APPENDIX I

HYDROLOGY AND WATER QUALITY

HYDROLOGY AND WATER RESOURCES
ENVIRONMENTAL SETTING EVALUATION
SOUTHERN CALIFORNIA EDISON
WEST OF DEVERS UPGRADE PROJECT
RIVERSIDE AND SAN BERNARDINO COUNTIES, CALIFORNIA

PREPARED FOR:
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September 6, 2013
Project No. 208520001

Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

September 6, 2013
Project No. 208520001

Ms. Mona McGuire DeLeon
LSA Associates
703 Palomar Airport Road, Suite 260
Carlsbad, California 92011

Subject: Hydrology and Water Resources Environmental Setting Evaluation
Southern California Edison
West of Devers Upgrade Project
Riverside and San Bernardino Counties, California

Dear Ms. DeLeon:

This report presents the results of our Hydrology and Water Resources environmental setting evaluation for the West of Devers Upgrade Project (WOD Project) located in Riverside and San Bernardino Counties, California. The purpose of this study was to evaluate the hydrologic conditions and water resources within the WOD corridor using readily available data, and to provide an environmental setting report which can be utilized in the Proponent's Environmental Assessment for the project. The study was conducted in accordance with your request and authorization, and per the scope of services outlined in our proposal dated October 7, 2011.

We appreciate the opportunity to provide geotechnical consulting services for this project.

Sincerely,
NINYO & MOORE

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1. INTRODUCTION

In accordance with your request and authorization, we have performed a hydrology and water resources evaluation for the Southern California Edison (SCE) West of Devers Upgrade Project (WOD) located in Riverside and San Bernardino Counties, California (Figure 1). We have performed an evaluation of the environmental setting regarding hydrology and water resources for inclusion in the Proponent's Environmental Assessment (PEA) for the project. The purpose of our evaluation was to evaluate the hydrologic conditions and water resources in the Project study area.

2. SCOPE OF SERVICES

Ninyo & Moore's scope of services has included review of hydrologic background materials and field reconnaissance of the study area. Specifically, we have performed the following tasks:

- Review of readily available climatic data, hydrologic maps, flood maps, groundwater data, well data, Regional Water Quality Control Board reports and data, and County General Plan information.
- Hydrological site reconnaissance by a representative from Ninyo & Moore conducted on March 26 and March 29, 2012, to observe and document the existing surface conditions along accessible portions of the WOD Project.
- Compilation of existing hydrological data pertaining to the project.
- Preparation of this report presenting the results of our study relative to the hydrological aspects of the project's conceptual design and construction to be included in the PEA.

3. PROJECT DESCRIPTION

3.1. General

SCE is proposing the WOD project (Proposed Project) in order to expand and transfer their transmission system. The Proposed Project would upgrade the existing WOD system by replacing existing 220 kilovolt (kV) transmission lines and associated structures with new, higher-capacity 220 kV transmission lines and structures; modifying existing substation facilities; removing and replacing existing subtransmission (66 kV) lines; removing and replacing existing distribution (12 kV) lines; and making various telecommunication improvements.

The Proposed Project is located primarily within the existing West of Devers corridor in the incorporated and unincorporated areas of Riverside and San Bernardino Counties including Morongo Band of Mission Indians (Morongo) Reservation (Reservation), and the Cities of Banning, Beaumont, Calimesa, Colton, Grand Terrace, Loma Linda, and Redlands (Figure 1). The existing utility corridor traverses through a combination of residential, commercial, agricultural, recreation, and open space areas.

The Project would include the removal and rebuilding of approximately 181 circuit miles of existing 220 kV line facilities (approximately 48 corridor miles) primarily within existing utility right-of-way (ROW). The Project would involve upgrade to these existing 220 kV lines: Devers-Vista No. 1; Devers-Vista No. 2; Devers-El Casco; El Casco-San Bernardino; Devers-San Bernardino; San Bernardino-Vista; and Etiwanda-San Bernardino. Substation improvements are proposed as part of the project at the Devers, El Casco, Timoteo, Tennessee, Vista, Etiwanda, and San Bernardino substations. As part of the Proposed Project, existing access roads and spur roads would be rehabilitated and new roads would be constructed.

This project description is based on planning level assumptions. Details would be further evaluated following additional engineering design and assessment of field conditions.

3.2. Transmission Line Segments

The Proposed Project has been divided into six geographic segments that include the following proposed upgrades:

- **Segment 1** is approximately 3.5 miles in length and extends south from San Bernardino Substation to the San Bernardino Junction and includes the following existing 220 kV transmission lines: Devers-San Bernardino, Etiwanda-San Bernardino, San Bernardino-Vista, and El Casco-San Bernardino. Proposed work within Segment 1 would include the removal of approximately 44 existing double-circuit lattice steel towers (LSTs), one single-circuit LST, 59 miles of existing conductor, and 7 miles of existing overhead ground wire (OHGW). Proposed work would also include the installation of approximately 55 double-circuit LSTs, 6 single-phase tubular steel poles (TSPs), 87 miles of new conductor, and 7 miles of new Optical Ground Wire (OPGW). The newly rebuilt 220 kV transmission lines in this segment would connect to the existing 220 kV switchrack inside San Bernardino Substation.

- **Segment 2** is approximately 5 miles in length and extends west from the San Bernardino Junction to Vista Substation and includes the Devers-Vista No. 1 and Devers-Vista No. 2 220 kV transmission lines. The existing structures and existing conductor would be removed and replaced within existing ROW. Proposed work within Segment 2 would include the removal of approximately 29 double-circuit LSTs, 31 miles of conductor, and 5 miles of OHGW. Proposed work would also include the installation of approximately 35 double-circuit LSTs, 4 double-circuit TSPs, 67 miles of new conductor, and 6 miles of new OPGW. The newly rebuilt 220 kV transmission lines in this segment would connect to the existing 220 kV switchrack inside Vista Substation.

- **Segment 3** is approximately 10 miles in length and extends east from the San Bernardino Junction to El Casco Substation and includes the following existing 220 kV transmission lines: Devers-Vista No. 1, Devers-Vista No. 2, El Casco-San Bernardino, and Devers-San Bernardino. The existing structures and existing conductor would be removed and replaced within existing ROW. Proposed work within Segment 3 would include the removal of approximately 34 double-circuit LSTs, 82 single-circuit LSTs 120 miles of conductor, and 50 miles of OHGW. Proposed work would also include the installation of approximately 133 double-circuit LSTs, 264 miles of new conductor, and 22 miles of new OPGW. The newly rebuilt El Casco-San Bernardino 220 kV transmission line in this segment would connect to the existing 220 kV switchrack inside El Casco Substation.

- **Segment 4** is approximately 12 miles in length and extends east from the El Casco Substation to San Gorgonio Avenue in the City of Banning and includes the following existing 220 kV transmission lines: Devers-Vista No. 1, Devers-Vista No. 2, Devers-El Casco, and Devers-San Bernardino. The existing structures and existing conductor would be removed and replaced within existing ROW. Proposed work within Segment 4 would include the removal of approximately 45 double-circuit LSTs, 64 single-circuit LSTs, 54 H-frame structures, one three-pole structure, 144 miles of conductor, and 60 miles of OHGW. Proposed work would also include the installation of approximately 136 double-circuit LSTs, three single-phase wood poles with guys, 320 miles of new conductor, and 26 miles of new OPGW. The newly rebuilt Devers-El Casco 220 kV transmission line in this segment would connect to the existing 220 kV switchrack inside El Casco Substation.

- **Segment 5** is approximately 9 miles in length and extends east from San Gorgonio Avenue in the City of Banning to the eastern limit of the Reservation at Rushmore Avenue and includes the following existing 220 kV transmission lines: Devers-Vista No. 1, Devers-Vista No. 2, Devers-El Casco, and Devers-San Bernardino. Proposed work within Segment 5 would include the removal of approximately 33 double-circuit LSTs, 34 single-circuit LSTs, 65 H-frame structures, 5 TSPs, 108 miles of conductor, and 45 miles of OHGW. Proposed work would also include the installation of approximately 72 LSTs, 36 TSPs, 250 miles of new conductor, and 20 miles of new OPGW.

- **Segment 6** is approximately 8 miles in length and extends east from the eastern limit of the Reservation at Rushmore Avenue to Devers Substation and includes the following existing 220 kV transmission lines: Devers-Vista No. 1, Devers-Vista No. 2, Devers-El Casco, and Devers-San Bernardino. Proposed work within Segment 6 would include the removal of approximately 29 double-circuit LSTs, 31 single-circuit LSTs, 56 H-frame structures, 96 miles of conductor, and 40 miles of OHGW. Proposed work would also include the installation of approximately 93 double-circuit LSTs, 211 miles of new conductor, and 18 miles of new OPGW. The newly rebuilt 220 kV transmission lines in this segment would connect to the existing 220 kV switchrack inside Devers Substation.

3.3. Transmission Structures

The Proposed Project would primarily be constructed on a combination of new 220 kV double-circuit LSTs, double-circuit TSPs, and single-phase TSPs. Each of the proposed 220 kV transmission lines would consist of overhead wires (conductors) that would be supported by LSTs and/or TSPs and would be electrically isolated from the structures by insulators. In addition to the conductors and insulators, the proposed transmission structures would be equipped with overhead ground wires and/or optical fiber ground wires for shielding and/or telecommunication purposes.

Approximately 524 LSTs would be used for the Proposed Project. The footprint for LSTs would range from approximately 20 feet × 20 feet, to 42 feet × 42 feet, and extend approximately 110 feet to 184 feet above ground. Each LST would use approximately 20 to 310 cubic yards of concrete. Each LST would be attached to four concrete foundations that would be approximately 3 feet to 7 feet in diameter and would extend underground approximately 15 feet to 50 feet with up to approximately 4 feet of concrete visible above ground. The typical conductor span length between structures would be approximately 850 feet. The LSTs would be steel structures with a dulled galvanized finish. The vertical distance between conductor arms would be approximately 18.5 feet.

Approximately 40 TSPs would be used for the Proposed Project. The TSPs would be approximately 3 feet to 7 feet in diameter at the base and extend approximately 110 to 200 feet above ground. The TSPs would be attached to concrete foundations that would be approximately 5 feet to 12 feet in diameter and would extend underground approximately 30 feet to 60 feet with up to approximately 4 feet of concrete visible above ground. Each TSP would use approximately 25 cubic yards to 270 cubic yards of concrete. The typical conductor span length of TSPs would be approximately 650 feet between structures. The TSPs would be steel structures with a dulled finish. The vertical distance between conductor arms would be approximately 18.5 feet. While the Proposed Project would primarily utilize double-circuit TSPs, approximately 6 single-phase TSPs could be used for the Proposed Project, depending on final engineering, in order to connect the new construction to the existing San Bernardino Substation 220 kV switchrack.

Approximately 3 wood poles with guys would be used for the Proposed Project. The wood poles would be approximately 2 to 3 feet in diameter at the base and would taper to approximately 1 to 2 feet in diameter at the top of the pole. Wood poles would be buried to a depth of approximately 9 to 12 feet below the ground surface and would extend approximately 60 to 80 feet above ground.

Additionally, various types of temporary structures would be used during the Proposed Project to facilitate construction of the new 220 kV transmission lines. These temporary wood and/or steel structures would function as guard structures and/or shoo-fly structures. These temporary structures would be direct-buried and/or guyed and removed following completion of construction for the particular location.

The approximate dimensions of the structures and dimensions of the auger-drilled foundations of the structures proposed for the WOD project are summarized in Table 1.

Table 1 – Typical Transmission Structure Dimensions

Type of Structure	Proposed Number of Structures	Approximate Height Above Ground	Approximate Pole Diameter	Approximate Foundation Hole Depth	Approximate Foundation Diameter
LST	524	110 ft. – 184 ft.	N/A	15 ft. – 50 ft.	3.0 ft. – 7.0 ft. at each leg
TSP	40*	110 ft. – 200 ft.	3.0 ft. – 7.0 ft.	30 ft. – 60 ft.	5 ft. – 12 ft.
TSP (single phase)	6**	65 ft. – 120 ft.	3.0 ft. – 7.0 ft.	30 ft. – 60 ft.	5 ft. – 12 ft.
Wood Pole with guys (single phase)	3	60 ft. – 80 ft.	2.0 ft. – 3.0 ft.	8 ft. – 12 ft.	4 ft. – 5 ft.

Notes:
Specific structure type, foundation type, quantities, height and spacing would be determined upon final engineering, and would be constructed in compliance with CPUC General Order 95.
* Includes 36 TSPs in Segment 5
** Single-phase TSPs will be located inside San Bernardino Substation.

3.4. Structure Site Preparation

The new structure pad locations and laydown/work areas would first be graded and/or cleared of vegetation as appropriate to provide vegetation-free surface for structure installation. Sites would be graded in such a manner to preclude ponding and to flow in the direction of the natural drainage. In addition, drainage would be designed to preclude ponding and erosive water flows that could cause damage to the structure footings. The graded area would be compacted to be capable of supporting heavy vehicular traffic.

Erection of the structures typically involves establishment of a crane pad. The crane pad would occupy an area of approximately 50 feet by 50 feet and be located adjacent to each applicable structure within the laydown/work area used for structure assembly and erection and would remain for operations and maintenance activities. The pad may be cleared of vegetation and/or graded as appropriate to provide a relatively level surface for crane operation. The decision to use a separate crane pad within the laydown/work areas would be evaluated during final engineering for the Proposed Project and the selection of the appropriate construction methods to be used by SCE or its contractor.

Benching may be needed to provide access for footing construction, assembly, erection, and wire stringing activities during line construction. Benching is a technique in which earth-moving equipment excavates a terraced access to structure locations in steep and rugged terterrain. Benching would also be used on an as-needed basis in areas to provide for the safety of personnel during construction activities.

3.5. Structure Foundation Installation

Structure foundations for each LST would typically consist of four poured-in-place concrete pier footings. Foundations for each TSP would typically consist of a single drilled poured-in-place concrete pier footing. Actual footing diameters and depths for each of the structure foundations would depend on the structure design as well as the soil conditions and topography at each site and would be evaluated during final engineering.

The foundation process begins with the drilling of the holes using truck or track-mounted excavators with various diameter augers to match the design diameter of the structure type. LST foundations typically entail an excavated hole approximately 3 feet to 7 feet in diameter and approximately 15 feet to 50 feet deep; TSPs typically entail an excavated hole approximately 5 feet to 12 feet in diameter and approximately 30 feet to 60 feet deep. On average, each footing for a LST structure would project approximately 1 to 4 feet above ground level; TSP footings would project approximately 1 to 2 feet above ground level within franchise areas and approximately 1 to 4 feet above ground level in uninhabited areas.

The excavated material would be used to backfill excavations from the removal of nearby structures (if any), used in the rehabilitation of existing access roads, or as fill at existing substations. Alternatively, the excavated soil may be disposed at an off-site disposal facility in accordance with applicable laws.

Following excavation of the foundation footings, steel reinforcement cages and stub angles (LSTs) or anchor bolts (TSPs) would be set, survey positioning would be checked, and concrete would then be placed. The steel reinforcement cages may be assembled at staging yards or vendor facilities and delivered to each structure location by flatbed truck or they may be delivered loose and assembled at the job site. Depending upon the type of structure being constructed, soil conditions, and topography at each site, LSTs would include approximately 20 to 310 cubic yards of concrete delivered to each structure location and TSPs would include approximately 25 to 270 cubic yards of concrete delivered to each structure location.

Ground caving is possible along the WOD Project during the drilling of the LST/TSP foundations due to the presence of loose soils and/or shallow groundwater. The use of water, drilling mud and/or casings would be made available to mitigate ground caving and to stabilize the sidewalls from sloughing. Drilling mud (fluid stabilizer) is used during drilling to stabilize the excavations. The concrete for the foundation is then pumped to the bottom of the hole, displacing the mud slurry. Mud slurry brought to the surface is typically collected in a pit adjacent to the foundation and/or vacuumed into a truck to be reused or discarded at an off-site disposal facility in accordance with applicable laws.

During construction, existing commercial concrete supply facilities would be used. Concrete samples would be collected at time of placement and tested to see that engineered strengths were achieved. A normally specified SCE concrete mix typically takes approximately 14 to 28 working days to cure to an engineered strength. Once this strength has been achieved, crews would be permitted to commence erection of the structure.

Conventional construction techniques would generally be used as described above for new foundation installation. Alternative foundation installation methods would be used where conventional methods are not practical. In some cases, equipment and material may be deposited at structure sites using helicopters or by workers on foot, and crews may prepare the foundations using hand labor assisted by hydraulic or pneumatic equipment, or other methods.

3.6. Substations

There are no new substations proposed as part of the WOD Project. Modifications to existing substation equipment would be performed to accommodate continuous and emergency power on the WOD 220 kV transmission lines between Vista, San Bernardino, El Casco, Etiwanda, and Devers Substations. Substation improvements are proposed at the Devers, El Casco, Timoteo, Tennessee, Vista, Etiwanda, and San Bernardino substations. Substation-related work would be conducted within the existing substation walls or fence lines. The proposed substation improvements would not result in changes to access or parking, changes to drainage, or perimeter modifications to walls or fencing at the existing substations. New equipment foundations would be constructed at several existing substation locations, involving grading activities, import and/or export of soil, and import of concrete. A summary of substation soil and concrete quantities is provided in Table 2 Substation Cut/ Fill Grading and Surface Improvements Summary.

Table 2 – Substation Cut/Fill Grading and Surface Improvements Summary

Element	Material	Approximate Surface Area (sq. ft.)	Approximate Volume (cu yd.)
Devers Substation			
Substation equipment foundations, cut	Concrete	1,109	108
Substation equipment foundations, import	Concrete	931	199
Site Fill	Soil	177	-
Site Cut	Soil	-	92
El Casco Substation			
Substation equipment foundations, cut	Concrete	770	43
Substation equipment, import	Concrete	910	51
Site Cut	Soil	140	8

Table 2 – Substation Cut/Fill Grading and Surface Improvements Summary

Element	Material	Approximate Surface Area (sq. ft.)	Approximate Volume (cu yd.)
Vista Substation			
Substation equipment foundations, cut	Concrete	1,109	108
Substation equipment foundations, import	Concrete	931	199
Site Fill	Soil	125	-
San Bernardino Substation			
Substation equipment foundations, cut	Concrete	2,797	322
Substation equipment foundations, import	Concrete	1,558	255
Site Fill	Soil	1,239	57
Timoteo Substation			
Substation equipment foundations, cut	Concrete	68	4
Substation equipment foundations, import	Concrete	60	3
Site Fill	Soil	8	1
Tennessee Substation			
Substation equipment foundations, cut	Concrete	25	2
Substation equipment foundations, import	Concrete	30	2
Site Cut	Soil	5	-

3.7. Access Roads

SCE would construct access roads to facilities it plans to remove and/or construct as part of the Proposed Project. The transmission roads are classified into two groups: access roads and spur roads. Access roads are through roads that run between structure sites and serve as the main transportation route along the ROW. Spur roads branch off from access roads and terminate at one or more structure sites. The typical transmission access road consists of a network of (dirt or paved or both) roads accessed from paved public and private roads.

It is estimated that access to the transmission line ROW for construction activities associated with the Proposed Project would be accomplished by utilizing a network of approximately 130 miles of existing access/spur roads, and constructing approximately 30 miles of new access/spur roads. SCE's existing access roads are located within SCE ROW/easements. New easements would be required for new access/spur roads.

The Proposed Project would utilize, to the extent practical, existing public roads, and existing transmission access roads, including disturbed road shoulders. Construction of new permanent and/or temporary access roads for the Project would occur within existing and newly acquired ROW. With property owner approval, temporary construction activities outside of the ROW may be performed in certain areas. Rehabilitation and/or upgrades to existing access roads may also be involved to facilitate construction access and to support permanent operation and maintenance activities. In some locations, retaining wall-type structures would be installed to minimize extensive grading operations, minimize area of surface disturbance, and/or provide slope stabilization. The extent of access road construction and improvements is dependent upon whether the roads would be used temporarily for construction activities or kept for permanent access for operation and maintenance activities. Land disturbance related to access/spur roads and retaining walls includes temporary construction work areas and permanent areas to be maintained during operations and maintenance.

Typical construction activities associated with rehabilitation of existing dirt access roads include vegetation clearing, blade-grading and re-compacting to remove potholes, ruts, and other surface irregularities in order to provide a smooth dense riding surface capable of supporting heavy construction and maintenance equipment. Existing dirt roads may also involve additional upgrades such as protection for underground utilities and widening existing roads that are too narrow for safe vehicle operation. Repair and stabilization of landslides, washouts, and other slope failures may be appropriate to preclude future slope failures. The type of structure to be utilized would be based on specific site conditions to be evaluated during final engineering.

Typical construction activities associated with new roads generally include activities similar to those described for the rehabilitation of existing dirt roads, but may also include the following additional construction requirements that depend upon the existing land terrain.

- Existing relatively flat terrain approximately 0 to 4 percent grade: Construction activities are generally similar to rehabilitation activities to existing dirt roads and in addition may involve activities such as clearing and grubbing and constructing drainage improvements (wet crossings, water bars, culverts, and the like).

- Existing rolling terrain approximately 5 to 12 percent grade: Construction activities generally include activities typical to flat terrain and in addition may involve activities such as cut and fill in excess of 2 feet depth, benched grading, drainage improvements (v-ditches, downdrains, energy dissipaters, etc.), and slope stability improvements such as retaining walls and/or reinforced earth improvements. The extent of slope stability improvements and structure type is evaluated after site-specific geotechnical investigations and final engineering are performed.

- Existing mountainous terrain over 12 percent grade: Construction activities would include similar activities as rolling terrain construction activities and in addition may involve significant cut and fill depths, benched grading, drainage improvements and slope stability improvements. In some cases, paving of the road may be appropriate.

Generally, dirt access roads would have a minimum 14-foot drivable width with 2 feet of shoulder on each side, as guided by the existing land terrain to accommodate appropriate drainage features. Typically, the drivable road would be widened, generally ranging from an additional 1 to 8 feet along curved sections of the access road. Access road gradients may be modified so that sustained grades generally do not exceed 12 percent. Grades greater than 12 percent would be permitted when such grades do not exceed 40 feet in length and are located more than 50 feet from any other excessive grade. In some instances, SCE may deviate from mitigating grades more than 12 percent.

New spur roads would be constructed similar to how access roads are described above. The new spur roads would typically have circle-type turnaround areas around the structure location. Where a circle-type turnaround is not practical, an alternative turnaround configuration would be constructed to provide safe ingress/egress of vehicles to access the structure location. It is common to use access roads and turnaround areas for structure access, parking, lay-down areas and as a crane pad set-up area during construction activities. In some instances, the turnaround area would remain as a permanent feature.

Temporary construction roads may be involved for construction of the 220 kV transmission portion of the Proposed Project. These roads would be separate from the access and spur roads. These temporary roads would be constructed solely for the purpose of facilitating construction activities when use of existing or proposed permanent roads would not be feasible. Approximately 15 miles of new roads will be used for temporary construction access.

Retaining wall locations are preliminarily assumed to occur within areas identified for proposed grading. For the purposes of the environmental analysis, it is estimated that the project will have approximately 10,400 linear feet of retaining wall structures spread amongst the various project segments. The specific number of retaining wall structures and locations would be identified during final engineering. Retaining walls could average approximately 10 feet in height.

3.8. Removal of Existing Structures/Facilities

Removal of existing LST and TSP structures would involve removal of the structures, conductor, and associated hardware. Existing access roads would be used to access structures, but some rehabilitation and grading may be involved before removal activities would begin to establish temporary crane pads for structure removal. For each structure to be removed, a laydown/work area would be prepared equivalent in size to the type of structure being removed. Most structure removal activities would use the crane pad or other previously disturbed area established for structure installation. If previously disturbed areas adjacent to the structure site are not available, an area would be cleared of vegetation and graded if the ground is not level. The crane would be positioned approximately 60 feet from the LST or TSP location to dismantle the structure. LSTs and TSPs would be dismantled down to the foundations and the materials would be transported to a recycling center. In the event that constructing a crane pad is not feasible, then a helicopter would be utilized for removal of the structure.

Foundations/footings would typically be crushed by mechanical means such as a pneumatic hammer. Footings would be removed to a depth approximately 1 to 2 feet below grade and the holes would be filled with excess soil and smoothed to match the surrounding grade. Footing materials would be transported to a construction yard where they would be prepared for disposal or recycling.

The existing wood poles would be removed once the sub-transmission, distribution, and telecommunication lines are transferred to the new structures. The removal would consist of the above and below-ground portions of the pole. Holes left from removing the poles would be backfilled with spoils that may be available as a result of the excavation for new poles and using imported fill as needed.

4. HYDROLOGIC INVENTORY

The purpose of the water resource inventory was to map, describe, and document existing water resources within the WOD study area. Development of the inventory was based on our review of readily available water resource data and literature pertinent to the Proposed Project. Background documents reviewed are presented in the References section. These include, but are not limited to, the following:

- Climatic data from the Western Regional Climatic Center (WRCC).
- Hydrologic information, groundwater data, and well data from the State of California Department of Water Resources (DWR).
- Federal Emergency Management Agency (FEMA) flood zone maps/data.
- General Plans for the Counties of Riverside and San Bernardino.
- Riverside County Flood Control and Water Conservation District Master Drainage Plans.
- United States Department of Fish and Game National wetland inventory.
- State Water Resources Control Board information and maps.
- Water quality data and standards from the State of California Regional Water Quality Control Boards (RWQCB) plans.
- Topographic maps from the United States Geological Survey (USGS).

To develop the water resources environmental setting for the proposed WOD project, this evaluation has included review of hydrologic and water quality background information and field reconnaissance. A review of hydrological background data and maps, flood zone maps, DWR data, RWQCB plans, and aerial photography was performed to assess the general hydrologic conditions within the project area and underlying the proposed WOD Project and substations. The information and data were compiled and mapped utilizing a geographic information system.

Limited field reconnaissance was performed of portions of Project accessible by vehicle on existing transmission line and other access roads and visible portions of the substation sites to observe general hydrologic site conditions, map pertinent hydrologic features, assess surface land uses and land cover types, and supplement the background literature study for this evaluation.

5. ENVIRONMENTAL SETTING

This section presents a discussion of the hydrologic conditions and water resources in the WOD project area and includes evaluation of the climate and general environmental setting, watersheds and hydrologic basins, floodplains, surface water, wetlands, groundwater and wells, and water quality.

The WOD Project is located in northern Riverside County and southern San Bernardino County. The project study area is generally bounded by the community of North Palm Springs and State Highway 62 on the East. The project area is bounded by Interstate 10 on the south for the portion of the Project east of the City of Beaumont. The foothills of the San Bernardino Mountains bound the north side of the Project east of the City of Beaumont. West of the City of Beaumont, the WOD Project is bounded by the San Timoteo Badlands on the south and San Timoteo Canyon Road on the north. The west end of the Project is bounded by the Santa Ana River and Interstate 10 on the north in the City of Loma Linda; and by the Santa Ana River and Interstate 215 on the west in the City of Grand Terrace (Figure 1). The WOD Project is located within two of California’s hydrologic regions, the Colorado River hydrologic region and the South Coast hydrologic region (DWR, 2012).

Primary physiographic features that the WOD Project traverses include the south part of the San Bernardino Valley, mountainous terrain of the San Timoteo Badlands, the southern flanks of San Timoteo Canyon, the San Gorgonio Pass between the San Bernardino and San Jacinto Mountains, steep foothills of the San Bernardino Mountains, the Whitewater River canyon, and western end of the Coachella Valley.

Segment 1. Segment 1 of the WOD Project extends from the San Bernardino Junction located in the San Timoteo Badlands north into the San Bernardino Valley to the San Bernardino Substation. Elevations along this segment range from approximately 1,800 feet MSL in the steep mountainous terrain to 1,100 feet MSL in the gently sloping valley.

Segment 2. From the San Bernardino Junction to the Vista Substation, Segment 2 of the WOD Project extends westward across the north end of the San Timoteo Badlands and narrow Reche Canyon through areas of moderate to steep terrain at elevations ranging from approximately 1,000 to 1,800 feet MSL. The Vista Substation is situated on an elevated terrace above the Santa Ana River on the west side of Interstate 215 at an elevation of approximately 1,000 feet MSL.

Segment 3. From the San Bernardino Junction to the El Casco Substation, Segment 3 of the WOD Project extends through the mountainous San Timoteo Badlands on the south flank of San Timoteo Canyon and crosses mountainous areas and narrow valleys comprising gentle to steep terrain where elevations range from approximately 1,800 to 2,400 feet MSL.

Segment 4. The El Casco substation at the west end of Segment 4 is located in an area of relatively moderate terrain at an elevation of approximately 2,200 feet MSL. Between the El Casco substation and Beaumont, the WOD Project traverses the north flank of San Timoteo Canyon where existing access roads and tower sites are located on moderate to steep hilly terrain and elevations range from approximately 2,100 to 2,600 MSL. In the Beaumont and Cherry Valley areas, the WOD Project extends across gentle to moderate topographic terrain where elevations range from approximately 2,700 to 2,400 feet MSL. Further east, the WOD Project crosses over the Banning Bench, an elevated topographic mesa, where existing access roads and tower sites are located on gentle to steep gradients with elevations ranging from approximately 2,600 to 3,000 feet MSL.

Segment 5. Segment 5 begins on the east side of the City of Banning and ends on the east side of the Reservation in the San Gorgonio Pass. This segment extends across gentle to moderate topographic gradients in the San Gorgonio Pass north of Banning and Cabazon where elevations gradually descend (west to east) from approximately 2,600 to 1,400 feet MSL.

Segment 6. Segment 6 traverses the foothills of the San Bernardino Mountains where existing access roads and tower sites are located on steep terrain and elevations range from approximately 1,500 to 2,000 feet MSL. The WOD Project extends across the steep-flanked canyon of the Whitewater River where existing towers are sited on each side of the canyon and the conductors span the canyon. The Devers Substation and eastern end of the WOD Project are situated in the western end of the Coachella Valley. This area east of the Whitewater River is generally comprised of relatively gentle to moderate topographic gradients for existing access roads and tower sites. Elevations in this part of the project area range from approximately 1,100 to 1,600 feet MSL. The Devers substation is situated at an elevation of approximately 1,100 feet MSL.

5.1. Climate and General Setting

The WOD project area is located within climatic regions ranging from the arid Coachella Valley desert area to semi-arid inland valley areas. The climate of the WOD study area is generally characterized by hot, dry summers and mild to cold winters. The rainfall season generally occurs in the winter and spring; summer monsoonal storms can occur, typically in August and September. WRCC data from three stations in the WOD study area have been included in our evaluation: the Redlands Station (No. 047306) located near the western portion of the WOD Project; the Beaumont Station (No. 040609) located roughly near the center of the WOD Project; and the Palm Springs Station (No. 046635) located near the eastern portion of the WOD project area (WRCC, 2012).

The climatic record for the Redlands Station includes the period from 1898 to 2012. The annual monthly average temperature is 63.7 degrees Fahrenheit. Temperature ranges have reached a low of approximately 18 degrees Fahrenheit and a high of approximately 118 degrees Fahrenheit. Average annual precipitation at this station is approximately 13.61 inches. The relatively low annual precipitation was recorded in 1961 at approximately 4.86 inches and the relatively high annual precipitation was recorded in 1978 at approximately 27.00 inches (WRCC, 2012).

The climatic record for the Beaumont Station includes the period from 1939 to 2012. The annual monthly average temperature is approximately 61.8 degrees Fahrenheit. Temperature extremes have reached a low of approximately 11 degrees Fahrenheit and a high of approximately 114 degrees Fahrenheit. Average annual precipitation at this station is approximately 17.84 inches. The relatively low annual precipitation was recorded in 1972 at approximately 7.24 inches and the relatively high annual precipitation was recorded in 1993 at approximately 39.41 inches (WRCC, 2012).

The climatic record for the Palm Springs Station includes the period from 1906 to 2011. The annual monthly average temperature is approximately 72.9 degrees Fahrenheit. Temperature extremes have reached a low of approximately 19 degrees Fahrenheit and a high of approximately 123 degrees Fahrenheit. Average annual precipitation at this station is approximately 5.49 inches. The relatively low annual precipitation was recorded in 1999 at approximately 0.76 inches and the relatively high annual precipitation was recorded in 1983 at approximately 13.72 inches (WRCC, 2012).

5.2. Watersheds

A watershed (or hydrologic basin) is the geographic area draining into a river system, ocean, or other body of water through a single outlet, and includes the receiving waters of that system. Watersheds are usually bordered and separated from other watersheds by mountain ridges or other naturally elevated areas, and can contain multiple sub-watersheds. The WOD study area traverses two primary watersheds, the Whitewater Basin and the Santa Ana River Basin, and also crosses a small part of the San Jacinto River Hydrologic Basin (Figure 2).

5.2.1. Whitewater Watershed

DWR Watershed Number/Calwater Watershed Code (181/10719)

The Whitewater watershed encompasses portions of the WOD study area from the Devers Substation west to a topographic drainage divide located between Banning and Beaumont. Much of the City of Banning drains eastward into the San Gorgonio Rivers Sub- watersheds of the Whitewater watershed. The Whitewater River and San Gorgonio River cross the WOD Project and drain eastward into the Whitewater Basin. Potrero Creek and Smith Creek are part of this watershed. The Whitewater Basin drains south-eastward through the Coachella Valley into the Salton Sea. The Whitewater Basin is located within the hydrologic boundary of the larger Colorado River Hydrologic Region, which covers a large drainage area in the southeastern corner of the State.

5.2.2. Santa Ana River Watershed

DWR Watershed Number/Calwater Watershed Code (49/4801)

The Santa Ana River watershed encompasses portions of the WOD study area west of the drainage divide between Banning and Beaumont. Creeks draining into the Beaumont and Cherry Valley area that are tributaries to the San Timoteo Wash drain westward in San Timoteo Canyon to the Santa Ana River in the San Bernardino area. Drainages within the San Timoteo Badlands portion of the WOD project area flow northward into San Timoteo Canyon. Reche Canyon in the west part of the WOD project area drains northward into the Santa Ana River. The Santa Ana River Basin drains areas in the Inland Empire in Riverside and San Bernardino Counties and portion of Orange County. The Santa Ana River generally flows southwestward and drains into the Pacific Ocean.

5.2.3. San Jacinto River Watershed

DWR Watershed Number/Calwater Watershed Code (501/4802)

The San Jacinto watershed encompasses a small portion of the WOD project area in the Beaumont and Cherry Valley area and is located on the drainage divide between the Whitewater and Santa Ana watersheds. Potrero Creek is a primary surface drainage that flows southward across the WOD Project and is within the Potrero Creek Sub- watershed. The Potrero Creek Sub- watershed drains southward into the San Jacinto River.

5.3. Floodplains

A floodplain is a relatively flat geographical area (e.g., a valley floor) adjacent to and formed by alluvial streams and rivers that are occasionally subject to inundation. Functioning floodplains provide flood management, acting as temporary storage of flood water. This storage of water decreases run-off velocity, reduces flood peaks, and distributes storm flows over longer time periods, causing tributary and main channels to peak at different times. Floodplains can also provide important and rich habitats as a result of the associated alluvial and riparian ecosystems.

A 100-year floodplain is an area of land that has a one percent chance of inundation every year, or once every 100 years. The FEMA has estimated and mapped 100-year floodplains in Riverside and San Bernardino Counties. FEMA has categorized 100-year floodplains as potential Flood Hazard Areas, and provided guidelines for construction activities within these areas to comply with floodplain management ordinances.

Potential FEMA 100-year floodplains that cross, or are near the WOD Project have been mapped along the San Timoteo Wash, Santa Ana River, Reche Canyon, Potrero Creek, Smith Creek, San Gorgonio River wash, Millard Canyon, and the Whitewater River canyon, and are shown on Figure 2. Table 3 summarizes the 100-year floodplains by project segment.

Table 3 – FEMA 100-year Floodplains That Cross or are Near the WOD Project[1]

Surface Water Feature	Location
San Timoteo Wash	Segment 1
Santa Ana River	Segment 2
Reche Canyon	Segment 2
Potrero Creek	Segment 4
Smith Creek	Segment 4
San Gorgonio River Wash	Segment 5
Millard Canyon	Segment 5
Whitewater River	Segment 6

[1]FEMA, 2013, 100-year floodplan maps.

5.4. Dam Inundation, Seiche and Tsunami

Based on the Safety Element of the County of Riverside 2003 General Plan, and the Geologic Hazard Overlays of the San Bernardino County Land Use Plan (2009), the WOD Project does not cross areas subject to dam inundation. The WOD Project does not cross a natural or manmade lake or reservoir, and is not subject to inundation from seiche. The Project is elevated approximately 100 feet or more above the El Casco Lakes located on the canyon bottom below the Project. Due to the distance from the Pacific Ocean, the project is not subject to tsunami run-up hazards.

5.5. Mudflows

Mudflows typically occur in areas of steep slopes where underlying earth materials are relatively weak and particularly where sufficient vegetative growth is lacking. Mudflows are typically caused by high incident rainfall or concentrated surface runoff conditions that weaken surficial materials. Mudflows can be caused by construction activities related to weakened earth materials, denudation of vegetation or variations in drainage patterns.

5.6. Surface Water Resources

The WOD project area is located roughly 50 miles or more from the Pacific Ocean. Based on review of background maps, the WOD Project does not cross a natural or manmade lake or reservoir. The Project extends across the south flank of San Timoteo Canyon and is elevated approximately 100 feet or more above the El Casco Lakes located on the canyon bottom below the Project.

Due to seasonal variability in rainfall and climate, many of the rivers and streams in the WOD study area vary between ephemeral, intermittent, and perennial. An ephemeral stream is a stream or reach of channel that flows in response to precipitation in the immediate locality, and whose channel is above the zone of saturation. An intermittent stream is a stream or a reach of a channel which flows during certain times of year; for example, when it receives water from a spring, seep, melting snow-pack from the higher elevations, or other periodic source. A perennial stream or river is a stream, river, or reach of channel that flows throughout the year, and whose upper surface is generally below the upper zone of saturation.

Two major perennial rivers are located near the WOD project area: 1) the Santa Ana River and 2) the Whitewater River. The Santa Ana River is located near the west end of the WOD Project (Segment 2) below the Vista Substation in the Grand Terrace area, and is also located approximately one-half mile north of the San Bernardino Substation. This river originates in the San Bernardino Mountains and flows through San Bernardino, Riverside and Orange counties southwesterly toward the Pacific Ocean. It transports more than 125 million gallons per day of recycled water from Riverside and San Bernardino counties for recharge into the Orange County Groundwater Basin and satisfies approximately 40 percent of Orange County's water demand (SWRCB). The WOD Project crosses the Whitewater River in Segment 6 approximately 4 miles west of the Devers Substation. This river is the major drainage course in the Coachella Valley. There is perennial flow in the mountainous area of the Whitewater River, but because of diversions and percolation into the Whitewater basin, the river becomes dry further downstream (east) of the project area. The constructed downstream extension of the Whitewater River channel known as the Coachella Valley Storm Water Channel, serves as drainage way for irrigation return flows, treated community wastewater, and storm runoff (SWRCB).

The WOD Project crosses ephemeral and intermittent creeks and canyon washes in the undeveloped rural areas of the corridor. The Counties of Riverside and San Bernardino maintain storm drain channels within the urbanized areas of the WOD Project, including areas in the communities of Banning, Beaumont, Loma Linda and Grand Terrace. Table 4 summarizes the locations of the principal rivers, creeks, washes and channels crossed by the segments of the WOD Project. The locations of the primary surface water features are shown on Figure 3.

Table 4 – Surface Water Features Crossed by the WOD Project

Surface Water Feature	Segment	Location
Mission Channel/Zanja Creek	Segment 1	South of San Bernardino Substation
San Timoteo Canyon Wash	Segment 1	Between Loma Linda and San Bernardino Substation

Table 4 – Surface Water Features Crossed by the WOD Project

Surface Water Feature	Segment	Location
Santa Ana River	Segment 2	West of the WOD Project below the Vista Substation in Grand Terrace, and one-half mile north of the San Bernardino Substation
Reche Canyon	Segment 2	Between Loma Linda and Grand Terrace
Various canyon creek drainages	Segment 3	San Timoteo Badlands
San Timoteo Canyon Wash	Segment 4	Between Beaumont and San Timoteo Badlands
Little San Gorgonio Creek	Segment 4	Beaumont
Noble Creek	Segment 4	Beaumont
Marshall Creek Channel [1]	Segment 4	Beaumont
Highland Springs Channel [1]	Segment 4	Between Banning and Beaumont
Smith Creek Channel [1]	Segment 4	West of Banning
West Pershing Channel [1]	Segment 4	West of Banning
Montgomery Creek	Segment 4	Banning Bench (North of Banning)
San Gorgonio River	Segment 5	East of Banning
Hathaway Creek	Segment 5	East of Banning
Potrero Creek	Segment 5	Between Cabazon and Banning
Millard Canyon	Segment 5	Cabazon
Whitewater River	Segment 6	4 miles west of Devers Substation

Notes:
[1] Riverside County Flood Control and Water Conservation District, 1983, Master Drainage Plans.

5.7. Wetlands

The U.S. Environmental Protection Agency defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soils. Wetlands generally include swamps, marshes, bogs and similar areas.” According the U.S. Fish and Wildlife Service National Wetlands Inventory (FWS, 2012), the WOD Project crosses through two wetland areas classified as riverine wetlands. The riverine wetlands crossed by the Project are located in the Noble Creek channel in the city of Beaumont (Segment 4), and in the San Gorgonio River channel northeast of the city of Banning (Segment 5).

5.8. Groundwater Resources

The proposed WOD Project crosses two groundwater basins and seven groundwater sub-basins designated by the DWR. The eastern portion of the WOD Project is situated in the Coachella Valley Groundwater Basin, and extends across the San Gorgonio Pass, Indio, and Mission Creek subbasins. The western portion of the WOD Project is situated in the Upper Santa Ana Valley Groundwater Basin and extends across the Riverside-Arlington, Rialto-Colton, Bunker Hill, and San Timoteo subbasins (DWR Groundwater Bulletin 118). Groundwater basins and subbasins that the WOD project crosses are described in further detail below.

A statewide groundwater elevation monitoring program tracks seasonal and long-term trends in groundwater elevations in California's groundwater basins by collecting and evaluating depth-to-water measurements in wells operated by local entities. This data is provided to the DWR and maintained on a public database called the Water Data Library. The groundwater elevation data that are provided in this database are important information used toward improving the management of California's groundwater resources (DWR, 2003). Depth-to-water measurements in wells located near the WOD project area that are monitored by the USGS are presented in Table 5.

Table 5 – Wells and Groundwater Levels Near the WOD Project Area

Well Number*	Groundwater Basin	Depth-to-Water Measurements (feet) (date)		
		Low	High	Recent
01S05W36C011S0	Santa Ana River	55.2 (10/30/2007)	48.6 (04/20/2005)	51.5 (04/15/2008)
01S04W29K004S	Riverside-Arlington	68.0 (12/22/2004)	16.0 (07/27/2005)	62.0 (07/22/2008)
01S04W29H005S	Riverside-Arlington	77.7 (12/22/2004)	69.2 (07/11/2006)	73.5 (07/22/2008)
01S04W27M001S	Rialto-Colton	127.8 (08/11/2008)	103.1 (10/26/2005)	127.8 (08/11/2008)
01S04W21N001S	Rialto-Colton	191.7 (12/19/1959)	28.8 (04/24/1943)	55.9 (04/12/1988)

Table 5 – Wells and Groundwater Levels Near the WOD Project Area

Well Number*	Groundwater Basin	Depth-to-Water Measurements (feet) (date)		
		Low	High	Recent
01S04W26F001S	Bunker Hill	111.8 (11/2/1962)	6.0 (08/22/1931)	102.3 (06/30/1988)
01S04W25E005S	Bunker Hill	133.8 (08/11/2008)	108.9 (04/19/2006)	133.8 (08/11/2008)
01S03W19L001S	Bunker Hill	179.8 (04/16/2008)	149.4 (04/19/2005)	179.8 (04/16/2008)
01S03W19G002S	Bunker Hill	224.7 (07/01/1966)	14.9 (03/30/1945)	112.2 (04/12/2000)
01S03W17H001S	Bunker Hill	204.5 (02/28/1963)	49.3 (04/28/1941)	130.7 (04/12/2000)
01S03W31A003S	Bunker Hill	237.8 (11/24/1964)	64.9 (03/28/1945)	201.3 (04/16/2008)
01S03W33C001S	Bunker Hill	159.8 (11/27/1991)	73.8 (03/28/1945)	154.3 (04/16/2008)
01S03W35G005S	Yucaipa	163.3 (09/29/1956)	0.1 (01/02/1943)	17.0 (04/16/2008)
02S03W02L001S	Yucaipa	273.1 (09/25/1967)	240.3 (04/13/2008)	240.3 (04/13/2008)
02S02W18N001S	San Timoteo	212.1 (10/29/1992)	97.5 (04/19/2005)	105.2 (04/17/2008)
02S02W16A001S	San Timoteo	233.7 (06/09/1998)	231.3 (05/17/2006)	233.5 (04/29/2008)
02S02W24N002S	San Timoteo	176.3 (11/05/2007)	102.0 (04/26/1999)	157.1 (04/28/2008)
02S02W25D001S	San Timoteo	151.5 (11/06/2007)	15.0 (03/01/1927)	128.7 (04/28/2008)
02S02W25D002S	San Timoteo	96.6 (11/06/2007)	50.9 (04/27/1999)	84.8 (04/28/2008)
02S02W25P001S	San Timoteo	193.0 (03/15/1949)	81.0 (02/28/1957)	111.8 (04/25/2005)
02S01W29M002S	San Timoteo	366.3 (04/28/2008)	354.7 (04/25/2005)	366.3 (04/28/2008)
02S01W33L001S	San Timoteo	366.4 (04/29/2008)	305.0 (03/28/1989)	366.4 (04/29/2008)
02S01W30E003S	San Timoteo	194.7 (04/28/2008)	150.0 (04/03/1963)	194.7 (04/28/2008)
02S01W30L001S	San Timoteo	187.2 (11/05/2007)	108.0 (04/02/1946)	187.2 (11/05/2007)
02S01W29G005S	San Timoteo	439.7 (04/28/2008)	395.0 (05/16/2006)	439.7 (04/28/2008)
02S01W32B001S	San Timoteo	384.0 (05/01/2007)	350.0 (06/18/1991)	384.0 (05/01/2007)
02S01W33M001S	San Timoteo	338.0 (09/30/1993)	305.0 (02/15/1989)	338.0 (10/25/1999)

Table 5 – Wells and Groundwater Levels Near the WOD Project Area

Well Number*	Groundwater Basin	Depth-to-Water Measurements (feet) (date)		
		Low	High	Recent
02S01W33R002S	San Timoteo	402.1 (04/28/2008)	383.6 (04/26/2005)	402.1 (04/28/2008)
03S01W01N001S	San Timoteo	375.8 (07/06/1973)	289.0 (09/04/1951)	367.5 (04/26/1999)
02S01W34A002S	San Timoteo	680.6 (05/02/2007)	577.2 (12/01/2005)	612.3 (04/29/2008)
03S01E06M001S	San Gorgonio Pass	376.9 (11/08/1984)	320.7 (11/29/1958)	367.8 (04/28/1999)
03S01E06N001S	San Gorgonio Pass	402.1 (11/08/2007)	385.6 (04/27/2005)	401.6 (04/30/2008)
03S01E08M001S	San Gorgonio Pass	512.5 (04/30/2008)	494.8 (04/28/1999)	512.5 (04/30/2008)
03S01E04A001S	San Gorgonio Pass	114.0 (01/24/1986)	37.0 (01/07/1984)	83.7 (04/30/2008)
03S01E03C002S	San Gorgonio Pass	162.9 (05/01/2008)	109.2 (04/27/2005)	162.9 (05/01/2008)
02S01E25R001S	San Gorgonio Pass	52 (12/09/1976)	42.8 (5/31/1980)	47.0 (12/21/1984)
03S02E07P003S	San Gorgonio Pass	429.2 (05/01/2008)	405.9 (02/22/2007)	429.2 (05/01/2008)
03S02E07K001S	San Gorgonio Pass	449.7 (11/07/2007)	442.9 (05/19/2006)	449.7 (11/07/2007)
03S02E15P001S	San Gorgonio Pass	341.5 (09/17/2008)	337.6 (01/29/2009)	337.6 (01/29/2009)
03S03E07D001S	San Gorgonio Pass	449.6 (05/02/2008)	439.7 (11/30/2005)	449.6 (05/02/2008)
03S03E07M001S	San Gorgonio Pass	293.5 (04/27/2005)	282.3 (11/30/2005)	284.7 (05/02/2008)
03S04E20D001S	Indio	554.5 (03/14/1978)	151.0 (04/28/1987)	407.7 (04/20/1992)
03S04E20F003S	Indio	494.2 (09/25/1979)	153.7 (04/29/1987)	362.7 (04/21/2008)
03S03E08A001S	Mission Creek	317.7 (11/07/2007)	297.3 (11/30/2005)	317.7 (11/07/2007)

*Well monitored by the U. S. Geological Survey.

5.8.1. Upper Santa Ana Valley Groundwater Basin (Groundwater Basin Number 8-2)

5.8.1.1. Riverside-Arlington Subbasin (Groundwater Basin Number 8-2.03)

The Riverside-Arlington Groundwater Subbasin drains a surface area of approximately 58,600 acres (92 square miles). This subbasin is bounded by impermeable rocks of Box Springs Mountains on the southeast, Arlington Mountain on the south, La Sierra Heights and Mount Rubidoux on the northwest, and the Jurupa Mountains on the north. The northeast boundary is formed by the Rialto-Colton fault, and a portion of the northern boundary is a groundwater divide beneath the community of Bloomington (DWR, 2003).

The Riverside-Arlington Groundwater Subbasin is replenished by infiltration from the Santa Ana River, underflow past the Rialto-Colton fault, intermittent underflow from the Chino Subbasin, return irrigation flow, and deep percolation of precipitation (DWR, 2003). Storage capacity of this Subbasin is approximately 243,000 acre feet. USGS wells near the portion of the WOD project that crosses the Riverside-Arlington Groundwater Subbasin show recent depth-to-water measurements range between approximately 62 feet and 74 feet (Table 5).

5.8.1.2. Rialto-Colton Subbasin (Groundwater Basin Number 8-2.04)

The Rialto-Colton Groundwater Subbasin drains a surface area of approximately 30,100 acres (47 square miles). This subbasin is bounded by the San Gabriel Mountains on the north, the San Jacinto fault on the east, the Box Spring Mountains on the south, and the Rialto-Colton fault on the west (DWR, 2003).

The principal recharge areas of the Rialto-Colton Groundwater Subbasin are Lytle Creek in the northwest, Reche Canyon in the southeast, and the Santa Ana River in the south-central part of the subbasin. Lesser amounts of recharge are provided by percolation of precipitation to the valley floor, underflow from fractured basement rock, underflow through the San Jacinto fault in younger Santa Ana River deposits, and irrigation and septic returns (DWR, 2003). Storage capacity of this subbasin is approximately 210,000 acre feet. USGS wells near the portion of the WOD project that crosses the Rialto-Colton Groundwater Subbasin show recent depth-to-water measurements range between approximately 56 feet and 128 feet (Table 5).

5.8.1.3. Bunker Hill Subbasin (Groundwater Basin Number 8-2.05)

The Bunker Hill Groundwater Subbasin drains a surface area of approximately 89,600 acres (120 square miles). This subbasin is bounded by contact with consolidated rocks of the San Gabriel Mountains, San Bernardino Mountains, and Crafton Hills, and by several faults. The southern boundary is defined by the Banning fault, the east boundary is the Redlands fault, the northern boundary is the San Andreas fault, the northwestern boundary is the Glen Helen fault, and the southwest boundary is the San Jacinto fault (DWR, 2003).

The Bunker Hill Groundwater Subbasin is replenished by infiltration of runoff from the San Gabriel and San Bernardino Mountains. Recharge is provided by the Santa Ana River, Mill Creek, and Lytle Creek. Lesser amounts of recharge are provided by Cajon Creek, San Timoteo Creek, creeks flowing southward out of the San Bernardino Mountains, deep percolation of water from precipitation and resulting runoff, percolation from delivered water, and water spread in streambeds and spreading grounds (DWR, 2003). Storage capacity of this subbasin is approximately 5,976,000 acre feet. USGS wells near the portion of the WOD project that crosses the Bunker Hill Groundwater Subbasin show recent depth-to-water measurements range between approximately 102 feet and 201 feet (Table 5).

5.8.1.4. San Timoteo Subbasin (Groundwater Basin Number 8-2.08)

The San Timoteo Groundwater Subbasin drains a surface area of approximately 73,100 acres (114 square miles). This subbasin is bounded to the north and northeast by the Banning fault and impermeable rocks of the San Bernardino Mountains, Crafton Hills, and Yucaipa Hills, on the south by the San Jacinto fault, on the west by the San Jacinto Mountains, and on the east by a topographic drainage divide with the Colorado River Hydrologic Region (DWR, 2003).

The San Timoteo Groundwater Subbasin is replenished by subsurface inflow and percolation of precipitation, runoff, and imported water. Runoff and imported water are delivered to streambeds and spreading grounds for percolation (DWR, 2003). Storage capacity of this subbasin is approximately 2,010,000 acre feet. USGS wells near the portion of the WOD project that crosses the San Timoteo Groundwater Subbasin show recent depth-to-water measurements range between approximately 85 feet and 612 feet (Table 5).

5.8.2. Coachella Valley Groundwater Basin (Groundwater Basin Number 7-21)

5.8.2.1. San Gorgonio Pass Subbasin (Groundwater Basin Number 7-21.04)

The San Gorgonio Pass Groundwater Subbasin drains a surface area of approximately 38,650 acres (60 square miles). This subbasin is bounded on the north by the San Bernardino Mountains and by semi-permeable rocks, and on the south by the San Jacinto Mountains. A surface drainage divide between the Colorado River and South Coastal Hydrologic Regions bounds the subbasin on the west. The eastern boundary is formed by a bedrock constriction that creates a groundwater cascade into the Indio Subbasin (DWR, 2003).

Precipitation and streamflow account for a relatively small percentage of the groundwater recharge to the San Gorgonio Pass Groundwater Subbasin. Agricultural return and wastewater effluent also contribute to the recharge of groundwater to the subbasin (DWR, 2003). Storage capacity of this subbasin is estimated at approximately 2,200,000 acre feet. USGS wells near the portion of the WOD project that crosses the San Gorgonio Pass Groundwater Subbasin show recent depth-to-water measurements range between approximately 47 feet and 513 feet (Table 5).

5.8.2.2. Indio Subbasin (Groundwater Basin Number 7-21.01)

The Indio Groundwater Subbasin drains a surface area of approximately 336,000 acres (525 square miles). The Banning fault and the semi-permeable rocks of the Indio Hills bound the subbasin on the north and northeast. Impermeable rocks of the San Jacinto and Santa Rosa Mountains bound the subbasin on the south. A bedrock constriction separates the Indio Subbasin from the San Gorgonio Pass Subbasin on the northwest. The Salton Sea is the eastern boundary and the subbasin's primary discharge area. A low drainage divide forms a short boundary with the West Salton Sea Groundwater Basin in the southeast (DWR, 2003).

The Indio Groundwater Subbasin is significantly replenished by surface runoff and subsurface inflow. Other subbasin recharge contributors include the Whitewater River spreading grounds northwest of Palm Springs which receives Colorado River Aqueduct water, and Colorado River water that is conveyed into the subbasin via the Coachella Canal (DWR, 2003). Storage capacity of this subbasin is approximately 29,800,000 acre feet. USGS wells near the portion of the WOD project that crosses the Indio Groundwater Subbasin show recent depth-to-water measurements range between approximately 363 feet and 408 feet (Table 5).

5.8.2.3. Mission Creek Subbasin (Groundwater Basin Number 7-21.02)

The Mission Creek Groundwater Subbasin drains a surface area of approximately 49,000 acres (76 square miles). The subbasin is bounded by the impermeable rocks of the San Bernardino Mountains on the west and the Banning fault on the south. The northern and eastern parts of the subbasin are bounded by the Mission Creek fault. The Indio Hills bound the subbasin on the southeast (DWR, 2003).

The Mission Creek Groundwater Subbasin is replenished by runoff from creeks and rivers from the surrounding highland. The subbasin is also recharged from subsurface leakage that occurs across the Mission Creek Fault from the neighboring Desert Hot Springs Groundwater Subbasin (DWR, 2003). Storage capacity of this subbasin is approximately 2,600,000 acre feet. There is one USGS well near the portion of the WOD project that crosses the Mission Creek Groundwater Subbasin. Recent depth-to-water measurement at this well recorded a groundwater measurement of approximately 318 feet (Table 5).

5.9. Water Quality

Water quality is gauged by the physical, chemical, and biological characteristics of water in respect to its suitability for a particular purpose. California's water quality standards are found in the Water Quality Control Plans (also known as Basin Plans) adopted by the State of California Water Resources Control Board and the nine RWQCBs. Each RWQCBs develops a specified regional Water Quality Control Plan which establishes water quality objectives for the reasonable protection of beneficial uses of a particular body of water. The WOD Project is located within the jurisdiction of the Colorado and Santa Ana RWQCB's.

The Colorado RWQCB has jurisdiction over areas in the Colorado River hydrologic region and Whitewater watershed; and the Santa Ana RWQCB has jurisdiction over areas in the South Coast hydrologic region and Santa Ana and San Jacinto watersheds. Surface water and groundwater quality objectives for the WOD study area are described in the Colorado River Basin Region Water Quality Control Plan and Santa Ana River Basin Region Water Quality Control Plan. Additional groundwater quality objectives are described in California's Groundwater Bulletin 118.

Beneficial uses of water may be consumptive or non-consumptive. Consumptive uses include municipal, industrial, and irrigation uses that consume water and cause the depletion of water supply. Non-consumptive uses include activities such as swimming, boating, fishing, hydropower generation, and other uses that do not significantly deplete supply (RWQCB, 2006; RWQCB, 2008). Beneficial uses of water near the WOD study area are listed in Tables 7 and 8 in the following sections. These beneficial uses include Municipal and Domestic Supply (MUN), Agricultural Supply (AGR), Industrial Process Supply (PROC), Freshwater Replenishment (FRSH), Industrial Service Supply (IND), Ground Water Recharge (GWR), Water Contact Recreation (REC-1), Non-contact Water Recreation

(REC-2), Warm Freshwater Habitat (WARM), Cold Freshwater Habitat (COLD), Wildlife Habitat (WILD), Hydropower Generation (POW), Rare, Threatened, or Endangered Species (RARE).

5.9.1. Surface Water Quality

The State Water Quality Control Board's 2010 Integrated Report (CWA Sections 303(d) List/305(b) Report) contains recent listings of impaired water bodies within the State. Based on the report, Reach 4 of the Santa Ana River is listed as impaired for pathogens (RWQCB, 2010). No other water bodies within the Project Study area are listed.

Surface water bodies near the WOD project with designated beneficial uses are listed in Table 6.

Table 6 – Beneficial Uses of Water Bodies Near the WOD Project Area

Water Body	Beneficial Uses												
	MUN	**AGR**	**PROC**	**FRSH**	**IND**	**GWR**	**REC1**	**REC2**	**WARM**	**COLD**	**WILD**	**POW**	**RARE**
Santa Ana Regional Water Quality Control Board													
Santa Ana River (Reach 4)	+					X	X	X	X		X		
San Timoteo Creek (Reach 3)	+					X	X	X	X		X		
Little San Gorgonio Creek	X					X	X	X		X	X		
Other Tributaries to San Timoteo Creek (Valley Reaches)	I					I	I	I	I		I		
Other Tributaries to San Timoteo Creek (Mountain Reaches)	I					I	I	I		I	I		
Colorado River Regional Water Quality Control Board													
Hathaway Creek	X	X				X	X	X	X		X		
Millard Canyon Creek	X	X				X	X	X	X		X		
Potrero Creek	X	X				X	X	X	X		X		
San Gorgonio River	X	X				X	X	X		X	X		
Whitewater River	X	X				X	X	X	I	X	X	X	
Unlisted Perennial and Intermittent Streams	X			I/X		I/X	I/X	I/X	I/X		I/X		I/X
Washes (Ephemeral Streams)				I		I		I			I		

Notes:
X – Present or potential beneficial use, I – Intermittent beneficial use, + – Excepted from MUN
MUN - Municipal and Domestic Supply, AGR - Agricultural Supply, PROC - Industrial Process Supply, FRSH - Freshwater Replenishment, IND - Industrial Service Supply, GWR - Ground Water Recharge, REC-1 - Water Contact Recreation, REC-2 - Non-contact Water Recreation, WARM - Warm Freshwater Habitat, COLD - Cold Freshwater Habitat, WILD - Wildlife Habitat, POW - Hydropower Generation, and RARE - Rare, Threatened, or Endangered Species.

Each Regional Board has developed water quality objectives for various categories that may affect water quality in the region. Table 7 lists surface water quality objectives presented in the Santa Ana Region and Colorado River Region Water Quality Control Plans. Details regarding the water quality objectives are presented in the Water Quality Objectives chapters of the plans.

Table 7 – Surface Water Quality Objectives

	Santa Ana RWQCB Water Quality Objective	Colorado River RWQCB Water Quality Objective
Aesthetic Qualities	Waste discharges shall not result in coloration of the receiving waters which causes a nuisance or adversely affects beneficial uses. The natural color of fish, shellfish or other resources used for human consumption shall not be impaired. Waste discharges shall not contain floating materials, including solids, liquids, foam or scum, which can cause a nuisance or adversely affect beneficial uses.	Shall be free from substances attributable to wastewater of domestic or industrial origin or other discharges which adversely affect beneficial uses not limited to settling to form objectionable deposits; floating as debris, scum, grease, oil, wax, or other matter; and producing objectionable color, odor, taste or turbidity.
Algae	Waste discharges shall not contribute to excessive algal growth in surface receiving waters.	--
Ammonia (Un-ionized)	Discharges shall not cause the concentration of un-ionized ammonia (as nitrogen) to exceed 0.098 mg/L (NO3– N) as a 4-day average.	--
Bacteria (E. Coli)	Not to exceed a geometric mean of 200/100 ml (REC-1) or 2000/100 ml (REC-2) for not less than 5 samples equally spaced during a 30-day period. Not more than 10% of samples may exceed 400/100 ml (REC-1) or 4000/100 ml (REC-2).	Not to exceed a geometric mean of 126/100 ml (REC-1) or 630/100 ml (REC-2) for not less than 5 samples equally spaced during a 30-day period. No sample shall exceed 400/100 ml (REC-1) or 2000/100 ml (REC-2).
Bacteria (Enterococci)	--	Not to exceed a geometric mean of 33/100 ml (REC-1) or 165/100 ml (REC-2) for not less than 5 samples equally spaced during a 30-day period. No sample shall exceed 100/100 ml (REC-1) or 500/100 ml (REC-2).

Table 7 – Surface Water Quality Objectives

	Santa Ana RWQCB Water Quality Objective	Colorado River RWQCB Water Quality Objective
Biochemical Oxygen Demand (BOD)	Waste discharges shall not result in increases in BOD levels which exceed values listed in Chapter 4 or which adversely affect beneficial uses.	--
Biostimulatory Substances	--	Shall not occur in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.
Boron	Boron concentrations shall not exceed 0.75 mg/L as a result of controllable water quality factors.	--
Chemical Constituents	--	Shall not contain concentrations in amounts that adversely affect beneficial uses. There shall be no increase in hazardous chemical concentrations found in bottom sediments or aquatic life. Concentration limits of specific constituents are listed in Chapter 3.
Chlorine, Residual	To protect aquatic life, the chlorine residual in wastewater discharged to surface water shall not exceed 0.1 mg/L.	--
Fluoride	Fluoride concentrations shall not exceed 0.7 – 1.2 mg/L (varying with temperature) in MUN surface waters as a result of controllable water quality factors.	--
Hardness	The hardness of MUN receiving waters shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.	--
Metals	Chapter 4 includes specific water quality objectives for metals.	--
Methylene Blue Activated Substances (MBAS)	MBAS concentrations shall not exceed 0.05 mg/L in MUN surface waters as a result of controllable water quality factors.	--
Nitrate	Nitrate-nitrogen concentrations shall not exceed 45 mg/L (as NO_3) or 10 mg/L (as N) in MUN surface waters as a result of controllable water quality factors.	--

Table 7 – Surface Water Quality Objectives

	Santa Ana RWQCB Water Quality Objective	Colorado River RWQCB Water Quality Objective
Nitrogen, Total Organic	Chapter 4 includes specific water quality objectives for nitrogen.	--
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other material in concentrations that result in a visible film or in coating objects in the water, or which cause a nuisance or adversely affect beneficial uses.	Shall not contain oils, greases, or waxes in concentrations that cause nuisance or adversely affect beneficial uses.
Oxygen, Dissolved	The dissolved oxygen content of surface waters shall not be depressed below: WARM - 5 mg/L, or COLD – 6 mg/L as a result of controllable water quality factors. In addition, waste discharges shall not cause the median dissolved oxygen concentration to fall below 85% of saturation or the 95th percentile concentration, or fall below 75% of saturation within a 30-day period.	The dissolved oxygen concentration shall not be reduced below the following minimum levels at any time: WARM - 5 mg/L COLD - 8 mg/L WARM & COLD - 8 mg/L
Pesticide Wastes	--	The discharge of pesticidal wastes from pesticide manufacturing processing or cleaning operations to any surface water is prohibited.
pH	The pH of surface waters shall not be raised above 8.5 or depressed below 6.5 as a result of controllable water quality factors.	Since the regional waters are somewhat alkaline, pH shall range from 6.0-9.0. Discharges shall not cause any changes in pH detrimental to beneficial water uses.
Radioactivity	Radioactive materials shall not be present in the waters of the region in concentrations which are deleterious to human, plant or animal life. Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations in excess of those limits specified in the California Code of Regulations, Title 22, Chapter 15, Article 5, Section 64443.	Radionuclides shall not be present in waters in concentrations which are deleterious to human, plant or aquatic life, or that result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant or aquatic life. Waters designated for use as MUN shall not contain concentrations in excess of those limits specified in the California Code of Regulations, Title 22, Chapter 15, Article 5, Section 64443.
Sediment	--	The suspended sediment load and suspended sediment discharge rate shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Table 7 – Surface Water Quality Objectives

	Santa Ana RWQCB Water Quality Objective	Colorado River RWQCB Water Quality Objective
Sodium	Chapter 4 includes specific water quality objectives for sodium.	--
Solids - Suspended or Settleable Materials	Surface waters shall not contain suspended or settleable solids in concentrations which cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors.	Discharges of wastes or wastewater shall not contain suspended or settleable solids in concentrations which increase the turbidity of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in turbidity does not adversely affect beneficial uses.
Solids - Total Dissolved	The dissolved mineral content of the waters in the region shall not exceed specific objectives listed in Table 4-1, Chapter 4, as a result of controllable water quality factors.	Discharges of wastes or wastewater shall not increase the total dissolved solids content of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such increase in total dissolved solids does not adversely affect beneficial uses.
Sulfate	Chapter 4 includes specific water quality objectives for sulfate.	--
Sulfides	The dissolved sulfide content of surface waters shall not be increased as a result of controllable water quality factors.	--
Surfactants	Waste discharges shall not contain concentrations of surfactants which result in foam in the course of flow or use in the receiving water, or which adversely affect aquatic life.	--
Tainting Substances	--	Water shall be free of unnatural materials which individually or in combination produce undesirable flavors in the edible portions of aquatic organisms.
Taste and Odor	Surface waters in the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations which cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish or other resources used for human consumption shall not be impaired.	Shall be free from substances which producing objectionable color or odor.

Table 7 – Surface Water Quality Objectives

	Santa Ana RWQCB Water Quality Objective	Colorado River RWQCB Water Quality Objective
Temperature	The natural receiving water temperature of surface waters shall not be altered by discharges of waste unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. As a result of controllable water quality factors, the temperature of water designated as COLD shall not be increased by more than 5° F; the temperature of water designated as WARM shall not be raised above 90° F June through October or above 78° F during the rest of the year; and lake temperatures shall not be raised more than 4° F above established normal values.	The natural receiving water temperature of surface waters shall not be altered by discharges of waste unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.
Toxicity	Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health. The concentrations of contaminants in waters which are existing or potential sources of drinking water shall not occur at levels that are harmful to human health. The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.	Waters shall not contain toxic substances in concentrations that are toxic to, or produce detrimental physiological responses in human, plant, animal, or aquatic life.
Turbidity	Waters of the region shall be free of changes in turbidity that adversely affect beneficial uses. Increases in turbidity which result from controllable water quality factors shall comply with guidelines in Chapter 4.	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

5.9.2. Groundwater Quality

Groundwater supplies near the WOD project with designated beneficial uses are listed in Table 8.

Table 8 – Beneficial Uses of Groundwater Near the WOD Project Area

Water Body	Beneficial Uses			
	MUN	**AGR**	**PROC**	**IND**
Santa Ana Regional Water Quality Control Board				
Rialto Groundwater Management Zone	X	X	X	X
Bunker Hill Groundwater Management Zone	X	X	X	X
Beaumont Groundwater Management Zone	X	X	X	X
San Timoteo Groundwater Management Zone	X	X	X	X
Riverside Groundwater Management Zone	X	X	X	X
Colorado River Regional Water Quality Control Board				
Coachella Groundwater Hydrologic Subunit	X	X		X
San Gorgonio Groundwater Hydrologic Subunit	X	X		X

Notes:
X – Present or potential beneficial use, I – Intermittent beneficial use, + – Excepted from MUN
MUN - Municipal and Domestic Supply, AGR - Agricultural Supply, PROC - Industrial Process Supply, IND - Industrial Service Supply.

Each Regional Board has developed water quality objectives for various categories that may affect groundwater quality in the region. Table 9 lists groundwater quality objectives presented in the Santa Ana Region and Colorado River Region Water Quality Control Plans. Details regarding the water quality objectives are presented in the Water Quality Objectives chapters of the plans.

Table 9 – Groundwater Quality Objectives

	Santa Ana RWQCB Water Quality Objective	Colorado River RWQCB Water Quality Objective
Aesthetic Qualities	Waste discharges shall not result in coloration of the receiving waters which causes a nuisance or adversely affects beneficial uses.	--
Arsenic	Arsenic concentration shall not exceed 0.05 mg/L in MUN groundwater as a result of controllable factors.	--
Bacteria (Coliform)	Total coliform numbers shall not exceed 2.2/100 ml over any 7-day period in MUN groundwater as a result of controllable factors.	In MUN groundwater, the concentration of coliform organisms shall not exceed limits specified in the California Code of Regulations, Title 22, Chapter 15, Article 3.
Barium	Barium concentrations shall not exceed 1.0 mg/L in MUN groundwater as a result of controllable factors.	--
Boron	Boron concentrations shall not exceed 0.75 mg/L in groundwater of the region as a result of controllable factors.	--
Chloride	Chloride concentrations shall not exceed 500 mg/L in MUN groundwater of the region as a result of controllable factors.	--
Cyanide	Cyanide concentrations shall not exceed 0.2 mg/L in MUN groundwater as a result of controllable factors.	--
Fluoride	Fluoride concentrations shall not exceed 1.0 mg/L in MUN groundwater as a result of controllable water quality factors.	--
Hardness	The hardness of MUN receiving waters shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.	--
Metals	Chapter 4 includes specific water quality objectives for metals.	--
Methylene Blue Activated Substances (MBAS)	MBAS concentrations shall not exceed 0.05 mg/L in MUN groundwater as a result of controllable water quality factors.	--

Table 9 – Groundwater Quality Objectives

	Santa Ana RWQCB Water Quality Objective	**Colorado River RWQCB Water Quality Objective**
Nitrate	Nitrate-nitrogen concentrations listed in Chapter 4 shall not be exceeded as a result of controllable water quality factors.	--
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other material in concentrations which cause a nuisance or adversely affect beneficial uses.	--
pH	The pH of groundwater shall not be raised above 9 or depressed below 6 as a result of controllable water quality factors.	--
Radioactivity	Radioactive materials shall not be present in the waters of the region in concentrations which are deleterious to human, plant or animal life. Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations in excess of those limits specified in the California Code of Regulations, Title 22, Chapter 15, Article 5, Section 64443.	Groundwater designated for use as MUN shall not contain radioactive material in excess of those limits specified in the California Code of Regulations, Title 22, Chapter 15, Article 5, Section 64441 and 64443.
Sodium	Sodium concentration shall not exceed 180 mg/L in MUN groundwater as a result of controllable water quality factors. Groundwater designated AGR shall not exceed a sodium absorption rate (SAR) of 9 as a result of controllable water quality factors.	--
Solids - Total Dissolved	The dissolved mineral content of the waters in the region shall not exceed specific objectives listed in Table 4-1, Chapter 4, as a result of controllable water quality factors.	Discharges of wastes or wastewater shall not increase the total dissolved solids content of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such increase in total dissolved solids does not adversely affect beneficial uses.
Sulfate	Sulfate concentrations shall not exceed 500 mg/L in MUN groundwater of the region as a result of controllable factors.	--

Table 9 – Groundwater Quality Objectives

	Santa Ana RWQCB Water Quality Objective	Colorado River RWQCB Water Quality Objective
Taste and Odor	Groundwater in the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations which cause a nuisance or adversely affect beneficial uses.	Groundwater for use as MUN supply shall not contain taste- or odor-producing substances in concentrations that adversely affect beneficial uses as a result of human activity.
Toxicity	Groundwater of the region shall be maintained free of substances in concentrations which are toxic, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.	Groundwater for use as MUN supply shall not contain concentrations of chemical constituents in excess of the limits specified in the California Code of Regulations, Title 22, Chapter 15, Article 4, Section 64435, Tables 2, 3 and 4, as a result of human activity.

Water quality data for public supply wells in the WOD project study area from the DWR Groundwater Bulletin 118 (2004) are presented in the following Table 10.

Table 10 – Water Quality in Public Supply Wells[1]

	Inorganics (Primary)	Radiological	Nitrates	Pesticides	VOCs and SVOCs	Inorganics (Secondary)
Riverside-Arlington Groundwater Subbasin						
Number of Wells Sampled	48	48	51	50	50	38
Number of Wells with a Concentration Above a MCL[2]	2	11	21	19	8	3
Rialto-Colton Groundwater Subbasin						
Number of Wells Sampled	38	40	38	40	40	38
Number of Wells with a Concentration Above a MCL	0	0	2	0	3	3
Bunker Hill Groundwater Subbasin						
Number of Wells Sampled	212	207	214	211	211	212
Number of Wells with a Concentration Above a MCL	13	34	34	20	32	25
San Timoteo Groundwater Subbasin						
Number of Wells Sampled	27	26	28	27	27	27
Number of Wells with a Concentration Above a MCL	0	0	0	0	0	1
San Gorgonio Groundwater Subbasin[3]						
Number of Wells Sampled	--	--	--	--	--	--
Number of Wells with a Concentration Above a MCL	--	--	--	--	--	--

Table 10 – Water Quality in Public Supply Wells[1]

	Inorganics (Primary)	Radiological	Nitrates	Pesticides	VOCs and SVOCs	Inorganics (Secondary)
Indio Groundwater Subbasin						
Number of Wells Sampled	161	162	164	163	161	161
Number of Wells with a Concentration Above a MCL	2	7	0	0	0	13
Mission Creek Groundwater Subbasin						
Number of Wells Sampled	14	15	15	14	14	14
Number of Wells with a Concentration Above a MCL	0	2	1	0	0	0

[1]DWR, 2003
[M]aximum Contaminant Level
[3]Data not provided

Groundwater quality data for the groundwater basins in the WOD project study area from the DWR Groundwater Bulletin 118 (2004) are presented in the following sections.

5.9.2.1. Upper Santa Ana Valley Groundwater Basin

Riverside-Arlington Groundwater Subbasin

Groundwater is dominantly calcium-sodium bicarbonate in character with total dissolved solids (TDS) ranging from 210 to 889 milligrams per liter (mg/L).

Rialto-Colton Subbasin

Groundwater in this subbasin has a TDS content ranging from 163 to 634 mg/L.

Bunker Hill Subbasin

Groundwater within this subbasin is predominantly calcium-bicarbonate in character with a TDS range of 150 to 550 mg/L. Electrical conductivity measurements range from 95 to 2,920 microhms. Some parts of the subbasin are impaired by trichloroethylene, tetrachloroethylene/perchloroethylene, and dibromochloropropane.

San Timoteo Subbasin

Groundwater beneath San Timoteo Canyon is characterized by sodium bicarbonate, groundwater in the alluvium of Little San Gorgonio Creek is characterized by calcium bicarbonate, and groundwater in younger alluvium near Beaumont is characterized by calcium bicarbonate while the older alluvium is characterized by sodium bicarbonate. TDS content in this subbasin ranges from 170 to 340 mg/L. Some parts of the subbasin are impaired by high nitrate and salinity levels.

5.9.2.2. Coachella Valley Groundwater Basin

San Gorgonio Pass Subbasin

Groundwater in this subbasin is predominantly calcium-sodium bicarbonate in character with a TDS content ranging from 106 to 205 mg/L.

Indio Subbasin

Native groundwater in this subbasin is predominantly calcium bicarbonate in character with a TDS content of 300 mg/L (DWR, 2003). However, the Colorado River recharges the subbasin with water that is characterized by sodium sulfate and calcium sulfate. Some parts of the subbasin are impaired by nitrate and fluoride.

Mission Creek Subbasin

The northwestern area of this subbasin is characterized by calcium-magnesium bicarbonate while the southeastern area is characterized by sodium chloride-sulfate. TDS content for this subbasin is generally below 500 mg/L.

6. PROJECT ALTERNATIVE

This section provides a general description of the WOD Project Alternative (Alternative Project) and comparison of the conditions between the Proposed Project and Alternative Project. The Alternative Project would include an alternative Project for the relocation of an approximate 3-mile-long section of Segment 5 of the existing WOD corridor. As shown on Figure 1, the alternative Project in Segment 5 would be located approximately 500 feet to 1,500 feet south of and roughly parallel to the proposed Project. The Alternative Project is approximately 0.13 mile longer than the proposed Project. There are no differences in the elements of the Proposed Project and Alternative Project outside of Segment 5. Therefore, this comparison focuses on the differences between the Proposed and Alternative Projects within Segment 5. The proposed Project and alternative Project for the new 3-mile-long segment of the 220 kV transmission line in Segment 5 are shown for comparison on Figures 1 through 3.

6.1. Alternative Project Environmental Setting

Table 11 outlines a comparison of the environmental setting between the Proposed and Alternative Projects in Segment 5.

Table 11 – Environmental Setting Comparison Between the Proposed and Alternative Projects in Segment 5

Feature	Proposed Project	Alternative Project
Physiography	Gently sloping topography varying from approximately 2,080 to 2,400 feet MSL.	Gently sloping topography varying from approximately 2,080 to 2,400 feet MSL.
Watershed	Whitewater	Whitewater
Hydrologic Basin	Smith Creek	Smith Creek
FEMA 100-year Flood Zone	Crosses San Gorgonio River 100-year flood zone	Crosses San Gorgonio River 100-year flood zone
Dam inundation, Seiche, Tsunami	No hazard	No hazard
Mudflows	Not relevant in gentle terrain	Not relevant in gentle terrain
Surface Water Resource	Crosses San Gorgonio River	Crosses San Gorgonio River
Wetlands	No wetlands mapped	No wetlands mapped
Groundwater	Deep, ranges from 47-512.5 feet	Deep, ranges from 47-512.5 feet
Water Quality	Colorado RWQCB beneficial uses and objectives	Colorado RWQCB beneficial uses and objectives

Comparison of the environmental setting indicates that there are no substantial hydrological variations between the Proposed Project and Alternative Project.

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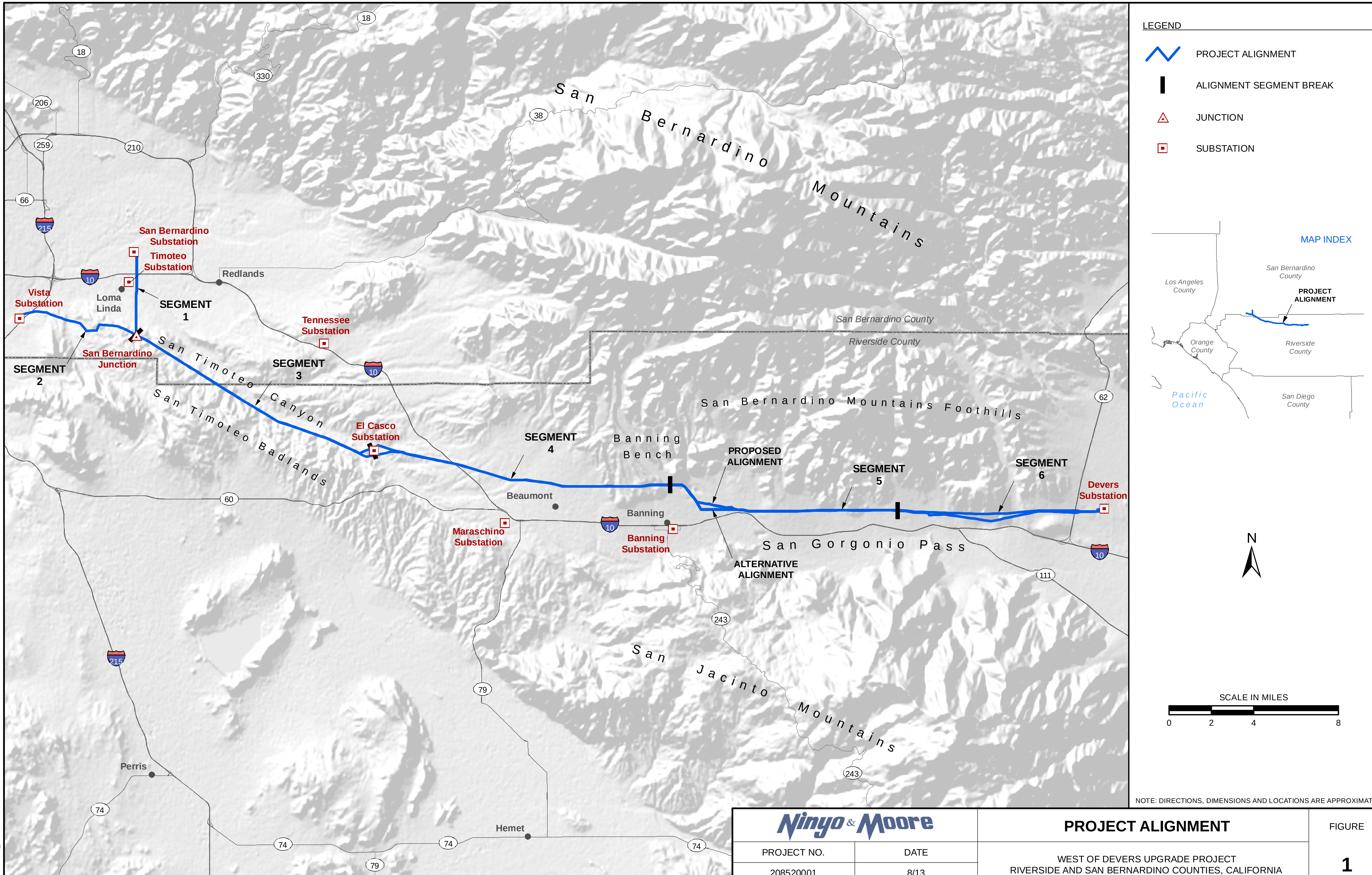
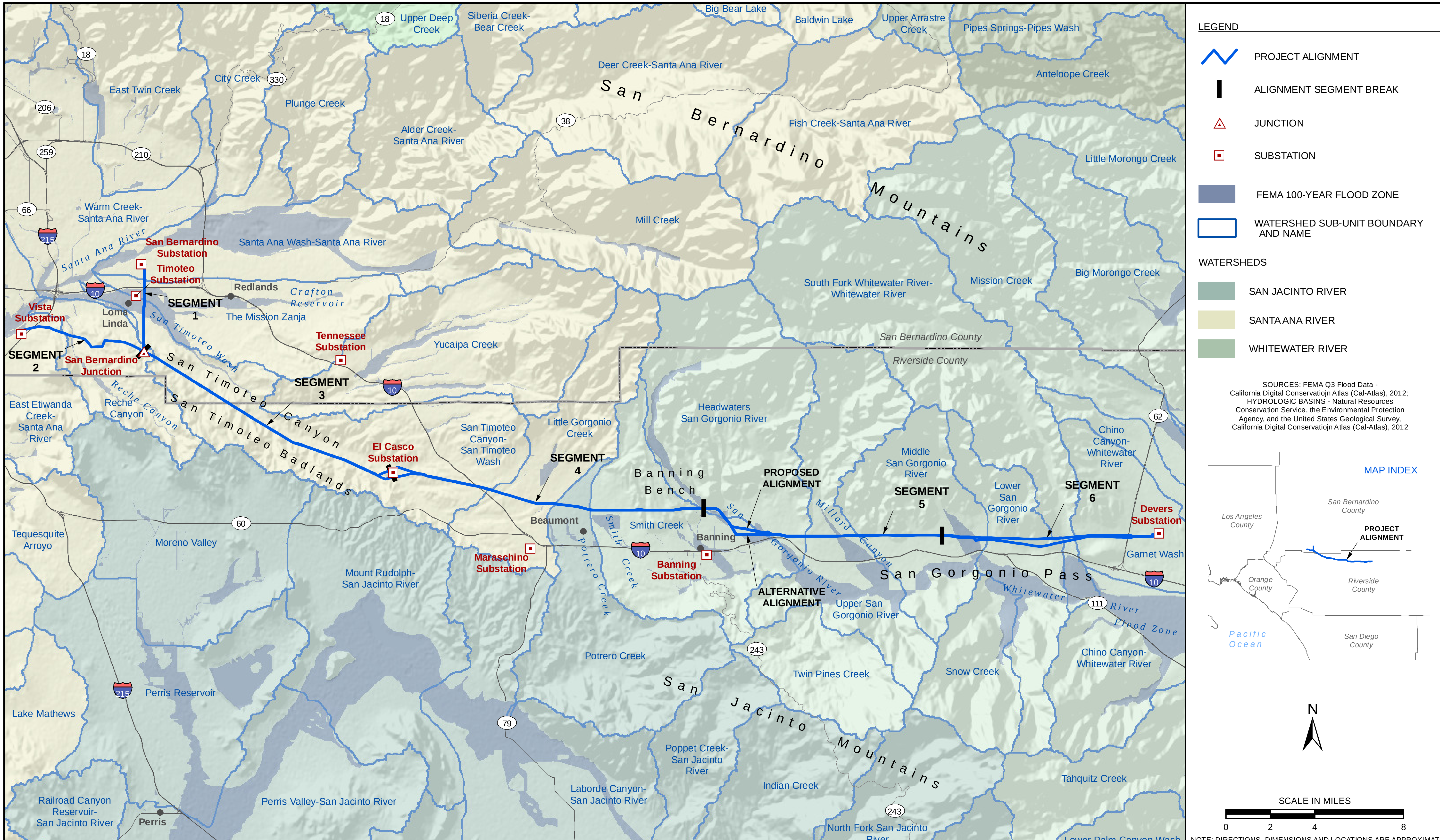


Ninyo & Moore	PROJECT ALIGNMENT	FIGURE
PROJECT NO. 208520001 / DATE 8/13	WEST OF DEVERS UPGRADE PROJECT RIVERSIDE AND SAN BERNARDINO COUNTIES, CALIFORNIA	1



Ninyo & Moore

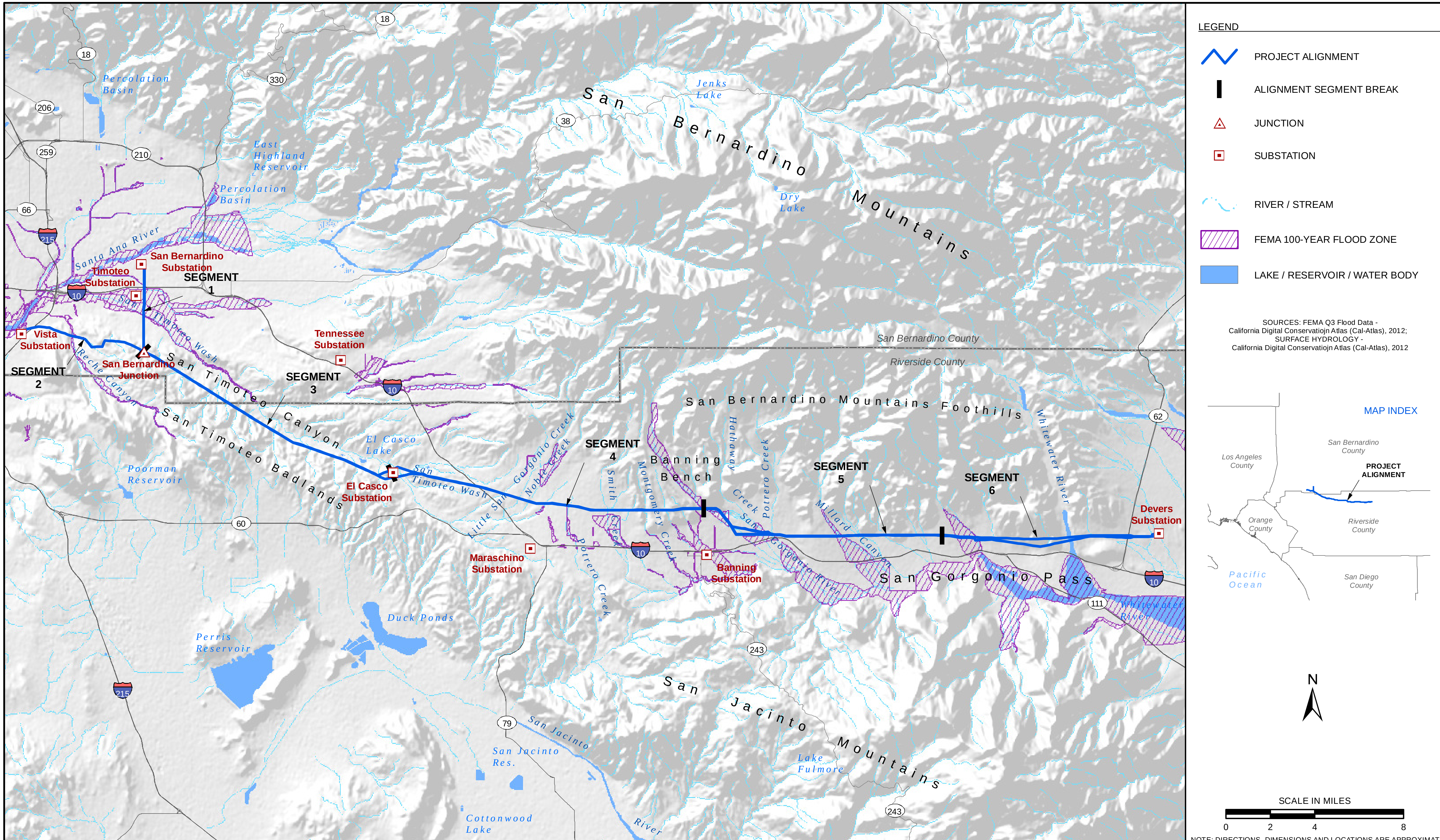
WATERSHEDS AND FLOOD ZONES

WEST OF DEVERS UPGRADE PROJECT
RIVERSIDE AND SAN BERNARDINO COUNTIES, CALIFORNIA

PROJECT NO.	DATE
208520001	8/13

FIGURE 2

2_208520001_WS_FLDZ_SCE.mxd 10/15/2013 JDL



Ninyo & Moore

SURFACE HYDROLOGY

PROJECT NO.	DATE
208520001	8/13

WEST OF DEVERS UPGRADE PROJECT
RIVERSIDE AND SAN BERNARDINO COUNTIES, CALIFORNIA

FIGURE 3