 4,900 square miles of the High Desert in San Bernardino County. For management purposes, the MWA generally separates its service area into six management areas, including the five subareas of the adjudicated Mojave Basin Area (Alto, Baja, Centro, Este, and Oeste) and the Morongo Basin/Johnson Valley Area. The HDC Project alignment runs through the Alto and Oeste subareas.

Alto Subarea

Alto subarea water levels near the Mojave River are relatively stable exhibiting seasonal fluctuations with rising levels in winter and declining levels in summer. It is expected that under current pumping conditions and long-term average flows in the river, water levels in the Floodplain Aquifer will generally remain stable. Water levels in the western portion of Alto in the Regional Aquifer exhibit declines consistent with heavy pumping and limited local recharge.

Water levels in the eastern portion of Alto indicate similar trends although to a lesser extent; most likely due to limited pumping in the regional aquifer east of the river and possibly higher localized septic return flow due to the lack of sewers in some areas. Continued pumping in depleted areas of the Regional Aquifer may result in long-term local negative impacts such as declining yields and water quality problems. As a whole, the Alto subarea appears to be in regional balance although portions of the subarea have shown continued historical declines. Localized declines in water levels may be ameliorated by a redistribution of groundwater production and return flows (e.g. construction of local wastewater treatment plants).

Recharge facilities within the Alto subarea include the Oro Grande Demonstration Recharge site (approximately 3 miles from the Project corridor) and the Rock Springs Recharge Site and the Proposed Antelope Wash Recharge Site, both of which are located approximately 10 miles from the Project corridor (Kennedy/Jenks Consultants 2011).

Oeste Subarea

Hydrographs for the southern portion of Oeste Subarea indicate a long-term decline in water levels, but declines in most wells appear relatively small (less than or about one foot per year). More significant declines occur locally, especially in the vicinity of heavy pumping. Water levels in the north to central portion of Oeste near El Mirage indicate relatively stable conditions.

MWA has four sources of water supply – natural surface water flows, wastewater imports from outside the MWA service area, SWP imports, and return flow from pumped groundwater not consumptively used. According to the water supply contract between the California Department of Water Resources and MWA revised on October 12, 2009, MWA's maximum annual entitlement from the SWP is 82,800 AFY from 2010 to 2014; 85,800 AFY from 2015 to 2019; and 89,800 AFY from 2020 to 2035.

MWA receives SWP water at four locations off the aqueduct. The first of four turnouts to the MWA service area is located at Sheep Creek, which is essentially a stub out in the Phelan Area and not used at this time. Second is the Mojave River turnout, also known as the White Road Siphon, located southwest of the City of Victorville and serves the Mojave River Pipeline. The third turnout is the Highway 395 turnout, located southwest of the boundary dividing the City of Victorville from the City of Hesperia, which is being developed for the Oro Grande Wash Recharge Project. The fourth and last turnout is known as the Morongo Siphon (or Antelope Siphon Turnout) and serves the Morongo Basin Pipeline. In addition, the MWA takes water delivery from Cedar Springs Dam at Silverwood Lake through controlled releases to the Mojave River. To distribute the supply of water to the points of demand, MWA has taken a central role in designing and constructing the Morongo Basin and Mojave River pipelines, which extend from the California Aqueduct.

The Mojave River Pipeline extends approximately 76 miles from the California Aqueduct to recharge sites along the Mojave River. The large-diameter pipeline project was started in 1996 and completed in 2006 to deliver up to 45,000 AFY to the Mojave Basin Area to offset growing depletion of native water supplies caused by the region's growth and the over pumping of groundwater. There are four groundwater recharge basins that have been constructed at Hodge, Lenwood, Daggett/Yermo, and Newberry Springs.

Almost all of the water use within MWA is supplied by pumped groundwater. Native surface supply, return flow, and SWP imports recharge the groundwater basins. MWA has an average natural supply of 54,045 AFY. SWP supplies average 54,778 AFY. Supplies from return flows increase over the planning period, due to increased groundwater pumping, as does imported wastewater. Based upon all available supplies compared with total demands, available supplies are sufficient to meet projected demands beyond 2035.

VICTORVILLE WATER DISTRICT

Victorville Water District's (VWD's) service area is located in the southwest region of San Bernardino County and encompasses approximately 85 square miles. The majority of VWD's land use is residential, with large amounts of open space and smaller elements of commercial and industrial uses. VWD currently receives potable water supplies exclusively from groundwater through 36 active wells. These wells pump from the local aquifer (Mojave Groundwater Basin) and meet all of VWD's demands which were 22,733 af in 2010 (Carollo Engineers 2011).

VWD does not currently use surface or imported water to meet its system demands, but is planning to utilize regional water supplies in the future to aid in groundwater replenishment. Regional water supply options for VWD, discussed below, will allow further groundwater utilization without lowering groundwater levels (Carollo Engineers 2011).

Groundwater Recharge with Surface Spreading

The Oro Grande Wash Project was established and piloted by Victor Valley Water District (VVWD) and is now managed by the Mojave Water Agency (MWA) in conjunction with other regional groundwater recharge projects. This project consists of surface spreading ponds located south of Sycamore Street and west of the Oro Grande Wash, as well as a pipeline from the State Water Project to the spreading ponds. In 2010 VWD projected that this project would recharge 8,000 acre feet per year (AFY). A total capacity of 12,000 AFY is assumed as MWA plans to expand the Oro Grande Wash Project as required to meet demands.

Groundwater Recharge with Injection Wells

The Regional Recharge and Recovery Project (R^3) is a project implemented by MWA to provide seasonal storage of imported water using the groundwater aquifer. Imported water will be injected at times when sufficient imported water is available. This water can then be extracted during high demand periods and/or in dry years by using groundwater wells at various locations. A new transmission main system will then connect these groundwater wells to convey and distribute pumped groundwater to a number of water agencies in the high desert area. It is anticipated that this project could potentially provide water to the Apple Valley Ranchos Water Company, the City of Adelanto, the City of Hesperia, Golden State Water Company, the San Bernardino County Service Area and VWD. The project would increase the replenishment of the groundwater aquifer by recharging the basin with raw imported water at eight recharge sites across MWA's service area.

The R^3 project would be implemented in phases with a total planned allocation for VWD of 16,500 AFY. The Phase 1 allocation for VWD and the Southern California Logistics Airport is set at 6,800 AFY or 6.1 million gallons per day and was projected to be available in January 2012. Per the MWA 2010 Regional UWMP, the Phase 2 allocation for the R^3 project will begin approximately in 2015. MWA's 2010 Regional UWMP does not indicate a Phase 2 allocation for VWD, however in their 2010 UWMP; VWD assumed their Phase 2 allocation would be 16,650 AFY.

APPLE VALLEY RANCHOS WATER COMPANY

The Apple Valley Ranchos Water Company (AVRWC) service area covers approximately 50 square miles encompassing the majority of the Town of Apple Valley and portions of the surrounding area. AVRWC currently has a single source of water supply – local groundwater from the Mojave River Groundwater Basin. Specifically, AVRWC obtains groundwater from the Alto subarea of the Mojave River Groundwater Basin and provides potable water from 23 active wells within its service area in Apple Valley. The present capacity of these wells totals approximately 37 million gallons per day. Imported SWP water via the MWA is used to recharge the Alto basin and then it is pumped by the AVRWC (Kennedy/Jenks Consultants 2011a).

The AVRWC water system facilities also include approximately 450 miles of pipeline and 11.6 million gallons of storage. The majority of the wells pump directly into the portion of the distribution system referred to as the Main Pressure Zone. This zone is equipped with elevated storage that is capable of supplying the entire system by gravity flow.

Based on the production capacity of the existing wells, the maximum water that can be supplied by the current AVRWC system is 37 mgd. AVRWC has been regularly increasing the number of wells to meet the increasing demands of the city.

AVRWC has been assigned Base Annual Production (BAP) rights of 13,330 AFY. AVRWC has a projected Free Production Allocation (FPA) of 60 percent (7,998 AFY) from 2010 to 2035. AVRWC is allowed to produce as much water as it needs annually to meet its requirements, subject only to compliance with the physical solution set forth in the Mojave

Basin Area Judgment. An underlying assumption of the Judgment is that sufficient water will be made available to meet the needs of the Basin in the future from a combination of natural supply, imported water, water conservation, water reuse and transfers of FPA among parties.

The Watermaster for the Mojave River Groundwater Basin, MWA, is actively operating recharge sites for conjunctive use along the Mojave River Pipeline. Recharge sites including Hodge, Lenwood, Daggett, Newberry Springs, and Rock Springs Outlet provide MWA with the ability to recharge SWP water into subareas where replacement water is purchased. These sites also provide MWA with the ability to bank excess SWP water as available.

MOJAVE WATER AGENCY

MWA serves an area of 4,900 square miles of the High Desert in San Bernardino County. For management purposes, the MWA generally separates its service area into six management areas, including the five subareas of the adjudicated Mojave Basin Area (Alto, Baja, Centro, Este, and Oeste) and the Morongo Basin/Johnson Valley Area. The HDC Project alignment runs through the Alto and Oeste subareas.

Alto Subarea

Alto subarea water levels near the Mojave River are relatively stable exhibiting seasonal fluctuations with rising levels in winter and declining levels in summer. It is expected that under current pumping conditions and long-term average flows in the river, water levels in the Floodplain Aquifer will generally remain stable. Water levels in the western portion of Alto in the Regional Aquifer exhibit declines consistent with heavy pumping and limited local recharge.

Water levels in the eastern portion of Alto indicate similar trends although to a lesser extent; most likely due to limited pumping in the regional aquifer east of the river and possibly higher localized septic return flow due to the lack of sewers in some areas. Continued pumping in depleted areas of the Regional Aquifer may result in long-term local negative impacts such as declining yields and water quality problems. As a whole, the Alto subarea appears to be in regional balance although portions of the subarea have shown continued historical declines. Localized declines in water levels may be ameliorated by a redistribution of groundwater production and return flows (e.g. construction of local wastewater treatment plants).

Recharge facilities within the Alto subarea include the Oro Grande Demonstration Recharge site (approximately 3 miles from the Project corridor) and the Rock Springs Recharge Site and the Proposed Antelope Wash Recharge Site, both of which are located approximately 10 miles from the Project corridor (Kennedy/Jenks Consultants 2011).

Oeste Subarea

Hydrographs for the southern portion of Oeste Subarea indicate a long-term decline in water levels, but declines in most wells appear relatively small (less than or about one foot per year). More significant declines occur locally, especially in the vicinity of heavy pumping.

Water levels in the north to central portion of Oeste near El Mirage indicate relatively stable conditions.

MWA has four sources of water supply – natural surface water flows, wastewater imports from outside the MWA service area, SWP imports, and return flow from pumped groundwater not consumptively used. According to the water supply contract between the California Department of Water Resources and MWA revised on October 12, 2009, MWA's maximum annual entitlement from the SWP is 82,800 AFY from 2010 to 2014; 85,800 AFY from 2015 to 2019; and 89,800 AFY from 2020 to 2035.

MWA receives SWP water at four locations off the aqueduct. The first of four turnouts to the MWA service area is located at Sheep Creek, which is essentially a stub out in the Phelan Area and not used at this time. Second is the Mojave River turnout, also known as the White Road Siphon, located southwest of the City of Victorville and serves the Mojave River Pipeline. The third turnout is the Highway 395 turnout, located southwest of the boundary dividing the City of Victorville from the City of Hesperia, which is being developed for the Oro Grande Wash Recharge Project. The fourth and last turnout is known as the Morongo Siphon (or Antelope Siphon Turnout) and serves the Morongo Basin Pipeline. In addition, the MWA takes water delivery from Cedar Springs Dam at Silverwood Lake through controlled releases to the Mojave River. To distribute the supply of water to the points of demand, MWA has taken a central role in designing and constructing the Morongo Basin and Mojave River pipelines, which extend from the California Aqueduct.

The Mojave River Pipeline extends approximately 76 miles from the California Aqueduct to recharge sites along the Mojave River. The large-diameter pipeline project was started in 1996 and completed in 2006 to deliver up to 45,000 AFY to the Mojave Basin Area to offset growing depletion of native water supplies caused by the region's growth and the over pumping of groundwater. There are four groundwater recharge basins that have been constructed at Hodge, Lenwood, Daggett/Yermo, and Newberry Springs.

Almost all of the water use within MWA is supplied by pumped groundwater. Native surface supply, return flow, and SWP imports recharge the groundwater basins. MWA has an average natural supply of 54,045 AFY. SWP supplies average 54,778 AFY. Supplies from return flows increase over the planning period, due to increased groundwater pumping, as does imported wastewater. Based upon all available supplies compared with total demands, available supplies are sufficient to meet projected demands beyond 2035.

In MWA's 2010 UWMP, water demands and supplies were also evaluated out 50 years to year 2060. Although this is beyond the 20-year planning horizon required by the UWMP Act, it gives some insight into when, in the future, demands might exceed current supplies. It is assumed that demands continue to increase at the same rate through 2060. The projection indicates that current supplies are sufficient to meet demands through 2044, assuming SWP supplies remain constant at the 2035 availability.

MWA operates under a Regional Water Management Plan, which was revised in 2004 and adopted on February 24, 2005. The 2004 RWMP defines MWA's overall water management objectives for the period of 2004 through 2020 and identifies a variety of potential projects and programs that might be developed to balance future water demands with available supplies and to maximize the overall beneficial use of water throughout the MWA's service area. The adopted RWMP projected that groundwater overdraft, combined with expected growth and associated increasing demand for water, were projected to result in a substantial groundwater recharge requirement by 2020.

Therefore, supply enhancement projects, one which is described below and three of which were previously discussed, have the potential to address the key management issues related to overdraft of groundwater basins, localized water quality issues, and future growth/water demand. These projects are being planned to supplement the other groundwater recharge programs and facilities operated by MWA throughout their service area.

Antelope Valley Wash Recharge

Antelope Valley Wash Recharge ponds could provide groundwater recharge capacity of 3,500 AFY up gradient from the City of Hesperia wells. The Hesperia Master Plan of drainage identifies a 65-acre site for a storm water detention basin in the Antelope Valley Wash south of Ranchero Road. In addition to storm water detention, the site might be able to accommodate groundwater recharge. The Morongo Basin Pipeline passes by this area and would be the source of recharge water.

CITY OF ADELANTO

The City of Adelanto located on U.S. Highway 395, serves approximately 7,300 customers within its 50 square mile water service area. The City's water system includes 113 miles of pipe, nine active potable water wells, four booster pump stations, four pressure reducing stations, seven reservoirs from 0.75 million gallons to 5.0 million gallons and two emergency interties with the VWD (Psomas 2011).

The City lies within an adjudicated basin which is managed by MWA. MWA has established a Base Annual Production and a Free Production Allowance for the city. Adelanto's Base Annual Production is 4,366 AFY and its FPA is 2,620 aft. The city is entitled to pump more than 2,620 AFY if it purchases replacement water in the amount of the excess pumped over and above the FPA.

The City obtains all of its water supply from local groundwater in the Mojave River Basin. In 2010, 100 percent of the City's water supply (4,866 acre-feet) came from groundwater pumping from the Alto Subarea of the Mojave Basin. It is anticipated that Adelanto will continue to rely on groundwater pumping to meet 100 percent of its supply for the foreseeable future.

HESPERIA WATER DISTRICT

The Hesperia Water District (District) is located in the High Desert region of San Bernardino County and is bordered by the Town of Apple Valley to the northeast, the City of Victorville to the north, and the community of Phelan to the west. The District's service area matches the City's boundaries, with minor exceptions, and covers approximately 74 square miles. The

District's municipal water system extracts all of its water supply from the underground aquifers through 18 active groundwater wells located throughout the District. The District obtains groundwater from the Alto subarea of the Mojave River Groundwater Basin. The Mojave River Groundwater Basin, which is adjudicated, is a source of groundwater flowing north from the San Bernardino Mountains. Water is recharged to the Basin through percolation and sub-surface flow from adjoining basins. This groundwater is the only source of supply for the District's system (Kennedy/Jenks Consultants 2011b).

The District provides domestic water from eighteen (18) active wells within this area. All wells are located in the Mojave River Groundwater Basin. Water is conveyed from the wells to the consumers via a distribution system with pipe sizes ranging between 4 and 24 inches in diameter. The District currently maintains 14 storage reservoirs within the distribution system with a total capacity of 64.5 mg.

The District may produce as much groundwater as needed to satisfy its customer demands within its service area. The District has been assigned Base Annual Production rights of 13,688 AFY. The District is located within the Alto Subarea and has a projected Free Production Allowance of 8,213 AFY from 2010 to 2035.

GROUNDWATER HYDROLOGY

The west portion of the project area is located in the Antelope Valley Groundwater Basin (AVG Basin). The AVG Basin has a surface area of 1,580 square miles and includes portions of Los Angeles, Kern and San Bernardino counties. Recharge to the AVG Basin is primarily accomplished by perennial runoff from the surrounding mountains and hills. Most recharge occurs at the foot of the mountains and hills by percolation through the head of alluvial fan systems. The Big Rock and Little Rock Creeks, in the southern part of the basin, contribute to about 80 percent of runoff in the AVG Basin. Other minor recharge is from return of irrigation water and septic system effluent.

From 1975 through 1998, groundwater levels ranged from an increase of 84 feet to a decrease of 66 feet. The parts of the AVG Basin with declining water levels are along the Highway 14 corridor from Palmdale through Lancaster to Rosamond and surrounding Rogers Lake on Edwards Air Force Base.

Historically, groundwater flowed north from the San Gabriel Mountains and south and east from the Tehachapi Mountains toward Rosamond Lake, Rogers Lake, and Buckhorn Lake. These dry lakes are places where groundwater can discharge by evaporation. Because of recent groundwater pumping, groundwater levels and flow have been altered in urban areas such as Lancaster and Edwards Air Force Base. Groundwater pumping has caused subsidence of the ground surface as well as earth fissures to appear in Lancaster and on Edwards Air Force Base. By 1992, 292 square miles of Antelope Valley had subsided by more than one foot. This subsidence has permanently reduced aquifer system storage by about 50,000 acre-feet (California Department of Water Resources 2004).

The east portion of the project area is located in the Mojave River Groundwater Basin (MRG Basin) which is managed by the Mojave Water Agency. The MRG Basin encompasses 1,400 square miles and has an estimated total water storage capacity of nearly 5 million af. Groundwater is recharged into the basin predominantly by infiltration of water from the Mojave River, which accounts for approximately 80 percent of the total basin natural recharge. Other recharge sources include infiltration of storm runoff from the mountains and recharge from human activities such as irrigation return flows, wastewater discharge, and enhanced recharge with imported water. Over 90 percent of the basin groundwater recharge originates in the San Gabriel and San Bernardino Mountains. Groundwater is discharged from the basin primarily by well pumping, evaporation through soil, transpiration by plants, seepage into dry lakes where accumulated water evaporates, and seepage into the Mojave River (California Department of Water Resources 2004).

3.2.5 Geology/Soils

SOIL EROSION POTENTIAL

Hydrologic Soil Groups are based on the rate of water infiltration, with Group A having the highest rates and Group D having the lowest rates. According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, soils within the Project corridor are identified as Adelanto coarse sandy loam; Arizo loamy fine sand; Bryman loamy fine sand; Cajon loamy sand; Cajon-Arizo complex; Cajon-Wasco; Cajon loamy fine sand; Cajon sand; Cajon gravelly sand; Cave loam; Dune land; Haplargid-calciorthids complex; Helendale loamy sand; Helendale-Bryman loamy sands; Hesperia loamy fine sand; Hesperia fine sandy loam; Hesperia loam; Kimberlina loamy fine sand; Lavic loamy fine sand; Manet coarse sand; Manet fine sandy loam; Manet loamy sand; Mirage-Joshua complex; Pits; Riverwash; Rosamond fine sandy loam; Rosamond loam; Rosamond loam, saline-alkali; Rosamond loam, sandy loam substratum; Rosamond loamy fine sandy; Rock land; Rock outcrop-lithic torriorthents complex; Trigger-Sparkhule-rock outcrop; Sunrise sandy loam; Victorville sandy loam; and Villa loamy sand. Of the soil types identified in the NRCS Web Soil Survey, approximately 29.4 percent are rated as Hydrologic Soils Group (HSG) A; 57.9 percent are rated as HSG B; 9.4 percent are rated as HSG C; 1.1 percent is rated as HSG D and the remaining 2.2 percent were not rated (Natural Resources Conservation Service 2012). The soil data, along with potential for surface runoff and erosion hazards, are shown in Table 3-5.

Table 3-5. Project Site Soil Data

Soil Type	Hydrologic Soil Group	Surface Runoff	Erosion Hazard
Adelanto Coarse Sandy Loam	B	Moderately Low	Slight
Arizo Loamy Fine Sand	A	Low	Slight
Bryman loamy fine sand	B	Moderately Low	Slight
Cajon-Arizo Complex	A	Negligible	Slight
Cajon Gravelly Sand	A	Negligible	Slight

Table 3-5. Project Site Soil Data

Soil Type	Hydrologic Soil Group	Surface Runoff	Erosion Hazard
Cajon Loamy Sand	A	Negligible	Slight
Cajon Loamy Fine Sand	A	Negligible	Slight
Cajon Sand	A	Negligible	Slight
Cajon-Wasco	A	Negligible	Slight
Cave Loam	D	High	Moderate - High
Dune Land	A	Negligible	Slight
Haplargid-calciorthids complex	-	-	-
Helendale-Bryman loamy sands	B	Moderately Low	Slight
Helendale loamy sand	B	Moderately Low	Slight
Hesperia Loamy Fine Sand	B	Moderately Low	Slight
Hesperia Fine Loamy Sand	B	Moderately Low	Slight
Hesperia Fine Sandy Loam	B	Moderately Low	Slight
Hesperia Loam	B	Moderately Low	Slight
Kimberlina Loamy Fine Sand	B	Moderately Low	Slight
Lavic Loamy Fine Sand	B	Moderately Low	Slight
Manet Coarse Sand	B	Moderately Low	Slight
Manet Fine Sandy Loam	B	Moderately Low	Slight
Manet Loamy Sand	B	Moderately Low	Slight
Mirage-Joshua Complex	C	Moderate	Moderate
Pits	-	-	-
Riverwash	A	Negligible	Slight
Rock Land	D	High	Moderate - High
Rosamond Fine Sandy Loam	B	Moderately Low	Slight
Rock Outcrop-Lithic Torrorthents Complex	-	-	-
Rosamond Loamy Fine Sand	B	Moderately Low	Slight
Rosamond Loam	B	Moderately Low	Slight

Table 3-5. Project Site Soil Data

Soil Type	Hydrologic Soil Group	Surface Runoff	Erosion Hazard
Rosamond loam, saline-alkali	B	Moderately Low	Slight
Rosamond loam, sandy loam substratum	B	Moderately Low	Slight
Sunrise Sandy Loam	C	Moderate	Moderate
Trigger-Sparkhule-Rock Outcrop Association	D	High	Moderate - High
Victorville Sandy Loam	B	Moderately Low	Slight
Villa Loamy Sand	B	Moderately Low	Slight

Source: Caltrans 2012.

3.2.6 Biological Communities

A Draft Natural Environment Study (NES) (Caltrans 2014) 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 (May 2014), the Biological Study Area (BSA) supports habitat suitable for variety of plant communities. A total of twenty-one (21) special status plant species were identified as being potentially present. Of these species, three (3) were found present within the BSA based on focused surveys; however these species are not typically present in an aquatic habitat. The special status plant species include alkali mariposa lily, Booth's evening primrose and Mojave fish-hook cactus.

SPECIAL STATUS WILDLIFE SPECIES

Surveys were conducted to determine the presence of special status aquatic/riparian wildlife species in the BSA. A total of thirty-seven (37) special status animal species were identified as occurring within the vicinity of the proposed project site. Of those, 27 species were observed or have the potential to occur within the project limits due to habitat suitability. Of the 37 special status animal species identified, the only special status wildlife species identified in aquatic habitat was the Southwestern willow flycatcher which was observed within the BSA in specific areas along the Mojave River and Least Bell's vireo where several individuals displaying nesting behavior were observed in the BSA in specific areas along the Mojave River. Based on the focus surveys, the following special status wildlife species are known to occur in numerous locations within the vicinity of the project site and may utilize aquatic habitat to nest and forage:

- Silvery legless lizard
- Cooper's hawk
- Tricolored blackbird
- Short-eared owl
- Western yellow-billed cuckoo
- Yellow-breasted chat
- Summer tanager
- Yellow Warbler
- Yuma myotis
- Mojave river vole

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:

- Riparian Scrub
- Riparian Woodland
    - Fremont cottonwood forest

SPECIAL AQUATIC SITES

Riverine/riparian habitat and isolated ephemeral washes were mapped within the BSA. A subset (i.e. riparian woodland, riparian scrub) of these communities may include criteria that support wetlands.

FISH PASSAGE

According to the Draft NES, there are no federal fisheries and no essential fish habitat within the BSA. Water Quality Objectives and Beneficial Uses

3.2.7 Surface Water Quality Objectives and Beneficial Uses

The document for each region of the SWRCB's jurisdiction is the Water Quality Control Plan, commonly referred to as the Basin Plan. The Basin Plan designates beneficial uses for surface and ground waters, and it sets qualitative and quantitative objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy. The Basin Plan also describes implementation programs to protect the beneficial uses of all waters in the region and surveillance and monitoring activities to evaluate its effectiveness (Lahontan RWQCB 1995). The receiving water bodies within the Project corridor with designated beneficial uses are displayed in Table 3-6.

To protect beneficial uses, the RWQCB has set forth water quality objectives (WQOs) that are described in the Basin Plan (Lahontan RWQCB 1995). WQOs are intended to (1) protect public health and welfare; and (2) maintain or enhance water quality in relation to the designated existing and potential beneficial uses of the water. The WQOs for receiving waters within the Project corridor are discussed in Section 3.4.

Table 3-6. Beneficial Uses

Water Body	Beneficial Use											WQE	FLD
	MUN	AGR	IND	GWR	REC-1	REC-2	COMM	WARM	COLD	WILD	SPWN		
Antelope Hydrologic Unit 626.00													
Little Rock Creek	X				X	X	X		X	X			
Big Rock Creek	X	X	X		X	X	X		X	X	X		
Little Rock Reservoir	X	X	X	X	X	X	X		X	X			
Mojave Hydrologic Unit 628.00													
Mojave River	X	X		X	X	X	X	X	X	X			
Turner Wash	X	X		X	X	X						X	X

MUN = Municipal and Domestic Supply; AGR= Agricultural Supply; IND = Industrial Service Supply; GWR = Groundwater Recharge; REC-1 = Water Contact Recreation; REC-2 = Non-contact Water Recreation; COMM = Commercial and Sports Fishing; WARM = Warm Freshwater Habitat; COLD = Cold Freshwater Habitat; WILD = Wildlife Habitat; SPWN = Spawning, Reproduction and Development; WQE = Water Quality Enhancement; FLD = Flood Peak Attenuation/Flood Water Storage

3.3 Existing Water Quality

For purposes of regulating water quality, the State of California is divided into nine regions. Of these, the Lahontan Region spans eastern California from the Oregon border in the north, to the Mojave Desert, San Bernardino Mountains, and eastern Los Angeles County in the south. The Region is nearly 600 miles long and has a total area of more than 33,000 square miles. It includes the highest point (Mount Whitney, +14,494 ft.) and lowest point (Badwater, Death Valley, –282 ft.) in the contiguous United States (California Regional Water Quality Control Board, Lahontan Region 2007).

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 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, and others, to collect information on the quality of the State's waters.

For the first five years of the SWAMP program (i.e., 2000–2005), the primary goal of monitoring within the Lahontan Region was to conduct monitoring to determine—to the extent that funding was available and using a region-wide network of sampling stations—whether ambient water quality at the monitored sites is in compliance with the chemical and physical WQOs contained in the Water Quality Control Plan for the Lahontan Region (Basin Plan), the California Toxics Rule, and California's Maximum Contaminant Levels (MCLs) for drinking water.

The following sections summarize SWAMP monitoring activities conducted within the hydrologic units applicable to the HDC (i.e. the Antelope hydrologic unit and the Mojave hydrologic unit). Data tables and figures that compare the monitoring results with Basin Plan WQOs and other regulatory criteria for Little Rock Reservoir, Mojave River at Upper Narrows and Mojave River below Forks Reservoir are provided in Appendix B, C and D, respectively.

SWAMP monitoring activities were conducted from July 2000 through August 25, 2005. The Little Rock Reservoir was the only site sampled within the Antelope hydrologic unit. Two sampling sites within the Mojave hydrologic unit that were near the HDC corridor included the Mojave River at Upper Narrows and the Mojave River below the Forks Reservoir (See Table 3-7).

Table 3-7. SWAMP Monitoring Site Location Coordinates

Antelope HU 626.00		
Site Name	**Latitude**	**Longitude**
Little Rock Reservoir	34.48468	-118.02220
Mojave HU 628.00		
Site Name	**Latitude**	**Longitude**
Mojave River, at Upper Narrows	34.53320	-117.28597
Mojave River, below Forks Reservoir	34.54452	-117.23740

BASIN PLAN CRITERIA – ANTELOPE HU AND MOJAVE HU

For the two hydrologic units, there were 1,226 values comparable to Basin Plan criteria. Of these, 44 samples exceeded Basin Plan objectives (Table 3-8). Basin Plan objectives were exceeded for pH, dissolved oxygen (DO), total dissolved solids (TDS), fluoride, sulfate (SO_4), and boron. All of these averages, however, are based upon only one or two samples each, and therefore probably do not accurately reflect true average conditions. Unless additional data are available from other sources, further investigation would be needed to accurately characterize ambient levels of boron, TDS, fluoride and SO_4 at Little Rock Reservoir.

Table 3-8. Comparison of Basin Plan Criteria to Results for the Antelope HU and Mojave HU

Hydrologic Unit	Water Body	pH	DO	TDS	Fecal Coliform	Chloride	Fluoride	SO_4	Boron	NO_3	TKN	Total Nitrogen	PO_4	Total Phosphorus	Pesticides	Total Number of Data Points
Antelope	Little Rock Reservoir	0/43	13/43	2/3	0/4	0/3	2/3	2/3	3/3	0/3	NA	NA	NA	NA	-	108
Mojave	Mojave River below Forks Reservoir	2/15	0/14	NA	-	0/5	4/5	3/5	1/5	NA	NA	NA	NA	NA	0/510	559
	Mojave River Upper Narrows	0/15	2/14	NA	-	0/5	5/5	5/5	0/5	NA	NA	NA	NA	NA	0/510	559
Total Potential Exceedances		2	15	2	0	0	11	10	4	0	0	0	0	0	0	44/1226

For the Little Rock Reservoir, annual averages for boron concentration from 2001 – 2003 were 60, 92 and 32 micrograms per liter (µg/L), respectively, compared to the Basin Plan objective of 30 µg/L (Figure 3-22).

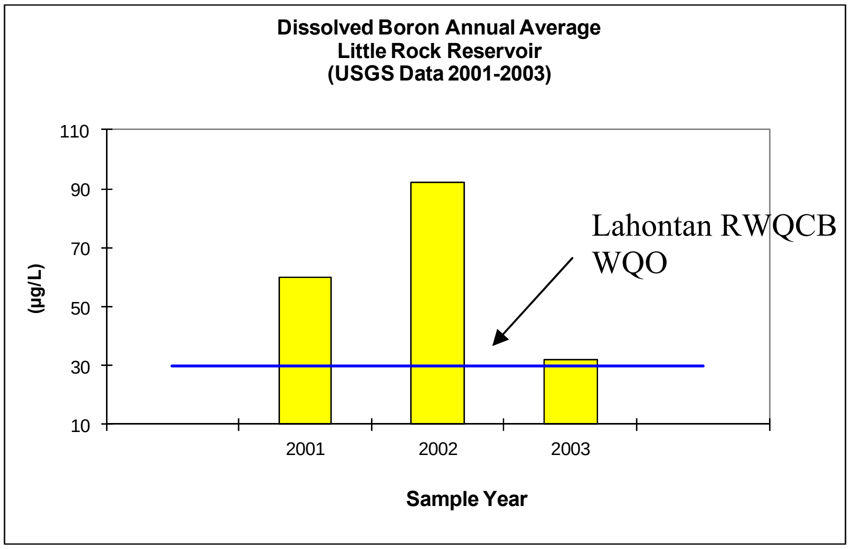

Figure 3-22. Dissolved Boron at Little Rock Reservoir

Annual averages for TDS from 2001 – 2003 were 414, 343, and 136 milligrams per liter (mg/L), respectively, compared to the Basin Plan objective of 176 mg/L (Figure 3-23).

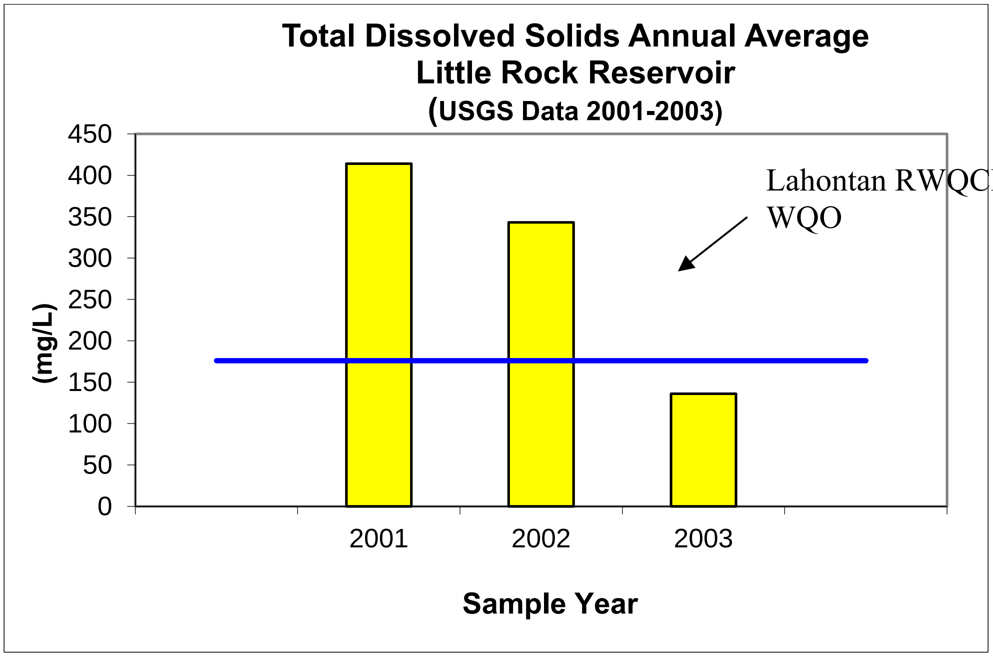

Figure 3-23. Total Dissolved Solids at Little Rock Reservoir

Annual averages for fluoride from 2001 – 2003 were 0.30, 0.40 and 0.17 mg/L, respectively, compared to the Basin Plan objective of 0.29 mg/L (Figure 3-24).

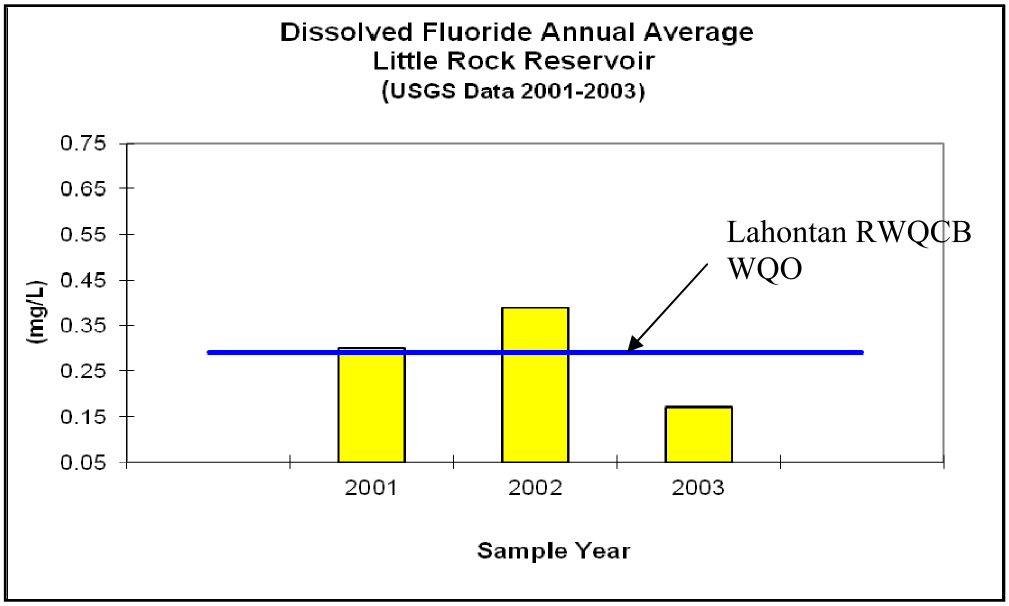

Figure 3-24. Dissolved Fluoride at Little Rock Reservoir

Annual averages for SO_4 from 2001 – 2003 were 37.3, 36.1, and 13.4 mg/L, respectively, compared to the Basin Plan objective of 16.5 mg/L (Figure 3-25).

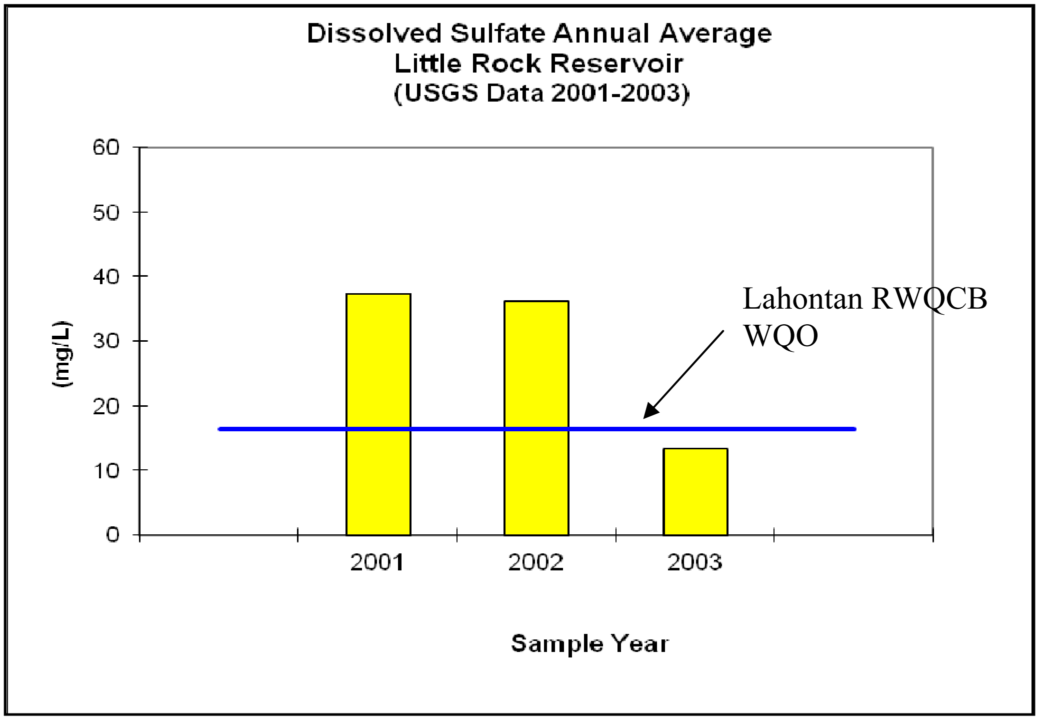

Figure 3-25. Dissolved Sulfate at Little Rock Reservoir

At the Mojave River below Forks Reservoir, Basin Plan WQOs for SO_4 were exceeded in three out of five years, with annual average SO_4 values for 2001 – 2005 of 95, 37, 61, 25 and 14 mg/L, respectively compared to the Basin Plan objective of 35 mg/L (Figure 3-26). At the Mojave River at Upper Narrows, Basin Plan WQOs were exceeded in all five years, with annual average SO_4 values for 2001 – 2005 of 49, 47, 47, 43, and 54 mg/L, respectively, compared to the Basin Plan objective of 40 mg/L. These average annual results are comprised, however, of only two to four samples each, and therefore may not accurately reflect true average conditions. Unless additional data are available from other sources, further investigation would be needed to accurately characterize ambient levels of SO_4 at these two locations along the main stem of the Mojave River.

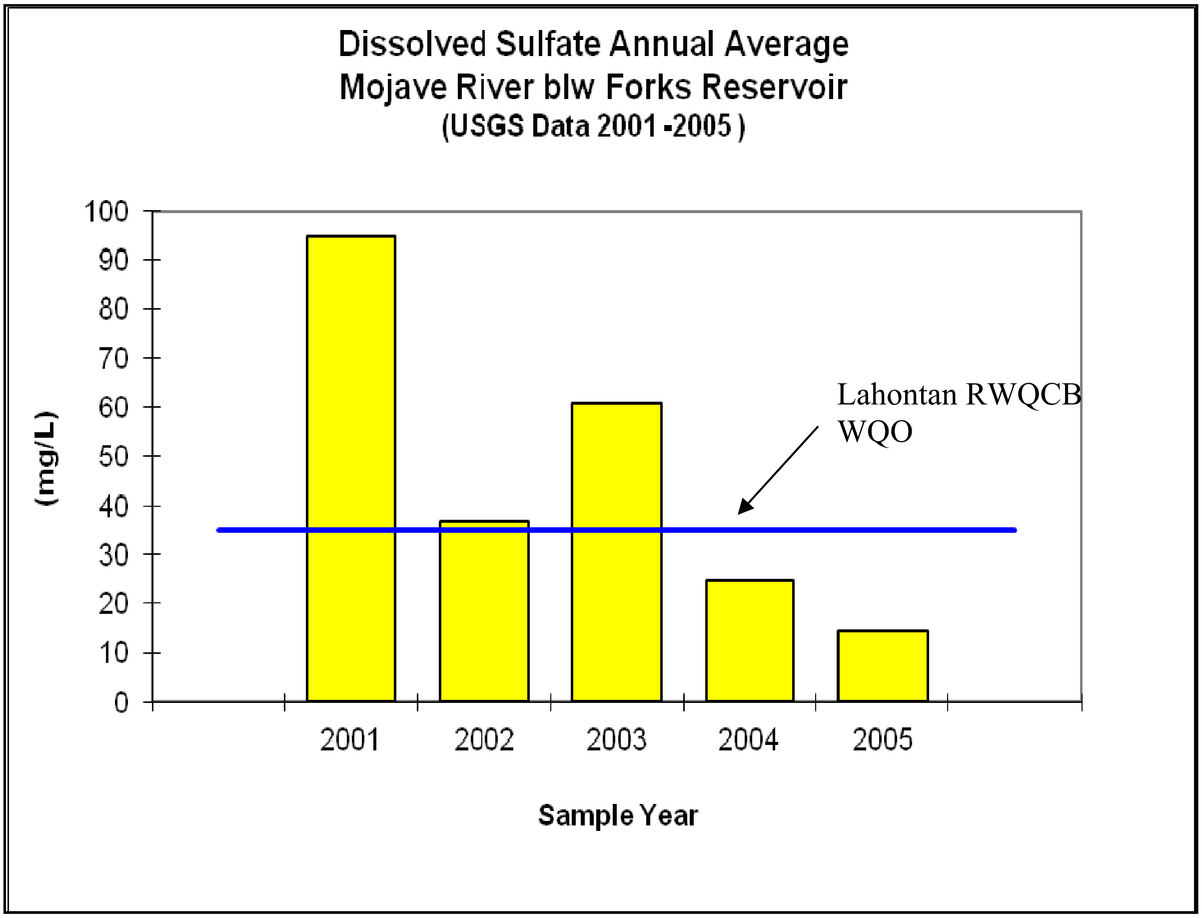

Figure 3-26. Dissolved Sulfate at Mojave River below Forks Reservoir

Potential fluoride exceedances were observed at the Mojave River below Forks Reservoir in four out of five years (Figure 3-27). The annual average fluoride concentrations for 2001 through to 2005 were 4.6, 2.8, 2.6, 1.8 and 0.7 mg/L, respectively, compared to the Basin Plan objective of 1.5 mg/L. At the Mojave River at Upper Narrows, potential fluoride exceedances were observed in all five years, with annual average fluoride concentrations for 2001 – 2005 of 0.5, 0.42, 0.46, 0.45 and 0.35 mg/L, respectively, compared to the Basin Plan objective of 0.2 mg/L. These average annual exceedances are comprised, however, of only two to four samples each, and therefore may not accurately reflect true average conditions. Unless additional data are available from other sources, further investigation would be needed to accurately characterize ambient levels of fluoride at these two locations along the main stem of the Mojave River.

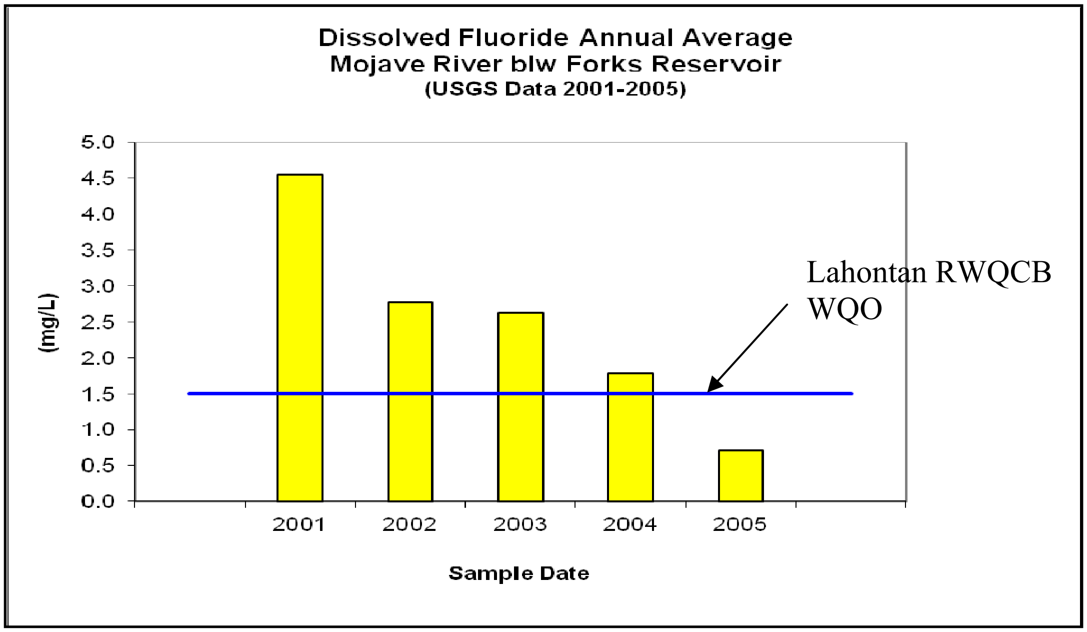

Figure 3-27. Dissolved Fluoride at Mojave River below Forks Reservoir

The WQO for boron was exceeded at the Mojave River below Forks Reservoir (Figure 3-28). The annual average concentration for boron during 2001 was 261 µg/L, compared to the Basin Plan's objective of 200 µg/L. The annual average for boron, however, is based upon only two samples, and is probably not an accurate representation of average conditions. The two samples were collected in July and October (the dry summer/fall season). For other years, when just three or four samples were collected and evenly spaced throughout the calendar year, the boron objective was met at this site. Therefore, the Lahontan RWQCB concluded that the 2001 annual average concentration does not demonstrate a significant issue at the Mojave River or its headwater streams.

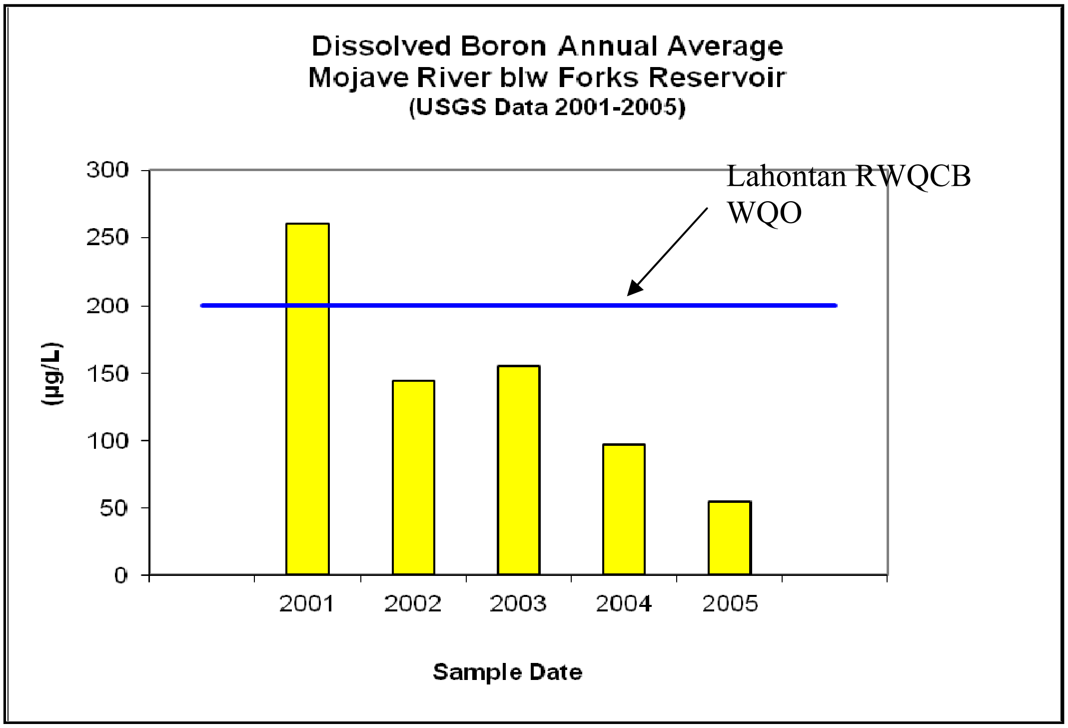

Figure 3-28. Dissolved Boron at Mojave River below Forks Reservoir

Primarily during the hot summer months, the WQO for DO was exceeded at the Mojave River Upper Narrows site (Figure 3-29). This site has a designated beneficial use of COLD (i.e., Cold Freshwater Habitat), and therefore the DO objective is a minimum of 4.0 mg/L. Given that all DO measurements were taken onsite at the time of water sampling; no continuous (i.e., time series) data were collected and the naturally wide diurnal and seasonal fluctuations in DO concentration, these results should not be considered conclusive. More frequent sampling would be required to accurately characterize DO concentrations at this site.

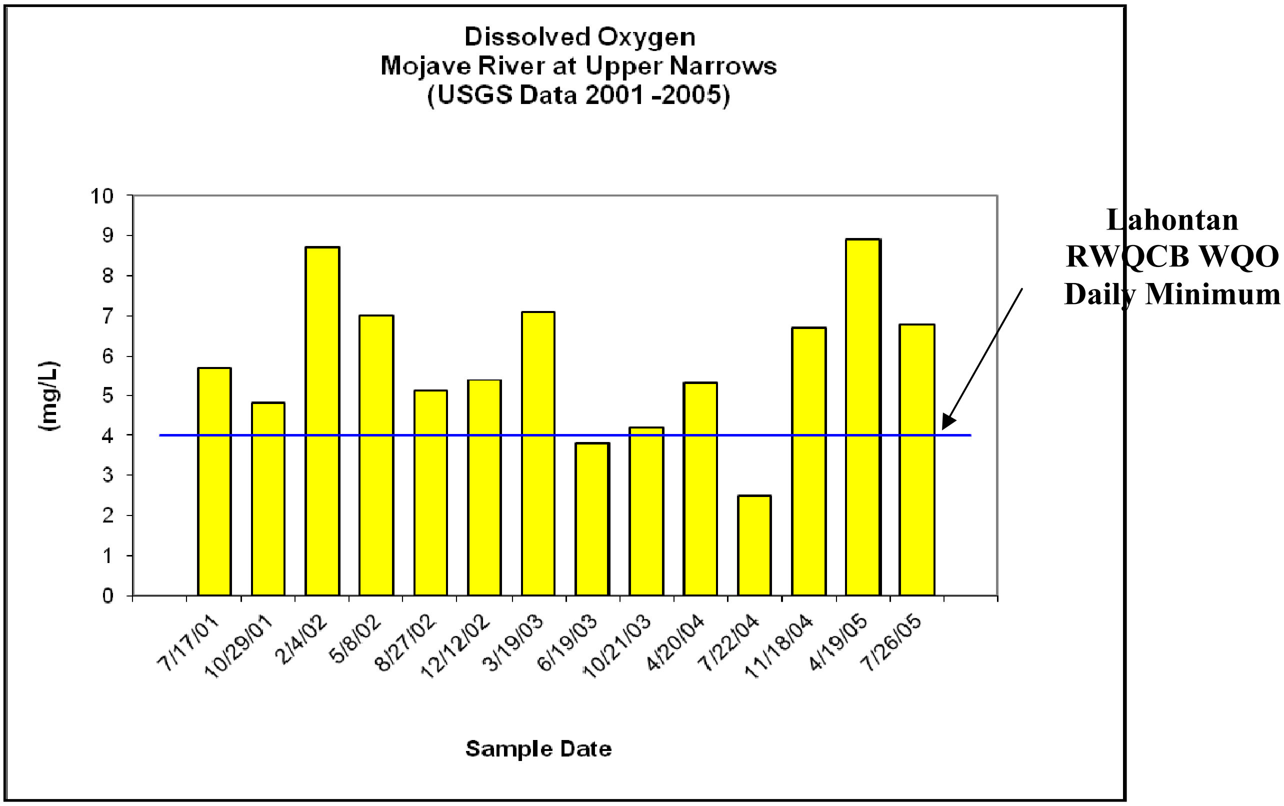

Figure 3-29. Dissolved Oxygen at Mojave River at Upper Narrows

Thirteen of the forty-three discrete DO concentrations measured at Little Rock Reservoir were lower than the Basin Plan's applicable minimum criteria of 4.0 mg/L. It is important to note that several of the near-bottom DO measurements were duplicates, and all of the potential measurements were observed at or near the bottom of the reservoir, where oxygen depressions are not unexpected. Further, the Basin Plan's DO criteria were derived to achieve inter-gravel DO concentrations based upon literature values for flowing waters, and may not be achievable under natural conditions at the bottom of many lakes. While the data indicate that the bottom of Little Rock Reservoir does at times approach or reach anoxia, the extent of the anoxia cannot be determined by this data set. The Lahontan RWCQB concluded that the limited DO data do not necessarily indicate a significant issue (Figure 3-30).

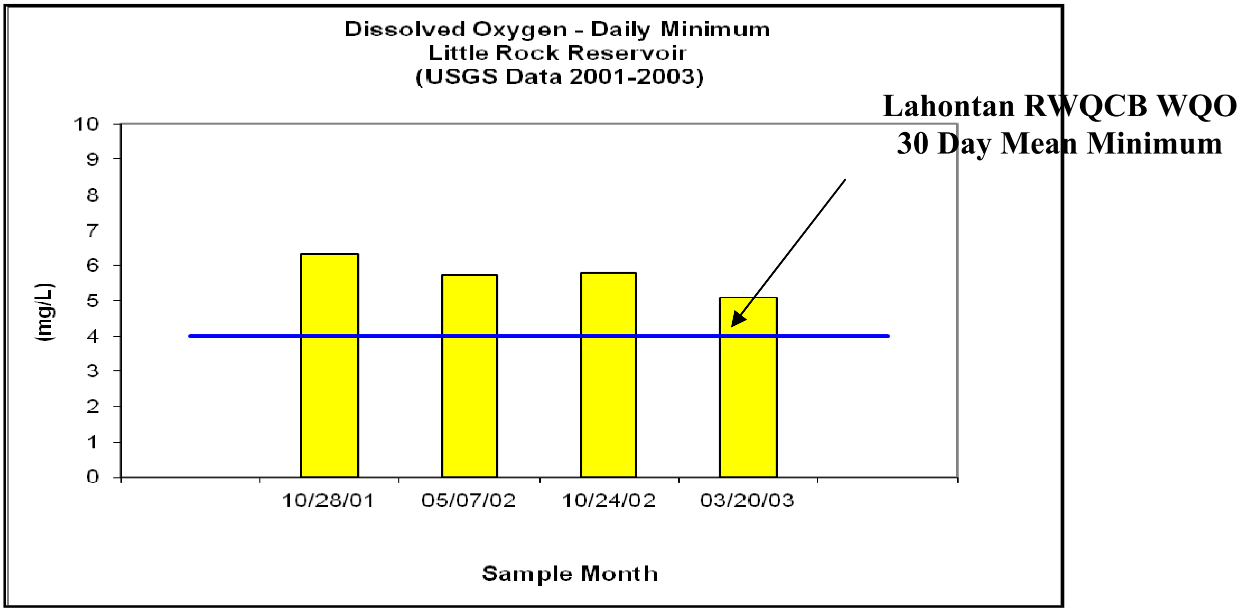

Figure 3-30. Dissolved Oxygen at Little Rock Reservoir

Two of fifteen pH measurements at the Mojave River below Forks Reservoir site were considered as outside of the Basin Plan's target pH range of 6.5 to 8.5 (Figure 3-31). The Basin Plan, however, acknowledges that some waters of the Lahontan Region may have natural pH levels outside of the target range. Therefore, further investigations would be needed to accurately characterize ambient pH levels at this site.

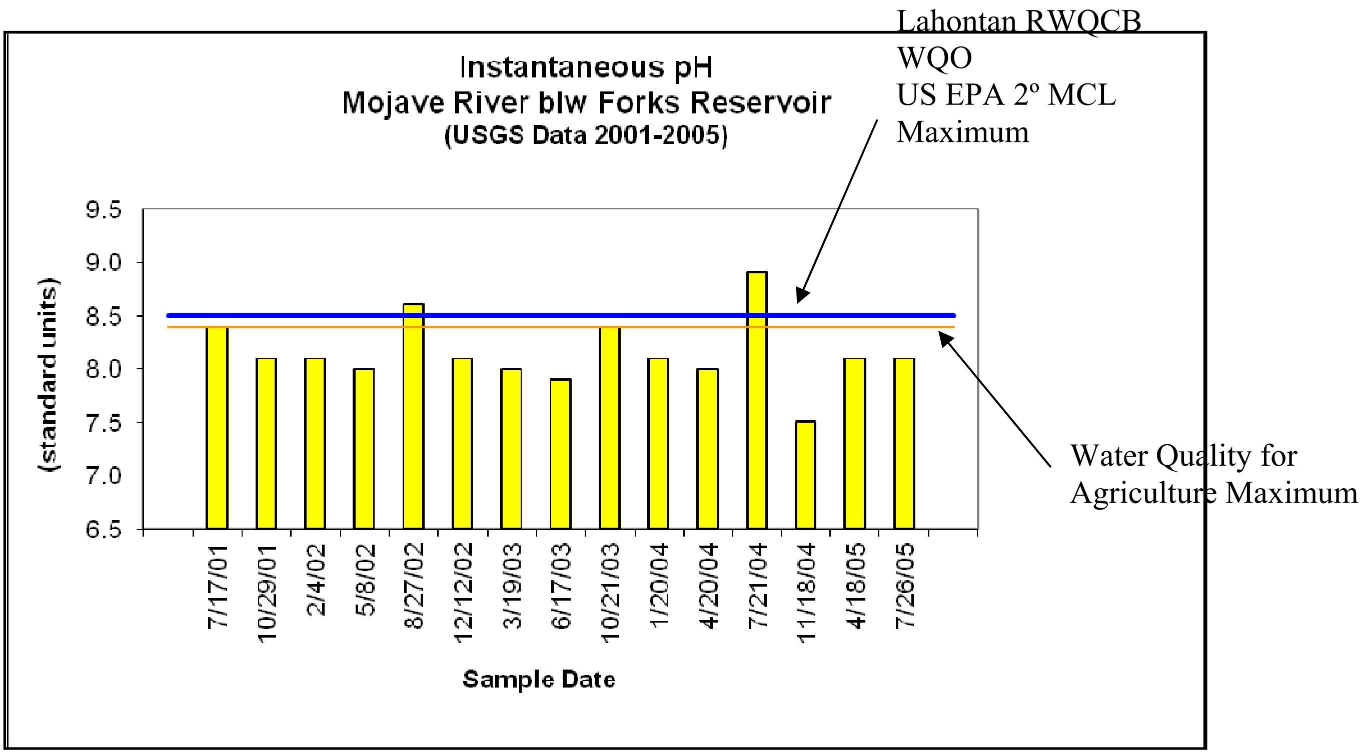

Figure 3-31. pH at Mojave River below Forks Reservoir

CALIFORNIA TOXICS RULE CRITERIA – ANTELOPE HU AND MOJAVE HU

Table 3-9 displays a compilation of the total number of data points associated with the California Toxics Rule (CTR) Human Health criteria versus the total number of data points available for the Antelope and Mojave HU sampling sites[2]. At the two sites on the Mojave River, a suite of organic chemicals was monitored from 2001 through 2005. No samples exceeded the CTR Human Health criteria.

[2] Due to funding limitations, metals were not monitored at the Mojave River sites and no organics or metals were monitored at the Little Rock Reservoir.

Table 3-9. Comparison of CTR Human Health Criteria to Results for the Antelope HU and Mojave HU

Hydrologic Unit	Water Body	Total Sb	Total Cu	Total Ni	Total Hg	Total Tl	Organics	Total Number of Data Points
Antelope	Little Rock Reservoir	-	-	-	-	-	-	-
Mojave	Mojave River below Forks Reservoir	-	-	-	-	-	0/285	285
	Mojave River Upper Narrows	-	-	-	-	-	0/285	285
Total Number Exceeding Criteria		0	0	0	0	0	0	0/560

DRINKING WATER CRITERIA - ANTELOPE HU AND MOJAVE HU

Table 3-10 presents a compilation of the total number of data points that exceeded the primary Drinking Water Criteria maximum contaminant levels (MCLs) versus the total number of data points available for the Antelope and Mojave HU sampling sites.

The Little Rock Reservoir had a total of 16 dissolved Fluoride data points that were comparable to primary drinking water MCLs (Figure 3-32). None of the sample results exceeded the primary Drinking Water Criteria MCLs.

Table 3-10. Comparison of Primary MCL Criteria to Results for the Antelope HU and Mojave HU

Hydrologic Unit	Water Body	F	NO_3	Al	Sb	As	Be	Cd	Cu	Pb	Ni	Hg	Se	Tl	U	Organics	Total Number of Data Points
Antelope	Little Rock Reservoir	0/8	0/8	-	-	-	-	-	-	-	-	-	-	-	-	-	16
Mojave	Mojave River below Forks Reservoir	9/14	0/15	-	-	-	-	-	-	-	-	-	-	-	-	0/420	449
	Mojave River Upper Narrows	0/14	0/15	-	-	-	-	-	-	-	-	-	-	-	-	0/420	449
Total Number Exceeding Criteria		9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9/914

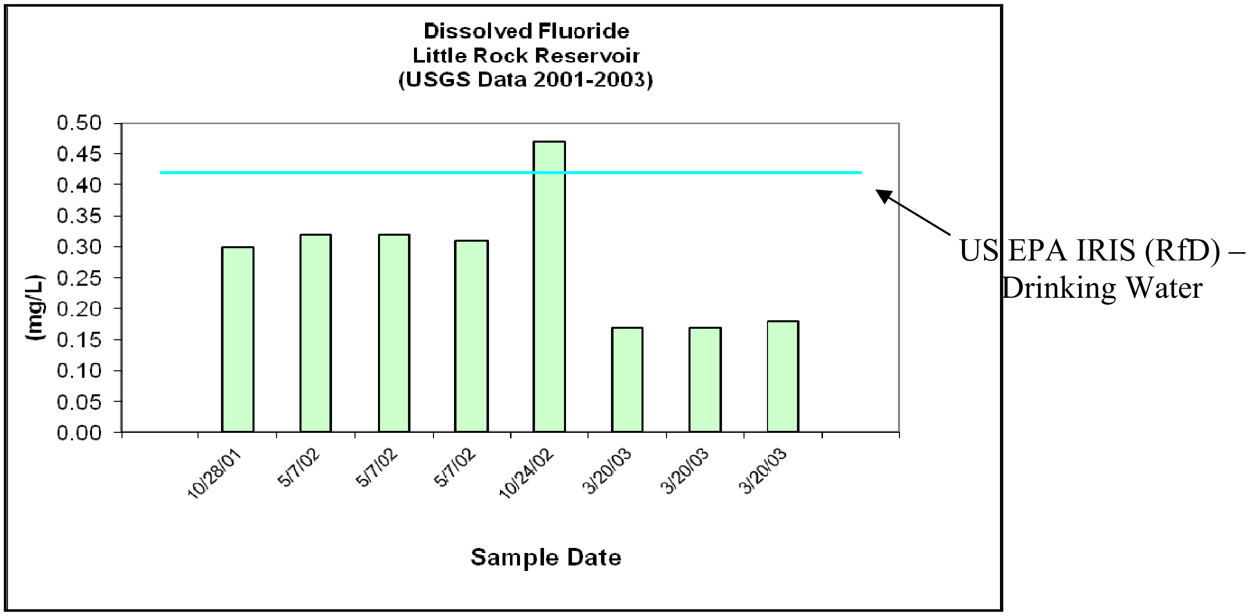

Figure 3-32. Dissolved Fluoride at Little Rock Reservoir[3]

A total of 898 data points were comparable to primary dissolved fluoride MCLs for the two locations along the Mojave River. Nine samples exceeded the dissolved fluoride limit at the Mojave River below Forks Reservoir Site (Figure 3-33). All other results indicated compliance with primary MCLs.

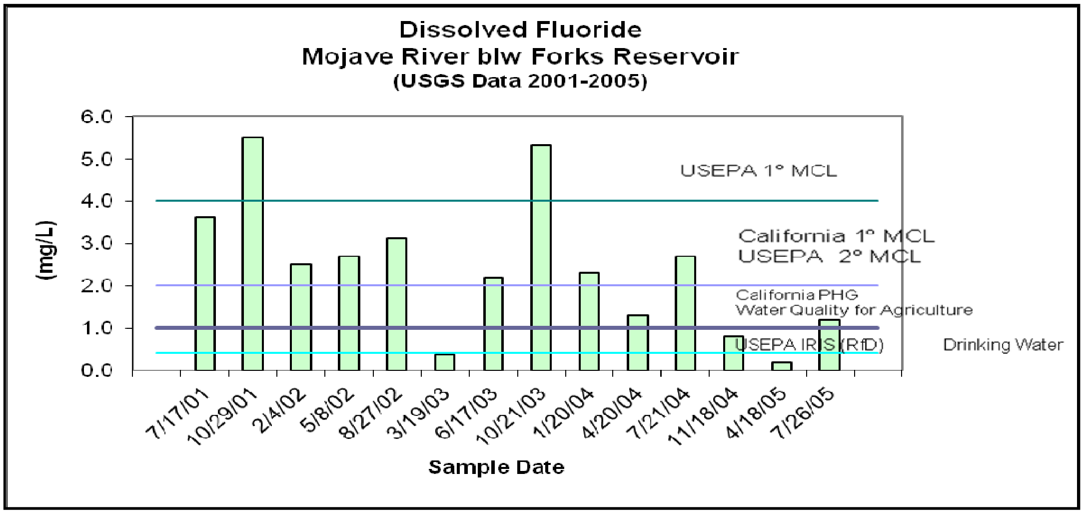

Figure 3-33. Dissolved Fluoride at Mojave River below Forks Reservoir

Table 3-11 presents a compilation of the total number of results that exceeded secondary Drinking Water Criteria MCLs versus the total number of data points available for the Antelope and Mojave HU sampling sites. Little Rock Reservoir had a total of 83 data points

[3] IRIS (RfD) – Integrated Risk Information System, Reference Dose

that were comparable to secondary drinking water MCLs. Five samples collected for manganese exceeded the secondary drinking water criteria MCLs for Little Rock Reservoir. A total of 150 data points were comparable to secondary drinking water MCLs for the two sites along the Mojave River. None of the samples exceeded the secondary drinking water MCLs.

Table 3-11. Comparison of Secondary MCL Criteria to Results for the Antelope HU and Mojave HU

Hydrologic Unit	Water Body	Al	Cu	Fe	Mn	Ag	Zn	SC	SO_4	TDS	Cl	Organics	Total Number of Data Points
Antelope	Little Rock Reservoir	-	-	0/8	5/8	-	-	0/43	0/8	0/8	0/8	-	83
Mojave	Mojave River below Forks Reservoir	-	-	-	-	-	-	0/15	0/15	0/15	0/15	0/15	75
	Mojave River Upper Narrows	-	-	-	-	-	-	0/15	0/15	0/15	0/15	0/15	75
Total Number Exceeding Criteria		0	0	0	5	0	0	0	0	0	0	0	5/233

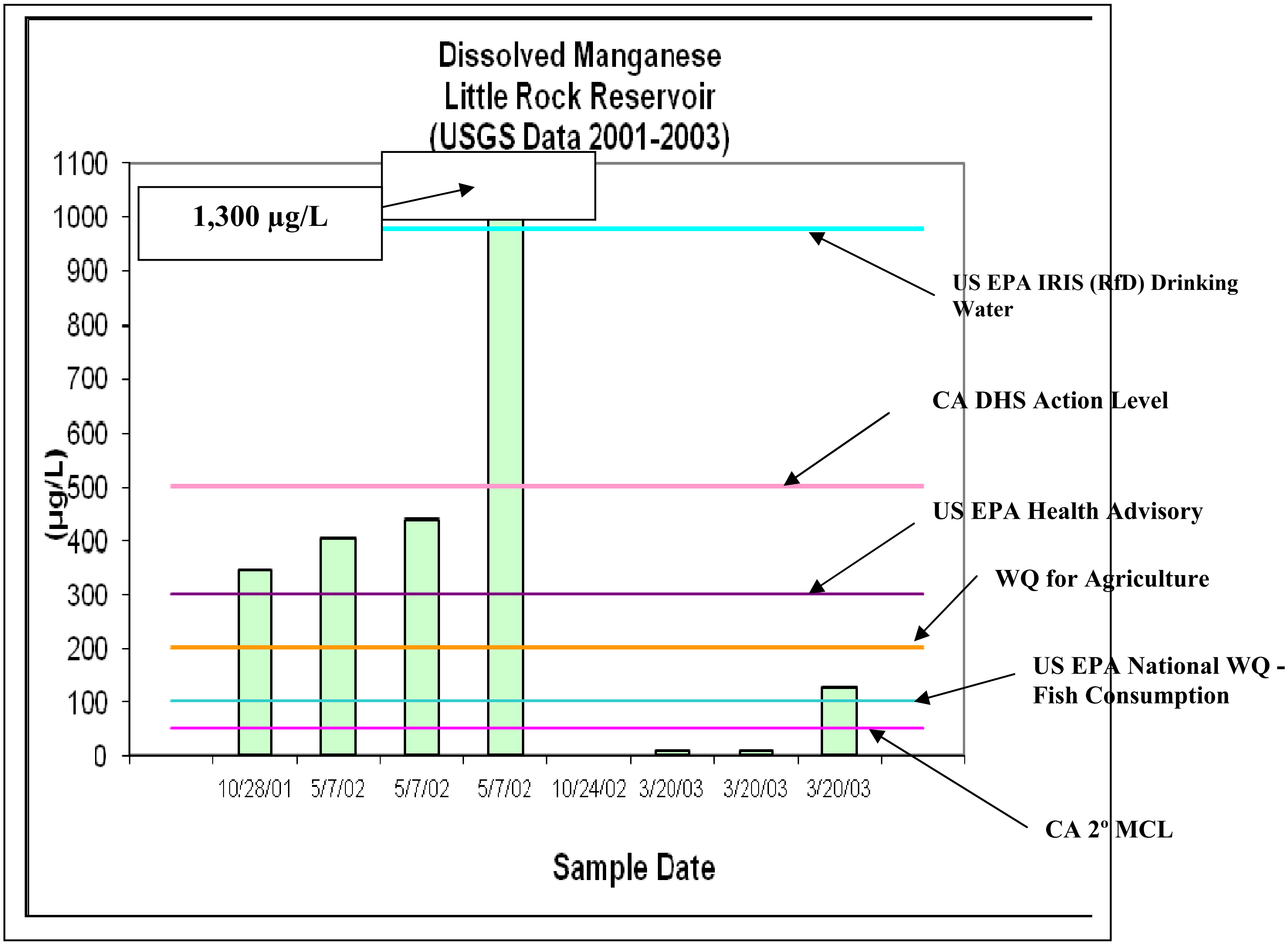

Figure 3-34. Dissolved Manganese at Little Rock Reservoir

For Little Rock Reservoir, approximately 6 percent of the data set exceeded the secondary MCL criteria, with all 6 percent attributed to manganese (Figure 3-34). It was determined that the manganese levels were elevated where oxygen levels were depressed. Furthermore, the observed concentrations of manganese only exceeded secondary MCLs, and are primarily a concern regarding taste and odor (i.e., not human health), and such levels of manganese may be removed via treatment prior to delivery for municipal/domestic use.

GROUNDWATER WATER QUALITY OBJECTIVES AND BENEFICIAL USES

The groundwater quality objectives shown in Table 3-12 apply to all groundwater in the HDC Corridor (Lahontan RWQCB 1995). Beneficial uses for groundwater in the Antelope Valley groundwater basin are Municipal and Domestic Supply (MUN), Agriculture Supply (AGR), Industrial Process Supply (IND), and Freshwater Replenishment (FRSH). Beneficial uses for groundwater in the Lower Mojave River Valley groundwater basin are Municipal and Domestic Supply (MUN), Agriculture Supply (AGR), Industrial Process Supply (IND), Freshwater Replenishment (FRSH) and Aquaculture (AQUA).

Table 3-12. Groundwater Quality Objectives

Constituent	WQOs for Groundwater
Bacteria, Coliform	In waters designated as MUN, the concentration of total coliform organisms over any 7-day period shall be less than 1.1/100 mL.
Chemical Constituents	Groundwaters designated as MUN shall not contain chemical constituents in concentrations in excess of the MCL or secondary MCL based upon drinking water standards specified in the following provisions of Title 22 of the California Code of Regulations: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges). Groundwaters shall not contain concentrations of chemical constituents that adversely affect the water for beneficial uses (i.e., agricultural purposes). Waters designated as AGR shall not contain concentrations of chemical constituents that adversely affect the water for beneficial uses.
Radioactivity	Radionuclides shall not be present in groundwaters 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. At a minimum, groundwaters designated MUN shall not contain concentrations of radionuclides in excess of the maximum contaminant levels specified in Table 4 (MCL Radioactivity) of Section 64443 of Title 22, California Code of Regulations.
Tastes and Odors	Groundwaters shall not contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses. For ground waters designated as MUN, at a minimum, concentrations shall not exceed adopted secondary maximum contaminant levels specified in Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits), and Table 64449-B of Section 64449 (Secondary Maximum Contaminant Levels-Ranges) of Title 22 of the California Code of Regulations

Source: Lahontan RWQCB 2005.

3.3.1 Regional Water Quality

SURFACE WATER

Per the Lahontan RWQCB, the Mojave watershed management area includes the Mojave and Broadwell hydrologic units (HUs). In the Mojave River watershed (San Bernardino County), nonpoint source issues relating to overdraft of the ground water are of concern, including impacts to wetlands and springs. The potential impacts of confined animal facilities (i.e., dairies and chicken farms) and other agricultural activities are of concern. The area is generally in transition from predominantly agricultural to urban land uses. Thus, the nonpoint source concerns are shifting towards urban runoff and construction-related impacts from land development. Other concerns include the use of chemical pesticides to control exotic plants and animals, as well as hydromodification caused by development and flood control projects (Lahontan RWQCB 2005).

The Antelope Valley watershed management area includes the following HUs: Mesquite, Ivanpah, Owlshead, Leach, Granite, Bicycle, Goldstone, Coyote, Superior, Ballarat, Trona, Coso, Upper Cactus, Indian Wells, Fremont, Antelope, and Cuddeback. In these watersheds, land development (urban runoff, septic systems) contributes to nonpoint source discharges. At least one confined animal facility is of concern. Historic agricultural use was mainly alfalfa; currently, more common crops are row crops such as carrots. Other potential nonpoint source discharges result from pesticide applications, irrigation return water, and ground water percolation. Ground water overdraft is also an issue. Erosion and habitat loss from deforestation following wildfires is also of concern (Lahontan RWQCB 2005).

GROUNDWATER

Groundwater quality in the Antelope Valley groundwater basin is typically calcium bicarbonate in character near the surrounding mountains and is sodium bicarbonate or sodium sulfate character in the central part of the basin. In the eastern part of the basin, the upper aquifer has sodium-calcium bicarbonate type water and the lower aquifer has sodium bicarbonate type water. Total dissolved solids (TDS) content in the basin averages 300 mg/L and ranges from 200 to 800 mg/L. Data from 213 public supply wells show an average TDS content of 374 mg/L and ranges from 123 to 1,970 mg/L.

According to the Antelope Valley Integrated Regional Water Management Plan, groundwater quality is excellent within the principal aquifer but is not as good towards the northern portion of the dry lake areas. Some portions of the basin contain groundwater with high fluoride, boron, TDS, and nitrate concentrations. Arsenic is another emerging contaminant of concern in the Antelope Valley Region. Research conducted by the Los Angeles County Waterworks District and the United States Geological Survey has shown the problem to reside primarily in the deep aquifer, and it is not anticipated that the existing arsenic problem will lead to future loss of groundwater as a water supply resource for the Antelope Valley.

MWA's groundwater basins contain numerous areas with water quality issues. Key contaminants include arsenic, nitrates, iron, manganese, Chromium VI, and TDS. Measurements in excess of drinking water standards have been found for some of these constituents within the MRG Basin.

Another potential water quality issue facing MWA is the accumulation of salt in the groundwater basins. Because the Mojave Basin Area is considered a closed basin, salts added to the locally generated wastewater, salts contained in the imported reclaimed wastewater and salts in the SWP supplies are generally not removed from the basin.

To understand the potential long-term water quality changes that may occur in the MRG Basin over time due to long-term effects of wastewater and importation of SWP water into the MWA service area, the Lahontan RWQCB and the MWA worked cooperatively to develop a regional salt balance model. The model was finalized in 2007 and generally showed that the importation of SWP water mitigated the long-term effects of salt loading (TDS increases) primarily caused by population increases and the associated larger volumes of wastewater entering the basin.

3.3.2 List of Impaired Waters

The CWA requires States to identify water bodies that are considered *impaired*, which means the water body does not meet water quality standards. States must then place these water bodies onto a list, referred to as the "CWA Section 303(d) List of Water Quality Limited Segments." On October 11, 2011, the U.S. Environmental Protection Agency issued its final decision regarding the water bodies and pollutants added to California's 303(d) List. This list, referred to as the California 2010 Integrated Report, replaces the 2006 California CWA 303(d) List. The 2010 Integrated Report includes a combined list of CWA Section 303(d) water bodies that are listed as not meeting water quality standards and Section 305(b) water bodies that identifies water bodies still requiring the development of a total maximum daily load (TMDL), those that have a completed TMDL approved by the U.S. Environmental Protection Agency, and those that are being addressed by actions other than a TMDL (SWRCB 2011).

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 Best Management Practices (BMPs). These pollutants, designated as Targeted Design Constituents (TDCs), include sediment; metals (i.e., total and dissolved fractions of zinc, lead and copper); nitrogen; phosphorus, and general metals (Caltrans 2010).

The Mojave Forks Reservoir outlet to Upper Narrows is listed as impaired for fluoride. The Mojave River (Upper Narrows to Lower Narrows) is listed as impaired for fluoride, sulfates and total dissolved soils. Little Rock Reservoir is listed as impaired for manganese. When comparing these pollutants with the Caltrans TDCs, only manganese would be considered a TDC (SWRCB 2013).

Once a water body is listed as impaired, the State is required to develop a TMDL to address each pollutant causing the impairment. A TMDL defines how much of a pollutant load a water body can tolerate and still meet water quality standards. The TMDL is required to account for contributions from point sources (i.e., permitted discharges), as well as contributions from nonpoint sources, including natural background. TMDLs allocate allowable pollutant loads for each source and identify management measures that, when implemented, will assure that water quality standards are attained. TMDLs, along with their associated implementation plans, are adopted into a RWQCB's Basin Plan through the Basin planning process.

All three water bodies (i.e., Little Rock Reservoir, Mojave Forks Reservoir outlet to Upper Narrows and Mojave River Upper Narrows to Lower Narrows) are listed in the 2010 Integrated Report as requiring the development of a TMDL (SWRCB 2011a). It is anticipated that the TMDL for these pollutants (fluoride, sulfates, TDS and manganese) shall be completed by January 2021.

3.3.3 Areas of Special Biological Significance

In an effort to protect and restore ecologically sensitive ecosystems along the coast, California created 34 Areas of Special Biological Significance spanning the length of the coast. This designation was intended to bring special protection to fragile coastal biological communities by strictly limiting or prohibiting discharges of point source waste and requiring non-point source pollution to be controlled to the "extent practicable" before it reaches an Area of Special Biological Significance to preserve natural water quality conditions. According to the map provided by the SWRCB (SWRCB 2011b), there are no Areas of Special Biological Significance sites within the Project limits.

4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

Construction and operation of the HDC 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 permanent (post-construction) BMPs, is provided in the following sections.

4.2 Potential Impacts to Water Quality

This discussion examines the biological, physical/chemical, and human use constituents to determine whether the discharge of storm water from the proposed Project would cause or contribute to the violation of WQOs and if the proposed Project would have the potential to affect the beneficial use of the water bodies within the Project limits. Construction activities were evaluated for the potential to affect surface water quality because of uncontrolled runoff and discharges. These activities include accidental releases of construction-related hazardous materials, ground disturbance and associated erosion and sedimentation, storm water discharges, and dewatering discharges, particularly in locations within or close to a surface water body. Project maintenance and operation activities were reviewed for the potential to introduce pollutants into the environment, with a particular focus on storm water runoff.

4.2.1 Anticipated Changes to the Physical 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 erosion and 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 storm water 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 storm water 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.

DRAINAGE PATTERNS

Construction of new highway projects generally impacts existing drainage areas and streams in a watershed by altering the natural flow patterns through the addition of impervious surface area and variations in contributing drainage area. The impacts 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.

The hydrologic analysis evaluated potential impacts of the HDC build alternatives on existing hydrology in local and regional drainage areas. Hydrologic analyses for the regional drainage areas were developed and presented in the Draft Preliminary Geomorphology Report (Parsons 2012) and the Preliminary Hydrology and Hydraulics Report (Parsons 2013). Relevant results from these reports were utilized in the water quality analysis to provide an evaluation on a regional basis and are discussed below.

FLOOD CONTROL FUNCTIONS

As shown in Figure 4-1, offsite runoff generally crosses the corridor in a northerly direction. Facilities would be designed for the 100-year storm event in order to prevent flooding of the proposed roadway and potential flooding upstream and downstream of the roadway. The two ways to enable flood flows to cross the proposed freeway are to: 1) place cross culverts along the alignment to enable flows to cross at existing flow concentration points, mimicking existing flow conditions, or 2) place longitudinal channels along the alignment to divert existing flow parallel to where culverts are proposed. Since flow diversion would exacerbate downstream flooding conditions and cause erosion to occur downstream, the first option was chosen as the recommended concept for flood and erosion control along most of the Project alignment.

Cross Culverts

Cross culverts are proposed along the corridor in a way to minimize flow diversions and to enable flows to cross at existing flow concentration points, mimicking existing flow conditions along the Project alignment. The culverts would enable runoff to cross the freeway without inundating the paved surface and without flooding upstream and downstream properties. Each culvert would be designed with inlet/outlet headwalls. Energy dissipaters, in the form of vegetated riprap pads, will be incorporated at the downstream ends of the cross culverts to slow flows down to non-erosive levels, where necessary. In general, the cross culvert slopes are flat enough (on the order of 0.2 to 0.5 percent slope) to prevent velocities from rising too high. To address agency concerns regarding establishment of vegetation where riprap is to be used, construction of such energy dissipation devices would include placement of 1-foot of topsoil above the rip rap that will be "flood compacted" in order to fill the voids within the underlying riprap. The flood compacting will cause the fill soil to enter the interstices of the riprap, thus allowing vegetation to grow.

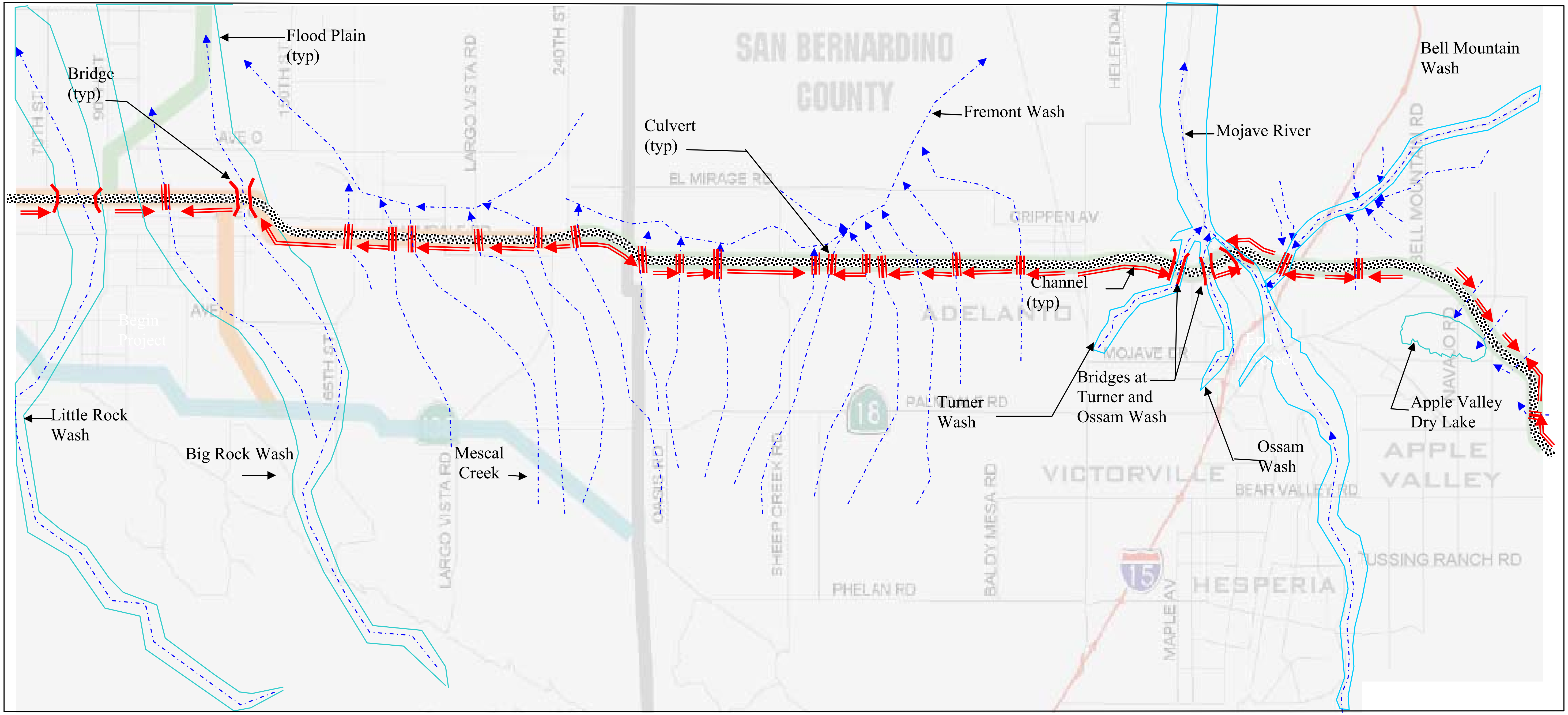

Figure 4-1. HDC Proposed Off-Site Drainage System Schematic

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The hydraulic analysis for sizing each cross culvert is provided in a separate document (Parsons 2013). Note that at this preliminary level, only concrete box culverts and reinforced concrete pipe culverts have been evaluated. Culverts were designed with concrete bottoms to withstand structural and vibratory issues related to the HSR Feeder Service Alternative. If soft bottoms are required, the allowance for a small amount of silt buildup in the culvert floor has been incorporated into the design, though silt buildup beyond one foot should not be allowed. The minimum height for each culvert is 3 feet. This will ensure maintainability of the culverts if silt build-up occurs and enables small wildlife to cross the alignment. At certain locations, culverts were increased in height to 5- and 6-feet to allow for larger wildlife to cross the HDC, where recommended by the Biologist.

Bridges

Bridges are proposed over the deeper streams such as Little Rock Wash, Big Rock Wash, Turner Wash, Ossam Wash and Mojave River. Bridge hydraulics were conducted for the 100-year storm event flow using HEC-RAS computer modeling software provided in a separate report. The HEC-RAS model results show that construction of the bridges would impose no significant rise in the BFEs. The flow rates, bridge configurations, flow velocities and flow depths at each location are provided in a separate report (Parsons 2013).

Infiltration Basins

Based upon preliminary engineering studies, infiltration basins are proposed at most interchanges/intersections within the right-of-way. These infiltration basins would treat and partially contain the on-site pavement runoff of the roadway. The infiltration basins treat runoff by retaining the water quality volume (WQV) and enough flow volume to ensure flow rates mimic existing conditions.[4] Once the required volume has been retained, runoff outlets through spillways or pipe risers where the excess runoff will be conveyed to the natural flow path. Along the west portion of the alignment, a drainage master plan (DMP) has been developed that incorporates a network of storm drains and detention facilities for flood control within Palmdale. After construction of the DMP, the outflow from the infiltration basins will be tied to the proposed drainage network. In this way, the installation of the infiltration basins will alleviate both water quality and hydromodification impacts related to the roadway construction. The locations of the proposed infiltration basins are shown in Appendix A.

Channels

A series of longitudinal channels placed at the edge of ROW to intercept and convey offsite flows to the culverts and bridges are proposed along the corridor. In most instances, where velocities allow it, these channels will be earthen or vegetated. In some instances, velocities may be too high to allow channels of this type. Where flow velocities are too high for earthen or vegetated channels, other forms of erosion protection will be evaluated, including the use of concrete-lined conveyance systems.

4 Infiltration basins also provide an additional benefit of retaining trash.

EROSION 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 the HDC build alternatives, sediment yield from the road is negligible, because it is paved, and final design and construction criteria includes cut and fill slopes which will be re-vegetated after construction so that they will 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 HDC build alternatives and the subsequent re-routing or diversion of flows.

In general, the roadway will be constructed on fill and the proposed alignment will be elevated approximately 12-feet above grade. Within Palmdale, the alignment spans the floodplain at the connection with SR-14. Here, the roadway profile is significantly higher than 12 feet above grade.

Infiltration basins, earthen and concrete channels, cross culverts, storm drain pipelines and inlets, riprap energy dissipation devices and other forms of erosion protection will be constructed so that runoff will be intercepted and conveyed along and across the roadway alignment without the need for pump stations, while minimizing erosion potential. In most cases, these facilities will be placed at or above grade. Though in some instances, the facilities may be constructed in cut as long as gravity flow conditions are maintained downstream.

Embankment Slopes

Existing slopes are relatively flat, less than 2 percent on average. Proposed slopes will generally follow existing grade. Swales and channels will be constructed as flat as possible in order to minimize erosive flow velocities while maintaining appropriate conveyance capacities. Embankment slopes shall not be steeper than 2:1 (horizontal to vertical), and will be constructed at 4:1 or flatter to the maximum extent practicable.

AQUIFER RECHARGE/GROUNDWATER

The addition of impervious surfaces as a result of implementation of the build Alternatives would not interfere with groundwater recharge. Recharge to the Antelope Valley Basin is primarily accomplished by perennial runoff from the surrounding mountains and hills. Most recharge occurs at the foot of the mountains and hills by percolation through the head of alluvial fan systems. The Big Rock and Little Rock Creeks, in the southern part of the basin, contribute about 80 percent of runoff into the Antelope Valley Basin. Irrigation water and septic system effluent are additional recharge sources for the basin. Recharge to the Mojave River Groundwater Basin is predominantly accomplished by infiltration of Mojave River water. The other recharge sources include infiltration of storm water runoff, irrigation return flows, wastewater discharge, and enhanced recharge with imported water. Recharge facilities within this basin are located in the Alto subarea and include the Oro Grande Demonstration Recharge site (approximately 3 miles from the Project corridor) and the Rock Springs Recharge Site and the Proposed Antelope Wash Recharge Site, both of which are located approximately 10 miles from the Project corridor.

4.2.2 Anticipated Changes to the 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 storm water 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 storm water 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 storm water contamination. Larger pollutants, such as trash, debris, and organic matter, could also be associated with construction activities. As such, the discharge of storm water may cause or threaten to cause violations of WQOs. These pollutants would occur in both the storm water discharges and non-storm water discharges and could potentially cause chemical degradation and aquatic toxicity in the receiving waters.

Operation of the proposed corridor would result in an increase in impervious surface areas, which could potentially increase storm water 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).

4.2.3 Anticipated Changes to the Biological Characteristics of the Aquatic Environment

Special Aquatic Sites

As indicated previously, a subset of the communities (i.e. riparian woodland, riparian scrub) mapped within the BSA include criteria that support wetlands. According to the NES (Caltrans 2014), the main alignment[5] and Variation E[6] are expected to permanently impact no more than 3.81 acres of waters of the U.S. (WUS) and 7.04 acres of WUS[7], respectively. The main alignment and Variation E are expected to permanently impact no more than 3.81 acres of Waters of the State of California (WSC) and 7.04 acres of WSC, respectively. Permanent and temporary impacts totaling no more than 57.51 acres of California Department of Fish and Wildlife (CDFW) jurisdictional areas are anticipated within the proposed project area along the widest alignment variations.

During construction of the proposed project, the anticipated permanent changes to the special aquatic sites include the accidental deposition of fill material, the disturbance and/or removal of existing vegetation and encroachment. The temporary changes during construction may include limited to minimal encroachment. During operation of the proposed project, the increase in impervious surfaces would cause an increase in storm water discharge to special aquatic sites.

Habitat for Fish and Other Aquatic Organisms

The four alternatives were evaluated for the potential change they may cause to the habitat of fish and other aquatic organisms. Within the BSA, the Mojave River was the only area suitable for fish and other aquatic organisms. The NES states that the Main Alignment and Variation E will result in the disturbance and/or removal of a number of acres of jurisdictional waters (i.e. wetland and non-wetland WUS, Waters of the State of California and CDFW jurisdictional areas) during construction. These areas include the crossings of the Mojave River. After construction of the proposed project, the increase in impervious surface area may result in an increase in storm water discharge to the fish and 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 facility. The jurisdictional waters and wetlands delineated include plant communities such as the riparian woodland that support riparian bird species that are dependent on the aquatic environment to sustain the facultative and obligate plant species in both the riparian woodland and some riparian scrub communities.

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[5] The main alignment for highway and rail share a similar footprint from SR-14 in the east to I-15 in the west.

[6] Highway and rail have separate footprints for Variation E near Mojave River. Although Variation E would exceed the 5-acre permanent impact threshold for NEPA/404, it would have greater impacts to a number of environmental resources (in addition to Waters of the U.S.) and is strongly opposed by the City of Victorville

[7] The quantified permanent impacts are subject to modification following the U.S. Army Corps of Engineers verification process.

Fish Passage

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

Wildlife Habitat

According to the NES, the proposed project's Build Alternatives would result in permanent direct changes to wildlife habitat 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. The temporary changes associated with equipment access are anticipated in no more than 0.65 acres below the OHWM in WSC. Staging and equipment access are proposed outside of other jurisdictional areas and therefore temporary changes within these areas are not anticipated.

Wildlife Passage

During focused surveys for the NES, wildlife was found to use the natural drainages as movement corridors throughout the project area, particularly Mojave River, Big Rock Wash, Littlerock Wash, Mescal Creek and roads that crossed the California Aqueduct. The construction of a multi-lane highway over such a long span with natural open space occurring on both sides will certainly cause a change to wildlife movement.

The design of the proposed project would include wildlife crossing structures that are as natural and easy for wildlife to use as feasible. Specific design features would include:

- Large at-grade, soft-bottom culverts where natural drainages occur
- Smaller drainages would be designed as a hard-bottom box culvert, placed with a minimum one foot below surrounding grade
- Increase culvert height by two feet and width by one foot

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 exotic plants occurring on the California Exotic Plant Council's 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 the 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 nonnative 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.

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4.2.4 Expected Changes to the Human Use Characteristics of the Aquatic Environment

Sediment or silt in a water body can decrease recreational, commercial, and aesthetic values, as well as decrease the drinking water quality. Receiving water bodies polluted with chemical contaminants are unsuitable for drinking, recreation, agriculture, and industry. Chemical pollutants in a water body also diminish the aesthetic quality of lakes and rivers. Pollutants can also seep down and affect groundwater and ultimately degrade drinking water supplies. The following discussion details the expected changes to the human use characteristics of the aquatic environment for the proposed Project.

EXISTING AND POTENTIAL WATER SUPPLIES

Table 3-1 summarized potential and existing water supplies for the water agencies within the proposed Project footprint. As indicated, all of the water agencies within the HDC corridor rely on either SWP or groundwater resources. Overall, in the Antelope Valley Groundwater Basin, recharge is predominantly achieved through perennial runoff and minor recharge is achieved using irrigation water and septic system effluent. Recharge in the Mojave River Groundwater basin is by infiltration of Mojave River water followed by infiltration of storm water runoff, irrigation return flows, wastewater discharge, and enhanced recharge with imported water. None of the build alternatives are expected to result in the destruction of groundwater wells or the permanent lowering of groundwater levels. There would be no placement of impervious road surfaces in recharge areas. Furthermore, all of the offsite water would be conveyed through the facility and back to the environment. All onsite water would be treated and then released into the environment via the proposed infiltration basins. Although all of the build alternatives would result in alterations to drainage, such as changes in ground surface permeability via paving and changes in topography via grading and excavation, a reduction in recharge is not expected to occur that could affect groundwater levels in the aquifers or existing and potential water supplies.

RECREATIONAL OR COMMERCIAL FISHERIES

There are four water bodies within the Project area that have a beneficial use designation of Commercial and Sportfishing. This beneficial use recognizes commercial and sport fishing as well as the collection of other aquatic organisms, including but not limited to uses involving organisms intended for human consumption (Lahontan RWQCB 1995). During the construction phase, erosion and sedimentation could affect the recreational or commercial fisheries 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. Erosion and sediment control techniques implemented during construction will retain soil and sediment on the construction site. Particular attention will be paid to large mass-graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great. The SWPPP would include a description of BMPs and control practices to be used for both temporary and permanent erosion control. Also, a description of the BMPs to reduce wind erosion at all times would be provided. In the operational phase, given that all onsite water would be treated and then released into the environment via the proposed infiltration basins, implementation of any of the build alternatives would not impact recreational or commercial fisheries.

OTHER WATER RELATED RECREATION

All of the water bodies within the proposed Project area have a designated beneficial use of Noncontact Water Recreation (REC-2). This beneficial use refers to uses of waters used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach-combing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities (Lahontan RWQCB 1995). Recreational parks near the Project corridor which provide recreational opportunities similar to the uses described above, include, but are not limited to, Big Rock Wash Wildlife Sanctuary (County of Los Angeles 2012), Mojave River Forks Regional Park and the Mojave Narrows Regional Park. These parks are managed and operated by the County of Los Angeles Department of Parks and Recreation and the San Bernardino County Regional Parks Department. Both the Los Angeles and San Bernardino counties have established policies and procedures to ensure diversified recreational opportunities for the enrichment of county residents and visitors while protecting the county's natural, cultural, historical and land resources (County of San Bernardino 2013, County of Los Angeles 2013). Assuming compliance with these established criteria to protect the county’s natural resources, then during construction and during the operational phase’s implementation of the build Alternatives would not interfere with noncontact water recreational activities.

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 the operation of the proposed project.

TRAFFIC/TRANSPORTATION PATTERNS

Offsite runoff generally crosses the corridor in a northerly direction. Facilities would be designed for the 100-year storm event in order to prevent flooding of the proposed roadway and potential flooding upstream and downstream of the roadway. The two ways to enable flood flows to cross the proposed freeway are to: 1) place cross-culverts along the alignment to enable flows to cross at existing flow concentration points, mimicking existing flow conditions, or 2) place longitudinal channels along the alignment to divert existing flow parallel to where culverts are proposed. Since flow diversion would exacerbate downstream flooding conditions and cause erosion to occur downstream, the first alternative was chosen as the recommended concept for flood and erosion control along most of the Project alignment. Therefore, implementation of the build Alternatives would not cause a disruption in traffic or transportation patterns due to flooding.

NAVIGATION

The NES identified the Mojave River as a traditionally navigable waterway (TNW) by the USACE. The Mojave River serves as terminus for the following ephemeral non-relatively permanent waters (non-RPW) within the BSA, Bell Mountain Wash, Ossom Wash, West Fork Ossom Wash, and Fremont Wash. No changes to navigation are anticipated because of constructing or long-term operation of the proposed project.

SAFETY

Safety considerations associated with the Build alternatives would relate to proposed Project encroachment into the base floodplain areas. Therefore, construction of the proposed project may cause changes to human safety within the aquatic environment. Based upon the selected Build Alternative, the existing impervious surface along the entire 63 mile corridor is approximately 80 acres. Based upon the selected Build Alternative, the proposed Project impervious surface area ranges from approximately 995 acres to 1,365 acres. As a result of the increased impervious area, an increase in runoff would be exhibited within the various watersheds traversed by the corridor during the operational phase. Since the soils are relatively pervious (see Table 3-4) and groundwater is relatively deep, it makes installation of infiltration basins practical. In this way, in the operational phase, the proposed drainage system would mitigate the potential increase in flow that could occur due to increases in impervious surfaces and thereby minimize any safety concerns.

4.2.5 Short-Term Impacts during Construction

PHYSICAL/CHEMICAL CHARACTERISTICS OF THE AQUATIC ENVIRONMENT

Construction of the HDC Project has the potential to temporarily impact water quality. Potential pollutant sources associated with the construction phase of the proposed Project include construction activities and materials expected at the Project site. Table 4-1 displays potential pollutant sources, along with pollutants typically associated with each activity for transportation infrastructure construction sites such as the HDC Project.

Table 4-1 Construction Site Activities, Materials, and Associated Pollutants

Construction Site Activity	Construction Site Materials	Pollutant
Vehicle and Equipment Cleaning, Fueling, and Maintenance	Vehicle Fluids	Oil Grease Petroleum Coolants
Concrete Cement Operations and Concrete Waste Management	Portland Concrete Cement and Masonry Products	Portland Concrete Cement
		Masonry Products
		Sealant (Methyl Methacrylate)
		Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash
		Mortar Concrete Rinse Water
	Curing Compounds	Non-Pigmented Curing Compounds
Landscaping	Landscaping and Other Products	Aluminum Sulfate
		Sulfur-Elemental
		Fertilizers-Inorganic
		Fertilizers-Organic
		Natural Earth (Sand Gravel and Topsoil)
		Herbicide
		Pesticide
		Lime
Excavation and Grading	Contaminated Soil	Aerially Deposited Lead
		Petroleum

Source: California Department of Transportation 2003a.

BIOLOGICAL CHARACTERISTICS OF THE AQUATIC ENVIRONMENT

The anticipated temporary impacts to the biological characteristics of the aquatic environment include the following:

- Minimal encroachment in special aquatic sites
- Equipment access to no more than 0.65 acres below the OHWM of the Bell Mountain Wash and an ephemeral braid of Fremont Wash
- Equipment access along numerous isolated ephemeral washes

HUMAN USE CHARACTERISTICS OF THE AQUATIC ENVIRONMENT

The anticipated temporary impacts to the human use characteristics of the aquatic environment include the following:

- Public access to Little Rock Creek, Big Rock Creek, Little Rock Reservoir, Mojave River and Turner Wash will impact the uses for other water related recreation such as for birding and walking
- Disturbance and/or removal of existing riparian vegetation will impact the aesthetics of the aquatic ecosystem
- Human safety within the aquatic environment may be impacted during construction

4.2.6 Long-Term Impacts during Operation and Maintenance

PHYSICAL/CHEMICAL CHARACTERISTICS OF THE AQUATIC ENVIRONMENT

Operation of the HDC Project has the potential to create long-term impacts to water quality. Potential pollutant sources associated with operation of the proposed Project include motor vehicles, illegal dumping and spills. Table 4-2 displays potential pollutant sources, along with the pollutant typically associated with transportation infrastructure operations.

Maintenance of the HDC has the potential to affect water quality. Potential pollutant sources associated with maintenance of the proposed Project include highway maintenance activities and landscaping care. Caltrans Division of Maintenance developed the Maintenance Staff Guide (Caltrans 2003) to assist Maintenance personnel in complying with the NPDES permit issued by the SWRCB. It is Caltrans' goal to reduce storm water pollution to the maximum extent practicable through the implementation of BMPs. As an employee handbook for the protection of water resources, maintenance Staff Guide provides detailed instructions on applying the approved Maintenance storm water BMPs to Maintenance highway activities such as landscaping, sweeping operations and roadside stabilization. For each maintenance activity, multiple approved Maintenance BMPs may be applicable. The intent of the Staff Guide is to aid the user in understanding and applying the approved Maintenance BMPs. Maintenance BMPs would be selected based on the type of maintenance activity. With implementation of Maintenance BMPs, no long-term impacts to the physical/chemical characteristics of the aquatic environment are anticipated.

Table 4-2. Transportation Infrastructure Operation Pollutant Sources and Pollutants

Pollutant Source	Pollutant
Motor Vehicles	Oil
	Grease
	Petroleum
	Coolants
	Nitrite
	Metals
Highway Maintenance	Asphalt
	Sediment
	Mineralized Organic Matter
	Thermoplastics
	Treated Wood
	Tree/Shrub Clippings
Landscaping	Aluminum Sulfate
	Sulfur-Elemental
	Fertilizers-Inorganic
	Fertilizers-Organic
	Natural Earth (Sand Gravel and Topsoil)
	Herbicide
	Pesticide
	Lime
Illegal Dumping	Trash
	Oil/Grease
Spills	Includes Hazardous and Non-Hazardous Chemicals

Source: Caltrans 2003a.

BIOLOGICAL CHARACTERISTICS OF THE AQUATIC ENVIRONMENT

The anticipated long-term impacts to the biological characteristics of the aquatic environment include:

- Accidental deposition of fill material, the disturbance and/or removal of existing vegetation, encroachment, and increase in storm water discharge to special aquatic sites
- The increase in impervious surface area may result in an increase in storm water discharge to the fish and aquatic organisms' habitat and higher concentrations of pollutants of concern
- Wildlife habitat may be impacted 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 within the Mojave River, Ossom Wash, and West Fork Ossom Wash.

HUMAN USE CHARACTERISTICS OF THE AQUATIC ENVIRONMENT

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

4.2.7 Impact Assessment Methodology

Potential short-term impacts were analyzed by determining the amount of disturbed soil area 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 existing tributary area and the proposed total impervious surface area within the Project area with the total watershed area. Impacts to surface and groundwater quality from the discharge of highway runoff were analyzed by comparing WQOs with average storm water runoff concentration from Caltrans highways and construction sites. Both qualitative and quantitative measures that describe the short-term and long-term impacts of each of the build Alternatives are summarized in tabular format and discussed in the following sections.

4.3 Alternative-Specific Impact Analysis

4.3.1 Storm Water Erosion

Table 4-3 displays the estimated temporary disturbed soil area for each build alternative within the HDC Corridor (Caltrans 2013). 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 sub-area and, subsequently, the sediment processes in these areas would be reduced because all disturbed soil areas 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 HDC Project.

Table 4-3. Temporary Disturbed Soil Area per Build Alternative

Build Alternative A	Build Alternative B	Build Alternative C	Build Alternative D
2,350	2,350	3,000	3,000

Table 4-4 displays the area for each Hydrologic Sub-area (HSA) that would be potentially affected by the proposed HDC Project. The area represented by each HSA is compared to the area within the HDC Project limits. Based on the four alternatives proposed, the maximum Caltrans tributary area to each HSA associated with alternatives D and E is less than 1 percent.

Table 4-4. HDC Contribution to the Watershed within the Project Limits

HSA Number	HSA Area (acres)	Existing Tributary Area[1] (acres)			
		Build Alt. A	Build Alt. B	Build Alt. C	Build Alt. D
626.5	557,620	650	650	650	650
626.8	265,344	1,350	1,350	1,350	1,350
628.1	106,382	650	650	650	650
628.2	556,821	1,650	1,650	2,000	2,000
	Total	**4,300**	**4,300**	**4,650**	**4,650**

Note: HSA – Hydrologic Sub-area
[1]Area of existing Caltrans ROW within the HDC Project limits
Source: Caltrans District 7, February 20, 2013; verified May 2014

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

Table 4-5 Estimated HDC Contribution to the Watershed within the Project Limits

HSA No.	HSA Area (acres)	Proposed Total Impervious Surface Area per Alternative (acres)				Proposed Contribution to HSA per Alternative (%)			
		A	B	C	D	A	B	C	D
626.5	557,620	240	240	300	300	0.04	0.04	0.05	0.05
626.8	265,344	285	285	425	425	0.11	0.11	0.16	0.16
628.1	106,382	150	150	220	220	0.14	0.14	0.21	0.21
628.2	556,821	400	400	500	500	0.07	0.07	0.09	0.09

Note: HSA – Hydrologic Sub-area

Source: Caltrans District 7, February 20, 2013

Table 4-6 compares the existing and proposed impervious surface area for each of the build alternatives. Alternatives C and D would add the most acreage (1,365 acres) of additional impervious surface area, followed by Alternatives A and B (995 acres).

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

Build Alternatives	Existing Impervious Surface Area (acres)	Proposed Additional Impervious Surface Area (acres)	Total Impervious Surface Area (acres)
A	80	995	1,075
B	80	995	1,075
C	80	1,365	1,445
D	80	1,365	1,445

Source: Caltrans District 7, February 20, 2013; verified May 2014

NO BUILD ALTERNATIVE

The HDC would not be constructed under the No Build Alternative, but it would involve construction of many improvements that have been defined in Section 4.6. Like the build Alternatives, these other improvements would require implementing temporary and permanent BMPs to control potential pollutants during construction and operation. The amount of disturbed soil area during construction of these improvements has not been determined for comparison to the build alternative because some of the proposed improvements for the selected alternative 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 improvements would include the implementation of BMPs to the maximum extent practicable.

4.3.2 Discharge of Highway Runoff on Surface Water Quality

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' storm water management strategies. Table 4-7 presents the average Caltrans storm water runoff concentrations from highways and construction sites compared to the most stringent of the WQOs established by the Ocean Plan, Basin Plan, or CTR (Caltrans 2003b). For certain constituents/parameters, no numeric WQO is currently established. For those constituents/parameters, a narrative objective was used. The comparison shows that concentrations in storm water runoff from Caltrans' facilities exceed the numeric WQO values for nearly half of the constituents listed. It is important to note that the comparison for metals were made based on the dissolved fraction of the metal as specified in the CTR. In addition, Caltrans monitored volatile organic, semi-volatile organic, and other organic pesticides in highway and construction site runoff characterization studies, and those parameters were not detected. As more data become available, Caltrans will be in a better position to assess the actual or threatened impacts runoff from storm drainage systems owned or operated by Caltrans may have on receiving water quality. In considering potential impacts of highway and construction site runoff on surface water quality, these data are assumed to reflect water quality similar to the quality of runoff from the proposed Project.

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 constituents that exceeded the WQO (i.e., ammonia, fecal coliform bacteria, total coliform bacteria, chromium, copper, lead nickel, and zinc), only the metals and ammonia are considered TDCs and are therefore treatable by Caltrans-approved Treatment BMPs[8]. During the construction phase, Construction Site BMPs would be implemented to treat storm water and non-storm water discharges to the maximum extent practicable and therefore runoff from the construction area would not likely create any surface water quality impacts. During the operational phase, runoff from the proposed HDC corridor would be conveyed to Caltrans-approved Treatment BMPs and 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.

[8] Department-approved Treatment Best Management Practices 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.

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
Conventional						
Biological oxygen demand	mg/L	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.	15.5	NA	Numerical comparison is not possible	
Chemical oxygen demand	mg/L	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.	86	60	Numerical comparison is not possible	

9 Reference: Statewide Storm Water Management Plan, CTSW-RT-02-008, May 2003

10 Most stringent WQO based on the Basin Plans, CTR and the Ocean Plan. Narrative statement used for those constituents that numerical WQO was not available.

11 Average based on the 1997-98 and 1998-99 monitoring data.

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
pH	pH units	The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge. The pH of bays or estuaries shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.2 units from natural conditions as a result of waste discharge.	7.4	7.9	Numerical comparison is not possible	
Temperature	°C	The natural receiving water temperature of surface waters shall not be altered by discharges of wastewater unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses.	14	15	Numerical comparison is not possible	

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
Total dissolved solids	mg/L	Discharges of wastes or wastewater shall not increase the TDS content of receiving waters, unless it can be demonstrated to the satisfaction of the RWQCB that such an increase in total dissolved solids does not adversely affect beneficial uses of receiving waters.	118	195	Numerical comparison is not possible	
Total suspended solids	mg/L	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.	160	500	Numerical comparison is not possible	
Turbidity	NTU	Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.	60	700	Numerical comparison is not possible	
Litter/Trash	lb/acre[12]	Waters shall not contain floating and settleable materials in concentrations that	20.5	NA	Numerical comparison is not possible	

12 Acre reported here is the area related to Caltrans right-of-way

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
		cause nuisance or adversely affect beneficial uses.				
Metals[13]						
Aluminum	µg/L	1,000	155	N/A	No	N/A
Arsenic	µg/L	10	2.8	N/A	No	N/A
Cadmium	µg/L	2.2[14]	0.6	N/A	No	N/A
Chromium	µg/L	2	3.1	5.2	Yes	Yes
Copper	µg/L	3.1	15.8	6.8	Yes	Yes
Lead	µg/L	2	7.3	0.8	Yes	No
Mercury	µg/L	0.04	ND	N/A		
Nickel	µg/L	5	6.3	3.2	Yes	No
Selenium	µg/L	5	ND	ND	No	No

13 Values shown are for dissolved concentrations

14 Function of the total hardness in a water body. Value corresponds to a total hardness of 100 mg/L.

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
Silver	µg/L	1.9	0.6	0.4	No	No
Zinc	µg/L	20	89.5	13.6	Yes	No
Nutrients						
Ammonia (NH3)	mg/L	0.00715	1.8	0.4	Yes	Yes
Nitrate (NO3)	mg/L	10	1.6	0.9	No	No
Nitrite (NO2)	mg/L	1	0.2	0.2	No	No
Ortho Phosphate	mg/L	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.	0.2	0.3	Numerical comparison is not possible	

[15] pH and temperature dependent. Value shown corresponds to a pH of 7 and temperature of 15 °C.

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
Total Kjeldahl Nitrogen	mg/L		2.9	2.5	Numerical comparison is not possible	
Total Phosphorus	mg/L		0.3	0.9	Numerical comparison is not possible	
Microbiological						
Fecal Coliform	MPN/ 100 ml	20	8,170	4,500	Yes	Yes
Total Coliform	MPN/ 100 ml	70	30,500	31,000	Yes	Yes
Toxicity	% Survival	Toxicity - All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a	N/A[16]	N/A	Numerical comparison is not possible	

[16] Sufficient toxicity data is not available to report

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
		median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.				
Oil and Grease	mg/L	Waters shall not contain oils, greases, waxes, or other similar materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.	14.5	1.2	Numerical comparison is not possible	
Pesticide						
Chlorpyrifos	µg/L	No individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.	0.6	0.3	Numerical comparison is not possible	

Table 4-7. Storm Water Runoff Storm Concentration and WQOs[9]

Constituent	Unit	WQO[10]	Average Storm Water Runoff Concentration from Caltrans Facilities[11]		Is Caltrans Average Storm Water Runoff Concentration Greater than the WQO?	
			Highways	Construction Sites	Highways	Construction Sites
Diazinon	µg/L	No individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.	0.7	0.4	Numerical comparison is not possible	
Glyphosate	µg/L	700	39.6	N/A	No	N/A

4.4 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 storm water quality during the construction and operation of the transportation facility to minimize potential storm water and non-storm water impacts to water quality. Caltrans' Statewide Storm Water Management Plan (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 BAT/BCT requirements and to address compliance with water quality standards. The BMPs are organized into four categories, as shown in Table 4-8.

Table 4-8. Caltrans BMP Categories

BMP	Description	Responsible Division for BMP Implementation
Construction Site BMP	Temporary soil stabilization and sediment control, non-storm water 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 the 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 HDC Project.

4.4.1 Construction Site BMPs

Construction Site BMPs would be applied during construction activities to minimize the pollutants in storm water and non-storm water discharges throughout construction. Construction Site BMPs would provide temporary erosion and sediment control, as well as control for potential pollutants other than sediment. Table 4-9 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 HDC 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 4-9. Construction Site BMP Categories

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

Source: Caltrans 2010.

Construction Site BMPs would be evaluated and identified through the preparation of the Storm Water Data Report 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, storm water 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 Construction General Permit.

4.4.2 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 4-10 displays Caltrans-approved Design Pollution Prevention BMPs that would be incorporated, as appropriate, into the design of the HDC Project.

Table 4-10. 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.

During the Project Initiation Document process, many Design Pollution Prevention BMPs were identified and are discussed in the following subsections. As additional data becomes available during the PA/ED and PS&E processes, 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 (City/County) 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 (Caltrans 2012). 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.

Treatment BMPs

Treatment BMPs are permanent measures that improve storm water 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 4-11 displays the Caltrans-approved Treatment BMPs.

Table 4-11. 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.

Each of the build Alternatives would include Project design features such as the design and installation of Treatment BMPs to the maximum extent practicable. The targeted design constituent 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 HDC Project from a water quality perspective in relation to the receiving water bodies within the proposed Project limits.

Preliminary engineering has indicated that the proposed Project presents opportunities for implementation of Treatment BMPs. All nine Caltrans-approved Treatment BMPs were analyzed to determine their feasibility for implementation on the proposed Project. Based on preliminary engineering, infiltration devices are proposed at most intersections within the right-of-way. Infiltration basins were selected based on their ability to treat the targeted design constituents (TDCs) (i.e., ammonia and general metals)[17] and meet the feasibility and siting criteria identified in the Project Planning and Design Guide (Caltrans 2010).

These infiltration basins would treat and partially contain the on-site pavement runoff of the roadway. The infiltration basins treat runoff by retaining the water quality volume (WQV) and enough flow volume to ensure flow rates mimic existing conditions. Once the required volume has been retained, runoff shall outlet through spillways or pipe risers where the excess runoff will be conveyed to the natural flow path. For each of the build Alternatives, the water quality volume would be routed away from local drainage courses and into the infiltration basin; therefore, at the onset of a design storm event,[18] it is expected that there will be no observable increase in the surface water quality constituent loadings at each of the local drainage areas.

[17] Infiltration basins are also considered an applicable BMP for trash (Caltrans 2010)

[18] The "Design Storm" is defined by Caltrans as the particular rain event that generates runoff rates or volumes that the drainage facilities are designed to handle (Caltrans 2010).

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[19] 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.

4.5 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, as well as from agricultural development and the conversion to more intensive types of agricultural cultivation. This analysis considers known projects identified within the project area. Each of these projects would have its own environmental document. Appendix E provides a list of projects that have the potential to influence cumulative impacts and were considered for this analysis.

4.5.1 Water Quality

The geographic context for the analysis of cumulative impacts associated with water quality is the area covered by the Antelope Valley and Mojave River watersheds. Development of the HDC Project, in combination with all other development that would occur in the watershed areas, would involve construction activities, increases in storm water 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 storm water 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

[19] Maintenance BMPs also include litter pickup within treatment BMPs such as Infiltration Basins

Permit; County and municipal codes related to control of storm water 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 Lahontan 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 HDC Project, and the proposed Project would not have a cumulatively considerable contribution to the cumulative effects related to water quality.

4.5.2 Groundwater

The geographic context for the analysis of cumulative impacts associated with groundwater is the area underlain by the Antelope Valley Groundwater Basin and the Mojave River Groundwater Basin. The HDC 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 HDC Project. Although implementation of the HDC 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 two basins 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 storm water 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 both 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 California Highway Patrol. 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 Code of Federal Regulations 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 Targeted Design Constituents, include sediment, metals (i.e., total and dissolved fractions of zinc, lead, and copper), nitrogen (e.g., ammonia), phosphorus, and general metals. Storm water runoff from the Project right-of-way 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's 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 storm water drainage system and watercourses and not create any groundwater quality impacts.

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

5 AVOIDANCE AND MINIMIZATION MEASURES

IMPACT: STORM WATER EROSION

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

- **WQ-1: Implement Storm Water BMPs.** The HDC Project would 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 HDC Project would be required to comply with the requirements of the NPDES Permit for Construction Activities, Order No. 2009-0009-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 a Storm Water Pollution Prevention Plan.** The Contractor would be required to develop an acceptable SWPPP. The SWPPP shall contain BMPs that have demonstrated effectiveness at reducing storm water pollution. The SWPPP shall address all construction-related activities, equipment, and materials that have the potential to affect water quality. All Construction Site BMPs would 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, storm water runoff, and other construction-related impacts. In addition, the SWPPP shall include implementation of specific storm water 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.

IMPACT: CONSTRUCTION DISCHARGES

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

- **WQ-3: Discharge of Construction Water.** If dewatering is expected for the preferred alternative, the contractor shall fully conform to the requirements specified Order No. 2003-0003-DWQ, Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality (General WDRs). This NPDES permit regulates specified low threat discharges of waste to land with underlying ground water, including well boring wastes, clear water discharges, small dewatering projects, and inert wastes. The NPDES permit requires a Notice of Intent or Application Form 200 to the Lahontan RWQCB with project plans and monitoring plans. A Notice of Applicability is then issued by the Lahontan RWQCB.

- **WQ-4: Discharge of Dredged or Fill Material.** Because the proposed Project involves work over Waters of the U.S. (i.e., Mojave River and tributaries), a Section 404 Permit may be required for the discharge of dredged or fill material into Waters of the U.S. This permit is administered by the United States Army Corps of Engineers.

- **WQ-5: 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. Locally, this program is administered by the Lahontan RWQCB.

IMPACT: BANK OR STREAMBED ALTERATION

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

- **WQ-6: Bank or Stream Bed Alteration Agreement.** Per Section 1602 of the Fish and Game Code, the HDC Project would be required to notify the Department of Fish and Wildlife of any proposed activity that would substantially divert or obstruct the natural flow of any river, stream, or lake; substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

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Appendix A Infiltration Basin Locations

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High Desert Corridor Infiltration Basin Layout 1

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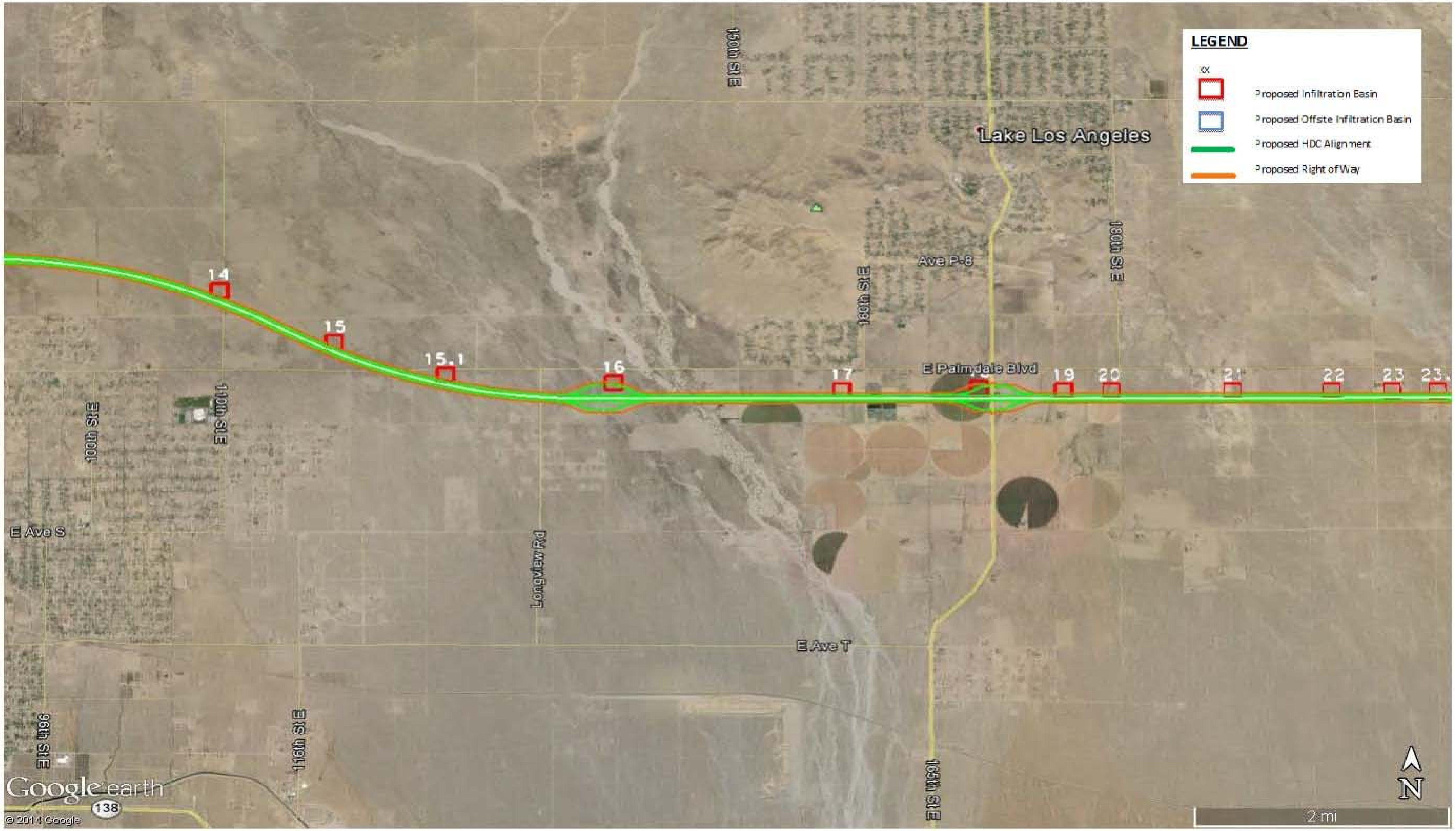

High Desert Corridor Infiltration Basin Layout 2

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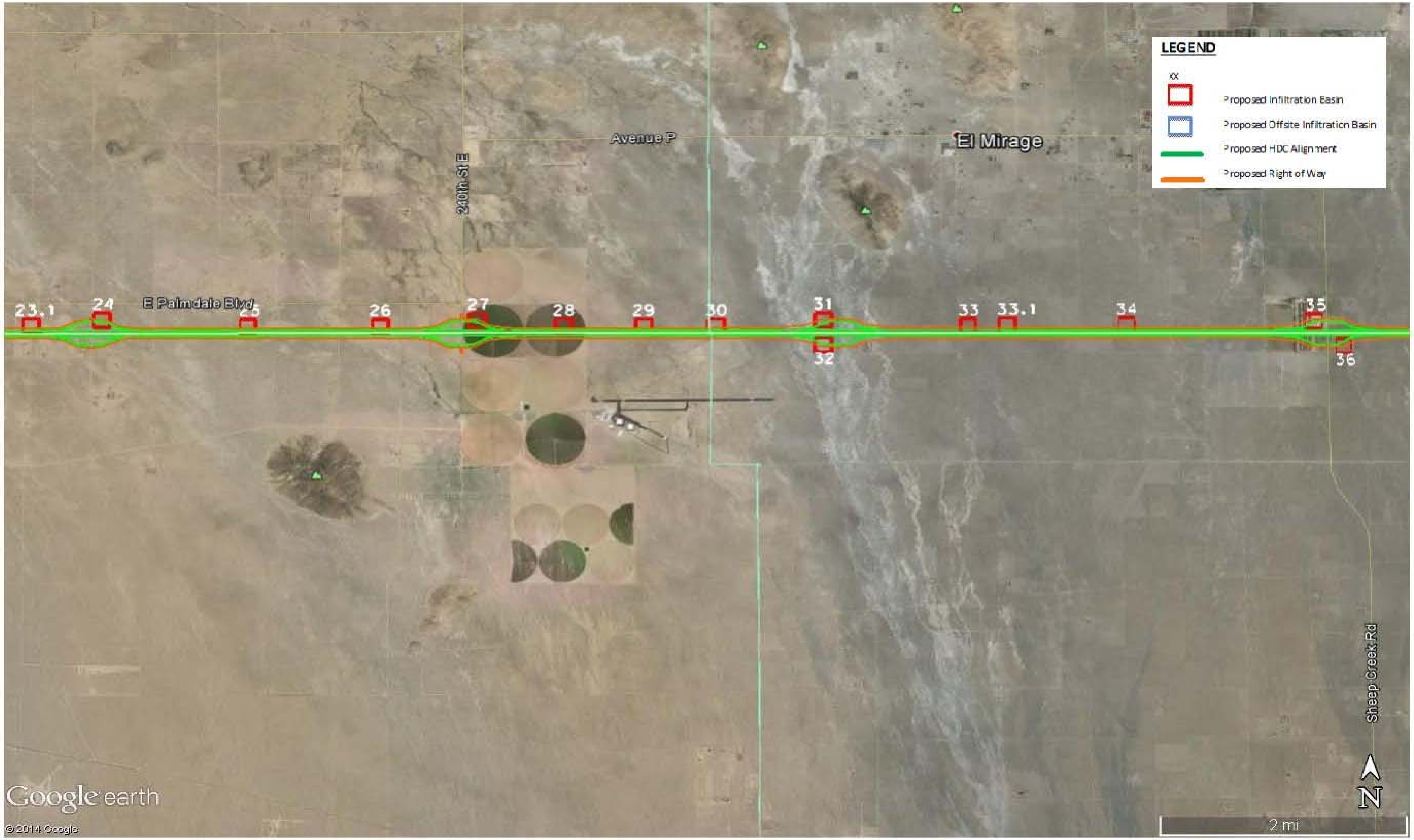

High Desert Corridor Infiltration Basin Layout 3

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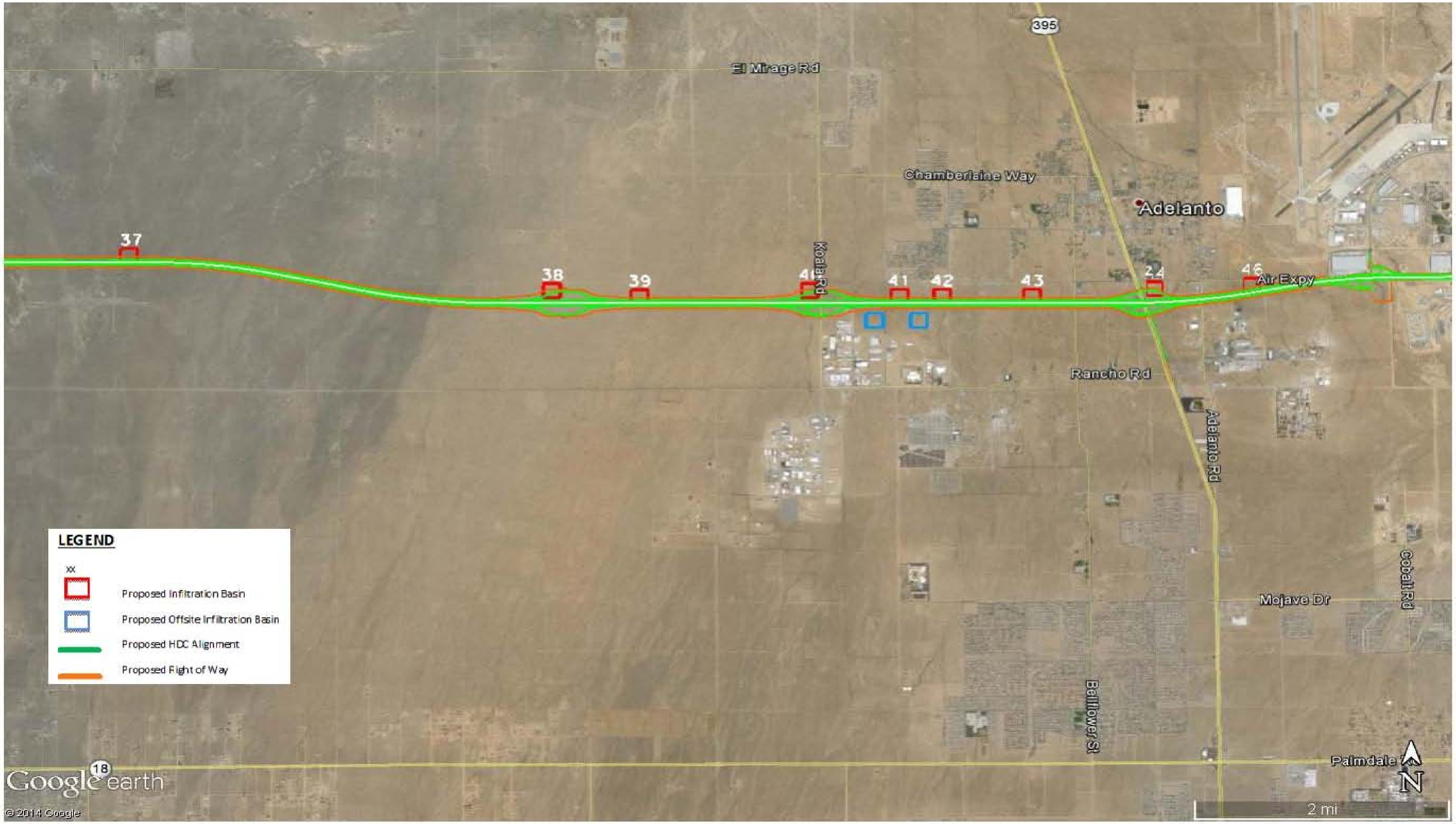

High Desert Corridor Infiltration Basin Layout 4

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High Desert Corridor Infiltration Basin Layout 5

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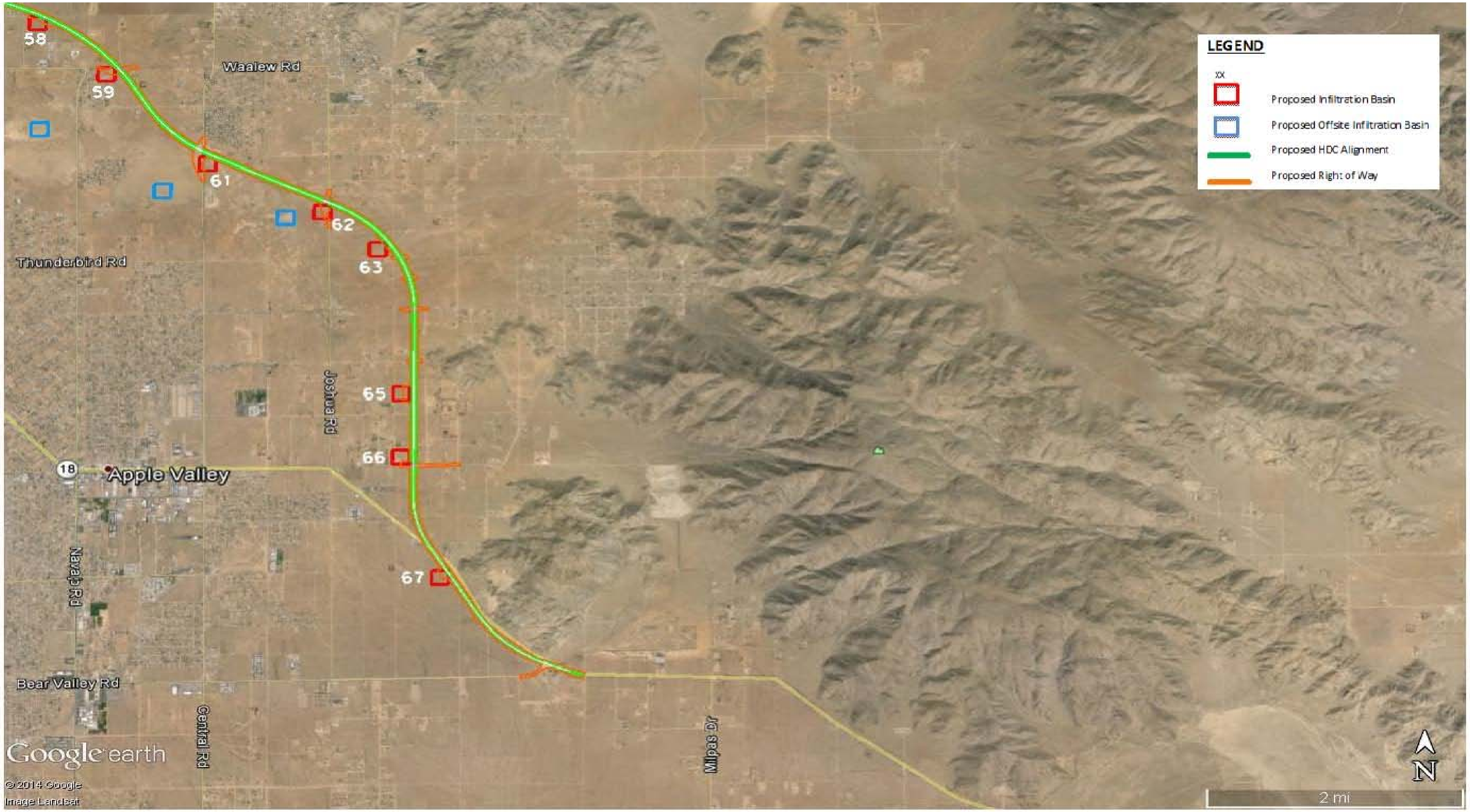

High Desert Corridor Infiltration Basin Layout 6

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Appendix B Water Quality Summary – Little Rock Reservoir

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Sample Date	Dissolved SO_4 (mg/L)	Dissolved F (mg/L)	Dissolved B (µg/L)	TDS/Residue (mg/L)
10/28/2001	37.3	0.30	60	414
Annual Average	37.3	0.30	60	414
5/7/2002	38.6	0.32	79	380
10/24/2002	33.5	0.47	104	305
Annual Average	36.1	0.40	92	343
3/20/2003	13.4	0.17	32	136
Annual Average	13.4	0.17	32	136

Sample Month	DO Daily Minimum 4.0 (mg/L)
10/28/2001	
5/7/2002	X
10/24/2002	
3/20/2003	X

Sample Year	Annual Average Dissolved SO_4 (mg/L)	Lahontan Water Quality Control Plan * 16.5 / 19 (mg/L)	California Toxics Rule	California 1° MCL	California 2° MCL 250 (mg/L)	USEPA 1° MCL 500 (mg/L)	USEPA National WQ Criteria (Taste & Odor) 250 (mg/L)
2001	37.3	X	NA	NA			
2002	36.1	X	NA	NA			
2003	13.4		NA	NA			

Sample Year	Annual Average Dissolved F (mg/L)	Lahontan Water Quality Control Plan .29 / .38 (mg/L)	California Toxics Rule	California 1° MCL 2 (mg/L)	California 2° MCL	Water Quality for Agriculture 1 (mg/L)	USEPA 1° MCL 4 (mg/L)	USEPA 2° MCL 2 (mg/L)	USEPA IRIS (RfD) Drinking Water 0.42 (mg/L)	California Public Health Goals 1 (mg/L)
2001	0.30	X	NA		NA					
2002	0.40	X	NA		NA					
2003	0.17		NA		NA					

Sample Year	Annual Average Dissolved B (µg/L)	Lahontan Water Quality Control Plan * 30 / 50 (µg/L)	California Toxics Rule	California 1° MCL	California 2° MCL	Water Quality for Agriculture 700 (µg/L)	USEPA IRIS (RfD) Drinking Water 1400 (µg/L)	California DHS Action Level (Drinking Water) 1000 (µg/L)	USEPA Health Advisory 1000 (µg/L)
2001	60	X	NA	NA	NA				
2002	92	X	NA	NA	NA				
2003	32	X	NA	NA	NA				

Sample Year	Annual Average TDS (mg/L)	Lahontan Water Quality Control Plan * 176 / 180 (mg/L)	California Toxics Rule	California 1° MCL	California 2° MCL 500 (mg/L)	Water Quality for Agriculture 450 (mg/L)	USEPA National WQ Criteria (Taste & Odor) 250 (mg/L)	
2001	414	X	NA	NA			X	
2002	343	X	NA	NA			X	
2003	136		NA	NA				

Note* Lahontan Water Quality Control Plan Standards; first value represents the Annual Average criteria, and the second value represents the 90th Percentile criteria

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Appendix C Water Quality Summary-Mojave River at Upper Narrows

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Sample Date	TIMES	Dissolved SO_4 (mg/L)	Dissolved F (mg/L)
7/17/2001	12:15	46.8	0.50
10/29/2001	12:30	52.0	0.50
Annual Average		49.4	0.50
2/4/2002	11:20	42.9	0.40
5/8/2002	11:10	41.7	0.35
8/27/2002	14:20	41.7	0.51
12/12/2002	13:00	61.2	-
Annual Average		46.9	0.42
3/19/2003	14:15	34.1	0.37
6/19/2003	7:45	55.1	0.50
10/21/2003	14:20	50.3	0.50
Annual Average		46.5	0.46
1/20/2004	10:00	38.8	0.40
4/20/2004	10:40	31.2	0.40
7/22/2004	9:10	63.0	0.60
11/18/2004	13:50	38.1	0.40
Annual Average		42.8	0.45
4/19/2005	11:40	22.2	0.30
7/26/2005	9:00	85.6	0.40
Annual Average		53.9	0.35

Sample Year	Annual Average Dissolved SO_4 (mg/L)	Lahontan Water Quality Control Plan * 40 / 100 (mg/L)	California Toxics Rule	USEPA 1° MCL 500 (mg/L)	California 2° MCL 250 (mg/L)	USEPA National WQ Criteria (Taste & Odor) 250 (mg/L)
2001	49.4	X	NA			
2002	46.9	X	NA			
2003	46.5	X	NA			
2004	42.8	X	NA			
2005	53.9	X	NA			

Sample Year	Annual Average Dissolved F (mg/L)	Lahontan Water Quality Control Plan* 0.2 / 1.5 (mg/L)	California Toxics Rule	Californi a 1° MCL 2 (mg/L)	USEPA 1° MCL 4 (mg/L)	USEPA 2° MCL 2 (mg/L)	USEPA IRIS (RfD) Drinking Water 0.42 (mg/L)	California Public Health Goals 1 (mg/L)	Water Quality for Agriculture 1 (mg/L)
2001	0.50	X	NA				X		
2002	0.42	X	NA						
2003	0.46	X	NA				X		
2004	0.45	X	NA				X		
2005	0.35	X	NA						

Note* Lahontan Water Quality Control Plan; first value represents the Annual Average criteria, and the second value represents the 90th Percentile criteria

Sample Date	TIMES	MTBE (µg/L)
7/17/2001	12:15	< .2
10/29/2001	12:30	E .1
2/4/2002	11:20	0.2
5/8/2002	11:10	< .2
8/27/2002	14:20	E .1
12/12/2002	13:00	0.3
3/19/2003	14:15	E .1
6/19/2003	7:45	< .2
10/21/2003	14:20	E.1
1/20/2004	10:00	E.2
4/20/2004	10:40	<.2
7/22/2004	9:10	<.2
11/18/2004	13:50	<.2
4/19/2005	11:40	<.2
7/26/2005	10:25	<.2

Sample Year	TDS (mg/L)	USEPA National WQ Criteria-Taste & Odor (mg/L)
7/17/01	397	250
10/29/01	404	250
2/4/02	344	250
5/8/02	343	250
8/27/02	413	250
12/12/02	455	250
3/19/03	315	250
6/17/03	461	250
10/21/03	477	250
1/20/04	369	250
4/20/04	345	250
7/22/04	496	250
11/18/04	391	250
4/19/05	197	250
7/26/05	442	250

Sample Date	Specific Conductance ($\mu^{s\text{-}cm}$)	Water Quality for Agriculture ($\mu^{s\text{-}cm}$)
7/17/01	639	700
10/29/01	687	700
2/4/02	558	700
5/8/02	597	700
8/27/02	720	700
12/12/02	742	700
3/19/03	508	700
6/19/03	770	700
10/21/03	832	700
1/20/04	605	700
4/20/04	565	700
7/22/04	815	700
11/18/04	630	700
4/19/05	322	700
7/26/05	706	700

Sample Date	TIMES	DO (mg/L)	Daily Minimum 4.0 (mg/L)
7/17/2001	12:15	5.7	
10/29/2001	12:30	4.8	
2/4/2002	11:20	8.7	
5/8/2002	11:10	7	
8/27/2002	14:20	5.1	
12/12/2002	13:00	5.4	
3/19/2003	14:15	7.1	
6/19/2003	7:45	3.8	X
10/21/2003	14:20	4.2	
4/20/2004	10:40	5.3	
7/22/2004	9:10	2.5	X
11/18/2004	13:50	6.7	
4/19/2005	11:40	8.9	
7/26/2005	9:00	6.8	

Appendix D Water Quality Summary-Mojave River below Forks Reservoir

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Sample Date	Sample Time	DO (mg/L)	Daily Minimum 4.0 (mg/L)
7/17/2001	15:00	6.3	
10/29/2001	15:00	7.6	
2/4/2002	13:45	11.4	
5/8/2002	13:40	9.8	
8/27/2002	11:45	9.8	
12/12/2002	10:40	11.1	
3/19/2003	10:45	11.9	
6/17/2003	10:30	6.3	
10/21/2003	11:30	8.9	
1/20/2004	12:45	-	
4/20/2004	12:45	9.2	
7/21/2004	12:15	10.8	
11/18/2004	10:30	10.8	
4/18/2005	13:45	10.0	
7/26/2005	12:30	7.8	

Sample Date	Sample Time	Dissolved SO_4 (mg/L)	Dissolved F (mg/L)
7/17/2001	15:00	73.2	3.6
10/29/2001	15:00	116.0	5.5
Annual Average		94.6	4.55
2/4/2002	13:45	43.9	2.5
5/8/2002	13:40	39.3	2.69
8/27/2002	11:45	2.2	3.12
12/12/2002	10:40	62.3	-
Annual Average		36.9	2.77
3/19/2003	10:45	19.6	0.36
6/17/2003	10:30	33.1	2.2
10/21/2003	11:30	130.0	5.3
Annual Average		60.9	2.62
1/20/2004	12:45	43.8	2.3
4/20/2004	12:45	14.3	1.3
7/21/2004	12:15	16.9	2.7
11/18/2004	10:30	23.3	0.8
Annual Average		24.6	1.78
4/18/2005	13:45	11.2	0.2
7/26/2005	12:30	17.5	1.2
Annual Average		14.4	0.70

Sample Year	Annual Average Dissolved SO_4 (mg/L)	Lahontan Water Quality Control Plan * 35 / 100 (mg/L)	California Toxics Rule	USEPA 1° MCL 500 (mg/L)	California 2° MCL 250 (mg/L)	USEPA National WQ Criteria (Taste & Odor) 250 (mg/L)
2001	94.6	X	NA			
2002	36.9	X	NA			
2003	60.9	X	NA			
2004	24.6		NA			
2005	14.4		NA			

Sample Date	Sample Time	Dissolved B (µg/L)
7/17/2001	15:00	225
10/29/2001	15:00	297
Annual Average		261
2/4/2002	13:45	100
5/8/2002	13:40	129
8/27/2002	11:45	204
Annual Average		144
3/19/2003	10:45	59
6/17/2003	10:30	102
10/21/2003	11:30	303
Annual Average		155
1/20/2004	12:45	88
4/20/2004	12:45	44
7/21/2004	12:15	184
11/18/2004	10:30	72
Annual Average		97
4/18/2005	13:45	50
7/26/2005	12:30	58
Annual Average		54

Sample Year	Annual Average Dissolved B (µg/L)	Lahontan Water Quality Control Plan* 200 / 300 (µg/L)	California Toxics Rule	California 1° MCL	California 2° MCL	USEPA IRIS (RfD) Drinking Water 1400 (µg/L)	California DHS Action Level (Drinking Water) 1000 (µg/L)	Water Quality for Agriculture 700 (µg/L)	USEPA Health Advisory 1000 (mg/L)
2001	261	X	NA	NA	NA				
2002	144		NA	NA	NA				
2003	155		NA	NA	NA				
2004	97		NA	NA	NA				
2005	54		NA	NA	NA				

Note* Lahontan Water Quality Control Plan; first value represents the Annual Average criteria, and the second value represents the 90th Percentile criteria

Sample Date	pH (field)	Lahontan Water Quality Control Plan* 6.5 / 8.5	California Toxics Rule	California 1° MCL	California 2° MCL	USEPA 2° MCL 6.5 - 8.5	Water Quality for Agriculture 6.5 - 8.4	USEPA National WQ Criteria (Aquatic Life) Instantaneous min/max 6.5 - 9	USEPA National WQ Criteria (Taste & Odor) 5 - 9
7/17/2001	8.4		NA	NA	NA				
10/29/2001	8.1		NA	NA	NA				
2/4/2002	8.1		NA	NA	NA				
5/8/2002	8.0		NA	NA	NA				
8/27/2002	8.6	X	NA	NA	NA	X	X		
12/12/2002	8.1		NA	NA	NA				
3/19/2003	8.0		NA	NA	NA				
6/17/2003	7.9		NA	NA	NA				
10/21/2003	8.4		NA	NA	NA				
1/20/2004	8.1		NA	NA	NA				
4/20/2004	8.0		NA	NA	NA				
7/21/2004	8.9	X	NA	NA	NA	X	X		
11/18/2004	7.5		NA	NA	NA				
4/18/2005	8.1		NA	NA	NA				
7/26/2005	8.1		NA	NA	NA				

Note* Lahontan Water Quality Control Plan; first value represents the Annual Average criteria, and the second value represents the 90th Percentile criteria

Sample Year	Annual Average Dissolved F (mg/L)	Lahontan Water Quality Control Plan* 1.5 / 2.5 (mg/L)	California Toxics Rule	California 1° MCL 2 (mg/L)	California 2° MCL	USEPA 1° MCL 4 (mg/L)	USEPA 2° MCL 2 (mg/L)	USEPA IRIS (RfD) Drinking Water 0.42 (mg/L)	California Public Health Goals 1 (mg/L)	Water Quality for Agriculture 1 (mg/L)
2001	4.55	X	NA	X	NA	X	X	X	X	X
2002	2.77	X	NA	X	NA		X	X	X	X
2003	2.62	X	NA	X	NA		X	X	X	X
2004	1.78	X	NA		NA			X	X	X
2005	0.70		NA		NA			X		

Note* Lahontan Water Quality Control Plan; first value represents the Annual Average criteria, and the second value represents the 90th Percentile criteria

Sample Year	TDS (mg/L)	USEPA National WQ Criteria-Taste & Odor (mg/L)
7/17/01	330	250
10/29/01	372	250
2/4/02	230	250
5/8/02	213	250
8/27/02	369	250
12/12/02	294	250
3/19/03	168	250
6/17/03	214	250
10/21/03	386	250
1/20/04	256	250
4/20/04	171	250
7/21/04	341	250
11/18/04	211	250
4/18/05	136	250
7/26/05	194	250

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Appendix E Cumulative Projects within the HDC Project Area

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Project Number	Project Title	Project Description	Lead Agency	Project Status
Transportation Projects				
1	Highway 395 Realignment	This project proposes to realign US-395 from I-15 in Hesperia to current US-395 in the northern parts of the City of Adelanto. The project is proposed to be a six-lane freeway from I-15 to Palmdale Road (SR-18); a four-lane freeway from Palmdale Road to Desert Flower Road; and a four-lane expressway from Desert Flower Road north to SR-58 at Kramer Junction.	Caltrans	This project is under consideration.
Victor Valley Development Projects				
2	Southern California Logistics Airport	This project proposes to redevelop the former George Air Force Base into a fully dedicated logistics and business park. A total of 168 million square feet is master planned.	Victor Valley Economic Development Authority	This project is under construction.
City of Palmdale - Local Development Projects				
3	Palmdale Trade and Commerce Center	This constantly-developing project is located on 756 acres of land next to SR-14. As of the last Specific Plan, a 10-acre entertainment facility and 130,000 square foot electronics manufacturing facility were approved but not yet constructed.	Palmdale	This project is under construction.
4	Yellen Park	This proposed project is 25 acres in size, at the southwest corner of Avenue S and Hillcrest Drive. Development started Summer 2011, and will be completed by Spring 2013	Palmdale	This project is under construction
5	Rancho Vista Park	This future project is located at the intersection of Town Center Drive and Bolz Ranch Road. It will be jointly used between Palmdale and the Westside Union School District.	Palmdale	This project has been approved.

Project Number	Project Title	Project Description	Lead Agency	Project Status
6	Oasis Park Expansion	Part of the Oasis Park and Marie Kerr Park Expansion that expanded these two parks by adding two swimming pools, a recreation center, water park, amphitheater, softball complex, and skatepark. Located on the southwest corner of Avenue S and 40th Street.	Palmdale	This project was completed in 2009.
7	Marie Kerr Park Expansion	Part of the Oasis Park and Marie Kerr Park Expansion that expanded these two parks by adding two swimming pools, a recreation center, water park, amphitheater, softball complex, and skatepark. On the corner of Rancho Vista Boulevard and 30th Street W.	Palmdale	This project was completed in 2009.
City of Adelanto - Local Development Projects				
8	Adelanto High School	This project, Adelanto's first public high school, is set to be completed by 2012. The 60-acre property is located on Mojave Drive between Raccoon Avenue and Joshua Road.	Adelanto	This project is under construction.
9	Adelanto Town Center	This 280,000 square foot retail project is located at the corner of Highway 395 and Mojave Drive. Its main anchor will be a Target store.	Adelanto	This project has been approved.
10	Adelanto Marketplace	This project's Phase II development added an additional 19,374 square feet of commercial space. It includes the city's first "eco-friendly" bank from Bank of America. Located at the northwest corner of Palmdale Road and Highway 395.	Adelanto	This project has been completed.
11	Adelanto Gateway Logistics Center	This 400-acre industrial project is located across from the Southern California Logistics Airport. The Center will consist of 10 to 15 industrial buildings ranging from 0.5 to 1.5 million square feet each. The land purchase was completed in mid-June 2007.	Adelanto	This project has been approved.

Project Number	Project Title	Project Description	Lead Agency	Project Status
12	Weaver Plaza	Located off of Highway 395 on Cactus Road, this 26,800 square-foot retail center looks to capitalize on the future commercial growth expected along Highway 395.	Adelanto	This project was completed in 2008.
13	U.S. Homes	313-Lot Subdivision, located at NEC Aster & Victor. APN 3103-101-01, 02, & 04. Project #15377.	Adelanto	This project is under construction
14	Stonebridge Development	36-Lot Subdivision, located at Bellflower North of Victor. Project #15393.	Adelanto	This project is under construction.
15	Desert Sage Properties	311-Lot Subdivision, located at NW Corner Muskrat/Air Expressway. APN 459-421-25. Project #15636, Ext 1.	Adelanto	This project has been approved.
16	Heller Development	71-Lot Subdivision, at SE Bellflower & Begonia. APN 3103-481-01,0,03,04. Project #16270.	Adelanto	Warranty?
17	D.R. Horton Inc	446 Lot Subdivision, at NEC or Palmdale Road (Hwy 18) and Verbana Road. APN 3103-441-07. Project #16356.	Adelanto	This project is under construction.
18	Haig	122-lot subdivision. SW Seneca and Aster. APN 3103-371-02. Project #16475.	Adelanto	Warranty?
19	Sundance Homes	93-lot subdivision. At Chamberlaine and Stevens. APN 0459-331-. Project #16490 & 14818.	Adelanto	This project is under construction.
20	Cal Capital	39-lot subdivision. At SEC Bellflower Street and Mojave. APN 3103-911-38. Project #16530 GPA 05-01 ZC 05-01 Ext 2.	Adelanto	This project has been approved.

Project Number	Project Title	Project Description	Lead Agency	Project Status
21	Provident Homes	151-lot subdivision. At NEC and NWC of Seneca/Stevens. APN 3103-361-9,10,11,12. Project #16549.	Adelanto	This project has been approved.
22	Desert Land Partners	66-lot subdivision. At NE Cactus and Verbana. APN 3128-461-08. Project #16603, Ext. 3.	Adelanto	This project has been approved.
23	Desert Sage	77-lot subdivision. At SW Seneca and Raccoon. APN 3132-041-06 & 07. Project #16618.	Adelanto	This project has been approved.
24	Heller Development	30-lot subdivision. At Palmdale between Verbana and Aster. Project #16654.	Adelanto	This project is in construction.
25	Heller Development	115-lot subdivision, at NE Vintage & Koala. Project #16668.	Adelanto	Warranty?
26	Regency Hills Homes	45-lot subdivision. On Panther Ave, between Auburn Ave and Vintage Rd. APN 0459-014-33. Project #16674 Ext 3.	Adelanto	This project has been approved.
27	Regency Homes XII	32-lot subdivision, at NEC Air Expressway and Aster Rd. APN 0459-122-24. Project #16691 Ext 3.	Adelanto	This project has been approved.
28	Regency Hills Homes	40-lot subdivision, at NEC of Aster Rd and Calico Rd. APN 0459-122-24. Project #16692 Ext 3.	Adelanto	This project has been approved.
29	Regency Homes XII	At Inca Ave and Aztec Ave. APN 459-122-37. Project #16693 Ext 3.	Adelanto	This project has been approved.
30	United Engineering	156-lot subdivision, at NE corner of Cactus & Aster. APN 3128-421-01, 05. Project #16916, Ext. 1 and 2.	Adelanto	This project has been approved.
31	Cactus & Raccoon	75-lot subdivision, at NE corner of Cactus & Raccoon. APN 3128-381-10, 11, 12, 13. Project #16918, GPA 05-02 Ext 1, 2.	Adelanto	This project has been approved.

Project Number	Project Title	Project Description	Lead Agency	Project Status
32	Canaday Company	160-lot subdivision, on Cactus Rd. APN 3128-501-03. Project #16930-2.	Adelanto	This project has been approved.
33	Heller Development	108-lot subdivision, at S. Villa/Aster. APN 3132-081-2. Project #16929, Ext 1, 2.	Adelanto	This project has been approved.
34	Margot Donald Dev.	30-lot subdivision. At SWC Begonia and Daisy. APN 3103-411-01. Project #16973.	Adelanto	This project is under construction.
35	Desert Land Partners	77-lot subdivision. On Verbena Rd/Poppy Rd. APN 3128-461-01. Project #17005, Ext 1.	Adelanto	This project has been approved.
36	Desert Sage Properties	54-lots, at NE corner of Koala and Seneca. APN 3132-041-05. Project #17006.	Adelanto	This project has been approved.
37	Lruri Two	78-lot subdivision, at Verbena/Joshua. APN 3132-18-11, 2. Project #17029.	Adelanto	In development.
38	United Engineering	75-lot subdivision, at NWC of Auburn and Verbena Rd. APN 0459-082-08. Project #17032.	Adelanto	This project is in the proposal stages.
39	Aster Bartlett	147-lot subdivision, at Bartlett Rd and Crippen Ave, between Stevents St and Aster Rd. APN 459-092-23, 459-571-01-16, 459-581-62, 459-631-41, 42, 71, 72, 459-711-01, 02, 31, 32. Project #17044 Ext 1.	Adelanto	This project has been approved.
40	Norris Consulting	Located North of Cactus, South of Holly extending approximately 660 Easterly of Pearmain. APN 3128-531-06, 07, 08. Project #17045.	Adelanto	This project is under construction.

Project Number	Project Title	Project Description	Lead Agency	Project Status
41	Adelanto 38	37-lot subdivision, at Crippen and Aster. APN 459-132-01. Project #17120 Ext 1.	Adelanto	This project is under construction.
42	Zephyr Adelanto	39-lot subdivision, at Bartlett and Stevens. APN 1459-421-16-0000. Project #17155, Ext 1, 2.	Adelanto	This project has been approved.
43	Canaday & Company	38-lot subdivision, at SEC Mojave and Aster Rd. APN 3132-091-01. Project #17171, GPA 05-04, ZC 05-03, Ext 1, Ext 2.	Adelanto	This project has been approved.
44	United Engineering	124-lot subdivision, at NWC Panther and Crippen. APN 459-014-11, 35. Project #17193, Ext 1,2.	Adelanto	This project has been approved.
45	Zephyr Adelanto	80-lot subdivision, at Stevens/Crippen/Bartlett. APN 0459-092-03. Project #17210.	Adelanto	This project has been approved.
46	American Heritage	38-lot subdivision, on Bartlett and Verbana. APN 459-132-33. Project #17213.	Adelanto	This project is in the proposal stages.
47	Victor Valley Land Partners	256-lot subdivision, east of Koala Rd between Seneca Rd and Palmdale Rd. APN 3103-331-03.	Adelanto	This project has been approved.
48	Pack, Pack, & Curtis	39 lots, on Victor between Lilac Rd and Verbana. APN 3132-181-04. Project #17242 Ext 1.	Adelanto	In development
49	Trandis Homes	104 lots, on SEC Seneca and Stevens. APN 3103-371-01. Project #17250.	Adelanto	In development.

Project Number	Project Title	Project Description	Lead Agency	Project Status
50	Janan Investments	107-lot subdivision, on Air Expressway between Daisy Rd and Verbana Rd. APN 0459-122-33. Project #17268.	Adelanto	This project is in the proposal stages.
51	C. W. Tefft	197-lot subdivision, on Koala Rd 600 ft south of El Mirage Rd. APN 0459-014-05 & 07. Project #17283 Ext 1.	Adelanto	This project has been approved.
52	United Engineering	57-lot subdivision, on SWC Chamerlain and Raccoon and Stevens. APN 459-701-201. Project #17312 Ext 2.	Adelanto	This project has been approved.
53	Cal Capital	46-lot subdivision, East of Bellflower, 330ft north of Victor. APN 3103-181-38. Project #17319, Ext 1, Ext 2.	Adelanto	This project has been approved.
54	Robert Slavin, Jr.	20-lot subdivision. On Lawson, between Lilac St and Bellflower. APN 0459-124-20. Project #17336.	Adelanto	This project is on hold.
55	New Desert Communities	40-lot subdivision, on Muskrat between Villa and South St. APN 3132-041-03. Project #17369.	Adelanto	This project has been approved.
56	C. W. Tefft Inc.	40-lot subdivision, on Chamberlaine Lane and Panther Avenue. APN 459-014-28. Project #17387 Ext 1.	Adelanto	This project has been approved.
57	Bernardo Camolinga	68-lot subdivision, SE SW of Auburn and New Hampshire Ave. APN 459-083-04-06, 459-084-75-78, 459-0893-43, 44. Project #17417.	Adelanto	This project has been approved.
58	Country Development	79-lot subdivision, on Vintage Rd between Aster Rd and Cypress St. APN 0459-08-01, 02. Project #17503.	Adelanto	This project has been approved.

Project Number	Project Title	Project Description	Lead Agency	Project Status
59	High Desert Partners	36-lot subdivision, NW corner La Paz Ave & Stevens Rd. APN 0459-331-06 & 07. Project #17542	Adelanto	This project is in the proposal stages.
60	High Desert Partners	125-lot subdivision, SW corner Auburn Ave and Stevens Rd. APN 0459-331-23, Project #17543.	Adelanto	This project has been approved.
61	Hyung S. Byun	19-lot subdivision, on Rhode Island St between Chaparral Ave and Mirage Rd. APN 0459-082-18. Project #17578.	Adelanto	This project is in the proposal stages.
62	Norris-Karney Three	66-lot subdivision, East of Bellflower St between Holly Rd and Poppy Rd. APN 3128-491-01-02&06. Project #17592.	Adelanto	This project has been approved.
63	Tandis Homes	48-lot subdivision, on Raccoon Rd between Kemper and Lawson. APN 459-721-32, 459-722-01. Project #17600.	Adelanto	This project is in development.
64	New Desert Communities	36-lot subdivision, SE corner of Raccoon and Villa. APN 3132-041-04. Project #17639 Ext 1.	Adelanto	This project has been approved.
65	Bachoura Family Trust	9-lot subdivision, at East Site of Bellflower St, between Seneca Rd and Villa St. APN 3103-201-03. Project #17726 Ext 1.	Adelanto	This project has been approved.
66	KNK One	57 lots, S of Chamberlain and W of Rhode Island. APN 0459-132-03. Project #17853.	Adelanto	This project is in the proposal stages.
67	KI Premier	35-lot subdivision, SE corner of Delicious St and Lawson Ave. APN 0459-221-01, 02. Project #17854.	Adelanto	This project is in the proposal stages.

Project Number	Project Title	Project Description	Lead Agency	Project Status
68	Bergeson Scarlett & Assoc.	SE corner of Seneca and Raccoon. APN 3103-361-01. Project #17869.	Adelanto	This project is in the proposal stages.
69	Seneca Villas	South side of Seneca, 330ft east of Raccoon Ave. APN 3103-361-03 & 04. Project #17873 Ext 1.	Adelanto	This project has been approved.
70	Frontier Homes	West of Bellflower, South of Lawson Ave, North of Cortez Ave. APN 0459-124-36, 0459-124-37. Project #17940.	Adelanto	This project has been approved.
71	Tandis Homes	NE corner of Bartlett and Daisy. APN 0459-132-33. Project #18006.	Adelanto	This project is in the proposal stages.
72	Hong Dong	39-lot subdivision. NWC Auburn and Koala. APN 0459-014-08. Project #18085.	Adelanto	This project is in the proposal stages.
73	Steve Reiner DRC	5-lot subdivision, on Adelanto Rd north of Air Expressway. APN 0450-024-16. Project #18171.	Adelanto	This project is in the proposal stages.
74	Thornton Development	78-lot subdivision, on Raccoon Ave between Crippen and Vintage Rd. APN 0459-331-36, 37. Project #18177.	Adelanto	This project is in the proposal stages.
75	Thomas Chan	10 lots, South side of Villa, approx 600ft east of Jonathan. APN 3132-321-03. Project #18183.	Adelanto	This project has been approved.
76	Keith Jones	8-lot subdivision, on SEC of Bellflower and Villa. APN 3103-201-01. Project #18191.	Adelanto	This project has been approved.

Project Number	Project Title	Project Description	Lead Agency	Project Status
77	Frontier Homes	60 single family residential lots, on NE corner of Air Expressway and Muskrat Ave. APN 0459-421-02, 03. Project #18205.	Adelanto	This project is in the proposal stages.
78	Frontier Homes	180 single family residential lots, on NW corner of Air Expressway and Raccoon Avenue. 0459-421-14, 15. Project #18211.	Adelanto	This project has been approved.
79	Viking Run	22 single family residential lots, on SE corner of Koala Rd and Villa St. APN 3132-041-01. Project #18226.	Adelanto	This project has been approved.
80	Oak Street	19 lots, North of Chamberlaine, 330ft east of Aster. APN 0459-082-25, 26. Project #18276.	Adelanto	This project is in the proposal stages.
81	Raffi Gharapetian	7 single family residential lots, on NE corner of Aster Rd and Chamberlaine Way. APN 0459-082-23. Project #18301.	Adelanto	This project has been approved.
82	Greg Norris, Norris Karney III	96 single family residential lots, on west side of Jonathan between Poppy and Holly. APN 3128-491-05, 11, 12, 14. Project #18336.	Adelanto	This project has been approved.
83	Jerry Ronnebeck Eng	32 unit townhomes, on SE Chamberlain and Montezuma. APN 0459-142-49, 50, 51, 52. Project #18379.	Adelanto	This project has been approved.
84	Land R Us	18 lots, on SE corner of Villa St and Jonathan St. APN 3103-231-01, 02. Project #18408.	Adelanto	This project has been approved.
85	John Koko	8 lots, on SE corner of Benton and Jonathan. APN 3103-221-12. Project #18511.	Adelanto	This project has been approved.

Project Number	Project Title	Project Description	Lead Agency	Project Status
86	United Engineering	171-lot subdivision, on NWC Chamberlain and Koala. APN 0459-014-13. Project #18526.	Adelanto	This project is in the proposal stages.
87	Makan Adelanto 2.2	8-lot subdivision, on Aster, 290ft north of Chamberlain. APN 0459-082-22.	Adelanto	This project has been approved.
88	Paradise Int'l Enterprise	26 lots, southwest Lawson and Delicious. APN 0459-221-21, 22, 24. Project #18729.	Adelanto	This project is in the proposal stages.
89	14280	59-lot subdivision, NWC of Lupin Rd and Pearmain Street. APN 3128-651-69, 3128-661-35, 36, 37. Tandis Homes.	Adelanto	This project has been completed.
90	15358	259-lot subdivision, on Mojave and Bellflower. APN 3103-181-34. Stephen Walker.	Adelanto	This project has been completed.
91	16103	235-lot subdivision, on Holly between Johnathan and Pearmain. APN 3128-531-02, 03, 04. Pulte Home.	Adelanto	This project has been completed.
92	16277	114-lot subdivision, on SW Victor & Bellflower. APN 3103-191-02, 12, 16, 18. Heller Development.	Adelanto	This project has been completed.
93	16440	185-lot subdivision, on SW Mojave and Bellflower. APN 3103-141-03, 3103-131-04 & 05. Beazer Homes.	Adelanto	This project has been completed.
94	16442	245-lot subdivision, on SW Mojave and Pearmain. APN 3103-211-03, 06. Horizon Communities.	Adelanto	This project has been completed.
95	16491	80-lot subdivision, on Cactus and Jonathan. APN 3128-501-04, 10. Canaday & Company.	Adelanto	This project has been completed.

Project Number	Project Title	Project Description	Lead Agency	Project Status
96	16650, 16655	90-lot subdivision, on NWC Lilac and Mojave. Land R Us.	Adelanto	This project has been completed.
97	16688	58-lot subdivision, on N Villa, S Victor, E Jonathan, W 395. APN 3103-221-09, 10. Stonebridge Adelanto.	Adelanto	This project has been completed.
98	16761	36-lot subdivision, North of Seneca Rd, South of and abutting Villa St, East of Bellflower St and West of Delicious St. APN 3103-201-02, 04, 05, 07. American Heritage Communities.	Adelanto	This project has been completed.
99	16773	36-lot subdivision, on NW Seneca and Aster. APN 3132-081-10, 11. Frontier Homes.	Adelanto	This project has been completed.
100	16803	40-lot subdivision, on SWC Daisy Rd and Seneca. APN 3103-401-04. Frontier Homes.	Adelanto	This project has been completed.
101	16829	70-lot subdivision, Easterly of Jonathan and between Seneca Rd and Villa St. APN 3103-231-04-08&11. Providian Homes.	Adelanto	This project has been completed.
102	16848	59-lot subdivision, west side of Jonathan, 300ft south of Mojave. APN 3103-181-39, 40. Stonebridge Adelanto, LLC.	Adelanto	This project has been completed.
103	16854	49-lot subdivision, W of Highway 395 between Victor St and Villa St. APN 3103-221-13, 14. Stonebridge Adelanto.	Adelanto	This project has been completed.
104	16855	40-lot subdivision, on SEC Cornell St and Delicious St. APN 3103-741-41. Stonebridge Adelanto.	Adelanto	This project has been completed.
105	16885	79-lot subdivision, on SWC Joshua and Hwy 395. APN 3103-211-05. Stonebridge Adelanto.	Adelanto	This project has been completed.

Project Number	Project Title	Project Description	Lead Agency	Project Status
106	16917	79-lot subdivision, on SE corner of Mojave and Verbana. APN 3128-421-01, 05. United Engineering.	Adelanto	This project has been completed.
107	16930-1	160-subdivision, Cactus Road and Delicious Street. APN 3128-501-03. Canaday Company.	Adelanto	This project has been completed.
108	17030	38-lot subdivision, on Victor St. APN 3132-181-6, 7. Desert Wind LLC.	Adelanto	This project has been completed.
109	17044-1	1-commercial lot phase. On Bartlett Rd and Crippen Ave, between Stevens St and Aster Rd. APN 459-092-23, 459-571-01-16, 459-581-62, 459-631-41,42,71,72, 459-711-01,02,31,32. Aster Bartlett Land Partners.	Adelanto	This project has been completed.
110	17259	73-lot subdivision, North of Air Expressway-Stevens-Raccoon. APN 0459-421-08. Frontier Homes.	Adelanto	This project has been completed.
City of Victorville – Local Development Projects				
111	Desert Valley Medical Hospital Expansion	Construction began in 2008 on the 500,000 square foot expansion to the hospital. The Victorville Redevelopment Agency helped the hospital by adding public improvements to the area. Located on Bear Valley Road between 1st Avenue and 2nd Avenue.	Victorville Redevelopment Agency	The project is under construction.
112	Ottawa Business Center	Located in the 233-acre Foxborough Industrial Park, on Hesperia Road between Terra Linda and Ottawa Streets, this new facility will be over 1 million square feet on 52 acres to allow for warehouse and distribution uses.	Victorville Redevelopment Agency	This project is in the planning stages.

Project Number	Project Title	Project Description	Lead Agency	Project Status
113	Cassa Bella Apartment Community	Completed in 2008, this apartment complex has 285 affordable housing units for working families. Located on Nisqualli Rod between Hesperia Road and 1st Avenue.	Victorville Redevelopment Agency	This project was completed in 2008.
114	Desert Plazas	This 90-acre retail development is located in the Hook Boulevard Project Area. This project is under constant development, and will include over 800,000 square feet of retail space once built out. Located on the southwest and southeast corners of Civic Drive and Roy Rogers Drive.	Victorville Redevelopment Agency	This project is under construction.
115	Costco Expansion	This new facility for the expanding retailer, located on Valley Center drive north of Lorene Drive, includes 160,000 square feet of retail space.	Victorville Redevelopment Agency	This project was completed in 2007.
116	I-15 La Mesa/ Nisqualli Interchange	This new interchange is located approximately 1.2 miles north of the I-15/Bear Valley Rd interchange and approximately 1.7 miles south of the I-15/Palmdale Road/SR-18 interchange. The purpose of this project is to increase vehicular access to existing nearby areas and relieve traffic congestion and delays.	City of Victorville	This project is under construction.
117	I-15/ Eucalyptus Interchange	This new interchange is proposed at Eucalyptus Street, approximately 1.2 miles south of the I-15/Bear Valley Road Interchange and about 2.3 miles north of the I-15/Main Street Interchange. This project aims to reduce congestion at the Bear Valley Road and Main Street interchanges.	City of Victorville & City of Hesperia	This project is in the planning stages.

Project Number	Project Title	Project Description	Lead Agency	Project Status
City of Apple Valley - Local Development Projects				
118	Yucca Loma Bridge	This project is Apple Valley's portion of the larger Yucca Loma Road/Yates Road/Green Tree Blvd Transportation project tied to the City of Victorville. The project will connect Apple Valley to the rest of San Bernardino County and Victorville, and ultimately ease congestion on Bear Valley Road and SR-18. At intersection of Yucca Loma and Apple Valley Rd.	Apple Valley	Construction will begin Spring 2012.
119	The Fountains at Quail Ridge	This 346,460 square foot, mixed-use project will consist of 167,300 square feet of commercial use (including 4,000 square feet for outdoor restaurant dining, two (2) freestanding drive-through restaurants and a bank with a drive-through); and 179,160 square feet of professional and medical office use. The project is located at the northeast corner of Apple Valley and Yucca Loma Roads.	Apple Valley	This project has been approved.
120	Medical, Mixed-Use Campus	Preliminarily approved, this 74-acre project will include a 120-bed acute care hospital, 99-bed sub-acute care facility, medical offices and general commercial uses. Located on Apple Valley Rd, between Sitting Bull and Bear Valley Roads.	Apple Valley	This project has reached preliminary approval.
121	Wal-Mart Supercenter	This proposed project will comprise approximately 260,000 square feet. The application is currently in process and will be reviewed by the Planning Commission. The project will be located at the northeast corner of Dale Evans Parkway and Bass Hill Road, between Thunderbird Road and Civic Center Park.	Apple Valley	The project is under review.

Project Number	Project Title	Project Description	Lead Agency	Project Status
122	Apple Valley Civic Center	Located at the northwest corner of Dale Evans Parkway and Highway 18, this project included the addition of a new 25,000 square foot Town Hall Annex and Community Meeting Room.	Apple Valley	This project was completed in 2010.
123	Apple Valley Commons	Located on Thunderbird Road between Dale Evans Parkway and Happy Trails Highway, this 733,000 square foot development includes commercial and retail facilities.	Apple Valley	This project has been completed.
124	Jess Ranch Marketplace	Located on the southwest corner of Bear Valley and Apple Valley Roads, this 969,000 square foot regional commercial center is currently undergoing Phase III of its development, which includes Cinemark Theatres, Best Buy, Bed Bath and Beyond, and 24 Hour Fitness.	Apple Valley	This project is under construction.
125	Apple Valley Towne Center	This 259,111 square foot center, located on the northeast corner of Bear Valley and Apple Valley Roads, is undergoing its Phase II development, compromising 82,000 square feet.	Apple Valley	This project is under construction.
126	Sprit River Center	This 35,000 square foot office park is located on the west side of Apple Valley Road between Highway 18 and Muni Road.	Apple Valley	This project has been completed.
127	Apple Valley Gateway Center	This 25,000 square foot retail center is located on the southwest corner of Apple Valley Road and Highway 18.	Apple Valley	This project has been completed.
128	St. Mary Medical Center	This regional medical center recently underwent a $40 million expansion. It is located on the northeast corner of Apple Valley Road and Happy Trails Highway.	Apple Valley	This project has been completed.

Project Number	Project Title	Project Description	Lead Agency	Project Status
129	Kamana Professional Center	Located near the corner of Siskiyou and Kamana Roads, this professional and medical office center encompasses over 13,000 square feet.	Apple Valley	This project has been completed.
130	Choice Medical Group	Recently finished, this facility offers one of the largest physician networks in the Victor Valley region. Located between Corwin Road and Happy Trails Highway.	Apple Valley	This project has been completed.
131	Apple Valley Square	This existing retail center has been approved for a 54,000 square foot expansion at the northwest corner of Navajo and Bear Valley Roads.	Apple Valley	This project has been approved.
132	Apple Valley Plaza	On the southwest corner of Bear Valley and Central Roads, this project was recently completed and includes a 14-screen Ultra Star Cinema.	Apple Valley	This project has been completed.
133	Apple Valley Road	This project area, from Yucca Loma Road south to Kanbridge, is now a four lane road with bike lanes, sidewalks, and landscaping. Due to storm drainage challenges, a seven and a half foot storm drain was buried underground, running directly through the Yucca Loma/Apple Valley Road intersection.	Apple Valley	This project has been completed.
134	Dale Evans Parkway Improvement Project	This parkway is currently being reconstructed between Otoe and Waalew Roads. The road is being widened to include bicycle lanes on both sides.	Apple Valley	This project is under construction.

Project Number	Project Title	Project Description	Lead Agency	Project Status
135	Apple Valley Municipal Animal Shelter	Located on the southeast corner of Powhattan and Quinnault, this 36,000 square foot facility provides animal care and education and adoption services.	Apple Valley	This project was completed in 2010.
136	Town Hall Annex	This 25,000 square foot expansion to the main town hall houses the city's Development Services. Located at the northwest corner of Dale Evans Parkway and Highway 18.	Apple Valley	This project was completed in 2010.