DRAFT ENVIRONMENTAL IMPACT REPORT

SANTA ANA RIVER WATER RIGHT APPLICATIONS FOR SUPPLEMENTAL WATER SUPPLY

October 2004

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT • 1954 •

WESTERN MUNICIPAL WATER DISTRICT

DRAFT ENVIRONMENTAL IMPACT REPORT

SANTA ANA RIVER WATER RIGHT APPLICATIONS FOR SUPPLEMENTAL WATER SUPPLY

October 2004

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT • 1954 •

WESTERN MUNICIPAL WATER DISTRICT

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

With the exception of Chapter 3.0, all figures can be found in sequential order at the end of the chapter in which they are first referenced. All Chapter 3.0 figures can be found in sequential order at the end of the subsection in which they are first referenced.

This page intentionally left blank

SUMMARY

This Draft Environmental Impact Report (DEIR) has been prepared pursuant to the California Environmental Quality Act (CEQA) to evaluate the potential environmental impacts associated with water right applications filed by the San Bernardino Valley Municipal Water District (Muni) and Western Municipal Water District of Riverside County (Western). The applications seek to divert and put to beneficial use a total of up to 200,000 acre-feet of water per year (afy) from the Santa Ana River (SAR). The Project consists of all discretionary actions necessary to conserve, divert, convey and store this water from the SAR for beneficial use.

Muni and Western are regional water agencies that manage groundwater and surface water supplies in San Bernardino and Riverside counties in Southern California. The recent completion of Seven Oaks Dam on the SAR provides an opportunity for Muni/Western to achieve the following objectives:

- Increase water supply reliability by reducing dependence on imported water;
- Develop and deliver a new, local, high quality, long-term water supply that is needed to meet part of anticipated future demands; and
- Expand operational flexibility by adding infrastructure and varying sources of water, thereby providing Muni/Western with greater capability to match varying supply and demand.

To accomplish these objectives, Muni/Western have jointly filed two applications with the State Water Resources Control Board (SWRCB) to appropriate water from the SAR. The applications seek the right to divert and put to beneficial use up to 200,000 afy of local water to help meet anticipated demands.

This summary provides brief descriptions of the essential aspects of the Project. They include: (1) overview of the Project; (2) need for the Project; (3) the public participation process; (4) the environmental analysis; (5) alternatives to the Project; and (6) comparison of the Project and alternatives.

S.1 OVERVIEW OF THE PROPOSED PROJECT

To divert, convey, and store water from the SAR, existing facilities would be used to the extent feasible. However, it would be necessary to construct and/or modify a number of facilities. These Project-related facilities would be located in four areas.

- The Seven Oaks Dam and Reservoir Area includes the intake structure of Seven Oaks Dam, the access road to the intake structure, and a section of road providing access upstream of the dam. To achieve the desired level of conservation storage, these infrastructure elements require modification.
- The Santa Ana River Construction Area includes the following proposed new facilities: Plunge Pool Pipeline; Low Flow Connector Pipeline; and Morton Canyon Connector II Pipeline.

- The Devil Canyon Construction Area adjacent to the Devil Canyon Power Plant and Afterbays of the SWP would accommodate the new Devil Canyon By-Pass Pipeline.
- The Lytle Creek Construction Area includes the new Lower Lytle Creek Pipeline and Cactus Basins Pipeline.

Water appropriated from the SAR will be put to beneficial use in the Muni/Western service areas through direct use, groundwater recharge, and/or exchange. Muni/Western have developed a set of analytic techniques and models which allows them to demonstrate the manner in which groundwater and surface water resources in their region can be conjunctively used. These techniques and models also demonstrate how it is possible to allocate water for maximum beneficial use through direct delivery, spreading to underground storage, or exchange. Muni/Western have, and will develop, through joint use agreements, the ability to coordinate use of water conveyance facilities on a local and regional basis. Muni/Western do not propose to export water for use outside their service areas. Any water conveyed outside their service areas would be returned via exchange as soon as practical.

Hydrologic analyses conducted by Muni/Western indicate that, after senior water right claims and environmental needs are accounted for, seasonal water conservation storage at Seven Oaks Dam can provide a water supply sufficient to help meet a portion of the projected demand within the Muni/Western service area and significantly delay or reduce anticipated demand for imported water. This will, in turn, improve the reliability of regional water supplies and allow for effective conjunctive use of groundwater and surface water supplies. This supplemental water has the added benefit of making water that is not imported by Muni/Western available to help meet the needs of other areas that depend on sources such as the State Water Project (SWP) and Colorado River.

S.2 NEED FOR THE PROPOSED PROJECT

The region relies, to a significant degree, on imported water supplies, whether from the SWP, the Colorado River, or other sources. Due to factors such as water quality concerns, drought, legal and institutional constraints, and environmental concerns, the reliability of these imported sources of water is declining. For example, the Department of Water Resources anticipates that long-term future deliveries by the SWP will average only 76 percent of contract amounts. As regional population and demand for water increase, Muni/Western can no longer rely solely on imported water to meet projected demands within their service areas and must explore and develop every opportunity to seek out additional sources of supply, including full utilization of available local water supplies. Population within the combined Muni/Western service areas is projected to increase by over 798,000 persons between 2000 and 2025 (a 65 percent increase). As the population increases, the demand for water will also increase over existing levels. Water demand (based on direct use) in the combined service areas is estimated to climb to over 680,000 afy over the same time period (a 35 percent increase). The Project is intended to meet a portion of the anticipated future water demand in the Muni/Western service area.

As far back as 1969, the *Orange County* and *Western* Judgments recognized that future population growth in the Inland Empire would require regional agencies such as Muni and Western to seek new and more reliable water supplies. For this reason, the *Orange County* Judgment authorizes these agencies to "engage in unlimited water conservation activities, including spreading, impounding, and other methods" in the upper watershed areas including in the vicinity of Seven Oaks Dam. The *Western* Judgment, like the *Orange County* Judgment, contemplates new conservation and also provides for the division of newly conserved supplies among the parties to the Judgment.

S.3 EIR PUBLIC PARTICIPATION PROCESS

The initial decision to prepare an EIR for the Project was made following completion of an Initial Study. A Notice of Preparation (NOP), including the Initial Study, was distributed to the California State Clearinghouse and other potentially interested parties in July of 2002. The release of the NOP initiated a 30-day public comment period that ended on August 31st, 2002. During the public review period, a public scoping meeting was held in the City of San Bernardino on August 6th, 2002, to receive agency and public comments regarding the scope of the environmental analysis for this DEIR. Comments on the NOP and Initial Study were received from State agencies, regional and local governmental agencies, regional authorities, and other non-governmental organizations. Muni/Western considered the comments received in refining the scope of analysis for this DEIR.

The DEIR will be circulated for review by public agencies and interested members of the public for a 45-day period and a public hearing will be held during this review period. Comments on the adequacy of the DEIR can be provided at that public hearing or in writing during the public review period. These comments will be considered and addressed in the Final EIR which will be prepared in compliance with CEQA Guidelines Section 15132. As co-lead agencies for the EIR, Muni and Western are jointly responsible for determining its adequacy pursuant to CEQA.

S.4 ENVIRONMENTAL ANALYSIS

Table S-1, which appears at the end of this chapter, summarizes the impacts of and corresponding mitigation measures, where called for, associated with implementation of the Project. Following are brief summaries, by resource area, of Project-related impacts.

S.4.1 Surface Water Hydrology and Water Quality *(Section 3.1)*

Anaerobic conditions are associated with current operations of Seven Oaks Dam and it is anticipated that a water quality monitoring and aeration program will be implemented by the Local Sponsors. In those years when the Project results in seasonal water conservation storage, Muni/Western will participate in this preventative program and provide funding, proportional to their contribution to the volume of seasonal water conservation storage in Seven Oaks Reservoir.

The Project would decrease flows in the Santa Ana River on non-storm days between Seven Oaks Dam and Riverside Narrows. Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversions were assessed. No feasible mitigation measures, however, have been identified. This reduction in non-storm day flow would not, however, adversely affect designated beneficial uses of the water.

Erosion to the channel leading to the Lytle Basins could result from water conveyed to the Lytle Basins spreading grounds. An energy dissipation structure placed at the terminus of the water delivery pipeline would be installed to prevent or reduce these effects.

S.4.2 Groundwater Hydrology and Water Quality *(Section 3.2)*

Due to the spatial and temporal variability of Project-related effects, concentration levels of total dissolved solids (TDS) and nitrate would intermittently and locally exceed water quality objectives (WQOs) in the San Bernardino Basin Area (SBBA). Less than significant and beneficial impacts would also occur intermittently and locally.

Using available reliable data, Muni/Western will, on an annual basis, evaluate impacts of the Project on TDS and nitrate concentrations in the SBBA. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni/Western will direct Project water spreading to reduce significant TDS and nitrate impacts.

With implementation of these actions by Muni/Western, impacts to TDS and nitrate concentration levels would be reduced. However, there may be short periods of time when significant impacts remain. Therefore, impacts to TDS and nitrate concentration levels in the SBBA would be significant and unavoidable.

S.4.3 Biological Resources *(Section 3.3)*

Two main types of impacts are anticipated for biological resources and are associated with: (1) ground disturbance during construction, (2) reduction in flows in the main channel of the SAR.

Construction activities would result in the disturbance and removal of riparian, wetland, stream, and upland habitat, including Riversidian Alluvial Fan Sage Scrub (RAFSS), and cause mortality of common wildlife species. These impacts would be reduced by implementation of a suite of mitigation measures. Prior to construction activities, surveys will be conducted, the results of which will aid in avoiding disturbance to habitats and wildlife species. A program will be implemented that includes: restricting disturbance; employee training; on-site monitoring; adoption of best management practices; and protection measures specifically designed for listed species. Additional mitigation would be achieved through the development and implementation of a Habitat Revegetation, Restoration, and Monitoring Program which will include the following measures: invasive species control; topsoil salvage and replacement; and habitat rehabilitation and replacement. If it is determined that preventative measures are not able to mitigate adverse impacts to RAFSS in a satisfactory manner, a compensation program will be implemented involving the acquisition, for every acre impacted, of a minimum of one acre of habitat of similar or greater habitat value.

The Project also would result in a reduction in the frequency and extent of overbank flooding in the segment of the Santa Ana River between Cuttle Weir and the confluence with Mill Creek. These changes could have significant impacts on the San Bernardino kangaroo rat (SBKR) and Santa Ana River woolly-star. This impact could be minimized by: monitoring and removing invasive non-native plant species that diminish value of SBKR and Santa Ana River woolly-star habitats; and implementing, together with federal and state agencies, a program to restore/renew habitat. Changes in stream flow associated with implementation of the Project could affect aquatic, riparian, and wetland habitats and species downstream of the points of diversion. These impacts would be less than significant.

S.4.4 Geology, Soils, and Mineral Resources *(Section 3.4)*

High groundwater levels at various locations within the San Bernardino Basin Area (SBBA) groundwater basin, but outside the Pressure Zone, would result from Project implementation. Development of a groundwater level monitoring program and focused groundwater spreading would alleviate the condition, but not to a level of less than significance. The impact would remain significant and unavoidable. The spatial extent of the area susceptible to liquefaction in the Pressure Zone of the SBBA would be reduced through implementation of the Project.

Potential impacts related to seismic ground shaking, seismically induced liquefaction, and slope failure could occur at all construction sites and throughout the region. Implementation of recommendations contained in site-specific geotechnical reports would reduce impacts to less than significant levels.

Construction activities associated with modifications to Seven Oaks Dam, relocation of access roads, placement of new pipelines, and pipeline excavation and de-watering activities may result in significant impacts associated with sedimentation and erosion, sediment scour and erosion, and on-site landslides and slope collapse. Implementation of mitigation measures would reduce impacts to a level of less than significant.

S.4.5 Land Use and Planning *(Section 3.5)*

Construction and operation of the Project generally would be consistent with existing land uses and land use plans in the Project area. It could, however, conflict with policies outlined in the San Bernardino County General Plan regarding maintenance of water supplies during seismic events. Consistency would, however, be assured through implementation of the mitigation measure requiring installation of a water flow shut-off mechanism on the intake structure of the Plunge Pool Pipeline.

S.4.6 Agricultural Resources *(Section 3.6)*

No significant impacts to agricultural resources were identified, although construction of the westernmost portion of Phase I of the proposed Plunge Pool Pipeline would result in the temporary conversion of approximately 11 acres of Important Farmland (i.e., Farmland of Statewide Importance) to non-agricultural use.

S.4.7 Recreational Resources *(Section 3.7)*

Construction activities in the vicinity of the Seven Oaks Dam, SAR, and Lytle Creek would have temporary, less than significant effects on nearby recreational uses through increased noise. The hang-gliding and paragliding recreational activities near the Devil Canyon Construction Area could experience temporary impacts during construction activities for up to 18 months related to access, noise, and air quality. These impacts would be less than significant and operations would not substantively affect recreational activities.

S.4.8 Air Quality *(Section 3.8)*

Emissions associated with construction activities would not: exceed the criteria pollutant ambient air quality standard for selected pollutants; substantially contribute to an existing or projected air quality standard violation; or expose sensitive receptors to substantial pollutant concentrations. Emissions from construction activities would, however, exceed the daily and calendar quarter South Coast Air Quality Management District (SCAQMD) emission significance thresholds for some selected pollutants. A number of mitigation measures would reduce this impact, but not to a less than significant level. Construction of the conveyance facilities would expose the public to some concentrations of toxic air contaminants, but this impact would be less than significant.

S.4.9 Cultural and Paleontological Resources *(Section 3.9)*

Activities associated with construction of major pipelines in the Santa Ana River Construction Area could have significant impacts to historic resources, especially the Francis Cuttle Weir Dam, North Fork Canal, and Greenspot Bridge. Additionally, construction could result in impacts to unanticipated cultural or paleontological resources. All impacts would be reduced to less than significant through the implementation of mitigation measures with the exception of impacts to the Francis Cuttle Weir Dam from construction of Phase I of the Plunge Pool Pipeline. In this case, should any portion of the Francis Cuttle Weir Dam be modified or demolished, a historic recordation of the structure will be prepared by a qualified architectural historian. The recordation will conform to the standards of either the Historic American Buildings Survey (HABS) or the Historic American Engineering Record (HAER).

S.4.10 Noise *(Section 3.10)*

Construction could expose residents near the sites to temporary, substantial increases in ambient noise levels. Impacts would not be mitigable to an impact level less than significant for those residents closest to the construction corridors. The impact would remain significant and unavoidable. Noise impacts may also result from occasional maintenance activities, but these would be infrequent and less than significant.

S.4.11 Aesthetics *(Section 3.11)*

Neither construction activities nor operations would significantly affect aesthetic resources.

S.4.12 Hazardous Materials and Groundwater Contamination *(Section 3.12)*

There are a number of contaminant plumes in the SBBA comprised mainly of perchlorate, trichloroethylene (TCE), and tetrachloroethylene (PCE). Under Project conditions, plume boundaries would intermittently and locally exceed those anticipated under No Project conditions, resulting in significant impacts. Due to the spatial and temporal variability of plume boundaries under Project conditions, beneficial impacts would also occur intermittently and locally.

Muni/Western will identify groundwater trends, including plume movement, and isolate changes attributable to the Project. To the extent feasible given existing infrastructure, and consistent with meeting other groundwater basin management objectives, Muni/Western will direct Project water spreading to limit adverse plume movements. It is possible that, even with implementation of these mitigation measures, impacts will remain significant and unavoidable.

Plume degradation would generally occur at the same rate and within the same area as under No Project conditions, resulting in negligible impacts. In addition, detailed modeling indicates that Project operations would locally and intermittently result in the plumes degrading more rapidly under Project conditions than under No Project conditions, resulting in beneficial impacts.

S.4.13 Public Services, Utilities, and Transportation *(Section 3.13)*

Disruptions in water supplies could occur during the construction of Project facilities. Implementation of mitigation measures involving the use of alternative sources and routing of supplies would reduce the impacts to a less than significant level. Disruptions to traffic flows and access to destinations would occur but would be fully mitigated through implementation of proposed mitigation measures that would include development and implementation of traffic management plans. Limitations on access to residences attributable to construction of the Cactus Basins Pipeline would remain significant and unavoidable even after implementation of mitigation measures.

S.5 PROJECT ALTERNATIVES

In addition to the No Project Alternative, three broad water supply alternatives were selected for detailed analysis:

- Alternative 1 - New Local Water Supplies;
- Alternative 2 - Enhanced Conservation; and
- Alternative 3 - New Imported Water Supply.

These alternatives were developed to avoid or substantially reduce the significant impacts associated with implementation of the Project to environmental resources by eliminating or reducing water diversions.

S.5.1 No Project Alternative

The No Project Alternative would occur if Muni/Western chose not to go forward with the Project or if the SWRCB decided not to issue an appropriative water right permit to Muni/Western. None of the construction activities (for diversion or conveyance facilities) that are part of the Project or the diversion of SAR water by Muni/Western would occur. During periods of high sustained runoff upstream of Seven Oaks Dam, water in excess of that diverted by senior water right holders and the San Bernardino Valley Water Conservation District (Conservation District) would, after detention behind the dam, be released in a controlled manner and flow downstream.

Population in the Muni/Western service area is forecast to increase, necessitating the delivery of greater quantities of water in the future. Without additional supplies of new water, existing supplies would become inadequate to meet anticipated demand around the year 2025. In the absence of new sources of water, it is possible that the rate of population growth could diminish due to the constrained water supply. Neither Muni nor Western has the authority to grant or deny land use permits, since such actions are the responsibility of land use planning agencies and the rate of growth depends on the decisions of these agencies. Actions by others (including private developers) could augment water supplies in the service area (by future water purchases or transfers) when demand exceeds supply. Muni has the responsibility to replace the quantity of water extracted from the SBBA that exceeds the safe yield by using whatever source of water they have available. The source would, in all likelihood, be comprised of SWP water that would be imported in increasing quantities.

S.5.2 Alternative 1 – New Local Water Supplies

Water supply planning and management has not fully used all potentially available water sources within and adjacent to the Muni or Western service areas. These other water supplies have not been utilized in the past due to concerns regarding water quality, cost, or other institutional constraints.

Three types of new local water supplies are evaluated in lieu of diversions of Santa Ana River water:

- Brackish groundwater desalination;
- Regional water recycling; and
- Increased groundwater extraction from the Riverside Basin.

These water supply concepts are grouped together for analysis purposes since they have a number of common attributes including they are local sources that have not been fully utilized; they require new additional treatment; and the distribution of the new water within the Muni/Western service area would involve construction activities with environmental impacts. It is assumed that the full amount of water available under the Project would be made available through any one of these water supplies.

S.5.3 Alternative 2 – Enhanced Conservation

Throughout the State of California, water agencies are faced with the task of developing new sources of water supply and conserving existing water resources to meet their individual projected water demands. Residential conservation remains the main focus for many agencies, but other strategies, including waste minimization, and industrial and agricultural conservation, are also under consideration. The Enhanced Conservation Alternative would provide the same amount of water as the maximum annual average provided by the Project (i.e., 27,000 afy). It is assumed that this alternative would primarily affect the Muni service area, since Western currently has an active conservation program and Western could achieve only minimal additional conservation gains. Water demand in the Muni service area is projected to increase by about 19 percent, from 226,700 afy in 2000 to 269,900 afy in 2025, an increase of 43,200 afy. Since all new urban development is mandated to use available conservation measures, to obtain the desired 27,000 afy from future growth alone, water users within the Muni service area would have to conserve over 60 percent between the years 2000 to 2025. This amount of conservation may be infeasible given that future demand projections prepared by the Santa Ana Watershed Project Authority (SAWPA) assumes only about 8-10 percent conservation.

Since Muni/Western are water wholesalers, the water purveyors (retailers) in the Muni/Western service areas would be required to implement any potential water conservation measures over and above those currently in place or planned. Detailed assessment of any future conservation programs would be required.

S.5.4 Alternative 3 – New Imported Water Supply

The development of new imported water sources, the acquisition of existing water sources followed by the transfer of that water for use in the Muni/Western service area, or a combination of both approaches, is considered a feasible alternative to the Project. Two options for new imported water sources are considered: (1) additional SWP water, and (2) seawater desalination.

Additional SWP Water

Muni/Western could acquire additional SWP water, in quantities sufficient to account for the reliability of the supply. This would require Muni/Western to acquire between about 14,500 and 35,500 af of additional Table A Amount. This new contract right would result in an average delivery of between about 11,000 and 27,000 afy.

Muni/Western could seek to acquire a larger amount of SWP contract rights or rights to other water supplies (on a willing seller, willing buyer basis) than they currently hold. This additional water supply could be obtained through the acquisition of: (1) rights from other contractors for annual delivery, or (2) surplus or turn-back pool water supplies that are available in "wet" years. This alternative would use a larger proportion of the SWP facilities and capacities and may require modifications to Muni/Western facilities.

Seawater Desalination

This option would include two major components: (1) the development of, or contribution to, a seawater desalination facility and associated facilities (e.g., brine disposal facility); and (2) the exchange of an amount of desalted water for SWP water.

The development of (or participation in) a new water supply using a seawater desalination technique is the primary new supply source under investigation by other wholesale and retail water agencies in Southern California. Since the Project would supply between about 11,000 and 27,000 afy, it would be most efficient for Muni/Western to join with other water purveyors in the development of a coastal desalination facility and receive water from the SWP supplies of other participants via exchange(s) rather than receive direct delivery of desalted water. Under this option, only those facilities needed to convey water within the Muni/Western service area would be required. This would avoid the cost, institutional issues, and environmental consequences of attempting to convey desalinated ocean water directly to the Muni/Western service area.

Under this alternative, Muni/Western would co-sponsor with other agencies a seawater desalting facility. The water generated at such a facility would be supplied to nearby users. A similar amount of SWP water would be transferred to Muni/Western from the water purveyor in the coastal community in exchange for the water produced from the desalination plant.

Depending on the extent of ancillary facilities included at the site, an area of 2 to 5 acres could be required. In addition to the desalination plant, the coastal facility would likely include new electrical power conveyance and control equipment, ocean water intake and salty-brine disposal structures, and a treatment water pumping plant.

S.6 COMPARISON OF THE PROJECT AND ALTERNATIVES

Table S-2 compares the direct and indirect environmental impacts of each of the alternatives carried forward for detailed analysis with those of the Project.

S.6.1 Comparison of No Project Alternative and the Project

The No Project Alternative would still require that water supplies be augmented. Under the No Project Alternative, Muni/Western would fully utilize existing SWP supplies at an earlier date than under the Project. This alternative also would not meet any of the Project objectives. It would:

- Avoid direct Project-related impacts, including beneficial impacts to groundwater conditions in the Pressure Zone of the SBBA.
- Delay indirect Project impacts because continued growth and development would be constrained by the limited water supply.

S.6.2 Comparison of Alternative 1 and the Project

This alternative would provide a similar amount of water as the Project and would partially meet the Project objectives. It would increase water supply reliability by reducing Muni/Western's dependence on imported water, although brackish groundwater is not a permanent supply. Use of recycled water would not meet the Project objective of delivering local high-quality water instead of imported supplies, since such water is limited to non-potable uses. This alternative would provide some improved operational flexibility, although as noted above, brackish water is not a permanent supply and recycled water can be used only for certain purposes. Some environmental impacts would be similar to those of the Project, and others would differ. In summary, this alternative would result in:

- Similar construction-related impacts to surface water hydrology and water quality.
- A degradation of surface water quality in the SAR downstream of regional wastewater treatment plants from recycling actions.
- A greater reduction in SAR flows as a result of recycling actions.
- A greater decrease in regional groundwater levels.

- Less construction-related impacts to biological resources and potential avoidance of impacts relating to the changes in flow in the Upper SAR.
- Greater impacts to biological resources below existing wastewater treatment plant discharges from recycling actions.
- Similar impacts to geological resources, land use, agriculture, recreational resources, and public services.
- Greater air quality impacts.
- Less potential for significant impacts to cultural resources.
- Greater noise impacts during construction.
- Greater impacts to aesthetic resources.
- Greater impacts related to hazardous materials.
- Greater impacts to public services, utilities and transportation.
- Similar indirect impacts associated with growth inducement to those of the Project.

S.6.3 Comparison of Alternative 2 and the Project

The Enhanced Conservation Alternative would provide a similar amount of water to the maximum annual average provided by the Project (up to 27,000 afy) and would meet the Project objective of reducing Muni/Western's dependence on imported water. It would not meet the objective of delivering additional high quality water instead of imported supplies, and would not improve operational flexibility because it does not expand the number of water supply sources or expand the ability to move water to different locations within the Muni/Western service area. Unlike the Project, it may not be achievable or sustainable. Muni, as a wholesaler of SWP water, does not have the authority to mandate conservation measures or change consumer water rate structures. Some of the Project's direct impacts would be avoided, although additional ones would occur. In summary, this alternative would result in:

- Avoidance of all direct construction-related impacts associated with the Project.
- Adverse impacts to surface water quality, associated with reduced effluent flows from wastewater treatment facilities and attendant increased salt concentrations, would be greater than for the Project.
- Adverse impacts to groundwater quality from percolation of degraded surface water would be greater than for the Project.
- Adverse impacts to biological resources resulting from increased pollutant concentrations due to less water being discharged from wastewater treatment plants would be greater than for the Project.
- Less beneficial impacts related to liquefaction potential compared to the Project.
- Indirect impacts associated with growth inducement would be similar to those of the Project.

S.6.4 Comparison of Alternative 3 and the Project

This alternative would provide a similar amount of water to the Project. However, in the case of the desalination plant, it would be necessary for Muni/Western to negotiate agreements with other agencies whereby imported water would be exchanged in lieu of water derived directly from the desalination plant. This would not meet the Project objectives of increasing water supply reliability by reducing Muni/Western's dependence on imported water and delivering local high-quality water instead of imported supplies. Some environmental impacts would be similar to those of the Project, and others would differ. In summary, this alternative would result in:

- Avoidance of all direct (construction- and operation-related) impacts associated with the Project, including beneficial impacts. However, construction impacts at a coastal construction site and within the Muni/Western distribution system would occur.
- Fewer impacts related to the following resources since the extent of construction would be less than under the Project: surface water hydrology and water quality; biological resources; and geology, soil, and mineral resources.
- Potential impacts to marine biological resources from operation of the desalination facility would exist whereas the Project would have no impact on marine biology.
- Potentially similar impacts to land use and agricultural resources, although this would depend on the location of the desalination plant.
- Potentially greater impacts to recreational resources, although this would depend on the location of the desalination plant.
- Greater air quality impacts during operations than those associated with the Project.
- Potentially similar impacts to cultural resources, although this would depend on the location of construction sites.
- More construction-related noise impacts, although they would depend on the proximity of noise sensitive receptors. Noise impacts during operation would be similar to those of the Project.
- Potentially greater impacts to aesthetic resources from desalination plant construction activities.
- Greater impacts to hazardous materials.
- Similar impacts related to public services, however, greater impacts related to utilities, and transportation.
- Indirect impacts associated with growth inducement would be similar to those of the Project.

Table S-1. Summary of Impacts and Mitigation Measures

Notes

1. Resource areas for which there are no impacts do not appear in this table.
2. A summary of the impact and mitigation measure is provided the first time this impact or mitigation measure is introduced in this table. Subsequent references to a previously introduced impact or mitigation measure are referenced only by their abbreviation, for example Impact GEO-1 or MM GEO-1.
3. Since some of the surface water quality and geology impacts are interrelated, geology impacts and mitigation measures are referenced under each resource area.

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Section 3.1 Surface Water Hydrology and Water Quality						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
GEO-1	X			Implementation of seasonal conservation storage would include modification of the trash rack of the intake structure and drilling into bedrock to provide additional anchors for the structure. These activities may result in significant impacts associated with sedimentation and erosion at the base of the dam. Substantial erosion may also occur during these short-term construction activities through the use of berms to divert water flow.	MM GEO-1: Before beginning construction, a sedimentation and erosion control plan will be prepared by Muni/Western and submitted to the SARWQCB for approval. In addition, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared by Muni/Western and submitted to the SARWQCB for approval prior to construction. Where possible, erosion control measures will be implemented by Muni/Western before beginning work in the rainy season. To minimize short-term impacts associated with erosion and off-site siltation of the SAR, standard erosion and sediment control features will be used during and immediately after grading and excavations.	Less than significant.
GEO-2	X			Substantial erosion and sedimentation may occur during grading and excavation activities associated with construction of new access roads at the dam and immediately upstream.	See MM GEO-1.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	Significant	Less than Significant	Beneficial	Environmental Impact	Mitigation Measure and Number	Residual Impact
Santa Ana River Construction Area						
GEO-3	X			Substantial erosion and sedimentation may occur during grading and excavation activities associated with construction of new pipelines and related appurtenances.	See MM GEO-1.	Less than significant.
GEO-4	X			Discharge of groundwater from dewatering wells during excavation activities could cause substantial short-term sediment scour and erosion at the point of discharge.	MM GEO-2: Muni/Western will direct the contractor to install, prior to de-watering activities, energy dissipation devices at discharge points to prevent erosion. Sedimentation basins (such as straw bales lined with filter fabric) will be used at dewatering discharge points to prevent excess downstream sedimentation. These basins will be constructed before dewatering and regularly maintained during construction, including after storm events, to keep them in good working order.	Less than significant.
Devil Canyon Construction Area						
GEO-3	X			See Impact GEO-3	See MM GEO-1.	Less than significant.
Lytle Creek Construction Area						
GEO-3	X			See Impact GEO-3	See MM GEO-1.	Less than significant.
PROJECT OPERATIONS AND MAINTENANCE						
Seven Oaks Dam and Reservoir Construction Area						
SW-1		X		Use of Seven Oaks Reservoir for seasonal water conservation storage would alter the amount of water in storage and height of the reservoir water surface. This would increase potential for erosion within the reservoir.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
SW-2	X			Use of Seven Oaks Reservoir for seasonal water conservation storage could substantially degrade water quality as a result of additional impoundment of flows in Seven Oaks Reservoir.	MM SW-1: Because anaerobic conditions are a problem associated with current operations at Seven Oaks Dam, it is anticipated that the operators of the dam (San Bernardino, Riverside, and Orange county flood control districts, known as the 'Local Sponsors') will implement a program (such as water quality monitoring and aeration) to avoid and reverse anaerobic conditions so that water quality objectives are not exceeded. In those years when the Project results in seasonal water conservation storage behind Seven Oaks Dam, Muni/Western will participate in such a preventative program and provide funding, proportional to the volume of seasonal storage behind Seven Oaks Dam.	Less than significant.
SW-3		X		Use of Seven Oaks Reservoir for seasonal water conservation storage would increase potential damage from seiches.	No mitigation is required.	Not applicable.
SW-4		X		Use of Seven Oaks Reservoir for seasonal water conservation storage would increase the potential for mudflows in the reservoir.	No mitigation is required.	Not applicable.
Santa Ana River Construction Area						
SW-5		X		The Project would place, within a 100-year flood hazard area, structures which would redirect flood flows for water diversion.	No mitigation is required.	Not applicable.
Lytle Creek Construction Area						
SW-6	X			Water delivered into the channel leading to the Lytle Basins could result in substantial erosion to this channel.	MM SW-2: An energy dissipation structure, a device to slow fast moving flows so as to prevent erosion, will be placed at the terminus of the pipeline delivering water to the Lytle Basins channel to ensure that water from the Project does not scour or erode the channel.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Santa Ana River						
SEGMENT A – UPSTREAM OF SEVEN OAKS DAM						
SW-1, -2, -3, and -4	X	X		See Impacts SW-1, SW-2, SW-3 and SW-4.	No mitigation required for Impacts SW-1, SW-3, and SW-4. See MM SW-1 to mitigate Impact SW-2.	Less than significant.
SEGMENT B – SEVEN OAKS DAM TO CUTTLE WEIR						
SW-7	X			The Project would significantly decrease river flow on non-storm days.	Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion for beneficial use by the Project.	Significant and unavoidable.
SW-8		X		The Project would decrease river flow and so could degrade water quality.	No mitigation is required.	Not applicable.
SW-9		X		Project diversions would decrease flow in River Segment B in a manner that could affect sediment transport.	No mitigation is required.	Not applicable.
SEGMENT C – CUTTLE WEIR TO THE CONFLUENCE WITH MILL CREEK						
SW-7, -8, and -9	X	X		See Impacts SW-7, SW-8, and SW-9.	No mitigation measures were identified for Impact SW-7. No mitigation is required for Impacts SW-8 and SW-9.	Impact SW-7 is significant and unavoidable in this river segment.
SEGMENT D – CONFLUENCE WITH MILL CREEK TO "E" STREET						
SW-7, -8, and -9	X	X		See Impacts SW-7, SW-8, and SW-9.	No mitigation measures were identified for Impact SW-7. No mitigation is required for Impacts SW-8 and SW-9.	Impact SW-7 is significant and unavoidable in this river segment.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
SW-10		X		Project diversions would decrease flow in the river from Mill Creek to "E" Street in a manner that could decrease the velocity and depth of overbank flows.	No mitigation is required.	Not applicable.
SEGMENT E – "E" STREET TO THE RIX-RIALTO WASTEWATER TREATMENT PLANT OUTFALL						
SW-7, -8, and -9	X	X		See Impacts SW-7, SW-8, and SW-9.	No mitigation measures were identified for Impact SW-7. No mitigation is required for Impacts SW-8 and SW-9.	Impact SW-7 is significant and unavoidable in this river segment.
SEGMENT F - RIX-RIALTO WASTEWATER TREATMENT PLANT OUTFALL TO RIVERSIDE NARROWS						
SW-7	X			See Impact SW-7.	No mitigation measures were identified for Impact SW-7.	Impact SW-7 is significant and unavoidable in this river segment.
Section 3.2 Groundwater Hydrology and Water Quality						
PROJECT CONSTRUCTION						
Santa Ana River Construction Area						
GW-1		X		Dewatering during project construction could result in temporary lowering of groundwater levels beneath the excavation site.	No mitigation is required.	Not applicable.
Devil Canyon Construction Area						
GW-1		X		See Impact GW-1.	No mitigation is required.	Not applicable.
Lytle Creek Construction Area						
GW-1		X		See Impact GW-1.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
PROJECT OPERATIONS AND MAINTENANCE						
San Bernardino Basin Area						
GW-2		X		Project operations would not interfere with groundwater recharge to the point where there would be a net deficit in aquifer volume (i.e., change in groundwater storage).	No mitigation is required.	Not applicable.
GW-3		X		The Project would not increase TDS and nitrate concentrations in the sub-basins of the SBBA such that post-Project concentrations would exceed WQOs.	No mitigation is required.	Not applicable.
GW-4	X	X	X	At some wells, the Project would increase TDS concentrations such that post-Project TDS concentrations would exceed WQOs.	MM GW-1: Using available reliable data, Muni/Western will, on an annual basis, evaluate impacts of the Project on TDS and nitrate concentrations in the SBBA. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni Western will direct Project water spreading to reduce significant TDS and nitrate impacts.	Significant and unavoidable.
GW-5	X	X	X	At some wells, the Project would increase nitrate concentrations such that post-Project nitrate concentrations would exceed WQOs.	See MM GW-1.	Significant and unavoidable.
Section 3.3 Biological Resources						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
BIO-1		X		Construction related to realigning roads in the Seven Oaks Dam and Reservoir Area would result in loss of native vegetation and temporary effects on common wildlife.	No mitigation is required, but MM BIO-1 through MM BIO-6 are recommended. MM BIO-1: Muni/Western will minimize disturbance to native habitats and listed and non-listed sensitive species by	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					the implementation of the following measures at construction sites prior to and during construction. Where ground disturbance is required, the Muni/Western program will include: restricting disturbance, employee training, on-site monitoring, BMPs, and listed species protection measures. *Restricting Disturbance* Restriction of staging, construction activities, equipment storage, and personnel to existing disturbed areas (such as roads, pads, or otherwise disturbed areas) to the maximum extent feasible. Clearly marking and delineating the limits of the staging areas as well as the construction corridors/zones in the field and graphically on all final construction drawings or blueprints. Personnel and equipment will be prohibited in native habitats outside the construction limits. Biologically sensitive areas, including individuals or colonies of listed and non-listed sensitive plant species and wildlife species, will be identified and delineated in the field prior to ground disturbance (see MM BIO-3) and will be clearly marked graphically on all final construction plans or blueprints so they will be avoided to the maximum extent feasible. Using methods to minimize the construction corridor width to the maximum extent feasible in sensitive habitats, such as transporting and stockpiling excavated materials in disturbed areas off the right-of-way (ROW), or into other parts of the ROW, by truck or conveyor belt.	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					*Employee Training* Implementation of an employee training program. Muni/Western's program will include an initial meeting with all personnel presented by a qualified biologist familiar with all affected species, habitats, and permit conditions. The employee training program will include a discussion of each species, all applicable laws, the permit conditions, and the potential penalties for violating permit conditions. The employee training program will be conducted before construction activities begin. Regular updates will occur during weekly tailgate meetings with construction personnel, and newly hired personnel will be informed of the permit conditions as well as the habitat and species issues before working on the site. *On-Site Monitoring* Biological monitoring of habitat clearing activities and removal of sedentary animals, both common and sensitive, within the ROW prior to clearing. This will require a qualified biologist to be at the location of habitat removal before clearing to attempt to remove animals where visible and, during removal activities, to ensure that no inadvertent impacts to adjacent habitats occur. Weekly inspections of the ROW perimeter near work areas will also reduce the potential for inadvertent impacts to adjacent habitat. *BMPs* *Dust control.* All areas of mechanical ground disturbance, including dirt access roadways, will be consistently moistened to reduce the creation of dust clouds. The frequency of watering will be consistent	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					with the desired goal and in accordance with regional standards and BMPs. *Erosion control*. Devices such as straw bales and "v" ditches will be installed in areas where construction activities may directly or indirectly cause increased erosion or sediment deposition on adjacent habitats. Routine removal of trash from construction areas. All refuse, including non-construction materials such as paper and miscellaneous food packaging materials, will be removed from the ROW to prevent littering of the adjacent habitat areas outside of the ROW. At a minimum, site clean-ups should occur weekly. *Listed Species Protection Measures* In areas where the SBKR is present, either within or adjacent to the ROW, Muni/Western will install exclusionary fencing where appropriate to reduce the potential for SBKR entering the ROW. Specifications for the fencing will be particular to the goal of SBKR exclusion and will be approved by the USFWS. Muni/Western may not install fencing in certain areas such as boulder-strewn washes where fence construction may cause substantial habitat disturbance. Following the installation of fencing, the animals within the ROW will be trapped and released within adjacent suitable habitat outside the ROW. These methods will be approved by the USFWS. In areas where the SBKR is present, either within or adjacent to the ROW, Muni/Western will limit construction activities to daylight hours (approximately 7:00 a.m. to 6:00 p.m.). During night hours, no activities	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					that would unnaturally increase the light or noise within adjacent occupied habitat will occur. In areas where the SBKR, CAGN, least Bell's vireo, or southwestern willow flycatcher are present, either within or adjacent to the ROW, Muni/Western will avoid or reduce construction activities in the vicinity of occupied habitat during the breeding season. Avoidance will take place from March 1 through June 30. In certain areas, avoidance of southwestern willow flycatcher will continue through July 31. Where complete avoidance is not possible, construction activities will be conducted in a manner that attempts to minimize disturbance during early morning hours and avoids the most sensitive breeding months of April and May. In areas where preconstruction sensitive species surveys and other seasonally limited activities such as seed collection and plant propagation are needed, Muni/Western will prepare a calendar of when such activities need to be accomplished and incorporate this into design and construction schedules to ensure that the surveys can be conducted in the appropriate season without causing delays. MM BIO-2: Muni /Western will develop a Habitat Revegetation, Restoration, and Monitoring Program (Program), obtaining input from CDFG and USFWS, for implementation in all habitat areas directly affected by construction activities. The Program will include the following measures: invasive species control, topsoil salvage and replacement, and habitat rehabilitation and replacement.	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					*Invasive Species Control* Where appropriate and feasible, the area to be disturbed will be treated to kill invasive exotics species and limit their seed production before initiating any earthmoving activity with the objectives of (1) preventing invasive species from spreading from the disturbance area, and (2) removing weed sources from the salvaged topsoil. Herbicides will be used only by a licensed herbicide applicator and may require notification to property owners or resource agencies. The treatment will be completed before earthmoving in order for this mitigation to have its intended effect (e.g., the treatment would need to occur before target species set seed). *Topsoil Salvage and Replacement* In areas where vegetation and soil are to be removed, the topsoil will be salvaged and replaced, where practicable. This may be accomplished using two lifts, the first to salvage the seed bank, and the second to salvage soil along with soil biota in the root zone. Soil will be stockpiled in two areas near the project site, with the seed bank labeled to identify it. Topsoil will be replaced in the proper layers after final reconfiguration of disturbed areas. Where presence of extensive deposits of boulders and cobbles limit the opportunity to salvage topsoil and make the above-mentioned procedure infeasible, Muni/Western will salvage available surface material and stockpile it for replace-ment on the surface of the restored area. Stockpiles will be covered if the soil is to be left for an extended period to prevent losses due to erosion and invasion of weeds.	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					*Habitat Rehabilitation and Revegetation* Muni/Western will develop and implement plans and specifications for replanting areas disturbed by the Project. Replanting will be with native species propagated from locally collected seed or cuttings, and, if applicable, will include seed of sensitive species that would be impacted during construction activities. Monitoring procedures and performance criteria will be developed by Muni/Western to address revegetation and erosion control. The performance criteria will consider the level of disturbance and the condition of adjacent habitats. Monitoring will continue for 3-5 years, or until performance criteria have been met. Appropriate remedial measures, such as replanting, erosion control or weed control, will be identified and implemented if it is determined that performance criteria are not being met. MM BIO-3: Before ground disturbance or other activities, qualified botanists and wildlife biologists will survey all proposed construction, staging, stockpile, and access areas for presence of state- or federally-listed plant or wildlife species. Preconstruction surveys will occur during the appropriate season and in accordance with established protocols (if required). These surveys will be conducted in all construction areas that occur in riparian, RAFSS, RSS, chaparral, or other native habitats. These surveys are for the purpose of documenting their locations relative to the construction areas and avoidance where feasible. Colonies of state- or federally- listed plants will be clearly marked, mapped, and recorded along with the numbers of individuals in each colony and their respective condition. Locations of listed animal species will also be marked,	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					mapped, and recorded. To the maximum extent feasible, construction areas and access roads will be adjusted to avoid loss of individual listed plants and animals and damage to habitats supporting these species. Individuals of listed wildlife species in the ROW, other than birds and other mobile species, will be captured if possible by biologists with the appropriate permits and relocated to suitable habitat outside the ROW. MM BIO-4: Where impacts to listed plant species are unavoidable, Muni/Western will develop and implement, together with the listing agency, a salvage, propagation, replanting, and monitoring program that would utilize both seed and salvaged plants constituting a representative sample of each colony of the species that would be affected. The program will include measures to perpetuate the genetic lines represented to the maximum extent feasible. The program will be approved by the appropriate resource protection agencies prior to its implementation. Activities involving handling of state- or federally- listed plant species may require permits as well as a memorandum of understanding from the USFWS or CDFG. The Muni/Western salvage, propagation, replanting, and monitoring program will incorporate provisions for re-creating suitable habitat and measures for re-establishing self-sustaining colonies of listed plant species, should they be affected on the various project sites. The program will include provisions for monitoring and performance criteria, including an annual assessment of progress, and provisions for remedial action if performance criteria are not being met. MM BIO-5: Prior to ground disturbance or other activities, qualified wildlife biologists will survey all proposed construction, staging, stockpile, and access areas for	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					presence of non-listed sensitive wildlife species. Preconstruction surveys will take place during the appropriate season and in accordance with established protocols (if required). These surveys will be conducted in all construction areas that occur in native habitats. In the event that non-listed sensitive wildlife species are observed in the impact area during these pre-project surveys, Muni/Western will implement the following measures: • Locations of non-listed sensitive animals found during the surveys will also be marked, mapped, and recorded. Locations of burrowing animals will be avoided where feasible. • Individuals of non-listed sensitive wildlife species in the ROW, other than birds, will be captured and relocated to suitable habitat outside the ROW. • Where nesting of non-listed sensitive bird species is found to occur within the ROW, vegetation clearing will be conducted outside the nesting season. MM BIO-6: Prior to ground disturbance or other activities, qualified botanists will survey all proposed construction, staging, stockpile, and access areas for presence of non-listed sensitive plant species. Preconstruction surveys will take place during the appropriate season and in accordance with established protocols (if required). These surveys will be conducted in all construction areas that occur in native habitats. In the event that non-listed sensitive plant species are observed in the impact area during pre-project surveys, Muni/Western will implement the following measures: • Colonies will be clearly marked, mapped, and recorded along with the numbers of individuals in each colony and their respective condition. To the	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-1 (cont.)					extent feasible, construction areas and access roads will be configured to avoid or minimize loss of individual plant and or damage to occupied habitats. • Where impacts to non-listed sensitive plant species are unavoidable, Muni/Western will develop and implement a salvage, propagation, replanting, and monitoring program that would utilize both seed and salvaged plants constituting an ample and representative sample of each colony.	
BIO-2	X			Construction of the Plunge Pool Pipeline would disturb and temporarily remove riparian, wetland, and stream habitat and cause mortality of common riparian wildlife species.	See MM BIO-1 and MM BIO-2.	Less than significant.
BIO-3	X			Construction of the Plunge Pool Pipeline would disturb and remove upland vegetation and wildlife habitat, including RAFSS, and cause mortality in common wildlife species.	See MM BIO-1 and MM BIO-2. MM BIO-7: To reduce impacts on biological resources, Muni/Western will realign pipelines to avoid sensitive resources and habitat to the maximum extent feasible. Specifically, Muni/Western will realign Phase II of the Plunge Pool Pipeline northward and place it adjacent to Greenspot Road (See Figure 3.3-7). This will put the project-related disturbance at the edge of the habitat and avoid bisecting the intermediate to mature RAFSS habitat along the western portion of the alignment. MM BIO-8: If MM BIO-7 is found to be infeasible, to compensate for permanent or long-term losses of RAFSS habitat and RAFSS habitat value, Muni/Western will acquire, for every acre impacted, a minimum of 1 acre of habitat of similar or greater habitat value than the RAFSS area impacted by the Plunge Pool Pipeline and dedicate it in perpetuity as a habitat conservation easement area, or other	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-3 (cont.)					appropriate designation, and provide funding for its future management as native habitat in perpetuity. The acquired RAFSS habitat area would ideally be contiguous with existing habitat already set aside in the WSPA or other dedicated RAFSS habitat. If good quality habitat in such a locality is not available for purchase, availability of other RAFSS habitat will be investigated, with the objective of obtaining good quality habitat near the project area.	
BIO-4	X			Construction of the Plunge Pool Pipeline would disturb or remove non-listed sensitive plant species, such as Plummer's mariposa lily (*Calochortus plummerae*) and Parry's spineflower (*Chorizanthe parryi* var. *parryi*), and their habitat.	See MM BIO-1, MM BIO-2, MM BIO-6, and MM BIO-7.	Less than significant.
BIO-5		X		Construction of the Plunge Pool Pipeline could disturb or remove habitat potentially occupied by listed wildlife species including the CAGN and the SBKR.	No mitigation is required, but MM BIO-1 through MM BIO-3 and MM BIO-7 are recommended.	Less than significant.
BIO-6		X		Construction of the Plunge Pool Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species such as the burrowing owl and the San Diego horned lizard.	No mitigation is required, but MM BIO-1, MM BIO-2 and MM BIO-5 are recommended.	Less than significant.
BIO-7		X		Construction of the Low Flow Connector Pipeline would disturb and remove upland vegetation and wildlife habitat and cause mortality in common wildlife species.	No mitigation is required, but MM BIO-1 and MM BIO-2 are recommended.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-8		X		Construction of the Low Flow Connector Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species.	No mitigation is required, but MM BIO-1, MM BIO-2 and MM BIO-5 are recommended.	Less than significant.
BIO-9		X		Construction of the Morton Canyon Connector II Pipeline would disturb and remove upland vegetation and wildlife habitat and cause mortality of common wildlife species.	No mitigation is required, but MM BIO-1 and MM BIO-2 are recommended.	Less than significant.
BIO-10		X		Construction of the Morton Canyon Connector II Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species.	No mitigation is required, but MM BIO-1, MM BIO-2 and MM BIO-5 are recommended.	Less than significant.
Devil Canyon Construction Area						
BIO-11	X			Construction of the Devil Canyon By-Pass Pipeline would disturb and remove upland, wetland, and riparian vegetation and wildlife habitat and cause mortality in common wildlife species.	See MM BIO-1 and MM BIO-2.	Less than significant.
BIO-12		X		Construction of the Devil Canyon By-Pass Pipeline could disturb habitat potentially occupied by listed and non-listed sensitive wildlife species.	No mitigation is required, but MM BIO-1, MM BIO-2 and MM BIO-5 are recommended.	Less than significant.
Lytle Creek Construction Area						
BIO-13		X		Construction of the Lower Lytle Creek Pipeline would disturb or remove upland vegetation and wildlife habitat and cause mortality in common wildlife species.	No mitigation is required, but MM BIO-1 and MM BIO-2 are recommended.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	Significant	Less than Significant	Beneficial	Environmental Impact	Mitigation Measure and Number	Residual Impact
BIO-14		X		Construction of the Lower Lytle Creek Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species.	No mitigation is required, but MM BIO-1, MM BIO-2 and MM BIO-5 are recommended.	Less than significant.
PROJECT OPERATIONS AND MAINTENANCE						
Seven Oaks Dam and Reservoir Area Construction Area						
BIO-15		X		Seasonal water conservation storage could alter the ecology of the Seven Oaks Dam and Reservoir Area.	No mitigation is required.	Not applicable.
Santa Ana River						
BIO-16		X		Reduction in frequency and extent of flood flows could adversely impact RAFSS by reducing the frequency and extent of habitat renewal processes in this natural community type.	No mitigation is required.	Not applicable.
BIO-17	X	X		Reduction in frequency and extent of overbank flooding could adversely affect SBKR and Santa Ana River woolly-star habitat. This impact would be significant between Cuttle Weir and Mill Creek and less than significant downstream of the confluence with Mill Creek.	MM BIO-9: Muni/Western will monitor and remove invasive non-native species establishing in the channel and adjacent RAFSS habitats between Seven Oaks Dam and Mill Creek. Target species include species of tamarisk or salt cedar (Tamarix spp.), fountain grass (Pennisetum setaceum), and giant reed (Arundo donax). These species establish in habitats suitable for SBKR and Santa Ana River woolly-star and have the potential to spread further into adjacent suitable habitat areas. Initial control will be established using a combination of physical removal and herbicidal treatment using appropriate environmental safeguards. Two to several follow-up treatments would be anticipated during the first year with follow-up monitoring and treatments at least once annually in ensuing years.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-17 (cont.)					MM BIO-10: Muni/Western will develop a program, together with the USFWS and CDFG, to selectively restore SBKR and Santa Ana River woolly-star habitat by using habitat manipulation, either by mechanical means or high pressure water, to remove vegetation and leave freshly deposited sand and silt, simulating the habitat-renewing aftermath of natural flooding. This will be done using an adaptive management approach with input from the USFWS and CDFG. If the high pressure water method is used, water will be piped by Muni/Western to areas of suitable habitat. A high-pressure nozzle will be directed at localized areas of habitat determined to be suitable for SBKR and Santa Ana River woolly-star after renewal. The nozzle will be hand-operated or operated from a light vehicle. Treatments will be accomplished in a randomized block design to allow experimental testing of variables such as duration and intensity of spray, addition of clean sand, season of disturbance, application of seed vs. allowing natural dispersal, etc. A rigorous monitoring program funded by Muni/Western will be established to enable the differences among experimental treatments to be determined. The primary indicator of success will be related to development of habitat characteristics identified with pioneer to intermediate RAFSS habitat within which SBKR and Santa Ana River woolly-star populations have been documented. These characteristics are documented in the literature and will be specified as part of the Muni/Western program. The program will be adjusted appropriately as results from earlier efforts become available. The design and implementation of the ongoing effort will be funded by Muni/Western and conducted by representatives of Muni/Western with input from the USFWS and CDFG.	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
BIO-18		X		Changes in non-storm day flows caused by the Project could affect aquatic habitats and species downstream of the point of diversion.	No mitigation is required.	Not applicable.
BIO-19		X		Changes in storm flows caused by the Project could affect the Santa Ana sucker downstream of the point of diversion.	No mitigation is required.	Not applicable.
BIO-20		X		Changes in non-storm day flows caused by the Project could affect the Santa Ana sucker downstream of the point of diversion.	No mitigation is required.	Not applicable.
BIO-21		X		Changes in non-storm day flows caused by the Project could affect riparian and wetland habitat and species downstream of the point of diversion.	No mitigation is required.	Not applicable.
Section 3.4 Geology, Soils, and Mineral Resources						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
GEO-1	X			See Impact GEO-1 under section. 3.1	See MM GEO-1 under section 3.1.	Less than significant.
GEO-2	X			See Impact GEO-2 under section. 3.1	See MM GEO-1 under section 3.1.	Less than significant.
Santa Ana River Construction Area						
GEO-3	X			See Impact GEO-3 under section. 3.1	See MM GEO-1 under section 3.1.	Less than significant.
GEO-4	X			See Impact GEO-4 under section. 3.1	See MM GEO-2 under section 3.1.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
GEO-5	X			Excavation of large temporary slopes to accommodate pipeline installation, at gradients as steep as 1:1 (horizontal to vertical), in unstable geologic units, could result in significant impacts associated with on-site landslides or collapse.	MM GEO-3: Muni/Western will implement recommendations established in a site-specific geotechnical report, prepared by a qualified geotechnical engineer or engineering geologist. The report recommendations will be based on a comprehensive evaluation of slope stability, seismic, and soil conditions that may affect construction of the pipelines and related facilities. Recommendations will be consistent with provisions of California Code of Regulations, Title 8, Construction Safety Orders. Project grading and excavations will be observed by a geotechnical engineer, engineering geologist, or other qualified representative, to verify compliance with recommendations of the geotechnical report. The geotechnical investigation will be completed in accordance with: • CDMG Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (CDMG 1997) • Southern California Earthquake Center, Recommended Procedures *for Implementation of DMG Special P8ublication 117 Guidelines for Analyzing and Mitigating Liquefaction in California* (SCEC 1999).	Less than significant.
GEO-6		X		Project construction in the Santa Ana River Construction Area would result in loss of availability of a known mineral resource.	No mitigation is required.	Not applicable.
Devil Canyon Construction Area						
GEO-3, -4, and -5	X			See Impacts GEO-3, GEO-4, and GEO-5.	See MM GEO-1, MM GEO-2, and MM GEO-3.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Lytle Creek Construction Area						
GEO-3, -4, and -5	X			See Impacts GEO-3, GEO-4, and GEO-5.	See MM GEO-1, MM GEO-2, and MM GEO-3.	Less than significant.
PROJECT OPERATIONS AND MAINTENANCE						
Santa Ana River Construction Area						
GEO-7	X			Multiple faults in the Santa Ana River Construction Area, including the San Andreas Fault Zone, could produce strong seismic ground shaking that would expose structures to substantial adverse effects.	MM GEO-4: Muni/Western will implement seismic-related recommendations contained in a site-specific geotechnical report, as discussed in MM GEO-3, to minimize seismically induced damage to the pipeline. MM GEO-5: A water flow shut-off mechanism will be installed by Muni/Western at the Plunge Pool Pipeline Intake Structure to terminate flow immediately following a large earthquake in the vicinity of the site. MM GEO-6: Muni/Western will complete emergency repairs to the pipeline and/or related facilities, in the event of seismically induced damage. MM GEO-1 and MM GEO-2 will be applied to reduce erosion-related impacts associated with soil disturbance during emergency repairs.	Significant and unavoidable.
GEO-8	X			Seismically induced liquefaction in the Santa Ana River Construction Area could result in pipeline damage and/or failure.	See MM GEO-1, MM GEO-2, MM GEO-4, MM GEO-5, and MM GEO-6.	Significant and unavoidable.
GEO-9		X		The Santa Ana River Construction Area is located on a geologic unit that could become unstable due to differential settlement associated with the Project, and potentially result in collapse.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Devil Canyon Construction Area						
GEO-7, and -9	X	*X*		See Impacts GEO-7 and GEO-9.	No mitigation is required for Impact GEO-9. See MM GEO-1, MM GEO-2, MM GEO-4, MM GEO-5, and MM GEO-6 for Impact GEO-7.	Impact GEO-7 would be significant and unavoidable.
GEO- 10		X		Historic groundwater conditions could expose structures in the Devil Canyon Construction Area to substantial adverse effects involving seismically induced liquefaction.	No mitigation is required.	Not applicable.
Lytle Creek Construction Area						
GEO-7, and -9	X	X		See Impacts GEO-7 and GEO-9	No mitigation is required for Impact GEO-9. See MM GEO-1, MM GEO-2, MM GEO-4, MM GEO-5, and MM GEO-6 for Impact GEO-7.	Impact GEO-7 would be significant and unavoidable.
San Bernardino Basin Area						
GEO-11			X	The surface area exposed to liquefaction potential within the Pressure Zone of the SBBA under all Project scenarios is less than under No Project conditions.	No mitigation is required.	Not applicable.
GEO-12			X	The surface area exposed to liquefaction potential outside the Pressure Zone of the SBBA (including the forebay and the intermediate area), under all Project scenarios, is less than under No Project conditions.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
GEO-13	X			High groundwater conditions could occur in the vicinity of Devil Canyon, Lytle Creek, and Mill Creek, located in the forebay of the SBBA.	MM GEO-7: Muni/Western will implement a groundwater level monitoring program using data from Index Wells (see Figure 3.4-5). This information will be used in conjunction with forecasts of groundwater levels derived from Muni/Western integrated surface and groundwater models to identify trends in groundwater levels and identify changes directly attributable to the Project. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni Western will direct Project water spreading to limit high groundwater conditions in the vicinity of Devil Canyon, Lytle Creek, Mill Creek, and areas in the forebay and intermediate area of the SBBA.	Significant and unavoidable.
GEO-14	X			Project-related groundwater levels within the intermediate area of the SBBA would locally rise within a depth of 50 feet of the ground surface.	See MM GEO-7.	Significant and unavoidable.
GEO-15	X			Subsidence rates in excess of 0.01 ft/yr would occur in the Pressure Zone from WY 2010 to WY 2017.	MM GEO-8: Muni/Western will implement a groundwater level monitoring program using data from Index Wells (see Figure 3.4-5). This information will be used in conjunction with forecasts of groundwater levels derived from Muni/Western integrated surface and groundwater models to identify trends in groundwater levels and isolate changes attributable to the Project. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni Western will direct Project water spreading to limit potential for subsidence in the Pressure Zone area of the SBBA.	Significant and unavoidable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Section 3.5 Land Use and Planning						
PROJECT OPERATIONS AND MAINTENANCE						
San Bernardino Basin Area						
LU-1		X		Increases in groundwater levels, due to Project operations, could conflict with existing land uses and limit future use of property in the Pressure Zone of the SBBA.	No mitigation is required.	Not applicable.
LU-2	X			Project construction and operation could be inconsistent with San Bernardino County policies related to maintaining water utilities during seismic events.	See MM GEO-5.	Less than significant.
Section 3.6 Agricultural Resources						
PROJECT CONSTRUCTION						
Santa Ana River Construction Area						
AG-1		X		Construction of the westernmost portion of Phase I of the Plunge Pool Pipeline would result in the temporary conversion of approximately 11 acres of Important Farmland (i.e., Farmland of Statewide Importance) to non-agricultural use.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Section 3.8 Air Quality						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir, SAR, Devil Canyon, and Lytle Creek Construction Areas						
AQ-1		X		Emissions from construction activities would not exceed a criteria pollutant ambient air quality standard for O_3, CO, NO_2, PM_{10}, and $PM_{2.5}$, substantially contribute to an existing or projected air quality standard violation, or expose sensitive receptors to substantial pollutant concentrations.	No mitigation is required.	Not applicable.
AQ-2	X			Emissions from construction activities would exceed the daily and calendar quarter SCAQMD emission significance thresholds for ROC, CO, NOx and PM_{10}.	MM AQ-1: Muni/Western will encourage the contractor to use emulsified diesel fuel in construction equipment, where feasible. Use of this alternative diesel fuel would reduce NOx and PM emissions by 14 and 62.9 percent, respectively, from conventional diesel (CARB 2001). MM AQ-2: Muni/Western will encourage the contractor to use the newest diesel-powered equipment available.	Significant and unavoidable for ROC, CO, and NOx emissions. Less than significant for PM_{10} emissions.
AQ-3		X		Construction of the conveyance facilities would expose the public to some concentrations of TACs.	No mitigation is required.	Not applicable.
Section 3.9 Cultural and Paleontological Resources						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
CR-1		X		Construction of the realigned upstream access road would cause a less than significant adverse change in the significance of the operator housing complex associated with SAR 2.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
CR-2	X			Destruction of an unanticipated cultural or paleontological resource because of construction activities would cause a substantial adverse change in the significance of the resource pursuant to section 15064.5 of CEQA.	MM CR-1: In the event of an unanticipated archaeological or paleontological resource discovery during construction, all ground disturbances within 150 feet of the discovery will be halted or redirected to other areas until the discovery has been documented by a qualified archaeologist or paleontologist, and its potential significance evaluated consistent with CEQA. Resources considered significant will be avoided by Project redesign. If avoidance is not feasible, the resource will be subject to a data recovery mitigation program, as appropriate. If human remains are discovered, the County Coroner will be contacted, and all procedures required by the California Health and Safety Code section 7050.5, State CEQA Guidelines section 15064.5(e), and PRC section 5097.98 will be followed.	Less than significant.
Santa Ana River Construction Area						
CR-2	X			See Impact CR-2.	See MM CR-1.	Less than significant.
CR-3	X			Construction of the Plunge Pool Pipeline (Phase I) would cause a substantial adverse change in the significance of the Francis Cuttle Weir Dam, a potentially significant historical resource as defined in section 15064.5 of CEQA.	MM CR-2: Proposed construction of the Plunge Pool Pipeline will avoid physical impacts to the Francis Cuttle Weir Dam to the extent feasible. In the event that any portion of the Francis Cuttle Weir Dam would be modified or demolished, a qualified architectural historian will prepare a historic recordation of the Francis Cuttle Weir Dam, in the context of the Conservation District’s groundwater spreading system. The recordation will conform to the standards of either the Historic American Buildings Survey (HABS) or the Historic American Engineering Record (HAER).	Significant and unavoidable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
CR-4	X			Construction of the Plunge Pool Pipeline (Phase I) would cause a substantial adverse change in the significance of the North Fork Canal, a potentially significant historical resource as defined in section 15064.5 of CEQA.	MM CR-3: Prior to construction activities along the segment of the Plunge Pool Pipeline, Phase I, aligned north of Greenspot Road, the location of the North Fork Canal will be precisely mapped on engineering design plans to identify where the canal falls within the construction corridor. Temporary fencing will be placed 5 feet south of the canal along the portion of the canal that falls within the construction corridor to provide a small buffer area, and no heavy construction equipment or vehicles will be allowed north of the fencing.	Less than significant.
CR-5		X		The construction of the Plunge Pool Pipeline (Phase II) would cause a less than significant adverse change in the significance of Grove House/Well site.	No mitigation is required.	Not applicable.
CR-6	X			The construction of the Plunge Pool Pipeline (Phase III) would cause a substantial adverse change in the significance of the Francis Cuttle Weir Dam, a potentially significant historical resource as defined in section 15064.5 of CEQA.	See MM CR-2.	Significant and unavoidable.
CR-7		X		The construction of the Plunge Pool Pipeline (Phase III) would cause a less than significant adverse change in the historic integrity of the North Fork Canal, a potentially significant historical resource as defined in section 15064.5 of CEQA.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
CR-8		X		The construction of the Morton Canyon Connector II Pipeline would cause a less than significant adverse change in the historic integrity of the Redlands Canal, a potentially significant historical resource as defined in section 15064.5 of CEQA.	No mitigation is required.	Not applicable.
CR-9	X			The construction of the Morton Canyon Connector II Pipeline would cause a substantial adverse change in the significance of the Greenspot Bridge, a significant historical resource as defined in section 15064.5 of CEQA, if the pipeline is installed through the "Hole in the Wall" at Greenspot Bridge.	MM CR-4: If it is necessary to install the Morton Canyon Connector II Pipeline through the "Hole in the Wall" within Greenspot Bridge's retaining wall, construction activities will be confined to previously disturbed sections only and the wall will be restored to pre-Project conditions. Prior to construction, a qualified architectural historian will review the final construction designs of the Morton Canyon Connector II Pipeline to verify avoidance of significant impacts to any Greenspot Bridge feature.	Less than significant.
Devil Canyon Construction Area						
CR-2	X			See Impact CR-2.	See MM CR-1.	Less than significant.
Lytle Creek Construction Area						
CR-2	X			See Impact CR-2.	See MM CR-1.	Less than significant.
CR-10		X		The construction of the Lower Lytle Creek Pipeline would cause a less than significant adverse change in the historic integrity of the Fontana Powerhouse complex, a potentially significant historical resource as defined in section 15064.5 of CEQA.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Section 3.10 Noise						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
NOI-1		X		Construction at the Seven Oaks Dam and Reservoir Area would generate Ldn levels of less than 60 dBA at the nearest noise sensitive receptors.	No mitigation is required.	Not applicable.
Santa Ana River Construction Area						
NOI-2	X			Construction of the Plunge Pool Pipeline could expose residents near Greenspot Road to increases in ambient noise levels. Temporary Ldn increases of more than 10 dBA could raise the levels to more than 70 dBA.	MM NOI-1: • A construction noise monitor, identified by the Project proponents, will be responsible for overseeing the contractor's implementation of the noise mitigation measures. The monitor will also be the point of contact for noise complaints. • Construction will occur only from Monday through Friday between 7 AM and 7 PM. No construction will occur on weekends or holidays. • Noise-generating construction equipment will be less than 10 years old or, if older, will not generate higher noise levels than new low-noise generating models. Documentation will be provided by the contractor. • Construction equipment will be accessorized with the manufacturers' recommended noise attenuation devices, such as sound mufflers or self-adjusting backup alarms, and be appropriately maintained. • In noise sensitive areas, temporary noise barriers will be located around high noise-generating equipment.	Significant and unavoidable for residents close to the construction.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
NOI-2 (cont.)					• Placement of construction equipment during times of operation will take into account the location of noise sensitive receptors. • Where noise levels are expected to be high, advanced warning in writing will be given to residents in the vicinity of construction activities indicating the expected duration of the activities.	
NOI-3		X		Construction of the Plunge Pool Pipeline could expose users of the Santa Ana Divide Trail to increased ambient noise levels.	No mitigation is required.	Not applicable.
NOI-4		X		Construction at the Morton Canyon Connector II Pipeline would create Ldn levels of less than 60 dBA at the nearest noise sensitive receptors.	No mitigation is required.	Not applicable.
Devil Canyon Construction Area						
NOI-5	X			The Devil Canyon By-Pass Pipeline construction activities could create Ldn levels at nearby residences in excess of 69 dBA and increase noise levels by more than 10 dBA.	See MM NOI-1.	Significant and unavoidable for residents close to the construction.
Lytle Creek Construction Area						
NOI-6	X			Construction of the Lower Lytle Creek and Cactus Basins pipelines could create noise levels (Ldn) at nearby residences in excess of 69 dBA and increase noise levels by more than 10 dBA.	See MM NOI-1.	Significant and unavoidable for residents close to the construction.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
PROJECT OPERATIONS AND MAINTENANCE						
Seven Oaks Dam and Reservoir, SAR, Devil Canyon, and Lytle Creek Construction Areas						
NOI-7		X		Maintenance activities for the proposed pipelines and facilities would not produce a noticeable noise increase for residences in the general area.	No mitigation is required.	Not applicable.
Section 3.11 Aesthetics						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
AES-1		X		Project construction would result in a less than significant impact to aesthetics.	No mitigation is required.	Not applicable.
Santa Ana River Construction Area						
AES-1		X		See Impact AES-1.	No mitigation is required.	Not applicable.
Devil Canyon Construction Area						
AES-1		X		See Impact AES-1.	No mitigation is required.	Not applicable.
Lytle Creek Construction Area						
AES-1		X		See Impact AES-1.	No mitigation is required.	Not applicable.
PROJECT OPERATIONS AND MAINTENANCE						
Santa Ana River Segments A-G						
AES-2		X		Project operations would result in a less than significant impact to aesthetics.	No mitigation is required.	Not applicable.
Groundwater Recharge Facilities						
AES-3		X		Project operations would result in a less than significant impact to aesthetics at and in the vicinity of groundwater spreading grounds.	No mitigation is required.	Not applicable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Section 3.12 Hazardous Materials and Groundwater Contamination						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
HAZ-1	X			The Project could create a significant hazard to the environment through the routine transport, use, and disposal of hazardous materials and waste used during grading and construction. Such hazards could occur through upset and accident conditions involving the release of construction equipment-related hazardous materials into the environment.	MM HAZ-1: Muni/Western will direct the contractor to wash out concrete trucks in a designated area where the material cannot run off into the stream or percolate into the groundwater. This area will be specified on all applicable construction plans and be in place before any concrete is poured. Muni/Western will direct the contractor to service construction vehicles in a manner that contains fluids, such as lubricants, within an impervious area to avoid spill-related water quality impacts. MM HAZ-2: Muni/Western will direct the contractor to inspect and, as necessary, service all equipment before it enters the construction site and regularly thereafter, and before working immediately adjacent to the SAR or any other drainage or creek to avoid equipment leak-related water quality impacts. Muni/Western will direct the contractor to repair any leaks or hoses/fittings in poor condition before the equipment begins work. MM HAZ-3: Muni/Western will direct the contractor to prepare a spill prevention and containment plan prior to equipment use on the site. Muni/Western will direct the contractor to follow the spill prevention plan during Project construction to prevent spill-related water quality impacts. This plan will include, but not necessarily be limited to: a. Specific bermed equipment maintenance and refueling areas. b. Bermed and lined hazardous material storage areas on site that are covered during the rainy season.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
HAZ-1 (cont.)					c. Hazardous material spill cleanup equipment on site (e.g., absorbent pads, shovels, and bags to contain contaminated soil). d. Workers trained in the location and use of cleanup equipment.	
Santa Ana River Construction Area						
HAZ-1	X			See Impact HAZ-1.	See MM HAZ-1, MM HAZ-2, and MM HAZ-3.	Less than significant.
Devil Canyon Construction Area						
HAZ-1	X			See Impact HAZ-1.	See MM HAZ-1, MM HAZ-2, and MM HAZ-3.	Less than significant.
Lytle Creek Construction Area						
HAZ-1	X			See Impact HAZ-1.	See MM HAZ-1, MM HAZ-2, and MM HAZ-3.	Less than significant.
PROJECT OPERATIONS AND MAINTENANCE						
San Bernardino Basin Area						
HAZ-2	X			The spatial extent of the perchlorate contamination footprint under all Project scenarios is greater than that under No Project conditions. When compared to the No Project, the number of wells contaminated by perchlorate under all Project scenarios exceeds the number of wells that avoid contamination.	MM HAZ-4: Using available data, in conjunction with the integrated surface and groundwater models, Muni/Western will identify groundwater trends, including plume movement and isolate changes attributable to the Project. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni/Western will direct Project water spreading to limit adverse plume movements.	Significant and unavoidable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
HAZ-3	X		X	The spatial extent of the TCE contamination footprint under all Project scenarios is less than that under No Project conditions. When compared to the No Project, the number of wells contaminated by TCE under Project Scenario C equals the number of wells that avoid contamination. For Project Scenarios A, B, and D, the number of wells contaminated exceeds the number of wells that would avoid contamination.	See MM HAZ-4.	Significant and unavoidable.
HAZ-4	X		X	The spatial extent of the PCE contamination footprint under all Project scenarios is less than that under No Project conditions, which results in a beneficial impact. When compared to the No Project, the number of wells contaminated by PCE under Project Scenarios A and B is less than the number of wells that avoid contamination. For Project Scenario C the number of wells contaminated equals the number of wells that would avoid contamination. For Project Scenario D, the number of wells contaminated exceeds the number of wells that would avoid contamination.	See MM HAZ-4.	Significant and unavoidable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Section 3.13 Public Services, Utilities, and Transportation						
PROJECT CONSTRUCTION						
Seven Oaks Dam and Reservoir Construction Area						
PS–1		X		Construction in the Seven Oaks Dam and Reservoir Area would result in a minor volume of construction debris.	No mitigation is required.	Not applicable.
PS-2		X		Construction in the Seven Oaks Dam and Reservoir Area would hinder access via the upstream road to SCE Santa Ana River facilities.	No mitigation is required.	Not applicable.
PS-3		X		Construction in the Seven Oaks Dam and Reservoir Area could contribute up to 548 daily trips (as measured in passenger car equivalents) to the surrounding street network.	No mitigation is required.	Not applicable.
Santa Ana River Construction Area						
PS-4	X			Construction of Phase III of the Plunge Pool Pipeline and Low Flow Connector could result in disruption of water supplies from the Plunge Pool By-Pass.	MM PS-1: During construction, Muni/Western will arrange to use facilities of the Santa Ana River-Mill Creek Cooperative Water Project Agreement to make deliveries to local users that would otherwise receive water from the Plunge Pool By-Pass Pipeline. If exchange cannot replace disrupted delivery, Muni/Western will furnish SWP water as replacement supply.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
PS-5	X			Construction of Phase III of the Plunge Pool Pipeline could result in disruption of water supplies from the SCE River Crossing Pipeline/North Fork Pipeline.	MM PS-2: During construction, Muni/Western will arrange to use facilities of the Santa Ana River-Mill Creek Cooperative Water Project Agreement to make deliveries to users that would otherwise receive water via the SCE River Crossing/North Fork Canal. The affected sections of the SCE River Crossing/North Fork canal shall be replaced in-kind after construction. If exchange cannot replace disrupted delivery, Muni/Western will furnish SWP water as replacement supply.	Less than significant.
PS-6	X			Construction of Phase I of the Plunge Pool Pipeline could result in disruption of water supplies from the North Fork Canal.	See MM PS-2.	Less than significant.
PS-7	X			Construction of Phase I of the Plunge Pool Pipeline could result in disruption of water supplies conveyed by the Conservation District Canal.	Either MM PS-3 or MM PS-4 would be applicable to Impact PS-7 MM PS-3: Deliveries that would have occurred to the Santa Ana River spreading grounds via the Conservation District Canal will instead occur via existing Muni facilities. After construction, the affected sections of the canal will be replaced with an in-kind structure. MM PS-4: Part of the Phase I Plunge Pool Pipeline could be replaced by a tunnel, and the length of the Phase III Plunge Pool Pipeline could be shortened. As shown in Figure 3.13-1, under this mitigation measure a tunnel would be built from a point just south and west of Cuttle Weir. The tunnel would extend southwesterly through the mountains for approximately 1,600 feet. At the base of the mountains, the tunnel would transition to an underground pipeline which would extend for approximately 2,250 feet before hooking up to a valve structure at the Foothill Pipeline terminus. Under this mitigation measure the designed conveyance capacity would be 1,500 cfs, though the operating capacity	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
PS-7 (cont.)					would be limited to 500 cfs until Phase II of the Plunge Pool Pipeline was completed. In total, with this mitigation measure, alignment of the Plunge Pool Pipeline Phase I would be approximately 3,850 feet. Due to the different location of the Phase I alignment, Phase III of the Plunge Pool Pipeline would also have to be somewhat modified. Per this mitigated alignment, Phase III of the Plunge Pool Pipeline would trend westward across a more northerly part of the SAR than would occur under the Project and, as a result, this new alignment of Phase III of the Plunge Pool Pipeline would be somewhat shorter, approximately 2,000 feet long, than under the Project (2,980 feet). The Low Flow Connector would remain as proposed by the Project, 3,500 feet long, though with the modifications to the Plunge Pool Pipeline, these two pipes would have a common trench for only about 1,350 feet, rather than 2,250 feet as would occur under the proposed Project. With this mitigation measure, the 15-foot diameter Plunge Pool Pipeline would be inside an 18-foot horseshoe-shaped tunnel. The rock through which the tunnel would be constructed is highly fractured and the steel pipe would be surrounded with concrete backfill. The tunnel would be constructed using a drill and blast method and waste rock would be sent to nearby aggregate facilities. Construction activities would last up to a year with the drilling taking about 3 months and back-filling another 3 months. Construction would occur daily 6 days per week. The route underlies lands of the San Bernardino National Forest.	

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
PS-8		X		Construction of the Low Flow Connector could result in disruption of water supplies from the Greenspot Pipeline for a short period.	No mitigation is required.	Not applicable.
PS-9		X		Construction of Phase I of the Plunge Pool Pipeline could result in disruption of water supplies from the Foothill Feeder and SARC pipelines for a short period.	No mitigation is required.	Not applicable.
PS-10		X		Construction of Phase II of the Plunge Pool Pipeline could result in disruption of water supplies to the Inland Feeder for a short period.	No mitigation is required.	Not applicable.
PS-11	X			Construction of Phase II of the Plunge Pool Pipeline would temporarily alter Greenspot roadway design features, thereby increasing roadway hazards.	MM PS-5: Muni/Western will direct the contractor to have a qualified traffic engineer prepare and implement a traffic management plan that defines how traffic operations will be managed and maintained on roadways during each phase of construction including any detours, signage, lane closures, or utility relocation work. The traffic management plan will specify necessary lane closures, detours, any signage/lighting, flaggers, and other traffic control measures needed to avoid accidents and provide access to residents and emergency response vehicles during construction.	Less than significant.
PS-12	X			Construction of the Morton Canyon Connector would temporarily alter Greenspot roadway design features, thereby increasing roadway hazards.	See MM PS-5.	Less than significant.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
PS-13	X			Construction of Phase I of the Plunge Pool Pipeline would block roadway access to the Seven Oaks Dam site.	MM PS-6: Muni/Western will direct the contractor to regrade a pathway, a portion of which was formerly used as a road during the construction of Seven Oaks Dam. During Project construction in the Santa Ana River Construction Area, non-construction vehicles will be directed to this detour route; see Figure 3.13-1. This detour route will allow authorized vehicles to enter the Seven Oaks Dam access road at a point northeast of the road closure, allowing full access to the Seven Oaks Dam operations buildings, SAR 2/3, and Seven Oaks Dam. Muni/Western will provide security at this detour road to prevent unauthorized access to the dam site.	Less than significant.
PS-14	X			Construction of the Phase III Plunge Pool Pipeline and Low Flow Connector would block roadway access to the Seven Oaks Dam site.	MM PS-7: During construction, Muni/Western will direct non-construction vehicles that need to access Seven Oaks Dam and Reservoir to an alternate access to Seven Oaks Dam; see Figure 3.13-2. This detour route will allow authorized vehicles to enter the dam site at the right abutment of Seven Oaks Dam. Muni/Western will provide security at this alternate access road during construction of the Phase III Plunge Pool Pipeline and Low Flow Connector to prevent unauthorized access to the dam site.	Less than significant.
PS-15		X		Construction in the Santa Ana River Construction Area could add up to 366 daily trips (as measured in passenger car equivalents) to the surrounding street network.	No mitigation is required.	Not applicable.

Environmental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
Devil Canyon Construction Area						
PS-16		X		Construction in the Devil Canyon Construction Area could add up to 122 daily trips (as measured in passenger car equivalents) to the surrounding street network.	No mitigation is required.	Not applicable.
Lytle Creek Construction Area						
PS-17		X		Construction of the Lower Lytle Creek Pipeline could result in disruption of water supplies from the San Gabriel Valley Municipal Water District Lytle Pipeline for a short period.	No mitigation is required.	Not applicable.
PS-18	X			Construction of the Lower Lytle Creek Pipeline would temporarily alter Riverside Avenue roadway design features, thereby increasing roadway hazards.	See MM PS-5.	Less than significant.
PS-19	X			Construction would limit direct access to multiple homes along the Cactus Basins Pipeline Route.	MM PS-5, in combination with the following, would reduce transportation impacts during Project construction: MM PS-8: All construction contractors will provide weekly updates regarding construction schedules and road closures to local police and fire jurisdictions. MM PS-9: All construction contractors will notify all residents in the construction area a minimum of 1 week before beginning construction. MM PS-10: All construction contractors will coordinate construction activities with local emergency services (police, fire, paramedic), the U.S. Postal Service, school bus and Omnitrans operators, delivery services, and local refuse companies to ensure continuity of these services.	Significant and unavoidable.

Table S-1. Summary of Impacts and Mitigation Measures

(continued)

Environ-mental Impact Number	*Significant*	*Less than Significant*	*Beneficial*	*Environmental Impact*	*Mitigation Measure and Number*	*Residual Impact*
PS-19 (cont.)					MM PS-11: All construction contractors will post warning signs and construct barriers to prevent pedestrians from inadvertently entering construction areas or falling into open trenches. Contractors will also ensure that Project construction areas have been properly secured before leaving the work site at the end of the day. Measures may include covering trenches and/or installing temporary fencing and safety lights.	
PS-20		X		Construction in the Lytle Creek Construction Area could cause a temporary disruption to bus service.	No mitigation is required.	Not applicable.
PS-21		X		Construction in the Lytle Creek Construction Area could add up to 404 daily trips (as measured in passenger car equivalents) to the surrounding street network.	No mitigation is required.	Not applicable.
PS-22	X			Change in pattern of groundwater recharge related to the Project could lower average groundwater levels at wells outside the Pressure Zone thus impairing groundwater production.	MM PS-12: Per the requirements of the Seven Oaks Accord, to avoid a significant effect on groundwater levels at one or more index wells located outside the Pressure Zone, Muni/Western will spread sufficient water to maintain static groundwater levels at the affected index wells. To implement this mitigation measure, Muni/Western will use a groundwater monitoring program based on information derived from the index wells. This information will be used in conjunction with forecasts of groundwater levels derived from Muni/Western integrated surface and groundwater models to identify trends in groundwater levels and isolate the share of change attributable to the Project. Remedial action will be implemented prior to an actual 10-foot reduction being reached, to avoid the significant impact.	Less than significant.

Table S-2. Impacts of Alternatives Compared to Those of the Project

Resource Area	*No Project*	*Alternative 1 – New Local Water Supplies*	*Alternative 2 – Enhanced Conservation*	*Alternative 3 – New Imported Water Supply*
DIRECT IMPACTS				
Surface Water Hydrology and Water Quality	–	= (construction) + (recycling)	+	–
Groundwater Hydrology and Water Quality	–	= (construction) + (recycling)	+	–
Biological Resources	–	– (construction) = (operations)	+	+
Geology, Soils, and Mineral Resources	–	=	–	–
Land Use and Planning	–	=	–	=
Agricultural Resources	–	=	–	=
Recreational Resources	–	=	–	+
Air Quality	–	+ (desalination) + (recycling) – (groundwater extraction)	–	+
Cultural and Paleontological Resources	–	–	–	=
Noise	–	+ (construction) = (operations)	–	=
Aesthetics	–	+	–	+
Hazardous Materials and Groundwater Contamination	–	+	–	+
Public Services, Utilities, and Transportation	–	= (public services) + (utilities & services) + (transportation)	–	= (public services) + (utilities & services) + (transportation)
INDIRECT IMPACTS				
	–	=	=	=

Notes:
+ Impacts of Alternative greater than impacts of Project.
= Impacts of Alternative equal to impacts of Project.
– Impacts of Alternative less than impacts of Project.

This page intentionally left blank.

1.0 INTRODUCTION

This Environmental Impact Report (EIR) has been prepared to evaluate the environmental impacts associated with water right applications filed by the San Bernardino Valley Municipal Water District and Western Municipal Water District of Riverside County (Muni/Western) to divert and put to beneficial use a total of up to 200,000 acre-feet of water per year (afy) from the Santa Ana River (SAR). The Project consists of all discretionary actions necessary to conserve, divert, convey and store this water from the SAR for beneficial use.

Muni and Western are regional water agencies that manage groundwater and surface water supplies in San Bernardino and Riverside counties in Southern California. The recent completion of Seven Oaks Dam on the SAR provides an opportunity for Muni/Western to achieve the following objectives:

- Increase water supply reliability by reducing dependence on imported water;
- Develop and deliver a new, local, high quality, long-term water supply that is needed to meet part of anticipated future demands; and
- Expand operational flexibility by adding infrastructure and varying sources of water, thereby providing Muni/Western with greater capability to match varying supply and demand.

To accomplish these objectives, Muni/Western have jointly filed two applications with the State Water Resources Control Board (SWRCB) to appropriate water from the SAR. The applications seek the right to divert and put to beneficial use a total of up to 200,000 afy of local water.

1.1 OVERVIEW OF THE PROPOSED PROJECT

Water appropriated from the SAR will be put to beneficial use in the Muni/Western service area through direct use, groundwater recharge, and/or exchange. Muni/Western have developed a set of analytic techniques and models which allows them to demonstrate the manner in which groundwater and surface water resources in their region can be conjunctively used. These techniques and models also demonstrate how it is possible to allocate water for maximum beneficial use through direct delivery, spreading to underground storage, or exchange. Muni/Western have, or will, develop, through joint use agreements, the ability to coordinate use of water conveyance facilities on a local and regional basis. Muni/Western do not propose to export water for use outside their service areas. Any water conveyed outside their service areas would be returned via exchange as soon as practical.

Hydrologic analyses by Muni/Western indicate that, after senior water right claims and environmental needs are accounted for, seasonal water conservation at Seven Oaks Dam can provide a water supply sufficient to help meet projected demand within the Muni/Western service area and significantly reduce the need to increase the use of imported water. This will, in turn, improve the reliability of regional water supplies and allow for effective conjunctive use of groundwater and surface water supplies. This supplemental water has the added benefit of making water that is not imported by Muni/Western available to help meet the needs of other areas that depend on the State Water Project (SWP) and Colorado River water.

To divert, convey, and store water from the SAR, existing facilities would be used to the extent feasible. However, it would be necessary to construct and/or modify a number of facilities. These Project-related facilities are located in four areas.

- The Seven Oaks Dam and Reservoir Area includes the intake structure of Seven Oaks Dam, the access road to the intake structure, and a section of road providing access upstream of the dam. To achieve the desired level of conservation storage, these infrastructure elements require modification.
- The Santa Ana River Construction Area includes the following proposed new facilities: Plunge Pool Pipeline; Low Flow Connector Pipeline; and Morton Canyon Connector II Pipeline.
- The Devil Canyon Construction Area adjacent to the Devil Canyon Power Plant and Afterbays of the SWP will accommodate the new Devil Canyon By-Pass Pipeline.
- The Lytle Creek Construction Area includes the new Lower Lytle Creek Pipeline and Cactus Basins Pipeline.

1.2 OVERVIEW OF MUNI AND WESTERN

Muni and Western were both created in 1954 to address the imbalance between available water supplies and the demands of a growing population in the Inland Empire area of Southern California (the urbanized portions of San Bernardino and Riverside counties). The Muni service area covers approximately 352 square miles in southwestern San Bernardino County, serving 14 major retail water purveyors in addition to agricultural and mutual water companies. The service area contains numerous cities and communities in portions of the San Bernardino Valley, the Crafton Hills area, and the Yucaipa Valley and includes the following cities: Colton, Grand Terrace, Highland, Loma Linda, Redlands, Rialto, San Bernardino, and Yucaipa. Western's service area covers approximately 510 square miles in western Riverside County, serving more than 18,000 retail and 8 wholesale customers. The Western Municipal Water District serves the cities of Canyon Lake, Corona, Lake Elsinore, Murrieta, Norco, Riverside, Temecula, the communities of Jurupa, Home Gardens, and Rubidoux, and the unincorporated areas of western Riverside County surrounding Lake Mathews. See Figure 1-1. (All figures are presented at the end of their respective chapter/section.)

Muni/Western provide wholesale imported water directly to retail suppliers and augment groundwater supplies by spreading imported water to recharge local groundwater basins so that water retailers can extract the recharged water from them. Muni holds a contract for water from the SWP. As a member agency of The Metropolitan Water District of Southern California (Metropolitan), Western receives imported water from both the SWP and Colorado River. Entities within Western also receive native groundwater imported from the San Bernardino Basin Area (SBBA) groundwater basin.

Muni/Western's key role in providing for and managing groundwater and surface water supplies on a long-term regional basis was recognized by the Orange County Superior Court in *Orange County Water District v. City of Chino et al.*, Case No. 117628 (April 17, 1969) (*Orange County* Judgment) and the Riverside County Superior Court in *Western Municipal Water District of Riverside County v. East San Bernardino County Water District*, Case No. 78426 (April 17, 1969)

(*Western* Judgment). To settle water rights disputes on the SAR, the *Orange County* Judgment imposes a physical solution that requires entities in the upper watershed to deliver a minimum quantity of water to certain points downstream. In part to ensure these flow obligations are met, the *Western* Judgment aims to preserve the safe yield of the SBBA by establishing entitlements to groundwater extractions by plaintiff parties and by requiring replenishment of the basin when extractions by non-plaintiff parties cause the aggregate safe yield to be exceeded. Court-appointed Watermaster committees made up of representative members from key regional water agencies administer both Judgments. Pursuant to the terms of the Judgments, representatives from both Muni and Western sit on the Watermaster committee for the *Orange County* Judgment, and Muni/Western together make up the two-member Watermaster committee for the *Western* Judgment. As members of the Watermaster committees, Muni/Western are directly responsible for ensuring that groundwater and surface water resources are effectively managed for the benefit of the region.

1.3 NEED FOR PROPOSED PROJECT

The region relies, to a significant degree, on imported water supplies, whether from the SWP, the Colorado River, or other sources. Due to factors such as water quality concerns, drought, legal and institutional constraints, and environmental concerns, the reliability of these imported sources of water is declining. For example, the Department of Water Resources anticipates that long-term future deliveries by the SWP will average only 76 percent of contract amounts. As regional population and demands for water increase, Muni/Western can no longer rely solely on imported water to meet projected demands within their service areas and must explore and develop every opportunity to seek out additional sources of supply including full utilization of available local water supplies. Population within the combined Muni/Western service area is projected to increase by over 798,000 persons between 2000 and 2025 (a 65 percent increase). As the population increases, the demand for water will also increase over existing levels. Water demand (based on direct use) in the combined service areas is estimated to climb to over 680,000 afy over the same time period (a 35 percent increase). The Project is intended to meet a portion of the anticipated future water demand in the Muni/Western service area.

As far back as 1969, the *Orange County* and *Western* Judgments recognized that future population growth in the Inland Empire would require regional agencies such as Muni and Western to seek new and more reliable water supplies. For this reason, the *Orange County* Judgment authorizes these agencies to "engage in unlimited water conservation activities, including spreading, impounding, and other methods" in the upper watershed areas including in the vicinity of Seven Oaks Dam. The *Western* Judgment, like the *Orange County* Judgment, contemplates new conservation and also provides for the division of newly conserved supplies among the parties to the Judgment.

1.4 SEVEN OAKS DAM AND SANTA ANA RIVER WATER MANAGEMENT

The U.S. Congress authorized construction of Seven Oaks Dam and Reservoir in 1986 as part of ongoing efforts to provide flood protection to the growing communities in Orange, Riverside, and San Bernardino counties. Completed in 1999, Seven Oaks Dam provides opportunities for new water supplies, as contemplated by the *Orange County* and *Western* Judgments.

Seven Oaks Dam was primarily constructed to regulate flood flows on the mainstem of the Santa Ana River. These floodwaters generally arrive between October and the end of February. During the rest of the year, space is available behind the dam in which to conserve water supplies. The U.S. Congress recognized this opportunity and directed the U.S. Army Corps of Engineers (USACE) to study the feasibility of using Seven Oaks Dam for water supply purposes, i.e., conservation. In 1997, the USACE issued a comprehensive report that concluded that use of Seven Oaks Dam for water supply is feasible, beneficial and compatible with the dam's flood-control functions. Based partly on this conclusion, Muni/Western proceeded to develop the Project.

Operation of Seven Oaks Dam for flood control purposes affects the nature of flow in the SAR downstream to Prado Dam. During most years, the SAR has little or no surface flow from its confluence with Keller Creek in the San Bernardino Mountains to just below the point at which the river crosses the San Bernardino/Riverside county line. Occasionally, however, unpredictable storms cause large quantities of water to flow in the SAR over a very short period. The presence of the dam regulates (slows) the rate at which water flows down the SAR, thereby decreasing downstream flooding and channel scour. This regulation of the flow of the SAR also enables more water to be captured for local beneficial use.

1.5 REGIONAL WATER MANAGEMENT

On July 21, 2004, Muni/Western and a number of water users in the San Bernardino Valley signed a settlement agreement known as the Seven Oaks Accord. In brief, the Seven Oaks Accord calls for Muni/Western to recognize the prior rights of the water users up to 88 cubic feet per second (cfs) from the natural flow of the SAR. In exchange, the water users agree to withdraw their protests to the Muni/Western water right applications. Further, all the parties to the Seven Oak Accord have agreed to support the grant of other necessary permits to allow Muni/Western to divert water from the SAR.

By means of the Seven Oaks Accord, Muni/Western agreed to modify their water right applications to the SWRCB to incorporate implementation of the Accord. Consequently, the analysis conducted in this EIR assumes implementation of the Accord.

The Accord calls for Muni/Western to develop and manage a groundwater spreading program that is intended to maintain groundwater levels at a number of specified wells owned and operated by the other parties. This integrated management program will be adopted within 5 years of SWRCB approval of the Muni/Western applications.

Muni/Western have developed a suite of models and analytical techniques enabling them to conduct the environmental impact analysis presented in this document. Some of these models assess conditions in groundwater basins in terms of groundwater levels, water quality, and contaminant plume conditions. It is anticipated that these models (in addition to groundwater level monitoring activities) will form the basis of the planned integrated management program called for in the Accord.

Management of surface water and groundwater resources in the Muni/Western service area takes place within a complex legal and institutional framework. Development of a comprehensive, coordinated regional water management plan will involve the cooperation of many parties interested in basin management, in addition to the signatories of the Seven Oaks Accord. The objectives of the Project evaluated in this EIR are much narrower than any such future regional water management plan. Such a regional plan would be a separate, independent project or program with broader objectives and alternatives than this Project. Accordingly, it would be speculative to attempt to analyze any such regional water management plan as part of this EIR.

1.6 PURPOSE AND INTENDED USES OF THIS EIR

This EIR has been prepared pursuant to the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Sec. 21000 et seq.) and the State CEQA Guidelines (14 Cal. Code Regs. Sec. 15000 et seq.).

The purposes of the EIR (State CEQA Guidelines Sec. 15002) are to:

- Disclose to decision-makers and the public the project's significant environmental effects,
- Identify ways to avoid or reduce these effects through alternatives or mitigation measures, and
- Enhance agency coordination and public participation in the project review process.

Muni/Western are co-lead agencies for the EIR. Other agencies that may use the EIR in approving various aspects of the Project are discussed in Chapter 2.

1.7 EIR PUBLIC PARTICIPATION PROCESS

The initial decision to prepare an EIR for the Project was made following completion of an Initial Study. A Notice of Preparation (NOP), including the Initial Study, was distributed to the California State Clearinghouse and other potentially interested parties in July 2002. The release of the NOP initiated a 30-day public comment period that ended on August 31st, 2002. During the public review period, a public scoping meeting was held in the City of San Bernardino on August 6th, 2002, to receive agency and public comments regarding the scope of the environmental analysis for this EIR. Comments on the NOP and Initial Study were received from state agencies, regional and local governmental agencies, regional authorities, and other non-governmental organizations. Muni/Western considered the comments received in refining the scope of analysis for this EIR.

A public hearing on the Draft EIR will be held during the public review and comment period for the Draft EIR. Comments on the adequacy of the EIR can be provided at that public hearing or in writing. These comments will be considered and addressed in the Final EIR.

1.8 EIR ORGANIZATION

The Project is described in detail in Chapter 2. Chapter 3 presents information under three major headings for each of the resource areas considered: the affected environment; environmental impacts associated with implementation of the Project; and mitigation measures designed to avoid or substantially reduce significant environmental effects. The EIR identifies all environmental resources potentially affected by the Project and the magnitude of any impact, as required by CEQA. The following environmental resources are analyzed:

- Surface Water Hydrology and Water Quality
- Groundwater Hydrology and Water Quality
- Biological Resources
- Geology, Soils and Mineral Resources
- Land Use and Planning
- Agricultural Resources
- Recreational Resources
- Air Quality
- Cultural and Paleontological Resources
- Noise
- Aesthetics
- Hazardous Materials and Groundwater Contamination
- Public Services, Utilities and Transportation.

Chapter 4 addresses the potential for the Project to induce growth, identifies indirect growth-related impacts, and describes mitigation measures. Chapter 5 describes a range of alternatives to the Project that would feasibly attain most of the basic objectives of the Project but would avoid or substantially lessen potentially significant adverse impacts of the Project. Chapter 6 describes the cumulative impacts of the Project when combined with impacts of other past, present, and probable future projects. Chapter 7 addresses other CEQA considerations, including whether the Project would have unavoidable significant environmental impacts and involve the irreversible or irretrievable commitment of resources. Chapter 8 lists references, as well as persons and agencies contacted, during preparation of the EIR. Chapter 9 identifies preparers of the EIR and Chapter 10 contains a list of acronyms used in the document. The following appendices are bound separately:

- Appendix A: Surface Water Hydrology
- Appendix B: Groundwater Hydrology
- Appendix C: Project Construction and Operations Activities
- Appendix D: Notice of Preparation and Initial Study
- Appendix E: Biological Resources
- Appendix F: Air Quality
- Appendix G: Draft Water Availability Analysis

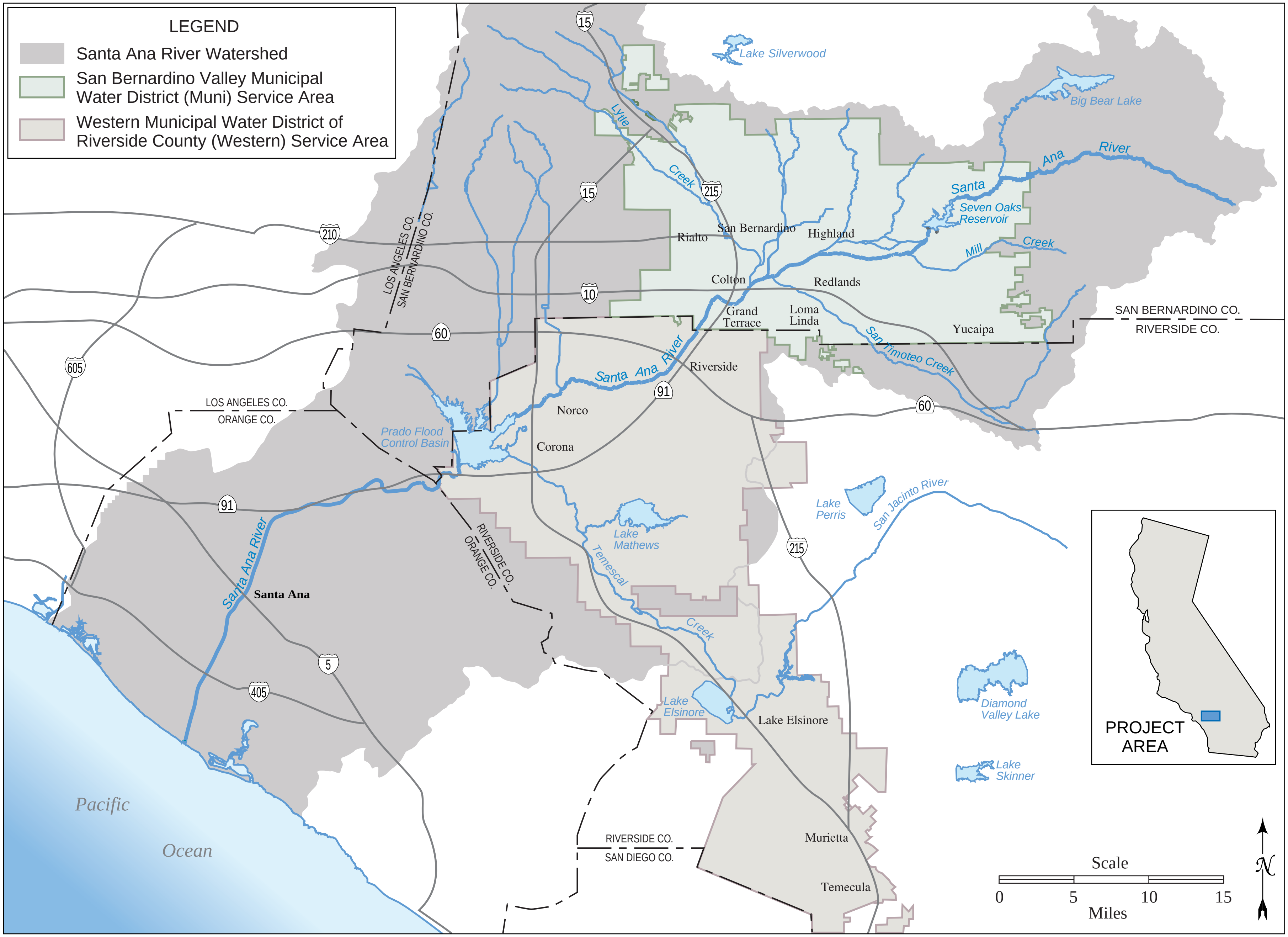


Figure 1-1. Muni and Western Service Areas

2.0 PROJECT DESCRIPTION

2.1 PROJECT SUMMARY

Population of the areas served by San Bernardino Valley Municipal Water District and Western Municipal Water District of Riverside County (Muni/Western) is anticipated to grow by 65 percent over the period 2000 to 2025. Muni/Western, the water wholesalers for the region, currently rely on imported water to supplement locally available water supplies to meet the supplemental water needs of retail purveyors and direct customers in their service areas. Muni, as a SWP Contractor, receives water imported from Northern California through the SWP and Western, as a member agency of Metropolitan, receives supplies from the SWP and Colorado River. In order to diversify their sources of water supply and to take advantage of the regulatory and seasonal water conservation storage potential created by the construction of Seven Oaks Dam, Muni/Western jointly have filed two water right applications with the SWRCB to divert unappropriated water from the SAR. The applications seek the right to divert and put to beneficial use a total of up to 200,000 afy. The Project consists of all discretionary actions necessary to conserve, divert, convey and store this water from the SAR for beneficial use.

2.2 PROJECT OBJECTIVES

The Project is designed to achieve the following objectives:

- Increase water supply reliability by reducing dependence on imported water;
- Develop and deliver a new, local, high quality, long-term water supply that is needed to meet part of anticipated future demands; and
- Expand operational flexibility by adding infrastructure and varying sources of water, thereby providing Muni/Western with greater capability to match varying supply and demand.

2.3 PROJECT LOCATION

The Muni/Western service area occupies the western portions of San Bernardino and Riverside counties (Figure 2-1). While implementation of the Project would use existing facilities to the extent feasible, some new facilities would be constructed and some existing facilities would be modified. These actions would take place in four general geographical areas as shown in Figure 2-1. These areas are as follows:

1. Seven Oaks Dam and Reservoir Construction Area;
2. Santa Ana River Construction Area that includes the lower canyon and alluvial fan area of the SAR immediately downstream of Seven Oaks Dam;
3. Devil Canyon Construction Area adjacent to the Devil Canyon Power Plant and Afterbays of the SWP; and

4. Lytle Creek Construction Area that includes the alluvial fan area of lower Lytle Creek just north of the City of Rialto and an area immediately to the south thereof.

As part of the Project, Muni/Western intend to utilize several existing groundwater recharge facilities. As shown in Figure 2-2, all but one of the 12 groundwater recharge facilities proposed for use under the Project are within Muni's service area. These recharge facilities overlie the Lytle Creek and Bunker Hill groundwater basins (collectively known as the San Bernardino Basin Area [SBBA]), the Rialto-Colton Basin, San Timoteo Basin, and Yucaipa Basin.

2.3.1 Diversions Upstream of Seven Oaks Dam

Water diverted at a number of points of diversion (PODs) upstream of Seven Oaks Dam is currently conveyed (after being used for power generation) through the existing Southern California Edison (SCE) Canal for delivery to senior water right claimants. These claimants are the Bear Valley Mutual Water Company (Mutual), Lugonia Water Company, North Fork Water Company, and Redlands Water Company. Water that is diverted upstream of Seven Oaks Dam is conveyed downstream in the SCE Canal to the Head Breaking Structure that is located west of, and at a lower elevation than, the spillway of Seven Oaks Dam (Figure 2-3). At the Head Breaking Structure (designed to reduce pressure in the pipeline) the SCE Canal bifurcates, delivering water to (a) the SCE SAR Powerhouse No. 2/3 via the New SCE Conduit; and (b) the Greenspot Forebay via the Old SCE Conduit. As part of the 1976 Santa Ana River-Mill Creek Cooperative Water Project Agreement, water diverted upstream of Seven Oaks Dam is physically taken by Muni downstream of the dam at the existing Greenspot Forebay and conveyed through the Greenspot Pipeline for delivery by gravity to locations which would otherwise require the use of the Greenspot Pump Station. Under the Project, Muni/Western would divert water at the foregoing PODs above Seven Oaks Dam in addition to water already taken per the Santa Ana-River Mill Creek Cooperative Water Project, and would initiate new PODs downstream of Seven Oaks Dam as described below.

2.3.2 Diversions Downstream of Seven Oaks Dam

Unappropriated water would be diverted at a number of PODs downstream of Seven Oaks Dam utilizing existing and new facilities. Existing facilities include the Auxiliary River Pickup, Division Box, Cuttle Weir, Santa Ana River Crossing (SARC) Pipeline, and San Bernardino Valley Water Conservation District (Conservation District) Canal (Figure 2-4). New facilities designed to convey diverted water include the proposed Low Flow Connector Pipeline and Plunge Pool Pipeline. These facilities, and others required to implement the Project, are described below.

2.4 PROJECT COMPONENTS

The Project has four major constituent elements, each of which is described below.

2.4.1 Seasonal Water Conservation Storage at Seven Oaks Dam

To optimize the beneficial use of unappropriated water in the SAR, the criteria under which Seven Oaks Dam is currently operated would be changed to accommodate conservation storage in addition to its current use for regulatory flood storage. After the designated flood control season (October through February), up to 50,000 af of water could be impounded in Seven Oaks Reservoir in seasonal water conservation storage. With or without the Project, Seven Oaks Dam will be operated for flood control benefits during the period October through February, with seasonal water conservation storage beginning in March and ending in September. Implementation of seasonal water conservation storage would require modifications within the Seven Oaks Dam and Reservoir Construction Area. Conservation storage would be consistent with that analyzed by the USACE in the *Seven Oaks Dam Water Conservation Feasibility Study Final Environmental Impact Statement (EIS)/Environmental Impact Report (EIR)* dated June 1997.

To accommodate seasonal conservation storage at Seven Oaks Dam, it would be necessary to modify/rebuild the intake structure, maintenance deck, and bulkhead of the dam, as well as the bridge and road used to access the intake structure (Figures 2-5 and 2-6). The intake tower would be raised using a 123-foot high steel frame placed on top of the maintenance deck. A new maintenance deck would be constructed on top of the new steel frame. With the addition of the steel frame and new maintenance deck, the existing trash rack structure would not meet seismic requirements and would have to be demolished and rebuilt. The new maintenance deck would connect to the left abutment of the dam via a 205-foot steel girder bridge. The bridge would then connect to a new intake access road built across the upstream face of the dam. To further strengthen the intake structure for seasonal conservation storage, a concrete "jacket" would be placed around the existing structure. Additional anchors would be installed between the intake structure and the neighboring bedrock.

It could take up to 18 months (spread over three dry periods) to perform all required construction activities at Seven Oaks Dam (see Appendix C). However, the modification of each individual dam component would be planned so as to be executed within a single non-flood season and, thus, would not affect the flood control function of the facility.

Seasonal water conservation storage could cause periodic inundation of an almost 2-mile section of the upstream access road leading to SCE facilities and a short section of the existing Warm Springs Canyon Road (see Figure 2-5). This would require the relocation of sections of both roads. Final design of the road modifications is not complete, but it is estimated that two sections of road would have to be rerouted, one approximately 10,075 feet long and another shorter 550-foot segment (USACE 1997). Any modifications to Seven Oaks Dam, either operational or structural, must be approved by USACE. Details on construction activities in the Seven Oaks Dam and Reservoir area are provided in Appendix C.

2.4.2 Diversion and Conveyance Facilities

Most of the water captured from the SAR would be conveyed through the proposed Plunge Pool Pipeline and Low Flow Connector Pipeline. These and other new pipelines would convey SAR water for direct delivery to water treatment plants and other users in the region; to spreading grounds for groundwater recharge; and to regional water facilities for exchange. Proposed new pipelines and associated facilities would be built in three areas: the Santa Ana River Construction Area; the Devil Canyon Construction Area; and the Lytle Creek Construction Area (see Figure 2-1).

The Project would include the recharge of unappropriated SAR water through the utilization of selected existing spreading basins. Groundwater recharge could also be accomplished indirectly through the delivery of surface water in lieu of groundwater pumping. The location of spreading grounds, their proximity to existing and proposed conveyance facilities, and relationship to underlying groundwater basins are shown in Figure 2-2. Details regarding spreading activity and effects on groundwater resources are presented in Appendix B.

2.4.2.1 Santa Ana River Construction Area

This area would accommodate diversion structures and three new proposed pipelines: (1) Plunge Pool Pipeline; (2) Low Flow Connector Pipeline; and (3) Morton Canyon Connector II Pipeline (Figure 2-4). In addition to the information provided below, further details on construction activities in the Santa Ana River Construction Area are provided in Appendix C.

Plunge Pool Pipeline

Construction of the Plunge Pool Pipeline would occur in three phases. Ultimately the pipeline would connect the plunge pool located immediately below Seven Oaks Dam to both Muni's existing Foothill Pipeline and Metropolitan's Inland Feeder Pipeline (Figure 2-4). Construction of each of the three phases would depend on funding, water demand, and other variables. Descriptions of the anticipated construction phases follow.

Phase I consists of a 15-foot diameter eastward extension of the existing Foothill Pipeline to a point in the Santa Ana River channel just west of the existing Cuttle Weir (see Figure 2-4). The extension would initially convey up to 500 cubic feet per second (cfs). This rate is due to the limited collective conveyance capacity of facilities to which Phase I of the Plunge Pool Pipeline would connect, i.e., the Foothill Pipeline and Santa Ana River Crossing (SARC) pipeline. This phase of the Plunge Pool Pipeline would be installed with a capacity to convey water at a rate of 1,500 cfs. This flow rate could be achieved, however, only upon completion of Phase II. New infrastructure associated with Phase I would include a valve structure at the Foothill Pipeline terminus, and a 4,000 foot-long segment of 15-foot diameter pipe. The extension would also require either the modification of the existing Conservation District intake structure adjacent to Cuttle Weir, or construction of a new intake structure immediately north.

Under Phase I, flows of up to 500 cfs would be diverted. However, due to capacity limitations, no more that 300 cfs of diverted water can be conveyed through the existing Foothill Pipeline (in reverse flow). An additional quantity of diverted water (up to 70 cfs) could be conveyed through the Santa Ana River Crossing (SARC) Pipeline with the remaining water (up to 130 cfs) conveyed through the Conservation District Canal to the Santa Ana River spreading grounds (Figure 2-4).

Phase II consists of construction of a 15-foot diameter pipe, from the valve structure installed at the Foothill Pipeline terminus in Phase I, westward to the Foothill Pipeline/Inland Feeder Pipeline intertie near Cone Camp Road (see Figure 2-4). This section of pipe would be approximately 2 miles long. The completion of Phase II would enable Muni/Western to convey up to 1,500 cfs from the Santa Ana River.

Phase III consists of connecting those portions of the pipeline developed in Phases I and II to the plunge pool of Seven Oaks Dam (Figure 2-4). The Phase III segment consists of a 15-foot pipeline, extending 2,980 feet from the southeast quadrant of the plunge pool to a point on the west bank of the SAR approximately 1,600 feet downstream of Cuttle Weir. An intake structure to the Plunge Pool Pipeline would be built within the plunge pool.

Low Flow Connector Pipeline

As shown on Figure 2-4, the Low Flow Connector Pipeline (a 4-foot diameter, approximately 3,500-foot long, 100 cfs capacity pipeline) would connect the existing Low Flow Outlet at Seven Oaks Dam to the Greenspot Pipeline. The northerly 750 feet of the pipe would either be buried under shallow cover (approximately 7 feet), or would be installed above ground on piers along the eastern edge of the existing bank slope of the plunge pool. Approximately 2,750 feet of the pipe downstream of the plunge pool would be underground in a common trench with the Plunge Pool Pipeline Phase III.

Morton Canyon Connector II Pipeline

The existing Morton Canyon Connector Pipeline provides a connection between the Greenspot Pump Station and the Greenspot Pipeline. This connection allows delivery of SWP water to the eastern portion of the Muni service area.

As shown in Figure 2-4, the proposed Morton Canyon Connector II Pipeline (a 4-foot diameter, approximately 1,900-foot-long, 100-cfs capacity pipeline) would be constructed near the southern edge of the SAR Wash east of Greenspot Road in an alignment parallel to the existing Morton Canyon Connector Pipeline. The Morton Canyon Connector II Pipeline would allow SAR water, diverted at Seven Oaks Dam, to be delivered to the Mill Creek area via the Greenspot Pump Station and Greenspot Pipeline. Further, this water could be delivered to the Yucaipa area by using the Crafton Hills Pump Station, East Branch Extension Pipeline, and Crafton Hills Reservoir.

2.4.2.2 Devil Canyon Construction Area

As shown on Figure 2-7, the proposed Devil Canyon By-Pass Pipeline (a 4.5-foot diameter, 120-cfs capacity pipeline) would connect the Muni Foothill Pipeline to the San Gabriel Valley Municipal Water District (SGVMWD) Lytle Pipeline (Lytle Pipeline). Muni currently contracts for 55 cfs of capacity in the Lytle Pipeline at all times, but under certain conditions the entire 120 cfs conveyance capacity of the pipe is available to Muni.

The Devil Canyon By-Pass Pipeline has two alignment options. The northern (shorter) alignment is about 250 to 570 feet long (depending on configuration) and connects the Foothill Pipeline with the Lytle Pipeline. The southern (longer) alignment is about 800 feet long and, in addition to connecting to the Foothill Pipeline and Lytle Pipeline, connects to the California Aqueduct (owned and operated by DWR). Both of the options are within a previously disturbed corridor that contains Metropolitan's Inland Feeder Pipeline. Details on construction activities in the Devil Canyon Construction Area are provided in Appendix C.

2.4.2.3 Lytle Creek Construction Area

The Lower Lytle Creek Pipeline and the Cactus Basins Pipeline would be built in the Lytle Creek Construction area (Figure 2-8). In addition to the information provided below, details on construction activities in the Lytle Creek Construction Area are provided in Appendix C.

Lower Lytle Creek Pipeline

The Lower Lytle Creek Pipeline would provide a connection between the Lytle Pipeline and the proposed Cactus Basins Pipeline. As illustrated in Figure 2-8, the pipeline would branch from the Lytle Pipeline at a new turnout adjacent to Riverside Avenue. From there, the pipeline would follow a southeast route within or adjacent to the northern boundary of Riverside Avenue to Linden Avenue, where it would connect with the proposed Cactus Basins Pipeline. This portion of the pipeline would be 2,700 feet long, 4.5 feet in diameter, with a capacity of 110 cfs.

Following its connection with the Cactus Basins Pipeline, the Lower Lytle Creek Pipeline would continue southeast within Riverside Avenue. Mid-block between Linden and Cedar avenues, the Lower Lytle Creek Pipeline would turn northeast to border the fenced perimeter of the Fontana Power Plant, then deliver water to an open ditch. The existing drainage would convey water to the existing Lytle Basins near the active channel of Lytle Creek. The Lytle Basins currently receive water leaving the Fontana Power Plant via an unlined channel. The extension of the Lower Lytle Creek Pipeline delivering water via the conveyance ditch to the spreading grounds would be a pipe 3 feet in diameter and about 1,200 feet long. In total, the Lower Lytle Creek Pipeline would be approximately 3,900 feet long.

Cactus Basins Pipeline

As illustrated in Figure 2-8, the proposed Cactus Basins Pipeline (4.5 feet in diameter, about 11,000 feet long and with a capacity of 110 cfs) would diverge from the proposed Lower Lytle Creek Pipeline to convey water to the existing Cactus Spreading and Flood Control Basins located near the Rialto Municipal Airport. From the Lower Lytle Creek Pipeline, the Cactus Basins Pipeline would extend southwest within Linden Avenue to the intersection with West Summit Avenue. The pipeline alignment would then follow Cedar Avenue south to the intersection with West Casmalia Street (just north of the alignment of the future 210 Freeway). From here the alignment would follow West Casmalia Street east to the intersection with Spruce Avenue, and proceed south along Spruce Street to connect to the existing Cactus Spreading and Flood Control Basins on the south side of Highland Avenue. The Cactus BasinsPipeline would include turnouts to the West Valley Water District Water Treatment Plant and Fontana Water Company Sandhill Water Treatment Plant.

2.4.3 Institutional Arrangements

Additional institutional arrangements would be put in place to achieve the following goals: sharing of the conveyance capacity of existing facilities; joint use of existing spreading grounds; and water exchange agreements. Discussions regarding such agreements have been initiated. It is anticipated that facilities included in these arrangements would be operated in a manner consistent with historic practices and within the range of conditions applicable to their permitted use. They would be used subject to applicable regulatory compliance.

Water exchanges allow flexibility in the timing of water delivery and, thus, assist in maximizing the beneficial use of captured water. For purposes of the Project, water exchanges are defined as the conveyance of newly appropriated SAR water to other agencies in consideration for the return of a like amount of water to the Muni/Western service area within a prescribed period.

The actual amounts of new SAR water used in exchange by local agencies within the Muni/Western service area would vary, depending on both local hydrologic conditions and the availability of alternative supplies. The actual amounts of exchange water would be coordinated with other water uses according to the priorities described in the following section. In the wettest of years, when the largest diversions from the SAR would occur, up to approximately 200,000 af of water could be available for exchange. All this water could be used in an exchange if (a) no local purveyors are able to take direct delivery of the water; (b) no local spreading facilities with adequate capacity are available or recharge of the water would be inconsistent with groundwater management goals; and (c) conveyance capacity is available.

The Project calls for the delivery of diverted water, utilizing existing conveyance facilities, for potential use by water agencies in Southern California. SAR water could be delivered directly to users or to a number of groundwater storage basins, both within and outside the Muni/Western service area. These facilities are either part of local agency conveyance systems that deliver water to retail providers and to spreading facilities for groundwater storage, or are part of regional water supply and distribution systems operated by entities such as DWR or Metropolitan.

2.4.4 Priorities for Distribution of Water

Under the Project, Muni/Western have several options available to them for conveying and distributing SAR water. The water can be put either to direct use, stored in groundwater basins within the Muni/Western service area for later extraction and use, or conveyed to agencies outside the Muni/Western service area for their use and returned (within a reasonable time) through exchange. The returned water would be used for direct use or groundwater recharge. The determination of how best to allocate SAR water at any given time would depend on Muni/Western's assessment of factors including the following: (a) demand for direct use; (b) availability of alternate local supplies; (c) potential for groundwater recharge; and (d) conveyance capacity.

Muni/Western would have the greatest distributional flexibility in years when a limited volume of SAR water is available. In very wet years, when large quantities of SAR water are available, distribution would likely be limited by low demand for direct delivery and conveyance capacity. Due to the variability of SAR flows, Muni/Western have developed a set of general priorities for allocating water appropriated from the SAR. These priorities do not limit operational flexibility in any given year.

Priority 1 — Meet the demands of purveyors within the Muni/Western service area that would otherwise be met with imported water or groundwater. Deliveries associated with this priority help to retain the benefits of the new SAR water within the Muni/Western service area.

Imported water that would otherwise have been delivered could (through storage) remain available for delivery at a later date. Groundwater that otherwise would have been extracted would remain in the groundwater basins, effectively providing in-lieu recharge in the service areas by reducing extraction from groundwater supplies.

Priority 2 — Conduct direct groundwater recharge within the Muni/Western service area. This priority provides groundwater benefits within the Muni/Western service area and allows for the future recovery of the supplies through use of local facilities. Water would be used to recharge groundwater supplies provided that the relevant groundwater basin can accept water without significant impacts related to high groundwater levels or water quality. Projected deliveries of appropriated SAR water to groundwater recharge within the Muni/Western service area are based on the conveyance capacity provided by existing and approved pipelines and the absorptive capacity of existing recharge facilities (see also Appendix A).

Priority 3 — Deliver water to agencies outside the Muni/Western service area as part of an exchange. Deliveries of SAR water would be made as part of an exchange involving the return of exchange water to Muni/Western within a prescribed, reasonable period of time.

2.5 PURPOSE AND INTENDED USES OF THIS EIR

This document fulfills the requirements of CEQA. Muni and Western are the joint lead agencies under CEQA. This EIR is an informational document for decision-makers and the public that identifies any significant environmental impacts of the Project and describes feasible alternatives and mitigation measures to avoid or reduce those significant impacts. The EIR is also intended to support the permitting processes of all agencies whose discretionary approvals must be obtained for particular components of the Project.

2.5.1 Permits, Approvals, and Consultations Potentially Required to Implement the Project

Table 2-1 lists the permits, approvals, and consultations that may be necessary to implement the Project. The information presented is preliminary and subject to change.

Muni and Western would also enter into agreements with other agencies, in addition to the agencies listed in Table 2-1, in order to facilitate water exchanges; gain access to various pipelines; and use various spreading grounds. Such agreements would assist in maximizing the potential benefits of the Project. As examples, Muni/Western could enter into agreements with Metropolitan for use of that agency's Inland Feeder Pipeline and for exchange of SAR water; and Muni/Western could enter into agreements with the San Bernardino Flood Control District for access to that agency's spreading grounds.

2.5.2 Agencies Expected to Use the EIR

As is evident from Table 2-1, many different agencies could use information and analyses contained in this EIR in their decision-making. The SWRCB has confirmed in writing that Muni/Western are required to be lead agencies, and that the SWRCB will be a responsible agency (personal communication with R. Swenerton 2002). Muni/Western are undertaking the planning, funding, and implementation of the Project, and thus Muni/Western are the appropriate CEQA lead agencies. The SWRCB will use the EIR in its decision-making process.

Table 2-1. Potentially Required Permits, Approvals, and Consultations

Agency	*Permits/Approvals Potentially Needed to Implement the Project*
U.S. Army Corps of Engineers	• Approval for any alterations to Seven Oaks Dam and its operations • Approval for new pipelines to connect to facilities of Seven Oaks Dam • Permits/approvals per Section 404 of the Clean Water Act (for the discharge of dredged and fill material into waters of the United States) • Permits/approvals per Section 10 of the Rivers and Harbors Act (for construction in waterways)
U.S. Fish and Wildlife Service	• Permits/approvals per the Federal Endangered Species Act
U.S. Forest Service	• Access agreements/permits for construction within the San Bernardino National Forest
California State Water Resources Control Board	• Approval of Muni/Western water right applications 31165 and 31370
Santa Ana Regional Water Quality Control Board	• Section 401 certification for water quality/stormwater runoff during construction • National Pollutant Discharge Elimination System (NPDES) permit for pipeline cleaning and maintenance activities
California Department of Fish and Game	• Section 2081 permit per the California Endangered Species Act • Section 1601 Streambed Alteration Agreement
State Historic Preservation Officer	• Consultations per Section 106 of the National Historic Preservation Act
South Coast Air Quality Control Board	• Permit to Construct • Approval of the fugitive dust emissions plan
County of San Bernardino	• Road Encroachment and Closure permit • Flood Control Right-of-Way (for construction in the floodplain) • Soil Erosion and Sediment Control Permit
City of Highland	• Road encroachment and closure permits
City of Rialto	• Road encroachment and closure permits
San Bernardino Flood Control District, Orange County Flood Control District, and Riverside County Flood Control and Water Conservation District (Local Sponsors of Seven Oaks Dam)	• Encroachment permits and access agreements
Metropolitan Water District of Southern California	• Encroachment permits and access agreements

The SWRCB will, after the EIR is completed and if Muni and Western certify the EIR and approve the Project, consider whether to approve Muni/Western's two water right applications, likely through a formal hearing process involving other water right applications on the Santa Ana River. As part of this process the SWRCB will consider this EIR and, as a responsible agency, reach its own conclusions on whether and how to approve the water right applications. After the conclusion of the hearing, the SWRCB will issue a decision about whether and under what conditions to approve the applications and issue a water right permit. After the permit is issued, Muni/Western would begin implementation of the Project described in the EIR, as it may be conditioned by the SWRCB and other regulatory agencies. After Muni/Western demonstrate that the proposed facilities have been constructed and water has been applied to beneficial use as authorized by the permit, the SWRCB will consider the issuance of a water right license to Muni/Western which confirms their right to appropriate the amount of water that the SWRCB determines has been applied to beneficial use.

2.5.3 Related Environmental Review and Consultation Requirements

In order to grant permits and approvals, several of the agencies listed in Table 2-1, in addition to the SWRCB, will either use this EIR for their decision-making, or may have to undertake their own review of potential environmental impacts of the Project. For example, as a part of its approval and permitting of the Project, USACE may need to undertake an analysis of potential environmental impacts of its proposed actions under the National Environmental Policy Act (NEPA). Also, under the federal Endangered Species Act, the USFWS may undertake independent review of Project impacts, if a Section 10 permit or Section 7 consultation is required.

2.6 PUBLIC INVOLVEMENT AND INTERAGENCY COORDINATION

The decision to prepare an EIR for the Project was made following the completion of an Initial Study. A Notice of Preparation (NOP), including the Initial Study, was distributed to the California State Clearinghouse and other potentially interested parties on July 11th, July 17th, July 18th, and July 31st, 2002. The NOP and the Initial Study are included in Appendix D. The release of the NOP initiated a 30-day public comment period that ended on August 31st, 2002. During this comment period, a public scoping meeting was held in the City of San Bernardino on August 6th, 2002 to receive agency and public comments regarding the scope of the environmental analysis for this EIR. Comments on the NOP and Initial Study were received from State agencies, regional and local governmental agencies, regional authorities, and non-governmental organizations. Copies of all comment letters received on the NOP and Initial Study are included in Appendix D. Muni/Western considered the comments received in refining the scope of analysis for this EIR.

A public hearing on this Draft EIR will be held during the public review period. Comments on the adequacy of the EIR can be provided at that public hearing or in writing; these comments will be responded to in the Final EIR.

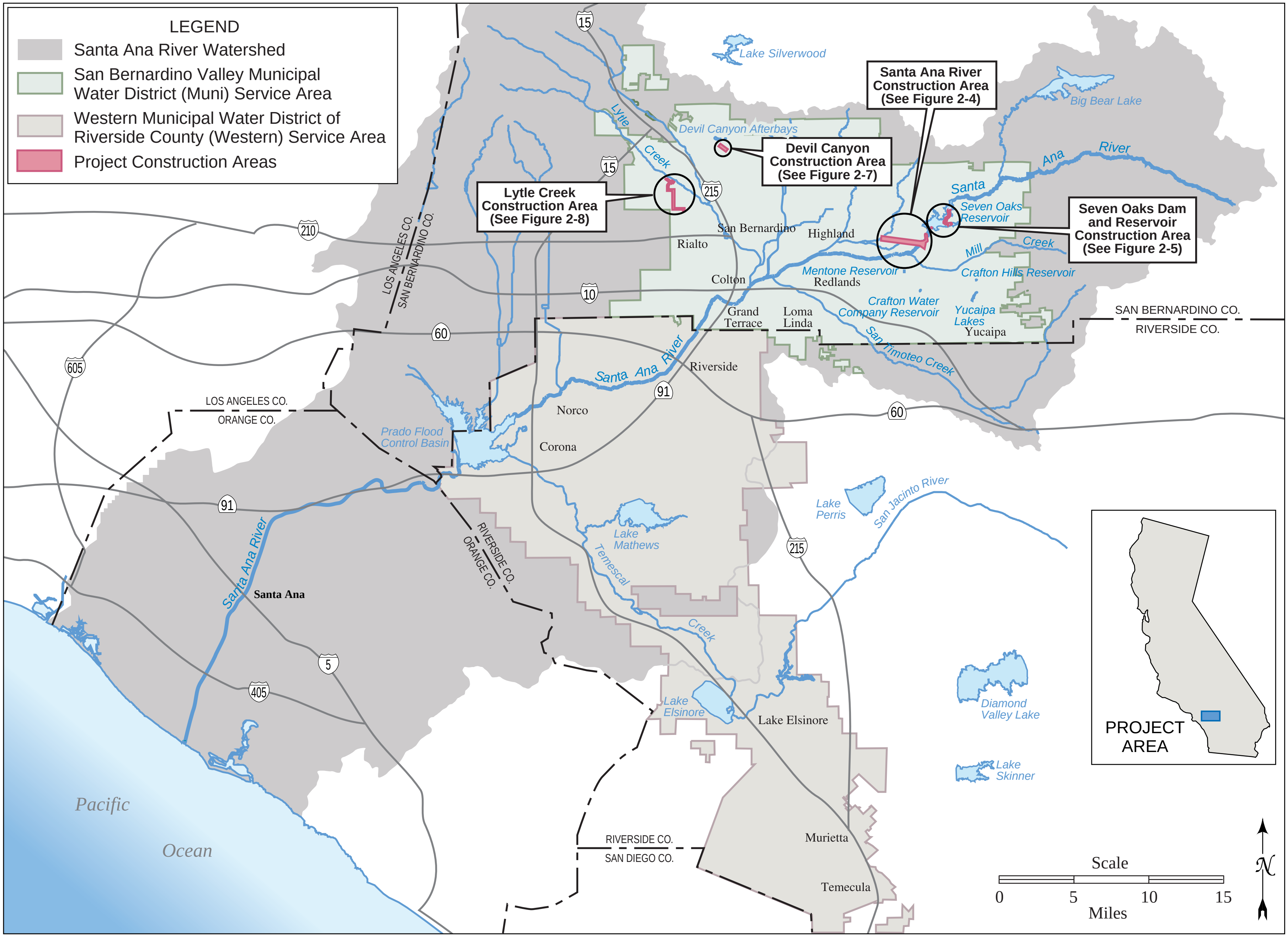


Figure 2-1. General Location of Project Construction Areas

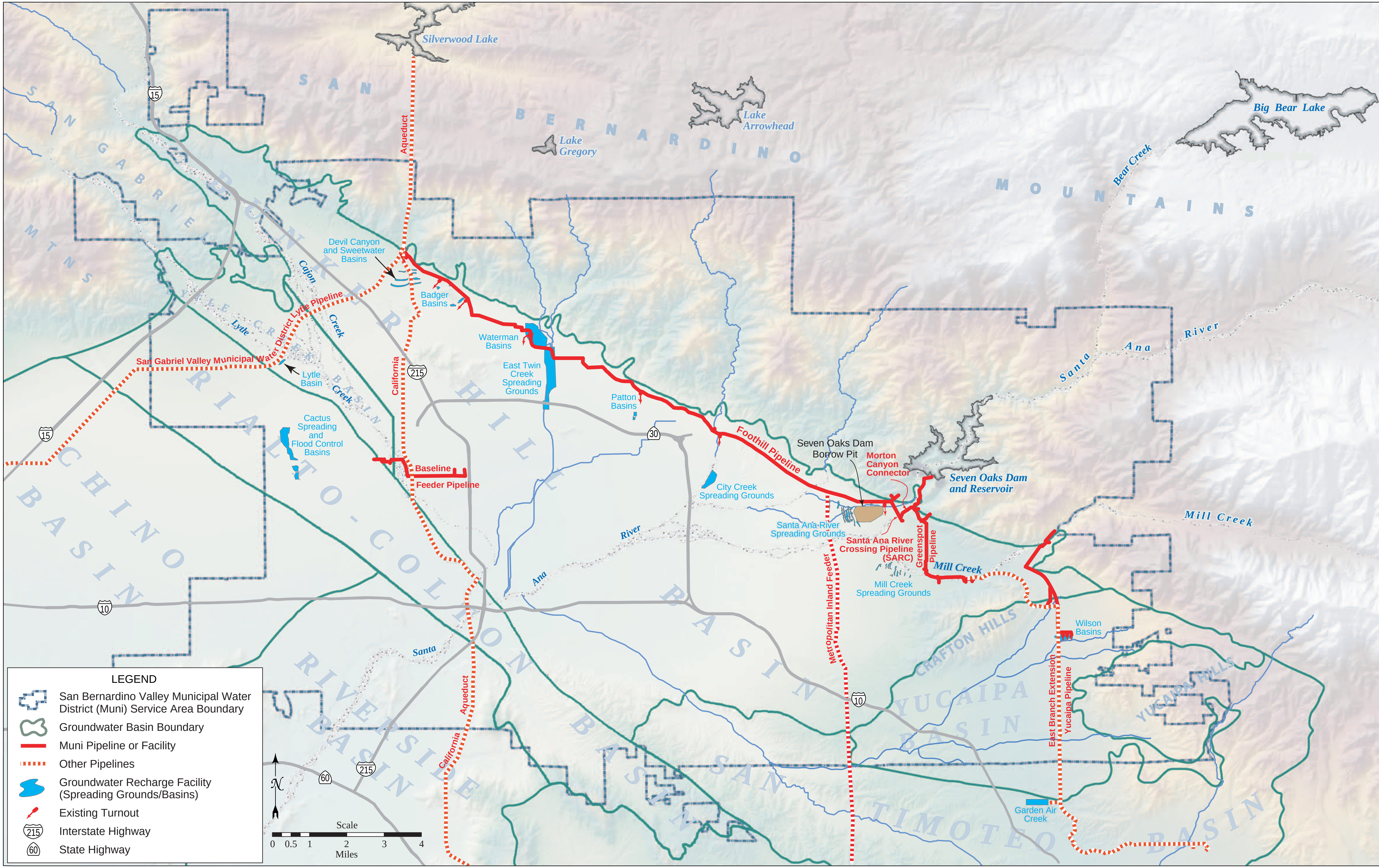


Figure 2-2. Groundwater Recharge Facilities and Underlying Groundwater Basins

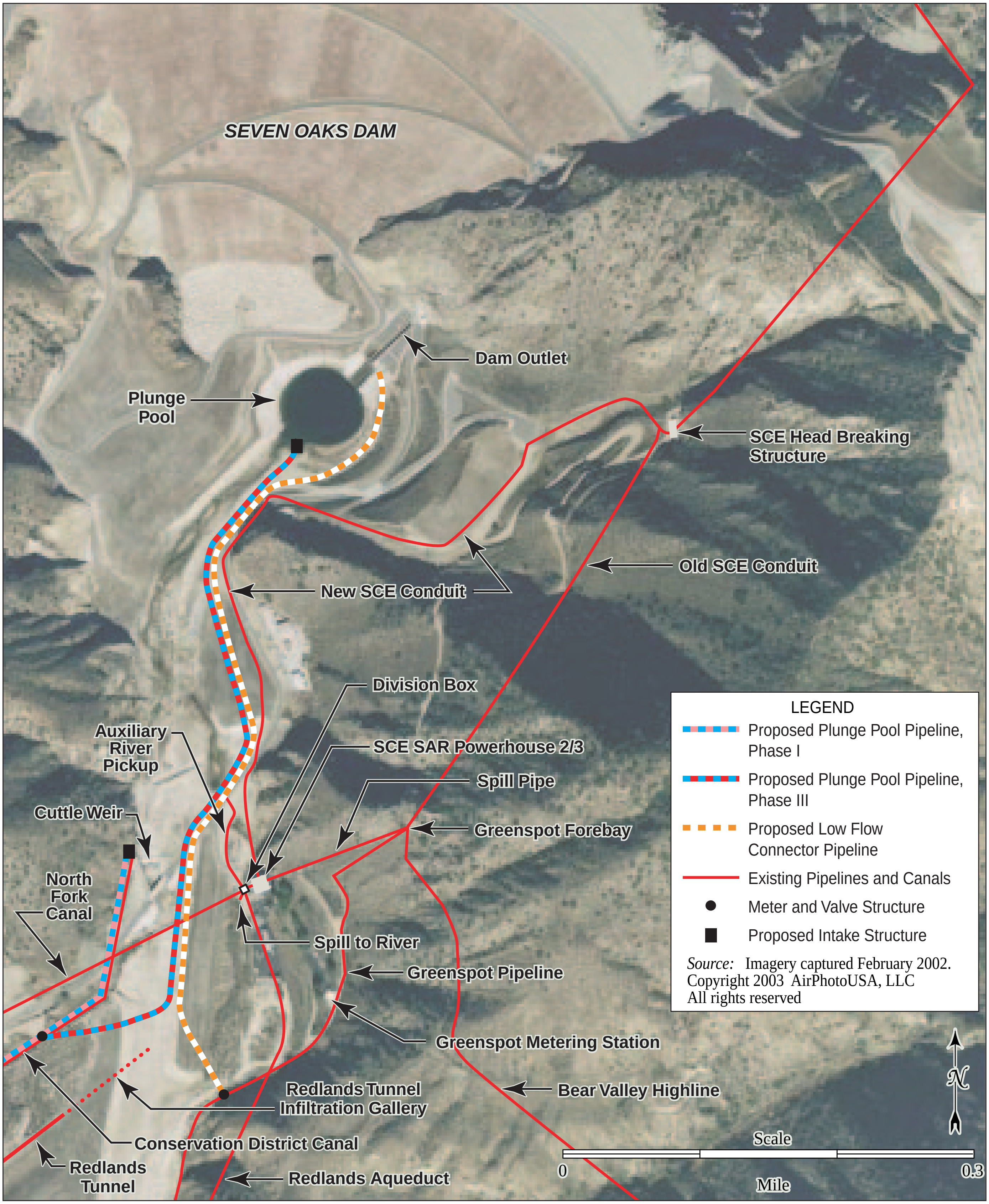


Figure 2-3. Proposed Project Facilities in the Vicinity of Seven Oaks Dam

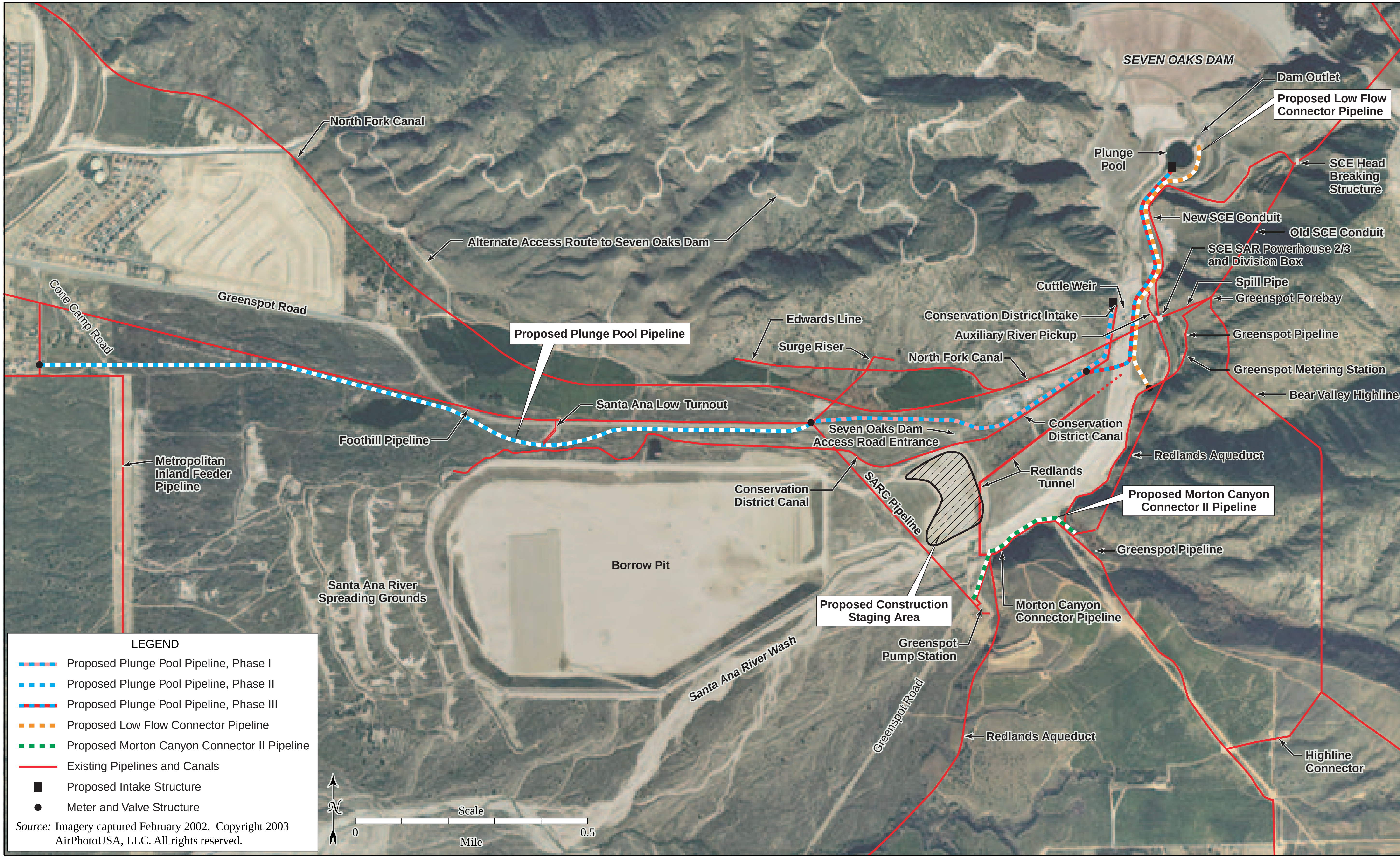


Figure 2-4. Proposed Project Facilities in the Santa Ana River Construction Area

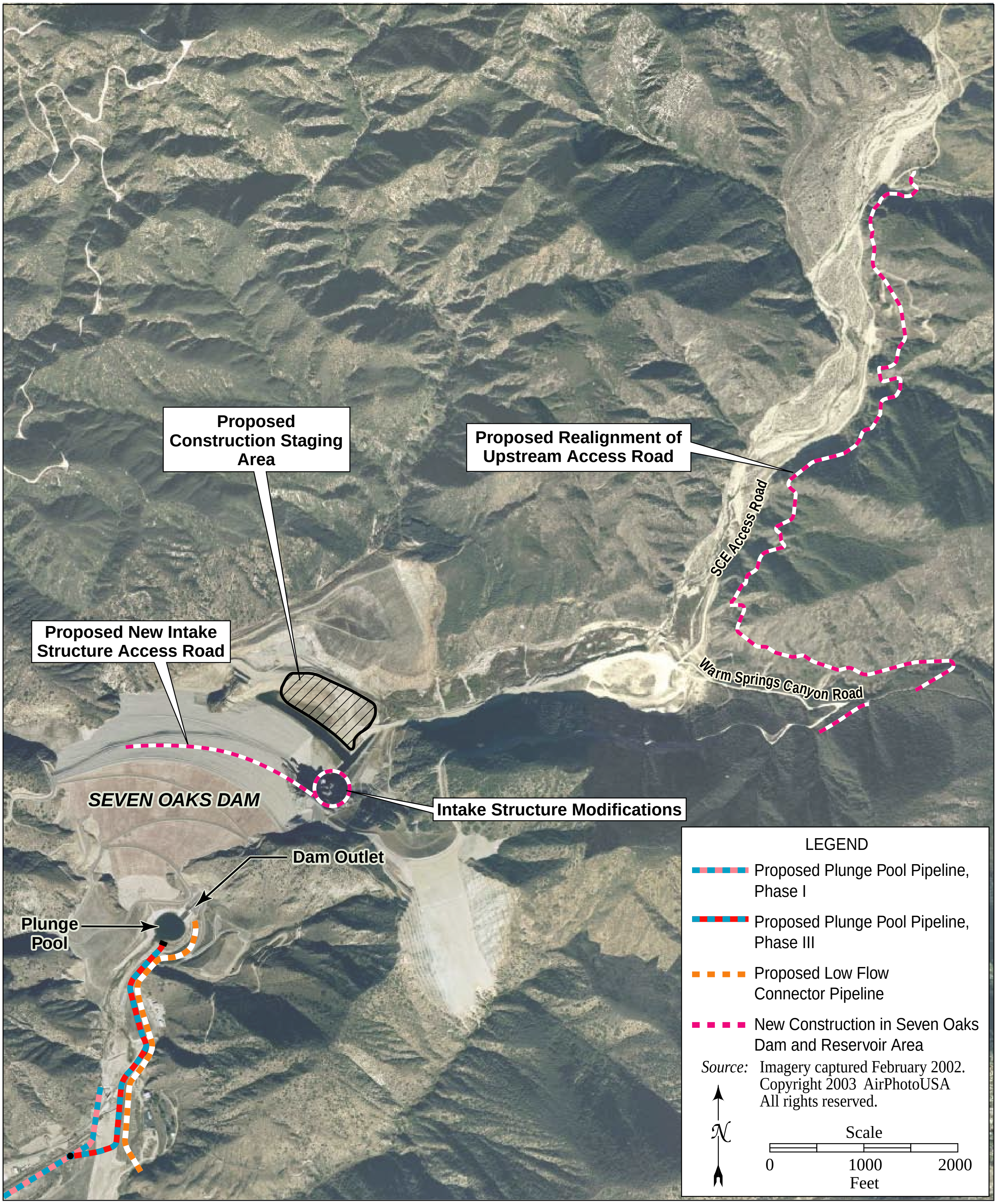


Figure 2-5. Seven Oaks Dam and Reservoir Construction Area

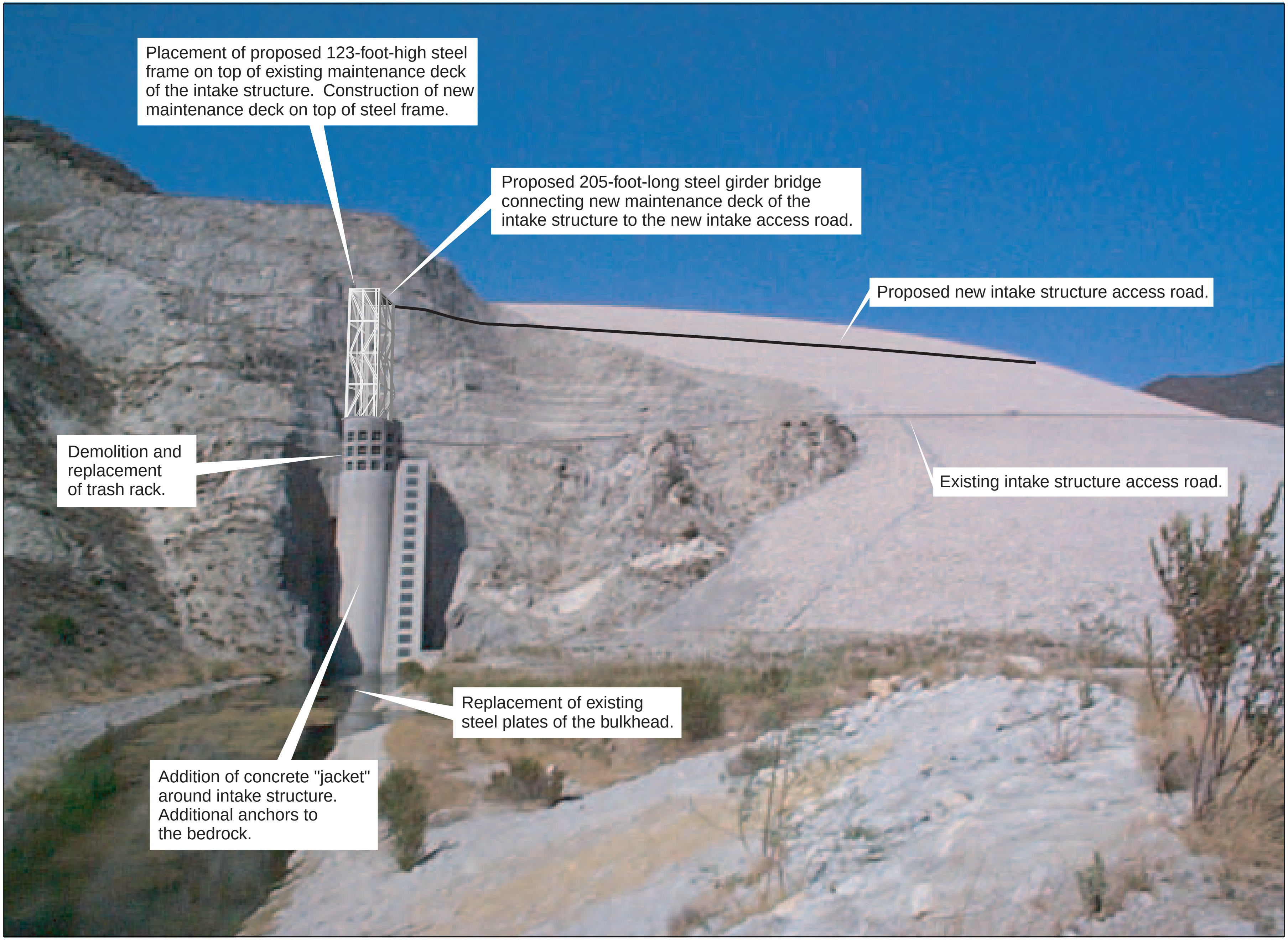


Figure 2-6. Visual Simulation of Modifications to Seven Oaks Dam Intake Structure and Access Road

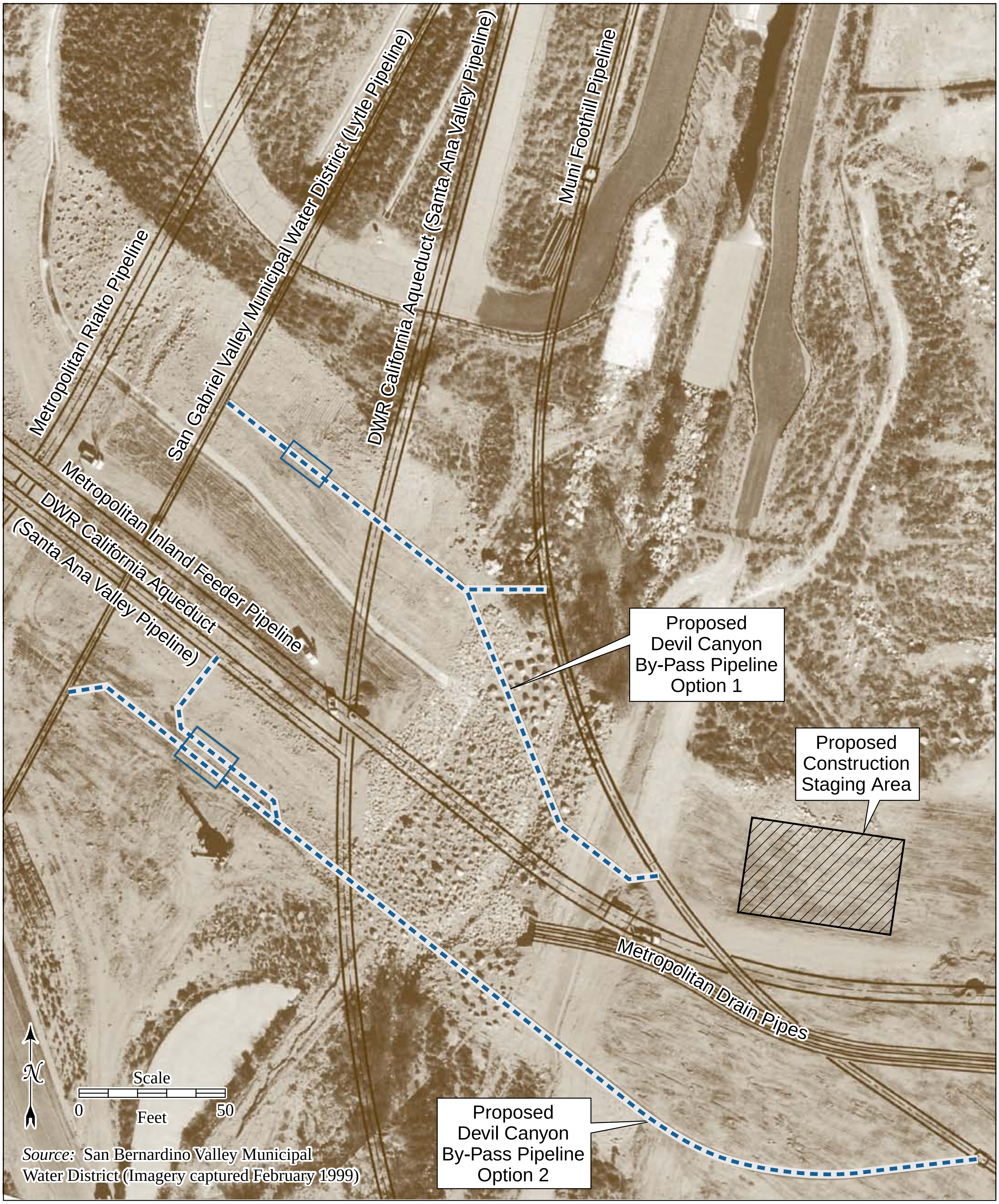


Figure 2-7. Proposed Project Facilities in Devil Canyon Construction Area

Figure 2-8. Proposed Project Facilities in Lytle Creek Construction Area

3.0 ENVIRONMENTAL SETTING, PROJECT IMPACTS, AND MITIGATION MEASURES

This chapter describes the environmental resources that could be affected by the Project, potential direct impacts to these resources, and mitigation measures that would minimize such impacts. Direct impacts are those that are caused by, and immediately related to, the Project. The following environmental resources are addressed: Surface Water Hydrology and Water Quality; Groundwater Hydrology and Water Quality; Biological Resources; Geology, Soil, and Mineral Resources; Land Use and Planning; Agricultural Resources; Recreational Resources; Air Quality; Cultural Resources; Noise; Aesthetics; Hazardous Materials and Groundwater Contamination; and Public Services, Utilities, and Transportation.

Since the Project would not directly induce population growth (for example, by proposing new homes or businesses) or displace existing housing or people, necessitating the construction of new housing, such direct impacts are not discussed further in this EIR. Indirect impacts associated with population and housing are, however, discussed in Chapter 4. This chapter addresses the potential for the Project to induce growth, identifies indirect growth-related impacts, and describes mitigation measures that would reduce the level of impact.

A number of aspects of the Project are common across environmental resources and are addressed once here, rather than in each specific resource section of Chapter 3. They include the following:

- Use of existing facilities for groundwater recharge, a major beneficial use of appropriated SAR water;
- The distinction between existing conditions and No Project conditions;
- A description of the variable amounts of appropriated water that could result from implementation of the Project. The full range of amounts of appropriated water are contained within four Project scenarios: Scenarios A, B, C, and D; and
- Assumptions regarding Project phasing of the Plunge Pool Pipeline.

Each of the resource-specific sections that follow in Chapter 3 conform to a common format. Each resource section is comprised of two major parts. The first addresses the Environmental Setting (also commonly referred to as baseline or existing conditions) for the resource. The second part, Impacts and Mitigations, focuses on impacts to the environment associated with the Project and measures that, when implemented, would avoid or reduce these impacts; both construction and operations phases of the Project are addressed separately.

The environmental setting sub-section for each resource is further divided into (1) regulatory and institutional setting, (2) Project construction areas, and (3) Project operations areas. The second sub-section for each resource, dealing with impacts and mitigation measures, focuses on the environmental impacts that can be anticipated from implementation of the Project. This second part begins with an explanation of the methodology used to identify and assess environmental impacts. This includes a description of "significance criteria" which comprise the standards or levels against which the significance of Project impacts is evaluated. Where appropriate, mitigation measures are proposed that would avoid and/or reduce the severity of environmental impacts.

USE OF EXISTING FACILITIES

It is anticipated that the Project would make use of existing water supply and distribution infrastructure, some of which is owned and operated by other agencies. This infrastructure includes conveyance and groundwater recharge facilities, all of which would be operated within the parameters of established operating guidelines, permits, and maintenance procedures. Groundwater recharge would involve the use of numerous groundwater recharge facilities or spreading grounds. These facilities, which are described in detail in Appendix B, are not owned or operated by Muni/Western and would be used based on cooperative agreements. The Project would not affect the manner in which these facilities are operated or maintained. Project-related environmental impacts associated with the operation and maintenance of these facilities in such areas of noise, aesthetics, air quality, and biological resources, for example, would not differ measurably from those experienced currently or in the past. For this reason, potential environmental effects associated with the use of these facilities are not discussed further in this document. Potential impacts associated with Project operations are addressed in two broad areas: the effects of Project groundwater recharge activities on groundwater levels and groundwater quality; and the effects of water diversions on in-stream flows in the Santa Ana River. Groundwater effects are addressed in sections 3.2 (Groundwater Hydrology and Water Quality), section 3.4 (Geology, Soils, and Mineral Resources), and section 3.12 (Hazardous Materials and Groundwater Contamination). Changes in flows in the Santa Ana River are addressed in section 3.1 (Surface Water Hydrology and Water Quality) and section 3.3 (Biological Resources).

EXISTING CONDITIONS AND NO PROJECT CONDITIONS

To assess the potential impacts of Project implementation on environmental resources, a comparison must be made to conditions that exist at an appropriate point in time, also referred to as "baseline" conditions. This baseline is conventionally defined as the existing physical conditions in the affected area at the time the Notice of Preparation (NOP) is published. Surface water and groundwater conditions change in response to numerous factors, the most fundamental of which are precipitation and runoff (supply) and diversions and extractions (demand). Surface water and groundwater conditions at any point in time depend on antecedent conditions of water supply and demand and will change in response to changes in the supply and demand determinants. It is, thus, not appropriate to compare surface water and groundwater conditions at some time in the future against a static description of conditions in a past time period. For this reason, anticipated conditions under the Project are compared to anticipated conditions likely to occur in the future without the Project, i.e., under the No Project Scenario.

Typically, future environmental conditions that would likely prevail in the absence of the Project are described and included in the analysis of alternatives under the concept of the "No Project Scenario." The purpose of describing and analyzing a No Project Scenario is to provide decision-makers with a comparison between the impacts associated with implementation of the Project and impacts likely to occur without the Project or project alternatives.

The analyses of impacts undertaken for Project and No Project conditions share a common set of assumptions. They include (1) water diversions and uses by both the Conservation District and senior water rights claimants would continue; and (2) releases of water from Seven Oaks Dam for environmental restoration purposes would be made as referenced in the Biological Opinion (BO) published by the U.S. Fish and Wildlife Service (USFWS).

VARIATION IN AMOUNT OF APPROPRIATED WATER UNDER PROJECT IMPLEMENTATION

In addition to future hydrologic conditions and other natural events, there are four major parameters that influence the amount of water available for appropriation by Muni/Western and the manner of their combination results in a range of potential diversions. These parameters are as follows:

1. Diversions by senior water rights claimants;
2. Diversions by the Conservation District;
3. Releases of SAR surface water from Seven Oaks Dam to accommodate habitat restoration as called for in the BO issued by the USFWS; and
4. Operation of Seven Oaks Dam for both flood control and seasonal water conservation storage.

The amount of unappropriated SAR surface water available for diversion in any given year depends on the values of these parameters. A number of model simulations reflecting combinations of these parameters were developed to determine the range of potential quantities of unappropriated SAR surface water. After all diversions are made, including those of Muni/Western, any SAR surface water not diverted is assumed to flow down the river. Table 3.0-1 lists each of these parameters and the values they can assume in the model simulations.

As shown in Table 3.0-2, 16 different simulations are possible through the different combinations of these four basic parameters. With completion of Phase I of the Plunge Pool Pipeline, SAR water is diverted at the Cuttle Weir at a maximum rate of 500 cfs and conveyed to (1) the Foothill Pipeline, (2) the Santa Ana River Crossing (SARC) Pipeline, and (3) the Santa Ana River Spreading Grounds. Upon completion of Phases II and III of the Plunge Pool Pipeline and its connection to the Inland Feeder Pipeline, up to a maximum of 1,500 cfs of SAR water could be diverted. Where appropriate, especially in the analysis of surface water and groundwater resources, impacts associated with diversions of either of these quantities of SAR water are analyzed. In this way, potential impacts to the environment have been bounded on the upper and lower limits, and impacts associated with the diversion of quantities of water between these two volumes have been assessed.

Under each of the 16 Project simulations, the amount of unappropriated SAR water captured with a maximum diversion rate of 1,500 cfs would be as shown in Table 3.0-3. With a maximum diversion rate of 500 cfs, the corresponding quantities of SAR water captured by Muni/Western would be as shown in Table 3.0-4.

Table 3.0-1. Parameters Used in Model Simulations

Parameter	*Parameter Type*	*Value in Model*
1. Diversions by senior water rights claimants	Variable	Historical diversions *or* Diversion of up to 88 cfs
2. Diversions by the Conservation District	Variable (assuming a maximum diversion rate of 300 cfs)	Historical diversions *or* Licensed right of up to 10,400 afy
3. Environmental Habitat Releases	Variable	1,000 cfs for 2 days at a 6-month minimum interval when water is available *or* Other habitat treatment (high-pressure water)
4. Seasonal Water Conservation Storage within Seven Oaks Reservoir	Variable	Dam operated for flood control *or* Dam operated for both flood control and seasonal water conservation storage

Of the 16 simulations, five have been carried forward for detailed analysis. They represent the following: maximum quantity of SAR water appropriated by Muni/Western with a diversion rate of 1,500 cfs; maximum quantity of SAR water appropriated by Muni/Western with a diversion rate of 500 cfs; minimum quantity of SAR water appropriated by Muni/Western with a diversion rate of 1,500 cfs; minimum quantity of SAR water appropriated by Muni/Western with a diversion rate of 500 cfs; and quantity of unappropriated SAR water most likely to occur under No Project conditions. Assumptions underlying each of these five scenarios are as outlined below.

- Project Scenario A. Scenario 15 in Table 3.0-3 represents the maximum potential appropriation by Muni/Western at a diversion rate of 1,500 cfs and is the result of assuming: (1) historical diversions by senior water rights claimants; (2) licensed diversions by the Conservation District; (3) environmental restoration without releases from Seven Oaks Dam; and (4) seasonal water conservation storage at Seven Oaks Dam.

- Project Scenario B. Scenario 15 in Table 3.0-4 represents the maximum potential appropriation by Muni/Western at a diversion rate of 500 cfs and is the result of assuming: (1) historical diversions by senior water rights claimants; (2) licensed diversions by the Conservation District; (3) environmental restoration without releases from Seven Oaks Dam; and (4) seasonal water conservation storage at Seven Oaks Dam.

Table 3.0-2. Project Simulations and Project Scenarios

Parameter	*Parameter Value*															
1. Senior Water Rights Claimants	User-Specified Diversion Rate of up to 88 cfs								Historical Diversions							
2. Conservation District	Historical Diversions				Licensed Right Diversions (up to 10,400 afy)				Historical Diversions				Licensed Right Diversions (up to 10,400 afy)			
3. Environmental Habitat Releases	1,000 cfs for 2 days		Other Habitat Treatment		1,000 cfs for 2 days		Other Habitat Treatment		1,000 cfs for 2 days		Other Habitat Treatment		1,000 cfs for 2 days		Other Habitat Treatment	
4. Seasonal Water Conservation Storage within Seven Oaks Reservoir	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Simulation Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Project Scenario		C or D													A or B	

Table 3.0-3. Estimates of Unappropriated SAR Water Available for Capture by Muni/Western for Base Period WY 1961-62 through WY 1999-2000
Project Diversion Capacity of 1,500 cfs
(Values in Acre-Feet)

		Project Scenario C													Project Scenario A	
Scenario	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Senior Claimant Diversions	**User-Specified Rate of up to 88 cfs**								**Historical Diversions**							
Conservation District Diversion	**Historical Diversions**				**Licensed Right (up to 10,400 afy)**				**Historical Diversions**				**Licensed Right (up to 10,400 afy)**			
Environmental Habitat Release	**1,000 cfs / 2 days**		**Other Habitat Treatment**		**1,000 cfs / 2 days**		**Other Habitat Treatment**		**1,000 cfs / 2 days**		**Other Habitat Treatment**		**1,000 cfs / 2 days**		**Other Habitat Treatment**	
Seasonal Storage	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Cumulative Total																
Senior Claimant Diversions	1,416,607	1,416,607	1,416,607	1,416,607	1,416,607	1,416,607	1,416,607	1,416,607	1,038,135	1,038,135	1,038,135	1,038,135	1,038,135	1,038,135	1,038,135	1,038,135
Reservoir Evaporation	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196	5,608	5,608	5,608	5,608	5,608	5,608	5,608	5,608
Conservation District Diversion	398,466	398,466	398,466	398,466	107,060	107,060	107,060	107,060	404,980	404,980	404,980	404,980	193,483	193,483	193,483	193,483
Environmental Habitat Release	27,769	27,769	-	-	35,703	35,703	-	-	35,703	35,703	-	-	35,703	35,703	-	-
Total Muni/Western Potential Capture	445,836	445,836	473,605	473,605	729,308	729,308	765,011	765,011	807,448	807,448	843,151	843,151	1,018,945	1,018,945	1,054,648	1,054,648
Undiverted from SAR*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874
Average Annual																
Senior Claimant Diversions	36,323	36,323	36,323	36,323	36,323	36,323	36,323	36,323	26,619	26,619	26,619	26,619	26,619	26,619	26,619	26,619
Reservoir Evaporation	82	82	82	82	82	82	82	82	144	144	144	144	144	144	144	144
Conservation District Diversion	10,217	10,217	10,217	10,217	2,745	2,745	2,745	2,745	10,384	10,384	10,384	10,384	4,961	4,961	4,961	4,961
Environmental Habitat Release	712	712	-	-	915	915	-	-	915	915	-	-	915	915	-	-
Total Muni/Western Potential Capture	11,432	11,432	12,144	12,144	18,700	18,700	19,616	19,616	20,704	20,704	21,619	21,619	26,127	26,127	27,042	27,042
Undiverted from SAR*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum Annual																
Senior Claimant Diversions	58,528	58,528	58,528	58,528	58,528	58,528	58,528	58,528	45,245	45,245	45,245	45,245	45,245	45,245	45,245	45,245
Reservoir Evaporation	273	273	273	273	273	273	273	273	368	368	368	368	368	368	368	368
Conservation District Diversion	56,953	56,953	56,953	56,953	10,400	10,400	10,400	10,400	48,152	48,152	48,152	48,152	10,400	10,400	10,400	10,400
Environmental Habitat Release	3,967	3,967	-	-	3,967	3,967	-	-	3,967	3,967	-	-	3,967	3,967	-	-
Total Muni/Western Potential Capture	121,026	121,026	124,933	124,993	147,468	147,468	151,435	151,435	171,389	171,389	175,356	175,356	194,350	194,350	198,317	198,317
Undiverted from SAR *	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Estimate (on a monthly basis) of the quantity of water remaining in the channel below Cuttle Weir after all diversions have occurred .

Model input variables that are common to all scenarios include the following (variables described in OPMODEL documentation):
a) Values shown in table for Total Potential Capture and Undiverted from SAR are estimated using OPMODEL and Allocation Model
b) Synthesized hydrology based on re-operated Bear Valley Dam
c) Release of continual 3 cfs from dam to account for groundwater interruption by the dam foundation
d) USGS gage differences and rounding accounted for in senior water claimant diversions
e) Conservation District diversion capacity = 300 cfs
f) Release frequency for environmental releases is no more than every 6 months for 8 scenarios with environmental releases
g) Maximum number of environmental releases = 100% of potential releases for 6 of the scenarios with environmental releases
h) Maximum annual diversion by Muni/Western = 200,000 afy
i) Percent of available dam release un-divertable through Plunge Pool Pipeline = 0%
j) Flood/Conservation target storages from USACE Feasibility Report and Interim Water Control Plan
k) Evaporation rates from USACE Feasibility Report

Table 3.0-4. Estimates of Unappropriated SAR Water Available for Capture by Muni/Western for Base Period WY 1961-62 through WY 1999-2000
Project Diversion Capacity of 500 cfs
(Values in Acre-Feet)

		Project Scenario D													Project Scenario B	
Scenario	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Senior Claimant Diversions	**User-Specified Rate of up to 88 cfs**								**Historical Diversions**							
Conservation District Diversion	**Historical Diversions**				**Licensed Right (up to 10,400 afy)**				**Historical Diversions**				**Licensed Right (up to 10,400 afy)**			
Environmental Habitat Release	**1,000 cfs / 2 days**		**Other Habitat Treatment**		**1,000 cfs / 2 days**		**Other Habitat Treatment**		**1,000 cfs / 2 days**		**Other Habitat Treatment**		**1,000 cfs / 2 days**		**Other Habitat Treatment**	
Seasonal Storage	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Cumulative Total	**(39-Year Base Period)**															
Senior Claimant Diversions	1,416,606	1,416,607	1,416,607	1,416,608	1,416,605	1,416,608	1,416,610	1,416,610	1,038,137	1,038,139	1,038,139	1,038,138	1,038,128	1,038,132	1,038,131	1,038,134
Reservoir Evaporation	3,218	3,196	3,234	3,196	3,328	3,196	3,380	3,196	5,734	5,608	5,783	5,608	6,029	5,608	6,081	5,608
Conservation District Diversion	398,466	398,466	398,466	398,466	107,060	107,060	107,060	107,060	404,980	404,980	404,980	404,980	193,483	193,483	193,483	193,483
Environmental Habitat Release	27,769	27,769	-	-	35,703	35,703	-	-	35,703	35,703	-	-	39,670	35,703	-	-
Total Muni/Western Potential Capture	407,312	400,599	431,097	420,165	680,406	663,260	712,085	688,520	748,045	727,788	768,762	740,623	954,556	916,718	981,931	936,212
Undiverted from SAR*	38,503	45,237	42,470	53,439	48,772	66,047	52,739	76,488	59,275	79,656	74,210	102,525	60,008	102,230	72,248	118,437
Total	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874	2,291,874
Average Annual																
Senior Claimant Diversions	36,323	36,323	36,323	36,323	36,323	36,323	36,323	36,323	26,619	26,619	26,619	26,619	26,619	26,619	26,619	26,619
Reservoir Evaporation	83	82	83	82	85	82	87	82	147	144	148	144	155	144	156	144
Conservation District Diversion	10,217	10,217	10,217	10,217	2,745	2,745	2,745	2,745	10,384	10,384	10,384	10,384	4,961	4,961	4,961	4,961
Environmental Habitat Release	712	712	-	-	915	915	-	-	915	915	-	-	1,017	915	-	-
Total Muni/Western Potential Capture	10,444	10,272	11,054	10,773	17,446	17,007	18,259	17,654	19,181	18,661	19,712	18,990	24,476	23,506	25,178	24,005
Undiverted from SAR*	987	1,160	1,089	1,370	1,251	1,694	1,352	1,961	1,520	2,042	1,903	2,629	1,539	2,621	1,853	3,037
Maximum Annual																
Senior Claimant Diversions	58,528	58,528	58,528	58,528	58,528	58,528	58,528	58,528	45,245	45,245	45,245	45,245	45,245	45,245	45,245	45,245
Reservoir Evaporation	278	273	278	273	343	273	343	273	410	368	410	368	551	368	573	368
Conservation District Diversion	56,953	56,953	56,953	56,953	10,400	10,400	10,400	10,400	48,152	48,152	48,152	48,152	10,400	10,400	10,400	10,400
Environmental Habitat Release	3,967	3,967	-	-	3,967	3,967	-	-	3,967	3,967	-	-	7,934	3,967	-	-
Total Muni/Western Potential Capture	104,294	104,294	108,261	108,261	128,351	126,721	132,318	130,688	145,880	144,520	145,880	144,520	166,402	158,831	173,580	162,064
Undiverted from SAR*	22,101	28,505	26,068	32,472	30,024	41,347	33,991	45,314	34,538	41,841	40,703	47,971	34,745	56,408	38,382	61,109

* Estimate (on a monthly basis) of the quantity of water remaining in the channel below Cuttle Weir after all diversions have occurred.

Model input variables that are common to all scenarios include the following (variables described in OPMODEL documentation):
a) Values shown in table for Total Potential Capture and Undiverted from SAR are estimated using OPMODEL and Allocation Model
b) Synthesized hydrology based on re-operated Bear Valley Dam
c) Release of continual 3 cfs from dam to account for groundwater interruption by the dam foundation
d) USGS gage differences and rounding accounted for in senior water claimant diversions
e) Conservation District diversion capacity = 300 cfs
f) Release frequency for environmental releases is no more than every 6 months for 8 scenarios with environmental releases
g) Maximum number of environmental releases = 100% of potential releases for 6 of the scenarios with environmental releases
h) Maximum annual diversion by Muni/Western = 200,000 afy
i) Percent of available dam release un-divertable through Plunge Pool Pipeline = 0%
j) Flood/Conservation target storages from USACE Feasibility Report and Interim Water Control Plan
k) Evaporation rates from USACE Feasibility Report

- Project Scenario C. Scenario 2 in Table 3.0-3 represents the minimum potential appropriation by Muni/Western at a diversion rate of 1,500 cfs and is the result of assuming: (1) diversions up to 88 cfs by senior water rights claimants; (2) historical diversions by the Conservation District; (3) environmental restoration with releases from Seven Oaks Dam; and (4) no seasonal water conservation storage at Seven Oaks Dam.

- Project Scenario D. Scenario 2 in Table 3.0-4 represents the minimum potential appropriation by Muni/Western at a diversion rate of 500 cfs and is the result of assuming: (1) diversions up to 88 cfs by senior water rights claimants; (2) historical diversions by the Conservation District; (3) environmental restoration with releases from Seven Oaks Dam; and (4) no seasonal water conservation storage at Seven Oaks Dam.

- No Project Scenario. Conditions representative of No Project conditions are: (1) historical diversions by senior water rights claimants; (2) historical diversions by the Conservation District; (3) environmental restoration with releases from Seven Oaks Dam; and (4) no seasonal water conservation storage at Seven Oaks Dam. The No Project Scenario is like Scenario 10 shown in Table 3.0-2, except no diversions would be made by Muni/Western.

Project Scenarios A through D span the range of quantities of unappropriated water available to Muni/Western under 16 possible simulations, assuming either of two diversions rates. By evaluating the extreme values in this range (Scenarios A and C assume diversions at the higher rate of 1,500 cfs while Scenarios B and D assume a diversion rate of 500 cfs), the full range of potential environmental consequences associated with implementation of any of the 16 possible simulations are included in the analysis. This bracketing or "bookend" approach negates the need to address each of the 16 simulations individually.

PLUNGE POOL PIPELINE PHASING

Construction of the Plunge Pool Pipeline would occur in three phases. Ultimately the pipeline would connect the plunge pool located immediately below Seven Oaks Dam to both Muni's existing Foothill Pipeline and Metropolitan's Inland Feeder Pipeline. Construction of each of the three phases would depend on funding, water demand, and other variables. No specific schedule is proposed for the phasing. For analysis purposes, a conservative approach is taken that assumes the construction phases will follow sequentially, one immediately after the other. Details regarding each phase are presented in Chapter 2 (Project Description) and Appendix C (Project Construction and Operations Activities).

3.1 SURFACE WATER HYDROLOGY AND WATER QUALITY

This section provides a description of surface water characteristics of the region, Project construction areas, and Project operation areas. Appendix A (Surface Water Hydrology) contains additional detail on the surface water setting, modeling tools used in the impact analysis, and estimate of changes to surface water hydrology resulting from implementation of the Project.

Changes to surface water can influence groundwater characteristics such as depth to groundwater, interactions with contaminant plumes, and groundwater quality. Such potential interactions are addressed in sections 3.2 (Groundwater Hydrology and Water Quality), 3.4 (Geology, Soils, and Mineral Resources), 3.12 (Hazardous Materials and Groundwater Contamination), and Appendix B (Groundwater Hydrology).

The manner in which the Project would make use of different water facilities is described in Appendix A and potential impacts to water utilities are described in section 3.13 (Public Services, Utilities, and Transportation).

3.1.1 Environmental Setting

The Santa Ana River (SAR) is the largest stream system in southern California. It begins high in the San Bernardino Mountains and flows over 100 miles southwesterly where it discharges to the Pacific Ocean between Newport Beach and Huntington Beach. The SAR watershed covers over 2,650 square miles of widely varying urban, rural, and forested terrain and covers the more populated urban areas of San Bernardino, Riverside, and Orange counties, as well as a small portion of Los Angeles County. The SAR watershed and its relationship to the Muni/Western service areas is illustrated in Figure 3.1-1.

Climate in the Project area is characterized by relatively hot, dry summers and cool winters with intermittent precipitation. Precipitation is nearly always in the form of rain in the lower elevations and mostly in the form of snow above 6,000 feet mean sea level (msl) in the San Bernardino Mountains. Mean annual precipitation ranges from about 12 inches in the vicinity of Riverside, to about 20 inches at the base of the San Bernardino Mountains, to more than 35 inches along the crest of the mountains. The long-term (water years [WY][1] 1883-84 through 2001-02) mean annual precipitation recorded at the San Bernardino County Hospital Gage is 16.4 inches. The historical record indicates that a period of above-average or below-average precipitation can last more than 30 years, such as the recent dry period that extended from 1947 to 1977. Most (73 percent) of the average annual precipitation occurs during the months of December through March and rainless periods of several months are common in the summers.

1 A water year runs from October through September of the following year. For example, water year 2000-01 began on October 1, 2000 and ended on September 30, 2001.

3.1.1.1 Characteristics of the Santa Ana River and its Tributaries

3.1.1.1.1 Measurement of Stream Flow and Stream Flow Variability

Runoff[2] records provide information on the characteristics of flow in the SAR and its tributaries. Such records are available for a number of stream gaging stations located on the mainstem of the SAR and throughout the SAR watershed, as shown in Figure 3.1-1 and Figure 3.1-2. The runoff records demonstrate the highly variable nature of river flow, with large floods and long periods of extremely low flow. As shown in Figure 3.1-2, three U.S. Geological Survey (USGS) gaging stations are located within the SAR canyon:

- The Southern California Edison (SCE) Canal Gage (USGS Gage 11049500) records flow that is diverted into the SCE Canal above Seven Oaks Dam;
- The Auxiliary Canal Gage (USGS Gage 11051502) records flow diverted from the SAR into the Auxiliary Canal above Cuttle Weir which ultimately enters the Division Box; and
- The Mentone Gage (USGS Gage 11051499) located on the SAR at River Mile (RM)[3] 69.96, just upstream of Cuttle Weir, accounts for water flowing in the SAR just below Seven Oaks Dam.

The combination of all three gages (referred to as the "Combined Flow" Mentone Gage [USGS record 11051501]), represents the sum of stream flow recorded in the river at the Mentone Gage, in addition to flow that would have been in the river at this location had it not been diverted upstream for use in the SCE hydroelectric system and at other points of diversion. The "River Only" Mentone Gage (USGS record 11051500) is the sum of the Mentone Gage and Auxiliary Canal Gage and is representative of SAR flow near Seven Oaks Dam.

There are two other USGS gaging stations located downstream of Seven Oaks Dam, but within the upper SAR basin: the "E" Street Gage (USGS Gage 11059300) located in the City of San Bernardino at RM 57.69; and the MWD (Metropolitan Water District) Crossing Gage (USGS Gage 11066460) located at RM 45.7 near Riverside Narrows. Table 3.1-1 provides the annual median[4], maximum, and minimum stream flow recorded at the River Only Mentone, "E" Street and MWD Crossing gages.

Flow in the SAR is highly variable from year to year. Additionally, flow in the SAR increases as one progresses downstream due to inflows from tributaries, rising water[5], and effluent from wastewater treatment plants (WWTPs). SAR flows at the "E" Street Gage include flows from Mill Creek and San Timoteo Creek but not from Lytle and Warm creeks, which enter the SAR

2 Runoff is that portion of precipitation that flows off the land surface to creeks, streams, and other water bodies.

3 In this report, river miles are counted from the mouth of the SAR at the Pacific Ocean, with miles increasing upstream. The SAR mouth is RM 0, Prado Dam is RM 30.5, and Seven Oaks Dam is RM 70.93.

4 Median is a measure of central tendency, as is mean (average). The median represents the 50th percentile, i.e., if data are sorted from highest value to lowest value, the median value is the value in the exact center of the range. The median is a more appropriate measure of central tendency than the mean when data are highly skewed.

5 Rising water is used to describe noticeable increases in streamflow in reaches where a subsurface restriction forces groundwater to the surface.

below the "E" Street Gage. SAR flows at the MWD Crossing include inflows from Lytle and Warm creeks, two large public WWTPs, and rising water.

Table 3.1-1. Upper Santa Ana River Median, Maximum, and Minimum Annual Flow (in acre feet)

	Median Annual Flow	*Maximum Annual Flow*	*Minimum Annual Flow*
River Only Mentone [a]	7,991	204,812	9
"E" Street [b]	25,525	319,976	0
MWD Crossing [c]	75,934	301,004	9,979

Source: USGS gage data.

a. USGS Gage 11051500. Period of record is WY 1911-12 through WY 1999-00.

b. USGS Gage 11059300. Period of record is WY 1938-39 through WY 1953-54, WY 1966-67 through WY 2000-01.

c. USGS Gage 11066460. Period of record is WY 1969-70 through WY 2000-01.

Figure 3.1-3 presents probability of exceedance curves[6] based on gage records for the River Only Mentone, "E" Street, and MWD Crossing gage locations. As shown in this figure, large annual flows in the upstream areas can be expected quite infrequently, but the probability of the same flow occurring downstream is greater. For example, flows in excess of about 70,000 afy have a frequency of occurrence of only 10 percent at the River Only Mentone Gage, whereas this same flow has a frequency of occurrence of over 60 percent at the MWD Crossing Gage. Additionally, in the upstream areas, minimum annual stream flows are generally much smaller than minimum annual flows in the downstream areas.

Figure 3.1-4 represents monthly flows in the SAR as recorded at the River Only Mentone Gage for the period of record. The largest monthly flows typically occurred in February and March and the lowest monthly flows typically occurred between August and October. Although stream flow increases downstream, the timing of flows (i.e., when the monthly maximums and minimums occur) is similar to the timing of flows observed at the River Only Mentone Gage. A wet year, compared to an average year, shows both greater monthly flows and earlier onset.

3.1.1.1.2 Tributaries

There are numerous tributaries that contribute flow to the mainstem of the SAR in the Project area including Mill Creek, City Creek, Plunge Creek (a tributary of City Creek), Mission Zanja Creek (located upstream of San Timoteo Creek), San Timoteo Creek, East Twin Creek, Warm Creek, and Lytle Creek (a tributary of Warm Creek). The flow (under 100-year flood

6 A probability of exceedance graph illustrates the cumulative frequency (probability) that a flow of a specific quantity has occurred historically. The graph portrays the probability of stream flow being greater than or equal to specific quantities. For example, Figure 3.1-3 shows that in about 20 percent of the years, stream flow at the River Only Mentone gage would be expected to equal or exceed 30,000 af; and in about 10 percent of the years, stream flow would be expected to equal or exceed 70,000 af.

conditions[7]) contributed by each of these tributaries is provided in Table 3.1-2. As a reference, during a 100-year flood event, Seven Oaks Dam would release up to 5,000 cfs (USACE 1988).

Table 3.1-2. Tributary Flow Contribution to the Santa Ana River (100-year flood event discharge in cfs)

Tributary	*Inflow*	*River Mile*
Mill Creek	19,500	68.67
City Creek & Plunge Creek (Combined)	5,000	62.87
Mission Zanja Creek	3,500	59.08
San Timoteo Creek	15,500	58.44
East Twin Creek	18,000	58.14
Lytle Creek & Warm Creek (Combined)	70,000	56.74
Source: USACE 2000.		

3.1.1.2 Recent and Anticipated Changes in the Santa Ana River Flow Regime

3.1.1.2.1 Wastewater Treatment Plant Discharges

There are 14 publicly owned wastewater treatment plants (WWTP) located above Prado Dam in the Upper SAR watershed (Santa Ana River Watermaster 2003). Nine of these plants contribute to surface flow of the SAR. Between 1970 and 2000, the total volume of wastewater contributions to SAR flows increased from 44,000 afy to 169,000 afy (Santa Ana River Watermaster 2003).

Three wastewater treatment plants (Redlands, Beaumont, and Yucaipa) discharge to the SAR and its tributaries upstream of the City of San Bernardino, but these discharges generally do not flow continuously to the SAR at "E" Street (Santa Ana River Watermaster 2003). Two plants, the Rapid Infiltration and Extraction (RIX)[8] WWTP in the City of Colton, and the Rialto WWTP in the City of Rialto discharge directly to the SAR via a discharge channel at RM 53.46 (approximately 4 miles below "E" Street and more than 7 miles upstream of Riverside Narrows). Wastewater discharges from these plants have hydraulic continuity to the SAR above Riverside Narrows. As can be seen in Figure 3.1-5, combined wastewater discharge from these two plants has risen from around 22,000 afy in WY 1970-71 to 57,750 afy in WY 2000-01 (Santa Ana River Watermaster 2003). The combined wastewater discharge is expected to increase to about 59,000 afy with both facilities operating at their respective design capacities. See Table 3.1-3.

Seven plants (Riverside, Corona, Inland Empire Utilities Agency [IEUA] Regional Plant 1, IEUA Regional Plant 2, IEUA Regional Plant 4, IEUA Carbon Canyon, and Western Riverside County)

7 A flood as defined under the Standard Flood Insurance Policy is a general and temporary condition of partial or complete inundation of normally dry land areas from overflow of inland or tidal waters or from the unusual and rapid accumulation of runoff of surface waters from any source. A 100-year flood refers to a flood level with a 1 in 100 percent chance of being equaled or exceeded in any given year.

8 The RIX WWTP went into operation in 1996 and takes all effluent from the Colton and San Bernardino Water Reclamation Plants. Prior to 1996, effluent from these plants entered the SAR just above and just below "E" Street, respectively.

contribute wastewater discharges to the SAR between Riverside Narrows and Prado Dam. In WY 2000-01 these discharges totaled 110,852 af (Santa Ana River Watermaster 2003).

Despite the likelihood that WWTP discharges will increase in the future, not all of the treated water may enter the SAR. Several cities and utilities are in the process of developing plans to recycle WWTP effluent, which could decrease discharges to the river. For example, the City of San Bernardino is currently evaluating a program to sell approximately 18,000 afy of tertiary effluent (of a total potential discharge of approximately 44,900 afy) from the RIX facility. Muni is currently working with the City of San Bernardino to ensure that the RIX facility continues to release quantities of treated effluent to the SAR adequate to fulfill downstream water obligations as called for in the *Orange County* Judgment (see section 3.1.1.5.1).

Table 3.1-3. Treated Wastewater Discharged Directly to the Santa Ana River above Riverside Narrows

Facility	*Current Discharge (afy)*	*Potential Future Discharge [a] (afy)*
RIX	49,407 [b]	44,900
Rialto	8,346 [b]	14,200
Total Discharges Directly to the SAR in the Project Area	57,753	59,000

Notes:
a. Potential future discharge based on design flow of the WWTPs.
b. Based on 2000-01 water year data reported in the Thirty-Second Annual Report of the Santa Ana River Watermaster (Santa Ana River Watermaster 2003).

3.1.1.2.2 Increased Urbanization

Urbanization taking place in the valley areas of the SAR basin has resulted in increased responsiveness of the basin to rainfall. The increase in impervious surfaces (such as roofs, roads, parking lots, etc.) and constructed drainages to remove surface water from urban areas has resulted in decreased groundwater infiltration and increased runoff from urban areas. These actions have reduced the lag-time between peak rainfall and peak runoff (i.e., constructed drainage systems move water from the urban areas to the river faster than this water would move if the land was not developed).

Compared to a basin without the influence of urbanization, the same rainfall occurring over an urbanized segment of the basin will result in higher peak discharges, a shorter lag-time to the peak discharge, and an overall larger volume of water entering the local drainage channels. Because the SAR Basin is experiencing rapid growth, increased urbanization of the basin is expected to continue, and therefore, this trend in increased discharge and decreased lag-times between peak rainfall and peak stream flow is expected to continue in the future.

3.1.1.2.3 Seven Oaks Dam

Seven Oaks Dam was completed in December 1999. The dam provides flood protection for downstream communities as a component of the ongoing Santa Ana River Mainstem Project of the U.S. Army Corps of Engineers (USACE). The dam is located 1 mile upstream of the mouth of the SAR canyon in the upper reaches of the river. Seven Oaks Dam is a 550-foot high earth/rock-fill dam with a gross storage capacity of 147,970 af at spillway crest (elevation 2,580 feet National Geodetic Vertical Datum [NGVD]).

From June through October of each year the dam operates in "pass through" mode, i.e., all water collected in the reservoir is released downstream. From the beginning of November to the end of May all flows except 3 cfs are stored until target debris pool storage is met at 2,200 NGVD (approximately 3,000 af of storage). Once debris pool target storage is obtained, the reservoir is operated so that outflow equals inflow. In the event of a flood, Seven Oaks Dam is operated in conjunction with Prado Dam. Releases at Seven Oaks Dam are held at 500 cfs or less until peak water surface elevation has passed at Prado Dam. Following a flood, water is released from Seven Oaks Dam at up to 7,000 cfs[9] until target storage is again reached. However, the outlet works are sized to pass a slightly larger discharge to provide flexibility and a factor of safety; releases as great as 8,000 cfs are possible through the outlet works under emergency operating conditions (USACE 1988). Releases greater than 8,000 cfs can only be made utilizing the dam spillway. Beginning in June and continuing through September, the debris pool is emptied (USACE 2002).

Seven Oaks Dam has substantially altered the natural hydrology of the SAR, with the largest changes occurring during and after periods of high stream flow (i.e., flood flows). Overall, the completion of Seven Oaks Dam has altered the discharge rate, depth, velocity, and volume of flow in the SAR and, hence, has affected flood magnitude and the extent of overbank flooding, along with the erosional and depositional characteristics in the overbank area. These changes are discussed immediately below.

3.1.1.3 Past and Future Flooding, Sediment Transport, and Overbank Flows of the Santa Ana River

3.1.1.3.1 Flooding

Flood events are the predominant factor in shaping the overbank or floodplain areas through erosion and deposition of sediment. The largest recorded flood is that of 1862, which had an estimated discharge rate of 317,000 cfs at Riverside Narrows (USACE 2000). It is believed that the 1862 flood had a major effect on the SAR channel. Prior to the flood, the river upstream from what is now the City of Redlands was a narrow, meandering stream lined with alder, willow, sycamore, and cottonwood trees (USACE 2000). The flood of 1862 washed out trees and deposited sand, gravel, and boulders on the riverbed and on the adjacent floodplain (USACE 2000). After the flood, the river no longer followed a well-defined course, but instead ran in several channels in the section below the mouth of the canyon (USACE 2000).

Historic records point to other large floods in 1867, 1869, 1891, 1916, 1927, 1938, 1967, and 1969. Estimated discharge for most floods that have occurred since 1862 (with the exception of those in 1867 and 1869, due to lack of data for these floods) is provided in Table 3.1-4. Information presented in Table 3.1-4 also illustrates how operation of Seven Oaks Dam will alter the flood

9 The maximum rate at which water can be released from the dam varies depending on the surface water elevation (i.e., stage) of the reservoir.

discharges if similar floods occur in the future. Of the 15 historic events for which flows were estimated, six produced overbank flooding (plus the historic events of 1867 and 1869). Based on hydraulic modeling conducted by the USACE, overbank flows were estimated to be greater than 30,000 cfs in the 1862 flood event (USACE 2000). In the 1938 flood, the next largest flood event, overbank flows were estimated to be about 9,000 cfs (USACE 2000). The third largest flood event in 1891 was similar to the 1938 event in magnitude and overbank flows. The remaining three flood events caused overbank flows of a much smaller extent (estimated at between 600 cfs and 1,300 cfs; USACE 2000). Field investigations by the USACE point to the fact that the 1938 and 1969 floods occupied pre-existing overbank channels that were likely formed by the large floods of 1862 and 1869 (USACE 2000).

Table 3.1-4. Estimated Historic Flows on the Santa Ana River Downstream of the Santa Ana River - Mill Creek Confluence

Event Date	*Pre-Seven Oaks Dam Flow (cfs)*	*Pre-Dam Overbank Flooding*	*Post-Seven Oaks Dam Flow (cfs)*
1862	96,700	Yes	18,500
1891	58,100	Yes	14,700
1916	31,500	Yes	8,700
1927	25,700	Yes	5,000
1938	58,600	Yes	18,600
1966	12,900	No	10,500
1967	18,500	No	10,100
January 1969	25,700	Yes	20,100
February 1969	12,000	No	8,000
January 1980	8,200	No	6,000
February 21, 1980	6,500	No	2,500
February 17, 1980	5,500	No	3,000
1983	3,300	No	600
1993	7,600	No	2,800
1995	9,700	No	3,400

Source: USACE 2000.

USACE projections of instantaneous peak flows at various locations along the mainstem of the SAR downstream from Seven Oaks Dam under pre- and post-dam conditions are provided in Table 3.1-5. The effect of Seven Oaks Dam on flow regulation in the SAR becomes attenuated the further downstream from the dam, with the largest changes in peak discharge for a given frequency seen nearest the dam and the smallest changes seen in inflow to Prado Dam. Under 100-year flood conditions SAR flow downstream of the confluence with Mill Creek has been reduced by about 67 percent, from 75,000 cfs prior to the construction of Seven Oaks Dam to 25,000 after the dam's construction (USACE 1988). At Prado, due to the effect of tributaries and other inflows to the river, the effect of Seven Oaks Dam is much less pronounced. Under 100-year flood conditions, inflow to Prado Dam has been reduced by about 15 percent, from 230,000 cfs to 195,000 cfs (USACE 1988).

In the future, the magnitude of the peak discharge for a given frequency is expected to increase due to greater levels of urbanization in the drainage area (i.e., the flow associated with the 100-year flood is expected to be greater in the future). Therefore, the ability of Seven Oaks Dam to reduce peak discharge for a given frequency is expected to decline slightly over time (i.e., the flood control benefits of the dam will be slightly less in the future as runoff downstream of the dam increases).

Table 3.1-5. Santa Ana River Mainstem Discharge-Frequency Values under Pre- and Post-Seven Oaks Dam Conditions

Location	*Pre and Post-Seven Oaks Dam*	*Drainage Area Size (sq. mi.)*	*Flood Condition/Frequency of Peak Discharge (cfs)*						
			200-Year	*100-Year*	*50-Year*	*25-Year*	*10-Year*	*5-Year*	*2-Year*
Outflow from Seven Oaks Dam	Pre	177	88,000	58,000	34,000	20,500	8,800	4,300	1,100
	Post		6,400	5,000	3,800	2,900	500	500	400
Downstream of Mill Creek	Pre	242	120,000	75,000	45,000	26,000	11,700	5,600	1,400
	Post		37,000	25,000	15,500	9,300	4,300	2,050	760
Downstream of City Creek	Pre	290	125,000	80,000	48,000	28,000	12,500	5,800	1,400
	Post		49,000	32,000	20,000	12,000	5,400	2,600	800
At "E" Street	Pre	500	165,000	105,000	60,000	33,000	13,500	6,000	1,400
	Post		100,000	67,000	39,000	22,000	9,000	4,000	920
At Riverside Narrows	Pre	824	265,000	175,000	102,000	57,000	23,000	9,500	1,600
	Post		205,000	130,000	80,000	45,000	18,000	7,600	1,400
Inflow to Prado Dam	Pre	2,255	360,000	230,000	132,000	72,000	28,000	11,500	2,800
	Post		300,000	195,000	110,000	60,000	23,000	9,500	2,300
Source: USACE 1988.									

3.1.1.3.2 Fluvial Processes

Changes in flood flows below Seven Oaks Dam result in changes to the area subject to overbank flooding, as well as changes to sediment transport within the SAR Wash. Water velocity and depth, both in the channel and in overbank areas, under pre- and post-dam conditions are provided in Table 3.1-6.

SEDIMENT TRANSPORT

As shown in Table 3.1-6, the operation of Seven Oaks Dam will modify the historic flow pattern of the upper SAR by lowering the hydrologic energy regime and reducing the discharge and velocity of flows below the dam.

Operation of Seven Oaks Dam will store and release flows to the upper SAR according to the fill and release criteria specified for Prado Dam. Generally during a flood event, flows less than or equal to 500 cfs are passed through Seven Oaks Dam, and flows in excess of 500 cfs are stored behind Seven Oaks Dam until Prado Flood Control Basin can accommodate the additional water. Longer periods of flow in the SAR in the 1,000 cfs to 4,000 cfs range than would have occurred historically result from this flood water storage and later releases from Seven Oaks Dam. Data indicate that, with operation of the dam, there is consistently an approximately 15 percent increase in the frequency of flows in the SAR downstream of Seven Oaks Dam in the 500 to 4,000 cfs range, and a decrease of approximately 25 percent in the frequency of flows over 4,000 cfs (EIP 2004). According to recent sediment transport analysis, it is flows over 4,000 cfs which mobilize gravel and cobbles in the SAR, whereas flows in the 500 to 4,000 cfs range transport sand (EIP 2004).

Table 3.1-6. Discharge, Depth and Velocity for Pre- and Post-Seven Oaks Dam Conditions, 50- and 100-Year Flood Events

	50-Year Flood		*100-Year Flood*	
	Pre – Seven Oaks Dam	*Post – Seven Oaks Dam*	*Pre – Seven Oaks Dam*	*Post – Seven Oaks Dam*
SAR CHANNEL BELOW MILL CREEK CONFLUENCE				
Discharge	45,000 cfs	15,500 cfs	75,00 cfs	25,000 cfs
Velocity (up to)	12 ft/s	10 ft/s	13 ft/s	11 ft/s
Average flow depth (up to)	9 ft	8 ft	11 ft	9 ft
OVERBANK[a]				
Overbank Flood Area Acreage	1,379 acres	1,031 acres	1,653 acres	1,202 acres
Discharge	4,200 cfs	80 cfs	17,300 cfs	600 cfs
Velocity	2.5-4.5 ft/s	1.0-2.0 ft/s	3.5-7.0 ft/s	2.0-3.0 ft/s
Average flood depth	2.0-3.5 ft	0.5-1.0 ft	2.5-5.0 ft	1.0-2.5 ft

Source: USACE 2000.

a. Overbank flooding is generally limited to three areas between the SAR confluence with Mill Creek downstream to RM 59.17 where the river is in an alluvial floodplain. Downstream of RM 59.17, the river is channelized and overbank flooding is unlikely.

The operation of Seven Oaks Dam effectively eliminated downstream transport of sediment larger than sand from the upper SAR watershed (EIP 2004, USACE 2000). The primary sediment sources to the river are tributaries such as Mill Creek, City Creek, Plunge Creek, Lytle Creek and Warm Creek (see Table 3.1-7).

Gravel and Cobble Transport. Sediment transport analysis indicates that even with a 25 percent reduction in the frequency of flows over 4,000 cfs attributable to dam operation, the SAR will transport gravel from the primary sediment sources (listed in Table 3.1-7). Nearly 90 percent of the gravel and cobble that would have moved downstream prior to the construction of Seven Oaks Dam will continue to move downstream. Modeling indicates that sediment deposition begins upstream of where the SAR water velocity slows at the energy dissipation structure near Interstate 10 (RM 60.5 to RM 57.5) (EIP 2004). Gravel-sized sediment moving past the energy dissipation structures downstream of Interstate 10 will be deposited over the next 10 miles (EIP 2004).

Sand Transport. Sediment transport modeling estimates that about 44,000 tons of sediment would reach Prado Dam annually under both pre- and post-dam conditions. However, with the dam in operation, more of the sediment (about 30,000 tons) will be composed of sand coming from degradation of the river downstream of the energy dissipaters at Interstate 10. With increased urbanization, it is likely that more flows of a magnitude to transport sand-sized material will occur, thus causing further scour below the energy dissipaters in the SAR (EIP 2004). Because there will be more flows of a magnitude adequate for moving sand, but not gravel, gravel downstream of the energy dissipaters will tend to remain in the area where deposited and will be relatively exposed and free of sand (EIP 2004).

Table 3.1-7. Tributaries Contributing Sediment to the SAR

River Mile	*Location*	*Significant Sediment Source*	*Area Yielding Sediment (sq. mi.)*
70.9	Santa Ana River Below Seven Oaks Dam	No	
68.67	Mill Creek at USGS Gage	Yes	43
62.87	City Creek and Plunge Creek (combined)	Yes	37
59.09	Mission Zanja Creek	No	
58.44	San Timoteo Creek	No	
58.14	East Twin Creek	No	
56.74	Lytle Creek and Warm Creek	Yes	155
55.50	Reche Canyon Channel	Yes	14
46.50	Sunnyslope Creek	No	
39.5	San Sevaine/Etiwanda Channel	No	
38.50	Day Creek	No	
Source: EIP 2004.			

OVERBANK FLOODING

Information presented in Table 3.1-6 demonstrates that Seven Oaks Dam will decrease the extent of the areas likely to experience overbank flooding. Based on results of modeling performed as part of the Biological Assessment (BA) for Seven Oaks Dam, the USACE determined that there are three major areas where 100-year floods could result in overbank flows under post-Seven Oaks Dam conditions:

1. The north bank between the Mill Creek Confluence and RM 65.41 where the 100-year flood could overtop the existing low flow channel banks and create continuous, separate, and parallel overbank flood flows within this approximately 4-mile stretch.
2. Between RM 64.90 and RM 63.78 flood flows could break out into the north overbank area and inundate a large active sand and gravel mining operation; and
3. Just upstream of the railroad bridge between RM 59.12 and RM 59.17, approximately 1,200 cfs of the post-dam 100-year flood flows (of 33,000 cfs) could break out into the north overbank (USACE 2000). Model results indicate that the flooding in this area would amount to less than 6 inches of shallow sheet flow (USACE 2000).

USACE estimates that with Seven Oaks Dam in place, the acreage of overbank flood areas will decrease by between 25 to 27 percent, relative to pre-dam conditions (though other estimates put the reduction in overbank flow acreages as high as 39 percent) (USACE 2000). Not only will overbank flood areas be reduced in size but the velocity and flood depth will be altered and this in turn will alter the sediment transport and scour experienced in these areas. Water velocity in the overbank flood areas would be reduced (under 100-year flood conditions) from between 3.5 and 7.0 feet per second (ft/s) to between 2.0 and 3.0 ft/s, while average flood depth would be decreased from 2.5 to 5.0 feet to 1.0 to 2.5 feet. Generally, it is estimated that in the overbank flood areas, sands become mobilized at water velocities of about 2 to 3 ft/s, gravels at about 6 ft/s, and boulders at 10 ft/s (USACE 2000). Vegetation can resist short-duration velocities up to 6 to 8 ft/s, but will be uprooted at higher velocities and/or longer duration flows (USACE 2000).

As discussed earlier, under post-dam conditions, velocities within the river channel are sufficient to transport sand- to boulder-sized material, and sand deposition would be expected in overbank flood areas adjacent to the river. However, the 50-year overbank flows would have a lower velocity, be shallow, and would mobilize and ultimately deposit substantially lower quantities of sand in the overbank areas than would 100-year flood flows. Deposition of sands would be possible with the shallow overbank flows associated with a 100-year flood event size, but scour and exposure of new surfaces outside of historic channels and rivulets on the floodplain is unlikely with Seven Oaks Dam in operation.

3.1.1.4 Water Quality

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) located throughout the state are responsible for the protection and, where possible, enhancement of the quality of California’s waters. The SWRCB sets statewide policies, and together with the RWQCBs, implements state and federal laws and regulations. Each of the nine RWQCBs adopts a Water Quality Control Plan or Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the region’s ground and surface waters, and local water quality conditions and concerns. The SAR Basin is within the boundaries of the Santa Ana Regional Water Quality Control Board (SARWQCB). The current Basin Plan for the SAR Basin was adopted in 1995, and amendments to this plan are currently under assessment (SARWQCB 2002).

The SARWQCB has divided the mainstem of the SAR into six reaches, Reaches 1 through 6 with reach numbers beginning at the Pacific Ocean and increasing upstream. Reaches 3 through 6 are located in the upper SAR basin (see Figure 3.1-6 for the location of these reaches). These reaches are described in more detail below, from upstream to downstream.

Reach 6 (RM 70.93 and above) includes the river upstream of Seven Oaks Dam where flows consist largely of snowmelt and storm runoff and where water tends to be of excellent quality (SARWQCB 1995).

Reach 5 (RM 70.93 to RM 57.68) extends from Seven Oaks Dam to the Bunker Hill Dike (San Jacinto Fault), which marks the downstream edge of the Bunker Hill groundwater basin.

This reach tends to be dry except during storm flows. The lower end of this reach has rising groundwater and San Timoteo Creek flows on an intermittent basis (SARWQCB 1995).

Reach 4 (RM 57.68 to RM 49.00) includes the SAR from the Bunker Hill Dike downstream to Mission Boulevard Bridge in Riverside. The bridge is the upstream limit of rising groundwater resulting from the constriction at Riverside Narrows. Until about 1985 most water in the reach percolated to the local groundwater leaving the lower part of the reach dry. However, flows are now perennial because of discharge from the RIX and Rialto WWTPs (USACE 2000). Much of the reach is operated for flood control (SARWQCB 1995).

Reach 3 (RM 49.00 to RM 30.50) includes the SAR from Mission Boulevard Bridge in Riverside to Prado Dam. At the Riverside Narrows, rising groundwater feeds several small tributaries including Sunnyslope Channel, Tequesquite Arroyo, and Anza Park Drain (SARWQCB 1995).

3.1.1.4.1 Beneficial Use

Beneficial use, in the context of water quality regulated by the RWQCBs, refers to the manner in which water is used for the benefit of one or more activities or purposes. Beneficial uses are determined by the SARWQCB, and specified in the Basin Plan. The beneficial uses are classed as an existing or potential use or as an intermittent use. The SARWQCB beneficial uses as adopted in the 1995 Basin Plan for each reach are provided in Table 3.1-8. Proposed amendments to the Basin Plan do not include changes to the designated beneficial uses of Reaches 3 through 6 of the SAR (SARWQCB 2004).

3.1.1.4.2 Components of Water Quality and Water Quality Objectives

The SARWQCB states that the quality of the SAR is a function of the quantity and quality of the various components of the flows (SARWQCB 1995). Three components make up the flow of the water in the SAR: (1) storm flows; (2) baseflow; and (3) non-tributary flow; the relative proportion of these components varies throughout the year.

The first component, "storm flows," results directly from rainfall, usually occurring between the months of December and April. Much of the rainfall and surface water runoff from the storms is captured and percolated into the groundwater basins. The quality of storm flow water is highly variable.

"Baseflow" makes up the second component of flow of water in the SAR, a large portion coming from the discharges of treated wastewater into the river, in addition to rising groundwater in the basin. This baseflow includes the non-point source discharges, as well as the uncontrolled and unregulated agricultural and urban runoff. Water quality objectives are set in relation to the baseflow in the river, not to the total flow in the river. The water quality objectives relevant to the Project are provided in Table 3.1-9. Proposed amendments to the Basin Plan do not include changes to the surface water quality objectives in these reaches of the SAR (SARWQCB 2004). The intent of these objectives is to protect the river's groundwater recharge beneficial use. Compliance with these objectives is verified by annual measurement of the baseflow quality.

The quantity and quality of baseflow is most consistent during the month of August. At that time of year the influence of storm flows and non-tributary flows is at a minimum and volumes of rising water and non-point source discharges tend to be low.

Table 3.1-8. Beneficial Uses of Santa Ana River Water*

Inland Surface Streams in the Upper Santa Ana River Basin	*Municipal and Domestic Supply*	*Agricultural Supply*	*Groundwater Recharge*	*Hydropower Generation*	*Water Contact Recreation*	*Non-Contact Water Recreation*	*Warm Freshwater Habitat*	*Cold Freshwater Habitat*	*Wildlife Habitat*	*Rare, Threatened or Endangered Species*	*Spawning, Reproduction, and Development*
Reach 2 – 17th Street in Santa Ana to Prado Dam	+	X	X		X	X	X		X	X	
Reach 3 - Prado Dam to Mission Blvd. (Segment F, G**)	+	X	X		X	X	X		X	X	
Reach 4 - Mission Blvd. in Riverside to San Jacinto Fault (Segment E, F)	+		X		X[c]	X	X		X		
Reach 5 - San Jacinto Fault in San Bernardino to Seven Oaks Dam[a, c] (Segment B, C, D)	X[b]	X	X		X	X	X		X	X	
Reach 6 - Seven Oaks Dam to Headwaters[c] (Segment A)	X	X	X	X	X	X		X	X		X

Source: SARWQCB 1995.
Notes:
X The waterbody has an existing or potential use.
\+ The waterbody has been specifically excepted from the Municipal and Domestic Supply designation in accordance with the criteria specified in the "Sources of Drinking Water Policy."
a. Reach 5 uses are intermittent upstream of Waterman Avenue.
b. Municipal beneficial use designation applies upstream of Orange Street (Redlands); downstream of Orange Street, water is excepted from Municipal beneficial use designation.
c. Access prohibited in some portions by San Bernardino County Flood Control District (SBCFCD) and USACE.
* A number of amendments have been proposed to the beneficial uses of the SAR as outlined in the Basin Plan. However, these proposed amendments do not include changes to the designated beneficial uses of Reaches 3 through 6 of the SAR (SARWQCB 2004).
** Segment refers to a stretch of the SAR delineated for use in this EIR. See section 3.1.1.7.

Table 3.1-9. Santa Ana River Basin Surface Water Quality Objectives*

Inland Surface Streams Upper Santa Ana River Basin	WATER QUALITY OBJECTIVES MILLIGRAMS/LITER (MG/L)						
	Total Dissolved Solids (TDS)	Hardness ($CaCO_3$)	Sodium (Na)	Chloride (Cl)	Total Inorganic Nitrogen (TIN) [a]	Sulfate (SO_4)	Chemical Oxygen Demand (COD)
Reach 2 - 17th Street in Santa Ana to Prado Dam	650 [b]	---	---	---	---	---	---
Reach 3 - Prado Dam to Mission Blvd. - Baseflow (Segment F, G**)	700	350	110	140	10[a]	150	30
Reach 4 - Mission Blvd. in Riverside to San Jacinto Fault (Segment E, F**)	550	---	---	---	10	---	30
Reach 5 - San Jacinto Fault in San Bernardino to Seven Oaks Dam (Segment B, C, D, E**)	300	190	30	20	5	60	25
Reach 6 - Seven Oaks Dam to Headwaters (Segment A**)	200	100	30	10	1	20	5

Source: SARWQCB 1995.

a. Total nitrogen, filtered sample.

b. Five-year moving average.

* A number of amendments have been proposed to the WQOs of the Basin Plan. However, these proposed amendments do not include changes to the WQOs applicable to Reaches 3 through 6 of the SAR (SARWQCB 2004).

** Segment refers to a stretch of the SAR delineated for use in this EIR. See section 3.1.1.7.

The major component of baseflow in August, therefore, is municipal wastewater. For these reasons, this period has been selected by the SARWQCB as the time when baseflow will be measured and its quality determined. In order to determine whether the water quality and quantity objectives for baseflow in Reach 3 of the SAR are being met, the SARWQCB collects a series of grab and composite samples during August of each year. The results are compared with the continuous monitoring data collected by USGS and data from other sources.

The SARWQCB sets discharge requirements on wastewater discharges, the major source of baseflow in the SAR. Waste discharge requirements are developed on the basis of the limited assimilative capacity of the river. Non-point source discharges, generally from urban runoff and agricultural tail-water, are regulated by requiring compliance with Best Management Practices (BMPs), where appropriate.

The third component of flow in the SAR that influences water quality is characterized by the SARWQCB as "non-tributary flow." Non-tributary flow is generally imported water released in the upper basin for recharge in the lower basin (SARWQCB 1995).

3.1.1.4.3 Water Quality Measurement Activities

Prado Dam has a subsurface groundwater barrier behind which groundwater pools and rises. As a result, all groundwater as well as surface waters from the upper basin are forced to pass through the dam (or over the spillway). For this reason, it is an ideal place to measure flows and monitor water quality.

The USGS operates a permanent continuous streamflow gaging station immediately below Prado Dam. Orange County Water District (OCWD) also takes water quality samples at the USGS gage every month. Compliance with the objectives for Reaches 2 and 3 is monitored by the SARWQCB, using the data and information available from the USGS gage, plus the data from its own specific sampling programs. Monitoring in Reaches 2 and 3 is used, indirectly, to monitor water quality in upstream reaches (Reaches 4 through 6) which are not formally monitored.

A recent USGS study conducted by the National Water Quality Assessment Program entitled *Concentrations of Dissolved Solids and Nutrients in Water Sources and Selected Streams of the Santa Ana Basin, California, October 1998-September 2001* examined concentrations of total dissolved solids (TDS) and nutrients in selected Santa Ana Basin streams as a function of water source. The principal water sources considered in the study were mountain runoff, wastewater, urban runoff, and storm flow. The USGS study of water-quality conditions in the SAR and tributaries focused on TDS and nutrient conditions representative of baseflow water of mountain sites, baseflow of the valley floor, and storm flow.

The USGS reports that streams on the Santa Ana Basin valley floor, including the SAR, generally have increasing dissolved minerals as one goes downstream. This effect is due to the fact that water is used, recycled, and used again. The level of TDS rises with each use of water, as solids are added, or increase due to the reduction in water volume from evaporation. All uses of water (residential, commercial, industrial, and agricultural) contribute to this problem as the water in the region is used, treated, recharged into the groundwater basins, extracted, and used again. The USGS report notes that rising groundwater also enters basin streams in some reaches, and their sampling indicated some of the highest TDS (and in some cases nitrates) may occur at sites on the valley floor that are dominated by rising groundwater. Nitrate concentrations are higher in Santa Ana Basin streams receiving treated wastewater than in streams without treated wastewater. The principal source of nitrate is fertilizer from historic agricultural operations. Since nitrate is in the groundwater, it is also in groundwater reaching the surface.

3.1.1.4.4 Existing Water Quality

While there are basin plan objectives for multiple constituents, water quality monitoring has focused on two constituents, TDS and nitrogen. These constituents have been reported at levels at or near regulatory standards and have, thus, been the focal point of regulatory activities.

Table 3.1-10 provides a summary of the available historical surface water quality data for TDS and nitrogen at points along the SAR. Water quality at the Mentone Gage, because of its location in the immediate vicinity of where Project diversion would occur, is representative of the water that would be diverted by the Project.

Table 3.1-10. Average Historic Surface Water Quality for Locations on the Santa Ana River (1990-2001)

Water Quality Constituent	*MWD Crossing Gage (Reach 3)**	*RIX-Rialto Effluent Outfall (Reach 4)**	*Mentone Gage (Reach 5)**
Total Dissolved Solids (TDS)	560 [a]	520 [b]	230 [a]
TDS Basin Plan Objective by Reach	700	550	300
Total Inorganic Nitrogen (TIN)	7.3 [a]	8.5 [b]	0.3 [a]
TIN Basin Plan Objective by Reach	10 [c]	10	5

Source: USGS gage data. Data for Mentone River Only Gage begins in October 1998. Data for Riverside Narrows Gage begins in August 1997.

a. USGS 2004.

b. The TDS and TIN values assigned for RIX-Rialto are the maximum values that occurred during 2001-2002 as reported in Table 4.4-9 of the City of San Bernardino Municipal Water Department RIX Facility Recycled Water Sales Program PEIR, March 2003.

c. Total nitrogen, filtered sample.

* Proposed amendments to the Basin Plan do not include changes to the water quality objectives in Reaches 3 through 6 of the SAR (SARWQCB 2004).

3.1.1.4.5 Imported Water Quality

Water is imported to the SAR basin from the Colorado River via the Colorado River Aqueduct (CRA), owned and operated by The Metropolitan Water District of Southern California (Metropolitan), and via State Water Project (SWP) facilities. The TDS level in CRA water averages approximately 700 mg/L and, during drought years, can increase to above 900 mg/L (Metropolitan and USBR 1999). Salinity projections for wet year conditions show TDS values between 650 and 800 mg/L (Metropolitan and USBR 1999). SWP water is suitable for most beneficial uses due to its low TDS levels of 200 to 300 mg/L (DWR 2003a). However, TDS levels of SWP water can vary due to drought conditions, flood events, reservoir management practices, and salt input from local streams.

3.1.1.5 Regulatory and Institutional Setting

Both water rights and water use on the SAR have been the subject of a number of court judgments and SWRCB orders. Two court judgments, referred to as the *Orange County* Judgment and the *Western* Judgment, provide the overall framework for the division of rights and responsibilities for water users in the SAR basin.

3.1.1.5.1 The Orange County Judgment

In 1963, the Orange County Water District (OCWD) filed suit against substantially all water users in the area tributary to Prado Dam seeking adjudication of water rights on the SAR. The litigation ultimately involved over 4,000 served water users and water agencies, the four largest of which were OCWD, Muni, Western, and the Chino Basin Municipal Water District (now the Inland Empire Utilities Agency). Given the magnitude of the potential litigation, these four districts and other parties developed a settlement that was approved by the Orange County Superior Court in a stipulated judgment entered on April 17, 1969. *Orange County Water District v. City of Chino et al.*, Case No. 117628 (*Orange County* Judgment). The *Orange County* Judgment imposes a physical solution that requires parties in the upper SAR watershed to deliver a minimum quantity of water to points downstream including Riverside Narrows and Prado Dam. A provision of the *Orange County* Judgment related to conservation establishes that, once the flow requirements are met, the Upper Area parties "may engage in unlimited water conservation activities, including spreading, impounding, and other methods, in the area above Prado Reservoir." The *Orange County* Judgment is administered by the five member SAR Watermaster that reports annually to the court and the four representative agencies. Muni, the Inland Empire Utilities Agency, and Western nominate one member each to the Watermaster, OCWD nominates two members, and members are appointed by the court.

3.1.1.5.2 The Western Judgment

The *Western* Judgment, entered simultaneously with the *Orange County* Judgment, settled rights within the upper SAR watershed in part to ensure that those resources upstream of Riverside Narrows would be sufficient to meet the flow obligations of the *Orange County* Judgment at Riverside Narrows (*Western Municipal Water District of Riverside County v. East San Bernardino County Water District*, Superior Court of Riverside County, Case No. 78426 [April 17, 1969]). Toward this end, the *Western* Judgment generally provides for:

- A determination of safe yield of the San Bernardino Basin Area (SBBA);
- Establishment of specific amounts that can be extracted from the SBBA by plaintiff parties equal in aggregate to 27.95 percent of safe yield;
- An obligation of Muni to provide replenishment for any extractions from the SBBA by non-plaintiffs in aggregate in excess of 72.05 percent of safe yield;
- An obligation of Western to replenish the Colton and Riverside basins if extractions for use in Riverside County in aggregate exceed certain specific amounts; and
- An obligation of Muni to replenish the Colton and Riverside basins if water levels are lower than certain specific water level elevations in specified wells.

Like the *Orange County* Judgment, the *Western* Judgment identifies regional representative agencies to be responsible, on behalf of the numerous parties bound thereby, for implementing the replenishment obligations and other requirements of the judgment. The representative entities for the *Western* Judgment are Muni and Western. Muni and Western are principally responsible for providing replenishment of the groundwater basins if extractions exceed amounts specified in the Judgment or as determined by the Watermaster. For purposes of this replenishment obligation, Muni acts on behalf of all defendants dismissed from the *Western* Judgment, and similarly, Western acts on behalf of the Plaintiffs and other dismissed parties within Western. Plaintiff parties with specific rights to produce 27.95 percent of the safe yield from the SBBA are the City of Riverside, Riverside Highland Water Company, Meeks & Daley Water Company, and the Regents of the University of California. The *Western* Judgment is administered by the two-person Western-San Bernardino Watermaster Committee: one person nominated each by Muni and Western, and both appointed by the court.

Like the *Orange County* Judgment, the *Western* Judgment contemplates that the parties will undertake "new conservation" which is defined as any increase in replenishment from natural precipitation which results from operation of works and facilities not in existence as of 1969. The *Western* Judgment specifies that the parties to the Judgment have the right to participate in any new conservation projects and, provided their appropriate shares of costs are paid, rights under the Judgment are increased by the respective shares in new conservation (72.05 percent by Muni and 27.95 by Western).

3.1.1.5.3 State Water Resources Control Board Orders

In 1989 (WR 89-25) and again in 1998 (WR 98-08), the SWRCB included the SAR in its Declaration of Fully Appropriated Streams (Declaration). Per this Declaration, the SAR was considered fully appropriated year-round. In 1989, the state Water Code prevented the SWRCB from accepting any new applications to appropriate water from watercourses listed in the Declaration.

In 1991, Muni submitted an application on behalf of itself and Western to appropriate up to 100,000 af annually from the SAR. At that time the SAR was categorized as "fully appropriated" by the SWRCB. However, in May 1995, the SWRCB adopted procedures for reviewing the fully appropriated stream status and Muni/Western subsequently submitted a petition to revise the Declaration of Fully Appropriated Stream Status for the Santa Ana River, together with the 1991 application.

The petition to revise the Declaration of Fully Appropriated Stream Status for the SAR submitted in 1995 by Muni and Western was followed in 1999 by a similar petition by OCWD. The SWRCB held hearings on the petitions in December 1999. Muni/Western provided evidence which demonstrated that flows in the SAR watershed had increased due to urbanization and the attendant increased runoff and increased releases of treated wastewater. Additionally, completion and subsequent operation of Seven Oaks Dam would increase availability of water during wet years. Based on evidence in the hearing record, the SWRCB amended the Declaration in Order WR 2000–12, to allow for the processing of the water right applications submitted by Muni/Western and OCWD (SWRCB 2000). Order WR 2000-12 did not determine the specific amount of water available for appropriation by petitioners.

In May 2001 Muni and Western jointly submitted a second application to appropriate 100,000 af of water annually ("Second Application") in addition to the 100,000 afy previously requested under the First Application, along with a second petition to revise the Fully Appropriated Streams Declaration for the SAR ("Second Petition"). The Second Petition and Second Application were based on updated hydrologic analyses submitted during the 1999 hearings which indicated that, in certain years, there is in excess of 200,000 af of water available for appropriation in the SAR. Based on the hydrologic evidence, in Order WR 2002-06 the SWRCB revised the Declaration pursuant to Muni/Western's Second Petition (and similar petitions by other parties) and accepted the following applications for processing:

- Muni/Western application requesting a right to collect a maximum of 100,000 af annually in surface and underground storage (the "Second Application");
- Chino Basin Watermaster application requesting a right to divert 97,000 afy to groundwater storage;
- San Bernardino Valley Water Conservation District (Conservation District) application proposing groundwater and surface storage of 174,545 afy;
- City of Riverside application proposing direct diversion of 75 cfs throughout the year for a total maximum direct diversion of 41,400 afy; and
- Four minor applications for diversion of up to 102 afy from the West and East Forks of Cable Creek within the SAR watershed.

Order WR 2002-06 did not determine the specific amount of water available for appropriation or whether the amount of water available for appropriation is sufficient to approve the applications. As in Order WR 2000-12, prior to any potential approval of the applications, the SWRCB requires that applications meet all necessary obligations under CEQA.

3.1.1.5.4 Senior Water Rights Claimants and the Seven Oaks Accord

The senior water rights claimants are a group of purveyors who claim pre-1914 water rights on the SAR. They are Bear Valley Mutual Water Company (and shareholders including City of Redlands), Lugonia Water Company, North Fork Water Company (and shareholders including East Valley Water District), and Redlands Water Company. The senior water rights claimants receive all of their SAR water via diversions made from the SAR at the Redlands Tunnel, the New SCE Conduit, Old SCE Conduit, and the smaller Auxiliary River Pickup (see Figure 3.1-2).

On July 21, 2004, Muni, Western, the City of Redlands, East Valley Water District, Bear Valley Mutual Water Company, Lugonia Water Company, North Fork Water Company, and Redlands Water Company signed a settlement agreement known as the Seven Oaks Accord. The Seven Oaks Accord calls for Muni/Western to recognize the prior rights of the water users up to 88 cfs from the natural flow of the SAR. In exchange, the water users agree to withdraw their protests to the Muni/Western water right applications. All the parties to the Seven Oak Accord have agreed to support the grant of other necessary permits to allow Muni/Western to divert water from the SAR. By means of the Seven Oaks Accord, Muni/Western agreed to modify their water right applications to the SWRCB to incorporate implementation of the Accord. Consequently, the analysis conducted in this EIR assumes implementation of the Accord.

3.1.1.5.5 San Bernardino Valley Water Conservation District

The Conservation District holds two licenses issued by the SWRCB to divert water from the SAR (Licenses 2831 and 2832). License 2831 grants the Conservation District the right to divert and spread 8,300 af of water annually during the period January 1 to May 31. License 2832 grants the Conservation District the right to divert and spread 2,100 af annually from October 1 to December 31. The total of the two licenses is 10,400 afy. The Conservation District diverts water directly from the SAR, just upstream of the Cuttle Weir, a low dam in the river channel (shown schematically in Figure 3.1-2). The current capacity of the Conservation District's canal is estimated at 300 cfs. The Conservation District also claims pre-1914 water rights.

Conservation District diversions are measured below the North Fork Box and include the total of diversions made at the Cuttle Weir and waters from the North Fork Box. Diversions by the Conservation District have averaged 9,870 afy over the period of record. For the period WY 1915-16 to WY 1968-69 Conservation District diversions averaged 7,337 afy; from WY 1970-71 to 1999-2000 diversions averaged 14,896 afy.

3.1.1.5.6 Santa Ana River-Mill Creek Cooperative Water Project Agreement

The Santa Ana River-Mill Creek Cooperative Water Project Agreement (informally known as the Exchange Plan), is an agreement among ten agencies and private water companies in the East San Bernardino Valley, executed in May 1976. The ten eligible entities (or members) include the following:

- Bear Valley Mutual Water Company
- City of Redlands
- Crafton Water Company
- East Valley Water District
- Lugonia Water Company
- North Fork Water Company
- Redlands Water Company
- San Bernardino Valley Municipal Water District
- San Bernardino Valley Water Conservation District
- Yucaipa Valley Water District

The parties have agreed to the exchange of water from the SAR, Mill Creek, and the SWP. The agreement is described as a "bucket for bucket exchange," whereby a party to the agreement provides a "bucket" of their water to a second, higher elevation, party and the second party provides a "bucket" of water from an alternate, lower elevation, source back to the original party. To facilitate exchanges, parties to the agreement share their existing facilities. However, specific facilities (called Cooperative Water Project facilities) were built and are operated by Muni, in part, to accommodate Exchange Plan deliveries.

3.1.1.6 Project Construction Areas

3.1.1.6.1 Seven Oaks Dam and Reservoir Construction Area

A description of the surface water hydrology of the Seven Oaks Dam and Reservoir Construction Area is provided below in section 3.1.1.7.

3.1.1.6.2 Santa Ana River Construction Area

A description of the surface water hydrology of the Santa Ana River Construction Area is provided below in section 3.1.1.7.

3.1.1.6.3 Devil Canyon Construction Area

A small drainage channel, Devil Canyon Creek, about 10 to 20 feet wide, crosses the Devil Canyon Construction Area. A large portion of this channel was graded and denuded during the construction of the Inland Feeder Pipeline by Metropolitan (see Figure 2-7). However, the channel was replaced following construction of that pipeline and, since 2000, has been repopulated by riparian vegetation.

3.1.1.6.4 Lytle Creek Construction Area

A man-made drainage channel crosses a portion of the Lytle Creek Construction Area, conveying water released from the Fontana Power Plant northeastward to existing basins near the active channel of Lytle Creek (see Figure 2-8).

3.1.1.7 Project Operations Areas

For the purposes of this analysis, Project-related impacts associated with operations are evaluated for seven segments of the SAR. Each segment of the river is delineated using criteria that have important implications for the analysis of Project-related impacts. These segments as listed below are displayed in Figure 3.1-6:

- Segment A – Upstream of Seven Oaks Dam to the confluence with Bear Creek (above RM 70.93);
- Segment B – Seven Oaks Dam to just above Cuttle Weir (RM 70.93 to RM 69.9);
- Segment C – Cuttle Weir to just above the confluence with Mill Creek (RM 69.9 to RM 67.89);
- Segment D – Mill Creek confluence to just above "E" Street (RM 67.89 to RM 57.69);
- Segment E – "E" Street to just above the RIX and Rialto Effluent Outfall (RM 57.69 to RM 53.46);
- Segment F – RIX and Rialto Effluent Outfall to just above Riverside Narrows (RM 53.46 to RM 45.7); and
- Segment G – Riverside Narrows to Prado Flood Control Basin (RM 45.7 to RM 35.5).

These river segments were chosen for particular purposes, e.g., locations at which USGS gage data are available, locations at which river flow changes due to large inflows or large diversions, and locations specific to water rights agreements and judgments. Other reports and agencies have used alternative designations to describe segments of the SAR. For example, the SARWQCB divides the mainstem of the SAR into six reaches, Reaches 1 through 6 with reach numbers beginning at the Pacific Ocean and increasing upstream. The USACE treats the SAR above Seven Oaks Dam to Prado Dam as three sub-areas. Sub-area 1 extends upstream above Seven Oaks Dam. Sub-Area 2 of the SAR extends from Seven Oaks Dam downstream to just below the confluence of City Creek (RM 70.93 to RM 61.5); and Sub-Area 3 continues downstream to the upstream limit of the 100-year pool elevation for Prado Dam (RM 61.5 to RM 35.5). Within these sub-areas, USACE further defines points corresponding to cross-sections included in the hydrologic modeling software of HEC-RAS[10]. Figure 3.1-6 illustrates these sub-areas.

3.1.1.7.1 Segment A, Upstream of Seven Oaks Dam

Segment A of the SAR is above RM 70.93, within USACE Sub-Area 1, and in SARWQCB Reach 6. Designated beneficial uses for this reach are shown in Table 3.1-8.

The watershed above Seven Oaks Dam drains approximately 177 square miles (USACE 1997). The average gradient of the river is 300 feet per mile, but tributaries have gradients ranging from 600 feet per mile to 1,900 feet per mile, which illustrates the steep topography of this area. This segment of SAR has two major structures, Bear Valley Dam and the Southern California Edison (SCE) hydroelectric system.

Bear Valley Dam is the only major structure that affects runoff to Seven Oaks Dam. Big Bear Lake is a water conservation reservoir, operated by the Big Bear Municipal Water District. The lake has a drainage area of about 38 square miles and has surcharge storage of about 8,600 af between the top of the conservation pool and the top of the dam (USACE 1995). For details on assumptions on inflow to the SAR from Bear Valley Dam releases, see Appendix A.

SCE operates the Santa Ana River Powerhouse 1 (SAR 1), and Santa Ana River Powerhouse 2/3 (SAR 2/3)[11] hydroelectric projects (SAR 1 powerhouse is upstream of Seven Oaks Dam, SAR 2/3 is downstream of the dam), consisting of water conveyance and power generation facilities on the river. The SCE system diverts water at concrete diversion dams on the SAR and its tributaries of Bear Creek, Breakneck Creek, Keller Creek, and Alder Creek. The SAR diversion dams and SCE conduit are capable of withdrawing and conveying water at a maximum rate of 93.3 cfs, which is conveyed, via the SCE conduit, along the canyon walls to a forebay where the water enters the SAR 1 Powerhouse. From the SAR 1 Powerhouse, the SCE conduit continues, collecting more water along the SAR and tributaries. The SCE conduit bypasses Seven Oaks Dam and Reservoir and delivers water to the SAR 2/3 Powerhouse. For assumptions on diversion by the SCE system, see Appendix A.

3.1.1.7.2 Segment B, Seven Oaks Dam to just above Cuttle Weir

Segment B of the SAR extends between RM 70.93 and RM 69.9, is in USACE Sub-Area 2 and SARWQCB Reach 5. Designated beneficial uses for this reach are shown in Table 3.1-8.

Releases from Seven Oaks Dam control the flow in this segment of the river. Up to 3 cfs is released constantly from Seven Oaks Dam into the plunge pool and becomes surface flow diverted via the Auxiliary River Diversion or by infiltration into the Redlands Tunnel. Stream flow in this segment is perennial due to this constant 3 cfs release. The major water diversions

---

10 HEC-RAS and HEC-2 are software models developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers. HEC-2 and HEC-RAS are models used to compute water surface profiles.

11 A portion of SCE conduit was replaced, Santa Ana River Powerhouse 2 was abandoned, and Santa Ana River Powerhouse 3 was replaced with Santa Ana River Powerhouse 2/3 to accommodate Seven Oaks Dam. Diversion points, uses of water and flow paths are essentially the same as before construction of Seven Oaks Dam.

in this segment are those made by the Conservation District. In this segment, the SAR slope is fairly steep, bed material is generally coarse, and the SAR is confined by the canyon walls and is in a constructed channel throughout. Besides Seven Oaks Dam, major features in this river segment include the Auxiliary Canal and Cuttle Weir.

Small amounts of water are diverted from the SAR into the Division Box via the Auxiliary River Diversion for use by the senior water rights claimants. This diversion takes water from the SAR upstream of the Mentone Gage, but downstream of Seven Oaks Dam (see Figure 3.1-2). The USGS maintains a gaging station on the Auxiliary River Diversion to measure flows. Flows diverted via the Auxiliary River Diversion are then conveyed via the Division Box and distributed via the Redlands Aqueduct or the River Crossing Pipeline.

The Cuttle Weir Dam was built in 1932 by what is now known as the Conservation District to divert flow in the SAR for groundwater spreading. The weir is located approximately one mile downstream from Seven Oaks Dam. Diverted SAR water is conveyed via the Conservation District Canal to the Santa Ana River Spreading Grounds.

Figure 3.1-7 shows probability of exceedance curves for flow above Cuttle Weir that are based on nearby gage data with adjustments made for diversions. It is evident from this figure that prior to the construction of Seven Oak Dam, about 32 percent of the time there was virtually no flow in this segment, flows above 10 cfs occurred approximately 35 percent of days, and flows above 100 cfs were rare, occurring only about 10 percent of the time. With the dam in operation, daily discharge is at least 3 cfs, and about 60 percent of the time discharge is greater than 3 cfs. For this segment of the SAR, with the dam in operation, a daily discharge of 10 cfs is equaled or exceeded approximately 45 percent of the time, while for flows of 100 cfs and higher, the frequency drops to less than 10 percent (Figure 3.1-7).

3.1.1.7.3 Segment C, Cuttle Weir to just above the Confluence of Mill Creek

Segment C of the SAR is between RM 69.9 and RM 67.89, in USACE Sub-Area 2 and SARWQCB Reach 5. Designated beneficial uses for Reach 5 are shown in Table 3.1-8.

There are no major tributaries or water control features in this segment of the SAR. Like its upstream segment, the SAR slope is fairly steep and bed material is generally coarse throughout. However, just downstream of the Cuttle Weir, the SAR exits the upper SAR canyon and enters the upper end of the Santa Ana Wash. At the Greenspot Bridge the SAR channel is approximately 250 feet wide. Throughout this segment, the river floodplain is wider and is no longer confined by the upper SAR canyon walls. Stream flows in this segment are ephemeral.

Figure 3.1-8 shows probability of exceedances curves for flow downstream of Cuttle Weir. Prior to the construction of Seven Oak Dam, about 65 percent of the time there was virtually no flow in this segment, flows above 10 cfs occurred just over 20 percent of days, and flows above 100 cfs occurred about 8 percent of the time. With the dam in operation, almost 75 percent of the time there is no discharge in this river segment. With the dam in operation a daily discharge of 10 cfs is equaled or exceeded approximately 22 percent of the time, while for flows of 100 cfs and higher, the frequency drops to about 8 percent (Figure 3.1-8).

This river segment includes an area that could be subject to overbank flows. In modeling performed as part of the Biological Assessment (BA) for Seven Oaks Dam, the USACE determined that even with operation of Seven Oaks Dam, a 100-year flood could overtop the existing low flow channel banks and create continuous, separate, and parallel overbank flood flows on the north bank between RM 69.47 and RM 65.41 (which extends into River Segment D from Mill Creek to "E" Street).

3.1.1.7.4 Segment D, Mill Creek Confluence to just above "E" Street

Segment D of the SAR is between RM 67.89 and RM 57.69, is in both USACE Sub-Areas 2 and 3, and is in SARWQCB Reach 5. Designated beneficial uses for Reach 5 are shown in Table 3.1-8.

This river segment receives substantial tributary inflow from Mill Creek, City Creek, Plunge Creek, Mission Zanja Creek, San Timoteo Creek, and East Twin Creek. Table 3.1-2, provides information on the relative contributions of each of these tributaries to SAR flow.

At the upper end of this river segment, river bed material is generally coarse, whereas the downstream portion of the segment consists of a soft-bottom channel with uncompacted earthen berms on both banks. In the upstream portion, the channel is about 1,800 feet wide (USACE 2000). In the downstream portion, the river is part of a broad wash up to 5,000 feet wide, which includes part of the floodplain for City Creek and Plunge Creek.

Figure 3.1-9 shows probability of exceedances curves for flow below the confluence of Mill Creek. These curves are estimated based on nearby gage data with adjustments made for diversions and other losses as well as inflow. This figure shows that prior to the construction of Seven Oak Dam, about 55 percent of the time there was no flow in this segment, flows above 10 cfs occurred approximately 35 percent of days, and flows above 100 cfs occurred approximately 15 percent of the time. With the dam in operation flows are similar to those of pre-dam conditions, demonstrating that the inflow from Mill Creek lessens the influence of flows from the Project area in this segment. With the dam in operation, approximately 48 percent of the time there is no discharge in this river segment, flow above 10 cfs is equaled or exceeded just over 40 percent of the time, while for flows of 100 cfs and higher, the frequency is about 14 percent (Figure 3.1-9).

Segment D includes multiple areas that could be subject to overbank flooding (USACE 2000). At the upstream portion of this segment, between the Mill Creek Confluence and RM 65.41, a 100-year flood could overtop the existing low flow channel banks and create continuous, separate, and parallel overbank flood flows. A second area that could experience overbank flooding is between RM 64.90 and RM 63.78. Here, 100-year flood flows could break out onto the north bank area and inundate a large active sand and gravel mining operation. A third area subject to overbank flooding is near the railroad bridge between RM 59.12 and RM 59.17 (USACE 2000). Modeling suggests that approximately 1,200 cfs of the post-dam 100-year flood flows could break out into the north overbank areas (USACE 2000). Model results indicate that the flooding in this area would amount to less than 6 inches of shallow sheet flow (USACE 2000).

3.1.1.7.5 Segment E, "E" Street to just above the RIX and Rialto Effluent Outfall

Segment E of the SAR is between RM 57.69 and RM 53.46, is entirely within USACE Sub-Area 3 with the majority of the segment in SARWQCB Reach 4. A small portion (about 0.02 mile) at the upstream end of the segment is in Reach 5. Designated beneficial uses for Reaches 4 and 5 are shown in Table 3.1-8.

River Segment E receives tributary inflow from Lytle Creek and Warm Creek. Table 3.1-2, above, provides information on the relative contribution of these tributaries to SAR flow. From November to April, this segment generally has flow along its entire length, however, from May to October the streambed typically dries out from approximately RM 54.5 downstream until the RIX and Rialto Effluent Outfall at RM 53.46 (USACE 2000). Throughout Segment E, the river has been largely channelized to confine flows and protect bridges and other structures.

Figure 3.1-10 presents probability of exceedance curves for flow downstream of "E" Street. Prior to the construction of Seven Oak Dam, about 5 percent of the time there was no flow in this segment, flows above 10 cfs occurred approximately 90 percent of days, and flows above 100 cfs occurred approximately 13 percent of the time. With the dam in operation, flows are consistently lower than pre-dam conditions, but this effect is due largely to the loss of WWTP effluent that, prior to 1996, was discharged into this river segment but is now discharged into Segment F. Currently, approximately 42 percent of the time there is no flow in this river segment, flows above 10 cfs are equaled or exceeded approximately 48 percent of the time, while for flows of 100 cfs and higher, the frequency drops to about 12 percent (Figure 3.1-10).

3.1.1.7.6 Segment F, RIX and Rialto Effluent Outfall to just above Riverside Narrows

Segment F of the SAR (between RM 53.46 and RM 45.7) is entirely within USACE Sub-Area 3. About two-thirds of Segment F is in SARWQCB Reach 4 and one-third in SARWQCB Reach 3. Designated beneficial uses for this reach are shown in Table 3.1-8.

The river in Segment F receives inflow from wastewater discharges from the RIX and Rialto WWTPs. As described in section 3.1.1.2.1, these WWTPs discharged 57,750 af in WY 2000-01 and in the future discharge could increase to 59,000 afy. Generally, this river segment and downstream have flow year-round, attributable to the effluent discharge, rising water, and urban and agricultural runoff (USACE 2000).

Figure 3.1-11 presents probability of exceedance curves downstream at the RIX and Rialto Effluent Outfall. They vary from the curves shown for the upstream segments (Figures 3.1-7 through 3.1-10) and illustrate the presence of higher and more sustained flows below the RIX and Rialto Effluent Outfall. This figure shows that, prior to the construction of Seven Oak Dam, flows equaled or exceed 10 cfs at all times. With the dam in operation, flows are consistently higher than under pre-dam conditions, but this effect is due largely to the addition of WWTP effluent that, prior to 1996, was discharged in Segment E. Since 1999, discharge in this river segment has equaled or exceed 60 cfs at all times.

3.1.1.7.7 Segment G, Riverside Narrows to Prado Dam

Segment G extends from Riverside Narrows at RM 45.7 to Prado Dam at RM 30.5. This river segment falls entirely within SARWQCB Reach 3 and is in USACE Sub-Area 3. Stream flow is perennial throughout Segment G due to inflow from WWTPs and groundwater up-welling.

3.1.2 Impacts and Mitigation Measures

3.1.2.1 Impact Assessment Methodology

This section outlines the general impact assessment methodology and includes a description of the hydrologic modeling undertaken to support the impact analysis. Detailed information on modeling tools and processes is provided in Appendix A.

3.1.2.1.1 Surface Water Models

The impact analysis methodology requires that future surface water conditions be forecast. This is accomplished using information derived from a suite of three models: Operations Model (OPMODEL); Allocation Model; and River Analysis. The first model (OPMODEL) estimates the quantities of unappropriated water potentially available for diversion from the SAR. The second model (Allocation Model) analyzes how such diversions could be distributed among a number of beneficial uses. With information on the amount of potential diversions and allocation of water, the third model (River Analysis) evaluates the potential effects that diversions may have on hydrologic processes in the SAR, particularly instream flows and overbank flooding. The different models and their interactions are illustrated in Figure 3.1-12.

OPMODEL

The Operations Model, referred to as OPMODEL, is a tool used to estimate the quantity of unappropriated SAR water available for diversion by Muni/Western after accounting for diversions by prior rights holders and other uses. This model simulates monthly releases that could be made from Seven Oaks Dam under a varying set of factors. Estimates of the quantities of unappropriated water are influenced by a number of factors, the most critical of which are listed below.

- Diversions by senior water rights claimants;
- Diversions by the Conservation District;
- Releases designed to accomplish habitat restoration as prescribed by the terms of the Biological Opinion (BO) for the operation of Seven Oaks Dam; and
- Operation of Seven Oaks Dam for flood control only or flood control with seasonal water conservation storage.

As detailed in Appendix A, there are high and low estimates for each of these factors. For example, habitat restoration plans per the BO are still under development. Ultimate habitat restoration plans may use large volumes of water released from Seven Oaks Dam or may rely on other treatments that use little or no water. Likewise the model can accommodate either licensed or historical Conservation District diversions (see Figure 3.1-13). The combination of high and low estimates for each of the four factors results in 16 different "scenarios." As described earlier in the introduction to Chapter 3, of these 16 scenarios, five have been carried forward for detailed analyses: Project Scenarios A, B, C, and D as well as the No Project Scenario. They represent the following: maximum quantity of SAR water appropriated by Muni/Western with a 1,500 cfs diversion rate (Scenario A); maximum quantity of SAR water appropriated by Muni/Western with a 500 cfs diversion rate (Scenario B); minimum quantity of SAR water appropriated by Muni/Western with a diversion rate of 1,500 cfs (Scenario C); minimum quantity of SAR water appropriated by Muni/Western with a diversion rate of 500 cfs (Scenario D); and the scenario representative of No Project conditions (No Project Scenario).

The initial input to OPMODEL is an estimate of inflow to Seven Oaks Reservoir. There is no gage to measure this quantity and, thus, it is necessary to develop an estimate. Estimates of SAR surface water inflow are based primarily on USGS historical data recorded at the Mentone Gage, modified to reflect current operating conditions of Bear Valley Dam located upstream of Seven Oaks Dam. To make forecasts, OPMODEL assumes a repeat of historical hydrologic conditions of the period WY 1962-63 through WY 2000-01. For more information on the use of this hydrologic base period (WY 1962-63 to WY 2000-01) to make forecasts, see Appendix A.

For each of the Project scenarios and the No Project Scenario, OPMODEL provides estimates of the following:

- Quantities of SAR water diverted by senior water rights claimants;
- Evaporation from the reservoir surface;
- Quantities of SAR water diverted by the Conservation District;
- Quantities of SAR water released for environmental habitat restoration;
- Total potential SAR water available for appropriation by Muni/Western; and
- Undiverted SAR water.

ALLOCATION MODEL

Allocation Model is designed to estimate how water diverted from the SAR by Muni/Western could be distributed to a variety of beneficial uses. The categories and priorities of these beneficial uses are (1) direct use in the Muni/Western service areas; (2) groundwater recharge of the SBBA; (3) groundwater recharge outside the SBBA but within the Muni/Western service areas; and (4) exchange programs. Appendix A provides detailed information on each of the specific direct uses, groundwater spreading basins, and exchange partners which could receive water as part of the Project and the quantities of SAR water that could be delivered to each.

Allocation Model accounts for the absorptive capacity of each beneficial use and the conveyance capacity of the delivery system. Allocation Model is designed to estimate how water captured from the SAR could be put to beneficial use while, at the same time, meeting a number of external objectives. These objectives include (1) meeting Muni's recharge obligations of the SBBA under the *Western* Judgment; (2) avoiding high groundwater conditions; (3) avoiding deterioration of groundwater levels in the Pressure Zone; and (4) not adversely affecting groundwater contamination plumes. To meet these various objectives, Allocation Model tracks deliveries of SAR water diverted as part of the Project, deliveries of imported water to meet the requirements of the *Western* Judgment, and deliveries of SWP water returned from exchange programs. These deliveries are tracked to locations within Muni's service area that are inside and outside the SBBA. The objectives of avoiding high groundwater conditions and avoiding deterioration of groundwater levels in the Pressure Zone are met through an iterative process using both Allocation Model and the groundwater model (see Appendices A and B).

RIVER ANALYSIS

River Analysis is a collection of analytical techniques designed to assess the effects that potential diversions by Muni/Western could have on the flow regime of the SAR. Analysis is conducted for two sets of conditions:

- Storm flow conditions where attention is focused on overbank flooding; and
- Non-storm flow conditions where attention is focused on changes in channel flow.

Of the various models, it is the results of River Analysis that describe potential changes to the characteristics of the river system.

Storm flow analysis utilizes the public domain model HEC-RAS Version 3.1.1 (May 2003). HEC-RAS calculates water surface profiles assuming steady, gradually varied flow in a river reach or a full network of channels. The analysis for the Project used channel geometry data and instantaneous flow rates for various return periods (e.g., 50-year flood, 100-year flood, etc.) used by the USACE in the BA (USACE 2000) for the Seven Oaks Dam. The output of the HEC-RAS model allows for a comparison of water velocity, depth of water in the channel, wetted area in the river channel, velocity of water in overbank areas, and depth of water in overbank areas between the No Project and Project scenarios (Scenarios A through D) for different types of storm/flood events.

The non-storm flow analysis was conducted through the use of a daily version of the monthly OPMODEL, referred to as the Daily Operations Model (DOP), and a river analysis model referred to as the Daily River Analysis Model (DRAM). The goal of the non-storm flow analysis, under both No Project and Project scenarios, is to simulate, or synthesize, hydrological flows at specific locations along the river channel.

DOP is a spreadsheet model used to simulate the release of water from Seven Oaks Dam on a daily time step. The model is based on similar input parameters and computational criteria to those used in the monthly OPMODEL. Results from DOP become input data to DRAM.

DRAM is designed to simulate daily river flow rates for non-storm days at six specific locations along the mainstem of the SAR between Seven Oaks Dam and Riverside Narrows. The locations are (1) upstream of Cuttle Weir; (2) immediately downstream of Cuttle Weir; (3) immediately downstream of the Mill Creek confluence; (4) at "E" Street in the City of San Bernardino; (5) immediately downstream of the outfall of the RIX and Rialto WWTPs; and (6) at the MWD Crossing Gage at Riverside Narrows. In addition to the output from DOP, DRAM uses a number of data sources to compute or simulate flows at specific locations on the

SAR, including estimated SAR inflows from tributaries and WWTPs, and losses attributable to evaporation and infiltration. More detail on these data sources is provided in Appendix A.

Collectively, the results from DOP and DRAM provide a comparison of average non-storm daily flows and the number of zero flow days for the No Project and Project scenarios.

3.1.2.1.2 Interpreting Modeling Results and Project Effects

FLOW

Modeling results provide information on changes to both storm-flows and non-storm flows in the SAR that could result with implementation of the Project. The storm flow analysis provides information on peak storm discharges within different river reaches, velocity of flood flows in the channel and in overbank areas, and depth of water in the channel and in overbank areas. This information can be directly applied to determine potential changes in fluvial processes or changes in the extent of area inundated during a flood event.

Non-storm flows are the predominant condition on the SAR; approximately 70 percent of all days are classified as non-storm flow days. Also, because non-storm flow days result in low flows, diversions on non-storm days are more likely to have a measurable impact. The hydrologic models used to assess changes in non-storm flows use USGS gage data as input. This gage data has a margin of measurement error estimated to be ± 15 percent. When the difference between non-storm flows under No Project conditions and corresponding flows under Project scenarios, as estimated by the model, differ by less than this error, it is unclear whether the difference is a true change or due to the error of measurement inherent in the model. However, when the difference between the No Project and Project scenarios is greater than the error of measurement, then the difference is attributed to the Project and this is considered a measurable change.

The daily analysis of Seven Oaks Dam operations shows that releases from the dam rarely exceed 500 cfs on non-storm days. Therefore, the effect of Project diversions on SAR flows during non-storm periods is essentially identical for both the 500 cfs and 1,500 cfs Muni/Western diversion rates. As described in detail in section 3.0, Scenario A and Scenario B both represent the maximum potential appropriation by Muni/Western that results from the following combination of assumptions: (1) historical diversion by senior water rights claimants; (2) licensed diversions by the Conservation District; (3) environmental restoration without releases from Seven Oaks Dam; and (4) seasonal water conservation storage at Seven Oaks Dam. Scenario A and Scenario B differ only in terms of the assumed Muni/Western diversion rate: Scenario A assumes a 1,500 cfs diversion rate and Scenario B assumes a 500 cfs diversion rate. Because the diversion rate makes virtually no difference when dealing with non-storm flows, Scenario A will have the same effect on non-storm flows as Scenario B. Scenario C and Scenario D both represent the minimum potential appropriation by Muni/Western and differ only in terms of the assumed Muni/Western diversion rate. Again, because the diversion rate makes little or no difference when dealing with non-storm flows, Scenario C will have similar impacts on non-storm flows as Scenario D. Therefore, when discussing potential impacts on non-storm flows, the results for Scenarios A and B are identical and are presented together as are the results for Scenarios C and D.

WATER QUALITY

The potential effects of Project implementation are also assessed against hydrology and water quality requirements and guidelines issued by the SARWQCB (as outlined in the 1995 Basin Plan and amendments). Change in surface water quality for points downstream of Project diversions was estimated based on maximum possible change in flow. The volume of water diverted by the Project was subtracted from baseflow (as estimated by non-storm flow) at points downstream and concentrations of TDS and TIN were calculated based on the lowered flow. Representative values for flow, TDS concentration, and TIN concentration for points along the SAR were taken from USGS data and data provided by the City of San Bernardino Municipal Water Department for the RIX WWTP effluent.

3.1.2.2 Significance Criteria

The significance criteria outlined below are based on the Initial Study checklist in Appendix G of the State CEQA Guidelines. A number of potential impacts in Appendix G are either not relevant to this analysis or are addressed elsewhere, including:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). This potential impact is addressed in section 3.2.
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. The Project does not include housing.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failures of a levee or dam. Project construction would not impact the flood control function of Seven Oaks Dam. Design and construction of modifications to Seven Oaks Dam would undergo review to ensure that no impairment of the dam's primary purpose, i.e., flood control, occurs during or after construction.
- Inundation by tsunami. The Project is not located in an area subject to the effects of a tsunami.
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater systems. Because the majority of Project facilities would be located underground, the Project would not increase impervious surfaces so as to increase runoff.

Impact criteria in Appendix G of the State CEQA Guidelines that are pertinent to the Project are listed below. These criteria have been tailored and augmented to make them directly applicable to the Project.

- Result in a measurable change, i.e., a change greater than ±15 percent, in non-storm flow;

- Change fluvial processes such that, in a 100-year flood event, channel velocity is decreased below that necessary to transport sand and/or gravel and cobble;
- Result in increased flooding on- or off-site.
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Violate any water quality standards or waste discharge requirements.
- Substantially degrade water quality, including increasing erosion or siltation on- or off-site.

3.1.2.3 Project Construction

3.1.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Because some of the surface water quality impacts are associated with geology impacts, the associated geology impacts (e.g., Impact GEO-1) as well as geology mitigation measures (e.g., MM GEO-1) are referenced in this section.

Impact GEO-1. *Implementation of seasonal conservation storage would include modification of the trash rack of the intake structure and drilling into bedrock to provide additional anchors for the structure. These activities may result in significant impacts associated with sedimentation and erosion at the base of the dam. Substantial erosion may also occur during these short-term construction activities through the use of berms to divert water flow, resulting in significant impacts.*

Demolition and modification of the trash rack section of the intake structure and drilling to install additional anchors would occur during the dry summer months to reduce potential soil erosion and sedimentation. Construction of Seven Oaks Dam and the impermeable grout curtain beneath it causes sub-surface water to rise to the surface. Berms would be constructed to divert these surface water flows away from construction activities. Debris from the demolition and drilling activities is unlikely to discharge into surface water flows; however, in the unlikely event that this occurred, substantial erosion and sedimentation impacts could occur. This is considered a significant impact. Substantial short-term erosion may also occur through use of diversion berms during demolition and drilling activities, resulting in significant impacts.

MITIGATION MEASURES

MM GEO-1: Before beginning construction, a sedimentation and erosion control plan will be prepared by Muni/Western and submitted to the SARWQCB for approval. In addition, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared by Muni/Western and submitted to the SARWQCB for approval prior to construction. Where possible, erosion control measures will be implemented by Muni/Western before beginning work in the rainy season. To minimize short-term impacts associated with erosion and off-site siltation of the SAR, standard erosion and sediment control features will be used during and immediately after grading and excavations.

RESIDUAL IMPACTS

Residual impacts would be less than significant because MM GEO-1 would provide appropriate erosion control measures during modification of the trash rack.

Impact GEO-2. *Substantial erosion and sedimentation may occur during grading and excavation activities associated with construction of new access roads at the dam and immediately upstream, resulting in significant impacts.*

Construction activities such as cut and fill grading operations associated with facilities may contribute substantial erosion and sedimentation.

MITIGATION MEASURES

MM GEO-1 would reduce erosion-related impacts in the Seven Oaks Dam and Reservoir Construction Area.

RESIDUAL IMPACTS

Residual impacts would be less than significant, because MM GEO-1 would provide appropriate erosion control measures during cut and fill grading operations.

3.1.2.3.2 Santa Ana River Construction Area

Project construction would temporarily place structures within a 100-year flood hazard area. However, in the active river channel, Project construction would be limited to the dry period and construction would not impede or redirect flood flows.

Impact GEO-3. *Substantial erosion and sedimentation may occur during grading and excavation activities associated with construction of new pipelines and related appurtenances, resulting in significant impacts.*

As described in Appendix C, construction in the Santa Ana River Construction Area would involve the disturbance of approximately 133 acres, excavation of 1,786,000 cubic yards (cy) of soil, and more than 45 construction vehicles and other equipment. The extensive ground disturbance could result in substantial erosion and sedimentation. This would be a significant impact to water quality.

MITIGATION MEASURES

MM GEO-1 would reduce erosion-related impacts in the Santa Ana River Construction Area.

RESIDUAL IMPACTS

MM GEO-1, requiring implementation of erosion control and water quality protection measures during construction, would reduce Impact GEO-3 to a less than significant level.

Impact GEO-4. *Discharge of groundwater from dewatering wells during excavation activities could cause substantial short-term sediment scour and erosion at the point of discharge, resulting in significant impacts.*

A substantial increase in erosion due to dewatering activities may lead to increased siltation of local drainages and the SAR, resulting in significant water quality impacts.

MITIGATION MEASURES

MM GEO-2: Muni/Western will direct the contractor to install, prior to de-watering activities, energy dissipation devices at discharge points to prevent erosion. Sedimentation basins (such as straw bales lined with filter fabric) will be used at dewatering discharge points to prevent excess downstream sedimentation. These basins will be constructed before dewatering and regularly maintained during construction, including after storm events, to keep them in good working order.

RESIDUAL IMPACT

Residual sediment scour and erosion impacts would be less than significant, because MM GEO-2 would provide appropriate erosion control measures during de-watering activities.

3.1.2.3.3 Devil Canyon Construction Area

Impact GEO-3, described above, applies to the Devil Canyon Construction Area. Activities in this area include installation of pipeline facilities. Construction in the Devil Canyon Construction Area would involve the disturbance of approximately 3 acres, excavation of 17,000 cy of soil, and more than 19 construction vehicles and other equipment. The ground disturbance could result in substantial erosion and sedimentation to the small drainage which crosses the Project construction site. This would be a significant impact.

MITIGATION MEASURES

MM GEO-1 would reduce construction-related impacts to erosion and water quality in the Devil Canyon Construction Area.

RESIDUAL IMPACTS

MM GEO-1, requiring implementation of erosion control and water quality protection measures during construction, would reduce Impact GEO-3 to a less than significant level.

3.1.2.3.4 Lytle Creek Construction Area

Impact GEO-3, described above, applies to the Lytle Creek Construction Area. Construction in the Lytle Creek Construction Area would involve the disturbance of approximately 20 acres, excavation of 277,000 cy of soil, and more than 39 construction vehicles and other equipment. The ground disturbance could result in substantial erosion and sedimentation to the stormwater system in the construction area as well as the small drainages of Lytle Wash north of Riverside Avenue. This would be a significant impact.

MITIGATION MEASURES

MM GEO-1 would reduce construction-related impacts to erosion and water quality in the Lytle Creek Construction Area.

RESIDUAL IMPACTS

MM GEO-1, requiring implementation of erosion control and water quality protection measures during construction, would reduce Impact GEO-3 to a less than significant level.

3.1.2.4 Project Operations and Maintenance

3.1.2.4.1 Project Construction Areas

Project operation would result only in decreased flood flows and would not create flooding in areas that would not typically flood under No Project conditions.

SEVEN OAKS DAM AND RESERVOIR

Impact SW-1. *Use of Seven Oaks Reservoir for seasonal water conservation storage would alter the amount of water in storage and height of the reservoir water surface. This would increase potential for erosion within the reservoir. This is a less than significant impact.*

Project operations could result in a higher reservoir elevation during the months of March through September than under the No Project. Under No Project conditions, during the period March through September, the reservoir could hold water up to an elevation of 2,200 feet above msl. With the Project, the reservoir could temporarily store water up to an elevation 2,418 feet above msl during the months of March through September depending on rainfall and other conditions. This temporary increase in area of inundation would occur in an area already designated for flood storage use, and in an area that would periodically hold flood water. Given the dam operating conditions, fluctuation of the reservoir would be minimal and wave action and resulting erosion would also be minimal. Given the nature of the geology of the reservoir, it is unlikely that water stored behind the dam would create scouring activity resulting in benches. Because the potential for conservation storage to result in erosion within the reservoir is negligible, this is a less than significant impact. No mitigation is required.

Impact SW-2. *Use of Seven Oaks Reservoir for seasonal water conservation storage could substantially degrade water quality as a result of additional impoundment of flows in Seven Oaks Reservoir. This would be a significant impact.*

In general, water quality is degraded by extended impoundment in long, deep storage pools, particularly during summer months when higher temperatures cause water column stratification and lowered levels of dissolved oxygen (cumulatively referred to as "anaerobic conditions"). Anaerobic conditions can also cause several other water quality parameters to be exceeded. Examples include:

- Hydrogen sulfide can be generated in harmful quantities when materials containing sulfur, such as biological detritus and mineral sulfides, are available;

- Ammonia can be generated from nitrogen-containing material and un-ionized ammonia, in particular, can be toxic to many aquatic organisms, including trout;
- Anaerobic conditions can lower the pH, which results in the release of trace metals found in bottom sediments; and
- Local nuisance conditions, such as algal blooms and mosquito breeding, are also more likely to occur.

Anaerobic conditions have already occurred in the water of the debris pool behind Seven Oaks Dam. Implementation of seasonal water conservation storage could result in additional impoundment of water during the warm summer months, thus increasing the amount of water subject to anaerobic conditions, a significant impact.

MITIGATION MEASURES

MM SW-1: Because anaerobic conditions are a problem associated with current operations at Seven Oaks Dam, it is anticipated that the operators of the dam (San Bernardino, Riverside, and Orange county flood control districts, known as the 'Local Sponsors') will implement a program (such as water quality monitoring and aeration) to avoid and reverse anaerobic conditions so that water quality objectives are not exceeded. In those years when the Project results in seasonal water conservation storage behind Seven Oaks Dam, Muni/Western will participate in such a preventative program and provide funding, proportional to the volume of seasonal water conservation storage behind Seven Oaks Dam.

RESIDUAL IMPACTS

Implementation of MM SW-1, participation in a water quality program to monitor and correct anaerobic conditions in waters impounded in Seven Oaks Reservoir, would reduce Impact SW-2 to a less than significant level.

Impact SW-3. *Use of Seven Oaks Reservoir for seasonal water conservation storage would increase potential damage from seiches. This would be a less than significant impact.*

A seiche could occur within the Seven Oaks Reservoir as a result of a strong earthquake in the vicinity of the Project area. Seiche potential in Seven Oaks Reservoir is increased by Project implementation as a result of the greater volume of water stored for Project uses, compared to the use of the facility strictly for flood control. For conditions above the dam, the area is already designated for flood storage use, so there is no additional impact to the area when water is stored in the reservoir. Since the reservoir design reflects planning for the potential effects of earthquake motion, and the asymmetrical shape of the reservoir minimizes the potential for damages due to harmonic buildup of seiche waves, impacts would be less than significant. No mitigation is required.

Impact SW-4. *Use of Seven Oaks Reservoir for seasonal water conservation storage would increase the potential for mudflows in the reservoir. This would be a less than significant impact.*

Potential mudflows resulting from Project implementation would be confined to the area behind Seven Oaks Dam, resulting primarily from the greater volume of water in the reservoir. The reservoir's design as a flood storage facility makes significant impacts as a result of mudflows unlikely. Therefore, impacts associated with mudflows would be less than significant, and no mitigation is required.

SANTA ANA RIVER CONSTRUCTION AREA

Impact SW-5. *The Project would place, within a 100-year flood hazard area, structures which would redirect flood flows for water diversion. This is a less than significant impact.*

Diversion structures and other infrastructure placed in the 100-year flood hazard area in the Santa Ana River Construction Area would be designed specifically to redirect water by diversion. Facility design would be subject to review and approval by the USACE and local sponsors of the dam (San Bernardino, Riverside, and Orange County flood control districts). Hence the potential to increase flood hazards is less than significant, and no mitigation is required.

DEVIL CANYON CONSTRUCTION AREA

Project operations would have no impact on surface water in the Devil Canyon Construction Area.

LYTLE CREEK CONSTRUCTION AREA

Impact SW-6. *Water delivered into the channel leading to the Lytle Basins could result in substantial erosion of this channel. This is a significant impact.*

The channel from the Fontana Power Plant to the Lytle Basins is an earthen ditch. This ditch was originally built to accommodate the discharge from the Fontana Power Plant (up to approximately 65 cfs). Over time the channel has deepened through scour and its current capacity is estimated to be greater than 65 cfs. In its current state the channel has stabilized, fines and sands have been removed, the channel bottom is rock cobble, and the banks are protected by heavy vegetation. The Project would introduce flows up to 90 cfs into this ditch, however, flows generally are expected to be no more than 30 cfs. Despite the channel being relatively stable, these flows, combined with flows from the Fontana Power Plant, could result in scour and benching of this channel. This is a significant impact.

MITIGATION MEASURES

MM SW-2: An energy dissipation structure, a device to slow fast moving flows so as to prevent erosion, will be placed at the terminus of the pipeline delivering water to the Lytle Basins channel to ensure that water from the Project does not scour or erode the channel.

RESIDUAL IMPACTS

Implementation of MM SW-2 requiring the installation of an energy dissipater will reduce Impact SW-6 to a level of less than significant.

3.1.2.4.2 Santa Ana River

The diversion of water from the SAR by Muni/Western has the potential to influence hydrologic and fluvial geomorphic processes downstream. Since potential changes may vary by location, an assessment is conducted for each of a number of segments of the SAR. These segments are defined and described in section 3.1.1.7.

SEGMENT A – UPSTREAM OF SEVEN OAKS DAM

No impacts are anticipated to the segment of the Santa Ana River upstream of the Seven Oaks Dam and Reservoir.

SEGMENT B – SEVEN OAKS DAM TO JUST ABOVE CUTTLE WEIR

Impact SW-7. *The Project would significantly decrease river flow on non-storm days.*

On non-storm days, flows occur on all days in the segment between the plunge pool and Cuttle Weir. These flows are attributable to a combination of the 3 cfs minimum release from the dam, releases for the Conservation District, environmental habitat releases, as well as other flows related to operation of the dam, e.g., emptying of the debris pool. During Phase I and II of the Plunge Pool Pipeline, no water would be diverted at the plunge pool and the Project would have no effect on River Segment B. Under Phase III of the Plunge Pool Pipeline, however, all flows remaining after accounting for the 3 cfs minimum release from the dam, releases for the Conservation District, and environmental habitat releases could be diverted from the plunge pool.

Under pre-dam conditions this river segment had no measurable flows in the channel on approximately 32 percent of all days. With Seven Oaks Dam in place, flows on all non-storm days equal or exceed 3 cfs (see Figure 3.1-14 and Table 3.1-11). As shown in Table 3.1-11 and Figure 3.1-14, there is a change in median non-storm flow from 5 cfs under the No Project Scenario to 3 cfs under Project scenarios. Figure 3.1-14 shows daily discharge for non-storm days under the No Project and Project Scenarios A and C, as well as the measurement error bands. [Only Project Scenarios A and C are described here because these scenarios are applicable to Phase III of the Plunge Pool Pipeline.] As can be seen in this figure, flow under the Project (under either Scenario A or C) differs from the No Project for a range of daily discharge values between 3 cfs and 500 cfs (except between 20 cfs to 30 cfs under Scenario A when there is no measurable difference). Thus, a measurable change in non-storm day flows is attributable to the Project, and this is a significant impact.

MITIGATION MEASURES

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were

Table 3.1-11. Project Effect on Non-Storm Day Flows in Segment B of the SAR (Monthly Summary for WY 1966-67 through WY 1999-2000)

	Base Period	January		February		March		April		May		June		July		August		September		October		November		December	
	Days	*Days*	*% of Jan Days*	*Days*	*% of Feb Days*	*Days*	*% of Mar Days*	*Days*	*% of Apr Days*	*Days*	*% of May Days*	*Days*	*% of Jun Days*	*Days*	*% of Jul Days*	*Days*	*% of Aug Days*	*Days*	*% of Sep Days*	*Days*	*% of Oct Days*	*Days*	*% of Nov Days*	*Days*	*% of Dec Days*
HISTORICAL CONDITIONS (PRE-DAM)																									
Total Days	12,419	1,054		961		1,054		1,020		1,054		1,020		1,054		1,054		1,020		1,054		1,020		1,054	
Storm Days	4,044	577	55%	565	59%	698	66%	588	58%	341	32%	224	22%	122	12%	79	7%	126	12%	146	14%	203	20%	375	36%
Non-Storm Days	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Zero Flow Days	4,012	172	16%	79	8%	45	4%	88	9%	223	21%	422	41%	553	52%	606	57%	542	53%	524	50%	455	45%	303	29%
Minimum Flow for Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Median Flow for Non-Storm Day (cfs)	1	4		5		6		5		2		0		0		0		0		0		0		2	
Maximum Flow for Non-Storm Days (cfs)	520	223		520		155		115		184		92		257		180		167		171		68		99	
NO PROJECT																									
Non-Storm Days with Zero Flow	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Flow	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Minimum Flow on Non-Storm Days (cfs)	3	3		3		3		3		3		3		3		3		3		3		3		3	
Median Flow on Non-Storm Days (cfs)	5	3		5		7		8		4		3		23		23		23		3		3		3	
Maximum Flow on Non-Storm Days (cfs)	4,003	503		4,003		158		118		187		1,003		280		203		190		134		1,503		503	
PROJECT SCENARIO A OR B[a,b]																									
Non-Storm Days with Zero Flow	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Flow	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Non-Storm Days with Project Diversion	3,268	6	1%	38	4%	25	2%	68	7%	159	15%	361	35%	854	81%	939	89%	571	56%	33	3%	110	11%	104	10%
Median Flow for Non-Storm Day (cfs)	3	3		3		6		5		3		3		3		3		3		3		3		3	
Maximum Flow for Non-Storm Days (cfs)	3,503	303		3,503		103		52		23		3		3		3		3		134		278		102	
PROJECT SCENARIO C OR D[a,b]																									
Non-Storm Days with Zero Flow	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Flow	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Non-Storm Days with Project Diversion	821	6	1%	10	1%	1	0%	4	0%	31	3%	24	2%	210	20%	295	28%	110	11%	107	10%	22	2%	1	0%
Median Flow for Non-Storm Day (cfs)	3	3		3		3		3		3		3		3		17		3		3		3		3	
Maximum Flow for Non-Storm Days (cfs)	3,503	142		3,503		107		65		164		303		111		89		84		68		303		46	
SCENARIO A OR B versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	-2	0	0%	-2	-45%	-1	-14%	-3	-37%	-1	-30%	0	0%	-20	-87%	-20	-87%	-20	-87%	0	0%	0	0%	0	0%
SCENARIO C OR D versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	-2	0	0%	-2	-45%	-4	-57%	-5	-60%	-1	-30%	0	0%	-20	-87%	-6	-26%	-20	-87%	0	0%	0	0%	0	0%

Notes:

[a] Results for 500 cfs and 1,500 cfs diversion rate differ by less than 1 percent.

[b] Only Phase III of the Plunge Pool Pipeline, a 1,500 cfs Muni/Western diversion pipeline at the plunge pool, affects this river segment.

identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion for beneficial use by the Project.

RESIDUAL IMPACTS

Impact SW-7 is significant and unavoidable.

Impact SW-8. *The Project would decrease river flow and so could degrade water quality. This is a less than significant impact.*

The maximum volume of water diverted under the Project was subtracted from baseflow (as defined by SARWQCB) at points downstream and the concentration of TDS was calculated based on the adjusted flow (see Table 3.1-12). Representative values for flow and TDS concentrations for points along the SAR were derived from data from the USGS and the City of San Bernardino Municipal Water Department.

This method of evaluating potential changes in TDS concentration assumes a "worst-case" situation, i.e., that all of the water diverted by the Project would have otherwise flowed downstream under No Project conditions. It is likely that, due to evaporation and percolation, very little surface water in River Segment B has hydrologic connectivity to points downstream. But, as shown in Table 3.1-12, this "worst-case" analysis identified little change. Calculations of water quality found no change in TDS above Cuttle Weir (in River Segment B). Further downstream, in other river segments, change in TDS would be minor. As far down as the MWD Crossing Gage the change is less than 2 percent. At Prado, because of the large inflows, no change in flow or water quality concentration attributable to the Project would be detectable. The potential increase in TDS concentrations would not cause basin plan objectives to be exceeded in any river segment downstream of the diversion (Segments A through G).

A parallel analysis was accomplished for TIN levels and the results are presented in Table 3.1-13. Again this "worst-case" analysis found little change. Calculations of water quality found no change in TIN above Cuttle Weir (in Segment B), and as far down as the MWD Crossing Gage the change is less than 3 percent. None of the potential increases would cause TIN to exceed basin plan objectives. At Prado, because of the large inflows, no change in flow or water quality concentration would be detectable.

Therefore, while diversions from the Project could cause changes in water quality, this change would be minor and less than significant. No mitigation measures are required.

Impact SW-9. *Project diversions would decrease flow in River Segment B, in a manner that could affect sediment transport. This is a less than significant impact.*

It is estimated that peak discharge associated with Seven Oaks Dam, under a 100-year flood condition, would be 5,000 cfs. Under Phase I and II of the Plunge Pool Pipeline, no water would be diverted at the plunge pool and the Project would have no effect in the SAR Segment B. Under Phase III of the Plunge Pool Pipeline, 1,500 cfs would be diverted at the plunge pool and

Table 3.1-12. Potential Impact of Project on Santa Ana River Total Dissolved Solids (TDS) Level

Location	Median Baseflow [a]		TDS [b,c]			
	No Project (cfs)	Project (cfs)	Representative TDS under SAR Baseflow Condition for No Project (mg/L)	Potential TDS under SAR Baseflow Condition with Project (mg/L)	Applicable WQO (mg/L)	WQO Exceeded with Project
Above Cuttle Weir	5	3	230	230	300	No
Below Cuttle Weir	0	0	NA	NA	300	No
RIX and Rialto Outfall	74	68	520	529	550	No
MWD Crossing Gage	86	86	560	568	700	No

Notes:

a. Non-storm day flow representing baseflow as defined by the SARWQCB.

b. TDS values representative of the SAR baseflow condition at Cuttle Weir and Riverside Narrows were assigned based on the Mentone and MWD gage data under the baseflow condition as reported USGS Water-Resources Investigations Report 03-4326.

c. The TDS value assigned for RIX-Rialto is the maximum value that occurred during 2001-2002 as reported in Table 4.4-9 of the City of San Bernardino Municipal Water Department RIX Facility Recycled Water Sales Program PEIR, March 2003.

Table 3.1-13. Potential Impact of Project on Santa Ana River Total Inorganic Nitrogen (TIN) Level

Location	Median Baseflow [a]		TIN (Nitrite plus Nitrate) [b,c]			
	No Project (cfs)	Project (cfs)	Representative TIN under SAR Baseflow Condition for No Project (mg/L)	Potential TIN under SAR Baseflow Condition with Project (mg/L)	Applicable WQO (mg/L)	WQO Exceeded with Project
Above Cuttle Weir	5	3	0.3	0.3	5	No
Below Cuttle Weir	0	0	NA	NA	5	No
RIX and Rialto Outfall	74	68	8.5	8.7	10	No
MWD Crossing Gage	86	86	7.3	7.5	10	No

Notes:

a. Non-storm day flow representing baseflow as defined by the SARWQCB.

b. TIN values representative of the SAR baseflow condition at Cuttle Weir and Riverside Narrows were assigned based on the Mentone and MWD gage data under the baseflow condition as reported USGS Water-Resources Investigations Report 03-4326.

c. The TIN value assigned for RIX-Rialto is the maximum value that occurred during 2001-2002 as reported in Table 4.4-9 of the City of San Bernardino Municipal Water Department RIX Facility Recycled Water Sales Program PEIR, March 2003.

would, thus, not flow down Segment B. A decrease of 1,500 cfs from a flow of 5,000 cfs would cause flows in this segment of the river to fall below 4,000 cfs, the discharge rate necessary to mobilize and transport cobble and gravel. However, this river segment typically does not contribute gravel and cobble to downstream locations and, thus, this decrease in flow would not result in a change to geomorphologic processes in this river segment (USACE 1988, EIP 2004). Flows would still be sufficient (greater than 500 cfs) to mobilize and transport sand. Therefore, this is a less than significant impact, and no mitigation is required.

SEGMENT C – CUTTLE WEIR TO JUST ABOVE THE CONFLUENCE WITH MILL CREEK

Impact SW-7, a significant decrease in river flow on non-storm days, also applies to this river segment.

As can be seen in Table 3.1-14 and Figure 3.1-15, under No Project conditions, flows below Cuttle Weir are typically low. Under Pre-Dam conditions 65 percent of all days had zero flow (see Figure 3.1-8). With Seven Oaks Dam in place, median non-storm day flow is zero (Table 3.1-14 and Figure 3.1-15) and in only about 25 percent of non-storm days is there flow in River Segment C (Figure 3.1-15). Under Phase I of the Plunge Pool Pipeline, up to 500 cfs would be diverted at Cuttle Weir. In later phases of the Plunge Pool Pipeline 1,500 cfs would be diverted at, or above, Cuttle Weir. As can be seen in Figure 3.1-15 and Table 3.1-14, with the Project there would be no flow in this river segment on non-storm days. Figure 3.1-15 shows daily discharge on non-storm days under the No Project and Project scenarios, as well as the measurement error bands. As can be seen in this figure, the decline in non-storm flows is greater than could be attributable to measurement error for flows less than 200 cfs. Thus, a measurable change in non-storm day flows is attributable to the Project, and this is a significant impact.

MITIGATION MEASURES

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion for beneficial use by the Project.

RESIDUAL IMPACTS

Impact SW-7 is significant and unavoidable.

Impact SW-8, a less than significant decrease in water quality resulting from decreased river flow, also applies to Segment C. See Tables 3.1-12 and 3.1-13.

Impact SW-9, a less than significant change in sediment transport processes resulting from decreased flow, also applies to this river segment**.**

It is estimated that peak discharge associated with Seven Oaks Dam, under a 100-year flood condition, could be 5,000 cfs in the river segment from Cuttle Weir to Mill Creek. Under Phase I of the Plunge Pool Pipeline, up to 500 cfs could be diverted at Cuttle Weir; in later phases of the

Table 3.1-14. Project Effect on Non-Storm Day Flows in Segment C of the SAR (Monthly Summary for WY 1966-67 through WY 1999-2000)

	Base Period	January		February		March		April		May		June		July		August		September		October		November		December	
	Days	*Days*	*% of Jan Days*	*Days*	*% of Feb Days*	*Days*	*% of Mar Days*	*Days*	*% of Apr Days*	*Days*	*% of May Days*	*Days*	*% of Jun Days*	*Days*	*% of Jul Days*	*Days*	*% of Aug Days*	*Days*	*% of Sep Days*	*Days*	*% of Oct Days*	*Days*	*% of Nov Days*	*Days*	*% of Dec Days*
HISTORICAL CONDITIONS (PRE-DAM)																									
Total Days	12,419	1,054		961		1,054		1,020		1,054		1,020		1,054		1,054		1,020		1,054		1,020		1,054	
Storm Days	4,044	577	55%	565	59%	698	66%	588	58%	341	32%	224	22%	122	12%	79	7%	126	12%	146	14%	203	20%	375	36%
Non-Storm Days	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Zero Flow Days	5,966	291	28%	199	21%	220	21%	281	28%	451	43%	608	60%	798	76%	823	78%	711	70%	726	69%	471	46%	387	37%
Minimum Flow for Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Median Flow for Non-Storm Day (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	441	103		441		110		65		176		92		191		140		167		171		59		66	
NO PROJECT																									
Non-Storm Days with Zero Flow	6,183	426	40%	309	32%	271	26%	302	30%	493	47%	659	65%	521	49%	540	51%	603	59%	712	68%	717	70%	630	60%
Non-Storm Days with Flow	2,192	51	5%	87	9%	85	8%	130	13%	220	21%	137	13%	411	39%	435	41%	291	29%	196	19%	100	10%	49	5%
Minimum Flow on Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Median Flow on Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Maximum Flow on Non-Storm Days (cfs)	3,921	482		3,921		110		65		176		1,000		211		160		187		90		1,200		457	
PROJECT SCENARIO A OR B[a]																									
Non-Storm Days with Zero Flow	8,374	477	45%	395	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Non-Storm Days with Flow	1	0	0%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Project Diversion	3,268	6	1%	38	4%	25	2%	68	7%	159	15%	361	35%	854	81%	939	89%	571	56%	33	3%	110	11%	104	10%
Median Flow for Non-Storm Day (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	3,500	0		3,500		0		0		0		0		0		0		0		0		0		0	
PROJECT SCENARIO C OR D[a]																									
Non-Storm Days with Zero Flow	8,374	477	45%	395	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Non-Storm Days with Flow	1	0	0%	1	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Project Diversion	821	6	1%	10	1%	1	0%	4	0%	31	3%	24	2%	210	20%	295	28%	110	11%	107	10%	22	2%	1	0%
Median Flow for Non-Storm Day (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	3,421	0		3,421		0		0		0		0		0		0		0		0		0		0	
SCENARIO A OR B versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
SCENARIO C OR D versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Notes:

[a] Results for 500 cfs and 1,500 cfs diversion rate differ by less than 1 percent.

Plunge Pool Pipeline, 1,500 cfs could be diverted at or above Cuttle Weir. A decrease of 500 to 1,500 cfs from a flow of 5,000 cfs could cause flows in Segment C of the river to fall below that necessary to mobilize and transport cobble and gravel. However, this river segment typically does not contribute gravel and cobble to downstream locations and, thus, this decrease in flow would not result in a change to geomorphologic processes in this river segment (USACE 1988, EIP 2004). Therefore, this is a less than significant impact, and no mitigation is required.

SEGMENT D – CONFLUENCE WITH MILL CREEK TO JUST ABOVE "E" STREET

Impact SW-7, a significant decrease in non-storm flow, also applies to SAR Segment D.

As can be seen in Table 3.1-15 and Figure 3.1-16, under No Project conditions, flows below Mill Creek are typically low. Under Pre-Dam conditions 46 percent of all days had zero flow and with Seven Oaks Dam in place median non-storm day flow is zero (Table 3.1-15 and Figure 3.1-16). Generally, there is only detectable flow about 40 percent of non-storm days, and even then it is small, typically less than 10 cfs (see Table 3.1-15). Figure 3.1-16 shows daily discharge on non-storm days under the No Project and Project scenarios, as well as the measurement error bands. With the Project, there would still be flow in the river on non-storm days, but the volume would be less and would occur less frequently than under No Project conditions. As can be seen in Figure 3.1-16, the decline in non-storm flows is greater than could be attributable to measurement error for flows less than 300 cfs (except in the 30-60 cfs flow range). Thus, a measurable change in non-storm day flows is attributable to the Project and this is a significant impact.

MITIGATION MEASURES

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion for beneficial use by the Project.

RESIDUAL IMPACTS

Impact SW-7 is significant and unavoidable.

Impact SW-8, a less than significant decrease in water quality resulting from decreased river flow, also applies to this river segment. See Tables 3.1-12 and 3.1-13.

Impact SW-9, a less than significant change in sediment transport resulting from decreased flow, also applies to this river segment**.**

It is estimated that peak flow under No Project conditions during a 100-year flood event would be 25,000 cfs in the river segment from Mill Creek to "E" Street (USACE 1988). With implementation of the Project, peak flow during a 100-year flood event would be no more than 23,500 cfs. Because the Project would decrease flow from the upper Santa Ana Canyon, it is possible that the frequency with which sand, cobble and gravel is mobilized and transported in this river segment could decline. But the impact of the Project would be minor since Mill Creek

Table 3.1-15. Project Effect on Non-Storm Day Flows in Segment D of the SAR (Monthly Summary for WY 1966-67 through WY 1999-2000)

	Base Period	January		February		March		April		May		June		July		August		September		October		November		December	
	Days	*Days*	*% of Jan Days*	*Days*	*% of Feb Days*	*Days*	*% of Mar Days*	*Days*	*% of Apr Days*	*Days*	*% of May Days*	*Days*	*% of Jun Days*	*Days*	*% of Jul Days*	*Days*	*% of Aug Days*	*Days*	*% of Sep Days*	*Days*	*% of Oct Days*	*Days*	*% of Nov Days*	*Days*	*% of Dec Days*
HISTORICAL CONDITIONS (PRE-DAM)																									
Total Days	12,053	1,023		932		1,023		990		1,023		990		1,023		1,023		990		1,023		990		1,023	
Storm Days	3,989	568	56%	544	58%	690	67%	574	58%	341	33%	224	23%	122	12%	79	8%	126	13%	146	14%	201	20%	374	37%
Non-Storm Days	8,064	455	44%	388	42%	333	33%	416	42%	682	67%	766	77%	901	88%	944	92%	864	87%	877	86%	789	80%	649	63%
Zero Flow Days	5,499	236	23%	177	19%	147	14%	206	21%	481	47%	607	61%	682	67%	724	71%	600	61%	676	66%	572	58%	391	38%
Minimum Flow for Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Median Flow for Non-Storm Day (cfs)	0	0		1		2		1		0		0		0		0		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	951	217		951		248		167		342		174		438		310		327		332		112		155	
NO PROJECT																									
Non-Storm Days with Zero Flow	4,661	237	23%	180	19%	147	14%	206	21%	481	47%	607	61%	365	36%	397	39%	468	47%	611	60%	571	58%	391	38%
Non-Storm Days with Flow	3,403	218	21%	208	22%	186	18%	210	21%	201	20%	159	16%	536	52%	547	53%	396	40%	266	26%	218	22%	258	25%
Minimum Flow on Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Median Flow on Non-Storm Days (cfs)	0	0		1		2		1		0		0		10		10		0		0		0		0	
Maximum Flow on Non-Storm Days (cfs)	4,431	527		4,431		248		167		342		1,082		458		330		347		168		1,214		544	
PROJECT SCENARIO A OR B[a]																									
Non-Storm Days with Zero Flow	5,504	237	23%	180	19%	147	14%	207	21%	481	47%	607	61%	682	67%	724	71%	600	61%	676	66%	572	58%	391	38%
Non-Storm Days with Flow	2,560	218	21%	208	22%	186	18%	209	21%	201	20%	159	16%	219	21%	220	22%	264	27%	201	20%	217	22%	258	25%
Non-Storm Days with Project Diversion	3,195	6	1%	38	4%	25	2%	68	7%	159	16%	361	36%	823	80%	908	89%	560	57%	33	3%	110	11%	104	10%
Median Flow for Non-Storm Day (cfs)	0	0		1		2		1		0		0		0		0		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	4,010	217		4,010		150		110		179		87		252		175		165		166		71		94	
PROJECT SCENARIO C OR D[a]																									
Non-Storm Days with Zero Flow	5,504	237	23%	180	19%	147	14%	207	21%	481	47%	607	61%	682	67%	724	71%	600	61%	676	66%	572	58%	391	38%
Non-Storm Days with Flow	2,560	218	21%	208	22%	186	18%	209	21%	201	20%	159	16%	219	21%	220	22%	264	27%	201	20%	217	22%	258	25%
Non-Storm Days with Project Diversion	821	6	1%	10	1%	1	0%	4	0%	31	3%	24	2%	210	21%	295	29%	110	11%	107	10%	22	2%	1	0%
Median Flow for Non-Storm Day (cfs)	0	0		1		2		1		0		0		0		0		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	3,931	217		3,931		150		110		179		87		252		175		165		166		71		94	
SCENARIO A OR B versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	-10	-100%	-10	-100%	0	0%	0	0%	0	0%	0	0%
SCENARIO C OR D versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	-10	-100%	-10	-100%	0	0%	0	0%	0	0%	0	0%

Notes:

[a] Results for 500 cfs and 1,500 cfs diversion rate differ by less than 1 percent.

(which is unaffected by the Project) dominates sediment contribution and transport in this river segment (EIP 2004). Therefore, this is a less than significant impact, and no mitigation is required.

Impact SW-10. *Project diversions would decrease flow in the river from Mill Creek to "E" Street in a manner that could decrease the velocity and depth of overbank flows. This is a less than significant impact.*

Based on HEC-RAS modeling performed for the Project, it is estimated that the instantaneous flow in this river segment would be reduced from 25,000 cfs under the No Project to 23,500 cfs with the Project. The overbank velocity and water depth in this section of the SAR between the Mill Creek Confluence and RM 62.9, would not be perceptibly affected by the Project. Therefore, this is a less than significant impact, and no mitigation is required.

SEGMENT E – "E" STREET TO JUST ABOVE THE RIX AND RIALTO EFFLUENT OUTFALL

Impact SW-7, a significant decrease in non-storm flow, also applies to this river segment.

As can be seen in Table 3.1-16 and Figure 3.1-17, under No Project conditions, flows below "E" Street are low. With Seven Oaks Dam in place, median non-storm day flow is 4 cfs (Table 3.1-16 and Figure 3.1-17). Generally there is only detectable flow about 50 percent of non-storm days, and during these days flow is small, typically no more than 25 cfs. Under the Project, up to 1,500 cfs would be diverted from flows upstream of this river segment and median non-storm day flow would be zero (see Table 3.1-16 and Figure 3.1-17). Figure 3.1-17 shows the No Project and Project scenarios, as well as the measurement error bands. With the Project there would still be flow in the river on non-storm days, but it would be less flow and occur less frequently than under No Project conditions. As can be seen in the figure, the decline in non-storm flows is greater than could be attributed to measurement accuracy for flows less than 150 cfs for Scenarios A and B and 10 cfs for Scenarios C and D. Thus, a measurable change in non-storm day flows is attributable to the Project and this is a significant impact.

MITIGATION MEASURES

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion for beneficial use by the Project.

RESIDUAL IMPACTS

Impact SW-7 is significant and unavoidable.

Impact SW-8, a less than significant decrease in water quality resulting from decreased river flow, also applies to this river segment. See Tables 3.1-12 and 3.1-13.

Impact SW-9, a less than significant change in sediment transport resulting from decreased flow, also applies to this river segment**.**

Table 3.1-16. Project Effect on Non-Storm Day Flows in Segment E of the SAR (Monthly Summary for WY 1966-67 through WY 1999-2000)

	Base Period	January		February		March		April		May		June		July		August		September		October		November		December	
	Days	*Days*	*% of Jan Days*	*Days*	*% of Feb Days*	*Days*	*% of Mar Days*	*Days*	*% of Apr Days*	*Days*	*% of May Days*	*Days*	*% of Jun Days*	*Days*	*% of Jul Days*	*Days*	*% of Aug Days*	*Days*	*% of Sep Days*	*Days*	*% of Oct Days*	*Days*	*% of Nov Days*	*Days*	*% of Dec Days*
HISTORICAL CONDITIONS (PRE-DAM)																									
Total Days	12,419	1,054		961		1,054		1,020		1,054		1,020		1,054		1,054		1,020		1,054		1,020		1,054	
Storm Days	4,044	577	55%	565	59%	698	66%	588	58%	341	32%	224	22%	122	12%	79	7%	126	12%	146	14%	203	20%	375	36%
Non-Storm Days	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Zero Flow Days	521	5	0%	0	0%	29	3%	42	4%	66	6%	59	6%	70	7%	66	6%	66	6%	50	5%	49	5%	19	2%
Minimum Flow for Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Median Flow for Non-Storm Day (cfs)	27	26		25		23		24		25		30		30		31		32		28		27		28	
Maximum Flow for Non-Storm Days (cfs)	400	170		400		61		57		87		70		188		250		190		182		79		95	
NO PROJECT																									
Non-Storm Days with Zero Flow	4,371	331	31%	265	28%	220	21%	313	31%	495	47%	528	52%	62	6%	33	3%	355	35%	552	52%	658	65%	559	53%
Non-Storm Days with Flow	4,004	146	14%	131	14%	136	13%	119	12%	218	21%	268	26%	870	83%	942	89%	539	53%	356	34%	159	16%	120	11%
Minimum Flow on Non-Storm Days (cfs)	0	0		0		0		0		0		0		0		0		0		0		0		0	
Median Flow on Non-Storm Days (cfs)	4	1		0		0		0		0		6		16		17		12		0		0		0	
Maximum Flow on Non-Storm Days (cfs)	2,184	267		2,184		28		41		63		556		176		219		176		150		896		242	
PROJECT SCENARIO A OR B[a]																									
Non-Storm Days with Zero Flow	6,212	331	31%	271	28%	222	21%	317	31%	515	49%	553	54%	715	68%	801	76%	668	65%	584	55%	674	66%	561	53%
Non-Storm Days with Flow	2,163	146	14%	125	13%	134	13%	115	11%	198	19%	243	24%	217	21%	174	17%	226	22%	324	31%	143	14%	118	11%
Non-Storm Days with Project Diversion	3,268	6	1%	38	4%	25	2%	68	7%	159	15%	361	35%	854	81%	939	89%	571	56%	33	3%	110	11%	104	10%
Median Flow for Non-Storm Day (cfs)	0	1		0		0		0		0		3		0		0		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	1,884	147		1,884		28		41		42		21		68		219		64		150		178		59	
PROJECT SCENARIO C OR D[a]																									
Non-Storm Days with Zero Flow	5,289	322	31%	268	28%	212	20%	313	31%	495	47%	528	52%	414	39%	403	38%	500	49%	626	59%	651	64%	557	53%
Non-Storm Days with Flow	3,086	155	15%	128	13%	144	14%	119	12%	218	21%	268	26%	518	49%	572	54%	394	39%	282	27%	166	16%	122	12%
Non-Storm Days with Project Diversion	821	6	1%	10	1%	1	0%	4	0%	31	3%	24	2%	210	20%	295	28%	110	11%	107	10%	22	2%	1	0%
Median Flow for Non-Storm Day (cfs)	0	4		0		0		0		0		6		12		12		0		0		0		0	
Maximum Flow for Non-Storm Days (cfs)	1,937	144		1,937		40		41		63		141		147		220		115		150		180		59	
SCENARIO A OR B versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	-4	0	0%	0	0%	0	0%	0	0%	0	0%	-3	-50%	-16	-100%	-17	-100%	-12	-100%	0	0%	0	0%	0	0%
SCENARIO C OR D versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	-4	3	300%	0	0%	0	0%	0	0%	0	0%	0	0%	-4	-25%	-5	-29%	-12	-100%	0	0%	0	0%	0	0%

Notes:

[a] Results for 500 cfs and 1,500 cfs diversion rate differ by less than 1 percent.

It is estimated that peak flow during a 100-year flood event under No Project conditions would be 67,000 cfs in the river segment from "E" Street to RIX-Rialto. With the Project, peak flow related to the 100-year flood event would be no more than 65,500 cfs. Because the Project would decrease flow from the upper Santa Ana Canyon, it is possible that the frequency with which sand, cobble, and gravel is mobilized and transported in this river segment could decline slightly. But the affect of the Project would be minor as City and Plunge creeks (which are unaffected by the Project) dominate sediment contribution and transport in this river segment (EIP 2004). Therefore, this is a less than significant impact, and no mitigation is required.

SEGMENT F – RIX AND RIALTO EFFLUENT OUTFALL TO JUST ABOVE RIVERSIDE NARROWS

Impact SW-7, a significant decrease in non-storm flow, also applies to this river segment.

As can be seen in Table 3.1-17 and Figure 3.1-18, in the SAR below the RIX and Rialto Effluent Outfall, water flows are continuous, even on non-storm days. With Seven Oaks Dam in place median non-storm day flow is 74 cfs (Table 3.1-17 and Figure 3.1-18). Under all Project scenarios, flows, even in low flow periods on non-storm days, would be similar to the No Project. The only noticeable difference between the Project (Scenario A or B) and No Project below the RIX and Rialto Effluent Outfall during low flow periods would occur in the 200 to 300 cfs range. Figure 3.1-19 shows a detail of mean daily discharge for the No Project and Project Scenarios A or B. Scenarios C and D are not shown because there is no measurable difference between these scenarios and the No Project. Figure 3.1-19 illustrates that, for a small percentage of non-storm days (approximately 0.5 percent), the decline in non-storm flows with Scenarios A or B, relative to the No Project, is greater than could be attributable to the measurement error, albeit for only a very limited flow range. Thus, a measurable change in non-storm day flows is attributable to the Project and this is a significant impact.

MITIGATION MEASURES

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion for beneficial use by the Project.

RESIDUAL IMPACTS

Impact SW-7 is significant and unavoidable.

SEGMENT G – RIVERSIDE NARROWS TO PRADO DAM

Hydrologic modeling performed for the Project found no detectable changes to flows in River Segment G.

Table 3.1-17. Project Effect on Non-Storm Day Flows in Segment F of the SAR (Monthly Summary for WY 1966-67 through WY 1999-20000)

	Base Period	January		February		March		April		May		June		July		August		September		October		November		December	
	Days	*Days*	*% of Jan Days*	*Days*	*% of Feb Days*	*Days*	*% of Mar Days*	*Days*	*% of Apr Days*	*Days*	*% of May Days*	*Days*	*% of Jun Days*	*Days*	*% of Jul Days*	*Days*	*% of Aug Days*	*Days*	*% of Sep Days*	*Days*	*% of Oct Days*	*Days*	*% of Nov Days*	*Days*	*% of Dec Days*
HISTORICAL CONDITIONS (PRE-DAM)																									
Total Days	12,419	1,054		961		1,054		1,020		1,054		1,020		1,054		1,054		1,020		1,054		1,020		1,054	
Storm Days	4,044	577	55%	565	59%	698	66%	588	58%	341	32%	224	22%	122	12%	79	7%	126	12%	146	14%	203	20%	375	36%
Non-Storm Days	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Zero Flow Days	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Minimum Flow for Non-Storm Days (cfs)	9	10		10		10		10		10		10		9		9		10		10		10		10	
Median Flow for Non-Storm Day (cfs)	34	35		31		32		27		35		33		36		36		36		33		34		33	
Maximum Flow for Non-Storm Days (cfs)	1,320	365		1,320		245		140		169		112		187		704		224		181		269		281	
NO PROJECT																									
Non-Storm Days with Zero Flow	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Flow	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	713	70%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Minimum Flow on Non-Storm Days (cfs)	61	62		62		62		61		62		63		64		62		63		68		70		64	
Median Flow on Non-Storm Days (cfs)	74	67		67		63		61		63		71		83		81		75		68		70		64	
Maximum Flow on Non-Storm Days (cfs)	2,271	393		2,271		269		134		203		619		240		747		268		218		976		311	
PROJECT SCENARIO A OR B[a]																									
Non-Storm Days with Zero Flow	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Flow	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Non-Storm Days with Project Diversion	3,268	6	1%	38	4%	25	2%	68	7%	159	15%	361	35%	854	81%	939	89%	571	56%	33	3%	110	11%	104	10%
Median Flow for Non-Storm Day (cfs)	68	67		67		62		61		62		69		70		67		63		68		70		64	
Maximum Flow for Non-Storm Days (cfs)	1,971	393		1,971		269		134		203		115		184		735		268		218		312		311	
PROJECT SCENARIO C OR D[a]																									
Non-Storm Days with Zero Flow	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Non-Storm Days with Flow	8,375	477	45%	396	41%	356	34%	432	42%	713	68%	796	78%	932	88%	975	93%	894	88%	908	86%	817	80%	679	64%
Non-Storm Days with Project Diversion	821	6	1%	10	1%	1	0%	4	0%	31	3%	24	2%	210	20%	295	28%	110	11%	107	10%	22	2%	1	0%
Median Flow for Non-Storm Day (cfs)	70	68		67		63		61		63		71		76		74		63		68		70		64	
Maximum Flow for Non-Storm Days (cfs)	2,023	393		2,023		269		134		203		204		211		747		268		218		312		310	
SCENARIO A OR B versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	-5	0	0%	0	-1%	0	0%	0	0%	0	0%	-2	-3%	-12	-15%	-15	-18%	-12	-16%	0	0%	0	0%	0	0%
SCENARIO C OR D versus NO PROJECT																									
			% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change		% Change
Median Flow for Non-Storm Day (cfs)	-4	1	2%	-1	-1%	0	0%	0	0%	0	0%	0	0%	-7	-8%	-8	-10%	-12	-16%	0	0%	0	0%	0	0%

Notes:

[a] Results for 500 cfs and 1,500 cfs diversion rate differ by less than 1 percent.

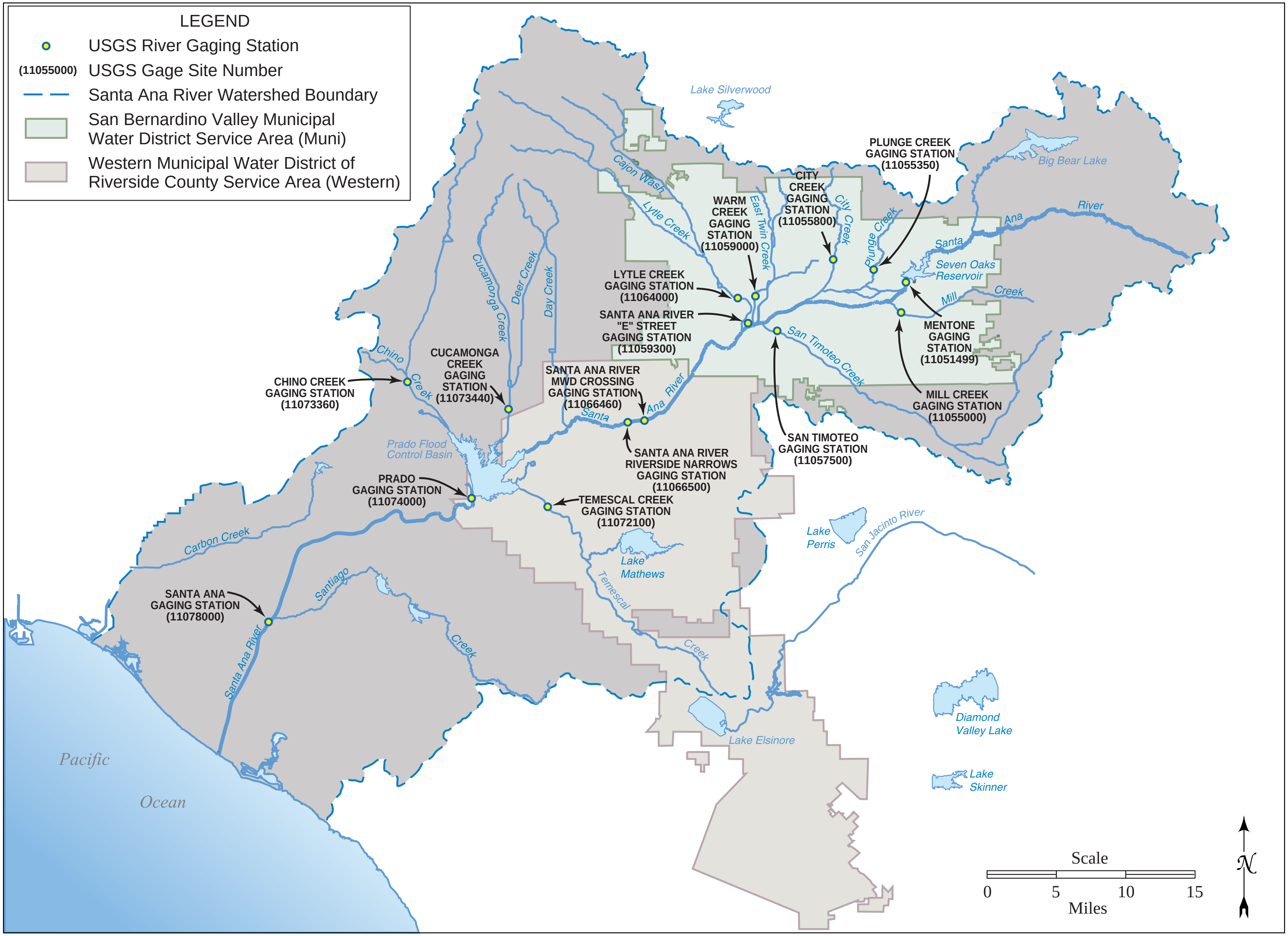


Figure 3.1-1. Santa Ana River Watershed, Gaging Stations, and Muni/Western Service Areas

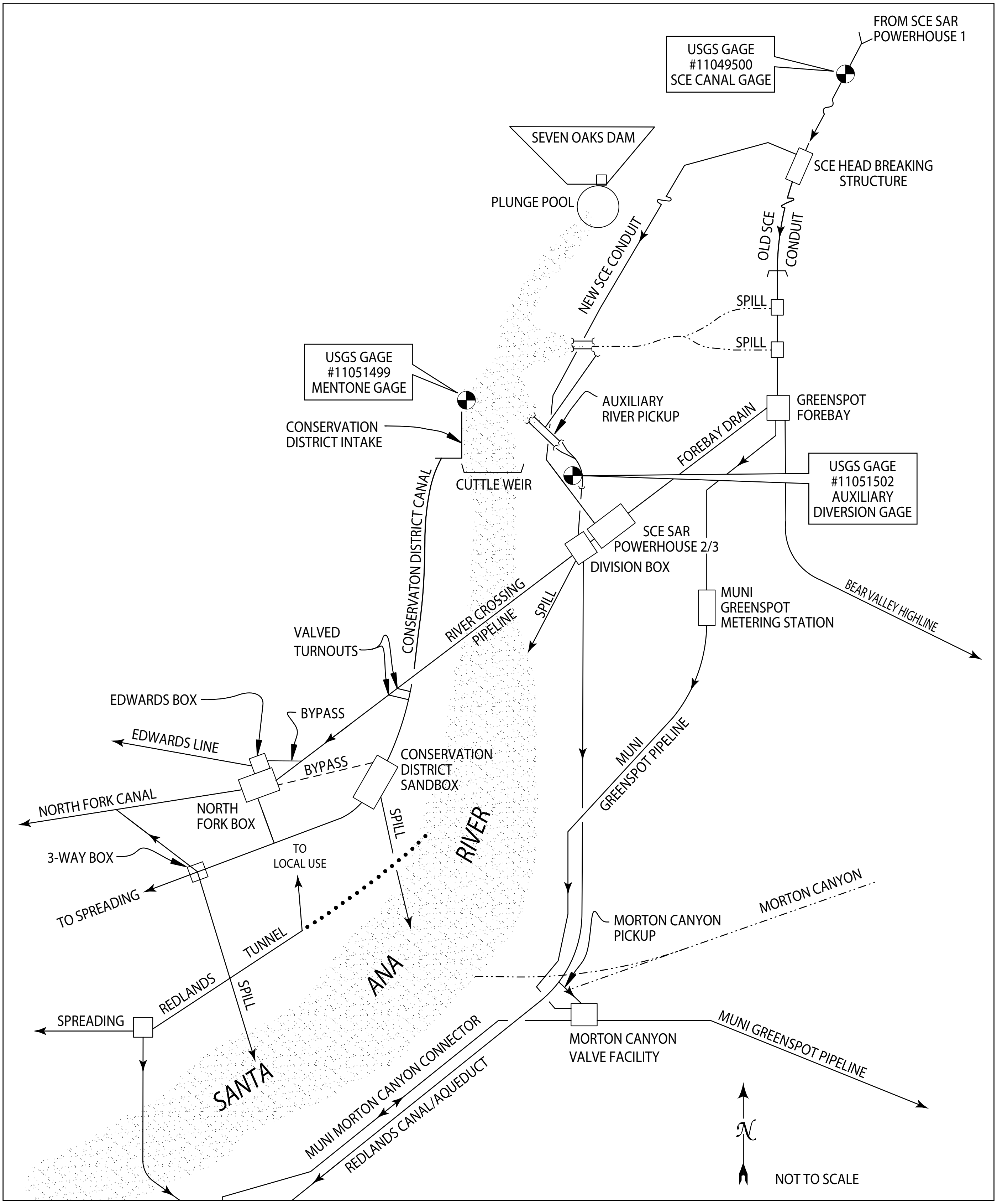


Figure 3.1-2. Schematic of Water Control Features and Gages in the Santa Ana River Canyon

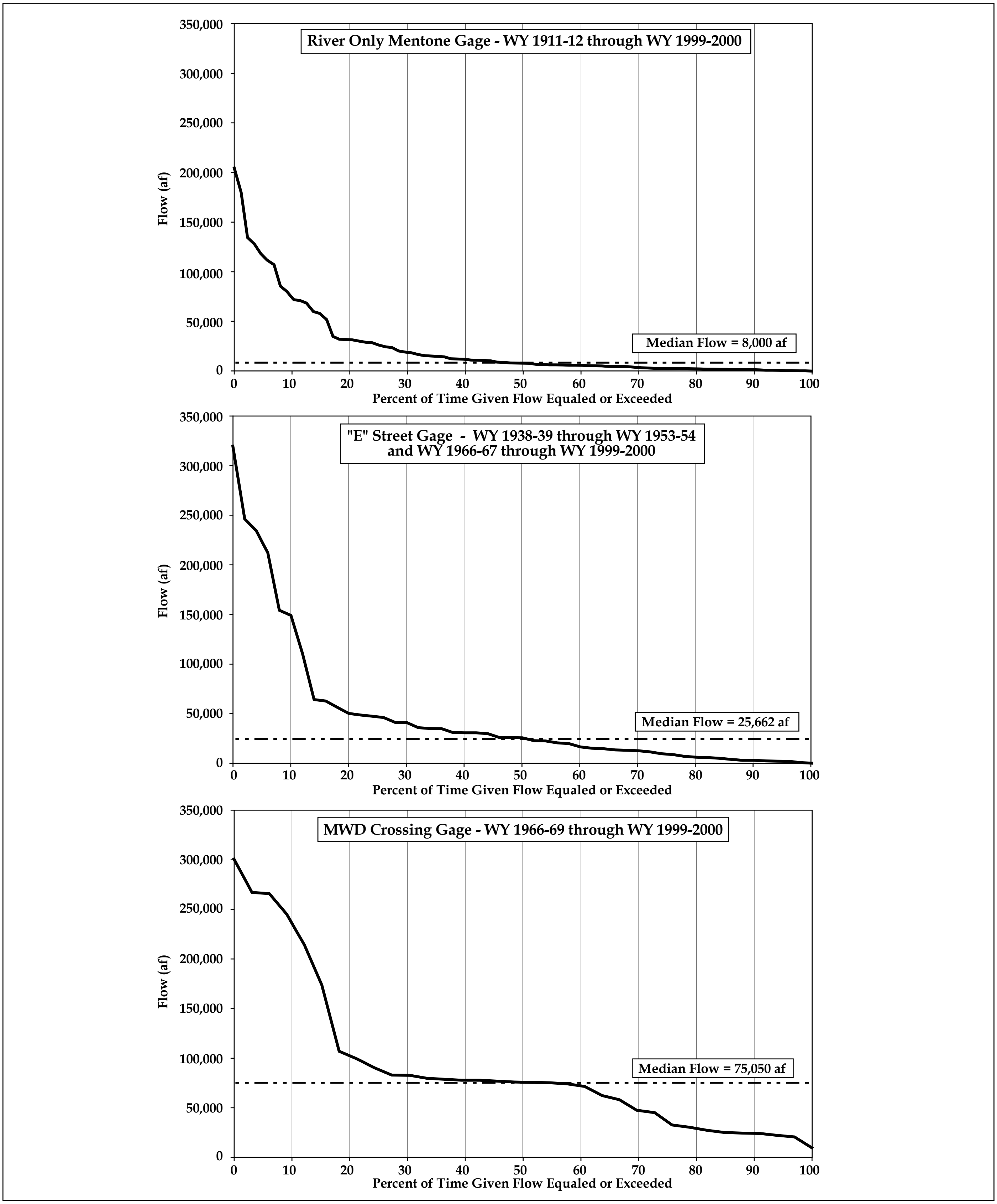


Figure 3.1-3. Probability of Annual Flow at the River Only Mentone, "E" Street, and MWD Crossing Gages

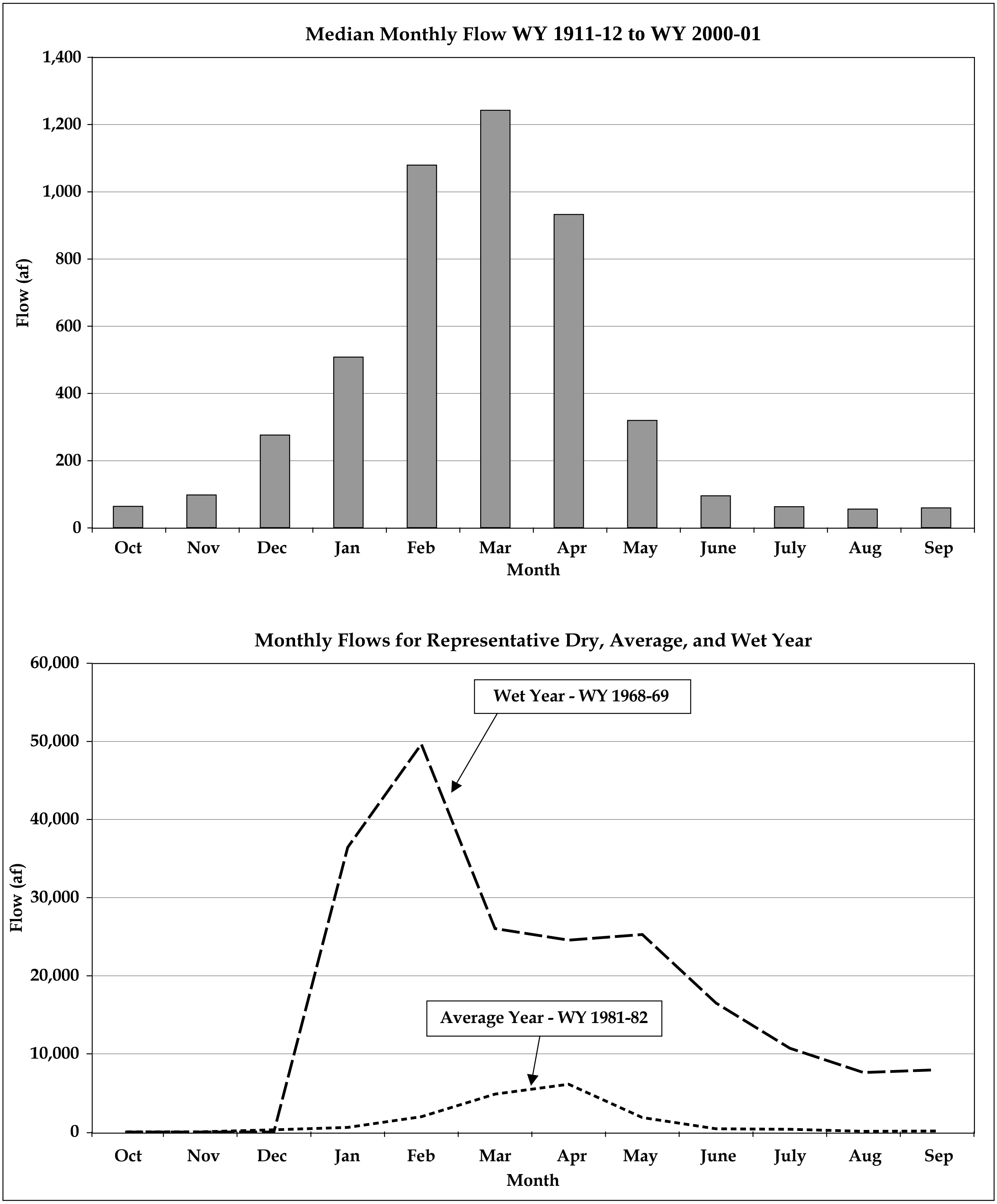


Figure 3.1-4. Variability in Monthly Flow, Santa Ana River at River Only Mentone Gage

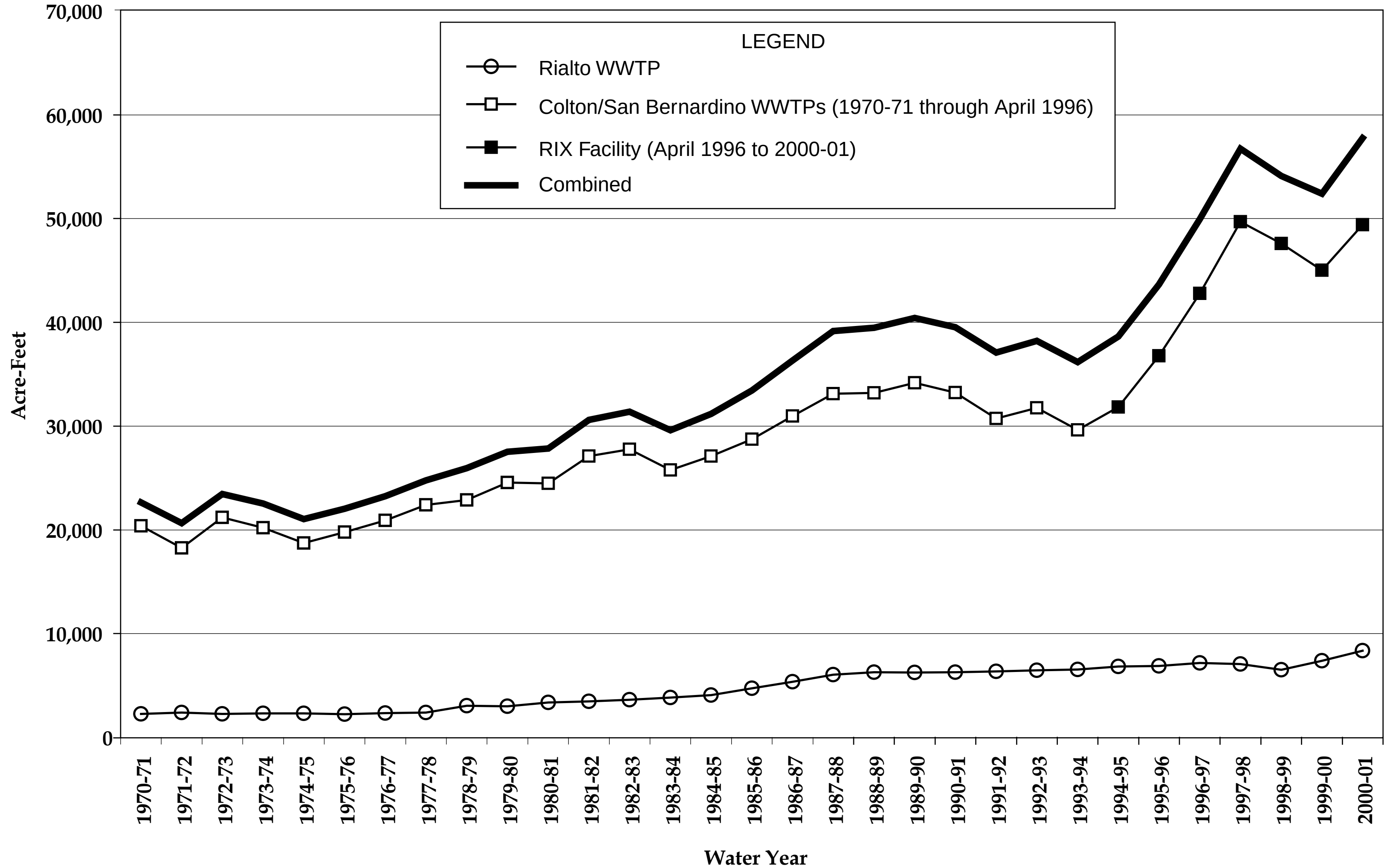


Figure 3.1-5. Wastewater Discharges to Santa Ana River above Riverside Narrows, WY 1970-71 through WY 2000-01

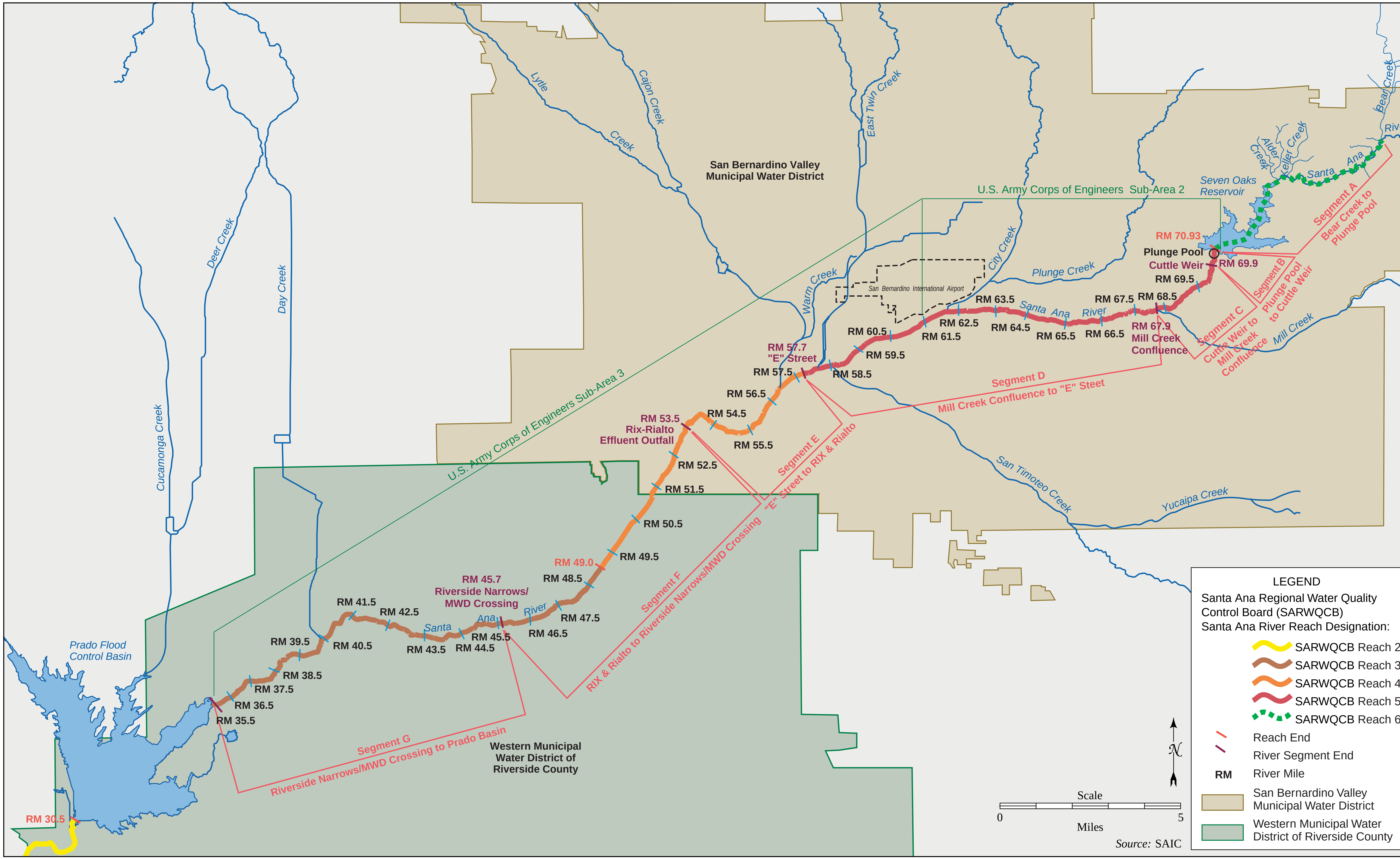


Figure 3.1-6. Santa Ana River, Tributaries, Reaches, and Segment Indicators

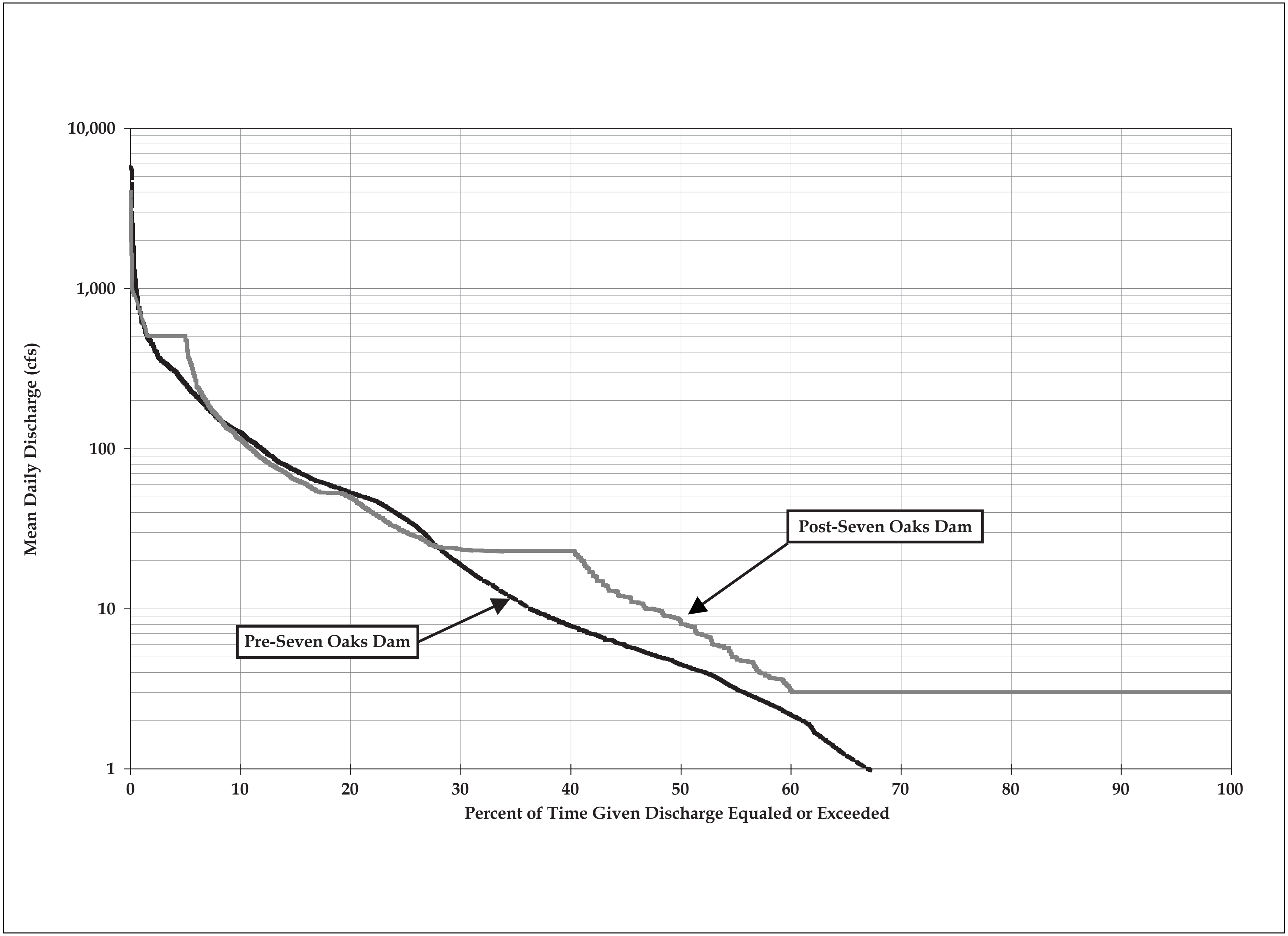


Figure 3.1-7. Probability of Daily Discharge for SAR Segment B, above Cuttle Weir, WY 1966-67 through WY 1999-2000

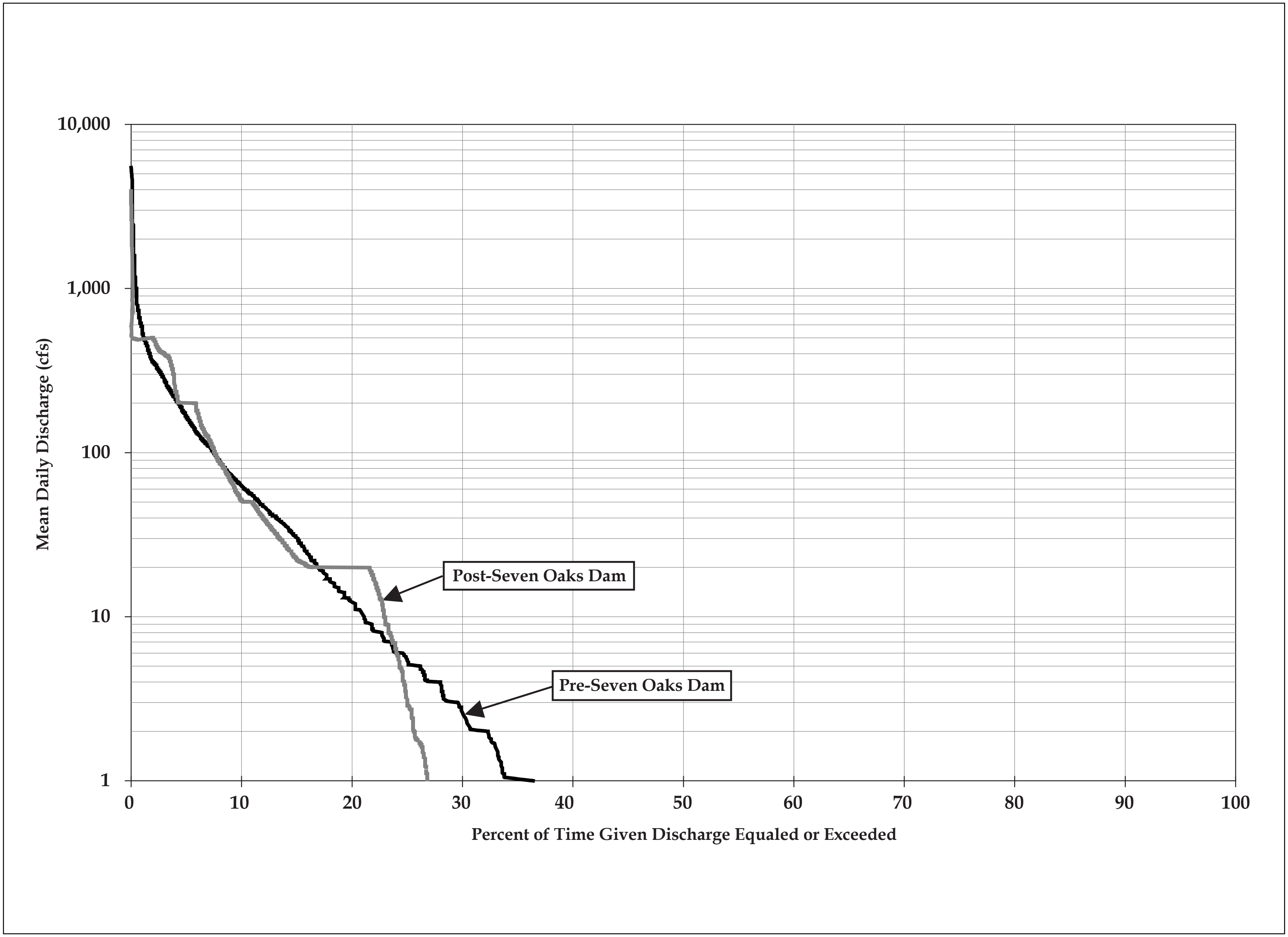


Figure 3.1-8. Probability of Daily Discharge for SAR Segment C, below Cuttle Weir, WY 1966-67 through WY 1999-2000

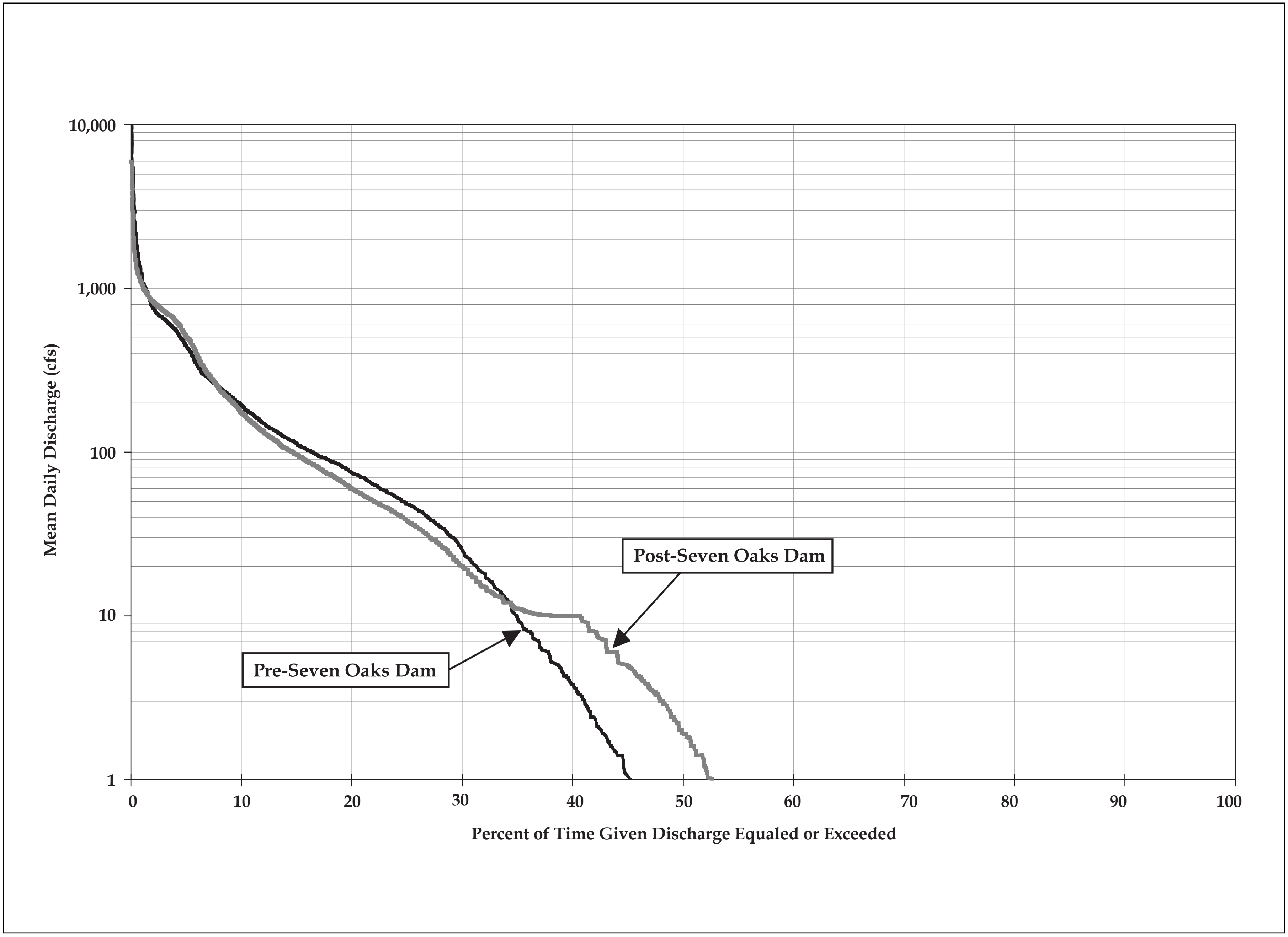


Figure 3.1-9. Probability of Daily Discharge for SAR Segment D, below Mill Creek, WY 1966-67 through WY 1999-2000

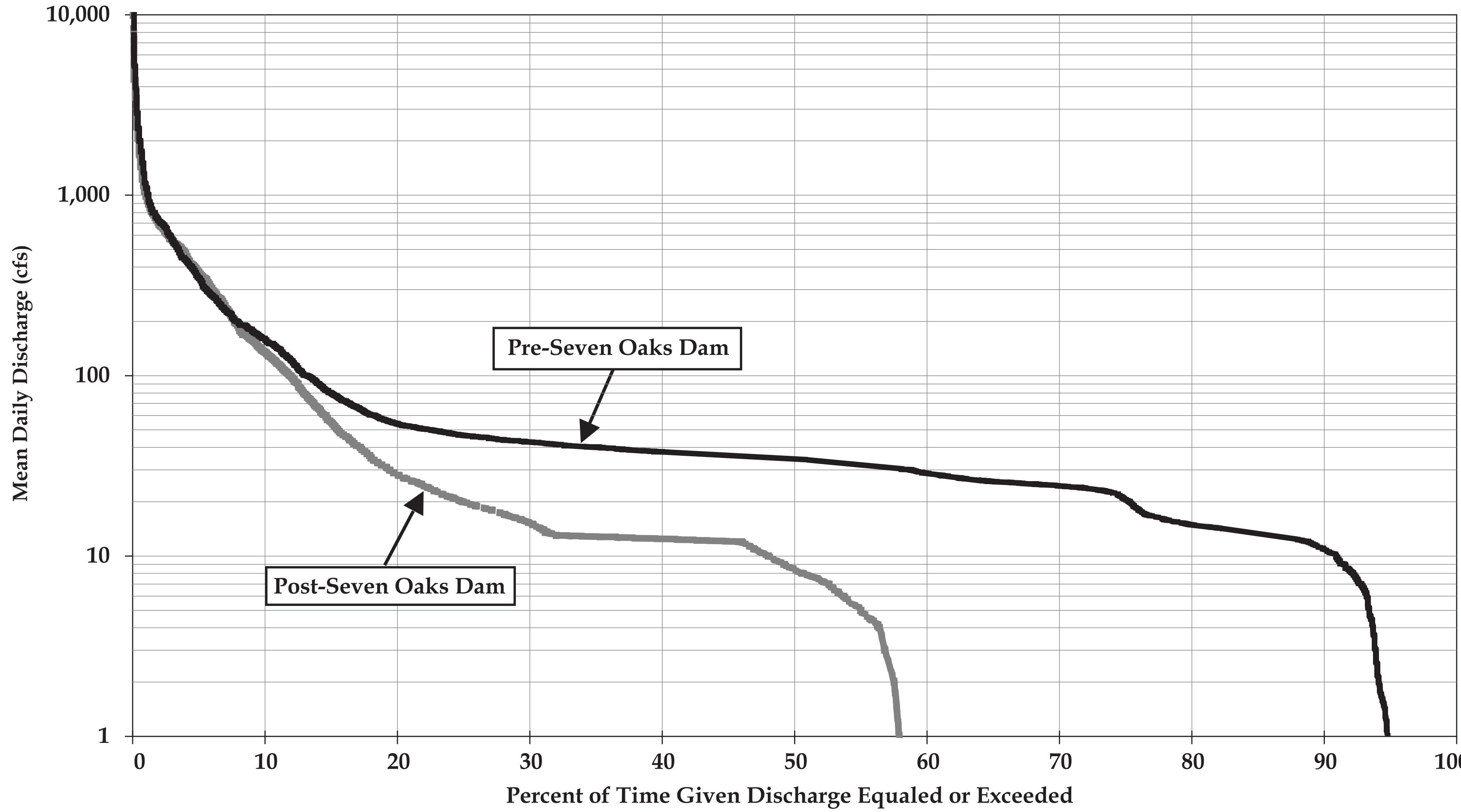


Figure 3.1-10. Probability of Daily Discharge for SAR Segment E, below "E" Street Gage, WY 1966-67 through WY 1999-2000

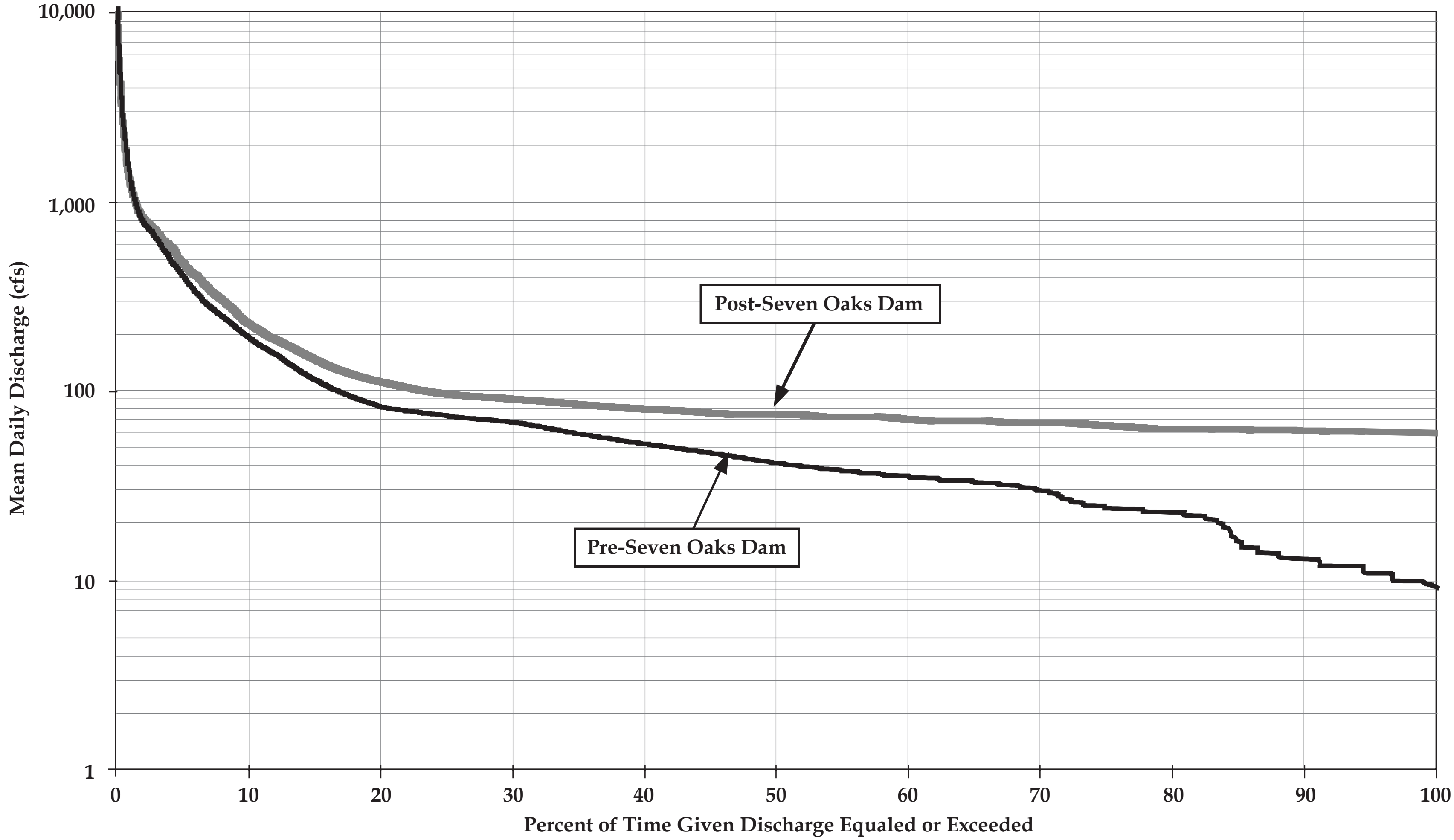


Figure 3.1-11. Probability of Daily Discharge for SAR Segment F, below RIX and Rialto Effluent Outfall, WY 1966-67 through WY 1999-2000

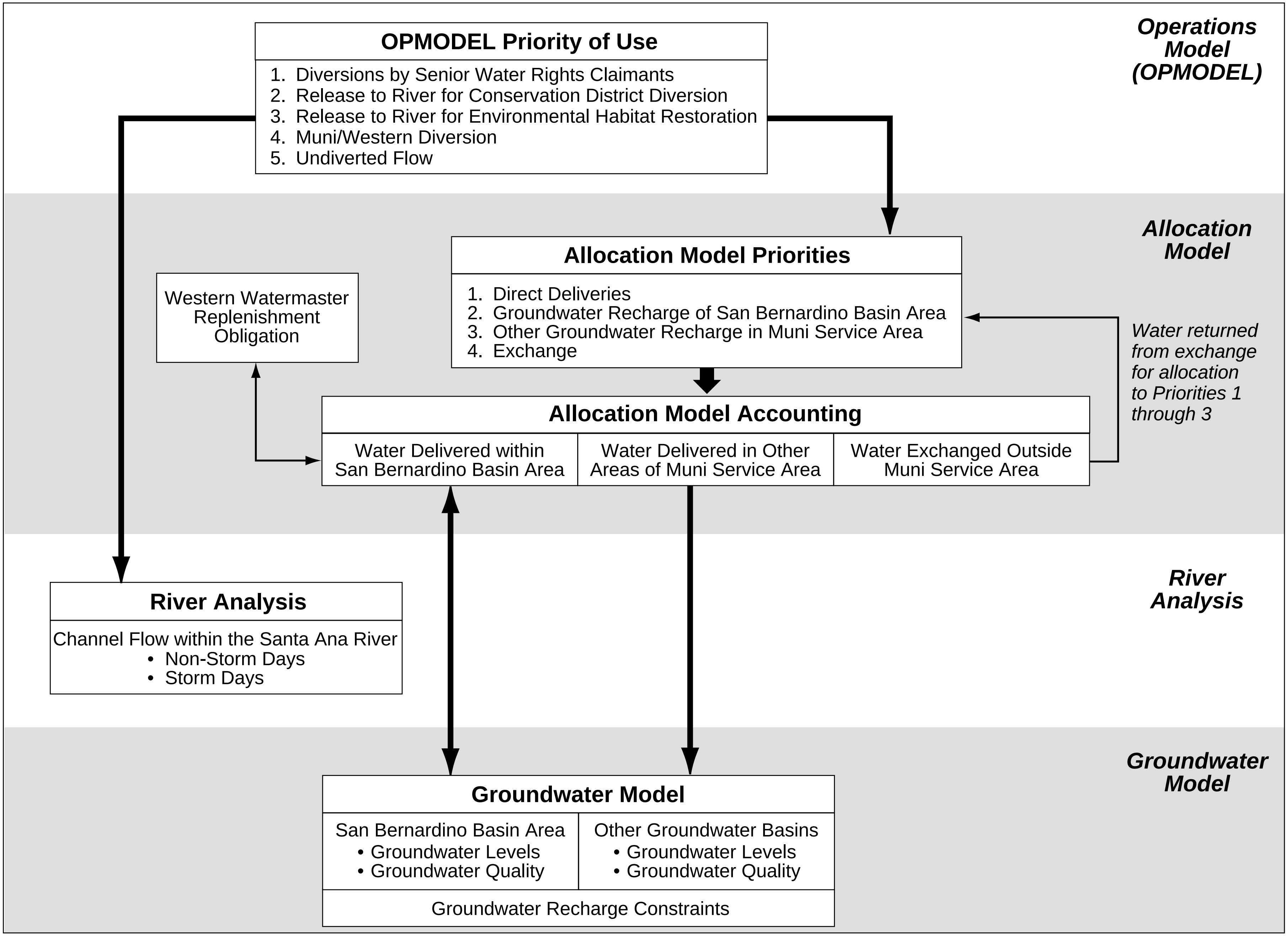


Figure 3.1-12. Modeling Tools Used in Hydrologic Analyses

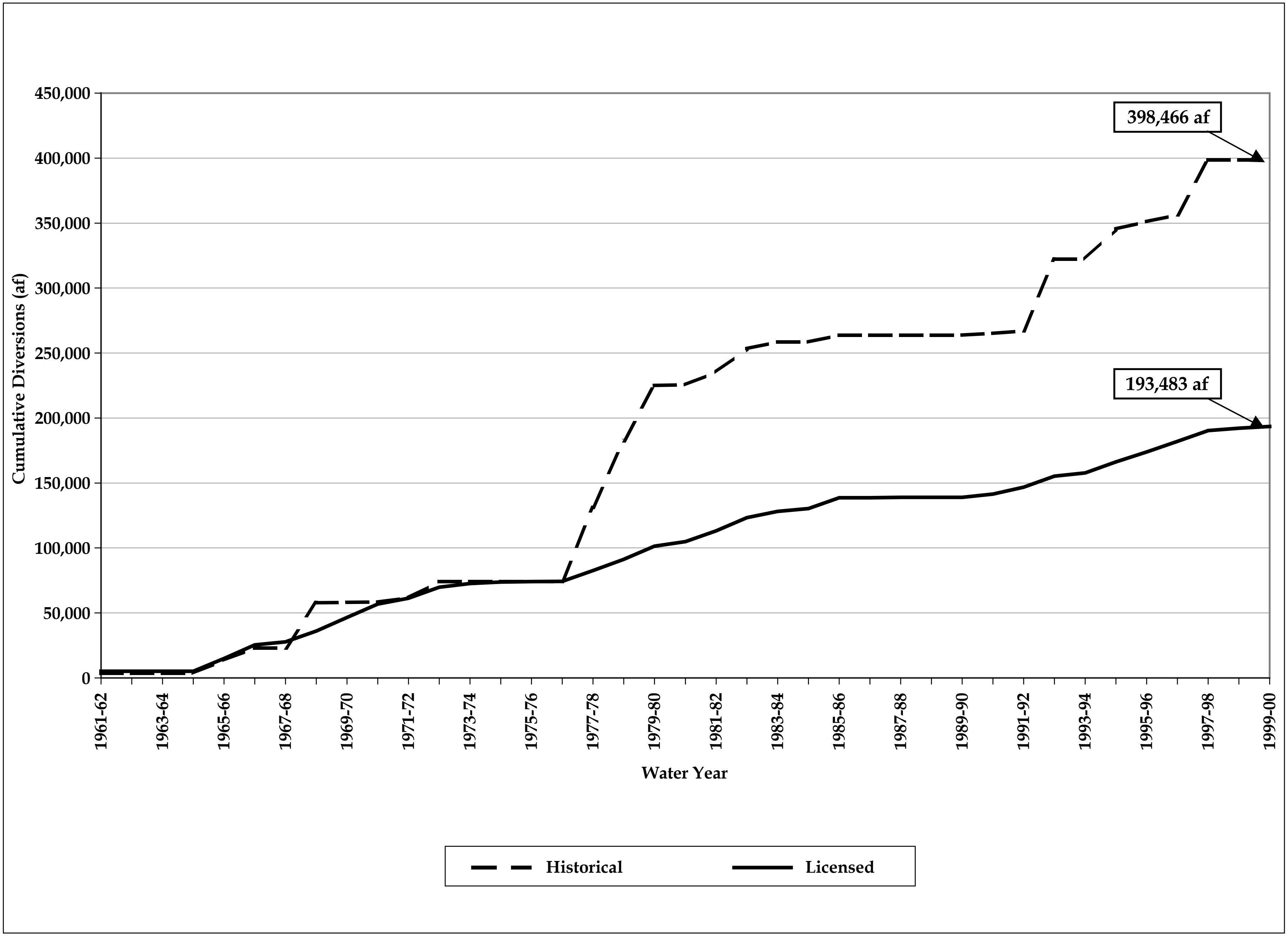
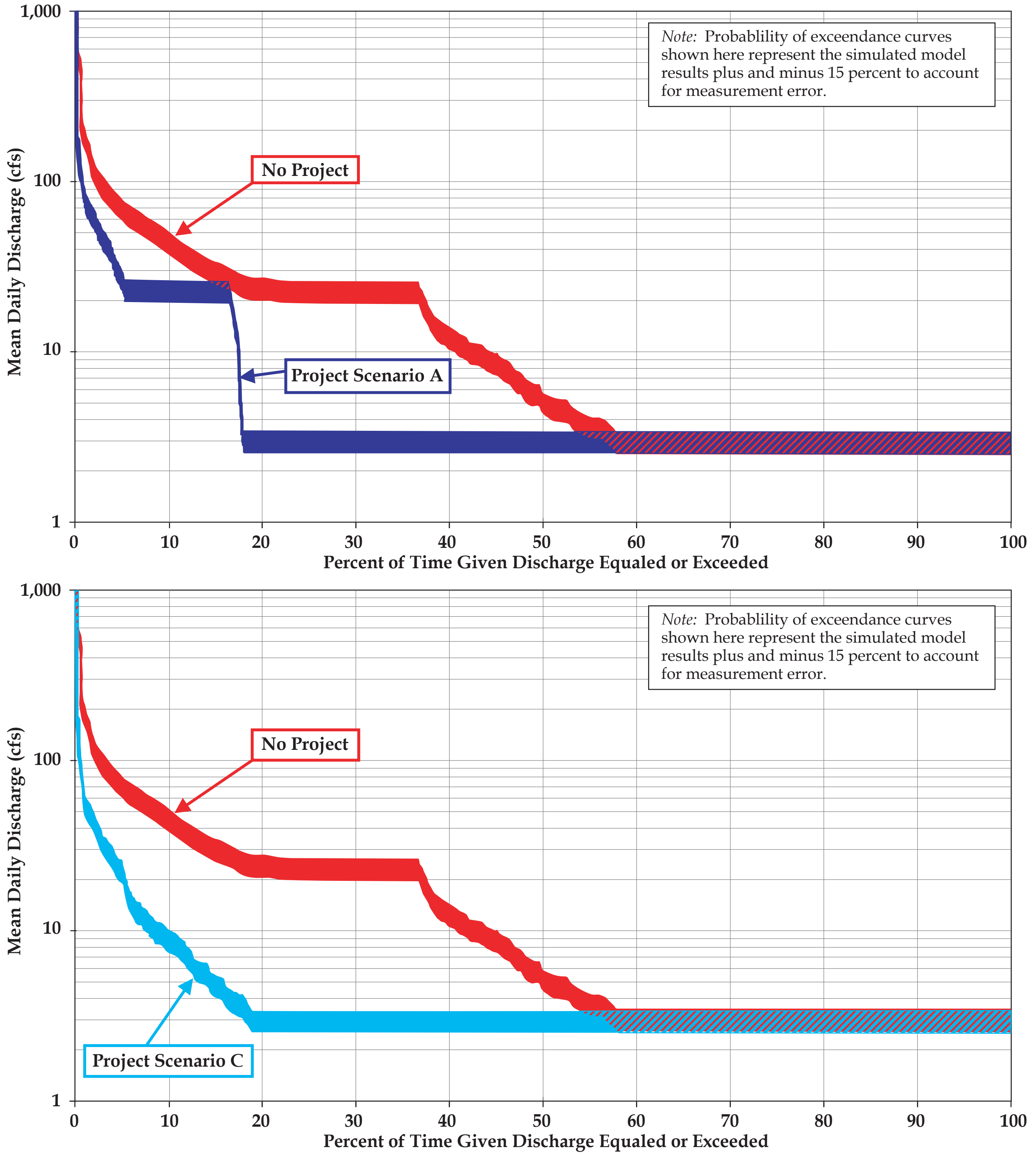


Figure 3.1-13. Cumulative Diversions by the Conservation District from the Santa Ana River, WY 1961-62 through 1999-2000



Phase III of the Plunge Pool Pipeline has a diversion rate of 1,500 cfs. Only Phase III affects this segment of the SAR, i.e., Scenarios A and C. These simulated probability of exceedance curves assume a repeat of hydrologic conditions for the WY 1966-67 through WY 1999-2000.

Figure 3.1-14. Probability of Exceedance (Non-Storm Days) for SAR Segment B, above Cuttle Weir

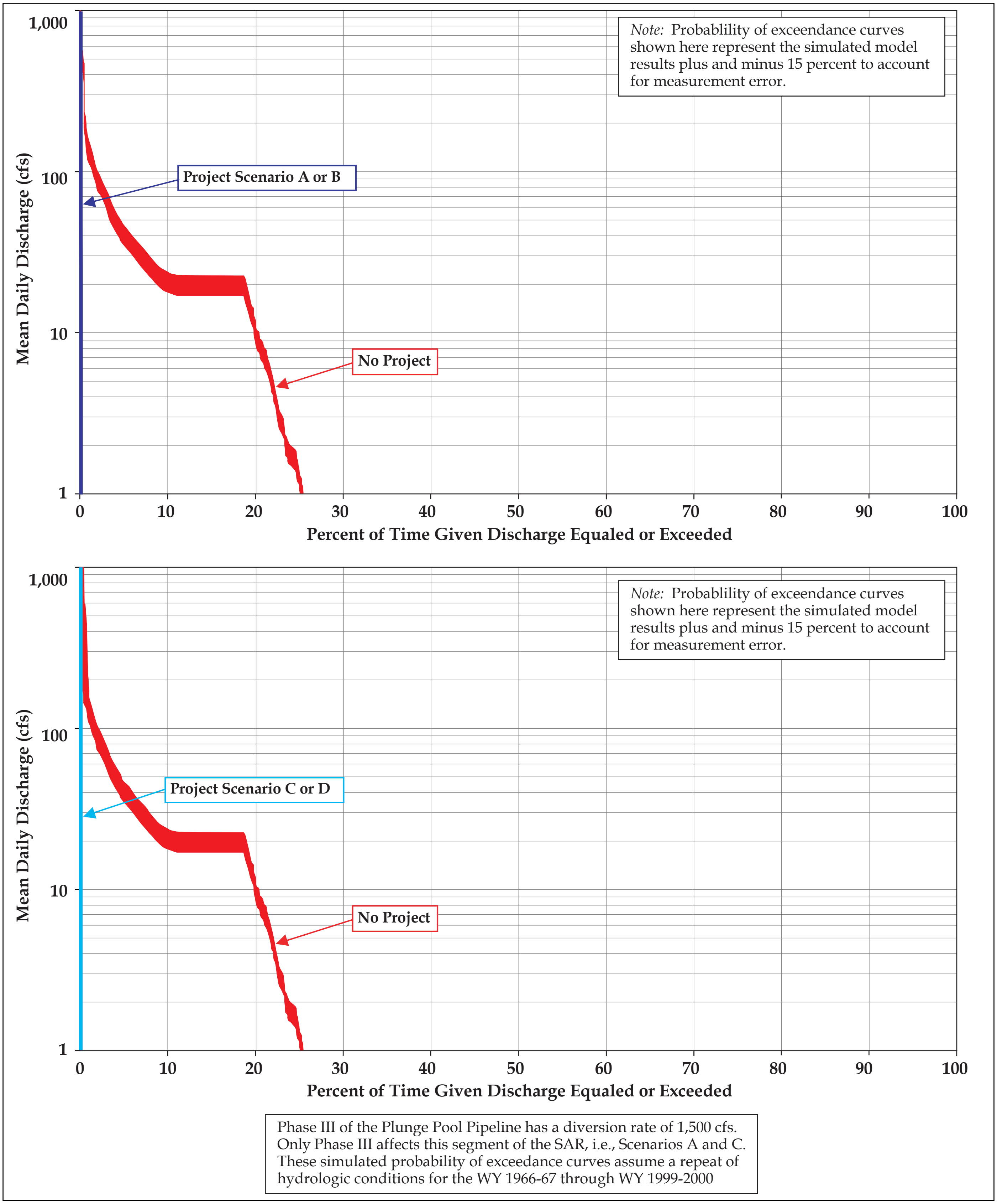


Figure 3.1-15. Probability of Exceedance (Non-Storm Days) for SAR Segment C, below Cuttle Weir

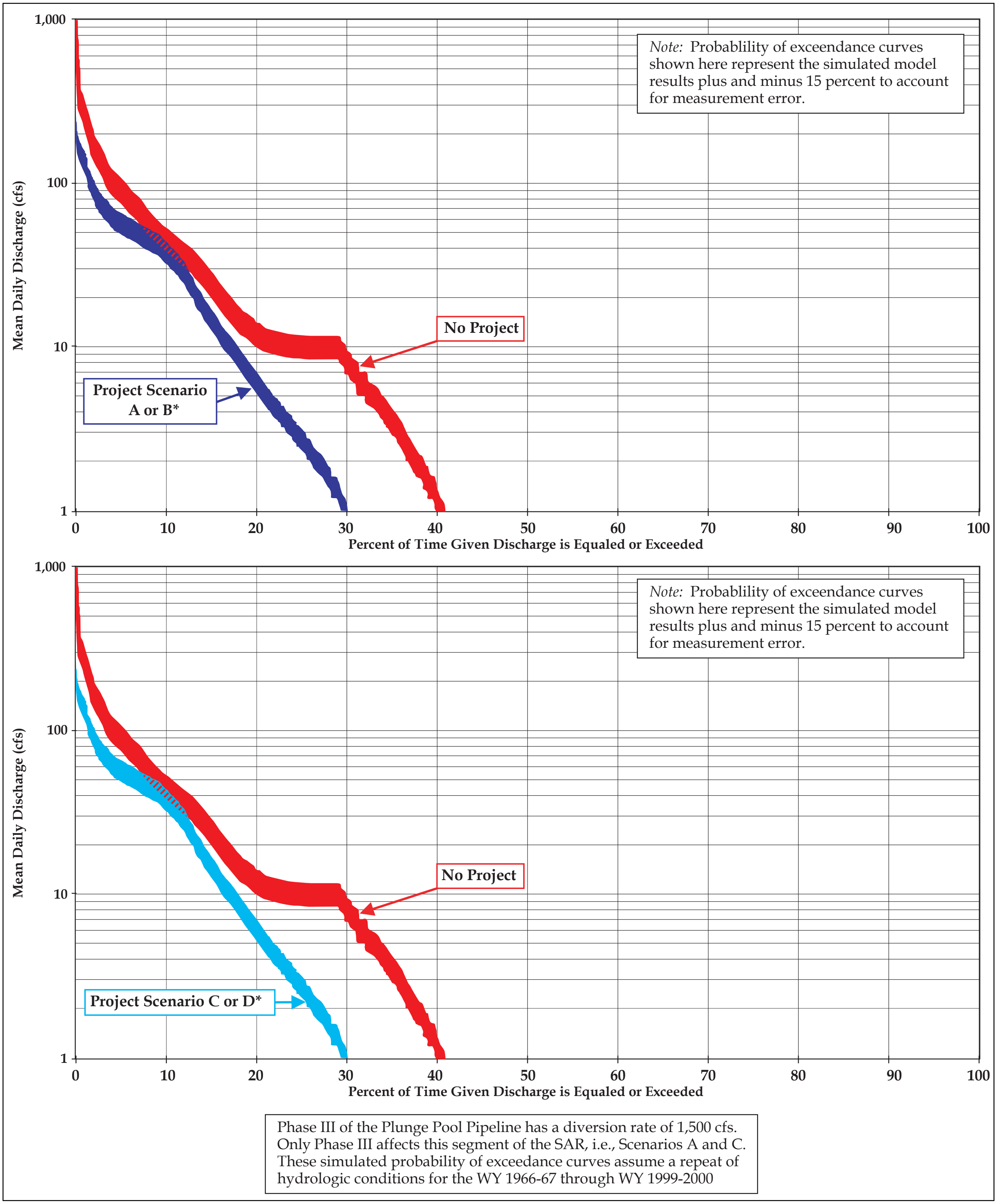


Figure 3.1-16. Probability of Exceedance (Non-Storm Days) for SAR Segment D, below Mill Creek Confluence

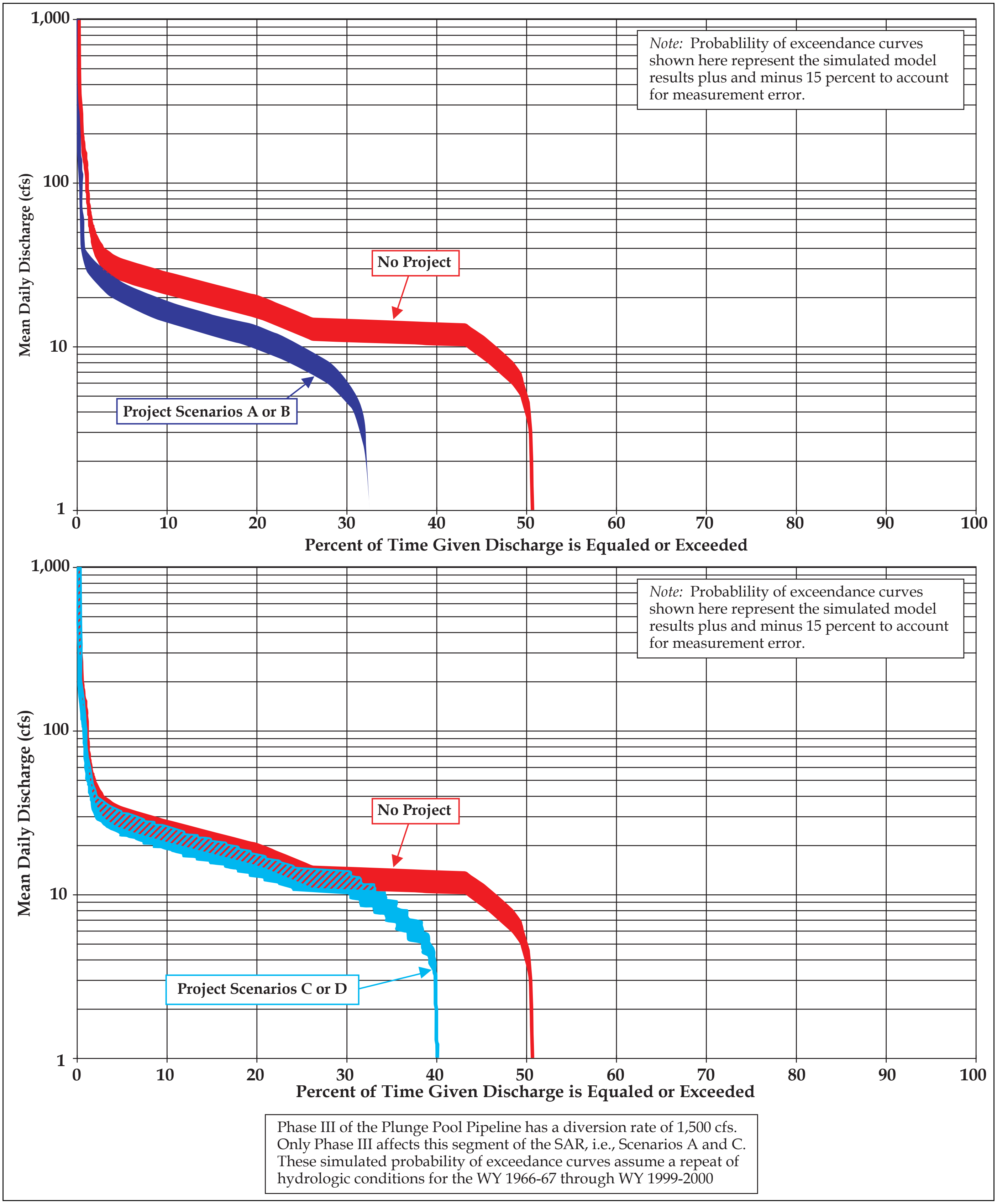


Figure 3.1-17. Probability of Exceedance (Non-Storm Days) for SAR Segment E, below "E" Street

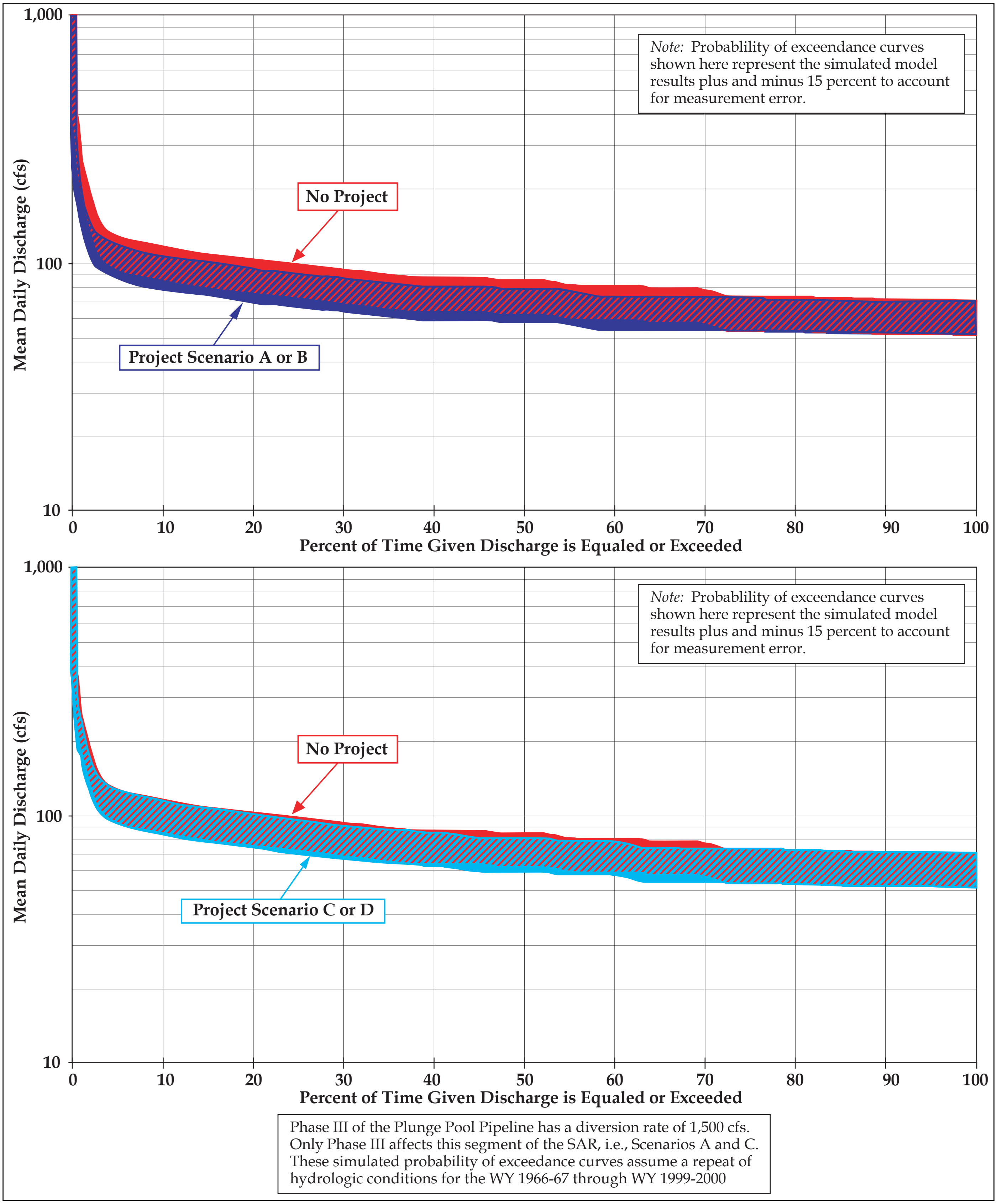


Figure 3.1-18. Probability of Exceedance (Non-Storm Days) for SAR Segment F, below RIX and Rialto Effluent Outfall

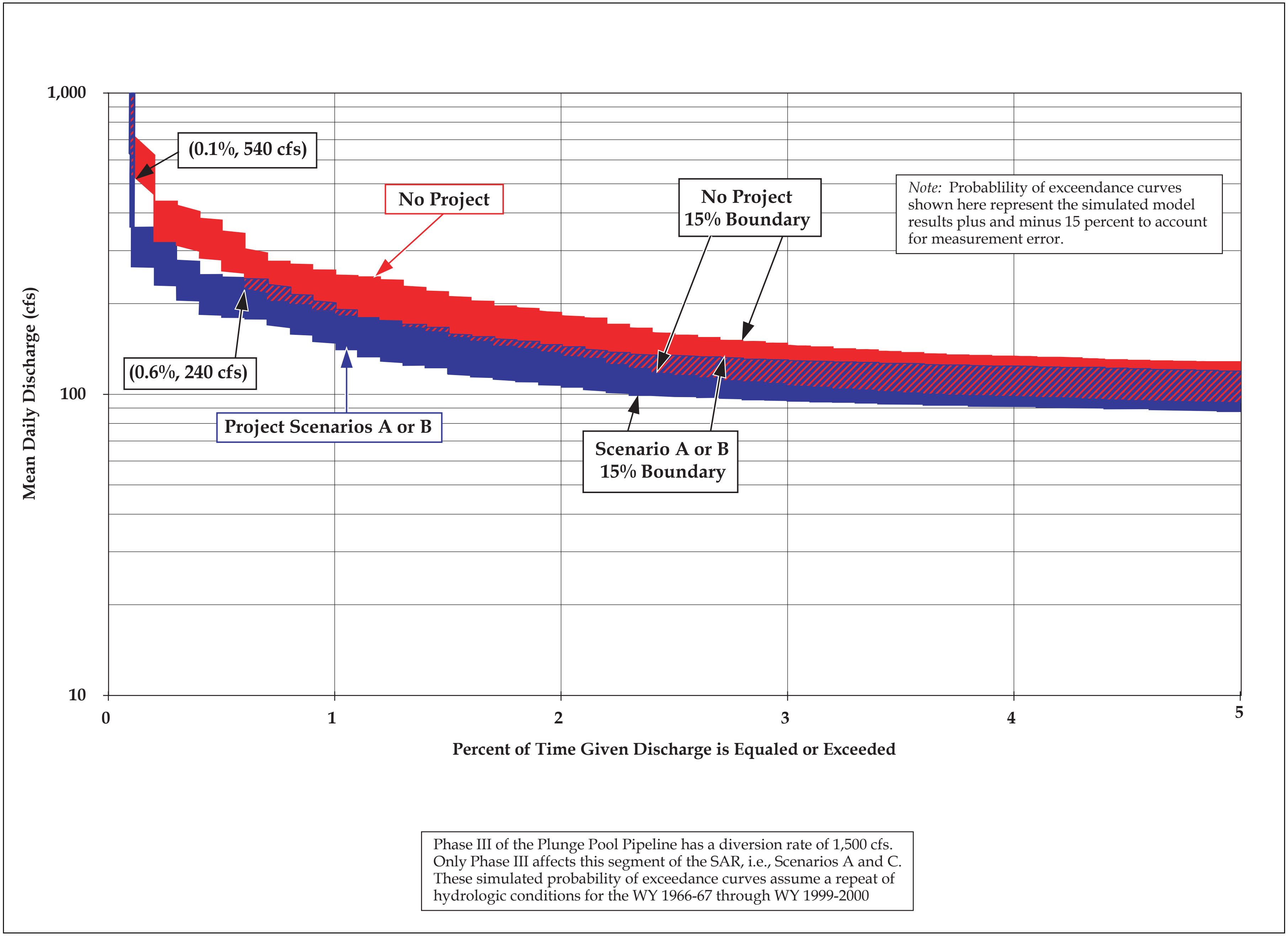


Figure 3.1-19. Detail of Probability of Exceedance (Non-Storm Days) for SAR Segment F, below RIX and Rialto Effluent Outfall

3.2 GROUNDWATER HYDROLOGY AND WATER QUALITY

This section addresses groundwater hydrology and groundwater quality and includes an assessment of groundwater basins, basin characteristics, and potential Project-related impacts to groundwater elevation and quality. It addresses changes in storage and other hydrologic conditions that could result from Project implementation. Topics discussed are closely related to topics in other sections, specifically: surface water hydrology (section 3.1), geology, soils, and mineral resources (section 3.4), and hazardous materials and groundwater contamination (section 3.12). Section 3.1 addresses Project impacts to surface water in terms of flows in the Santa Ana River (SAR) and water quality. Section 3.4 addresses the issues of liquefaction and subsidence, both of which can be related to groundwater recharge and extraction. Section 3.12 addresses hazardous materials including potential effects of the Project on existing groundwater contamination conditions. Appendix B (Groundwater Hydrology) provides additional detail regarding groundwater characteristics.

3.2.1 Environmental Setting

3.2.1.1 Regulatory and Institutional Setting

3.2.1.1.1 Judgments

The *Western* Judgment, entered simultaneously with the *Orange County* Judgment, settled rights within the upper SAR watershed in part to ensure that upstream water resources would be sufficient to meet the flow obligations of the *Orange County* Judgment. These two judgments are described initially in section 1.2 and in detail in sections 3.1.1.5.1 and 3.1.1.5.2.

3.2.1.1.2 Water Quality

The Santa Ana Regional Water Quality Control Board (SARWQCB) developed a Groundwater Management Plan as part of the SAR Basin Plan[1] (SARWQCB 1995). This Groundwater Management Plan attempts to balance natural recharge, artificial recharge, groundwater pumping, surface water use, imported water use, and wastewater reclamation to optimize groundwater quality and quantity. Additionally, the SARWQCB has identified beneficial uses[2] for the groundwater basins in the Project area. A number of beneficial uses are identified for the basins contained fully or partially within the Project area. The Project area includes the following groundwater basins: Bunker Hill and Lytle Creek (collectively referred to as the San Bernardino Basin Area [SBBA]), Rialto-Colton, Yucaipa, and San Timoteo. The

---

1 As identified in section 3.1, the State Water Resources Control Board (SWRCB) and the nine RWQCBs located throughout the state are responsible for the protection and, where possible, enhancement of the quality of California's waters. The SWRCB sets statewide policies and, together with the RWQCBs, implements state and federal laws and regulations. Each of the nine RWQCBs adopts a Water Quality Control Plan or Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the region's groundwater and surface waters, and local water quality conditions and concerns. The SAR Basin is located within the boundaries of the SARWQCB. The current Basin Plan for the SAR Basin was adopted in 1995, and amendments to this plan have recently been adopted.

2 Beneficial use refers to the manner in which water is used for the benefit of one or more activities or purposes. Examples of beneficial uses are: drinking water; irrigation water applied to croplands; recreation; and environmental resources such as fresh and saline aquatic species and their habitats. An application to the SWRCB for a water right must demonstrate that the water will be put to beneficial use. The RWQCB sets water quality standards for groundwater and surface water based on the water quality needed for local beneficial uses.

beneficial uses are municipal and domestic supply; agricultural supply; industrial service supply; and industrial process supply (SARWQCB 1995). The SARWQCB also developed water quality objectives (WQOs) for each of the groundwater basins in the Project area. The basin-specific WQOs are discussed in the water quality section for each basin below. A number of proposed amendments to the Basin Plan are under review, including modifications to WQOs (related to total dissolved solids [TDS] and nitrogen) for basins in the Project area. The specific proposed modifications are also discussed in the water quality section for each basin below.

Several factors influence and contribute to groundwater quality in the Project area including the following: recharge from adjacent mountains (San Bernardino and San Gabriel mountains); imported waters from the State Water Project (SWP) and the Colorado River; evapotranspiration rates; use of recycled wastewater; local geology (including the influence of faults); historical land uses and salinization; and contaminants introduced through human activities. In accordance with the Groundwater Management Plan, most municipal wastewater is exported from the upper basin, minimizing groundwater quality degradation and the localized high groundwater problems. The Groundwater Management Plan also includes goals for adequate recharge of groundwater basins with high quality water.

Constituents of concern are substances in water that pose a potential threat to the environment or human health. Constituents of concern in the upper SAR Basin include TDS, nitrates, perchlorate, radon, arsenic, and volatile organic compounds (VOCs). Table 3.2-1 provides a summary of the primary constituents of concern in groundwater basins in the Upper SAR basin. The highest levels of some of these substances are found in contaminant plumes within the SBBA and are addressed in section 3.12. Because groundwater plays a central role in the water supply for communities within the Upper SAR basin, the National Primary Drinking Water Regulations[3] (expressed as Maximum Contaminant Levels [MCLs]) and Secondary Drinking Water Regulations (termed primary and secondary drinking water standards) are described in Table 3.2-1.

The quality of imported water can affect groundwater quality since it is used to recharge groundwater basins within the Upper SAR basin, directly through groundwater recharge basins or indirectly through use and runoff. Water is imported into the Muni/Western service areas via SWP facilities and from the Colorado River via the Colorado River Aqueduct (CRA), the latter of which is owned and operated by The Metropolitan Water District of Southern California (Metropolitan). Imported water quality is discussed in more detail in section 3.1.1.4.5.

3 National Primary Drinking Water Regulations (generally referred to as Primary standards) are legally enforceable standards set by the Environmental Protection Agency (EPA) that apply to public water systems. Primary Standards are expressed as MCLs or Maximum Contaminant Levels. An MCL is the maximum permissible level of a contaminant in drinking water, which is delivered to any user of a public water system. National Secondary Drinking Water Regulations (generally referred to as Secondary standards) are non-enforceable guidelines also set by the EPA regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

Table 3.2-1. Primary Constituents of Concern in Groundwater Basins in the Upper SAR Basin

Constituent of Concern	*MCL*[1]	*Secondary Standard*	*Source*	*Health Effect*
Total Dissolved Solids (TDS)	--	500 mg/L	Recharge of saline water from storm flows, urban runoff, and imported water. Past agricultural land uses.	No known health effect, however, some of the components that comprise TDS may have health effects.
Nitrates	10 mg/L (reported as nitrogen)	--	Similar to TDS, areas with significant irrigated land use or dairy waste disposal histories typically overlie groundwater with elevated nitrate concentrations (SARWQCB 1995).	Interferes with oxygen carrying capacity in infants. With long-term exposure, nitrates may cause diuresis, starchy deposits, and spleen hemorrhaging (EPA 2003).
Perchlorate	N/A[2]	N/A[2]	Associated with industrial applications, but primarily with the manufacture of rocket fuel and other explosives. Mobile in soil and groundwater environments and can persist for many decades under typical conditions, because of its resistance to reaction with other available constituents.	Interferes with the function of the thyroid gland and the production of hormones necessary for normal human development. Can cause brain damage in fetuses and a potentially fatal form of anemia in adults. Effects of chronic exposures to lower levels are not known (Borkovich 2002).
Arsenic	0.05 mg/L[3]	--	Erosion of natural deposits, runoff from orchards, runoff from glass and electronics production wastes.	Association between bladder and lung cancers and chronic arsenic exposure (NRC 2001). Increasing evidence that chronic exposure may be associated with health effects other than cancer (NRC 2001).
Radon	300 pCi/L[4]	--	Erosion of natural deposits.	Increased risk of cancer.
VOLATILE ORGANIC COMPOUNDS (VOCs)[5]				
Methyl tertiary butyl ether (MTBE)	13 µg/L	--	Gasoline additive used to improve air quality by reducing emissions and increasing octane ratings.	Increases risk of cancer (Spellman and Drinan 2000). The DHS considers MTBE a carcinogen.
Benzene, trichloroethylene (TCE)	5 µg /L	--	Was commonly used for metal degreasing and was also used as a food extractant.	Increases the risk of cancer (Spellman and Drinan 2000).
Tetrachloroethylene (PCE)	5 µg /L	--	Commonly used in the dry-cleaning industry.	Increases the risk of cancer (Spellman and Drinan 2000).

Notes: mg/L = milligrams per liter; µg/L = micrograms per liter

1. An MCL (Maximum Contaminant Level) is the maximum permissible level of a contaminant in drinking water, which is delivered to any user of a public water system.
2. Both the federal and state governments require monitoring for perchlorate and the Office of Environmental Health Hazard Assessment (OEHHA) released a final Public Health Goal for perchlorate of 6 parts per billion (ppb) (OEHHA 2004).
3. The current drinking water MCL for arsenic is 0.05 mg/L, but this standard will be lowered in the year 2006 to 0.001 mg/L (USEPA 2002).
4. Proposed. (US EPA 2000).
5. VOCs are a broad category of synthetic chemicals such as degreasing agents, glues, dyes, paint thinners, and some pesticides that readily vaporize at room temperature.

3.2.1.2 Project Construction Areas

3.2.1.2.1 Seven Oaks Dam and Reservoir

The Seven Oaks Dam and Reservoir area is located just to the northeast of the SBBA. There are no defined groundwater basins in this area; however, alluvium deposits underlie the SAR in Warm Springs Canyon, and two unnamed drainages just to the north.

3.2.1.2.2 Santa Ana River Construction Area

The SAR Construction Area is located within the Bunker Hill Basin close to its northeastern boundary. The Bunker Hill Basin (part of the SBBA) is described in detail in section 3.2.1.3.

3.2.1.2.3 Devil Canyon Construction Area

The Devil Canyon Construction Area is also located within the Bunker Hill Basin close to its north boundary.

3.2.1.2.4 Lytle Creek Construction Area

The Lytle Creek Construction Area is located in the central section of the Lytle Creek Basin (part of the SBBA) and is described in detail in section 3.2.1.3.

3.2.1.3 Project Operations Areas

Groundwater Basins

This section describes the groundwater basins that could be affected by Project operations. Most Project-related activities would occur in the SBBA, which is comprised of the Bunker Hill Basin and Lytle Creek Basin. However, limited Project-related activities would also occur in the Rialto–Colton, San Timoteo, and Yucaipa basins. Boundaries of these basins are shown on Figure 3.2-1. Table 3.2-2 summarizes the storage capacity and surface area of these basins.

Table 3.2-2. Summary of Groundwater Storage Capacities and Basin Surface Area

Basin	*Storage Capacity (af)*	*Surface Area (acres)*
SBBA	5,976,000	90,000
Rialto–Colton	213,000	30,100
Yucaipa	783,000 – 1,230,000	25,300
San Timoteo	2,010,000	73,100
Source: DWR 2003b.		

Groundwater Recharge Facilities

The Project includes the use of numerous existing groundwater recharge facilities (spreading grounds or spreading basins) located above the following groundwater basins: SBBA, Rialto–Colton, and Yucaipa. The location of these facilities is shown on Figure 3.2-1, and selected characteristics are summarized in Table 3.2-3. Existing turnouts serve each recharge facility with the exception of the Cactus Spreading and Flood Control Basins, which would be served by the proposed Cactus Basins Pipeline.

Table 3.2-3. Groundwater Recharge Facilities

Facility Name	*Owner or Operator*	*Conveyance Used to Serve Facility*	*Turnout Name & Capacity (cfs)*	Recharge Facility Characteristics [a]: *Active Recharge Facility Area* [b] *(acres)*	*Percolation Rate* [c] *(ft/day)*	*Monthly Capacity (af)*	*Absorptive Capacity used in Allocation Analysis* [d] *(cfs)*	*Groundwater Basin (and sub-basin) Recharged* [e]
Santa Ana River Spreading Grounds	Conservation District	Foothill Pipeline	Santa Ana Low Flow (288)	60 [g]	1.5	3,060	50 [h]	SBBA (Bunker Hill)
Devil Canyon and Sweetwater Basins	SBCFCD [f]	Foothill Pipeline	Sweetwater (37)	30	1.5	1,350	23	SBBA (Bunker Hill)
Lytle Basins	Lytle Creek Water Conservation Association	Fontana Power Plant	Constructed drainage channel	Variable	1.5	Variable	30 [i]	SBBA (Lytle Creek)
City Creek Spreading Grounds	SBCFCD	Foothill Pipeline	City Creek (60)	75	1.5	3,375	57	SBBA (Bunker Hill)
Patton Basin	SBCFCD	Foothill Pipeline	Patton (12)	3	0.3	27	1	SBBA (Bunker Hill)
Waterman Basins	SBCFCD	Foothill Pipeline	Waterman (135)	120	0.5	810	30 [j]	SBBA (Bunker Hill)
East Twin Creek Spreading Grounds	SBCFCD	Foothill Pipeline	Waterman (135)	32	1.5	225	24 [k]	SBBA (Bunker Hill)
Badger Basins	SBCFCD	Foothill Pipeline	Sweetwater (22)	15	0.5	225	4	SBBA (Bunker Hill)
Mill Creek Spreading Grounds	SBVWCD	Greenspot Pipeline	Mill Creek Spreading (50)	26	1.5	1,170	20	SBBA (Bunker Hill)

Table 3.2-3. Groundwater Recharge Facilities (continued)

Facility Name	*Owner or Operator*	*Conveyance Used to Serve Facility* / *Turnout Name & Capacity (cfs)*	RECHARGE FACILITY CHARACTERISTICS [a] *Active Recharge Facility Area* [b] *(acres)*	*Percolation Rate* [c] *(ft/day)*	*Monthly Capacity (af)*	*Absorptive Capacity used in Allocation Analysis* [d] *(cfs)*	*Groundwater Basin (and sub-basin) Recharged* [e]
Cactus Spreading and Flood Control Basins	SBCFCD	San Gabriel Valley Municipal Water District Lytle Pipeline / Lower Lytle Creek (55)	46	1.5	2,070	35	Rialto-Colton
Wilson Basins	SBCFCD	East Branch Extension / Wilson Basins (30)	12	1	360	6	Yucaipa Basin
Garden Air Creek	Muni	East Branch Extension / Garden Air Creek (16)	n/a	n/a	n/a	16	San Timoteo Basin

Notes:

a. Values are from tabulation on map contained in Water Right Application by Muni and Western to appropriate water from the SAR or by engineering evaluation of spreading grounds.

b. Recharge facility area is the geographical extent of each basin that can be inundated for recharge.

c. Estimated percolation rate. This is the estimated rate at which water can percolate into the ground through the basin, expressed in feet per day. The values used have generally been computed from the annual recharge capacity tabulated on the application map. These rates are typically about one-half of the percolation rates presented by the United States Geological Survey (USGS 1972). The use of the smaller percolation rates is reasonable in that this Project would involve longer-term percolation rates that are typically smaller than short-term rates.

d. The estimated absorptive capacity for each site is computed by multiplying the basin area by the estimated percolation rate. Results are expressed in cubic feet per second (cfs) and used in the Allocation Model in acre-feet per month.

e. Note that there may be flow out of the sub-basin or basin identified. For example, a report by Geoscience Support Services, Inc. (1992) estimated that only 36 percent of the water recharged in the upper Lytle Creek area remains in the Lytle Creek sub-basin, while most of it flows to the Rialto–Colton Basin.

f. San Bernardino County Flood Control District.

g. Recharge facility area of 60 acres used, based on analysis of 1995 aerial photographs. However, the application map shows an area of 448 acres, which includes the borrow pit area for Seven Oaks Dam, possibly usable for recharge.

h Santa Ana River Spreading Grounds were assigned 50 cfs because of shared use of this facility.

i. Available absorptive capacity of Lytle Basins is assigned 30 cfs per month for use in the Allocation Model because of groundwater recharge targets; however, it has a higher estimated absorptive capacity of 97 cfs.

j. Available absorptive capacity for the Waterman Spreading Ground was assigned 30 cfs per month in the Allocation Model based on historical recharge rates. This would require use of 54 acres of the total site of 165 acres.

k. Available absorptive capacity for the East Twin Creek Spreading Grounds was assigned 24 cfs per month in the Allocation Model based on historical recharge rates. This would require use of 32 acres of the total site of 144 acres.

3.2.1.3.1 San Bernardino Basin Area

LOCATION

The San Bernardino Basin Area (SBBA) plays a central role in the water supply for communities within the Muni/Western service areas. The SBBA has a surface area of approximately 90,000 acres and lies between the San Andreas and San Jacinto faults, as shown in Figure 3.2-2. The basin is bordered on the northwest by the San Gabriel Mountains; on the northeast by the San Bernardino Mountains; on the east by the Banning fault and Crafton Hills; and on the south by a low, east-facing escarpment of the San Jacinto fault and the San Timoteo Badlands. Alluvial fans extend from the base of the mountains and hills that surround the valley and coalesce to form a broad, sloping alluvial plain in the central part of the valley. The SBBA traditionally refers to two groundwater basins: Bunker Hill and Lytle Creek, as shown on Figure 3.2-1. The Bunker Hill Basin is further divided into sub-areas, including the Cajon, City Creek, Devil Canyon, Divide, Lytle Creek, Mill Creek, Pressure Zone, Redlands, and Reservoir sub-areas (see Figure 3.2-3). These sub-areas are described collectively in the following section with the exception of the Pressure Zone, which is described in more detail because of high groundwater levels that have historically been of concern in this sub-area. The Lytle Creek Basin is also described in more detail because of the different hydrologic characteristics of this basin.

GEOLOGY AND WATER-BEARING FORMATIONS

The primary water-bearing formations of the SBBA are the unconsolidated sediments of older and younger alluvium and river channel material deposited and reworked by the SAR and tributaries such as Lytle Creek and Cajon Creek (Dutcher and Garrett 1963). Near the mountain front, the unconsolidated deposits tend to be coarse-grained and poorly sorted, becoming finer-grained and better sorted downstream. The older alluvium consists of continental, fluvial deposits, ranging in thickness from some tens of feet to more than 800 ft. The younger alluvium is about 100 ft thick, composed mainly of floodplain deposits. The relatively recent river channel deposits are less than 100 ft thick but are among the most permeable sediments in the SBBA and contribute to large seepage losses from streams (Danskin et al. N.D.).

Dutcher and Garrett (1963) divided the SBBA alluvial sediments into upper, middle, and lower confining members and upper, middle, and lower water-bearing members. However, the aquifer system of the SBBA is generally unconfined with water moving vertically between the multiple water-bearing layers. The confining members are more accurately described as very leaky aquitards[4] of finer grained sediments.

The upper and middle water-bearing members provide most of the water to municipal and agricultural wells. In the central part of the SBBA, these areas are separated by as much as 300 ft of interbedded silt, clay, and sand (the middle confining member). This middle confining member produces confined conditions over the central part of the basin (referred to locally as the "confined area"), but thins and becomes less effective toward the margins of the basin

4 An aquitard is a low-permeability sedimentary unit that can store groundwater and also transmit it slowly from one aquifer to another (Fetter 1988). An aquitard is generally considered to be a barrier or partial barrier to movement of groundwater because water tends to move substantially slower through aquitards than aquifers.

(Dutcher and Garrett 1963). Although the middle confining member is not as permeable as the adjacent water-bearing zones, this unit consists primarily of continuous sand and silt (not silt and clay as is found in most aquitards) and there is water production from this zone in many wells (Danskin et al. N.D.). The lower confining and lower water-bearing member are not typically penetrated by most production wells and play a smaller role in the valley-fill aquifer, mainly due to deeper depth and generally lower permeability.

Three exceptions to the general presence of the leaky stratified system in the SBBA occur in the southwestern, southern, and eastern portions of the basin. The three separate water-bearing zones are not identifiable in the southwestern part of the basin, between the San Jacinto and Loma Linda faults, i.e., the Lytle Creek Basin (see Figures 3.2-2 and 3.2-3), but are generally recognizable from the Loma Linda Fault eastward for approximately 4 miles. In part of a former marshland in the south part of the basin, between Warm Creek and the SAR, thick clay sequences in the Holocene younger alluvium result in confined to semi-confined aquifer conditions in the upper 50 to 100 ft of saturated materials. This area containing the upper confining member is referred to as the "Pressure Zone" (see Figure 3.2-3). The upper aquitard is also absent adjacent to the San Bernardino Mountains (i.e., the "forebay"), allowing groundwater recharge into the basin from mountain stream runoff.

GROUNDWATER FLOW

The areal pattern of groundwater flow, from areas of recharge along the base of the mountains, to areas of discharge where the SAR crosses the San Jacinto Fault, has historically remained relatively unchanged. Groundwater elevation contours shown in Figure 3.2-4 illustrate this flow regime in the SBBA. However, vertical groundwater movement has changed through time due to groundwater extraction and artificial recharge. Groundwater pumping has occurred from increasingly deeper depths, altering the natural vertical movement of groundwater by progressively draining deeper zones of groundwater (Danskin et al. N.D.).

RECHARGE AND DISCHARGE

Percolation from gaged streams (such as the SAR, Lytle Creek, Cajon Creek, Devil Canyon Creek, East Twin Creek, Warm Creek, City Creek, Plunge Creek, and Mill Creek) is the major source of recharge in the SBBA. Recharge occurs both in the stream channels and in nearby artificial recharge basins. As a result of the highly permeable river-channel deposits and the artificial recharge operations, nearly all of the flow in the smaller gaged streams (Devil Canyon, Waterman, East Twin, Plunge, and San Timoteo creeks) is recharged to the aquifer close to the mountain front. During floods, the major streams (SAR, Mill Creek, and Lytle Creek) transmit large volumes of water over a short period, resulting in some surface water exiting the basin without contributing to groundwater recharge. Percolation from un-gaged streams and other runoff sources (i.e., streams that do not have USGS gages, or runoff from urban areas that is not gaged) is less important than runoff via gaged streams since the total quantity of this runoff is about one-tenth that of gaged runoff.

Recharge to the SBBA also results from underflow (subsurface inflow), direct infiltration of precipitation, return flow, infiltration from underground sanitary sewer lines and storm drains, and artificial recharge of imported water. Subsurface inflow to the SBBA occurs (1) across the Crafton Fault and through the poorly transmissive materials comprising the Badlands,

(2) across a small section of unconsolidated deposits north of the Crafton Hills, and (3) through materials beneath the Cajon Creek and Lytle Creek channels. Underflow across the Crafton Fault and through the Badlands was defined by Dutcher and Fenzel (1972) to be approximately 6,000 acre-ft per year (afy) for the period 1945 to 1965, and underflow beneath the creek channels was estimated by the DWR (1970b) to be approximately 3,300 afy for the period 1935 to 1960. With the exception of unusually wet years, recharge from direct precipitation on the valley floor is minimal. An additional source of recharge is that derived from return flow of water pumped from and used locally within the SBBA. Hardt and Hutchinson (1980) estimated return flow to be 30 percent of total extractions, except for wells that export groundwater directly out of the San Bernardino area. Artificial recharge of imported water to the SBBA began in 1972. Because of the extremely permeable sand and gravel deposits, maximum instantaneous recharge rates are high. Based on a recharge efficiency rate of 95 percent, the total quantity of artificial recharge in the basin averaged about 7,400 afy from 1972 to 1992. Because of the size of several of the recharge basins and exceptionally permeable material, a larger quantity of water could be imported and recharged along the base of the San Bernardino Mountains if necessary (i.e., recharge basin capacity and infiltration rates are not currently limiting the amount of imported water recharged).

Groundwater discharge from the SBBA occurs from (1) rising water, (2) subsurface outflow, and (3) groundwater extractions. Rising water primarily occurs in the lower reaches of Warm Creek, when nearby groundwater rises above the level of the channel bottom. The quantity of groundwater discharge into the creek for the period 1945 to 1992 was determined to be highly variable, with a maximum discharge exceeding 40,000 afy and a minimum discharge of zero for 16 consecutive years, from 1963 to 1978 (Danskin et al. N.D.). Subsurface outflow occurs across the San Jacinto Fault and Barrier E at two locations, including in the vicinity of the SAR at the Colton Narrows, and where Lytle Creek emerges from the San Gabriel Mountains, north of Barrier J (see Figure 3.2-2). In the vicinity of the SAR at the Colton Narrows, subsurface outflow occurs in the younger alluvium. For the period 1936 to 1949, subsurface outflow in this area was estimated to range from 14,300 to 23,700 afy (Dutcher and Garrett 1963). Subsurface outflow north of Barrier J was estimated to be approximately 4,000 afy, by Dutcher and Garrett (1963), and between 2,700 and 4,200 afy during water years 1935 to 1960, by DWR (1970b).

While stream flow and subsurface outflow contribute to basin discharge, groundwater extraction is the primary discharge of groundwater from storage. Extracted water is used for agricultural, municipal, and industrial purposes. Most pumping is located near major streams, including the SAR, Lytle Creek, Warm Creek, and East Twin Creek. This areal distribution of pumpage reflects the exceptionally permeable deposits that underlie the stream channels and the abundant nearby recharge (Danskin et al. N.D.). As the area has become urbanized, the quantity of agricultural pumpage has declined considerably, presently accounting for less than 20 percent of the gross pumpage (Danskin et al. N.D.). However, overall pumpage has increased in the basin due to increased pumping for municipal and industrial purposes. Prior to 1940, gross pumpage in the basin was less than 110,000 afy, while currently pumping has reached as high as about 200,000 afy (Western–San Bernardino Watermaster 2002).

Per the provisions of the *Western* Judgment, operational criteria with regard to the amount of water in storage, along with extractions and additions that are made on an annual basis, apply to the SBBA. The basin is maintained to not exceed the long-term natural safe yield, so that extractions made by pumping on the part of agencies with authority to do so must be replaced (or replenished). Muni plays a critical role in these replenishment activities.

GROUNDWATER STORAGE AND WATER LEVELS

Estimates are made annually of the change in groundwater volume, or storage, in the SBBA by both Muni and the San Bernardino Valley Water Conservation District (Conservation District), from which a cumulative change in basin storage is calculated. The approach employed by Muni calculates the change in storage for nine sub-areas: Cajon, Devil Canyon, Lytle Creek, Pressure Zone, City Creek, Redlands, Mill Creek, Reservoir, and Divide (see Figure 3.2-3). Calculating the change in storage for the SBBA is accomplished by summing the individual values for each of the sub-areas.

The first change in storage calculation was completed for the years 1934-1960 by the DWR (DWR 1970b). The values were calculated using the Specific Yield Method and a mathematical model developed by TRW, Inc. (TRW 1967). In 1980, Muni updated the change in storage calculation to include the years 1961-1980. In the early 1990s, Muni created a new change in storage model using software developed by Environmental Systems Research Institute (ESRI). In years of low precipitation, infiltration (direct from precipitation and from surface streams) decreases while groundwater extractions increase, thereby causing the cumulative storage to decrease. The trend in cumulative change in storage over the period 1934-2002 is shown in Figure 3.2-5. The cumulative change in storage is cyclical based upon weather conditions. For example, 1934 through 1949 and 1979 through 1987 were wet periods, which produced increases in storage, while 1950 through 1978 was a dry period, resulting in decreased storage. To assist in the interpretation of Figure 3.2-5 (and Figure 3.2-12), an inset representing cumulative departure from average annual precipitation over the same time period is shown. These cycles are also evident in Figure 3.2-6, which illustrates the average annual rise or fall in depth to groundwater across the entire basin.

Groundwater in the Bunker Hill Basin generally flows in a southwesterly direction from the San Bernardino Mountains to the Colton Narrows. The San Jacinto Fault generally runs perpendicular to the groundwater flow and acts as a partial barrier, or subsurface, leaky dam, resulting in water level differences across the fault. This phenomenon also contributes to the high groundwater located within the City of San Bernardino commonly referred to as the Pressure Zone. Figure 3.2-7 depicts depth to groundwater contours throughout the SBBA, Rialto-Colton Basin, and Yucaipa Basin, including those reflecting shallow groundwater conditions in the Pressure Zone. In the past, water levels in the Pressure Zone have risen high enough to cause artesian conditions[5].

For the basin as a whole, there can be wide fluctuations in the average depth to groundwater from year to year, with annual changes as high as almost 40 feet (see Figure 3.2-6). However, for the most part, annual changes register less than 20 feet (+ or -), with only 6 years exceeding this range. There are, however, noticeable variations in behavior across sub-basins.

[5] Condition where groundwater levels rise above the land surface in confined aquifers.

The Lytle Creek Basin contains Lytle Creek with extensive headwaters in the adjacent mountain areas and a river channel comprised of deep, porous alluvial deposits. Due to the presence of Lytle Creek and its relatively small size, this sub-basin exhibits far greater and more extreme changes than any other sub-basin of the SBBA. In 40 of the 68 years, the annual average change in depth to groundwater exceeds 20 feet, with 8 years showing changes greater than 50 feet, and 3 years showing changes greater than 100 feet (see Figure 3.2-8).

WATER QUALITY

Groundwater in the SBBA is generally a sodium/calcium bicarbonate type, containing equivalent amounts of sodium and calcium near the land surface and an increasing predominance of sodium in deeper parts of the valley-fill aquifer. A total dissolved solids (TDS) range of 150 to 550 milligrams per liter (mg/L), with an average of 324 mg/L, is found in public supply wells (DWR 2003b). The current WQOs for the SBBA are provided in Table 3.2-4 and the proposed modifications to them are provided in Table 3.2-5. Additionally, using newly available information and analytical tools, sub-basins of the SBBA were both renamed and re-defined by the SARWQCB (see Figure 3.2-9 and Figure 3.2-10 for the original and revised sub-basins, respectively).

Table 3.2-4. Current Groundwater Quality Objectives for the SBBA[a]

Sub-basin	*Total Dissolved Solids (TDS)*	*Hardness*	*Sodium (Na)*	*Chloride (Cl)*	*Nitrate-nitrogen (NO_3-N)*	*Nitrate (NO_3)*	*Sulphate (SO_4)*
Bunker Hill I	260	190	15	10	1	4.5	45
Bunker Hill II	290	190	30	20	5	22.5	62
Bunker Hill Pressure Zone	300	160	30	20	1	4.5	62
Lytle Creek	225	175	15	10	1	4.5	30

a. All measurement units are milligrams per liter (mg/L) which is the equivalent of parts per million (ppm).

Source: SARWQCB 1995.

The Office of Environmental Health Hazard Assessment (OEHHA) developed Public Health Goals (PHGs) for nitrate. These are equivalent to California's current drinking water standards of 45 parts per million (ppm) for NO_3, the equivalent of 10 ppm NO_3-N.

Table 3.2-5. Proposed Groundwater Quality Objectives for the SBBA[a]

Groundwater Management Zone	*Total Dissolved Solids (TDS)*	*Nitrate-nitrogen (NO_3-N)*	*Nitrate (NO_3)*
Bunker Hill A	310	2.7	12.1
Bunker Hill B	330	7.3	32.8
Lytle	260	1.5	6.7

a. All measurement units are milligrams per liter (mg/L) which is the equivalent of parts per million (ppm).

Source: SARWQCB 2004.

The inorganic composition of the groundwater may be affected by geothermal water emanating from faults and fractures in the bedrock surface underlying the aquifer. For example, concentrations of fluoride that exceed drinking water standards have limited the use of groundwater extracted near some faults and from deeper parts of the aquifer. In some public supply wells in the SBBA, some inorganics (primary and secondary), radiological constituents, nitrates, pesticides, VOCs, and synthetic organic chemicals (SOCs) were found above the applicable MCL (see Table 3.2-6). However, all water delivered to public water users is treated prior to delivery and the quality of this water meets or is of better quality than the applicable state and federal standards.

Table 3.2-6. Prevalence of Contaminants in SBBA Wells

Constituent	*No. Wells Sampled*	*No. Wells with a Concentration Above an MCL*
Inorganics (primary)	212	13
Radiological	207	34
Nitrates	214	34
Pesticides	211	20
VOCs and SOCs	211	32
Inorganics (secondary)	212	25
Source: DWR 2003b.		

The SBBA is affected by five major groundwater contaminant plumes: the Redlands-Crafton, Norton Air Force Base, Muscoy, Newmark, and Santa Fe plumes. The major constituents of each plume are as indicated in Table 3.2-7. These regional contaminant plumes are discussed in section 3.12 (Hazardous Materials and Groundwater Contamination) and illustrated in Figure 3.12-1.

Table 3.2-7. Constituents in Groundwater Contamination Plumes in the SBBA

Contamination Plume	*TCE*[a]	*Perchlorate*	*PCE*[b]	*DBCP*[c]	*VOCs*[d]	*Superfund Site*
Redlands-Crafton	X	X	X	X		
Norton AFB	X		X			
Muscoy	X		X			X
Newmark	X		X			X
Santa Fe	X		X		X	

Notes:
a. TCE = trichloroethylene
b. PCE = tetrachloroethylene
c. DBCP = dibromochloropropane
d. VOCs = volatile organic compounds

PROJECT-RELATED RECHARGE FACILITIES

Following is a description of each of the groundwater recharge facilities that could be used as part of the Project. See Figure 3.2-1 for the location of these facilities.

Santa Ana River Spreading Grounds. The SAR Spreading Grounds, located downstream of Seven Oaks Dam on the alluvial fan of the SAR, are operated by the Conservation District. The water right application filed by the Conservation District with the SWRCB indicated that these spreading grounds have an area of about 448 acres. However, smaller estimated areas are presented in other documents (e.g., 60 acres in USGS [1972]). The SAR SG includes a borrow pit that was a source of materials used in the construction of Seven Oaks Dam.

The percolation rate for the SAR Spreading Grounds is approximately 1.5 ft/day, which results in a recharge rate (based on 448 acres) of about 22,800 af per month, or about 384 cfs. Maximum channel capacity limits this to 300 cfs. Use of some of the smaller acreages would result in smaller estimates of the recharge rate. For example, use of a more limited 60 acres would result in an estimated recharge rate, or absorptive capacity, of about 3,060 af per month, or about 50 cfs. Absorptive capacity is estimated by multiplying the active area of the recharge facility by the estimated percolation rate. Water delivered to the SAR Spreading Grounds recharges the Bunker Hill sub-basin of the SBBA (Table 3.2-3).

Devil Canyon and Sweetwater Basins. The Devil Canyon and Sweetwater Basins, located northwest of the California State University, San Bernardino campus, are operated by the SBCFCD and have an active spreading area of 30 acres. The estimated long-term percolation rate for the site is about 1.5 ft/day, which results in a recharge rate of about 1,350 af per month, or about 23 cfs. The Devil Canyon and Sweetwater Basins recharge the Bunker Hill sub-basin of the SBBA (Table 3.2-3).

City Creek Spreading Grounds. The City Creek Spreading Grounds, located along City Creek, between State Highway 30 and Boulder Avenue, are operated by SBCFCD. These spreading grounds have an active spreading area of about 75 acres and estimated percolation rate of about 1.5 ft/day, which results in a recharge rate of about 3,375 af per month, or about 57 cfs. The City Creek Spreading Grounds recharge the Bunker Hill sub-basin of the SBBA.

Patton Basins. The Patton Basins are located along Sand Creek, north of East Highland and west of the Patton State Hospital. The Patton Basins have an active spreading area of about 3 acres and an estimated percolation rate of about 0.3 ft/day. This equates to a recharge rate of about 27 af per month, or about 1 cfs. Recharge at this site contributes to the Bunker Hill sub-basin of the SBBA.

Waterman Basins. The Waterman Basins are located northeast of Wildwood Park and north of 40th Street in the City of San Bernardino. These basins are operated by SBCFCD; have an active spreading area of about 120 acres; and an estimated percolation rate of about 0.5 ft/day. This percolation rate equates to a recharge rate of about 810 af per month, or about 14 cfs. However, the absorptive capacity used in the Allocation Model is 30 cfs, based on historic use. The Waterman Basins recharge the Bunker Hill sub-basin of the SBBA (Table 3.2-3).

East Twin Creek Spreading Grounds. The East Twin Creek Spreading Grounds are located south of 40th Street, immediately south of the Waterman Basins, and are operated by SBCFCD. These spreading grounds have an area of about 32 acres and estimated percolation rate of about 1.5 ft/day, which results in a recharge rate of about 225 af per month, or about 4 cfs. However, the absorptive capacity used in the Allocation Model is 24 cfs, based on historic use. The East Twin Creek Spreading Grounds recharge the Bunker Hill sub-basin of the SBBA (Table 3.2-3).

Badger Basins. The Badger Basins, located in the Sycamore Flood Control Basin immediately east of the California State University, San Bernardino campus, are operated by the SBCFCD and have an active spreading area of about 15 acres. The estimated percolation rate for this site is 0.5 ft/day, which results in a recharge rate of about 225 af per month, or about 4 cfs. The Badger Basins recharge the Bunker Hill sub-basin of the SBBA (Table 3.2-3).

Mill Creek Spreading Grounds. The Mill Creek Spreading Grounds are located south of the main channel of Mill Creek, about 1 mile upstream of the confluence with the SAR, and are operated by the Conservation District. The Mill Creek Spreading Grounds have an active spreading area of about 26 acres and an estimated percolation rate of about 1.5 feet per day. This equates to a recharge rate of about 1,170 af per month, or about 20 cfs. Recharge at this site contributes to the Bunker Hill sub-basin of the SBBA (Table 3.2-3).

Santa Ana River Channel. While not a formal spreading facility, significant groundwater recharge occurs in the channel of the SAR. However, evaluating recharge potential can be more complicated for recharge in a natural channel than in a spreading facility dedicated to recharge. For example, the recharge rate depends on the wetted area, which can vary substantially in a natural channel depending on flow conditions. The area of the "active" channel of the SAR (defined by the area on aerial photographs with limited vegetation) has been estimated to be about 79 acres, while the area from the mouth of the canyon to Sterling Avenue (i.e., to about the San Bernardino International Airport or former Norton Air Force Base), including overflow lands, is about 2,110 acres (Danskin et al. N.D.).

In Danskin et al. (N.D.), the potential percolation rate was estimated to be about 4 ft/day. Consistent with the percolation rates for spreading grounds included in the applications, a percolation rate of 2 ft/day is used here as the long-term percolation rate that might be achieved in the channel. Using the 2 ft/day rate, the recharge rate may be about 4,740 af per month (or about 80 cfs) for the active channel, from the mouth of the canyon to Sterling Avenue, and about 126,600 af per month (or about 2,128 cfs) if the overflow lands are included. Percolation in the river could recharge the Bunker Hill sub-basin of the SBBA and the Rialto–Colton Basin. In a similar analysis, the U.S. Army Corp of Engineers (USACE) (1997) estimated that recharge in the active channel to Sterling Avenue would be approximately 1 cfs per wetted acre, which approximates to 79 cfs.

The maximum area (including overflow lands) for reaches from Sterling Avenue to Lower Warm Creek and from Lower Warm Creek to the San Bernardino/Riverside county line is given in Danskin et al. (N.D.). However, no recharge rate is provided, as those reaches overlie an area where the upward flow of groundwater into the stream channel is greater than the downward recharge of stream flows. It was estimated that there was a net recharge of approximately 95 cfs from Sterling Avenue to Prado Dam (USACE 1997).

SBBA SUB-BASINS

Pressure Zone. As previously discussed, in the vicinity of the confluence of Warm Creek and the SAR, the upper confining member acts to restrict vertical flow, causing semi-confined conditions in the upper 50 to 100 feet of saturated materials (Dutcher and Garrett 1963). This area is referred to as the Pressure Zone. In the past, groundwater levels in the Pressure Zone rose high enough under these semi-confined conditions to cause rising water. High groundwater levels in this area have damaged building foundations, flooded basements and utility structures, and increase the potential for liquefaction in this seismically active region. The Pressure Zone is located wholly within the City of San Bernardino. Six well locations in the Pressure Zone and the generalized extent of the Pressure Zone are shown in Figure 3.2-11. Groundwater level data from these wells are displayed as hydrographs in Figure 3.2-12. From Figure 3.2-12, it is clear that from 1934 through the late 1960s, water levels in general declined. Following this period until the mid-1980s, water levels increased. Water levels again began to decline after the mid-1980s through the beginning of the 1990s, when they began to even out. Groundwater levels recorded in selected wells in the Pressure Zone have ranged from approximately 100 - 200 ft below ground surface during dry periods (e.g., 1960s and 1970s) to at or above the ground surface during wet periods. For example, in the 1930s and 1940s some wells show artesian conditions (Antil Well No 3 and Mill & D St Well) as shown in Figure 3.2-12. However, over the long-term, groundwater levels are dropping in the Pressure Zone with the depth to groundwater increasing.

High groundwater in the Pressure Zone is further aggravated by the direction of groundwater flow in the Bunker Hill Basin, which is generally in a southwesterly direction from the San Bernardino Mountains to the San Jacinto Fault. The fault zone generally runs perpendicular to the groundwater flow and acts as a barrier, or partial barrier, causing the groundwater to “dam up” behind the fault and rise toward the land surface. High groundwater levels may create conditions conducive to liquefaction during an earthquake. See section 3.4 for additional information on liquefaction.

Lytle Creek Basin. The Bunker Hill and Lytle Creek basins are generally considered as one groundwater basin, the SBBA. However, the three separate water-bearing zones and intervening confining zones of the Bunker Hill Basin are not recognized in the Lytle Creek Basin. Sediments within the Lytle Creek Basin are, for the most part, highly permeable and unconfined to semi-confined, resulting in significant fluctuations in water levels. Water levels have fluctuated in excess of 200 ft over relatively short periods (less than 5 years) and in select wells (e.g., Fontana Union’s Well FU 8). From 1934 to 2002, depth to groundwater as measured in various wells in the basin has ranged from approximately 8 feet in the south-central portion of the basin to over 500 feet in the north-central portion of the basin (SBVMWD 2003).

Lytle Creek Basin is adjoined on the west by the Rialto-Colton Basin, along the Lytle Creek Fault (also known as Barrier E shown in Figure 3.2-2), and on the east and southeast by the Bunker Hill Basin, along the Loma Linda Fault and Barrier G. The northwestern border of the basin is delineated by the San Gabriel Mountains, and runoff from the mountains flows south/southeast through Lytle and Cajon creeks into the basin. Numerous groundwater barriers are present within Lytle Creek Basin, resulting in six compartments within the basin. Barriers A through D divide the northwestern portion of the basin into five sub-areas and the southeastern portion of the basin comprises the sixth sub-area. Barrier F divides the northwestern sub-areas from the southeastern sub-area. Studies (Dutcher and Garrett 1963) have shown that the groundwater barriers are less permeable with depth. When groundwater levels are high during “wet’” years, more leakage occurs across the barriers than when groundwater levels are lower (i.e., during “dry” years). The amount of pumping in each sub-area in large part controls the movement of groundwater across the barriers. Of the five sub-areas in northwestern Lytle Creek Basin, the most westerly is the first to receive recharge from both seepage from Lytle Creek and subsurface inflow across Barrier J, which appears to be an effective barrier to groundwater movement within the older alluvium but not the younger alluvium (Dutcher and Garrett 1963).

PROJECT-RELATED SPREADING GROUNDS

Lytle Basins, (Figure 3.2-1), located along Lytle Creek north of the city of Rialto, are operated by the Lytle Creek Water Conservation Association. The active portion of the recharge basins vary in size, due to intermittent construction of temporary levees, which confine recharge to various parts of the basins. The location of the levees depends on accessibility of equipment, with respect to water in the basins. The estimated long-term percolation rate for the basins is about 1.5 ft/day. Although these spreading basins have an estimated absorptive capacity of 97 cfs, only 30 cfs has been used in the Allocation Model, because recharge in excess of this rate results in rejected recharge, i.e., water that does not percolate and flows out as surface water. The Lytle Basins recharge the Lytle Creek Basin of the SBBA (Table 3.2-3).

3.2.1.3.2 Rialto–Colton Groundwater Basin

The approximately 30,100-acre Rialto–Colton Basin lies to the west of the SBBA. The basin is bounded on the northwest by the San Gabriel Mountains; on the northeast by the San Jacinto Fault and Barrier E; on the southeast by the Badlands; and on the southwest by the Rialto–Colton Fault (see Figure 3.2-1 and Figure 3.2-2). Except in the southeastern part of the basin, the San Jacinto and Rialto–Colton faults act as barriers that impede flow into and out of the basin (Danskin et al. N.D.).

The basin consists of four water-bearing units: the river channel; upper; middle; and lower. Groundwater generally moves from east to west in the river channel and upper water-bearing units. In the middle and lower water-bearing units, water moves from northwest to southeast. Groundwater movement is affected by two internal faults, Barrier J and an unnamed fault. Water moves across Barrier J into the un-faulted part of the groundwater system. The unnamed fault is a partial barrier to groundwater movement in the middle water-bearing unit and is an effective barrier in the lower water-bearing unit (Danskin et al. N.D.).

Sources of recharge to the Rialto–Colton Basin are subsurface inflow from the SBBA, precipitation, imported water, seepage from the SAR and Warm Creek, and irrigation return flow (Danskin et al. N.D.). Since 1971, pumping from the basin has varied from a low of approximately 5,000 af in 1983 to a high of approximately 17,600 af in 1990. In 2000, pumping was approximately 13,000 af (Western–San Bernardino Watermaster 2002). The basin has an estimated total storage capacity of about 210,000 af. The Rialto portion of the basin accounts for about 120,000 af of storage, with the remaining 93,000 af within the Colton portion of the basin.

Water levels vary across the basin due to the presence of internal faults. For example, in the northern part of the basin, water levels rise quickly following rainfall. In the 1990s and in this northern area of the basin, it was typical for well water levels to vary by 50 ft in a given year (DWR 2003b). However, in the southern part of the basin, groundwater levels are more static and water levels generally varied by only 5 to 10 ft per year in the 1990s (DWR 2003b).

GROUNDWATER FLOW

The USGS simulated groundwater flows in the Rialto-Colton Basin with particular attention placed on the effects of artificial recharge at the Cactus Spreading and Flood Control Basins and Linden Ponds (Woolfenden and Koczot 1999). Simulated flow patterns based on historical artificial recharge activities at the Cactus Spreading and Flood Control Basins are illustrated in Figure 3.2-13. As indicated by the flow paths, recharged water moves in a southeasterly direction away from Cactus Spreading and Flood Control Basins toward the channel of the SAR.

WATER QUALITY

In public supply well samples in the Rialto–Colton Basin, the average TDS is 264 mg/L with a range of 163 to 634 mg/L (DWR 2003b). The WQOs for the Rialto–Colton Basin are provided in Table 3.2-8 and the proposed modifications to these WQOs for the basin are provided in Table 3.2-9.

Table 3.2-8. Current Groundwater Quality Objectives for the Rialto–Colton Basin[a]

Rialto-Colton Sub-basin	WATER QUALITY OBJECTIVE (mg/L)					
	Total Dissolved Solids (TDS)	*Hardness*	*Sodium (Na)*	*Chloride (Cl)*	*Nitrate-nitrogen (NO_3-N)*	*Sulphate (SO_4)*
Rialto	200	95	35	35	2	40
Colton	400	240	35	35	3	64

a. All measurement units are milligrams per liter (mg/L) which is the equivalent of parts per million (ppm).

Source: SARWQCB 1995.

Table 3.2-9. Proposed Groundwater Quality Objectives for the Rialto-Colton Basin[a]

Groundwater Management Zone	*Total Dissolved Solids (TDS)*	*Nitrate-nitrogen (NO_3-N)*
Rialto	230	2.0
Colton	410	2.7

a. All measurement units are milligrams per liter (mg/L) which is the equivalent of parts per million (ppm).

Source: SARWQCB 2004.

The San Jacinto Fault markedly affects the groundwater chemistry in the basin. The TDS in groundwater downstream from the San Jacinto Fault is greater than that in the surface water found in the Bunker Hill outflow area. It is also higher in dissolved solids than well water just upstream from the fault.

Of 38 public water supply wells sampled, two were over the MCL for nitrates and, in three wells, secondary inorganics, VOCs, and semivolatile organic compounds (SVOCs) exceeded the

MCL (Table 3.2-10). Table 3.2-10 shows that most of the wells sampled did not contain constituents over the MCL. More than 143 water wells in Riverside and San Bernardino counties now exceed 4 parts per billion (ppb) of perchlorate contamination (CA DHS 2003). This level was the former Public Health Goal (PHG) established by the Office of Environmental Health Hazard Assessment (OEHHA). The current PHG is 6 ppb (OEHHA 2004). In the Muni service area, the City of Rialto, City of Colton, West Valley Water District, and the Fontana Water Company have shut down or restricted the use of 20 wells due to perchlorate contamination in the Rialto–Colton Basin where concentrations can be above 4 ppb (SARWQCB 2003b). See section 3.12 for additional information on perchlorate and other hazardous substances present in groundwater.

PROJECT-RELATED SPREADING GROUNDS

The Cactus Spreading and Flood Control Basins, which are located adjacent to and extend south of Baseline Road between Cactus Avenue and the Rialto Municipal Airport, are operated by SBCFCD. These spreading basins are comprised of a historic gravel mining area that is currently used as storm water detention basins. These basins have an active spreading area of about 46 acres and an estimated long-term percolation rate of about 1.5 ft/day. This percolation rate equates to a recharge rate of about 2,070 af per month, or about 35 cfs. The Cactus Spreading Grounds and Flood Control Basins recharge the Rialto–Colton Basin.

Table 3.2-10. Prevalence of Contaminants in Rialto-Colton Basin Wells

Constituent	*No. Wells Sampled*	*No. Wells with a Concentration Above an MCL*
Inorganics (primary)	38	0
Radiological	40	0
Nitrates	38	2
Pesticides	40	0
VOCs and SVOCs	40	3
Inorganics (secondary)	38	3
Source: DWR 2003b.		

3.2.1.3.3 Yucaipa Groundwater Basin

The 25,300-acre Yucaipa Basin lies to the east-southeast of the SBBA and is bounded on the north by the San Andreas fault; on the west by Crafton Hills; on the south by the Banning Fault; and on the east by the Yucaipa Hills (see Figure 3.2-2). Groundwater movement in the Yucaipa Basin is generally from the mountains and hills located to the north and east, in southward and westward directions. However, there are a number of faults, including the Chicken Hill Fault, Yucaipa Barrier, Casa Blanca Fault, and Gateway Barrier that influence the direction of flow on a local level. These faults cause offsets in water levels by as much as 160 ft. In the western part of the basin, northeast dipping beds of the San Timoteo Formation form barriers that cause artesian conditions (DWR 2003b).

Groundwater storage capacity in the Yucaipa Basin is estimated to be between 783,000 and 1,230,000 af, and pumping from the basin for domestic and irrigation use is estimated at

13,800 afy. Recharge to the basin is from percolation, infiltration from local overlying streams, subsurface inflow, and artificial recharge at spreading grounds. Groundwater levels have declined historically in the Yucaipa Basin. The decline was gradual from the 1930s until increased development and associated pumping (beginning after World War II) caused more rapid declines (DWR 2003b).

WATER QUALITY

Most of the recent groundwater samples from the Yucaipa Basin indicate a calcium bicarbonate type groundwater, generally meeting EPA drinking water standards, with little variation across the basin. Groundwater has higher mineral concentrations, but otherwise is similar to the surface water in the area. The average TDS from public supply wells is 322 mg/L with a range of 200 to 630 mg/L. The WQOs for the Yucaipa Basin are provided in Table 3.2-11 and the proposed modifications to these WQOs for the basin are provided in Table 3.2-12.

Table 3.2-13 contains data from wells sampled for various pollutants (DWR 2003b). MCL concentrations in most samples in the basin did not exceed the applicable standard.

Table 3.2-11. Current Groundwater Quality Objectives for the Yucaipa Basin[a]

	WATER QUALITY OBJECTIVE (mg/L)					
	Total Dissolved Solids (TDS)	*Hardness*	*Sodium (Na)*	*Chloride (Cl)*	*Nitrate-nitrogen (NO_3-N)*	*Sulphate (SO_4)*
Yucaipa Groundwater Basin	240	170	45	25	6	35

a. All measurement units are milligrams per liter (mg/L) which is the equivalent of parts per million (ppm).

Source: SARWQCB 1995.

Table 3.2-12. Proposed Groundwater Quality Objectives for the Yucaipa Basin[a]

Groundwater Management Zone	*Total Dissolved Solids (TDS)*	*Nitrate-nitrogen (NO_3-N)*
Yucaipa "maximum benefit"[b]	370	5.0
Yucaipa "anti-degradation"[c]	320	4.2

a. All measurement units are milligrams per liter (mg/L) which is the equivalent of parts per million (ppm).

b. Maximum benefit means that the objectives for the management zones assure protection of beneficial uses and are of maximum benefit to the people of the state. If the Regional Board finds that the maximum benefit is not demonstrated, then the anti-degradation objectives for these waters will apply.

c. Anti-degradation objectives are the historical ambient quality TDS and nitrate-nitrogen objectives. These objectives were based partly on consideration of anti-degradation requirements (State Board Resolution No. 68-16) and factors specified in Water Code Section 13241.

Source: SARWQCB 2004.

Table 3.2-13. Prevalence of Contaminants in Yucaipa Basin Wells

Constituent	*No. Wells Sampled*	*No. Wells with a Concentration Above an MCL*
Inorganics (primary)	43	1
Radiological	44	1
Nitrates	46	12
Pesticides	43	4
VOCs and SOCs	44	1
Inorganics (secondary)	43	4
Source: DWR 2003b.		

PROJECT-RELATED SPREADING GROUNDS

Wilson Basins. The Wilson Basins are located northeast of the intersection of Oak Glen Road and Bryant Street, just north of the City of Yucaipa, and are operated by SBCFCD. The Wilson Basins have an active spreading area of about 12 acres and an estimated percolation rate of about 1 ft/day, which results in a recharge rate of about 360 af per month, or about 6 cfs. The Wilson Basins recharge the Yucaipa Basin.

3.2.1.3.4 San Timoteo Groundwater Basin

The 71,300-acre San Timoteo Basin is located southeast of the Bunker Hill Basin and south of the Yucaipa Basin (see Figure 3.2-1). The Banning Fault marks the northern boundary, and the San Jacinto Fault marks the southern boundary of the San Timoteo groundwater basin (DWR 2003b) (Figure 3.2-2). The western part of the basin is bounded by the San Jacinto Mountains and the eastern boundary is a topographic drainage divide with the Colorado River system (DWR 2003b). Alluvium, the principal water-bearing unit of the San Timoteo Basin, is thickest near the City of Beaumont and thins to the southwest, but is not present in the central portion of the basin. The San Timoteo Formation, comprised of folded and eroded alluvial deposits, is the other water-bearing unit in the basin. The total thickness of the San Timoteo Formation is estimated to be between 1,500 and 2,000 ft, but water levels in the central part of the basin indicate water-bearing gravels to depths of only 700 to 1,000 ft (DWR 2003b).

Groundwater flow, which is generally from east to west toward the SBBA, is affected by local faulting. Water levels across the Banning Fault drop 100 to 200 ft to the south. In the western part of the basin, water levels drop to the south about 75 ft across the Loma Linda Fault and about 50 ft across the San Timoteo Barrier. In the northeastern part of the basin, water levels drop to the south across two unnamed faults (DWR 2003b).

Recharge to the San Timoteo Basin is from the percolation of runoff carried in streams, groundwater inflow from adjacent areas, percolation of direct precipitation, and percolation of water imported for domestic or irrigation use. A study of change in water levels, between 1933 and 1960, revealed distinctive hydrograph characteristics for wells in alluvial deposits in different parts of the basin. Hydrographs for wells in centrally located San Timoteo Canyon illustrated low yearly fluctuations, wells in the northeast portion of the basin showed high yearly fluctuations, and other areas showed a continual downward trend (DWR 2003b).

The total storage capacity of alluvial deposits in the basin is estimated to be about 2,010,000 af, which is an increase from estimated 1960 groundwater storage levels of approximately 1,570,000 af. Groundwater is replenished by subsurface inflow and percolation of precipitation, runoff, and imported water. Runoff and imported water are delivered to streambeds and spreading grounds for percolation and groundwater recharge (DWR 2003b).

WATER QUALITY

The mineral character of groundwater beneath San Timoteo Canyon is sodium bicarbonate; calcium bicarbonate in the alluvium of Little San Gorgonio Creek; calcium bicarbonate in younger alluvium near Beaumont; and sodium bicarbonate in older deposits. Water samples from 24 public supply wells have an average TDS content of approximately 253 mg/L, with a range of 170–340 mg/L (DWR 2003b). The WQOs for the San Timoteo Basin are the same as those for the Yucaipa Basin (see Table 3.2-11). Proposed modifications to these WQOs for the basin are provided in Table 3.2-14.

Table 3.2-14. Proposed Groundwater Quality Objectives for the San Timoteo Basin[a]

Groundwater Management Zone	*Total Dissolved Solids (TDS)*	*Nitrate-nitrogen (NO_3-N)*
San Timoteo "maximum benefit"[b]	400	5.0
San Timoteo "anti-degradation"[c]	300	2.7

a. All measurement units are milligrams per liter (mg/L) which is the equivalent of parts per million (ppm).

b. Maximum benefit means that the objectives for the management zones assure protection of beneficial uses and are of maximum benefit to the people of the state. If the Regional Board finds that the maximum benefit is not demonstrated, then the anti-degradation objectives for these waters will apply.

c. Anti-degradation objectives are the historical ambient quality TDS and nitrate-nitrogen objectives. These objectives were based partly on consideration of anti-degradation requirements (State Board Resolution No. 68-16) and factors specified in Water Code Section 13241.

Source: SARWQCB 2004.

Out of 27 sampled wells, one well contained secondary inorganics above the MCL (see Table 3.2-15); otherwise, no contaminants were found (DWR 2003b).

Table 3.2-15. Prevalence of Contaminants in San Timoteo Basin Wells

Constituent	*No. Wells Sampled*	*No. Wells with a Concentration Above an MCL*
Inorganics (primary)	27	0
Radiological	26	0
Nitrates	28	0
Pesticides	27	0
VOCs and SOCs	27	0
Inorganics (secondary)	27	1

Source: DWR 2003b.

PROJECT RELATED SPREADING GROUNDS

Garden Air Creek. Garden Air Creek is a tributary of San Timoteo Canyon Creek. There are no plans for a formal spreading facility at this location and recharge will be accomplished by percolation from existing, natural channels, up to a rate of 16 cfs. Although the turnout is outside Muni's district and inside the boundary of San Gorgonio Pass Water Agency (SGPWA), the recharge area is in the San Timoteo Canyon region, and thus inside the Muni service area boundary. This delivery will recharge the San Timoteo Basin.

3.2.2 Impacts and Mitigation Measures

3.2.2.1 Impact Assessment Methodology

This section outlines the general groundwater impact assessment methodology and includes a brief description of the hydrologic modeling undertaken in support of the analysis. Detailed information on modeling tools and processes is provided in Appendix B (Groundwater Hydrology).

A number of groundwater-related models are used in support of the impact analysis reported here and include MODFLOW, MODPATH, MT3DMS, PRESS, and the Hantush Equation. MODFLOW (MODular three-dimensional finite-difference groundwater FLOW model) was developed by the USGS and is a widely used model for groundwater flow simulation. MODFLOW was used to describe groundwater flow patterns within the SBBA and its overlying recharge basins. For the analysis of spreading facilities outside of the SBBA (in the Rialto-Colton and Yucaipa basins), the Hantush Equation was used. This equation is used to calculate the vertical recharge of the spreading basin so that groundwater levels beneath the spreading basin can be assessed. MODPATH is an associated program of MODFLOW and is used to estimate groundwater flow paths and travel times of groundwater in a basin. Another associated program of MODFLOW is MT3DMS (Modular 3-D Multi-Species Transport Model), which simulates the movement of groundwater contaminants TCE and PCE. In addition to the groundwater flow model, PRESS was used to analyze subsidence in the SBBA. The PRESS model simulates subsidence by taking into account changes in groundwater levels.

3.2.2.1.1 Groundwater Storage and Fluctuations in Groundwater Level

Per the provisions of the *Western* Judgment, the SBBA is regulated and monitored with regard to the amount of water in storage, along with extractions and additions that are made, on an annual basis. The long-term equilibrium of the basin is maintained by ensuring that extractions do not exceed the natural safe yield. To the degree that extractions made by pumping on the part of agencies with authority to do so exceed the safe yield, it is the responsibility of Muni to make the basin "whole" through replenishment. See section 3.1.1.5.2 for additional information on the *Western* Judgment. Because maintenance of the safe yield of the basin is the responsibility of Muni, Project operations would not measurably deplete the groundwater storage capacity of the SBBA.

Although implementation of the Project would not influence aggregate groundwater storage in the SBBA, the pattern and timing of groundwater recharge activities would vary between Project scenarios and the No Project. Changes in groundwater levels can influence other conditions in the basin including the extent of surface area susceptible to liquefaction under certain seismic conditions; potential ground subsidence; the movement and spatial extent of groundwater contaminant plumes; and the operation of municipal water production wells. These concerns are addressed in other sections of the document: section 3.4 (Geology, Soils, and Mineral Resources); section 3.5 (Land Use and Planning); section 3.12 (Hazardous Materials and Groundwater Contamination); and section 3.13 (Public Services, Utilities, and Transportation).

3.2.2.1.2 Groundwater Quality

Potential Project-related effects on groundwater quality in the SBBA are addressed at two scales: for each of the sub-basins; and by considering concentration levels of TDS and nitrates at a number of specific locations throughout the basin.

For each of the sub-basins within the SBBA, aggregate concentration levels of TDS and nitrates under each of the Project scenarios are compared to (1) No Project conditions; (2) current WQOs; and (3) proposed WQOs. In order to assess the potential significance of Project effects, a two-fold comparison is made. First, concentration levels under Project conditions are compared to concentration levels that would exist under No Project conditions. Second, concentration levels under Project conditions are compared to both current and proposed WQOs as stipulated by the SARWQCB. This comparison process is represented graphically as a decision flow chart in Figure 3.2-14. The decision process results in one of four impact determinations: significant, less than significant, and two types of beneficial classes. The first criterion (comparing the Project to No Project conditions) determines whether the impact is classed as beneficial or adverse. The second criterion (WQOs) further differentiates between the significant and less than significant categories. An impact to groundwater quality is considered significant when concentration levels under the Project exceed both the levels anticipated under No Project conditions and the pertinent WQO.

A more detailed assessment (relying upon the same impact methodology as described immediately above) is accomplished using 25 water production wells and 9 groundwater spreading facility locations. The identities of these wells and spreading grounds are shown in Table 3.2-16 along with the respective sub-basins (as defined by the SARWQCB) within which each is located. Their geographical locations are indicated in Figure 3.2-15 (with current SARWQCB sub-basins) and 3.2-16 (with proposed SARWQCB management zones).

Estimates of TDS and nitrate concentration levels at each of the chosen index well and spreading ground sites are derived from the groundwater modeling results and are developed for each of the 39 years covered by the hydrology models (WY2000-2001 through WY2038-2039).

An example of the application of the impact determination process can be seen in Figure 3.2-17. Annual water quality measurements (of TDS concentration levels) are presented for a single index well (IW14 – Leroy Street Well) for each of the 39 years for each of the four Project scenarios as well as the No Project. Also indicated on the graph are the current and proposed WQOs for TDS specific to the sub-basin within which the well is located (currently Bunker Hill I and proposed Bunker Hill A). As can be seen, for the most part, concentration levels for all Project scenarios are below No Project condition levels. Concentration levels for both Project and No Project conditions are uniformly above current and proposed WQOs.

Table 3.2-16. Location of Index Wells and Spreading Grounds

I.D. No.	*Name*	*Section of SBBA*	*Current SARWQCB Sub-Basin*	*Proposed SARWQCB Management Zone*
WELL LOCATIONS				
IW1	Vincent Well	Forebay	Bunker Hill I	Bunker Hill A
IW2	Devil Canyon No. 3	Forebay	Bunker Hill I	Bunker Hill A
IW3	Devil Canyon No. 1	Forebay	Bunker Hill I	Bunker Hill A
IW4	Cajon Well No. 1	Forebay	Bunker Hill I	Bunker Hill A
IW5	Mt. Vernon	Intermediate	Bunker Hill I	Bunker Hill A
IW6	Well 27	Forebay	Lytle Creek	Lytle
IW7	Well 26	Forebay	Lytle Creek	Lytle
IW8	Well 13	Intermediate	Lytle Creek	Lytle
IW9	Lord 7	Intermediate	Lytle Creek	Lytle
IW10	Well 24A	Forebay	Bunker Hill II	Bunker Hill A
IW11	Raub 1	Pressure Zone	Bunker Hill Pressure	Bunker Hill B
IW12	Lower Kelly	Pressure Zone	Bunker Hill Pressure	Bunker Hill B
IW13	Newmark 3	Forebay	Bunker Hill I	Bunker Hill A
IW14	Leroy Street Well	Intermediate	Bunker Hill II	Bunker Hill A
IW15	Well 40	Intermediate	Bunker Hill II	Bunker Hill B
IW16	Orange Street Well	Intermediate	Bunker Hill II	Bunker Hill B
IW17	Well 32	Intermediate	Bunker Hill II	Bunker Hill B
IW18	Well 62	Forebay	Bunker Hill II	Bunker Hill B
IW19	Agate 2	Intermediate	Bunker Hill II	Bunker Hill B
IW20	Nelson Street	Intermediate	Bunker Hill II	Bunker Hill B
IW21	Airport 2	Intermediate	Bunker Hill II	Bunker Hill B
IW22	San Bernardino Ave Well	Intermediate	Bunker Hill II	Bunker Hill B
IW23	Well 120	Forebay	Bunker Hill II	Bunker Hill B
IW24	Well 146A	Forebay	Bunker Hill II	Bunker Hill B
IW25	Observation Well	Forebay	Bunker Hill II	Bunker Hill B
SPREADING GROUNDS				
SG1	Devil Canyon/Sweetwater	Forebay	Bunker Hill I	Bunker Hill A
SG2	Santa Ana River	Forebay	Bunker Hill II	Bunker Hill B
SG3	Waterman	Forebay	Bunker Hill II	Bunker Hill A
SG4	Badger	Forebay	Bunker Hill I	Bunker Hill A
SG5	Patton	Forebay	Bunker Hill II	Bunker Hill B
SG6	Mill Creek	Forebay	Bunker Hill II	Bunker Hill B
SG7	City Creek	Forebay	Bunker Hill II	Bunker Hill B
SG8	East Twin Creek	Forebay	Bunker Hill II	Bunker Hill A
SG9	Lytle Creek	Forebay	Lytle Creek	Lytle

Impact determinations identical to those just described, are made for (1) each water quality parameter (TDS and nitrates); (2) at each of the 34 locations within the SBBA; (3) for each of 39 years; (4) with regard to both current and future WQOs; and (5) under each of the four Project scenarios. Thus, for example, there are over 10,000 separate impact determinations made with regard to TDS concentration levels and an equal number for nitrate concentration levels. For each Project scenario, the full array of impact determinations are presented as a color-coded matrix. Each of these matrices provides a generalized view of Project impacts throughout the SBBA as measured at 34 locations over 39 years. All impact categories — i.e., significant, less than significant, and beneficial — are evident with regard to both TDS and nitrate concentration levels. Descriptions of impacts are presented below in section 3.2.2.4.

3.2.2.2 Significance Criteria

Impact criteria in Appendix G of the State CEQA Guidelines that are pertinent to the Project are listed below. These criteria have been tailored and augmented to make them directly applicable to the Project.

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
- Otherwise substantially degrade water quality.

3.2.2.3 Project Construction

3.2.2.3.1 Seven Oaks Dam and Reservoir Construction Area

The Project would not cause construction-related impacts to groundwater at, or in the vicinity of, the Seven Oaks Dam and Reservoir Construction Area.

3.2.2.3.2 Santa Ana River Construction Area

Impact GW-1. *Dewatering during Project construction could result in a temporary lowering of groundwater levels beneath the excavation site. Impacts would be less than significant.*

Excavations, possibly as deep as 30-50 feet, may be required during the installation of pipelines and related facilities. It is possible that shallow groundwater could be encountered during these excavations activities. This would necessitate dewatering of the excavation site which could lower the groundwater in the immediate vicinity. Dewatering would be temporary, localized, and would not occur in volumes sufficient to substantially deplete groundwater supplies or affect the local area. Therefore, impacts would be less than significant and no mitigation is required.

3.2.2.3.3 Devil Canyon Construction Area

Impact GW-1, a less than significant impact due to possible dewatering at excavation sites, could apply to the Devil Canyon Construction Area.

3.2.2.3.4 Lytle Creek Construction Area

Impact GW-1, a less than significant impact due to possible dewatering at excavation sites, could apply to the Lytle Creek Construction Area.

3.2.2.4 Project Operations and Maintenance

As discussed in section 3.2.2.1.1, changes in groundwater levels could affect the area susceptible to liquefaction, potential subsidence, the movement and spatial extent of groundwater contaminant plumes, and the operation of municipal water production wells. These topics are addressed in other sections of the document. Therefore, the discussion here of potential groundwater level impacts attributable to Project operations takes a region-wide view of the SBBA. In addition, this section focuses on operational impacts to groundwater quality not associated with hazardous materials. See section 3.12 for impacts associated with hazardous materials and groundwater contamination.

Groundwater Storage and Fluctuations in Groundwater Level

Per the provisions of the *Western* Judgment, the SBBA is regulated and monitored with regard to the amount of water in storage as well as with regard to extractions and additions that are made on an annual basis. Groundwater storage in the basin is maintained by ensuring that extractions do not exceed the long-term natural safe yield.

Impact GW-2. *Project operations would not interfere with groundwater recharge to the point where there would be a net deficit in aquifer volume (i.e., change in groundwater storage). Impacts would be less than significant.*

Project diversions would divert water from the SAR, which would reduce recharge in the river channel. However, the lack of recharge in the river would be offset by (1) in-lieu recharge caused by direct delivery of SAR water, which reduces purveyor pumping; (2) spreading of SAR water in other spreading grounds in the SBBA; and (3) water returned from exchanges with other agencies. The net effect is to recharge the SBBA with a similar quantity of water as would occur under No Project conditions. The Project would affect only the timing and location of recharge.

In terms of the groundwater balance of the SBBA, the safe yield of the basin will be maintained per the provisions of the *Western* Judgment. Because SAR water diversions would not result in a net deficit in aquifer volume, impacts would be less than significant and no mitigation is required.

Groundwater Quality

Impact GW-3. *The Project would not increase TDS and nitrate concentrations in the sub-basins of the SBBA such that post-Project concentrations would exceed WQOs. Impacts would be less than significant.*

To analyze water quality impacts at the basin scale, the average concentration level for both TDS and nitrates was projected for the end of the model simulation in future year 2039. These levels are shown in Table 3.2-17 for each of the sub-basins within the SBBA. Results for both current groundwater sub-basin delineations (from the 1995 Basin Plan) as determined by SARWQCB and the proposed groundwater management zones (in the Amended Plan) are presented in the table.

Concentration levels for TDS would not exceed WQOs (current or proposed) or levels under No Project conditions in any of the sub-basins. Thus, no significant impacts are anticipated. There would be beneficial impacts under all Project scenarios in the Bunker Hill I and Bunker Hill II sub-basins under current WQOs, and in Bunker Hill A under proposed WQOs. Less than significant impacts could be expected in the Pressure Zone and Lytle sub-basins.

For nitrate concentration levels, beneficial impacts would be anticipated for all sub-basins under current and proposed WQOs.

Impact GW-4. *At some wells, the Project would increase TDS concentrations such that post-Project TDS concentrations would exceed WQOs. This impact would be significant.*

Due to the spatial and temporal variability of Project-related TDS concentrations, there are examples of each of the impact categories: significant, less than significant, and beneficial. This condition is well illustrated in the example graphs presented in Figures 3.2-17 through 3.2-20 and the matrices displayed in Figures 3.2-21 through 3.2-24 (for current WQOs) and in Figures 3.2-25 through 3.2-28 (for proposed WQOs).

The differences in TDS concentration between Project scenarios and No Project conditions result, in large part, from differences in the amounts of SWP spreading, SAR spreading, SAR channel percolation, and groundwater pumping.

Most of the index wells are deep and TDS concentrations vary little among scenarios. TDS at index well IW14 (Leroy Street Well), illustrated in Figure 3.2-17, decreases the most in response to high volumes of low TDS SAR water applied to spreading grounds at Devil Canyon/ Sweetwater, Waterman, and East Twin Creek spreading grounds under Project Scenarios A and B. Deep wells near the upper reaches of the SAR region, including IW17 (Well 32) shown in Figure 3.2-18, maintain fairly constant, low TDS concentrations as a result of recharge from the SAR or high quality, low TDS artificial recharge at the SAR or Mill Creek spreading grounds for No Project and all Project scenarios. Deep wells in the Pressure Zone, such as IW11 (Raub 1) illustrated in Figure 3.2-19, and IW12 (Lower Kelly) shown in Figure 3.2-20, demonstrate less change with time than wells in the intermediate section of the SBBA, but outside the Pressure Zone.

Table 3.2-17. Average TDS and Nitrate Concentration Levels at the End of Model Simulation (Year 2039)

CURRENT WQOs	TDS, mg/L						Nitrate (NO_3), mg/L					
Groundwater Sub-Basin	*SWRCB WQO*	*No Project Condition*	*Scenario A*	*Scenario B*	*Scenario C*	*Scenario D*	*SWRCB WQO*	*No Project Condition*	*Scenario A*	*Scenario B*	*Scenario C*	*Scenario D*
Bunker Hill I	260	358	352	357	352	350	4.5	11.3	11.0	11.3	11.1	11.0
Change from WQO		*98*	*92*	*97*	*92*	*90*		*7*	*7*	*7*	*7*	*6*
Change from No Project		*NA*	*-5*	*0*	*-6*	*-8*		*NA*	*-5*	*-4*	*-5*	*-5*
Bunker Hill II	290	291	289	288	289	290	22.5	12.3	11.9	11.8	12.1	12.2
Change from WQO		*1*	*-1*	*-2*	*-1*	*0*		*-10*	*-11*	*-11*	*-10*	*-10*
Change from No Project		*NA*	*-2*	*-3*	*-1*	*-1*		*NA*	*0*	*-1*	*0*	*0*
Bunker Hill Pressure Zone	300	285	291	289	288	288	4.5	11.2	10.5	10.4	10.9	11.0
Change from WQO		*-15*	*-9*	*-11*	*-12*	*-12*		*7*	*6*	*6*	*6*	*7*
Change from No Project		*NA*	*6*	*5*	*3*	*3*		*NA*	*-1*	*-1*	*0*	*0*
Lytle	225	212	214	213	213	214	4.5	3.7	3.8	3.9	3.8	3.7
Change from WQO		*-13*	*-11*	*-12*	*-12*	*-11*		*-1*	*-1*	*-1*	*-1*	*-1*
Change from No Project		*NA*	*2*	*1*	*1*	*2*		*NA*	*0*	*0*	*0*	*0*

PROPOSED WQOs	TDS, mg/L						Nitrate (NO_3), mg/L					
Proposed Groundwater Management Zone	*SWRCB WQO*	*No Project Condition*	*Scenario A*	*Scenario B*	*Scenario C*	*Scenario D*	*SWRCB WQO*	*No Project Condition*	*Scenario A*	*Scenario B*	*Scenario C*	*Scenario D*
Bunker Hill A	310	355	347	347	351	351	12.1	12.3	10.3	10.2	11.1	11.4
Change from WQO		*45*	*37*	*37*	*41*	*41*		*0*	*-2*	*-2*	*-1*	*-1*
Change from No Project		*NA*	*-8*	*-9*	*-5*	*-4*		*NA*	*-2*	*-2*	*-1*	*-1*
Bunker Hill B	330	262	267	268	264	263	32.8	10.2	10.5	10.5	10.4	10.4
Change from WQO		*-68*	*-63*	*-63*	*-66*	*-67*		*-23*	*-22*	*-22*	*-22*	*-22*
Change from No Project		*NA*	*6*	*6*	*2*	*2*		*NA*	*0*	*0*	*0*	*0*
Lytle	260	211	213	213	212	213	6.7	3.8	3.9	3.9	3.8	3.8
Change from WQO		*-49*	*-47*	*-47*	*-48*	*-47*		*-3*	*-3*	*-3*	*-3*	*-3*
Change from No Project		*NA*	*2*	*1*	*1*	*1*		*NA*	*0*	*0*	*0*	*0*

Projected TDS concentrations at Patton, East Twin Creek, and Waterman spreading grounds change most frequently in response to annual fluctuations of low TDS recharge water from either the SWP or SAR. The ambient groundwater TDS concentration in these areas is generally high and the applied high quality recharge water dilutes the existing concentrations during periods of high recharge. TDS concentrations at the SAR and Mill Creek spreading grounds are generally constant since recharge water generally has the same concentration level as the ambient conditions. Differences in TDS concentrations between Project scenarios at spreading grounds are principally a result of the frequency and amount of low TDS recharge water allocated in each scenario.

Under all Project scenarios and when considering current WQOs, the most frequent impacts are beneficial with over 50 percent of all impact determinations falling in this category for all Project scenarios. Significant impacts would be experienced in no more that 20 percent of all instances. The largest concentration of significant impacts occurs at locations within the Bunker Hill I sub-basin for all Project scenarios. All locations within the Bunker Hill I sub-basin experience significant impacts at some time during the 39-year forecast period. Most beneficial impacts tend to occur at locations within the Bunker Hill II sub-basin and, to a lesser degree, in the Lytle Creek sub-basin. The number of significant impacts under all four Project scenarios account for less than 20 percent of all impact determinations.

When proposed WQOs are used in the assessment of impacts, the proportion of beneficial impacts remains essentially unchanged among the scenarios (Table 3.2-18). See Figures 3.2-25 through 3.2-28. However, the proportion of significant impacts is reduced substantially and does not exceed 11 percent for any of the four Project scenarios. Locations with significant impacts cluster in Bunker Hill A with beneficial impacts clustered in Bunker Hill B and Lytle Creek sub-basins, a pattern similar to that using current WQOs as a significance threshold.

Table 3.2-18. Frequency of Impact Determinations for TDS

Project Scenario	IMPACT DETERMINATION		
	% Significant	*% Less than Significant*	*% Beneficial*
CURRENT WQO			
A	14	36	50
B	15	33	52
C	19	28	53
D	18	31	51
PROPOSED WQO			
A	10	40	50
B	9	38	53
C	11	36	53
D	9	39	52

Mitigation Measures

MM GW-1: Using available reliable data, Muni/Western will, on an annual basis, evaluate impacts of the Project on TDS concentrations in the SBBA. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni/Western will direct Project water spreading to reduce significant TDS impacts.

RESIDUAL IMPACTS

With implementation of MM GW-1, impacts to TDS concentration levels would be reduced. However there may be short periods of time when significant impacts remain. Therefore, impacts to TDS concentration levels in the SBBA would be significant and unavoidable.

Impact GW-5. *At some wells, the Project would increase nitrate concentrations such that post-Project nitrate concentrations would exceed WQOs. This impact would be significant.*

Due to the spatial and temporal variability of Project-related nitrate concentrations, there are examples of each of the impact determination categories: significant, less than significant, and beneficial. This condition is well illustrated in the example graphs presented in Figures 3.2-29 through 3.2-32 and matrices presented in Figures 3.2-33 through 3.2-36 for current WQOs and in Figures 3.2-37 through 3.2-40 for proposed WQOs.

Like the variability of TDS concentrations noted above, the minor differences in nitrate concentration between Project scenarios and No Project conditions result, in large part, from differences in the amounts of SWP spreading, SAR spreading, SAR channel percolation, and groundwater pumping.

As with the TDS concentrations, the deep index wells show infrequent variation and little difference between scenarios, and deep wells near the upper reaches of the SAR region maintain fairly constant, low nitrate concentrations as a result of recharge. Deep wells in the Pressure Zone, such as IW11 (Raub) shown in Figure 3.2-29 and IW12 (Lower Kelly) illustrated in Figure 3.2-30, show a steady decline in nitrate concentrations as high quality groundwater recharged at the spreading grounds gradually migrates to the Pressure Zone. The largest difference among deep wells between scenarios was observed at IW10 (Well 24A), illustrated in Figure 3.2-31, which shows a decline in nitrate concentration at the end of the model period under the No Project Scenario, while in Scenario A and B, it resumes its initial high concentration after a brief decline. This occurs as a result of increased recharge of high-quality, low nitrate SAR or SWP water at the Waterman, East Twin Creek, and Patton spreading grounds that push high nitrate groundwater from the Warm Creek region towards IW18 (Well 62). See Figure 3.2-32.

Projected nitrate concentrations at spreading grounds exhibit frequent fluctuations at Waterman, Devil Canyon/Sweetwater, and Patton spreading grounds in response to applied recharge water. Differences in nitrate concentrations between model scenarios at spreading grounds are principally a result of the frequency and amount of low nitrate recharge water allocated in each scenario.

As can be seen from the information presented in Figures 3.2-33 through 3.2-36, there are many instances of each of the impact levels. Under all Project scenarios, when considering current WQOs, the most frequently occurring impacts are beneficial with almost 60 percent of all impact determinations falling in this category (Table 3.2-19). Significant impacts would be experienced in no more than 17 percent of all instances. The largest concentration of significant impacts occurs at locations within the Bunker Hill I and Bunker Hill Pressure Zone sub-basins for all Project scenarios. All locations within the Bunker Hill I and Bunker Hill Pressure Zone sub-basins experience significant impacts at some time during the 39-year forecast period. Most beneficial impacts tend to occur at locations throughout the Bunker Hill II sub-basin and, to a lesser degree within the Lytle Creek sub-basin.

Table 3.2-19. Frequency of Impact Determinations for Nitrate

	IMPACT DETERMINATION		
Project Scenario	*% Significant*	*% Less than Significant*	*% Beneficial*
CURRENT WQO			
A	15	22	63
B	17	23	60
C	15	28	57
D	13	27	60
PROPOSED WQO			
A	2	35	63
B	3	37	60
C	3	39	58
D	4	36	60

When proposed WQOs are used in the assessment of impacts, the proportion of beneficial impacts remains essentially unchanged; see Figures 3.2-37 through 3.2-40. However, the proportion of significant impacts is reduced substantially and does not exceed 4 percent for any of the four Project scenarios. Locations with significant impacts cluster in Bunker Hill A, with beneficial impacts concentrated throughout the Bunker Hill B sub-basin.

MITIGATION MEASURES

MM GW-1: Using available data, Muni/Western will, on an annual basis, evaluate impacts of the Project on nitrate concentrations in the SBBA. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni Western will direct Project water spreading to reduce significant nitrate impacts.

RESIDUAL IMPACTS

With implementation of MM GW-1, impacts to nitrate concentration levels would be reduced. However, there may be short time periods when significant impacts remain. Therefore, impacts to nitrate concentration levels in the SBBA would be significant and unavoidable.

This page intentionally left blank.

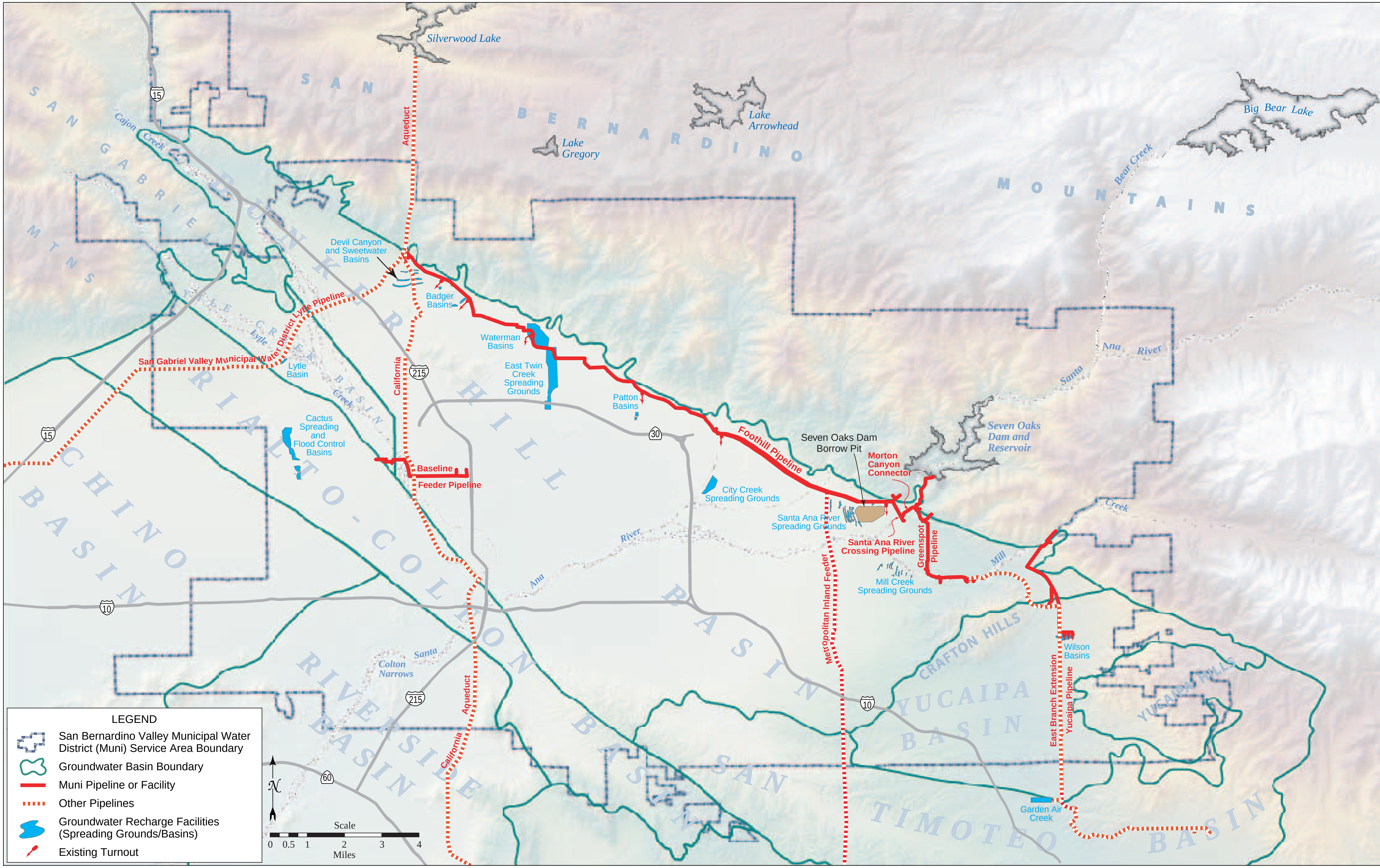


Figure 3.2-1. Groundwater Basins and Recharge Facilities

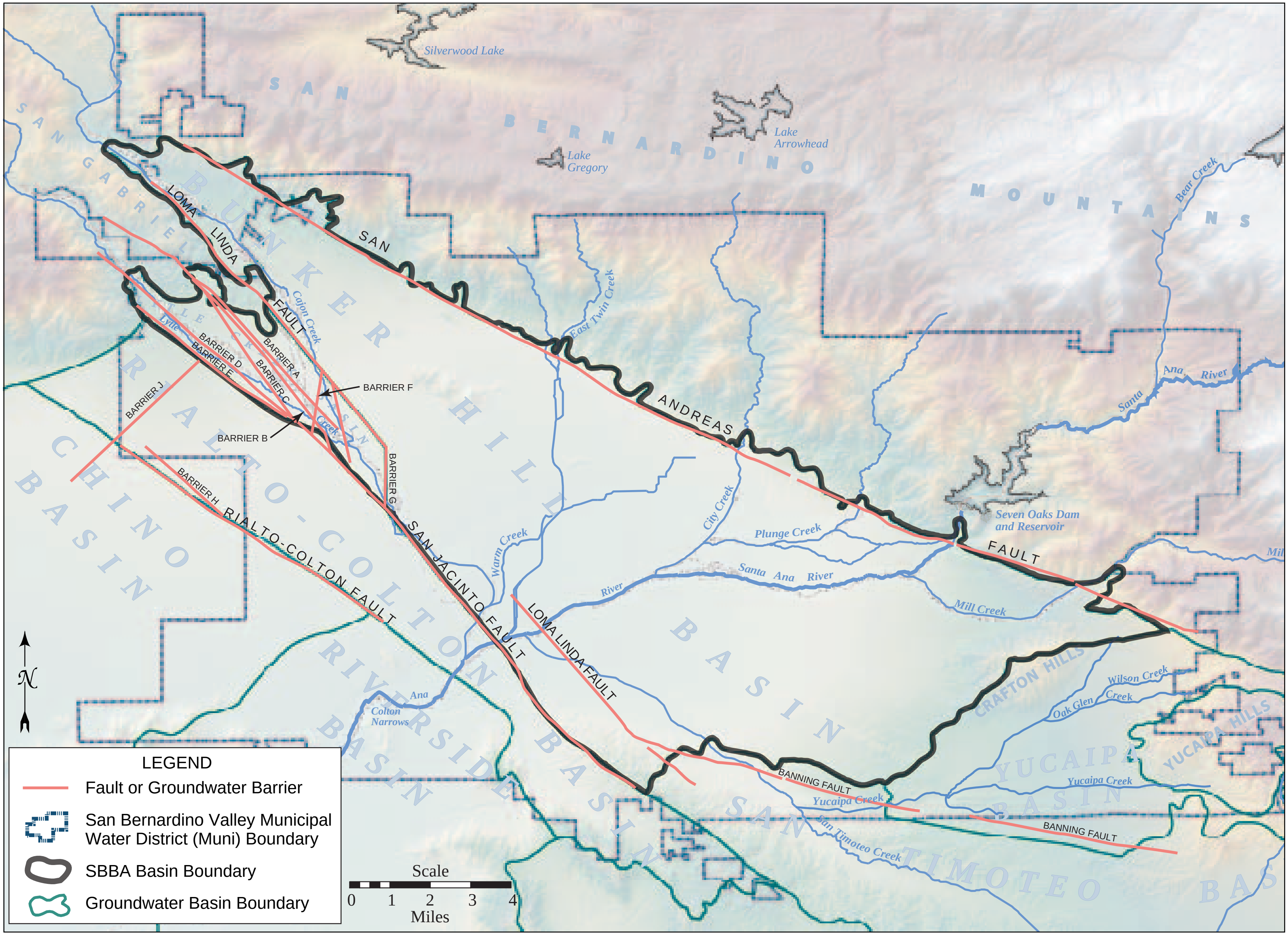


Figure 3.2-2. San Bernardino Basin Area (SBBA)

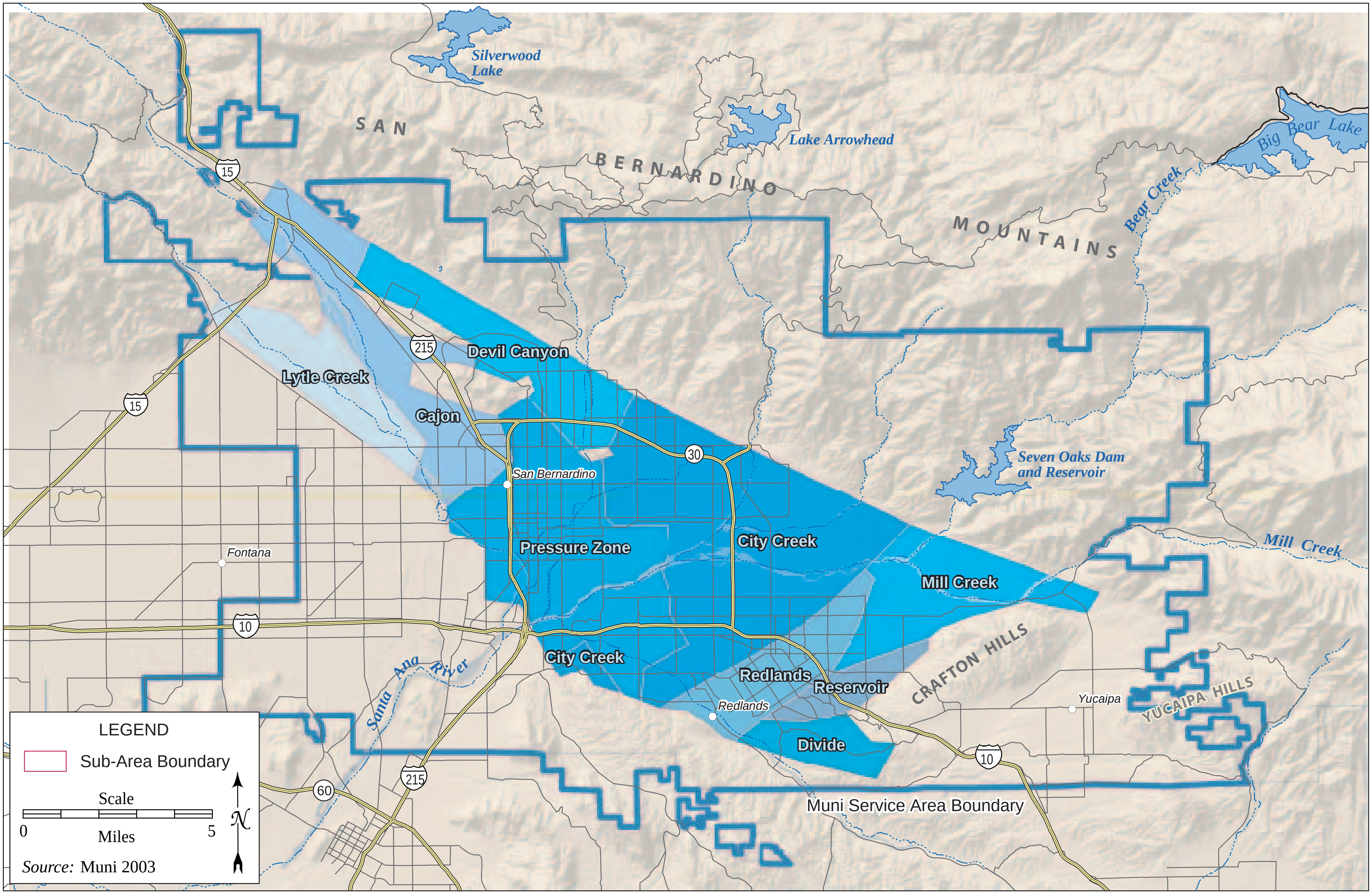


Figure 3.2-3. San Bernardino Basin Area (SBBA): Sub-Areas

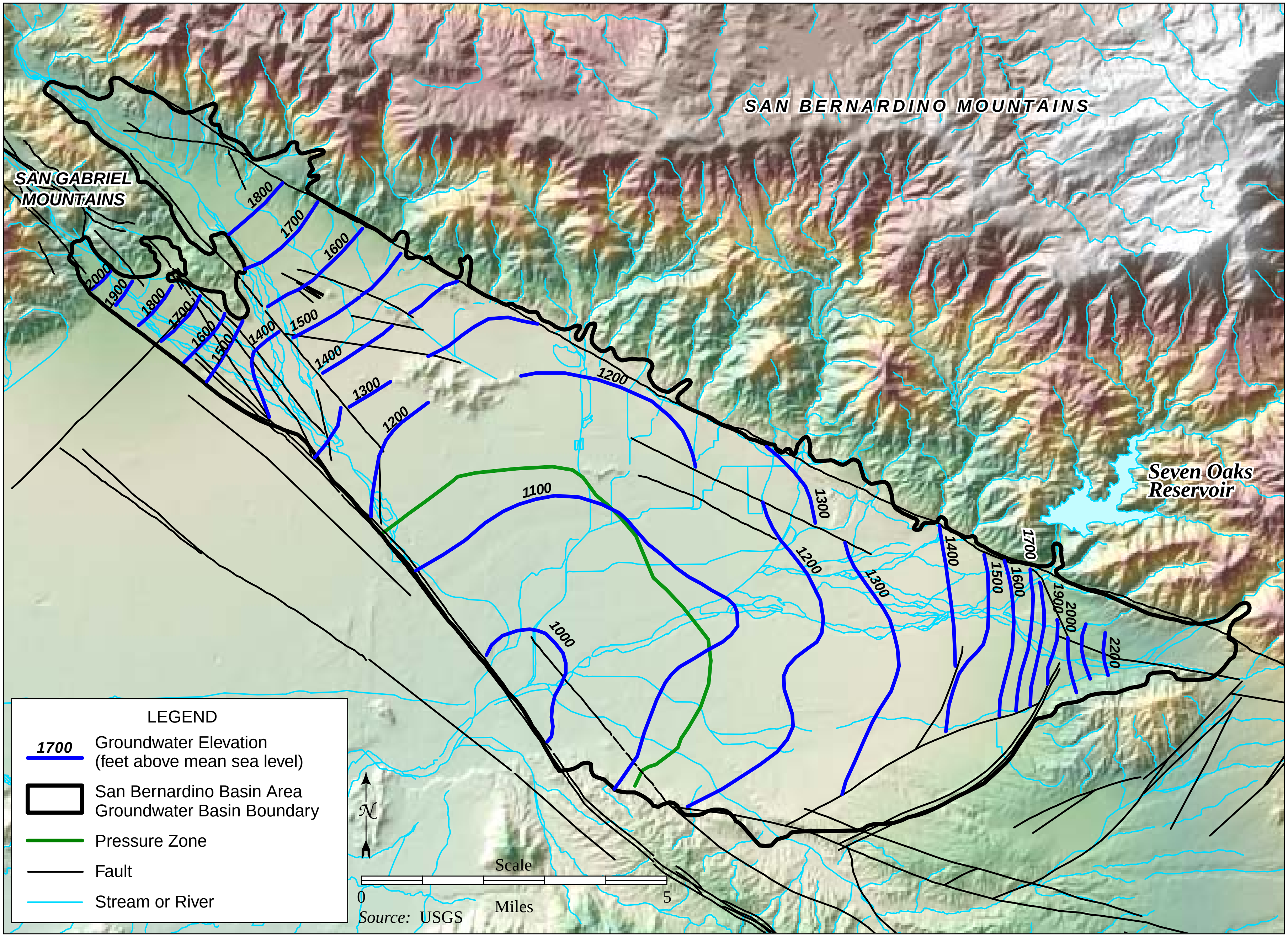
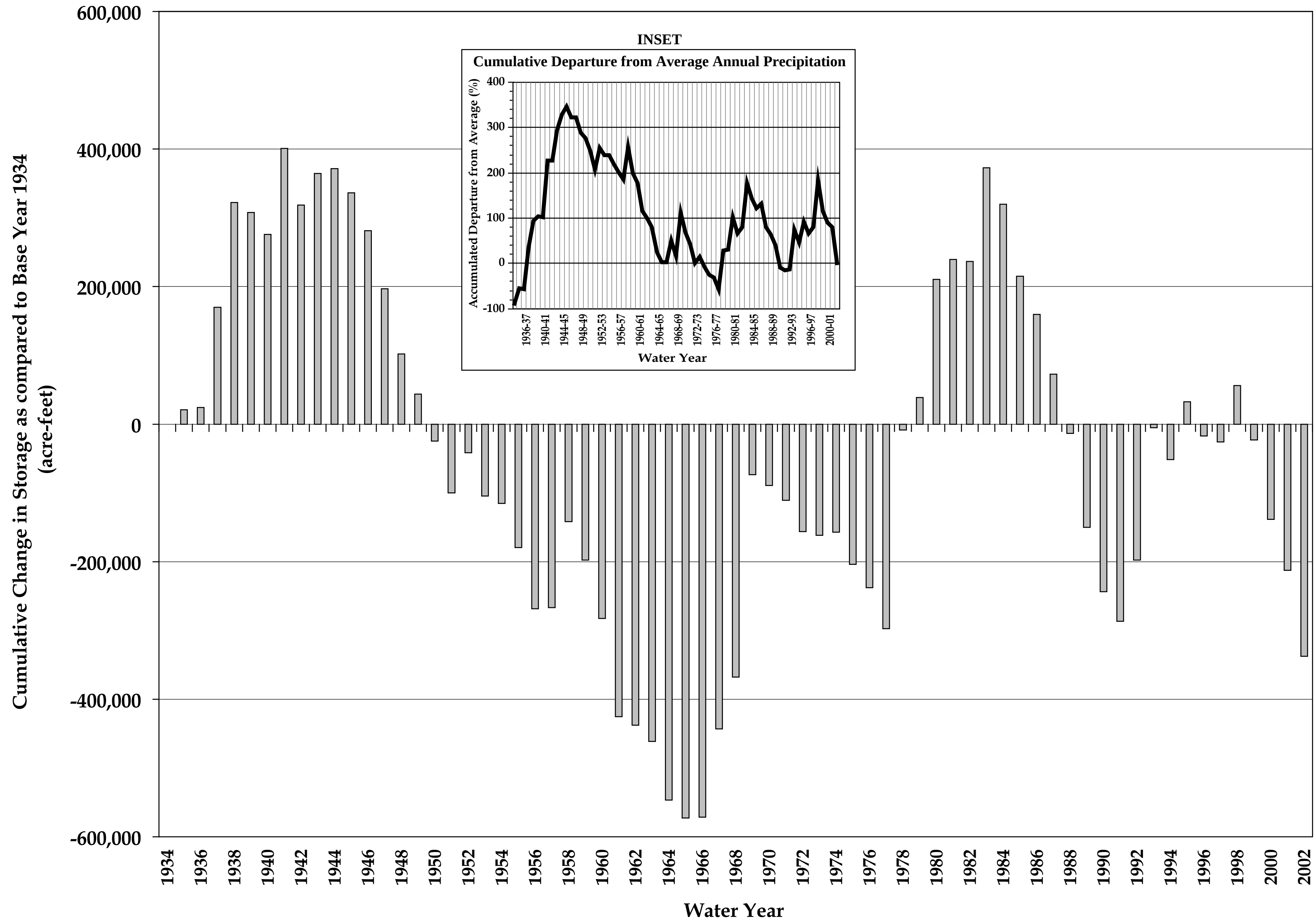


Figure 3.2-4. San Bernardino Basin Area (SBBA) Groundwater Elevation Contours - 1994



Source: Muni 2003

Figure 3.2-5. Cumulative Change in Groundwater Storage for the SBBA, WY 1934-35 to WY 2001-02

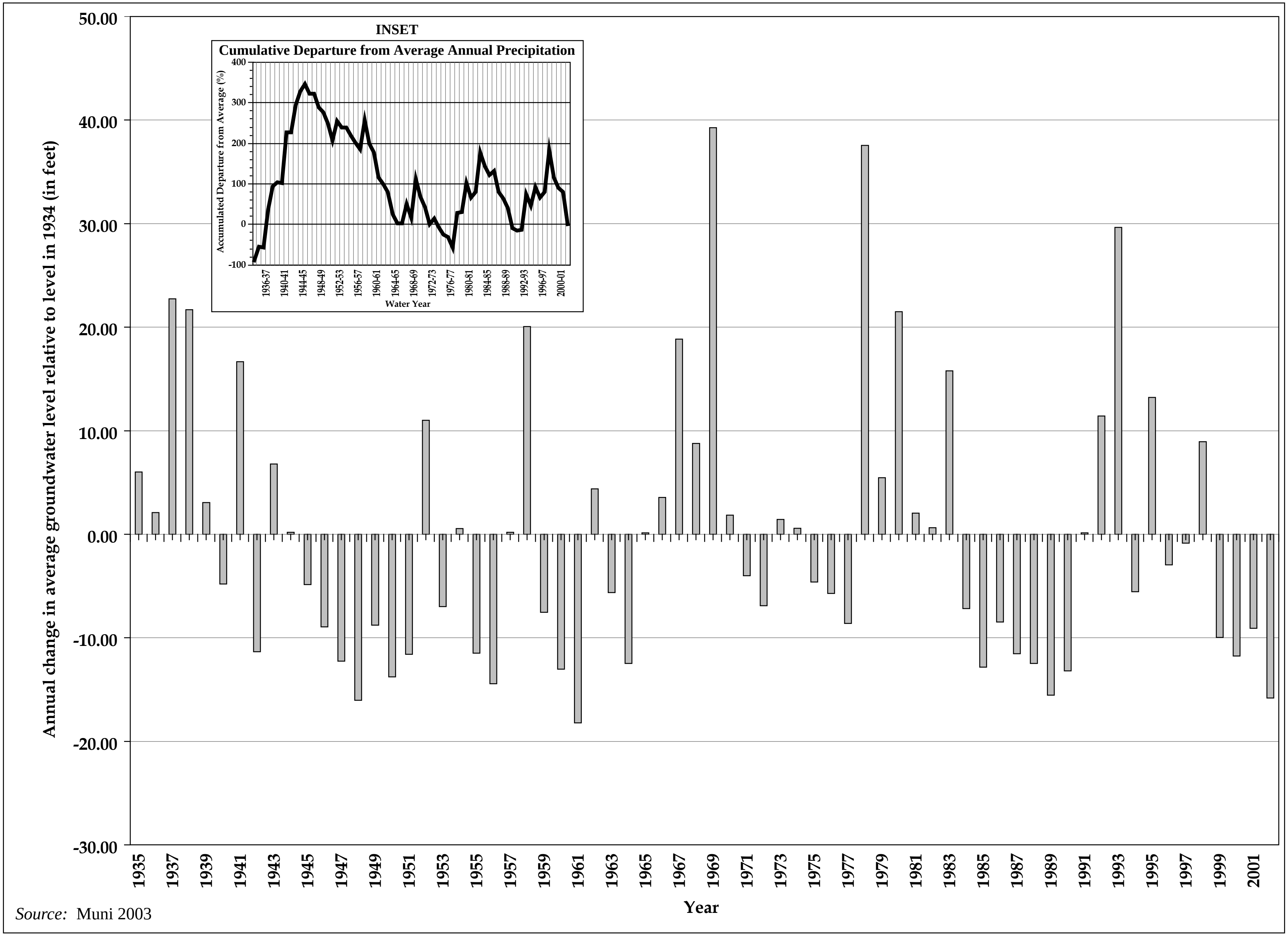


Figure 3.2-6. Average Change in Depth to Groundwater in the SBBA

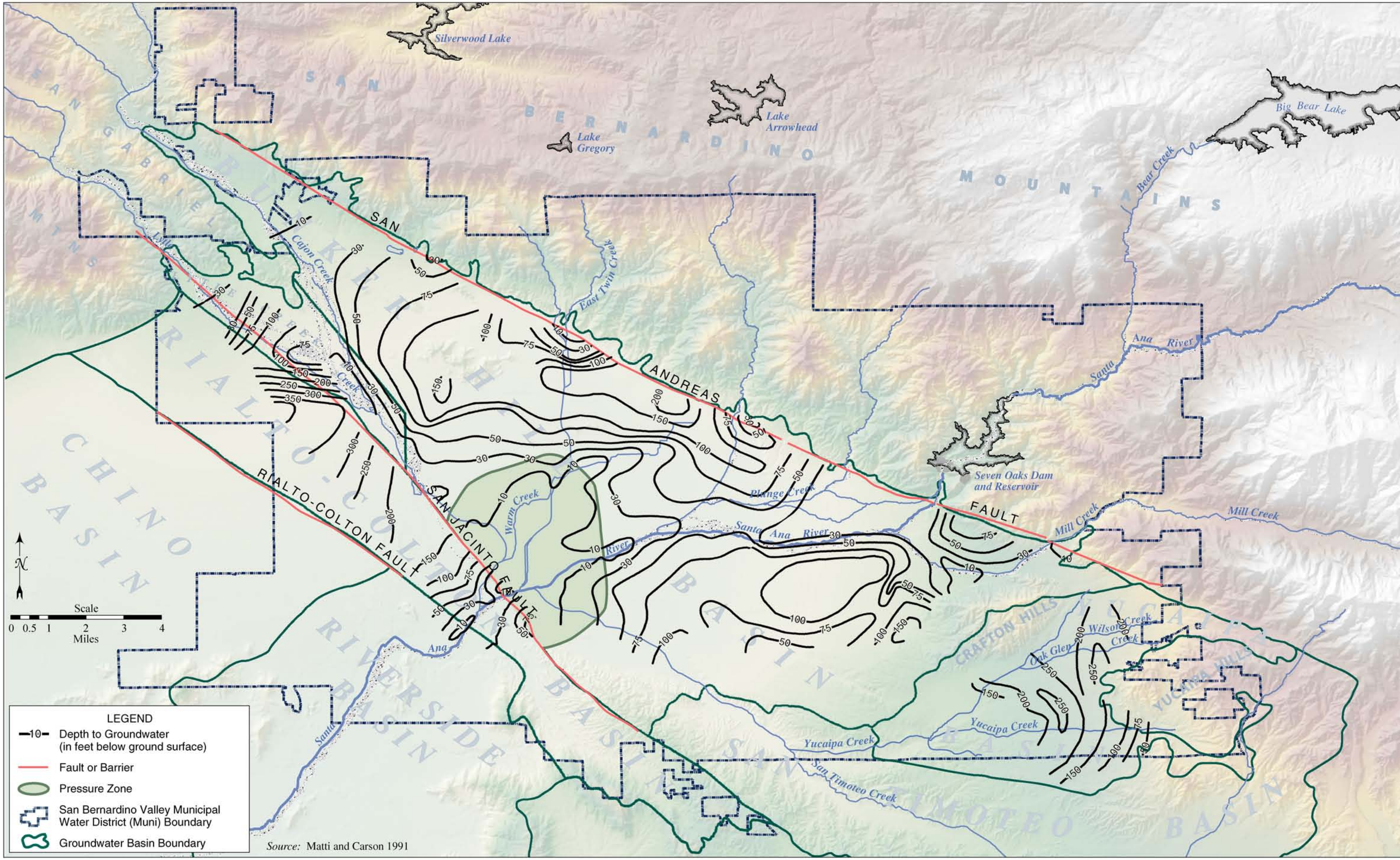


Figure 3.2-7. San Bernardino Basin Area (SBBA)
Depth to Groundwater in 1991

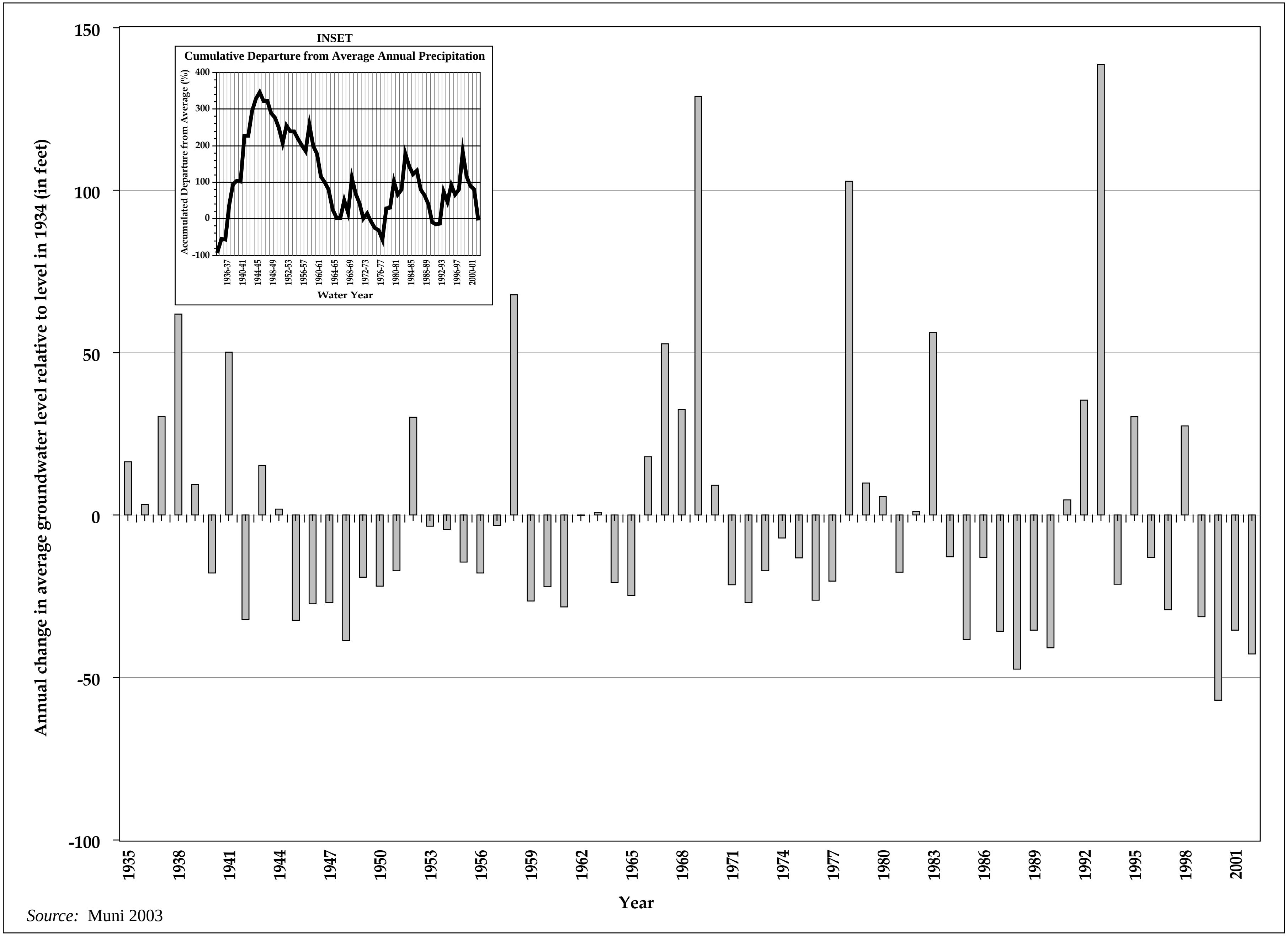


Figure 3.2-8. Average Change in Depth to Groundwater in the Lytle Creek Basin

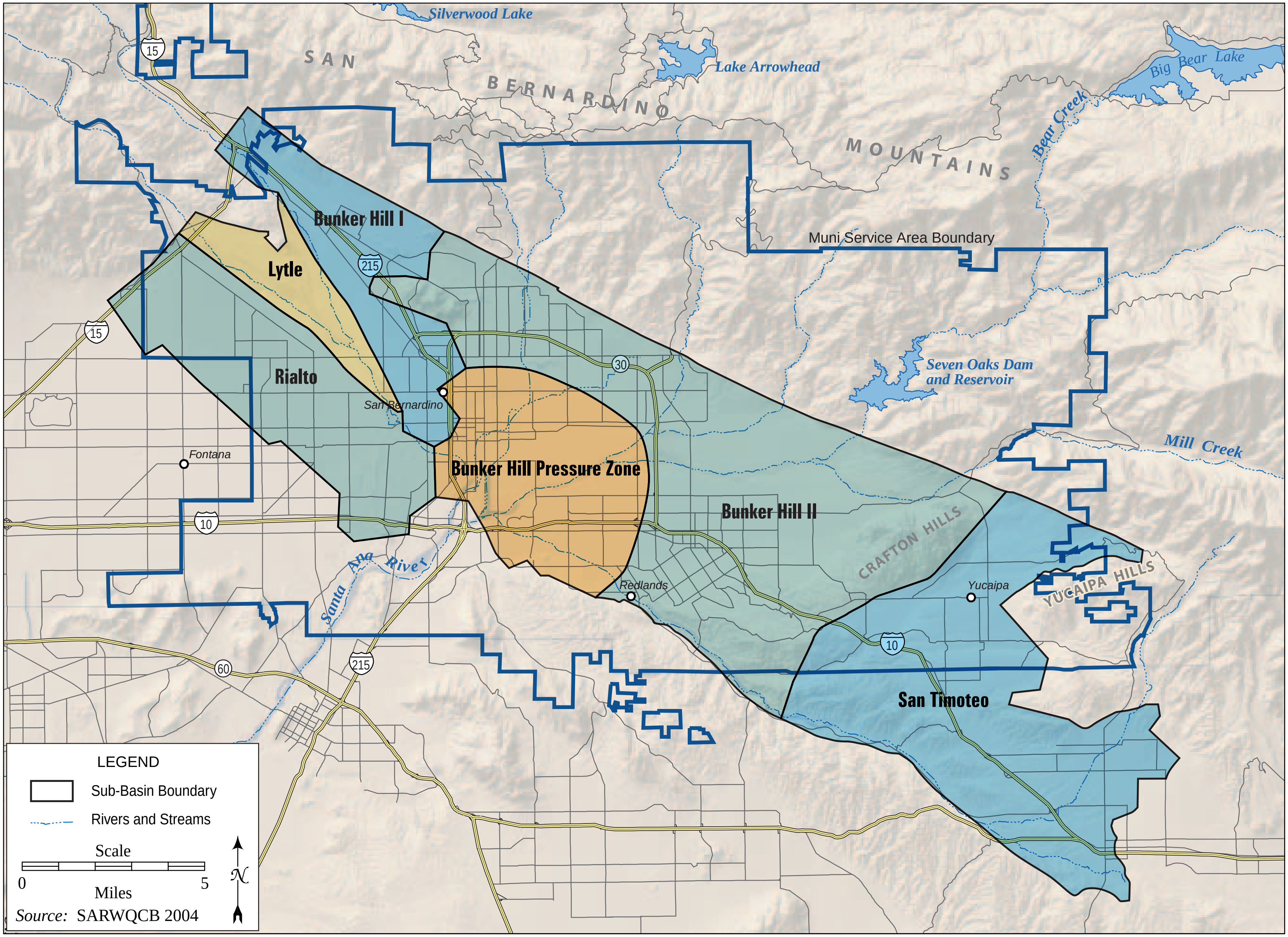


Figure 3.2-9. Current SARWQCB Sub-Basin Boundaries

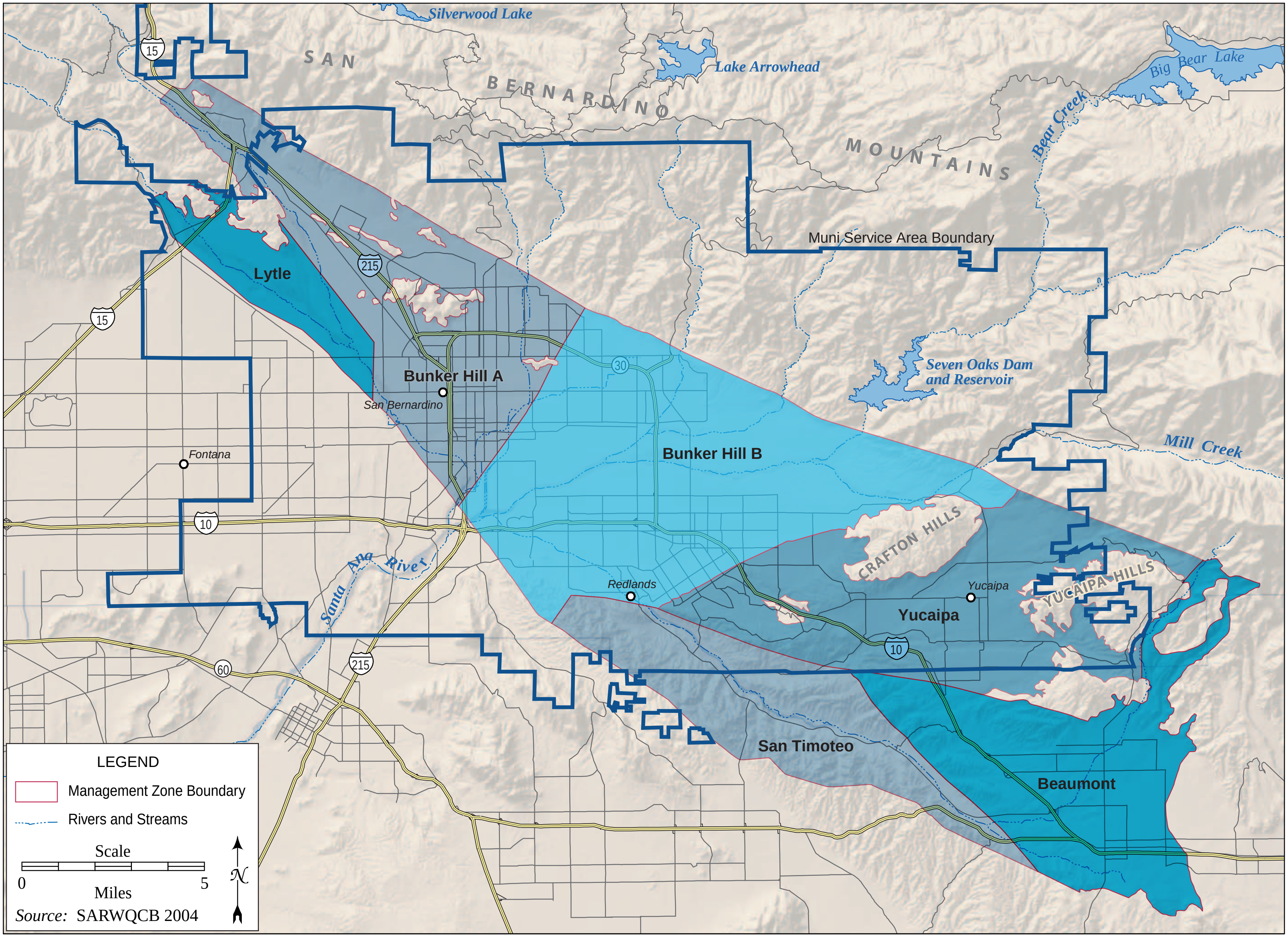


Figure 3.2-10. Proposed SARWQCB Management Zone Boundaries

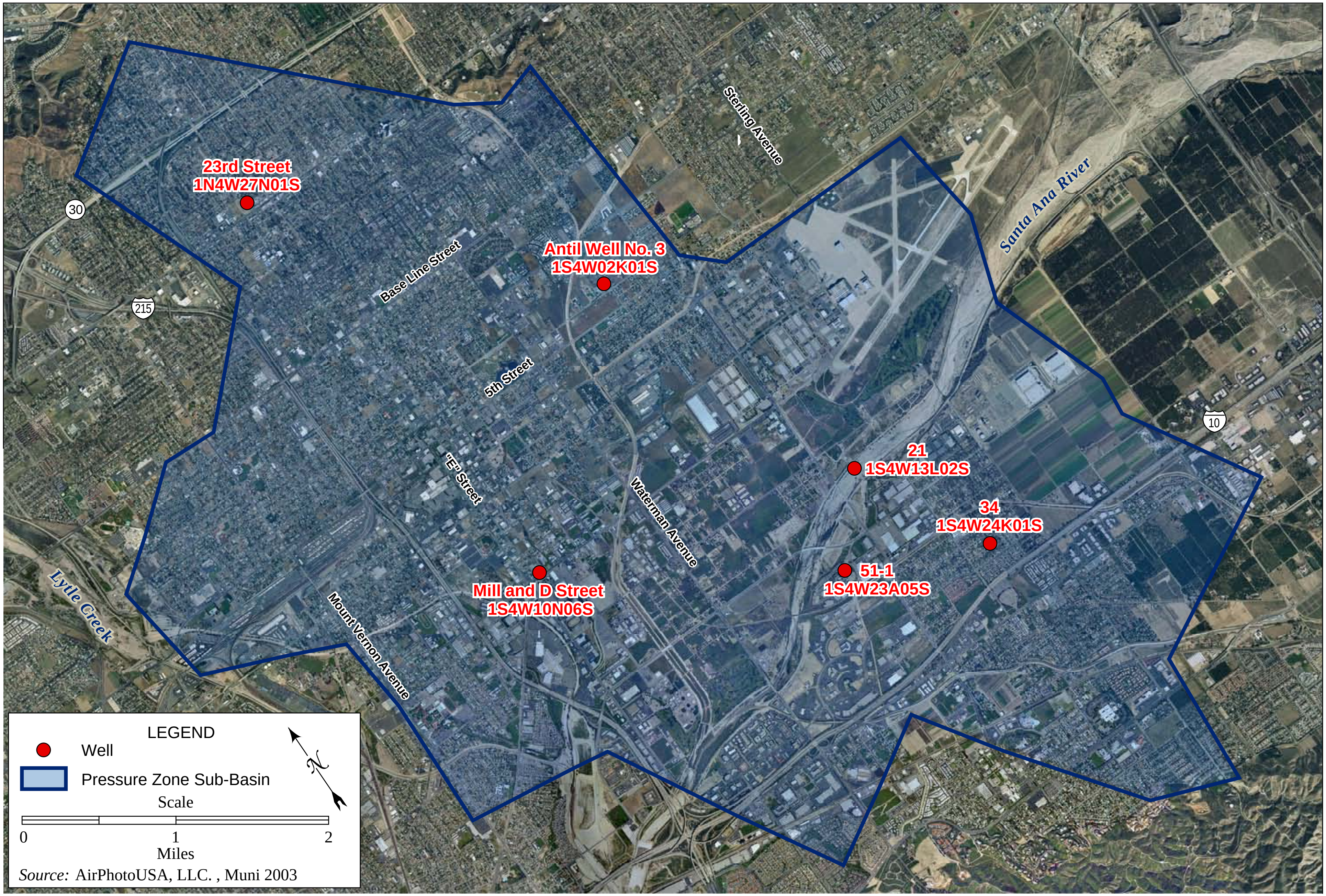


Figure 3.2-11. San Bernardino Basin Area (SBBA): Pressure Zone Sub-Basin and Well Locations

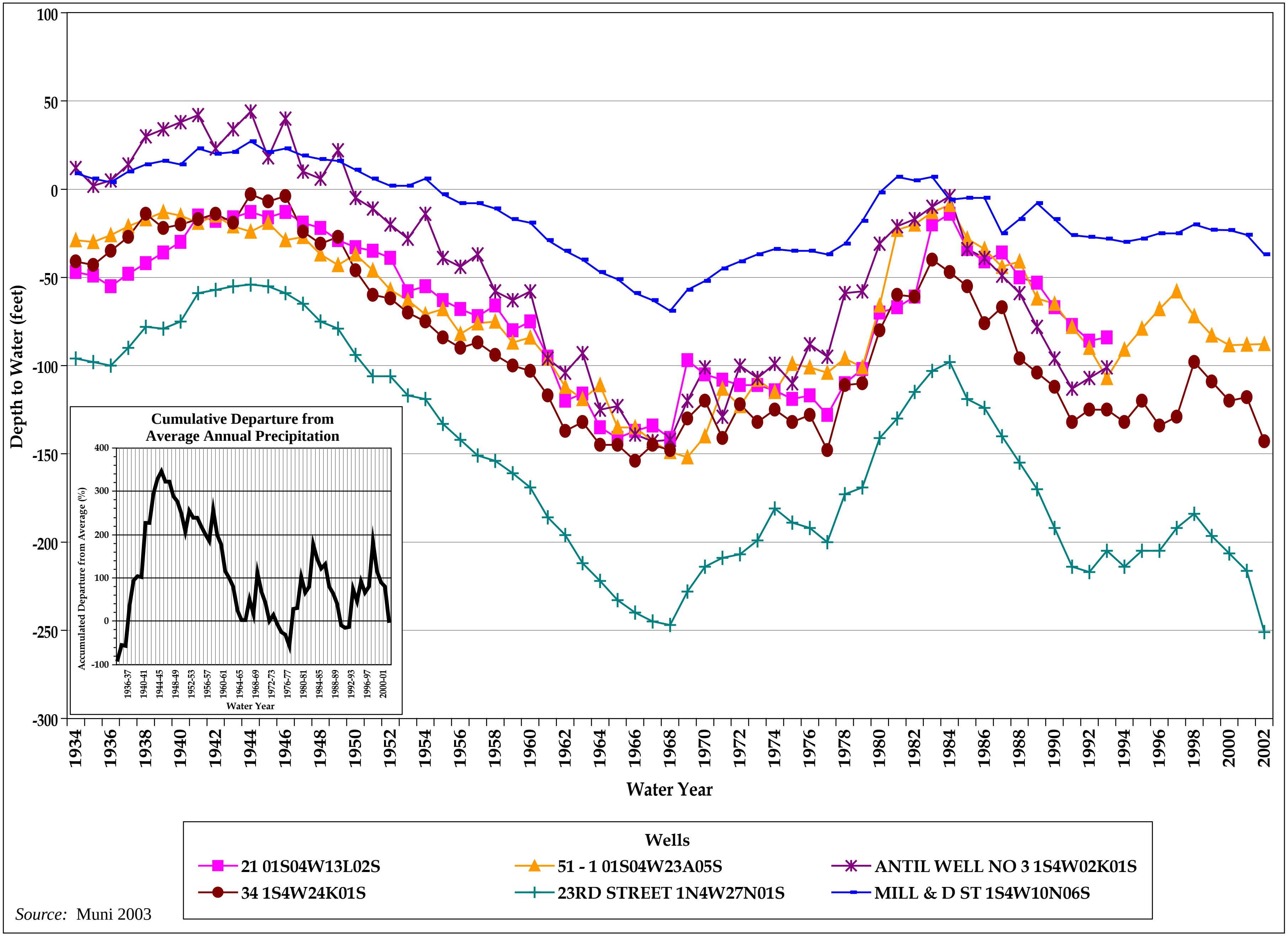
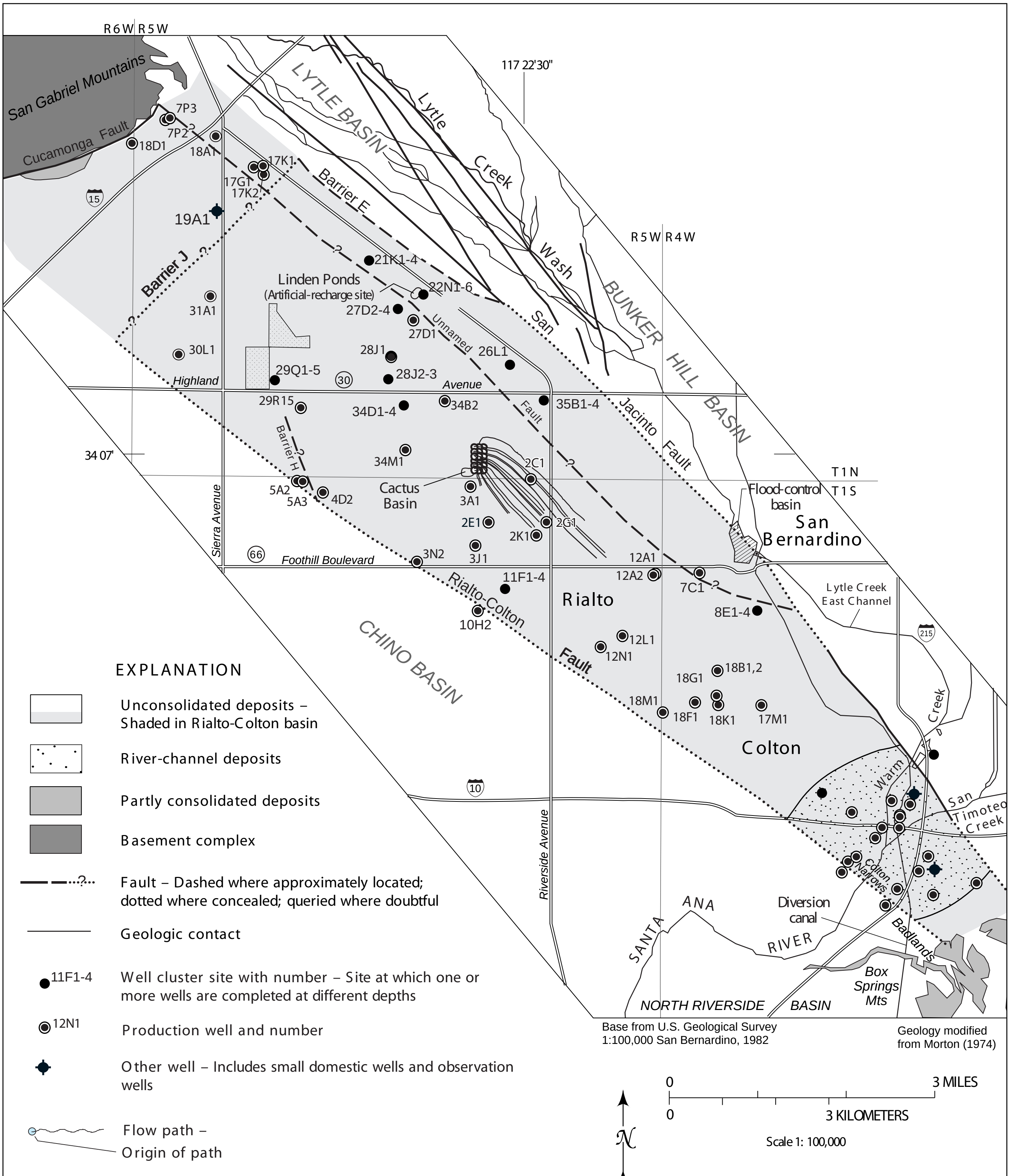


Figure 3.2-12. Groundwater Level Hydrographs for Selected Wells in the Pressure Zone Sub-Basin, WY 1934-35 to WY 2001-02



Source: Woolfenden and Koczot 1999

Figure 3.2-13. Simulated Flow Pattern (1982-2027) with Historical Recharge in Cactus Basin

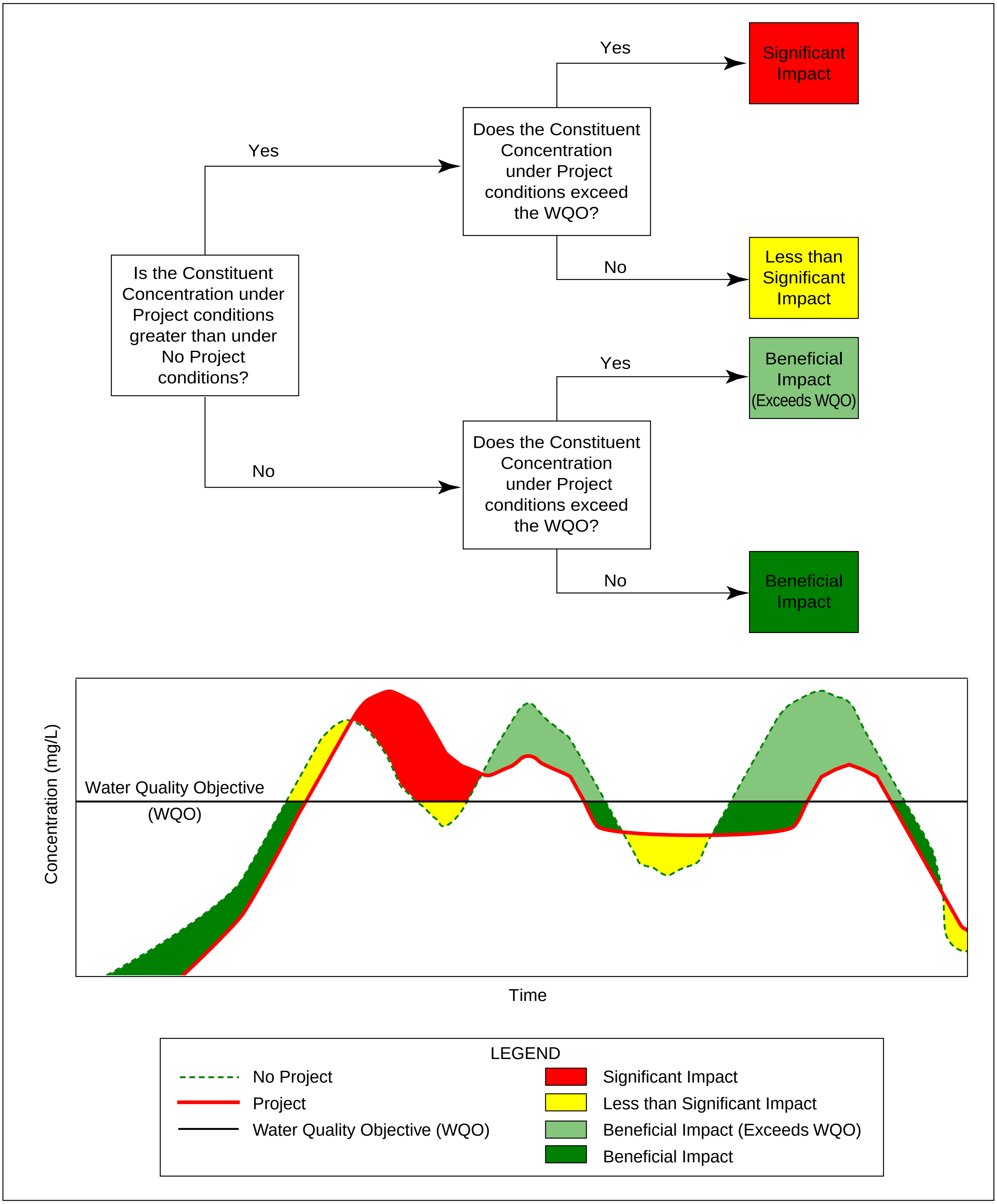


Figure 3.2-14. General Schematic for Groundwater Quality Impact Methodology Decision Flow Chart

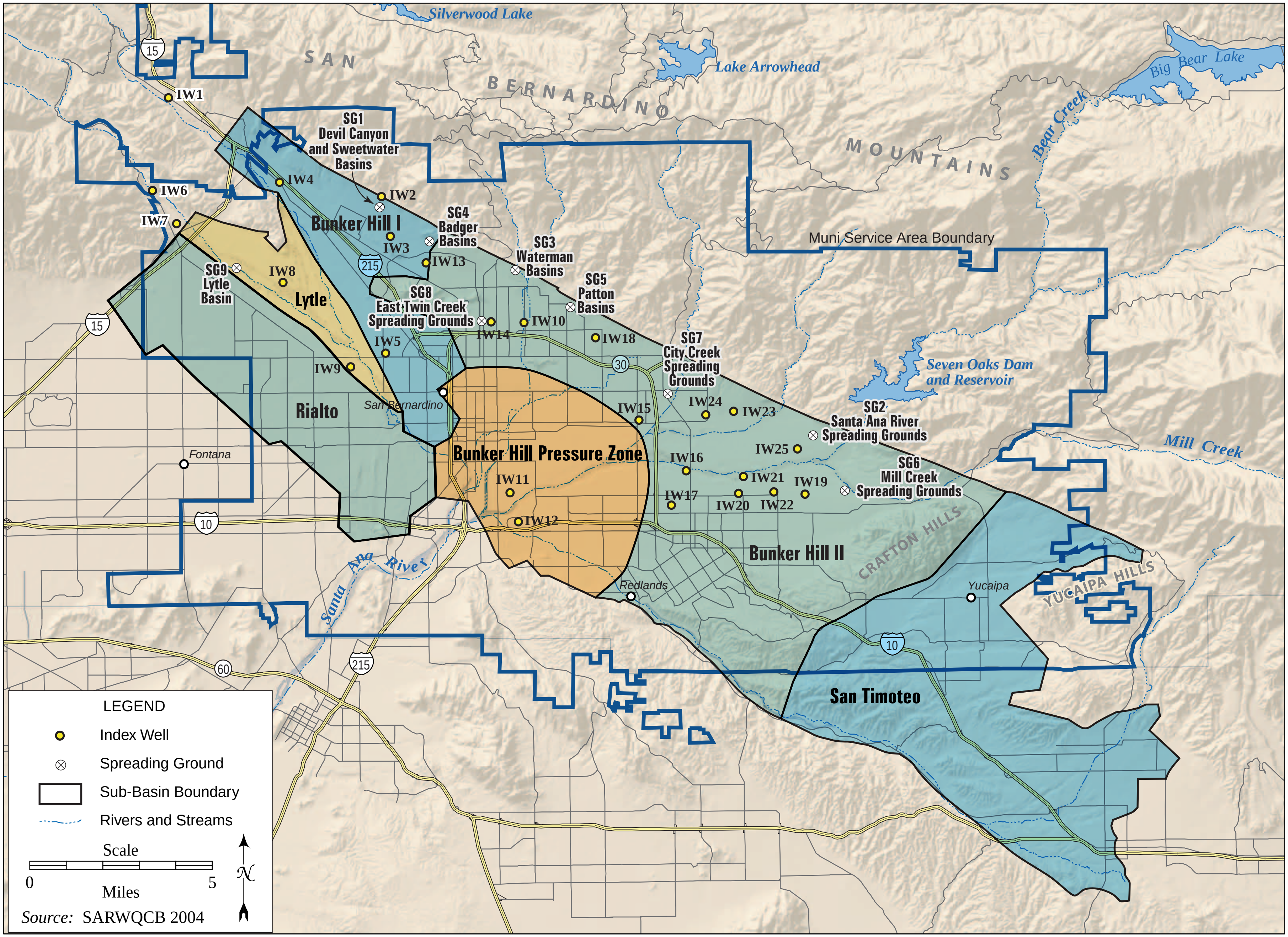


Figure 3.2-15. Location of Index Wells and Spreading Grounds in Relation to Current SARWQCB Sub-Basins

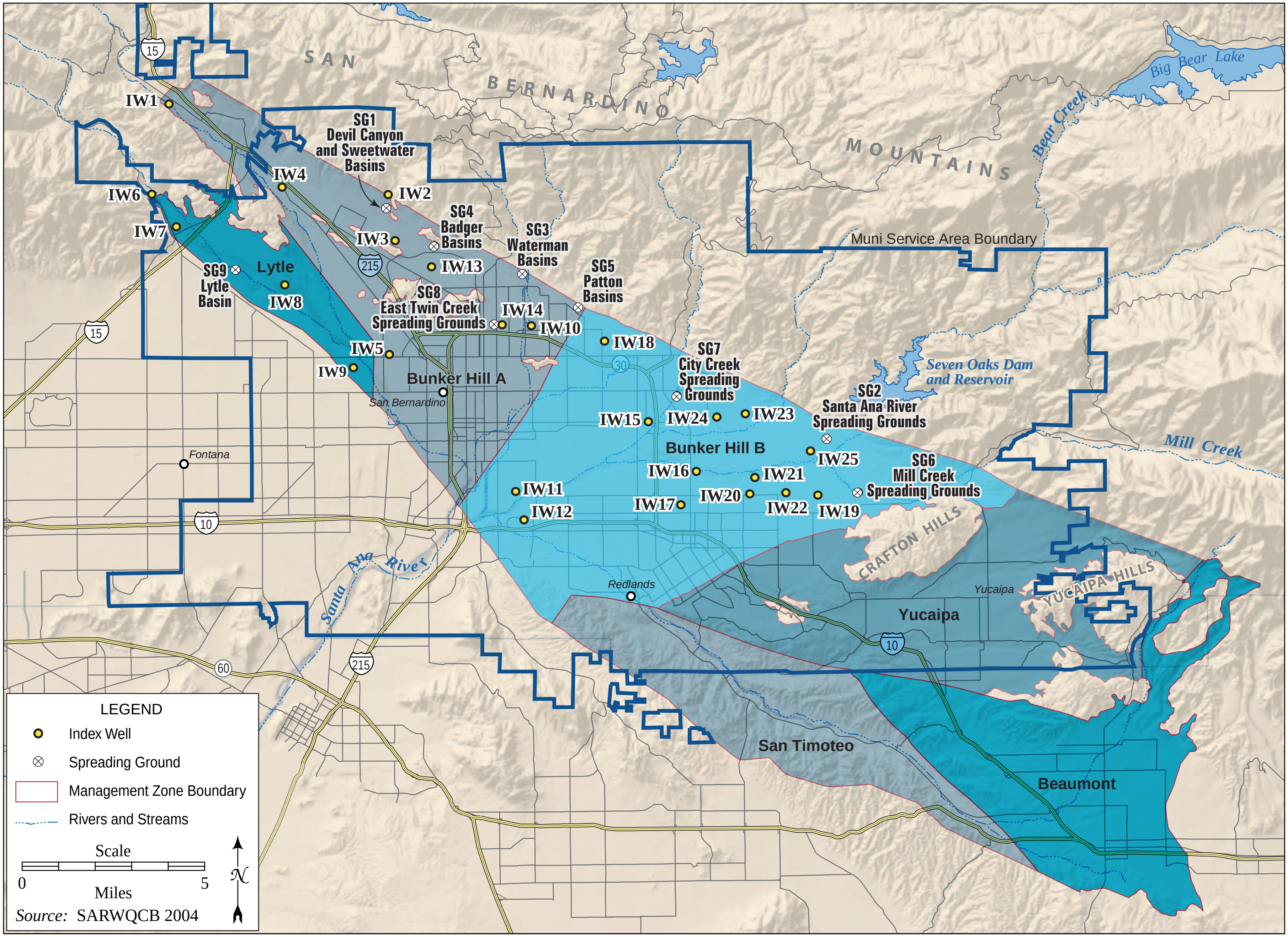


Figure 3.2-16. Location of Index Wells and Spreading Grounds in Relation to Proposed SARWQCB Management Zone Boundaries

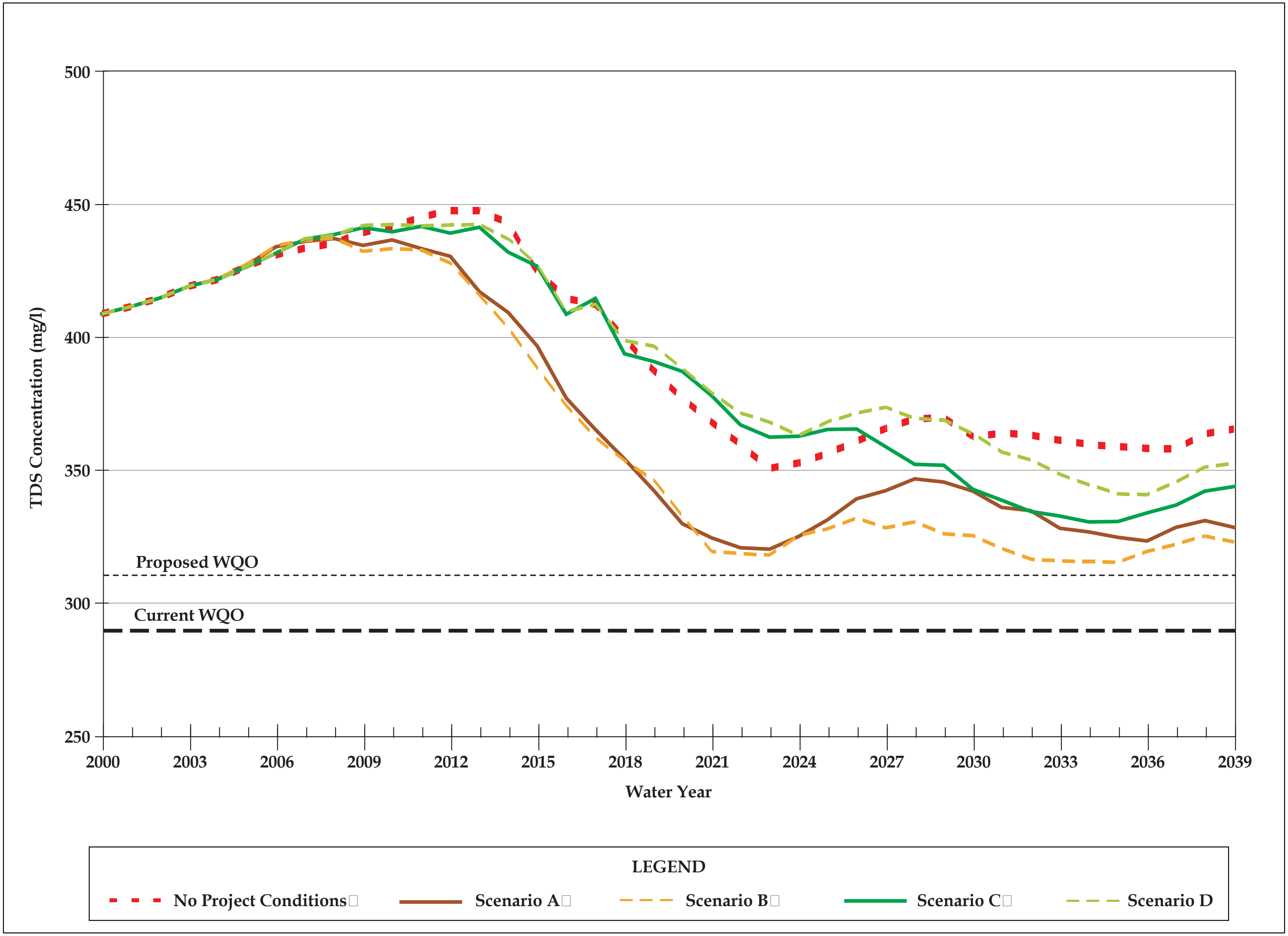


Figure 3.2-17. TDS Concentrations at IW14, Leroy Street Well

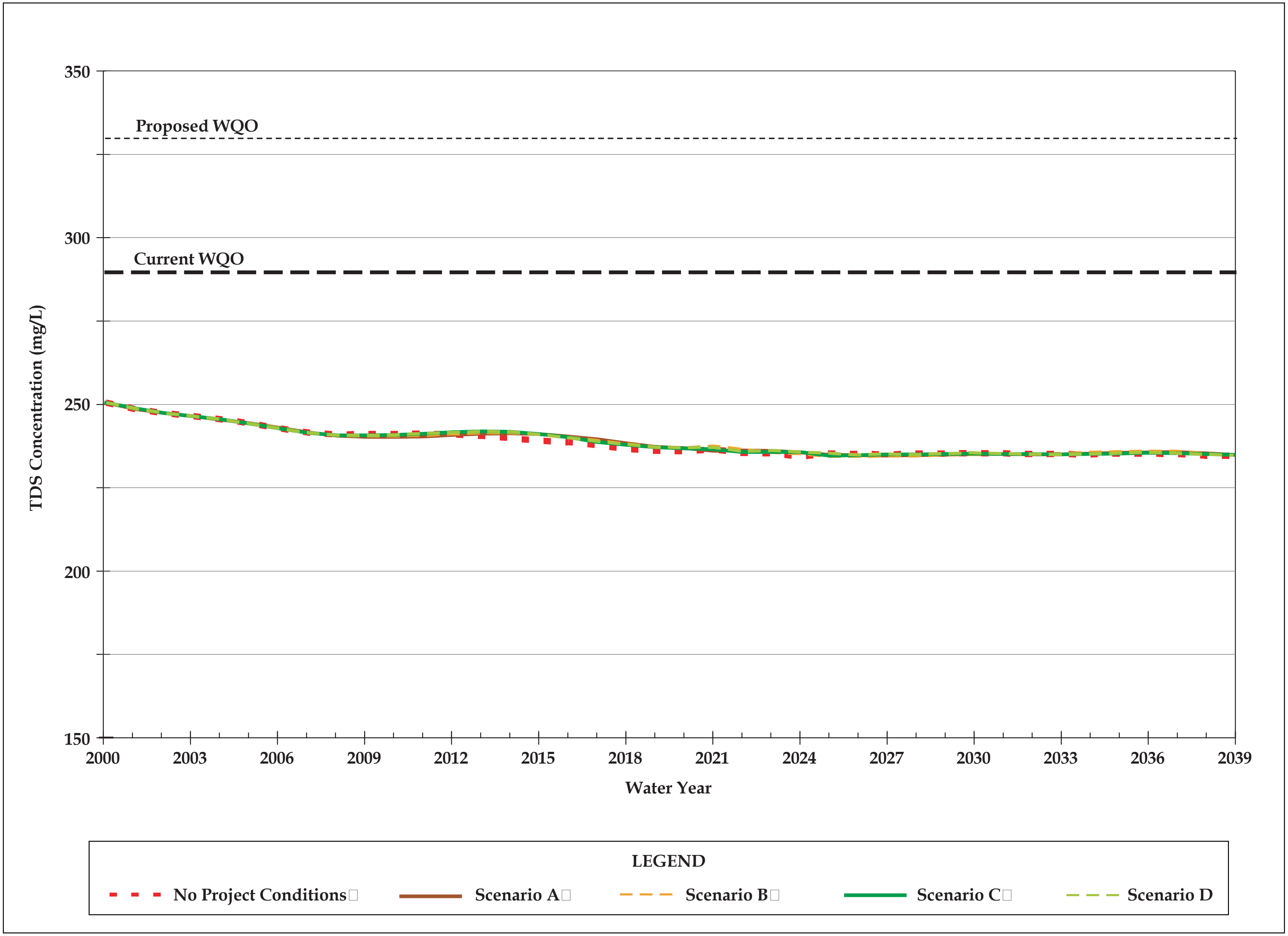


Figure 3.2-18. TDS Concentrations at IW17, Well 32

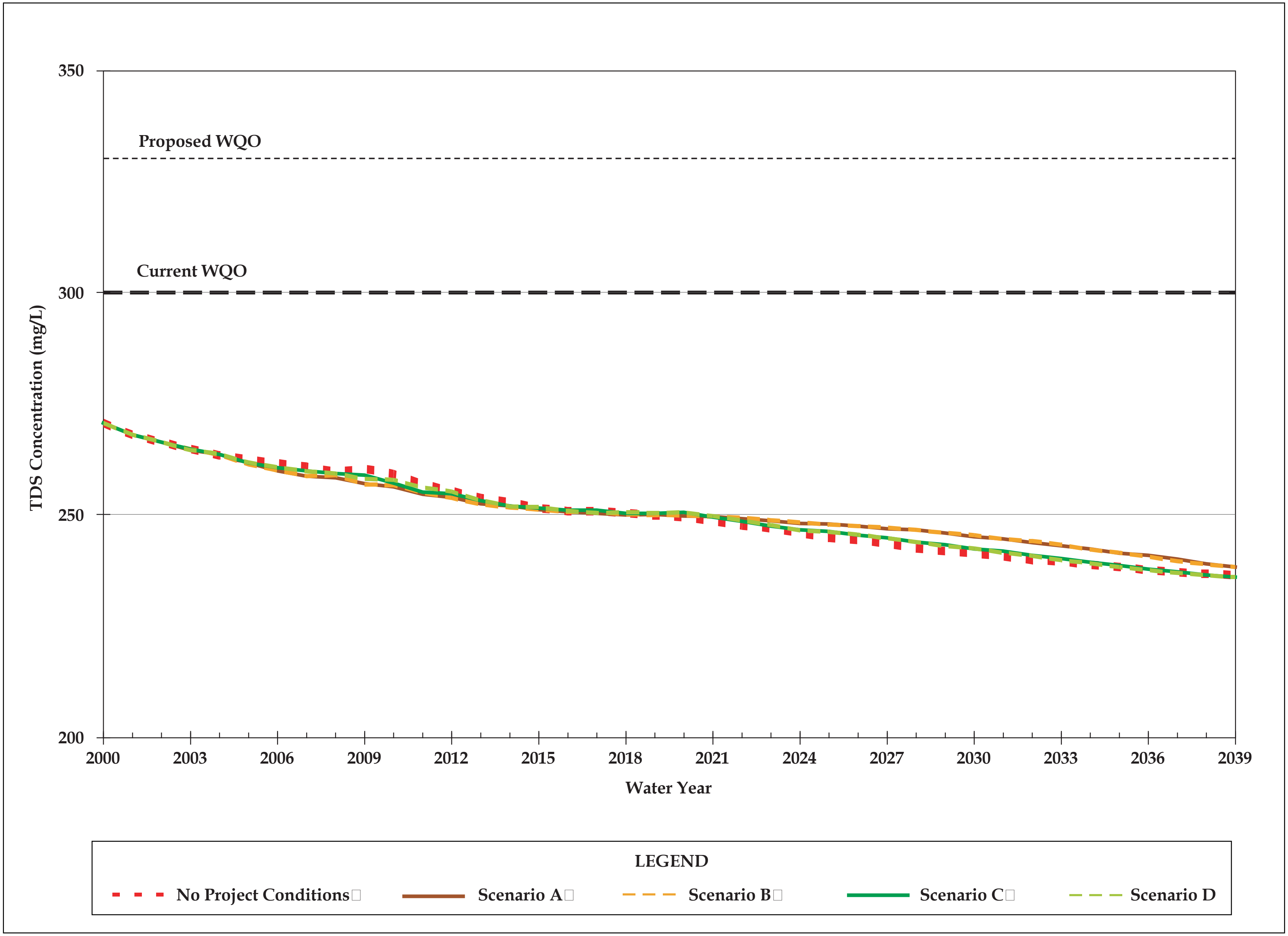


Figure 3.2-19. TDS Concentrations at IW11, Raub 1 Well

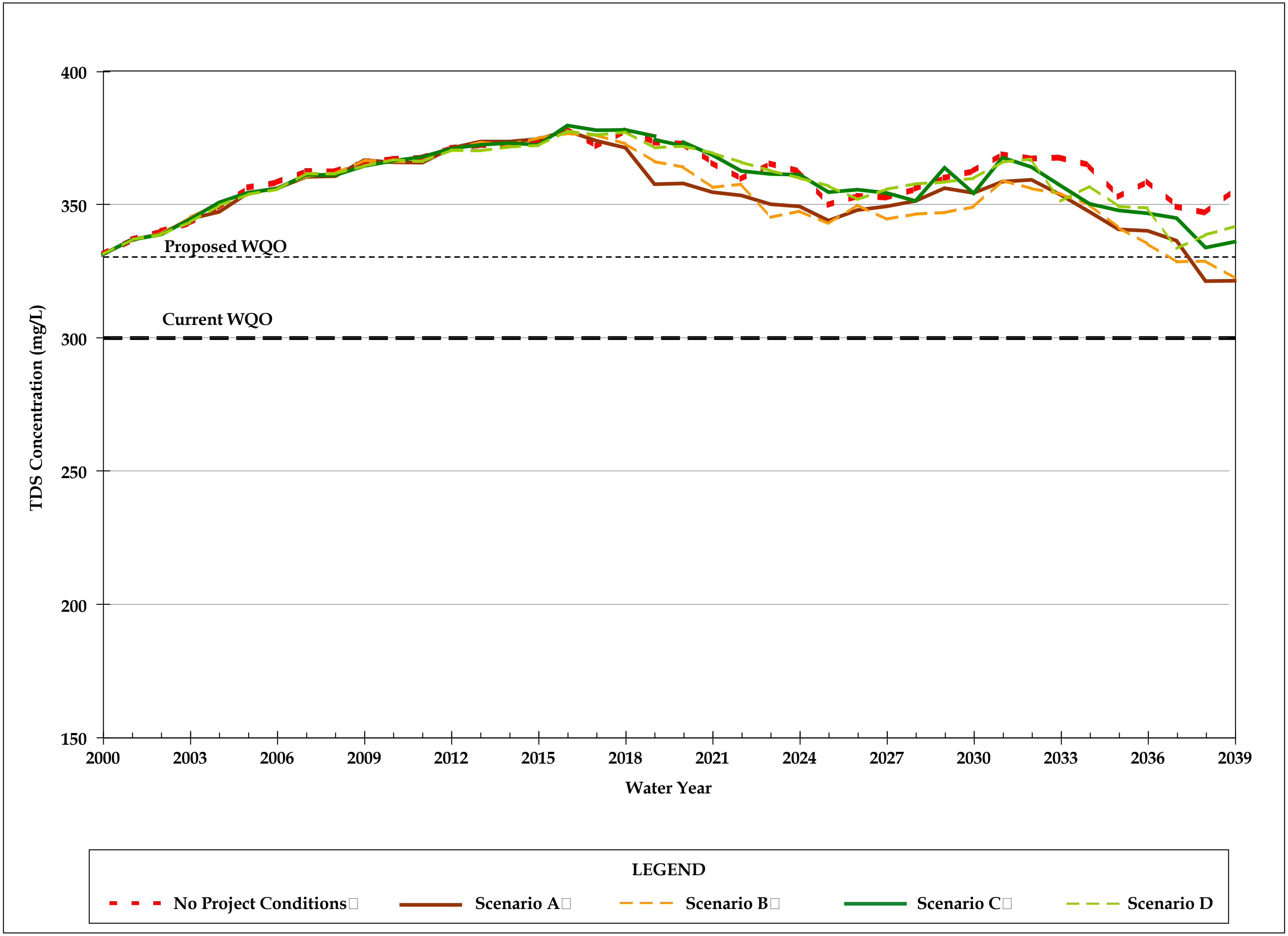


Figure 3.2-20. TDS Concentrations at IW12, Lower Kelly Well

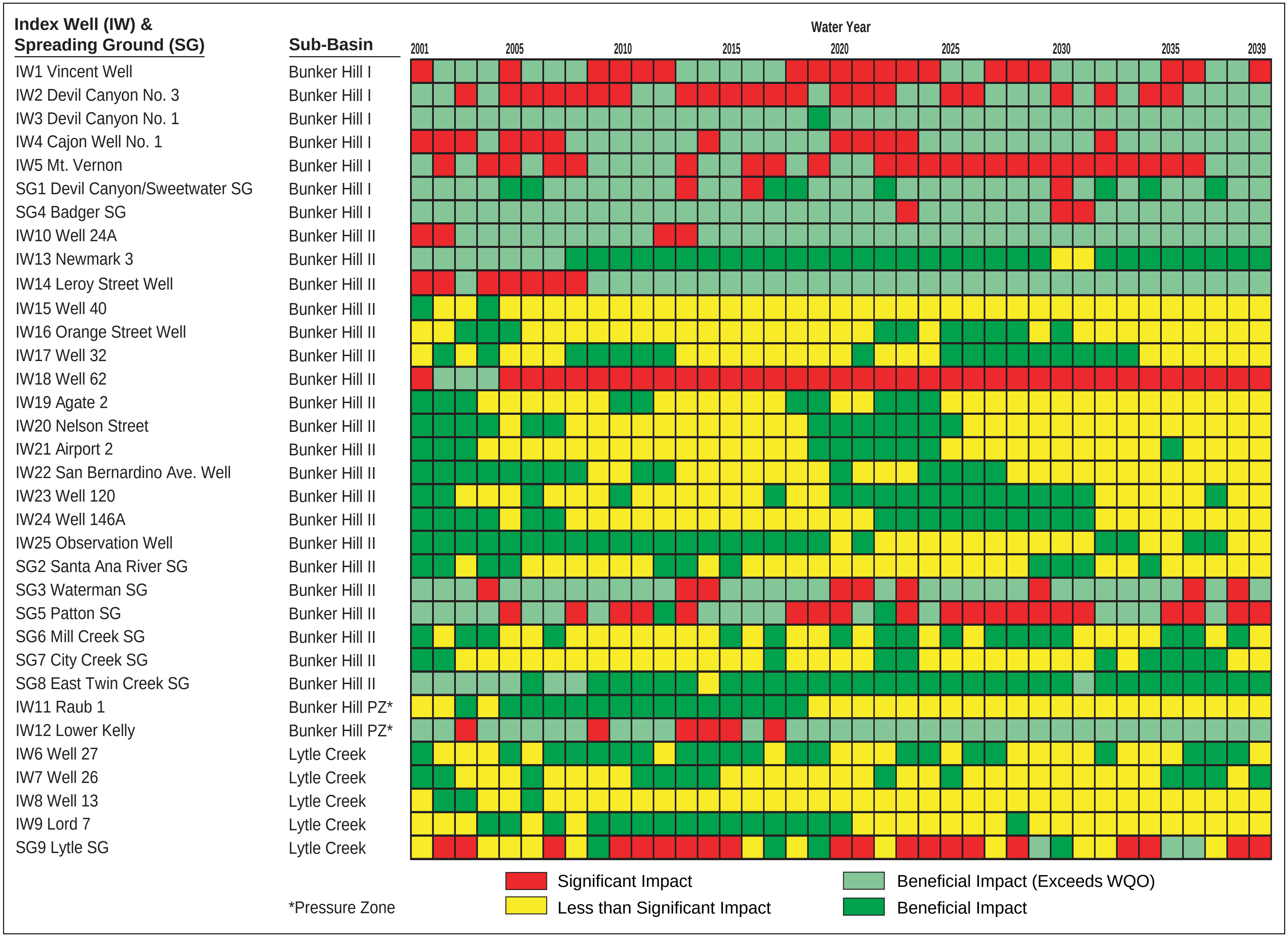


Figure 3.2-21. Annual Impacts for TDS - Scenario A (Current WQOs)

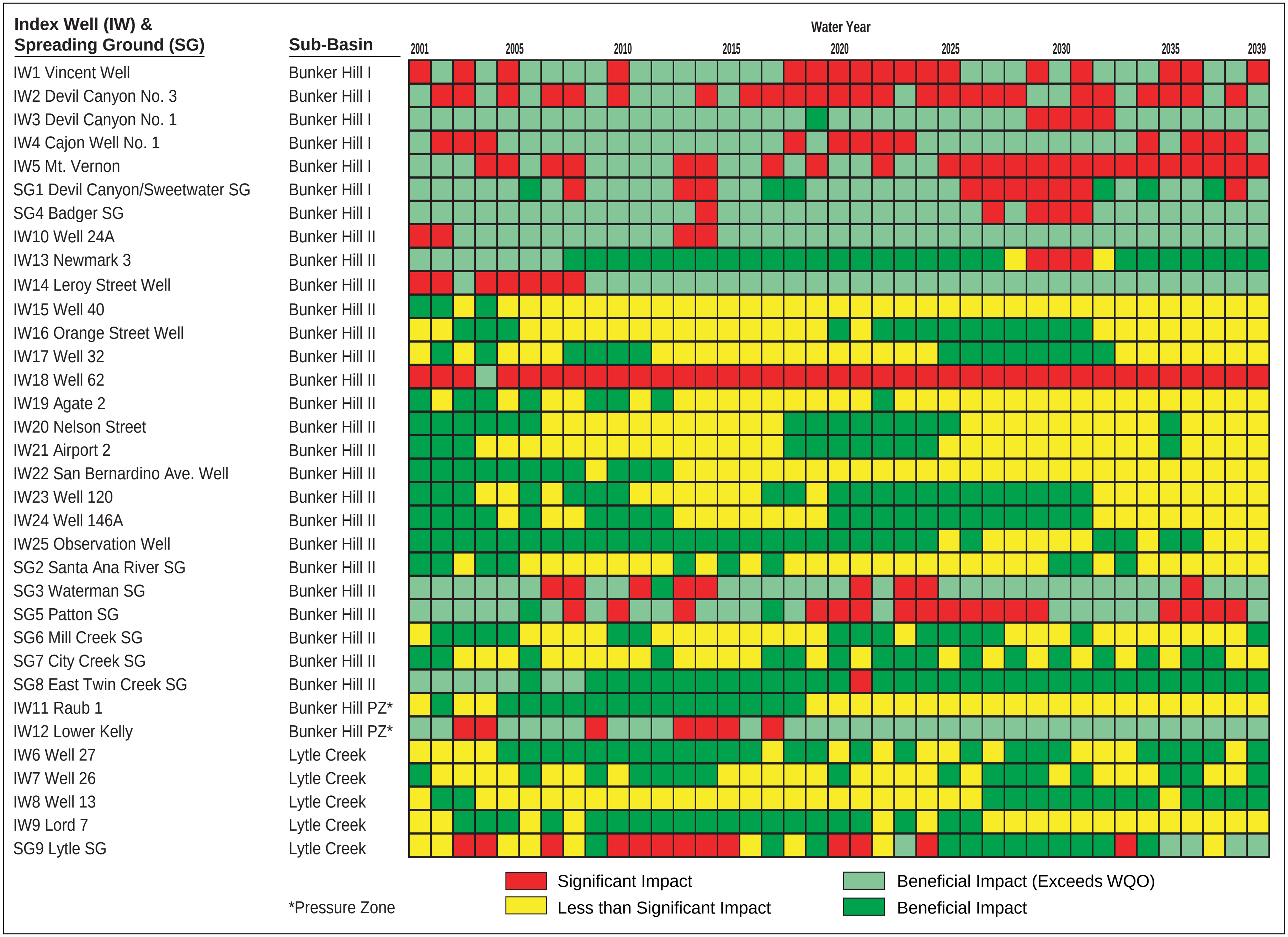


Figure 3.2-22. Annual Impacts for TDS - Scenario B (Current WQOs)

Figure 3.2-23. Annual Impacts for TDS - Scenario C (Current WQOs)

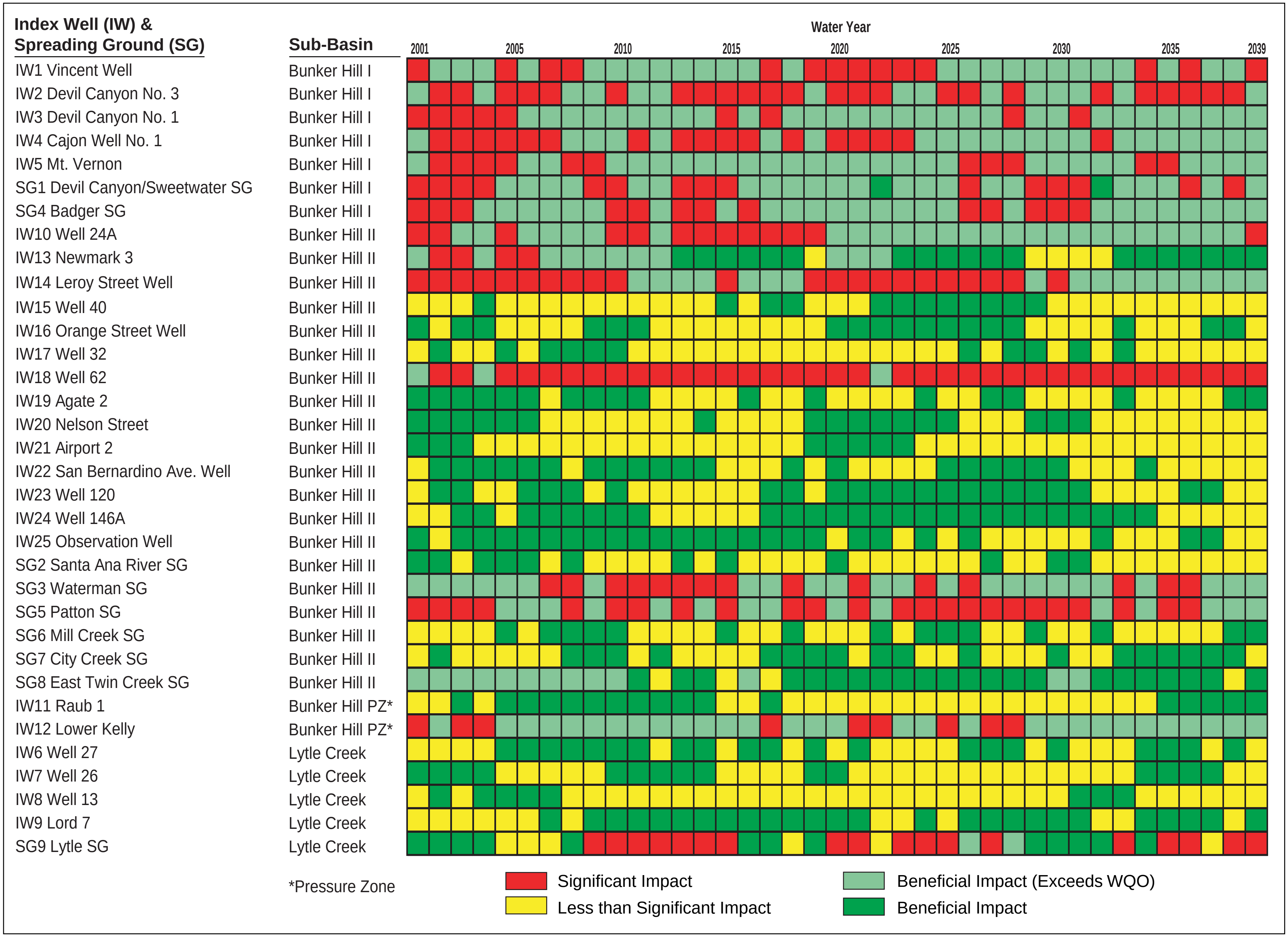


Figure 3.2-24. Annual Impacts for TDS - Scenario D (Current WQOs)

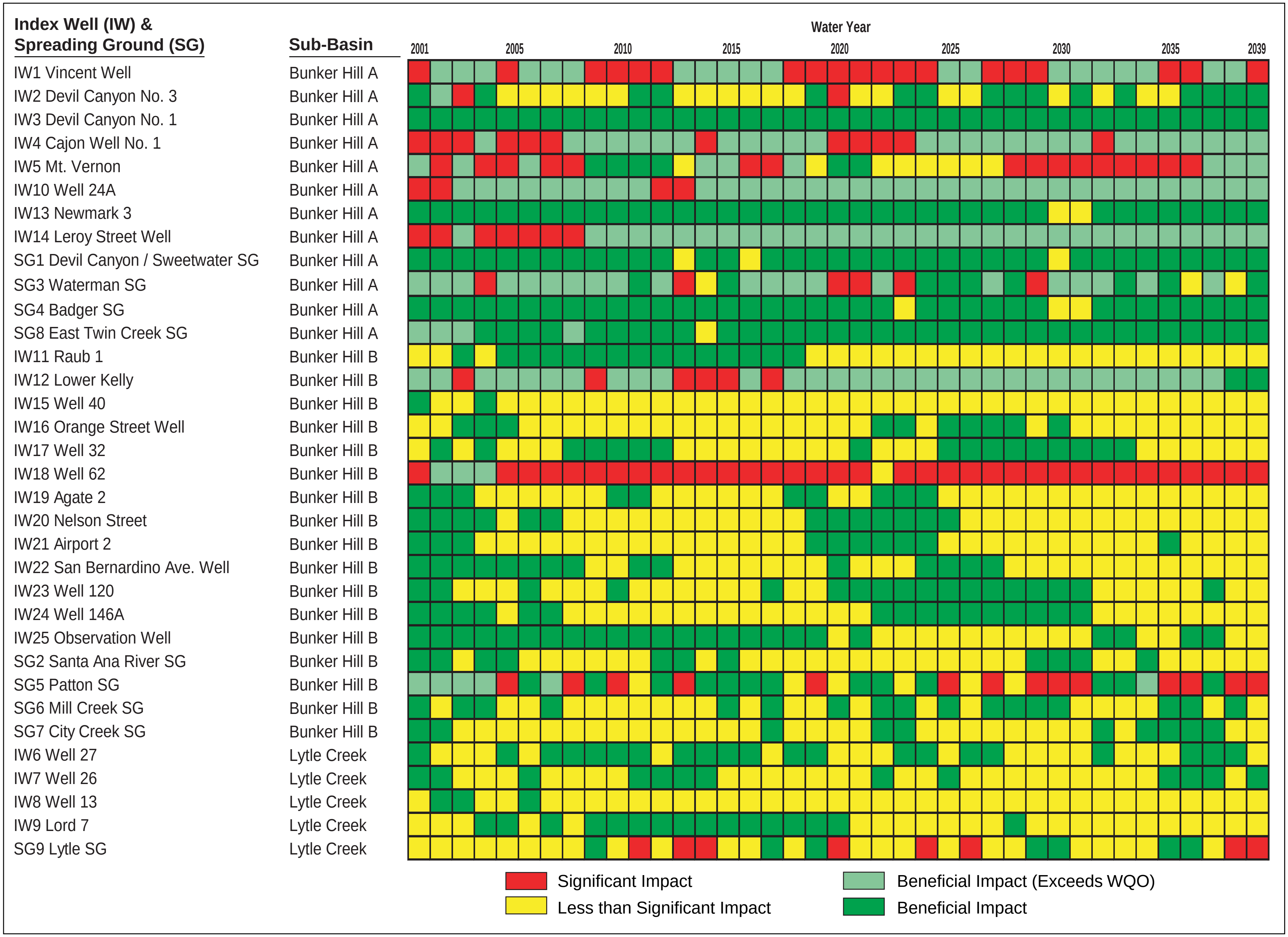


Figure 3.2-25. Annual Impacts for TDS - Scenario A (Proposed WQOs)

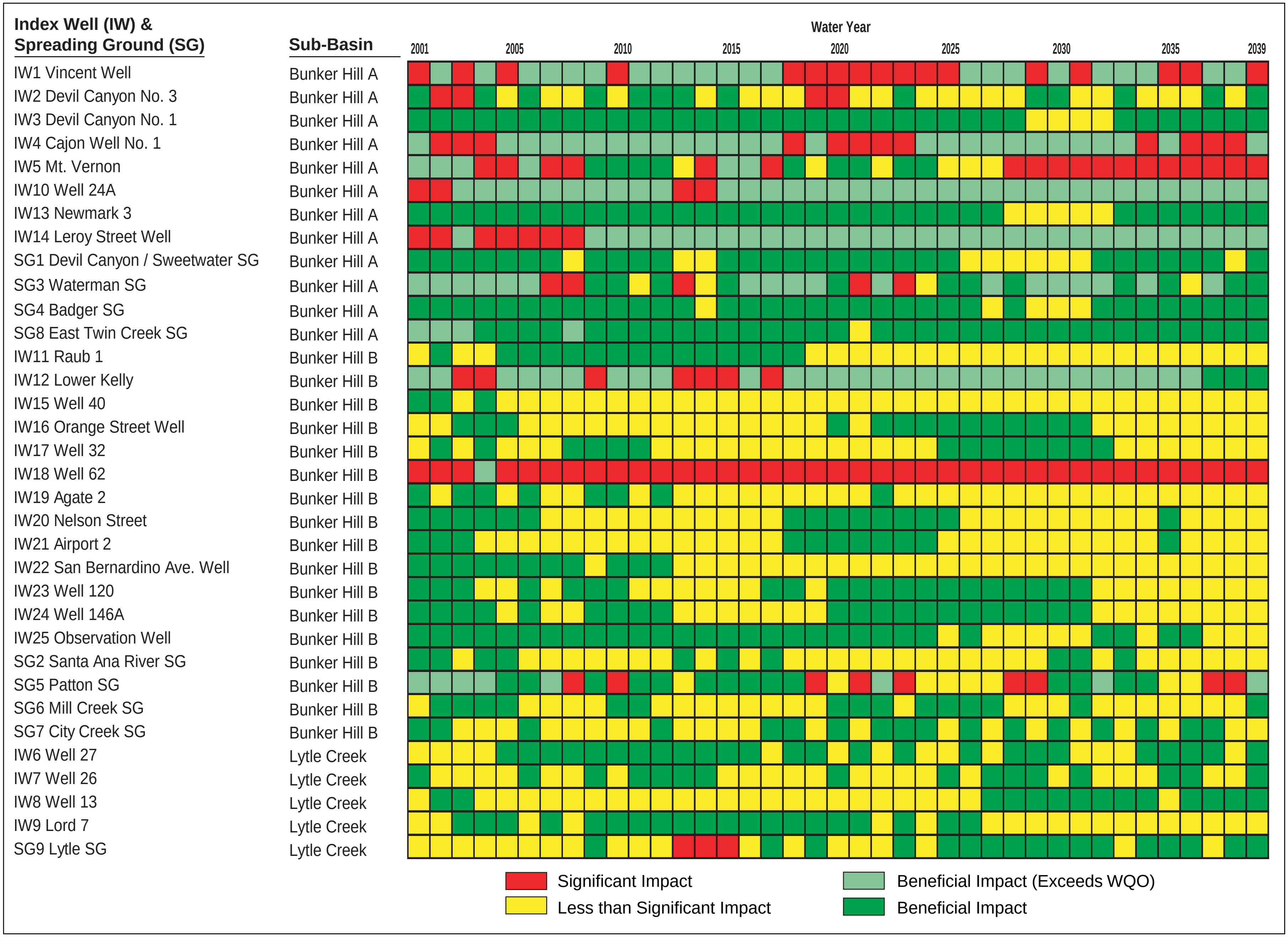


Figure 3.2-26. Annual Impacts for TDS - Scenario B (Proposed WQOs)

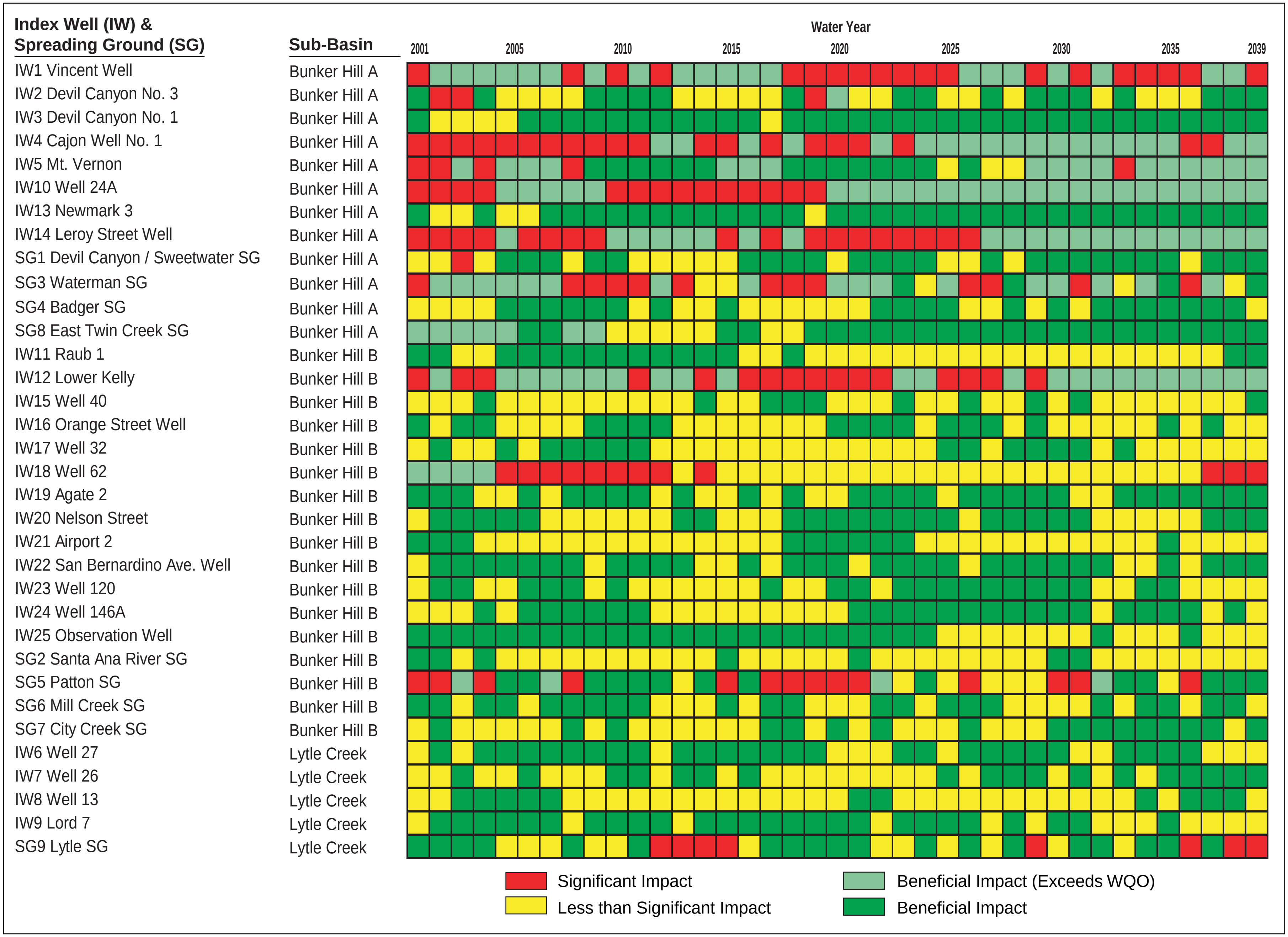


Figure 3.2-27. Annual Impacts for TDS - Scenario C (Proposed WQOs)

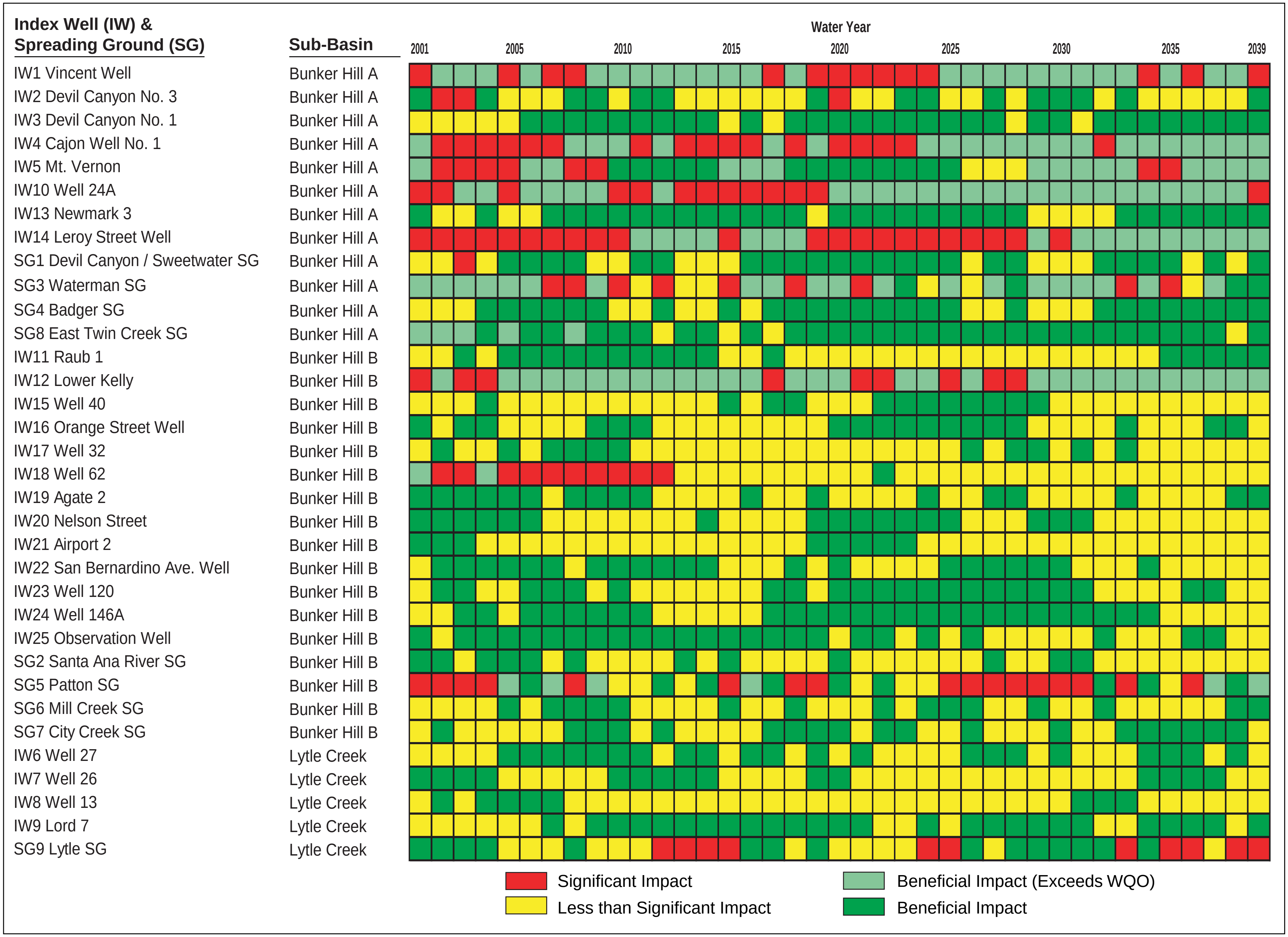


Figure 3.2-28. Annual Impacts for TDS - Scenario D (Proposed WQOs)

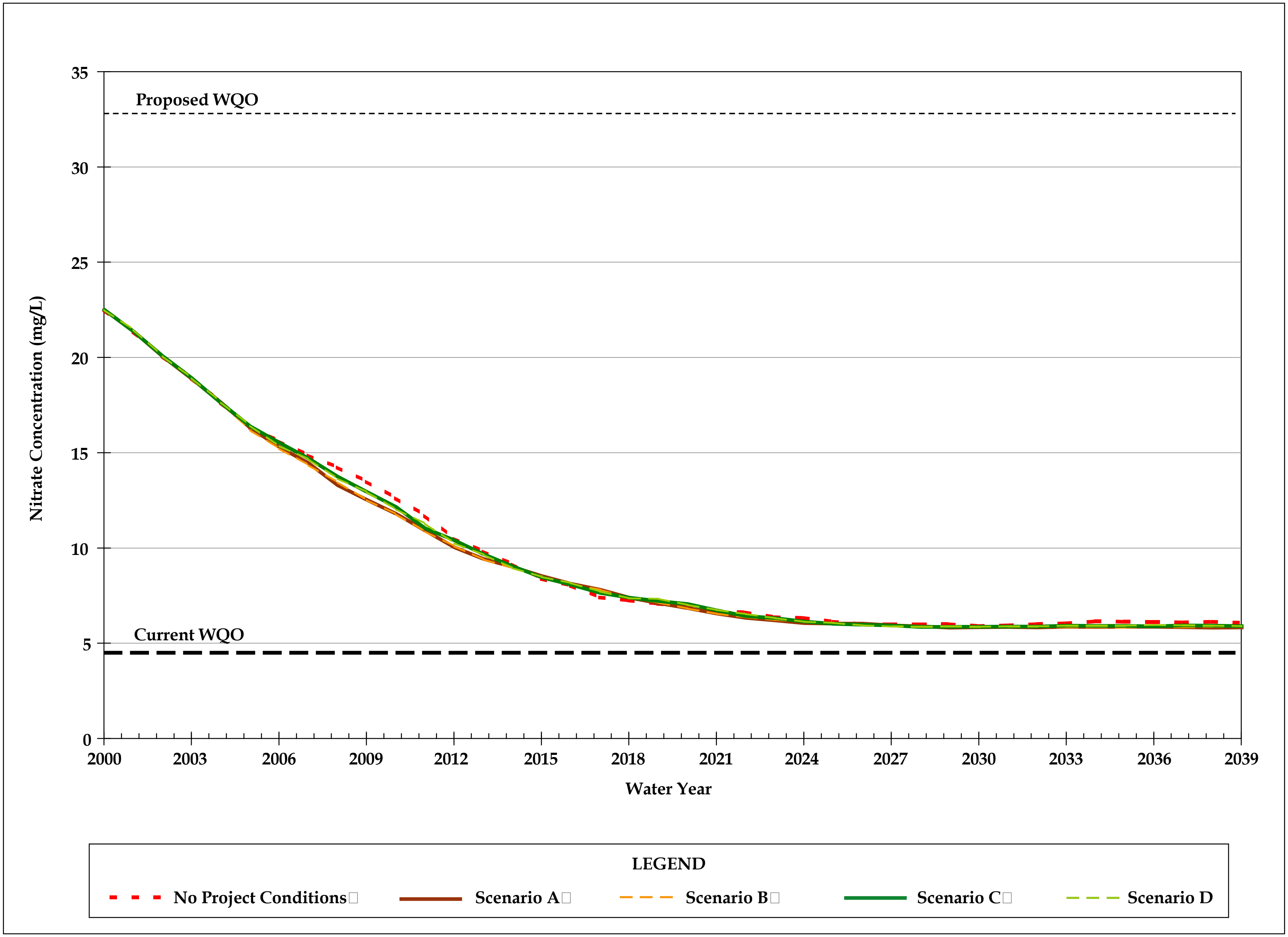


Figure 3.2-29. Nitrate Concentrations at IW11, Raub 1 Well

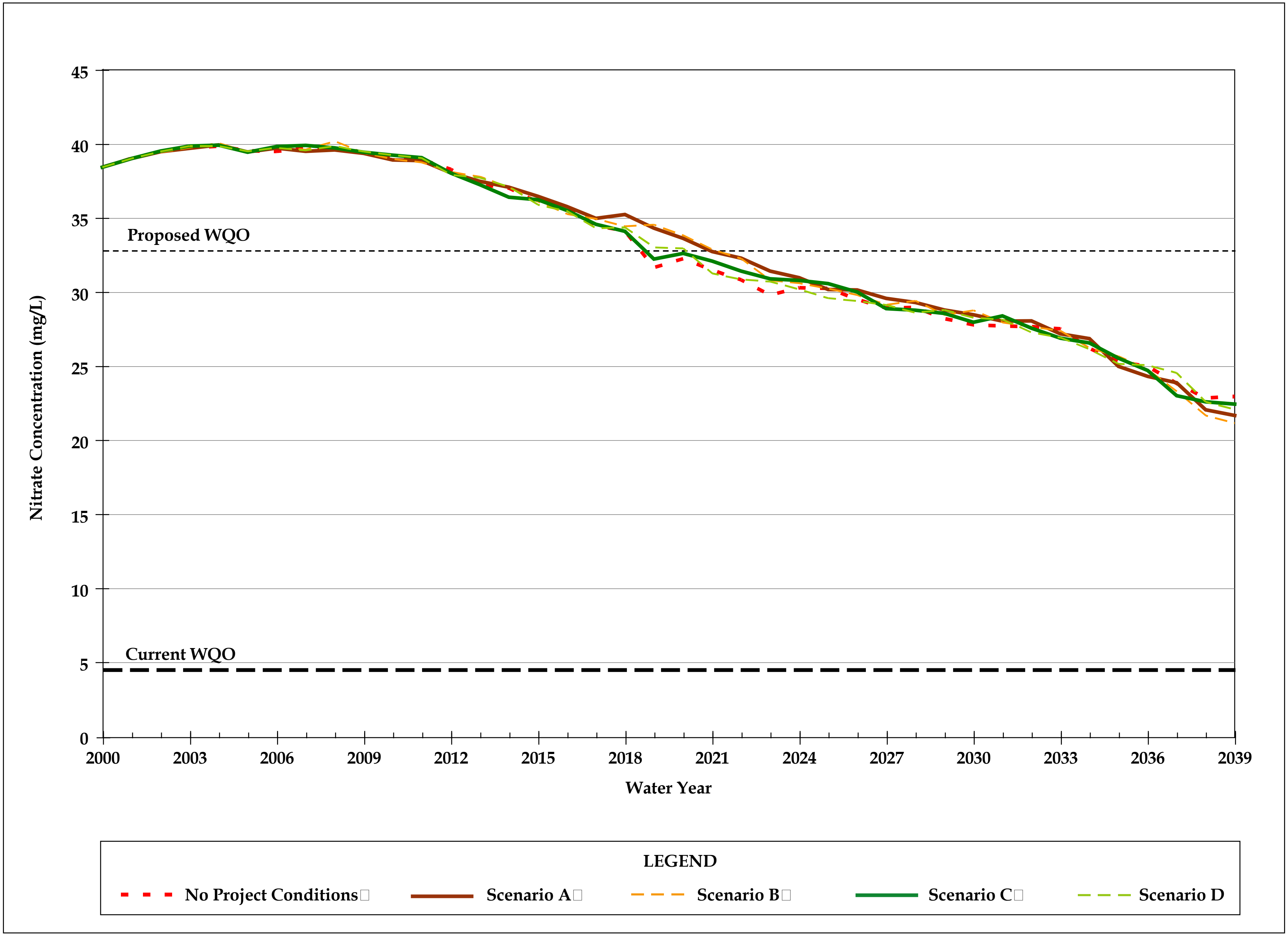


Figure 3.2-30. Nitrate Concentrations at IW12, Lower Kelly Well

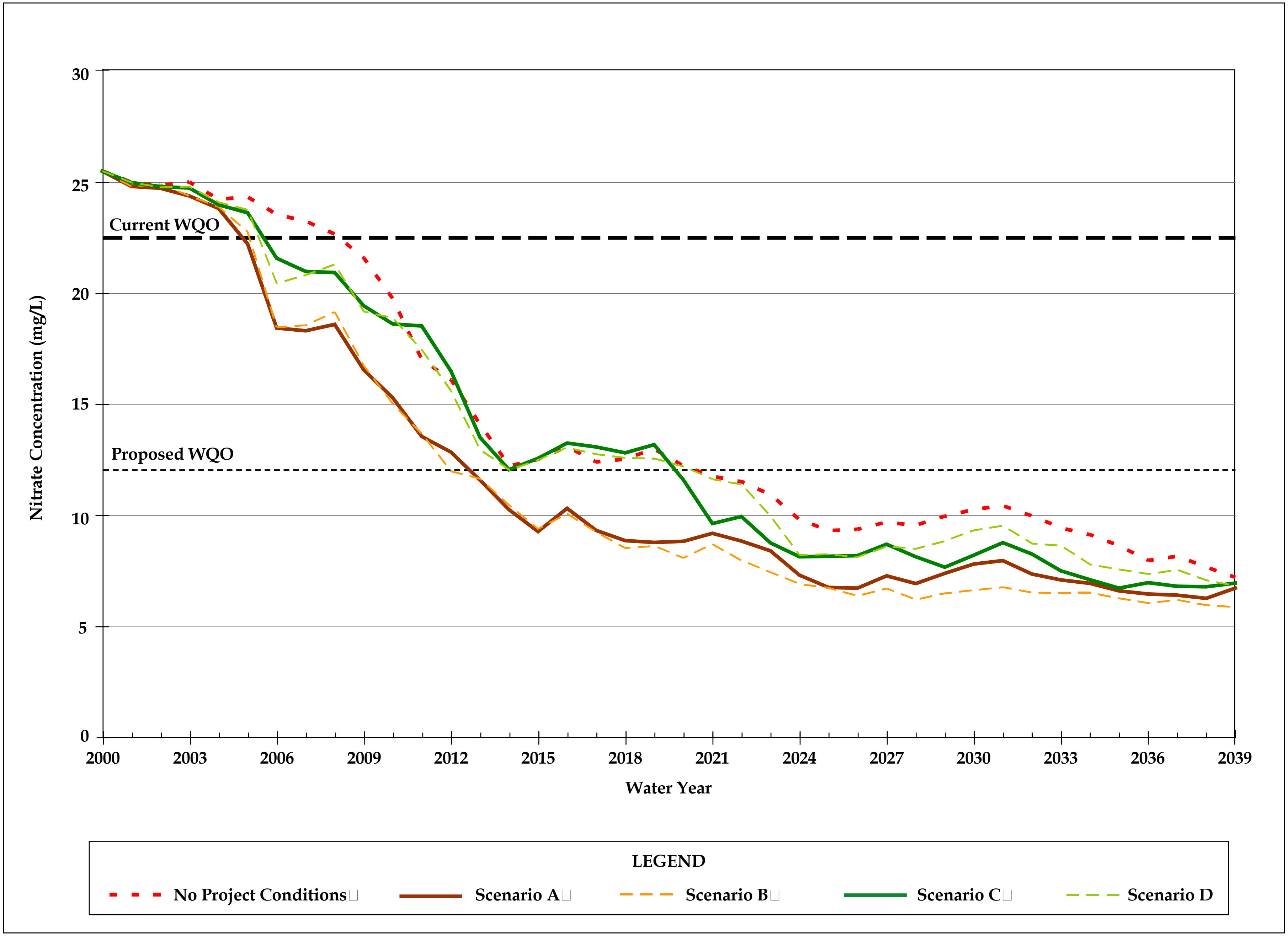


Figure 3.2-31. Nitrate Concentrations at IW10, Well 24A

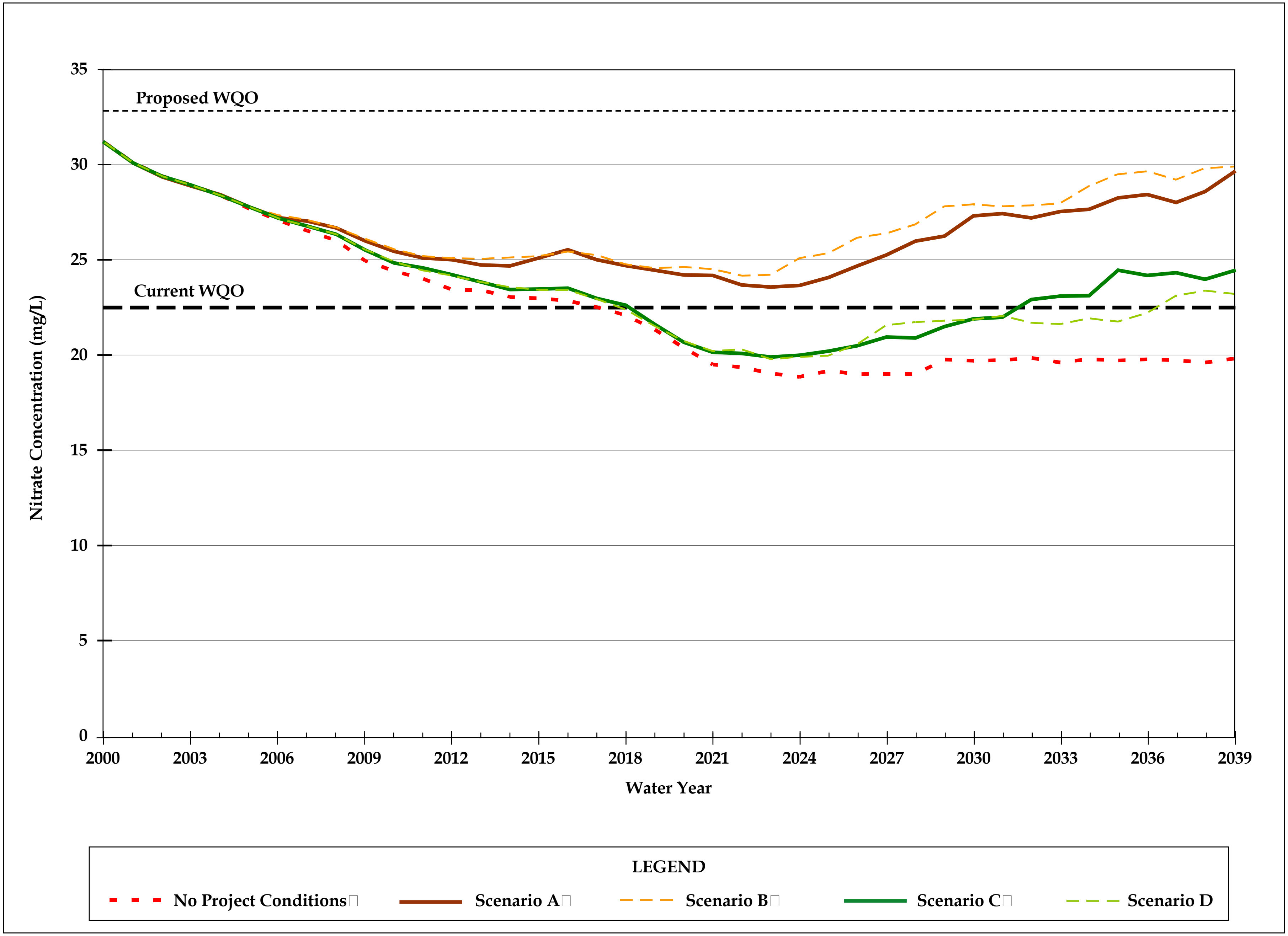


Figure 3.2-32. Nitrate Concentrations at IW18, Well 32

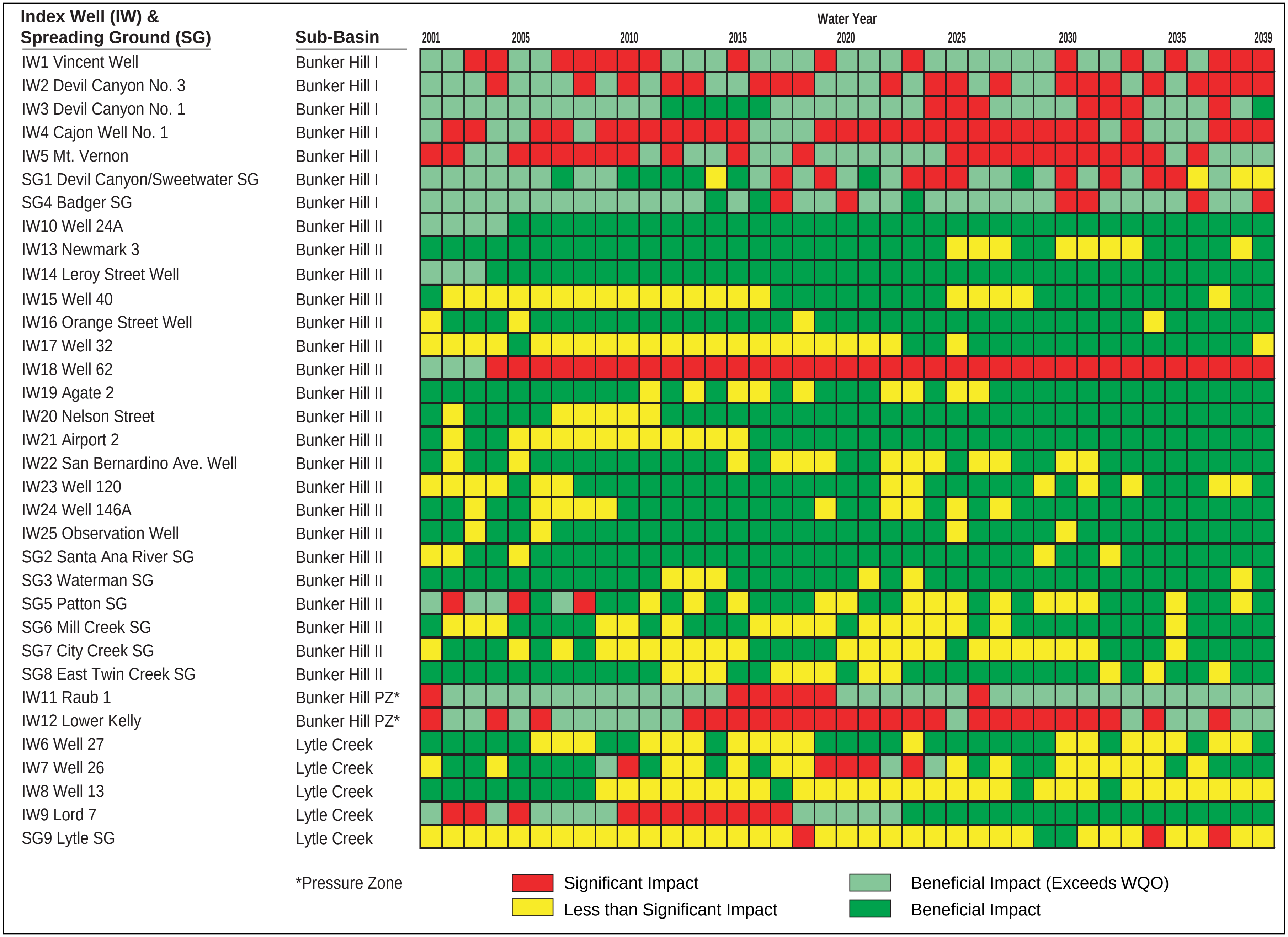


Figure 3.2-33. Annual Impacts for Nitrates - Scenario A (Current WQOs)

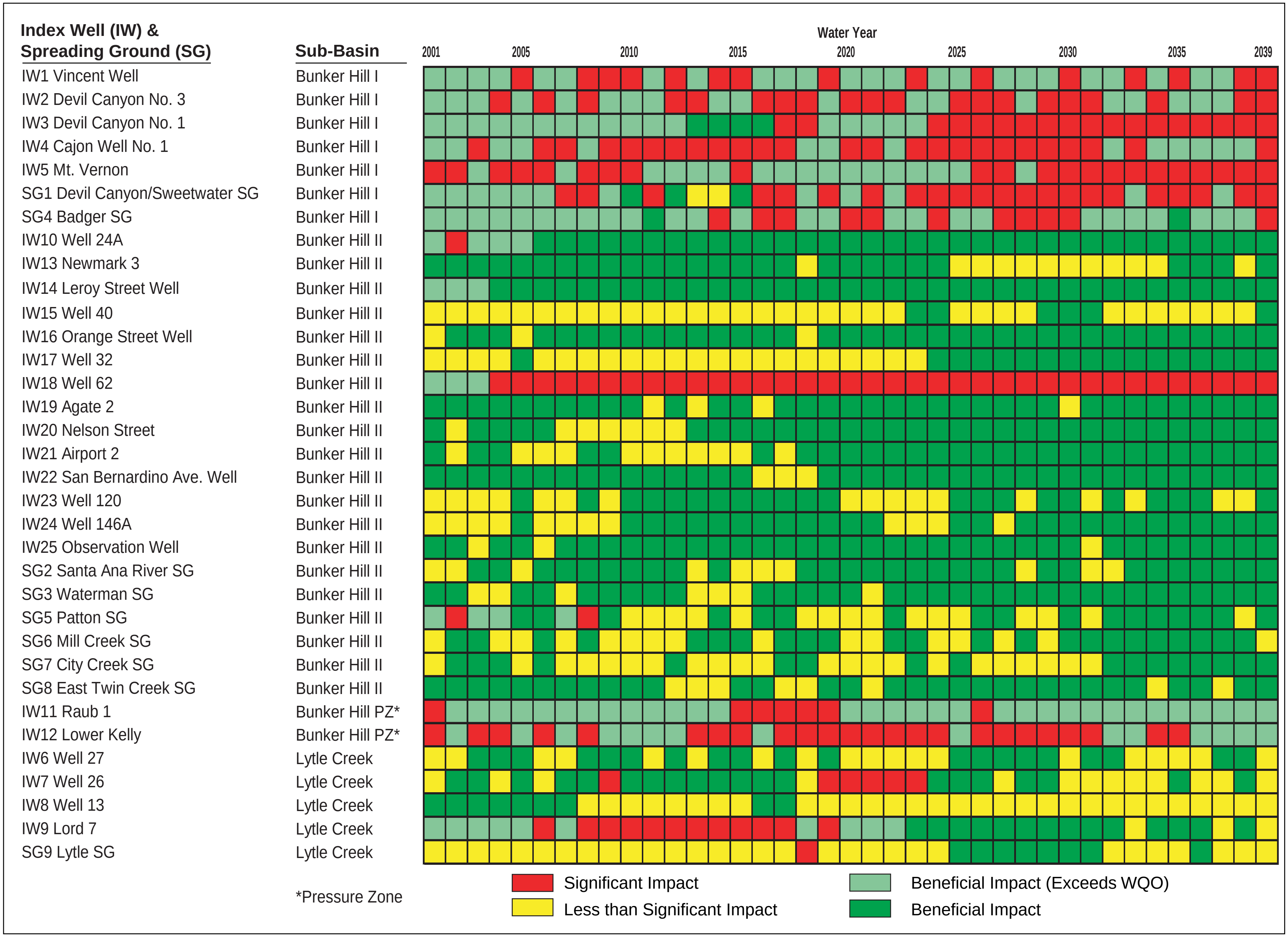


Figure 3.2-34. Annual Impacts for Nitrates - Scenario B (Current WQOs)

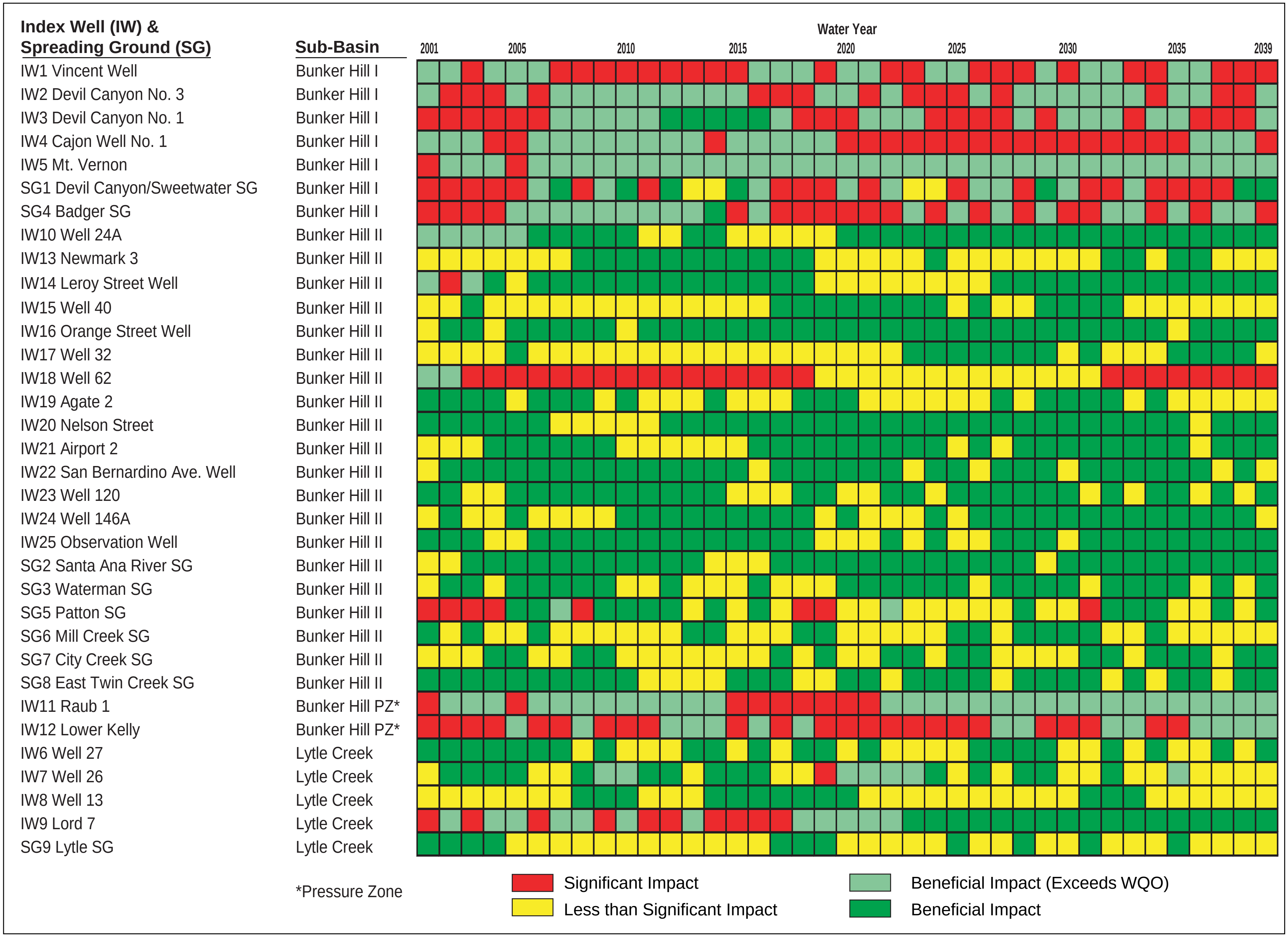


Figure 3.2-35. Annual Impacts for Nitrates - Scenario C (Current WQOs)

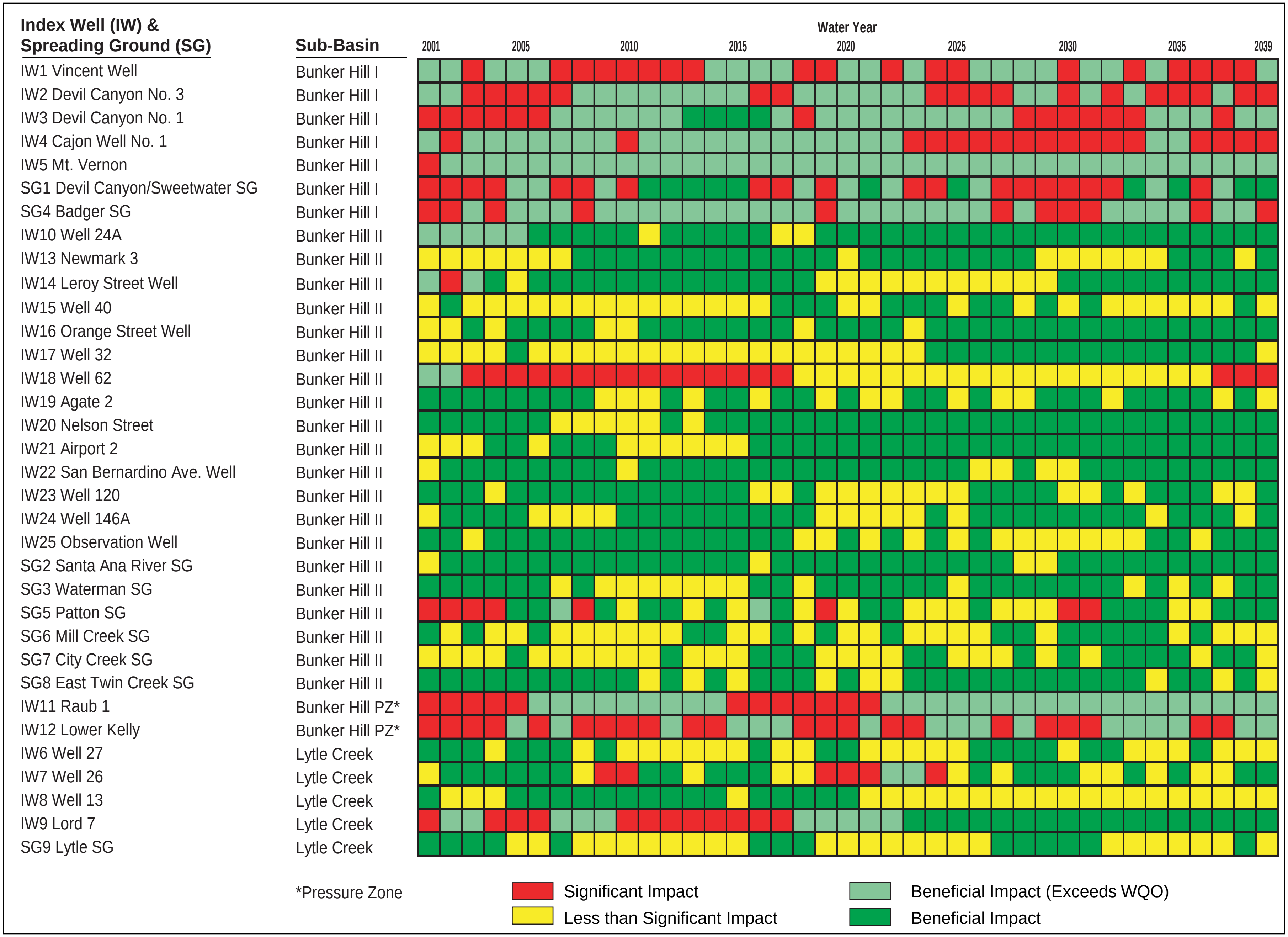


Figure 3.2-36. Annual Impacts for Nitrates - Scenario D (Current WQOs)

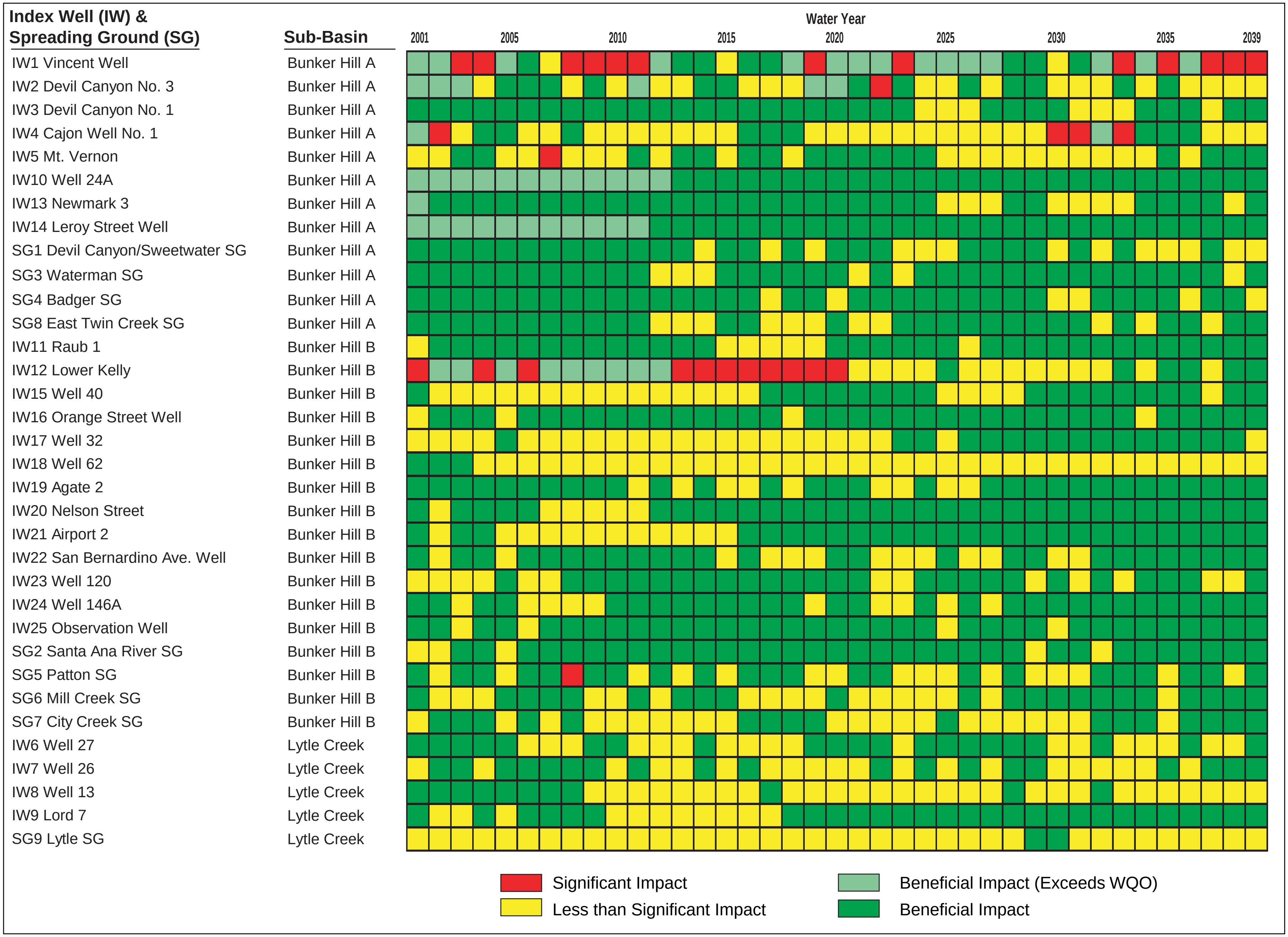


Figure 3.2-37. Annual Impacts for Nitrates - Scenario A (Proposed WQOs)

Figure 3.2-38. Annual Impacts for Nitrates - Scenario B (Proposed WQOs)

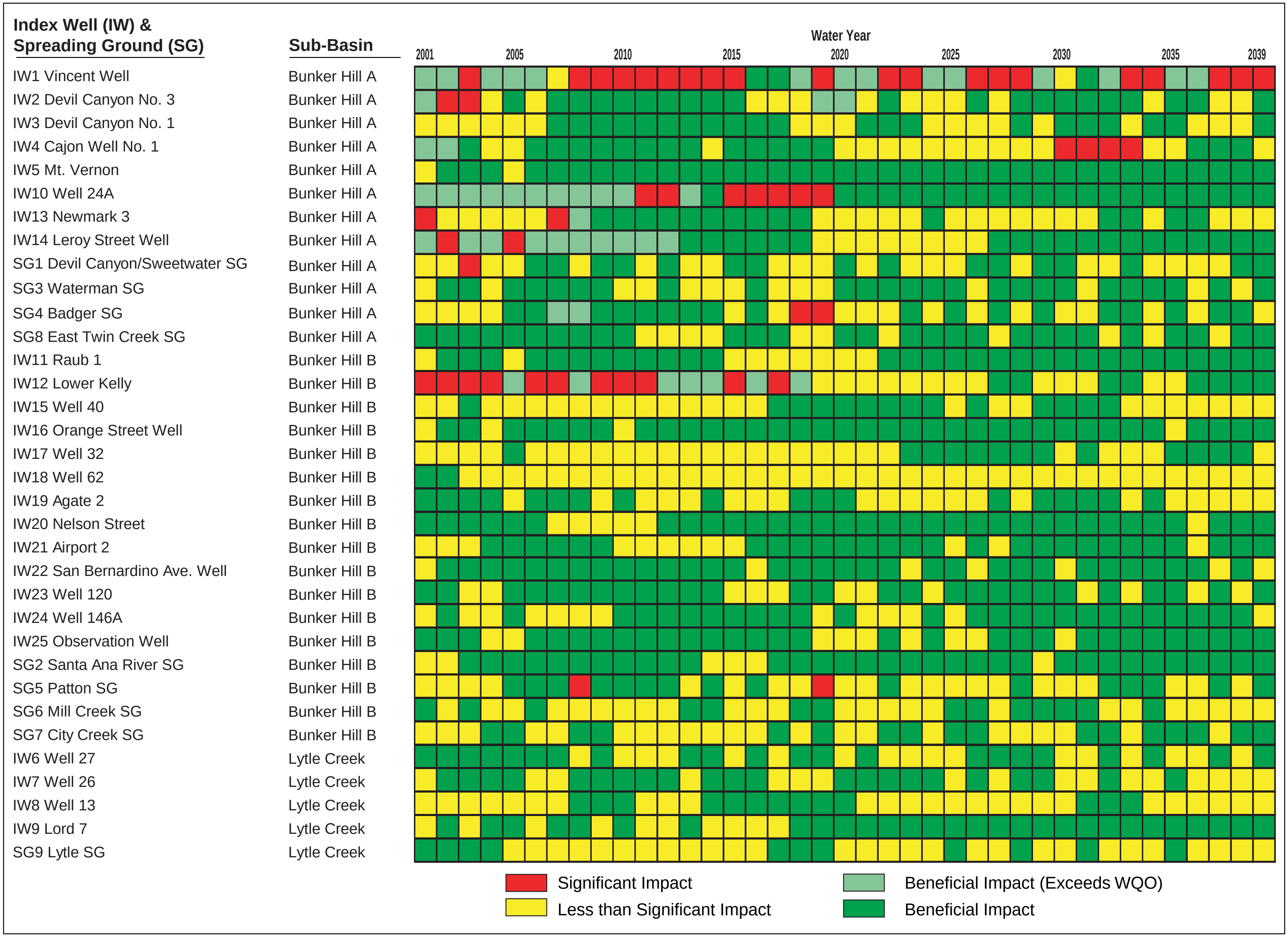


Figure 3.2-39. Annual Impacts for Nitrates - Scenario C (Proposed WQOs)

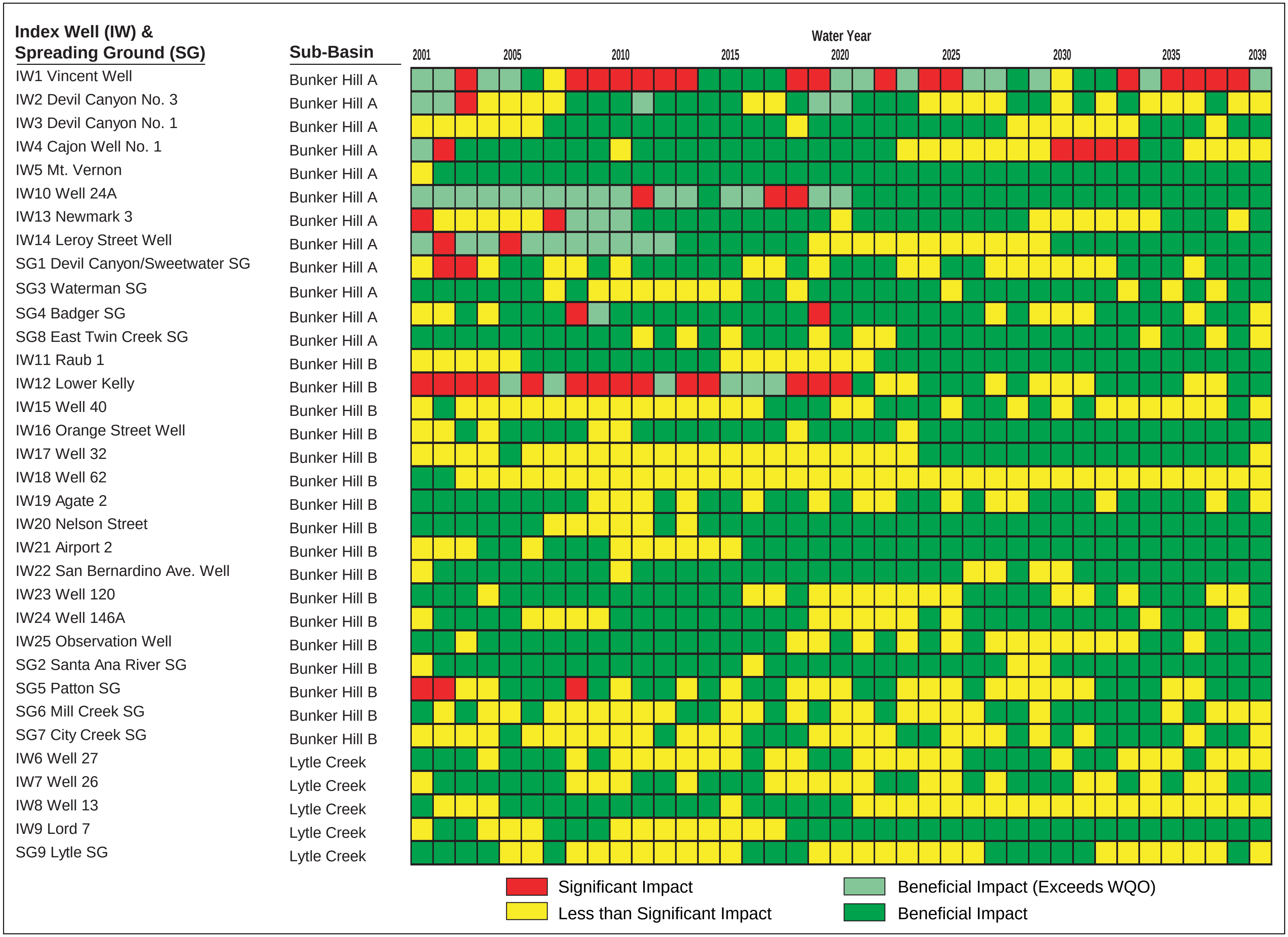


Figure 3.2-40. Annual Impacts for Nitrates - Scenario D (Proposed WQOs)

3.3 BIOLOGICAL RESOURCES

3.3.1 Environmental Setting

The study area for the biological resources analysis includes areas that would be affected by Project construction and operations (Figure 2-1). On the Santa Ana River (SAR), the study area extends from Seven Oaks Dam to Prado Flood Control Basin. Upstream from Seven Oaks Dam, impacts related to seasonal water conservation storage were evaluated in USACE's 1997 report, *Seven Oaks Dam Water Conservation Feasibility Study Final EIS/EIR*. Data sources that were reviewed include public documents, special studies and reports, maps, and consultations with local experts. In addition, reconnaissance field surveys were conducted in 2001 and 2002 by a team of botanical and wildlife specialists. Following the reconnaissance surveys, focused surveys for vegetation and habitat mapping and for endangered, threatened, and sensitive plant and wildlife species were conducted in 2003 and 2004. The surveys were focused on Project areas that would be affected by ground disturbance. These areas include the area near the plunge pool, the Plunge Pool Pipeline corridor from the plunge pool to Cone Camp Road, the SAR corridor from Seven Oaks Dam to the Greenspot Bridge, the Morton Canyon Connector II pipeline corridor, Devil Canyon By-Pass pipeline corridor, and the Lytle Creek wash area in proximity to the Lytle Basins. Surveys conducted for this Project are discussed further in the context of the specific resource discussions below and in Appendix E.

3.3.1.1 Regulatory and Institutional Setting

The regulatory framework for biological resources includes a number of federal, state, and local statutes and regulations (Table 3.3-1).

3.3.1.2 Santa Ana River Corridor from Seven Oaks Dam to the Prado Flood Control Basin

Hydrologic characteristics of the river are described in section 3.1.1.7 (Project Operations Areas). Except during the winter months of December through March, surface flows in the SAR between Seven Oaks Dam and the San Bernardino International Airport (River Segments B, C, and D as shown in Figure 3.1-6) are generally absent, and the riverbed is a braided, dry channel. Riparian habitat from Cuttle Weir to the airport is uncommon, and limited to a few patches.

Downstream from the airport, surface flows are more prevalent (as described in 3.1.1.7), and large areas of contiguous, well developed riparian habitat as well as giant reed (*Arundo donax*) infestations along the banks of the SAR are common. Just downstream and outside of the study area is Prado Flood Control Basin and Prado Dam. Approximately 2,150 acres of land upstream of Prado Dam is owned by the Orange County Water District (OCWD), the local sponsor for Prado Dam. Within this area are approximately 465 acres of constructed wetlands as well as large areas of mature riparian habitat, naturally occurring wetlands, and deepwater habitats. This habitat is primarily comprised of willow, sycamore, alder, and cottonwood woodlands, emergent marshlands, and open water habitats some of which are seasonally created by flows into the basin. In addition, this area supports large stands of giant reed, which are the subject of several on-going, large-scale eradication efforts. Prado Flood Control Basin, and specifically the constructed wetlands therein, functions primarily to remove nitrogen from the water, an

Table 3.3-1. Statutes and Regulations Applicable to Biological Resources

Statute or Regulation	*Description and Application to the Project*
Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.)	This Act provides for restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters. Section 404 of the Act prohibits discharges of dredged or fill materials into waters of the U.S., including wetlands, except as permitted under separate regulations by the U.S. Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA). The SAR and its tributaries are jurisdictional water bodies under Section 404, and excavation, backfilling, and water diversion during pipeline construction could require federal permits.
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)	The Endangered Species Act (ESA) protects threatened and endangered species (and their designated critical habitats), as determined by the U.S. Fish and Wildlife Service (USFWS), from unauthorized take, and directs federal agencies to ensure that their actions do not jeopardize the continued existence of federally listed species. This EIR addresses impacts to such species and their habitats and identifies mitigation measures where appropriate. Based upon this analysis, the USFWS will consider whether modifications made to federal facilities would conflict with the ESA and issue the appropriate compliance determination.
Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712) and Executive Order 13186 (2001)	The Act provides for the protection of migratory birds by making it illegal to possess, take, or kill any migratory bird species, unless specifically authorized by a regulation implemented by the Secretary of the Interior, such as designated seasonal hunting. The Executive Order requires federal agencies to obtain authorization from the USFWS for the "taking" of any migratory bird species. This EIR identifies potential impacts to migratory birds and identifies mitigation measures where appropriate. The potential for the taking of migratory bird species would be considered by the USFWS as part of its review of the Project under the ESA.
California Lake and Streambed Alteration Program (Fish and Game Code Section 1600 et seq.)	These sections of the Fish and Game Code require that any person, state, or local government agency, or public utility proposing a project that may divert, obstruct, or change the natural flow of any bed, channel, or bank of a river, stream, or lake to notify the California Department of Fish and Game (CDFG) before beginning the project. The SAR and its tributaries are jurisdictional water bodies under Section 1600 et seq. of the Fish and Game Code, and excavation, backfilling, and water diversion during pipeline construction could require a Lake or Streambed Alteration Agreement if CDFG determines that the Project would adversely affect existing fish and wildlife resources.
California Endangered Species Act of 1984 (Fish and Game Code Section 2050 et seq.)	The California Endangered Species Act (CESA), administered by CDFG, provides for the protection of state recognized candidate, threatened, and endangered plant and animal species native to the state of California, and prohibits the "take" of these species without CDFG authorization. CDFG defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." This EIR addresses impacts to California-listed species and their habitats and identifies mitigation measures where appropriate. Based upon this analysis, the CDFG will consider whether the Project would comply with CESA and determine whether a Section 2081 for the incidental take of California-listed species should be issued.

Table 3.3-1. Statutes and Regulations Applicable to Biological Resources (continued)

Statute or Regulation	*Description and Application to the Project*
California Fully Protected Birds, Mammals, Reptiles/Amphibians and Fish (Fish and Game Code Sections 3511, 4700, 5050 and 5515)	These statutes protect 37 "fully protected species" and prohibit take or possession at any time of these species, with few exceptions. "Fully protected" was a status implemented prior to CESA, and many of the same species are identified under both lists; however, "fully protected" also applies to species, such as the white-tailed kite, that are not listed under CESA. CDFG is unable to authorize incidental take of fully protected species. This EIR identifies any fully protected species present in the Project area, considers impacts to such species, and identifies mitigation measures as appropriate. The CDFG will take this analysis into consideration in determining whether to issue permits under CESA and the California Lake and Streambed Alteration Program.
Note: Counties, federal agencies, and local municipalities may maintain lists of species of special concern; the potential for impacts to such species was considered during the preparation of this EIR.	

improvement for water quality in Prado Flood Control Basin and in water that is subsequently released from Prado Dam.

The SAR Wash is a state-designated Significant Natural Area (SBD 011; USACE 2000). Approximately 27 sensitive plant and animal species are known to occur in the wash. About 760 acres of Bureau of Land Management (BLM) land within the upper Santa Ana River wash area downstream from the Greenspot Bridge have been designated by BLM as an Area of Critical Environmental Concern (ACEC) because of the presence of the federally listed species Santa Ana River woolly-star and San Bernardino kangaroo rat (SBKR) (USFWS 1988).

3.3.1.2.1 Vegetation and Habitats

For the purpose of this discussion, the SAR corridor is defined as the area located within the incised channel of the river. Alluvial fan habitats adjacent to the SAR corridor are discussed below in section 3.3.1.3. Persistent aquatic and riparian habitats are present immediately downstream of the Seven Oaks Dam plunge pool, in oxbows, in fault zones, in areas with man-made or natural water sources such as a tributary confluence or a storm drain outfall, in areas with perched water tables, and downstream of river mile (RM) 54.5 (see Figure 3.1-6) where groundwater emerges and flows on the surface of the riverbed (USACE 2000).

The SAR and its tributaries are jurisdictional water bodies under Section 404 of the Clean Water Act. Portions of the SAR that would be affected by construction of the proposed Plunge Pool Pipeline, Low Flow Connector Pipeline, and Morton Canyon Connector II Pipeline are considered "other waters." Some areas within the existing channel, beginning below the dam near the plunge pool, may also meet the definition of "wetlands" (33 CFR 328). Excavation and backfilling, as well as water diversion that would occur during trenching and installation of the proposed pipelines, would likely affect other waters and wetlands within the SAR and would require a federal Section 404 permit. The SAR and its tributaries also fall under Section 1600 of the Fish and Game Code (stream beds and associated riparian habitats), and the wetlands below the dam would also be jurisdictional under Section 1600 because they occur within the bed, bank, or channel of the SAR. A state Streambed Alteration Agreement would be required for construction in these areas.

Plant communities associated with the SAR corridor include riparian communities supported by surface water or near-surface groundwater, communities associated with intermittent flow and fluctuating groundwater levels, aquatic/wetland communities associated with perennial flows and ponds, upland communities that are up-gradient of the river bed, and ruderal or non-native communities that are associated with human uses or disturbances (USACE 2000).

Southern willow scrub/cottonwood riparian forest is dominated by black willow (*Salix goodingii*), red willow (*S. lasiolepis*), Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and the invasive exotic giant reed. Other species associates include Mexican elderberry (*Sambucus mexicana*), wild grape (*Vitis girdiana*), emory baccharis (*Baccharis emoryi*), umbrella sedge (*Cyperus eragrostis*), and Olney bulrush (*Scirpus olneyi*) (USACE 2000). Large patches of this community type occur discontinuously along many segments of the river beginning downstream from the confluence with San Timoteo Creek. A small patch exists just below the plunge pool.

Southern willow scrub is dominated by brush and alluvial scrub associates, such as mulefat (*B. salicifolia*), sand bar willow (*S. hindsiana*), as well as invasive woody exotics, such as salt cedar (*Tamarix* sp.), weedy herbaceous species, and non-native grasses (USACE 2000). This community occurs where the amount and persistence of surface water and groundwater is variable.

Aquatic and wetland habitats are defined by the presence of perennial water or saturated soil conditions. In addition to occurrences of species found in hydro-mesic communities, other species associated with this habitat include bur marigold (*Bidens laevis*), yellow water weed (*Ludwigia peploides*), willow weed (*Polygonum lapathifolium*), and knot grass (*Paspalum distichum*) (USACE 2000).

Upland habitats include bottom lands, bluffs, levees, and high terraces that are transitional between riparian and sage scrub habitats. These areas are dominated by scale broom (*Lepidospartum squamatum*) and alluvial scrub. Invasive non-native species in and adjacent to the river channel include salt-cedar (*Tamarix* sp.) and fountain grass (*Pennisetum setaceum*); the latter species appears to be spreading. Disturbed areas are also prevalent adjacent to the river and include roads, agricultural areas, and parks. The disturbed areas support few native species and those present do not rely on stream flows or other fluvial processes for survival.

Land uses along floodplain terraces have changed over the past 10-15 years, primarily due to a conversion of agricultural land uses to residential development. Although remaining agricultural areas do not typically provide habitat for most wildlife species, agricultural areas that are adjacent to undeveloped open spaces serve as important transitional areas and may serve as migratory corridors for some wildlife species.

3.3.1.2.2 Wildlife

The vegetation communities discussed above provide wildlife habitat throughout most of the SAR corridor. In general, wildlife within the area is extremely diverse and abundant, due to the amount of natural open space and diversity of habitat types, from the active river channels to the uppermost flood terraces. While a few wildlife species depend entirely on a single habitat type, the mosaic of all the vegetative communities within the study area and adjoining areas constitutes a functional ecosystem for a variety of wildlife species. Sensitive wildlife species are discussed in section 3.3.1.2.3.

Knowledge of invertebrates in the SAR corridor is generally limited by a lack of site-specific data, which is not unusual due to the difficulties in thoroughly surveying for invertebrates. However, the amount of open space in the area and the diversity of habitats present, including the water column of the plunge pool and active channel of the SAR, are considered sufficient to support healthy populations of a large number of invertebrate species.

The SAR contains a variety of riverine conditions and habitat types that support a number of fish species nearly throughout the entire river when winter and spring flows are present. Portions of the SAR, such as the segment that traverses the alluvial fan, are dry during most of the year and consequently offer only temporary habitat for fish. Of the 37 fish species believed to occur within the SAR watershed, only three native species have been reported between Seven Oaks Dam and Prado Flood Control Basin. These are the arroyo chub (*Gila orcutti*), Santa Ana speckled dace (*Rhinichthys osculus* ssp.), and Santa Ana sucker (*Catostomus santaanae*) (SAWPA 2002). A fourth native species, the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), has been extirpated from the river, and the partially armored subspecies has been introduced with established populations above Seven Oaks Dam, as well as in City Creek and Bear Creek (Swift et al. 1993). The arroyo chub and Santa Ana speckled dace are both state and federal species of special concern, while the Santa Ana sucker is federally listed as threatened and is discussed below in section 3.3.1.2.3 (Sensitive Plants and Wildlife).

The arroyo chub is known to occur in tributaries to the SAR between Riverside and the Orange County boundary (Swift et al. 1993). Breeding occurs in March to April (Moyle 1976). The speckled dace has been reported to occur in Lytle, Cajon, City, Strawberry, Mill, and Silverado creeks (Swift et al. 1993). This species is commonly found in rocky riffles of streams and is tolerant of warm waters. Spawning occurs throughout the summer with a peak in June and July.

Many of the 33 introduced fish species within the watershed are expected to occur in varying densities between Seven Oaks Dam and Prado Flood Control Basin (SAWPA 2002). The introduced species most likely to be present between Seven Oaks Dam and Prado Flood Control Basin include golden shiner (*Notemigonis crysoleucas*), fathead minnow (*Pimephales promelas*), goldfish (*Carassius auratus*), common carp (*Cyprinus carpio*), black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), western mosquitofish (*Gambusia affinis*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), and Mozambique tilapia (*Oreochromis mossambica*) (latter in Prado Flood Control Basin).

Amphibian populations are relatively common in the SAR corridor. Amphibian species expected to be present include Pacific chorus frog (*Pseudacris regilla*), western toad (*Bufo boreas*), western spadefoot toad (*Scaphiopus hammondii*), and the non-native bullfrog (*Rana catesbeiana*). Reptilian diversity and abundance typically varies with habitat type and character. Some species are associated with only one or two natural communities; however, most will forage in a variety of communities. Reptilian species expected to occur in the Project area include the western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), coastal western whiptail (*Cnemidophorus tigris multiscutatus*), orange-throated whiptail (*Cnemidophorus* *hyperythrus beldingi*), northern red-diamond rattlesnake (*Crotalus ruber ruber*), California king snake (*Lampropeltis getulus californiae*), and gopher snake (*Pituophis catenifer deserticola*).

The scrub, woodland, and riparian habitats in the SAR corridor provide foraging and cover habitat for song birds including year-round residents, seasonal residents, and migrating individuals. The overall condition of these communities in the Project area is good and mostly undisturbed. In addition, portions of the SAR and its tributaries provide a perennial water source for birds. The combination of these resources as well as the availability of many community types provides for a high diversity of bird species. Representative bird species observed during surveys include California towhee (*Pipilo crissalis*), Bewick's wren (*Thryomanes bewickii*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), black phoebe (*Sayornis nigricans*), western kingbird (*Tyrannus verticalis*), lazuli bunting (*Passerina amoena*), American crow (*Corvus brachyrhynchos*), and California thrasher (*Toxostoma redivivum*).

Much of the habitat within the Project area provides optimal foraging opportunities and several areas provide adequate breeding areas for raptors. Trees found in the riparian woodlands provide perches for foraging over the scrub and grassland. Raptors expected to occur in the Project area include, but are not limited to, Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), and American kestrel (*Falco sparverius*).

The diversity of habitats in the Project area is also expected to support a variety of mammals such as coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), and mule deer (*Odocoileus hemionus*). Other species with larger home ranges, such as the bobcat (*Lynx rufus*) and mountain lion (*Felis concolor*), are resident within the region and may occasionally use the Project area to forage or for cover. Small mammals such as the deer mouse (*Peromyscus maniculatus*), San Diego pocket mouse (*Chaetodipus fallax fallax*), and dusky-footed woodrat (*Neotoma fuscipes*) are also expected to occur in the area.

Wildlife corridors link areas of suitable habitat that are separated by unsuitable habitat such as rugged terrain, development, or changes in vegetation. Riverbeds often provide a favorable passageway for wildlife movement to otherwise disconnected areas. Local wildlife movement is expected to occur throughout the Project area along the SAR and its tributaries. Historically, the SAR bed within the Project area was likely to have supported substantial regional wildlife movement. In addition, the SAR floodplain may have acted as a hub for wildlife movement with many major tributaries converging in a relatively short section of the river. In recent years however, loss of habitat due to development on the floodplain and surrounding lowlands as well as construction of Seven Oaks Dam are likely to have greatly reduced the amount of regional movement through the Project area. Although less movement may be occurring, the SAR and associated floodplain are expected to support some regional wildlife movement and migration. Due to the reduction in wildlife corridors in the Project area, the remaining corridors between habitats have become increasingly important.

3.3.1.2.3 Sensitive Plants and Wildlife

This section identifies plant, fish, and wildlife species in the SAR corridor within the Project area that are listed or proposed for protection under ESA and CESA (Table 3.3-2). Appendix E, Tables E-5-1 and E-5-2, provide brief accounts of additional endangered, threatened, and other

Table 3.3-2. Threatened and Endangered Species of the SAR Corridor (page 1 of 5)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
Marsh Sandwort *Arenaria paludicola*	FE, SE, CNPS 1B	Low, perennial herb, often supported by surrounding vegetation, growing in bogs and fens, freshwater marshes and swamps. Presently, known from only two occurrences, one in Mendocino County and one in San Luis Obispo County. The historic location near San Bernardino is believed to have been extirpated. Affected by widespread historic modification of its specialized aquatic habitat; remaining populations threatened by development, erosion, and non-native plants.
Gambel's Water Cress *Rorippa gambelii*	FT, SE, CNPS 1B	Perennial herb, 1 to 6 feet tall, with white flowers. Restricted to freshwater or brackish marshes and swamps. In California, currently known from only four locations in Santa Barbara and San Luis Obispo counties (California Native Plant Society [CNPS] 2001). The historic location near San Bernardino is believed to have been extirpated. Habitat loss, erosion, and invasive exotic species such as *Eucalyptus* have affected this species.
Stephen's Kangaroo Rat *Dipodomys stephensi*	FE, ST	Generally occupies non-native grasslands dominated by annuals adjacent to sage scrub communities or open disturbed grasslands with scattered shrubs. Occurs in southwestern San Bernardino County, most of western Riverside County, and small portions of northern San Diego County. Although most of Subarea 3 is within the range of the Stephen's Kangaroo Rat, suitable habitat does not occur within the river corridor. This species is, therefore, not expected to occur within the Project study area.
Arroyo Toad *Bufo californicus*	FE, SSC	Occupies sandy washes with open areas, shallow pools, and patches of riparian vegetation. Once common from the central coast of California into Baja California, the arroyo toad now occupies only the headwaters of drainages where disturbance has been limited, in a small portion of its former range. Not reported from within the Project area or any other segment of the SAR. Habitat suitability surveys and focused surveys in recent years have confirmed the lack of suitable habitat and the lack of individuals or populations in the area. No Critical Habitat has been designated for this species and the recovery plan does identify any portion of the SAR corridor as being important to the recovery of this species.
California Red-Legged Frog *Rana aurora draytonii*	FT, SSC	Habitat is present in the SAR and in the general Project vicinity, but is considered of low or marginal quality. Species not reported in the SAR corridor in recent surveys (USACE 2000).

Table 3.3-2. Threatened and Endangered Species of the SAR Corridor (page 2 of 5)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
Western Yellow-billed Cuckoo *Coccyzus americanus occidentalis*	FSC, SE	Medium-sized songbird that inhabits riparian woodlands. Historically widespread in California and common in some riparian areas. A survey conducted in 1986 and 1987 estimated that only three locations supported more than five breeding pairs on a regular basis. Although these populations are not within the Project study area, several pairs of cuckoos have been detected downstream in the riparian woodlands of Prado Flood Control Basin (USFWS 2001).
Southwestern Willow Flycatcher *Empidonax trailii extimus*	FE, SE	Small migratory songbird that breeds in riparian habitat in the southwest U.S. during spring and summer. At the end of the breeding season, it returns to Mexico, Central America, or possibly northern South America where it remains for the rest of the year. Once common within the major drainages of southern California but increasingly rare in recent years. Has been reported within the SAR corridor at several different locations, chiefly between the San Timoteo Creek confluence and Prado Dam. Past surveys have recorded from seven to nine breeding pairs within this segment of the river and the Prado Flood Control Basin. One additional pair of southwestern willow flycatchers was recently observed in the Project area in Morton Canyon (USFWS 2001). Focused surveys conducted in 2003 within a small portion of the SAR corridor just below Seven Oaks Dam resulted in no observations of this species at that location (SAIC 2003). Critical habitat was designated by the USFWS in 1997 and included portions of the SAR corridor from RM 48.5 downstream to, and including, Prado Flood Control Basin. However, this designation has since been invalidated pending further legislative review and is not presently applicable.
Coastal California Gnatcatcher *Polioptila californica californica*	FT, SSC	Inhabits sage scrub vegetation in Southern California. Drastically decreased in numbers as a result of loss of more than 90 percent of its preferred habitat over the last two centuries. The current distribution stretches from a few locations in eastern Ventura County to northern Baja California, Mexico. The majority of the habitat within the SAR corridor is riparian and not suitable for the gnatcatcher. However, small amounts of suitable scrub habitat occur in the upstream portions of the corridor that pass through the alluvial fan. Its occurrence on the SAR alluvial fan is discussed below in section 3.3.1.3.3. Although most of the habitat within the main channel in this segment of the river is considered unsuitable, marginally suitable habitat exists on the adjacent terraces and moderately suitable habitat occurs across most of the undisturbed habitat on the alluvial fan. In addition, critical habitat has been

Table 3.3-2. Threatened and Endangered Species of the SAR Corridor (page 3 of 5)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
Coastal California Gnatcatcher (continued)		designated by the USFWS throughout this entire portion of the river and the SAR alluvial fan. However, within this designation, gnatcatchers are rare in this area at the northeastern extent of its range. The California Natural Diversity Database (CNDDB) documents one occurrence roughly in the vicinity of the SAR corridor near Church Street at East Highlands (CNDDB 2002). Several other sightings have been reported in the vicinity but may not be within the SAR corridor (USACE 1998c, Riverside County 2003a). The gnatcatcher was last recorded in 1999 within 0.2 mile east of McAllister Street, 0.1 mile west of the Metropolitan's Upper Feeder, and 1.2 miles southwest of Mockingbird Canyon Reservoir. No reports have indicated breeding individuals. Focused surveys conducted adjacent to the SAR corridor in portions of Subarea 2 resulted in no observations of this species (SAIC 2003).
Least Bell's Vireo *Vireo bellii pusillus*	FE, SE	Small migratory songbird that occupies riparian woodland habitat along streams and rivers of southern California and northwestern Baja California, Mexico. The least Bell's vireo arrives in early to mid spring and establishes nesting sites within dense riparian habitat with a well-stratified canopy. These birds then migrate back to southern Baja California, Mexico in the fall, where they spend the remainder of the year. Historically considered common within suitable habitat throughout California from the northern Sacramento Valley south into northwestern Baja California, Mexico (Franzreb 1989, in USACE 2000). Due to loss of riparian habitat, the range and population sizes have substantially declined. Within the SAR corridor, suitable habitat occurs throughout much of Subarea 3, and many least Bell's vireo sightings have been recorded. This stretch of the river, including the Prado Flood Control Basin, supports the second largest population of this species (personal communication, Tennant 2002). Additionally, most of this area, including habitat from RM 36.25 to RM 47.5 and within Prado Flood Control Basin, has been designated by the USFWS as critical habitat for the least Bell's vireo. The remainder of the SAR corridor, which flows through the alluvial fan, does not support suitable habitat for this species (USACE 2000). Focused surveys conducted adjacent to the SAR corridor in portions of Subarea 2 resulted in no observations of this species (SAIC 2003).

Table 3.3-2. Threatened and Endangered Species of the SAR Corridor (page 4 of 5)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
Santa Ana Sucker *Catostomus santaanae*	FE, SSC	Small, bottom-feeding fish with an average length of approximately 4.5 inches and a maximum length of about 8 inches (Moyle 1976). They occupy small- to medium-sized permanent streams with depths ranging from a few inches to 3 feet or more with slow to swift flows. Habitat subject to periodic severe flooding. Santa Ana suckers appear to be most abundant where the water is cool (less than 72^{o}F) and clear, although they can tolerate and survive in seasonally turbid water. Prefers coarse substrates consisting of gravel, rubble, and boulders. Although reported to be highly susceptible to polluted water, a recent study conducted by the OCWD indicates that the quality of the water is not a factor in the sucker's decline (OCWD 2001, Tennant 2002 pers. comm.). Larvae and young may be found in a greater variety of substrates where the margins of the streams gradually grade to exposed banks, about 6 inches deep and shallower. They are much less common where the water is deep up to the shoreline. As the fish matures, they move into deeper water. Adults are restricted to holes or pools that are usually 18 to 50 inches deep and usually associated with bridge abutments, large clumps of giant reed, the end of gabions, or other obstacles that lead to pool development (MEC and Aspen Environmental Group 2000). Santa Ana suckers typically reach sexual maturity in just over 1 year and typically live less than 3 years. Spawning occurs from March to early July, with a peak in spawning activity occurring in late May and June (Moyle 1976). However, surveys within the San Gabriel River have found small juveniles in December indicating that spawning may begin as early as November under some conditions. The fecundity of the Santa Ana sucker is also very high and may be an important characteristic that aids in its recolonization of streams after a severe flood event. This species feeds primarily on detritus, algae, and diatoms (MEC and Aspen Environmental Group 2000).

Table 3.3-2. Threatened and Endangered Species of the SAR Corridor (page 5 of 5)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
Santa Ana Sucker (continued)		Distribution within the SAR corridor extends from just upstream of the Riverside Avenue bridge in Riverside (at Rialto Drain), downstream to a few miles below Imperial Highway in Orange County (below Prado Dam). Surveys of this stretch of the River have yielded suckers at a number of locations. The species also is present in several tributaries to the SAR and breeds in Rialto Drain and Sunnyslope Creek (San Marino Environmental Associates [SMEA] 2002). Critical habitat was designated for this species on February 26, 2004 (FR 69(38):8839-8861). Although critical habitat within the Project area includes the area defined as Unit 1B, the SAR from Seven Oaks Dam downstream to La Cadena Avenue bridge (just below the confluence with Lytle Creek) as well as Mill Creek, Plunge Creek, and City Creek, the species does not occur in those areas. Occupied habitat for the species is protected by the Santa Ana Sucker Conservation Program and the Western Riverside Multiple Species Habitat Conservation Plan. An evaluation of the final rule for critical habitat designation (EIP 2004) concluded that designation of the unoccupied habitat in the SAR and its tributaries in Unit 1B is not supported by the best available scientific information. Specifically, the areas in Unit 1B are not needed to (1) provide and transport sediment (e.g., gravel) into the currently occupied Santa Ana sucker habitat (based on HEC-6 modeling); (2) maintain the natural hydrograph (all but flood flows in City and Mill creeks are diverted); (3) protect water quality (due to lack of riparian habitat and flows into the SAR); and (4) maintain habitat for the species (no evidence that the species ever inhabited Mill Creek and no plans exist to reintroduce the species into City Creek or the SAR Unit 1B). Decline is attributed to urbanization, water diversions, dams, introduced competitors and/or predators (i.e., brown trout), and other human caused disturbances. High flows within the basin between 1991 and 1996 have also been implicated for significant decreases in the Santa Ana sucker populations as evidenced by the low yields of the 1996 surveys. The USFWS has also stated that random events such as floods may lead to the demise of the species due to genetic isolation of remaining populations.

Notes: FE = federally-listed as endangered; FT = federally listed as threatened; FSC = federal species of special concern; SE = state-listed as endangered; ST = state-listed as threatened; SSC = state species of special concern; CNPS 1B = CNPS List 1B sensitive plant, fish, and wildlife species known from the general Project region. Endangered and threatened species of the alluvial fan area are listed in section 3.3.1.3 (Santa Ana River Alluvial Fan) (Table 3.3-3).

3.3.1.3 Santa Ana River Alluvial Fan

The Santa Ana River alluvial fan is located along the upper SAR, commencing where the river exits the canyon.

3.3.1.3.1 Vegetation and Habitats

The dominant vegetation community at the top of the fan and over much of the downstream alluvial fan area is riversidian alluvial fan sage scrub (RAFSS), a unique vegetation community. RAFSS is considered a threatened natural community by CDFG. This diverse scrub vegetation is regarded as sensitive because of its limited distribution (typically occurs only on upper alluvial fans along the southern base of the San Gabriel and San Bernardino mountains) and because only remnant tracts remain. Most of this original habitat has been lost or severely disturbed by urban, agricultural, and industrial development in this region. RAFSS is also considered unique because it supports assemblages of sensitive plant species, some of which occur only in the SAR alluvial fan (i.e., the Santa Ana River woolly-star).

RAFSS is common on floodplain terraces of the eastern portions of the alluvial fan that was created by the SAR. Soils in this area are very patchy, and reflect meandering channels that were created during flood runoff events. Soils are rocky throughout with rounded, river deposited rocks ranging from cobbles to small boulders being prevalent, and interspersed with patchy surface deposits of finer materials, especially sand and silt. Plant species dominance is also patchy, reflecting the patchy soils as well as the time since disturbance (e.g., by flooding, fire, and previous ground disturbances).

The RAFSS plant community is comprised of shrubs that are openly spaced with up to approximately 52 percent cover of perennials. Much of the shrub cover is low growing but in some areas there are regularly spaced individuals or clumps of overstory woody species such as California juniper or sugarbush (Zembal and Kramer 1984, USACE 1988). The community includes an assemblage of low drought-deciduous shrubs and larger evergreen woody shrubs that are characteristic of coastal sage scrub and chaparral plant communities, respectively (Smith 1980). Alluvial scrub is a relatively open vegetation community adapted to porous, low-fertility substrates as well as periodic flooding and erosion (Hanes et al. 1989).

The shrub covered terraces, which occur above the alluvial wash channels, exhibit differences in vegetative cover and composition that have been described as three phases of alluvial scrub vegetation (Smith 1980, Hanes 1984, Hanes et al. 1989). These phases are thought to correspond to factors such as flood scour, distance from a flood channel, time since the previous catastrophic flood, and substrate features such as texture and moisture content (Smith 1980, Hanes et al. 1989). The three phases have been referred to as pioneer [early], intermediate, and mature; but because the vegetation consists of mosaics of coastal sage scrub, chaparral, and transmontane juniper woodland species, this community is difficult to define or describe in ecological terms (Hanes 1984). Due to similarities in the composition of dominant species

Table 3.3-3. Threatened and Endangered Species of the SAR Alluvial Fan (page 1 of 4)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
The Santa Ana River Woolly-Star *Eriastrum densifolium* ssp. *sanctorum*	FE, SE, CNPS 1B	Perennial herb or subshrub reaching a height of 3 feet, found only in the SAR drainage. A conspicuous plant with silvery foliage and bright blue flowers that bloom from June to September. Occurs in gravelly riverbeds and terraces within chaparral or coastal scrub habitat classified as RAFSS. Recorded within the wash and floodplain of the SAR (See Figure 3.3-1). This species occurs only in the floodplain of the SAR where it is most commonly associated with sandy soils and early successional and intermediate phases of RAFSS habitat (Burk et al. 1988), although populations also occur among mature RAFSS. It is found primarily on newer surfaces of coarse, loose sand deposits where perennial and annual plant cover is relatively low. This subshrub is also found in intermediate to mature aged RAFSS habitats, but to a lesser extent. It is often found where animals have moved sand to the surfaces or where minor stream channels have deposited sand locally within the more mature RAFSS community. Additional information is in Appendix E. A 764-acre Woolly-Star Preserve Area (WSPA) was established near the Project area as mitigation in the 1990s by the USACE and local sponsors to address impacts related to the construction of Seven Oaks Dam (Figure 3.3-1). Suitable habitat appears to exist for this species along the upper portions of the proposed Plunge Pool Pipeline corridor. However, it was not observed during initial surveys conducted in the area during June 2001 nor during focused biological surveys conducted for the Project March 25-27, 2003, May 13-14, 2003, and June 9-10, 2003. During the focused surveys, a nearby known population of the species was observed to verify the growth stage and appearance of the Santa Ana River woolly-star on the survey date. Based on these survey results, the Santa Ana River woolly-star was not present along the surveyed corridor during 2003.

Table 3.3-3. Threatened or Endangered Species of the SAR Alluvial Fan (page 2 of 4)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
Slender-Horned Spineflower *Dodecahema leptoceras*	FE, SE, CNPS 1B	Spreading annual herb approximately 1 to 4 inches tall with sprays of tiny white to pink flowers, blooming between April and June. Distribution in the overall Project area is shown in Figure 3.3-2. One occurrence was recorded within the SAR fan 1 mile south of Greenspot Road and 0.5 mile east of the old railroad grade, about 0.75 miles south of the Phase II Plunge Pool Pipeline alignment. Threats to this species include agriculture, urbanization, reduction of scouring action due to flood control activities, sand and gravel mining, off-road vehicle activity, and non-native plants. Within the SAR fan, the Slender-horned spineflower is found on alluvial benches vegetated with intermediate to mature phase RAFSS. The habitats where the plant is found are infrequently flooded and have not been recently flooded. Usually found in open sandy areas in full sun, usually near California junipers. The preferred soil is medium- to coarse-grained sand with some cohesion and is sometimes described as silty. Cryptogamic crusts, comprised of lichens, mosses, liverworts and other non-vascular plants, are typically present. The microhabitat where the plants are found may contain other annual plants but is mostly devoid of grasses. It is not known what mechanism prevents aggressive non-native annual grasses or species from pre-empting these areas to the exclusion of the spineflower. It is thought that cryptogamic soil crusts play a role in inhibiting grasses that would otherwise displace the diminutive spineflower. Suitable habitat appears to exist for this species along portions of the proposed Plunge Pool Pipeline corridor, although it was not observed during initial surveys conducted in the area during June 2001 nor during focused biological surveys conducted for the Project March 25-27, 2003, May 13-14, 2003, and June 9-10, 2003. During the focused surveys, a nearby known population of the species was visited to verify the growth stage and appearance of the Slender-horned spineflower on the survey date. Based on the results of these surveys, this species was not present along the surveyed corridor in 2003.

Table 3.3-3. Threatened or Endangered Species of the SAR Alluvial Fan (page 3 of 4)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
Coastal California Gnatcatcher *Polioptila californica californica*	FT, SSC	Occupies sage scrub vegetation in southern California. Additional information in Appendix E. Although more prevalent in coastal sage scrub and Riversidian (also spelled Riversidean) sage scrub (RSS) in non-alluvial habitats, RAFSS does represent suitable habitat for the gnatcatcher. RAFSS habitat covers nearly all of the fan excluding those areas which have been disturbed recently. In addition, critical habitat for this species has been designated by the USFWS throughout the entire fan. Although suitable habitat occurs on the SAR alluvial fan and throughout the region, gnatcatcher observations are rare in this area, which is at the northeastern extent of its range. Several of the records described above indicate sightings within the SAR alluvial fan; however, none of the observations have indicated breeding individuals. Focused surveys conducted within those portions of the SAR alluvial fan associated with Project construction activities resulted in no observations of this species (SAIC 2003).
San Bernardino Kangaroo Rat *Dipodomys merriami parvus*	FE, SSC	The SBKR is found on the SAR alluvial fan and in a few other populations in the eastern Los Angeles Basin. Soil type and vegetation appear to be the most important factors in determining habitat suitability. This subspecies is found primarily on sandy loam substrates, characteristic of alluvial fans and flood plains, where they are able to dig simple, shallow burrows (McKernan 1997). The preferred vegetation type is also associated with alluvial fans, where the common elements are open habitat characterized by low shrub canopy cover (7 to 22 percent cover). Although the SBKR occasionally occupies sage scrub just outside an alluvial fan, alluvial scrub supports the highest population densities. Figure 3.3-3 shows the location of designated SBKR critical habitat identified in the Project area. Additional information is presented in Appendix E. Of the seven remaining locations, three including the SAR (1,725 acres), Lytle and Cajon washes (1,140 acres), and San Jacinto River (350 acres), contain the largest extant concentrations of SBKR and blocks of suitable habitat (McKernan 1997, USFWS unpub. GIS maps 1998).

Table 3.3-3. Threatened or Endangered Species of the SAR Alluvial Fan (page 4 of 4)

Common Name *Species Name*	*Status*	*Distribution and Occurrence in the Project Area*
San Bernardino Kangaroo Rat (continued)		Studies indicate that SBKR is expected to occur throughout Subarea 2, west of Greenspot Road. However, the majority of the suitable habitat occurs outside of the SAR corridor. Although SBKR occupies younger RAFSS, most of the active channel and some of the immediately adjacent terraces are scoured too frequently to support RAFSS and subsequently are not expected to support the SBKR. Focused surveys conducted within those portions of the SAR alluvial fan associated with Project construction activities resulted in no observations of this species (SAIC 2003).
Notes: FE = federally listed as endangered; FT = federally listed as threatened; FSC = federal species of special concern; SE = state-listed as endangered; ST = state-listed as threatened; SSC = state species of special concern; CNPS 1B = CNPS List 1B		

observed in early and intermediate phase RAFSS, it is difficult to distinguish these phases. However, the USACE (1996) differentiated between various phases of RAFSS habitats by the elevation at which the habitats occur when the species composition was similar.

Early phase RAFSS exhibits sparse cover and low species diversity, and plants are typically low in stature. This phase develops within infrequently flooded stream channels in the intervals between periodic flood events and will develop and occupy a site within the first decade or so after a major flood. Dominant species include California buckwheat (*Eriogonum fasciculatum*), scalebroom, and sometimes mulefat (Smith 1980, Hanes et al. 1989). Other dominant shrubs may include brittlebush (*Encelia farinosa*) and sweetbush (*Bebbia juncea*) (USACE 1996). Terraces with early RAFSS were thought to have dated to flooding that occurred in 1993 (USACE 1996), and are associated with overbank areas adjacent to the SAR or the confluence with City Creek and Plunge Creek (USACE 2000).

Intermediate phase RAFSS exhibits denser shrub cover and may have higher species diversity than early phase RAFSS. Species observed in intermediate RAFSS include California buckwheat, scalebroom, yerba santa (*Eriodictyon trichocalyx*), and Whipple's yucca (*Yucca whipplei*) (Hanes et al. 1989). Other dominant shrubs may include deerweed (*Lotus scoparius*) and brittlebush. Terraces with intermediate RAFSS were thought to have dated to flooding that occurred in 1938 and 1969 (USACE 1996).

Mature phase RAFSS includes a higher percentage of woody shrub species than intermediate RAFSS. Intermediate to mature transitional areas support California sagebrush (*Artemisia californica*), white sage (*Salvia leucophylla*), prickly pear (*Opuntia littoralis*), and valley cholla (*Opuntia parryi*). Mature RAFSS includes California juniper (*Juniperus californica*), California redberry (*Rhamnus crocea*), sugarbush (*Rhus ovata*), holly-leaf cherry (*Prunus illicifolia*), and chamise (*Adenostoma fasciculatum*). Junipers are more commonly found on desert slopes than in alluvial habitats. However, California juniper are thought to have colonized the alluvial fan from seed washed down from interior mountain slopes during major flood events. It is thought that the areas presently populated with California juniper and mature RAFSS were affected by the 1862 flood event.

3.3.1.3.2 Wildlife of the SAR Alluvial Fan

The vegetation communities discussed above provide wildlife habitat within the SAR alluvial fan. While a variety of animal types are well adapted to the conditions of the fan, wildlife diversity, in general, is low due to the relatively homogenous structure of the shrubby vegetation occurring throughout the fan. However, many wildlife species occurring within adjoining vegetative communities may occasionally traverse or use the periphery of the fan, making it part of a functional ecosystem for a variety of wildlife species. Descriptions and representative examples of the various wildlife populations in the SAR alluvial fan are provided below.

Analysis of invertebrates in the fan is generally limited by a lack of site-specific data. Although the diversity and abundance of invertebrates in the fan may be less than for areas with a greater assortment of plant communities, the amount of undisturbed native habitat on the fan is considered sufficient to support populations of many invertebrate species, including arachnids and a variety of insect orders.

Amphibian populations are expected to be uncommon in the fan due to the infrequency of pooled or ponded water, and the lack of riparian habitat on the fan. However, areas closest to the SAR corridor may occasionally support amphibians in wet years. In addition, some toad species often move into drier upland habitat during dry months. In addition, groundwater recharge basins and other isolated wet areas that are a result of man's activities or facilities may occasionally support amphibians. Common amphibian species that are expected to occur on the fan include, but are not limited to, western toad, western spadefoot toad, and Pacific and California (*Pseudacris cadaverina*) chorus frogs in isolated wet spots.

Although most of the habitat on the SAR alluvial fan is relatively homogeneous, it has the potential to support a wide variety of reptile species. Habitat characteristics such as sparse vegetation, small mammal burrows, abundant prey, and various sized boulders provide high quality habitat for many reptile species. Reptile species representative of the fan that are expected to occur include the western fence lizard (*Sceloporus occidentalis*), side-blotched lizard, coastal western whiptail, northern red-diamond rattlesnake, red coachwhip (*Masticophis flagellum piceus*), and chaparral whipsnake (*Masticophis lateralis lateralis*).

The sage scrub of the SAR alluvial fan provides foraging habitat and cover for year-round residents, seasonal residents, and migrating songbirds. Although less diverse than woodland habitats, scrub communities such as RAFSS support a large number of bird species. In addition, the scrub of the SAR fan covers a large area locally, and is relatively undisturbed. Bird species representative of RAFSS habitat are the same as described above for the SAR corridor.

Much of the habitat within the Project vicinity provides good foraging opportunities and several areas within the vicinity provide adequate breeding areas for raptors. Trees found in nearby riparian woodlands and ornamental (eucalyptus) woodlands provide perches for foraging over the scrub vegetation. RAFSS habitat is also excellent habitat for small mammals and likely supports a large rodent population. Collectively, the abundance of prey and the availability of perches and nest sites suggest that the fan is being used by a variety of raptor species. Raptor species expected to occur include, but are not limited to, the golden eagle (*Aquila chrysaetos*), Cooper's hawk, red-tailed hawk, red-shouldered hawk, American kestrel, turkey vulture (*Cathartes aura*), and the great-horned owl (*Bubo virginianus*).

Sage scrub habitat with an alluvial substrate often supports a large variety of mammals of all sizes, provided the area is large and contiguous with other community types. The SAR alluvial fan is expected to support many common small mammal species such as the deer mouse, San Diego pocket mouse, and the dusky-footed woodrat. Medium sized mammals are also expected to occupy the fan including the coyote, striped skunk (*Mephitis mephitis*), and desert cottontail. Other species with larger home ranges, such as mule deer, bobcat, and mountain lion, are resident within the region and are likely to occasionally forage on the fan.

As described above, wildlife movement is expected to occur throughout the SAR alluvial fan including the Project area via wildlife paths and trails throughout the habitat. Movement on a larger or regional scale is also expected to occur on the fan due to the confluence of many major drainages in the area and the restriction of movement through the SAR Canyon as a result of the construction of Seven Oaks Dam.

3.3.1.3.3 Sensitive Plants and Wildlife

This section identifies plant, fish, and wildlife species of the SAR alluvial fan within the Project area that are listed or proposed for protection under ESA and CESA. Table 3.3-3 identifies the species and their status. Figures 3.3-1, 3.3-2, and 3.3-3 show the distribution of these species in the Project area.

3.3.1.4 Project Construction Areas

3.3.1.4.1 Seven Oaks Dam and Reservoir

Biological resources upstream of Seven Oaks Dam that would potentially be affected by the Project were assumed to be within the potential inundation area of Seven Oaks Dam and mitigation for their loss was the responsibility of the USACE following its construction and operation for flood control. Greater details on these biological resources and the mitigation measures implemented are described in USACE (1988).

Biological resources within the intake structure construction area are limited to sparse vegetation and associated wildlife occurring in the staging area located just north of the intake structure. These area remains highly disturbed as a result of Seven Oaks Dam construction. Native chaparral vegetation and associated wildlife typical of steep slopes in the region occupy the construction corridor of the proposed new alignment for Warm Springs Road. This habitat is mostly undisturbed and surrounded by extensive open space. No state or federally listed species are known or expected to occur in the construction areas upstream of the dam. Several sensitive status species are known and expected to occur where suitable habitat is present.

3.3.1.4.2 Plunge Pool Pipeline Corridor

The following descriptions of habitats that occur in the proposed Plunge Pool Pipeline corridor are presented in order from east to west, starting at the existing plunge pool and ending at the pipeline's proposed intertie with the Metropolitan Inland Feeder at Cone Camp Road (see Figure 3.3-4, Sheets 1-5).

VEGETATION AND HABITATS

The plunge pool is a circular pool, approximately 25-30 feet deep, located immediately downstream of the dam. The banks of the pool have been graded and armored with cobbles. Immediately downstream of the plunge pool, the mainstem of the SAR is an engineered trapezoidal channel and the banks are also lined with loose boulders. Within the active channel, riparian vegetation has established in response to persistent flows that emanate from the outlet works of Seven Oaks Dam. Presently, this channel supports southern willow scrub riparian vegetation dominated by shrubby willows (including *Salix exigua* and *S. laevigata*) and emergent aquatic vegetation such as cattails (*Typha* sp.). Fremont's cottonwood (*Populus fremontii*) and a few western sycamore (*Platanus racemosa*) trees are also growing among the willows along the channel. This plant community has established since completion of the dam.

Restored/recovering riparian habitat and established riparian habitat are present within the Project area in the vicinity of the plunge pool below the dam, along the river to the SCE SAR 2/3 power plant and in Morton Canyon near the alignment of the proposed Morton Canyon Connector II Pipeline.

The predominant vegetation in the pipeline corridor north of the SAR channel and along Greenspot Road is characterized as RAFSS, with early, intermediate, and mature phases all represented on, or in close proximity to, the pipeline alignment. The species mentioned are natives, unless otherwise identified as exotic. Species observed along the pipeline corridor include low native shrubs that are regarded as pioneer RAFSS species. These include brittlebush, California buckwheat, deerweed, cudweed-aster (*Lessingia filaginifolia*), sweetbush, California sagebrush, and goldenbush (*Ericameria* sp.). Areas less recently disturbed support most of the above-mentioned pioneer species but also include additional native shrub species such as chamise, sugarbush, valley cholla, Whipple's yucca, and yerba santa. Between the shrubs in areas with developed soil, weedy introduced European grasses such as ripgut (*Bromus diandrus*) and foxtail fescue (*Vulpia myuros*) are prevalent, although patches of native annual wildflowers such as yellow pincushion (*Chaenactis glabriuscula*) are also present. During spring 2003, openings between the shrubs supported displays of a variety of native wildflowers. Here and there, patches of cryptogamic crust occur characterized by green and black mosses among the pebbles. These patches are relatively weed-free but support a variety of low-growing native annuals including Parry's spineflower (*Chorizanthe parryi* var. *parryi*), lastarriaea (*Lastarriaea coriacea*), sand pygmy weed (*Crassula connata*), winged pectocarya (*Pectocarya penicillata*), cryptantha (*Cryptantha* sp.), sun cups (*Camissonia hirtella*), and sapphire woolly-star (*Eriastrum sapphirinum*).

Portions of the western part of the Plunge Pool Pipeline alignment follow the alignment of the existing Foothill Pipeline, which was installed in 1970. These areas are in an early successional stage and are marked by large rocks, cobbles, and boulders with scattered low shrubs, the most prevalent being brittlebush (Encelia farinosa). Older terraces adjacent to the disturbed pipeline corridor were dominated by chamise, with redberry, large prickly pear (*Opuntia* sp.), valley cholla, Whipple's yucca, birdsfoot fern (*Pellaea mucronata*), and live-forever (*Dudleya lanceolata*). Occasional large patches of sugarbush and individuals of Mexican elderberry were also present. Shrub cover and numbers of native plant species were much higher on the older terraces than in the disturbed corridor.

WILDLIFE

The riparian scrub that occupies the active channel below the plunge pool is immature but sufficient to support many common species that use riparian habitat. Typical riparian species such as the black phoebe, black-headed grosbeak, and the yellow-rumped warbler would be expected. The sparse, ruderal grasslands are marginally suitable as foraging habitat for a variety of species but are unlikely to support breeding activities, except for the most common and ubiquitous species, such as ground squirrels and deer mice. The quality of the RAFSS, which occurs throughout much of the corridor, is highly variable. Those areas that have experienced recent or frequent disturbances are less suitable and are likely to support only the most tolerant species representing a small percentage of the variety and abundance of species that normally occupy undisturbed RAFSS. Areas supporting RAFSS that have experienced little disturbance, no disturbance, or have had sufficient time for re-growth are likely to support the variety and abundance of species typical of RAFSS on the SAR alluvial fan. Common species expected to occur within these communities are described in section 3.3.1.3.2 (Wildlife of the SAR Alluvial Fan). The remaining areas traversed by the proposed pipeline alignment are either devoid of vegetation or support citrus orchards and are expected to support only minimal, occasional use by common wildlife species. Wildlife movement in the pipeline corridor is described in sections 3.3.1.2.2 (Wildlife of the Santa Ana River Corridor) and 3.3.1.3.2 (Wildlife of the SAR Alluvial Fan).

SENSITIVE SPECIES

No sensitive plant species were identified within the proposed Plunge Pool Pipeline corridor, which includes portions of the SAR as well as alluvial fan terrace habitats located north of the existing borrow pit and groundwater recharge basins, and adjacent to Greenspot Road. However, habitat is present that appears suitable for the Santa Ana River woolly-star and Slender-horned spineflower (both of which are associated with RAFSS habitat) in the alluvial fan. Consequently, surveys of the proposed Plunge Pool Pipeline corridors were conducted.

No threatened or endangered plant species were observed during initial biological surveys conducted in the area in June 2001 nor during focused biological surveys conducted for the Project in 2003. Based on the results of these surveys, the Slender-horned spineflower and Santa Ana River woolly-star were not present in the corridor during the survey period, even though habitat characteristics are suitable.

About 25 individuals of Plummer's mariposa lily (*Calochortus plummerae*) were identified from seven locations along the proposed Plunge Pool Pipeline corridor during June 2003 (Figure 3.3-4, Sheets 3 through 5). Plummer's mariposa lily is a California Native Plant Society (CNPS) List 1B species (i.e., rare and endangered in California and elsewhere). This is a showy perennial herb that blooms from May to July. It is generally found in communities with granitic or rocky soils in association with chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, valley and foothill grasslands. Colonies of Parry's spineflower containing tens to hundreds of individuals were prevalent along the western portions of the proposed Plunge Pool Pipeline corridor (Figure 3.3-4, Sheets 3 through 5). These are closely associated with areas of cryptogamic soil in openings between shrubs. Competing non-native grasses were sparse and other low-growing native annuals were typically present. Some of the locations were within the area previously disturbed by installation of the Foothill Pipeline in 1970. Parry's spineflower is a CNPS List 3 species (i.e., need more information to assign status—a review list). It is a low annual herb with tiny white flowers that blooms between about April and June. It is found in sandy or rocky openings within chaparral and coastal scrub communities and appears to be especially prevalent in RAFSS.

Although year-round aquatic habitat is now present between Seven Oaks Dam and Cuttle Weir, Santa Ana sucker are not expected due to the distance to occupied habitat (about 9 miles) and lack of intervening suitable habitat to provide a movement corridor.

The Plunge Pool Pipeline corridor traverses some areas within the SAR Canyon that are considered marginally suitable for the arroyo toad. However, as described previously, the arroyo toad is not expected to occupy the SAR corridor. This determination is also applicable to the habitat within the Plunge Pool Pipeline corridor.

Although some riparian habitat occurs within Santa Ana River Canyon, it does not constitute a woodland community, which is preferred by the western yellow-billed cuckoo. This species is extremely rare in the region and is not expected to occur within the Plunge Pool Pipeline corridor due to lack of suitable habitat.

Similarly, riparian habitat occurring within the Plunge Pool Pipeline corridor is immature and is not expected to support the southwestern willow flycatcher or the least Bell's vireo. Focused surveys conducted in 2003 within all suitable habitat areas of the Plunge Pool Pipeline corridor resulted in no observations of these species (SAIC 2003a,b).

Within the Plunge Pool Pipeline corridor, the RAFSS habitat west of Greenspot Road and scrub habitat on the adjacent slopes through the SAR Canyon represent potentially suitable habitat for coastal California gnatcatcher (CAGN). In addition, that portion of the corridor west of Greenspot Road is within designated Critical Habitat. Although extremely rare in the area, gnatcatchers have occasionally been detected. Individuals that have been observed are believed to be transients due to the lack of breeding behavior detected and the inconsistent pattern of observations. This species has not been recorded within the Plunge Pool Pipeline corridor, and its presence is not expected. Focused surveys conducted in 2003 within all suitable habitat areas of the Plunge Pool Pipeline corridor resulted in no observations of this species (SAIC 2003c).

The Plunge Pool Pipeline corridor, as described above, traverses RAFSS vegetation along most of the alignment. Although this plant community is generally the preferred habitat of the SBKR, conditions at this location render it only marginally suitable for this species. In general, areas of RAFSS that have experienced recent or frequent disturbances or have become isolated due to disturbance barriers are less likely to support the SBKR. Areas supporting RAFSS that have experienced little disturbance, no disturbance, or have had sufficient time for re-growth are more likely to support SBKR. North of Greenspot Road, RAFSS habitat is mostly disturbed and past studies in this area have not detected the SBKR. Focused surveys conducted in 2003 for the Project within all suitable habitat areas of the Plunge Pool Pipeline corridor resulted in no observations of SBKR (SAIC 2004a).

Although SBKR are highly unlikely to occupy the habitat in the Plunge Pool Pipeline corridor, the area is contained within the USFWS-designated Critical Habitat for this species. The designation at this location is likely a result of the more cursory level of defining boundaries used by the USFWS for such large scale mapping efforts. Without site specific information to indicate otherwise, the area would be reasonably perceived to be a contiguous part of the larger RAFSS community of the SAR alluvial fan which is known to support the SBKR. In addition, Critical Habitat may include areas that represent important locations for future occupation and species recovery. Site specific information gathered during the many studies conducted as part of this Project would indicate that the Plunge Pool Pipeline corridor area is unlikely to be essential to SBKR conservation.

3.3.1.4.3 Low Flow Connector Pipeline

The Low Flow Connector would originate at Seven Oaks Dam adjacent to the plunge pool. From there, it would be constructed around the perimeter of the plunge pool in a previously disturbed area, and ultimately return to the same alignment and trench as the Plunge Pool Pipeline. It would then be located within the same trench as the Plunge Pool Pipeline for approximately 2,000 feet.

VEGETATION AND HABITATS

While in the same trench as the Plunge Pool Pipeline, the Low Flow Connector Pipeline would traverse the same types of habitats described above for the Plunge Pool Pipeline. Approximately ½ mile downstream from the plunge pool, the alignment of the Low Flow Connector Pipeline would diverge from that of the Plunge Pool Pipeline and turn to the southeast, ultimately connecting to the Greenspot Pipeline (see Figure 2-4). To make this connection, the trench and pipeline would cross over areas that were previously disturbed during construction of Seven Oaks Dam and an undisturbed side channel adjacent to the existing SCE structures and powerhouse. This side channel supports a mix of sage scrub and chaparral species, as well as individual mulefat plants, and invasive species such as fountain grass (*Pennisetum setaceum*).

WILDLIFE

Wildlife presence within the proposed Low Flow Connector Pipeline alignment is expected to be the same as described for the Plunge Pool Pipeline corridor except for the lack of RAFSS. Because these two proposed pipelines would share the same alignment, the habitats and associated wildlife within the shared area are identical. Because the Low Flow Connector Pipeline alignment occurs only within Santa Ana Canyon and does not cross the alluvial fan, very little high quality habitat is traversed. Consequently, the variety of wildlife species and their abundance is expected to be markedly less within the Low Flow Connector Pipeline alignment. Common species expected to occur within the communities occupying the Low Flow Connector Pipeline alignment and wildlife movement are described in section 3.3.1.2.2 (Wildlife of the Santa Ana River Corridor).

SENSITIVE SPECIES

No state or federally listed plant species are expected to occur along the Low Flow Connector Pipeline alignment. Sensitive wildlife species potentially occurring within the Low Flow Connector Pipeline alignment are as described above for the Plunge Pool Pipeline corridor and include arroyo toad, western yellow-billed cuckoo, southwestern willow flycatcher, CAGN, least Bell's vireo, and SBKR. From the standpoint of listed wildlife species, the only substantial difference between the Plunge Pool Pipeline corridor and the Low Flow Connector Pipeline corridor is the amount of suitable habitat for the CAGN and the SBKR which is present at the downstream end of the Low Flow Connector Pipeline alignment after it has diverged from the trench it shares with the Plunge Pool Pipeline (Phase III). Therefore, only these two species are discussed below.

As described above, scrub habitat on the slopes adjacent to the alignment through the SAR Canyon represents potentially suitable habitat for the CAGN. Additionally, small amounts of RAFSS may be marginally suitable in a few locations among the disturbed communities on the floor of the canyon. These areas coincide with the Low Flow Connector Pipeline alignment. Due to the small amount of habitat and the rarity of this species in the region, the gnatcatcher is not expected to occur within the Low Flow Connector Pipeline alignment. Focused surveys conducted in 2003 within all suitable habitat areas of the Low Flow Connector Pipeline alignment resulted in no observations of CAGN (SAIC 2003c). This area is also not within the USFWS designated critical habitat for the CAGN.

The Low Flow Connector Pipeline alignment does not traverse the alluvial fan, thus it crosses very little RAFSS. Most of the alignment occurs within disturbed areas. These areas, within the SAR Canyon below the dam, have recently experienced substantial disturbance as a result of the construction of Seven Oaks Dam. Re-growth of natural communities has begun but most areas would not be suitable for the SBKR. A few small fragments of less disturbed habitat may exist scattered within the canyon and within the Low Flow Connector Pipeline alignment. The SBKR is not expected to occur in this area due to the limited amount of suitable habitat and the results of studies indicate that the habitat is unoccupied (USACE 2000). Focused surveys conducted in 2003 within all suitable habitat areas of the Low Flow Connector Pipeline alignment resulted in no observations of this species (SAIC 2004a). This area is also not within the critical habitat for the SBKR designated by the USFWS.

3.3.1.4.4 Morton Canyon Connector II Pipeline

The Morton Canyon Connector II Pipeline would be located downstream of the SCE SAR 2/3 powerhouse and east of Greenspot Bridge. This pipeline would connect the existing Greenspot pipeline to the recently completed Greenspot Pump Station.

VEGETATION AND HABITATS

The Morton Canyon Connector II Pipeline would be constructed at the base of an existing terrace and outside the armored left bank of the SAR in a narrow strip of land that supports degraded Riversidian Sage Scrub (RSS) and RAFSS habitat. This area has been disturbed previously by construction of the dam, by reconstruction of the SAR channel and channel armor, and by the previous installation of the Morton Canyon Connector I. This area presently supports sage scrub and chaparral species, as well as non-native grasses and ruderal species. The distribution of habitats in the vicinity is shown in Figure 3.3-5.

WILDLIFE

Wildlife presence within the proposed Morton Canyon Connector II Pipeline corridor is expected to be similar to that described for the Low Flow Connector Pipeline corridor. These similarities are expected because most of the corridor is situated at the toe of the slope between the SAR Wash and the adjacent foothills. The corridor traverses various qualities of RSS and chaparral on the lower slopes and disturbed RAFSS on the alluvial fan immediately north of the Greenspot Pump Station. Wildlife associated with these communities is discussed above.

Within Morton Canyon, the corridor is adjacent to the toe of the slope and traverses habitat types such as sage scrub and unvegetated disturbed habitat. However, approximately 100 feet northeast of the corridor, the bottom of the canyon supports a riparian woodland community that extends from the mouth of the canyon upstream for several thousand feet. Although not directly within the corridor itself, the riparian habitat is likely to increase the overall abundance and variety of wildlife occurring in the immediate area. Common species that are expected to occur within habitat types of the Morton Canyon Connector II Pipeline corridor have been described previously in section 3.3.1.2.2 (Wildlife of the Santa Ana River Corridor).

Wildlife movement within the Morton Canyon Connector II Pipeline corridor is expected to be higher than in other areas of the Project, particularly near the mouth of Morton Canyon. As a result, wildlife movement of medium to large mammals is likely to be concentrated near the easternmost segment of the proposed Morton Canyon Connector II Pipeline corridor.

SENSITIVE SPECIES

No state or federally listed plant species are expected to occur along the Morton Canyon Connector II Pipeline corridor. The sensitive wildlife species potentially occurring within this portion of the Project are similar to those described for the Low Flow Connector Pipeline corridor discussed above: the arroyo toad, western yellow-billed cuckoo, southwestern willow flycatcher, CAGN, least Bell's vireo, and SBKR.

Although the species potentially occurring are the same, the likelihood of their occurrence within the Morton Canyon Connector II Pipeline corridor is greater for those species associated with riparian habitat due to the mature riparian habitat type present at the northern end of this pipeline. These species include the western yellow-billed cuckoo, southwestern willow flycatcher, and least Bell's vireo. In addition, willow flycatchers (unknown subspecies) have been observed within the canyon on several occasions and breeding southwestern willow flycatchers have been observed along nearby Mill Creek. Focused surveys for the southwestern willow flycatcher and least Bell's vireo conducted in 2003 within all suitable habitat areas of the Morton Canyon Connector II Pipeline corridor resulted in no observations of these species (SAIC 2003a,b).

Similarly, the potential for CAGN is greater within the proposed Morton Canyon Connector II Pipeline corridor than within the proposed Low Flow Connector corridor due to the greater amount of RSS habitat available. This species has also been recorded nearby in recent years. Focused surveys for the CAGN conducted in 2003 within all suitable habitat areas of the Morton Canyon Connector II Pipeline corridor, however, resulted in no observations (SAIC 2003c).

The potential for SBKR within the Morton Canyon Connector II Pipeline corridor is low due to the small amount of habitat and its marginal quality. Focused surveys conducted in 2003 within all suitable habitat areas of the Morton Canyon Connector II pipeline corridor resulted in no observations of this species (SAIC 2004a).

3.3.1.4.5 Devil Canyon Construction Area

VEGETATION AND HABITATS

The proposed Devil Canyon Construction Area is located on the southern slope of the western San Bernardino Mountains just below the mouth of Devil Canyon. Although the foothills in this area are generally undisturbed, the immediate area of the proposed construction area has undergone a substantial degree of disturbance (Figure 3.3-6). Several major regional water distribution pipelines merge in this area, and numerous associated structures occur on the surface. There are also access roads and staging facilities, some of which have been paved.

Most of the area within the proposed construction corridor lies within the disturbance footprint of a recently completed portion of the Metropolitan Inland Feeder Pipeline. Plant communities within the area include RSS, chaparral, southern willow scrub, mulefat scrub, and ruderal grassland. Dense southern cottonwood willow scrub occurs along the Devil Canyon channel, and has developed since about 2000, when the area was completely denuded. The previously disturbed area supports a relatively dense growth of cottonwood (*Populus fremontii*), white alder (*Alnus rhombifolia*), willows (*Salix* spp.), and mulefat. Adjacent areas are similar in species competition but still greater in stature. Most of the upland habitat appears to be the result of revegetation efforts following previous construction. These re-vegetated communities, classified as RSS, tended to be dominated by one to three shrub species, the most prevalent being California sagebrush, brittlebush, California buckwheat, and deerweed.

WILDLIFE

Wildlife abundance within the proposed Devil Canyon Construction Area is expected to be low. Due to the disturbed nature of most of the scrub and the sparse assemblage of native plants, the area is generally unsuitable for many species of the region. Only the more ubiquitous species would be expected within upland habitat of the Devil Canyon Construction Area. The riparian habitat, although mostly immature, is expected to support a greater diversity of common species. As a result of the general low habitat suitability and disturbance in the area, minimal wildlife movement is expected to occur within the Devil Canyon Construction Area.

SENSITIVE SPECIES

No state or federally listed plant species are expected to occur along the Devil Canyon By-Pass corridor. The sensitive wildlife species potentially occurring within this portion of the Project include the southwestern willow flycatcher, CAGN, and least Bell's vireo. The potential for these species is very low due to the small amount of riparian habitat present and the disturbed condition of the upland habitat. Focused surveys for these three species conducted in 2003 within all suitable habitat areas of the Devil Canyon By-Pass corridor resulted in no observations of these species (SAIC 2003a,b,c). These species, therefore, are not expected to occur.

3.3.1.4.6 Lytle Creek Construction Area

VEGETATION AND HABITATS

The location of the Lytle Basins is along the southern edge of Lytle Creek Wash near the confluence with Cajon Wash, approximately 4 miles southwest of the proposed Devil Canyon By-Pass site. Water would be released into an existing channel at the Fontana Power Plant on Riverside Road and would flow northeastward along this channel to existing basins near the active channel of Lytle Creek adjacent to an aggregate mining facility.

Overall, vegetation of Lytle Creek Wash is somewhat similar to that on the SAR alluvial fan and nearly all of the vegetation adjacent to the Lytle Creek channel and spreading basins can be characterized as RAFSS. As described earlier, the RAFSS community type can be subdivided by age class. The surrounding habitat is intermediate to mature phase RAFSS. The mature phase RAFSS includes scattered sycamores and very large (up to 35 feet tall) individuals of birchleaf mountain mahogany (*Cercocarpus betuloides*). The habitat in the existing basins is degraded due to the periodic clearing of the basins and adjacent berms.

The constructed channel, which currently receives flows from the Fontana Power Plant, supports a riparian community dominated by native species including mule fat, arroyo willow, sandbar willow, mugwort (*Artemisia douglasiana*), goldenrod (*Euthamia occidentalis*), annual sunflower (*Helianthus annuus*), and a variety of grasses and rushes. The basins support a combination of native species including coastal sagebrush, California buckwheat, scalebroom, matchweed (*Gutierrezia californica*), and deerweed along with colonies of weedy non-native species including tocalote (*Centaurea melitensis*), filaree (*Erodium* sp.), red brome (*Bromus rubens*), ragweed (*Ambrosia* sp.), castor bean (*Ricinis communis*), and giant reed. These weedy species are virtually absent from the adjoining RAFSS community, except on and near berms, basins, roads and other disturbed areas.

WILDLIFE

Although most of the habitat has been disturbed in the past, re-growth has occurred in most locations and is suitable for a variety of wildlife species. The riparian scrub that occupies the channel is immature but sufficient to support many common species that use riparian habitat. Typical riparian species such as black phoebe, black-headed grosbeak, and yellow-rumped warbler would be expected. The sparse, ruderal scrublands within the basin are marginally suitable for a variety of species as foraging habitat but are unlikely to support breeding activities except for the most common and ubiquitous species, such as ground squirrels and deer mice. The RAFSS which occurs adjacent to the basins is mostly high quality and suitable for supporting most species typically found in this community type. Common species expected to occur within these communities have been described previously. While the amount of wildlife movement within Lytle Creek would be expected to be regionally substantial, wildlife movement within the Lytle Basins is expected to be limited to mostly resident animals.

SENSITIVE SPECIES

No sensitive plant species were observed along the constructed channel or in the basins that would be used by the Project. Nearby RAFSS habitat supports abundant localized populations of Parry's spineflower and occasional individuals of Plummer's mariposa lily.

Several sensitive wildlife species may potentially occur within the Lytle Basins and conveyance channel. The riparian scrub within the conveyance channel represents marginally suitable habitat for the least Bell's vireo and southwestern willow flycatcher, while the upland communities within the dry basins represent marginally suitable habitat for the CAGN and the SBKR. One individual least Bell's vireo was recorded during focused surveys for the CAGN conducted in 2003. The vireo was observed within the riparian scrub of the conveyance channel on several occasions over a 4-week period. No evidence of breeding was observed, and the bird was no longer present during the later half of the least Bell's vireo breeding season. Focused surveys for the CAGN conducted in 2003 within portions of suitable habitat areas of the Lytle Basins and conveyance channel resulted in no observations of this species (SAIC 2003c). Focused surveys for the SBKR found poor habitat conditions (unvegetated rocky soils) and no SBKR in the recharge basins themselves and none in the area where the pipeline would be constructed (SAIC 2004a). Most of the habitat adjacent to the basins was relatively dense RAFSS habitat and supported a common, unrelated species known as the Dulzura kangaroo rat (*Dipodomys simulans*). One individual SBKR was captured on the 5th night at an open sandy spot near the channel leading to the basins. This site, at which three traps had been placed, was unlike the remainder of the trap line which occurred in relatively dense RAFSS cover. High quality habitat conditions and four individuals of SBKR were found in open sandy areas adjacent to the Lytle Creek Wash about ½ mile north of the previously mentioned capture site. The Lytle Creek Wash habitat is about 300 feet north of the northernmost of the settling basins (SAIC 2004a—see Appendix E).

3.3.1.4.7 Cactus Basins Pipeline

The Cactus Basins Pipeline would stem from the Lower Lytle Creek Pipeline along Riverside Drive and travel in a southerly direction along paved roadways through developed residential and commercial areas as described in section 2.4.2.3 (Lytle Creek Construction Area). This pipeline would end at the recharge basins known as the Cactus Spreading and Flood Control Basins.

VEGETATION AND HABITATS

This pipeline corridor occurs along roadways within a residential community and does not pass through any natural communities. The proposed corridor ends at the Cactus Spreading and Flood Control Basins, which are discussed in section 2.4.2.3 (Lytle Creek Construction Area) and shown in Figure 2-8.

WILDLIFE

Wildlife within the Cactus Basins Pipeline corridor is extremely limited due to the lack of native habitat or open space. Only very common species found in urban settings are expected to traverse the corridor such as the mocking bird, black phoebe, American crow, striped skunk, and California ground squirrel. However, these species are not expected to breed in the Cactus Basins Pipeline corridor due to lack of vegetation.

SENSITIVE SPECIES

Due to the lack of suitable habitat, no sensitive plant or wildlife species are expected to occur within the Cactus Basins Pipeline corridor.

3.3.2 Impacts and Mitigation Measures

3.3.2.1 Impact Assessment Methodology

Impact Assessment

No effects of construction activities associated with the Low Flow Connector, Morton Canyon Connector II, Devil Canyon By-Pass, and Lower Lytle Creek pipelines on listed and non-listed plant species as well as listed wildlife species were identified for the following reasons and consequently they are not discussed further in the impact assessment below. None of the plant species are known or expected to occur in the construction corridors at these locations, based on reconnaissance and focused field surveys. Several of these species, however, are known to be present nearby and have a low potential to colonize the pipeline corridors in the future. Listed wildlife species are unlikely to be resident in or adjacent to the construction corridors, but some individuals could pass through or forage in those areas. The low habitat value of these locations, small area to be affected, and lack of observations of these species during focused surveys in 2003, reduces the probability of such occurrences to very low.

Although the southwestern willow flycatcher and least Bell's vireo are closely associated with riparian woodland habitat, particularly in and near Prado Flood Control Basin, none are known or expected to occur in the plunge pool to Cuttle Weir segment of the river (Segment B), where they could be affected by construction. Furthermore, changes in river flows in Segment B are expected to have little or no effect on the existing riparian habitat. Consequently, the Project would have no impacts on these two species and is not addressed further in the impact analysis. Potential changes to the frequency and extent of overbank flooding on terraces between Cuttle Weir and Mill Creek (Segment C) as well as RAFSS habitats were analyzed and found to have no likely impacts on Slender-horned spineflower, California gnatcatcher, and other plant and animal species. The spineflower does not appear to depend on frequent flooding, the gnatcatcher is not expected to use RAFSS in this area except as a transient visitor, and other species are common enough that effects would be negligible.

All of the listed and non-listed bird species as well as most of the common species present in the Project region are covered under the Migratory Bird Treaty Act. The migratory status of these birds is considered in the impact analysis.

Pre-construction surveys, habitat restoration after construction, and other measures to avoid and minimize impacts would be implemented at each Project facility location by Muni/Western as described below.

Project use of groundwater recharge facilities and water conveyance facilities would occur within established operating guidelines and therefore would not affect biological resources at these locations.

Approach to Mitigation

Specific mitigation is described for the impacts identified in the following section. These measures anticipate the requirements of regulatory agencies. A mitigation implementation program would be prepared by Muni/Western for submission to agencies having regulatory authority over relevant aspects of the Project. These include San Bernardino County, USACE, USFWS, CDFG, and the SARWQCB. A compliance monitoring program would be developed and implemented by Muni/Western and would include an onsite environmental coordinator (OEC) or project biologist to oversee implementation of mitigation measures during construction and restoration, to ensure compliance with regulatory requirements, to assist both the regulatory agencies and construction contractors in interpreting the plans in the field, and to address and resolve unforeseen circumstances.

Muni/Western would take a consistent approach to impact avoidance, minimization, and habitat restoration by applying a suite of mitigation measures described below (Mitigation Measures MM BIO 1 through MM BIO 6), as applicable, to avoid, minimize, and mitigate impacts identified below at all construction sites in native habitat, including sites at which the specific impacts were found to be less than significant. These measures include a series of actions designed to avoid or minimize impacts to sensitive resources that may be present, minimize the extent and severity of impacts, and restore impacted areas and populations. Measures MM BIO-1 and MM BIO-2 are designed to minimize impacts on sensitive habitats and species and to restore the habitat after construction. Measures MM BIO-3, MM BIO-4, MM BIO-5 and MM BIO-6 are designed to facilitate avoidance or minimization of construction impacts on rare, threatened, endangered and sensitive plant and wildlife species and to restore populations and habitat where temporary disturbance is unavoidable.

The mitigation approach adopted by Muni/Western would provide added protection for sensitive habitats and species and would minimize the project-specific cumulative impacts on biological resources.

Although the mitigation measures identified in this document address all of the impacts identified in the applicable section, there is a potential for development of additional requirements and modification of the measures during state and federal permitting and consultation processes including the Section 1600 Streambed Alteration Agreement (CDFG), Section 404 Clean Water Act (USACE), Section 401 Water Quality Certification (RWQCB), Endangered Species Act (USFWS), and California Endangered Species Act (CDFG).

Implementation of mitigation measures associated with the construction and operation of Seven Oaks Dam, such as releases from the dam to aid in overbank flooding, may change some future baseline conditions. Conditions such as frequency of flooding, disturbances within the main channel, sediment loads and distribution, habitat age, and species distribution may be affected by Seven Oaks Dam mitigation measures that are already planned for implementation by USACE but have not yet been implemented. Planned mitigation releases from the dam would also reduce the adverse effects of operating the Project, for example, by causing habitat renewal. Conversely, implementation of the Project would not affect the feasibility of the mitigation program associated with the construction and operation of Seven Oaks Dam.

The Biological Assessment (BA) (USACE 2000) and Biological Opinion (BO) (USFWS 2002) for operation of Seven Oaks Dam were consulted extensively as part of this analysis, including developing and adapting mitigation measures for Project impacts. One of the key issues addressed in these documents was the anticipated effect of Seven Oaks Dam operations on habitat renewal processes associated with overbank flooding. Conservation measures identified in the BA and BO focused on attempts to simulate natural flood-renewal processes by means of "controlled releases" from the dam coupled with construction of temporary diversion dikes in the main channel of the river and containment dikes around the area to be treated. These experimental techniques have not yet been implemented and so their effectiveness is unknown. The scale of the proposed mitigation appears to be related to the extent of the area to be treated (between 600 and 700 acres). Implementation of these measures would involve substantial impacts to the habitat associated with earthmoving needed to create temporary diversion and containment dikes. The earthmoving for each diversion dike would affect 2-3 acres of habitat in the river, and the protective (containment) dikes around the Woolly-Star Preserve Area would have a footprint of up to 30 acres along with additional acreage for access and work area. These unintentional impacts of implementing these mitigation measures would affect SBKR and Santa Ana River woolly-star habitat (see Appendix E).

It is estimated that the total acreage affected by reduced overbank flooding as a result of the Project is on the order of 10 acres (see Impact BIO-17, below). To address impacts of this magnitude, a smaller-scale and more flexible approach to mitigation was developed. The proposed approach employs many of the key features identified in the BA and BO, including flood-mediated habitat renewal and use of an adaptive management approach, but would have minimal impacts on habitat and species except in the specific areas being treated, i.e. the target areas.

3.3.2.2 Significance Criteria

The criteria used to determine the significance of impacts associated with the Project are guided by the State CEQA Guidelines Appendix G (Environmental Checklist). In accordance with the Guidelines, a project would have a significant impact on the environment if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or the USFWS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or the USFWS.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Species that are not listed under the state or federal endangered species acts but that are recognized as rare, endangered, or sensitive by other entities including the CNPS or CDFG are defined as "non-listed sensitive species" throughout the remainder of this document. These include CNPS List 1B, List 3, and List 4 species and California Fully Protected species and California Species of Special Concern (CSC) as designated by the CDFG (see section 3.3.1.1 [Regulatory and Institutional Setting]). An evaluation of whether an impact on biological resources would be substantial must consider both the resource itself and how the resource fits into a regional or local context.

From the significance criteria above, Table 3.3-4 outlines Project-specific impact thresholds that have been identified for selected resources. The thresholds were developed to be measurable yet conservative, so that impacts falling below the threshold would be unlikely to be significant.

3.3.2.3 Project Construction Areas

3.3.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Impact BIO-1. *Construction related to realigning roads in the Seven Oaks Dam and Reservoir Area would result in loss of native vegetation and temporary effects on common wildlife species. This would be a less than significant impact.*

Construction activities would occur in the area of the intake tower and associated access road and along portions of Warm Springs Road and the SCE upstream access road. Construction impacts include the loss of native vegetation in the staging area and from construction of the new roadway, and indirect effects on general wildlife from temporary changes such as increases in noise, vibration, and dust.

The loss of most of the potentially impacted biological resources in the dam and reservoir area has previously been permitted and mitigated. The Seven Oaks Dam flood control project includes mitigation based on 100 percent loss of biological resources located within the dam site and within the 50-year flood reservoir area (up to elevation 2,425 feet NGVD), and 50 percent loss of floodplain vegetation above 2,425 feet NGVD to the maximum flood boundary. The impacts and mitigation requirements that are being implemented as part of the Seven Oaks Dam project are described in the *Final Supplemental Environmental Impact Statement/Environmental Impact Report* and the *Phase II General Design Memorandum* (USACE 1988). Because all biological resources under 2,425 feet NGVD are considered lost as part of the original Seven Oaks Dam flood control project, the Project would not result in any additional impacts under this elevation.

Table 3.3-4. Specific Impact Significance Thresholds for Selected Biological Resources

Resource and Impact	*Threshold*	*Rationale*
RESOURCE: **Riversidian alluvial fan sage scrub (RAFSS)** IMPACT:		
Habitat removal or long-term disturbance.	Loss of 1 or more acres of moderate to good quality habitat within or adjacent to other moderate to good quality habitat. Loss of 5 or more acres of poor quality habitat within or adjacent to existing disturbed areas. Poor quality habitat is assumed to be restorable to moderate quality or better.	One-acre and 5-acre thresholds are measurable and are conservatively judged to represent a considerable or substantial adverse effect given the very limited amount of remaining contiguous RAFSS habitat, the recognized structural diversity and species richness of the RAFSS habitat, and the time required to restore the community after severe disturbance. The higher threshold level for poor quality habitat is related to low present-day habitat value, time to restore habitat value, and uncertainties concerning ability to restore poor quality habitat.
Indirect impacts to adjoining areas as a result of construction	Isolation of 10 or more acres of suitable habitat narrower than about 0.5 mile in width (fragmentation) combined with construction-related indirect effects (exotic species invasion, interruption of native cover, off-corridor erosion and sedimentation) on that habitat.	Isolation and construction-related indirect effects degrade but do not eliminate habitat value and would be a temporary impact, minimized by BMPs and diminish as restoration of the intervening disturbed area progresses, hence the higher threshold of 10 acres.
RESOURCE: **Parry's spineflower** IMPACT:		
Loss of habitat or individuals.	Loss of 1 acre or more of occupied habitat or loss of more than about 150 individuals.	Thresholds would be measurable and are conservatively judged to represent considerable impacts.
Indirect impacts to adjoining areas as a result of construction.	Isolation of 10 or more acres of suitable habitat narrower than about 0.5 mile in width (fragmentation) combined with construction-related indirect effects (exotic species invasion, interruption of native cover, off-corridor erosion and sedimentation) on that habitat.	Isolation and construction-related indirect effects degrade but do not eliminate habitat value and would be a temporary impact, minimized by BMPs and diminish as restoration of the intervening disturbed area progresses.
RESOURCE: **Riparian and wetland habitat**		

1

Table 3.3-4. Specific Impact Significance Criteria for Selected Biological Resources (continued)

Resource and Impact	*Threshold*	*Rationale*
IMPACT: *Removal of habitat as a result of construction including construction-related effects on water quality (sedimentation, turbidity).*	Removal of any riparian or wetland habitat involving excavation or earthmoving.	Any removal involving excavation or earthmoving would be observable and measurable. The low threshold is in recognition of the scarcity of the habitat, high value per unit area, and its ecological importance.
Desiccation of riparian habitat as a result of Project operations.	Predicted observable reduction in density, height or vigor of riparian vegetation or wetted habitat in an area exceeding 1 acre.	The 1-acre threshold is conservative, reflecting the importance and scarcity of riparian and wetland habitat and is probably at the lower limit of delineation since this type of impact would most likely be spread out along habitat boundaries.
RESOURCE: **Santa Ana River woolly-star** IMPACT: *Reduction or elimination of flood-generated habitat renewal as a result of operations.*	Predicted reduction of 1 acre or more in habitat area affected by flooding with a 30-year or greater predicted increase in the recurrence interval of a 50-year flood with Seven Oaks Dam in place.	The 1-acre threshold is conservative, reflecting the importance and scarcity of this species. One acre is also near the lower limits of reliable prediction for the model for indirect potential impact that would occur years into the future. A 30-year increase in recurrence interval is conservatively chosen as a threshold because measurable adverse effects on this species related to habitat maturation would not likely occur during a shorter interval between floods.
RESOURCE: **San Bernardino kangaroo rat (SBKR)** IMPACT: *Direct mortality.*	5 or more individuals. (Note this threshold is defined for CEQA purposes; USFWS defines allowable "Take" under the Endangered Species Act. Allowable take may be greater or less than the threshold defined here.)	The low impact threshold is related to the importance of remaining populations and their isolated nature.

2

Table 3.3-4. Specific Impact Significance Criteria for Selected Biological Resources (continued)

Resource and Impact	*Threshold*	*Rationale*
Permanent removal of habitat.	Permanent loss of 1 or more acres of suitable habitat or *any* occupied habitat	This threshold would be measurable and is conservatively judged to represent a considerable impact, given a long-term or permanent loss.
Disturbance of potentially suitable habitat as a result of construction.	5 acres or more of suitable habitat.	This threshold would be measurable and is considered appropriate for the relatively short-term temporal loss of habitat value in suitable but unoccupied habitat that would be associated with a short-term construction disturbance.
Indirect impacts to adjoining areas as a result of construction.	Isolation of 10 or more acres of suitable habitat narrower than about 0.5 mile in width (fragmentation) combined with construction-related indirect effects (exotic species invasion, off-corridor erosion and sedimentation) on that habitat.	Isolation and construction-related indirect effects degrade but do not eliminate habitat value and would be a temporary impact, minimized by BMPs and diminish as restoration of the intervening disturbed area progresses.
Reduction or elimination of flood-generated habitat renewal processes.	Predicted reduction of 1 acre or more in habitat area affected by flooding with a 30-year or greater predicted increase in the recurrence interval of a 50-year flood with Seven Oaks Dam in place.	The 1-acre threshold is conservative, reflecting the importance and scarcity of SBKR. One acre is also near the lower limits of reliable prediction for the model for indirect potential impact that would occur years into the future. A 30-year increase in recurrence interval is conservatively chosen as a threshold because measurable adverse effects on SBKR related to habitat maturation would not likely occur during a shorter interval between floods.
RESOURCE: **California gnatcatcher (CAGN)** IMPACT:		
Direct mortality of individuals during construction.	5 or more individuals. (Note this threshold is defined for CEQA purposes; USFWS defines allowable "Take" under the Endangered Species Act. Allowable take may be greater or less than the threshold defined here.)	The low impact threshold is related to the importance of remaining populations and their isolated nature.
Permanent loss of occupied habitat.	Any measurable loss.	The low impact threshold is related to the importance of remaining populations and their isolated nature.

Table 3.3-4. Specific Impact Significance Criteria for Selected Biological Resources (continued)

Resource and Impact	*Threshold*	*Rationale*
RESOURCE: **Santa Ana sucker**		
IMPACT: *Loss of habitat as a result of reduced flows.*	Loss of 1 or more acres of occupied habitat or suitable habitat in close proximity with occupied habitat measured based on dewatering of suitable habitat within areas known to support the Santa Ana sucker.	The 1- acre threshold is conservative, reflecting the limited distribution of this species and small amount of suitable habitat available. This threshold is probably at the lower limit of delineation since this type of impact would most likely be spread out along habitat boundaries.
Reduction in quality of potentially suitable habitat as a result of reduced flow.	Impacts that substantially reduce the potential for occupation of 1 or more acres in areas of habitat.	The 1-acre threshold is conservative, reflecting the limited distribution of this species and small amount of suitable habitat available. This threshold is probably at the lower limit of delineation since this type of impact would most likely be spread out along habitat boundaries.
Changes in flood frequency and magnitude within designated Critical Habitat.	Substantial decrease in frequency of gravel and cobble transport during flood events between Mill Creek and the "E" Street Gage (a substantial decrease is one that is sufficiently large to be measurable at the upstream end of occupied habitat).	The threshold is designed to address a principal constituent element of the Critical Habitat designation for the Santa Ana River as it applies in the Project area.

Impacts above the 2,425-foot elevation would occur along 95 percent of the SCE access road construction corridor, a segment approximately 10,075 feet long and 14 feet wide, with 11 turnouts that are 50 feet wide. This activity would result in the loss of approximately 3.5 acres of native vegetation, almost exclusively occupied by a chaparral community. As stated above, impacts to vegetation between the 2,425-foot elevation and the maximum flood boundary of 2,585 feet have been considered 50 percent lost and mitigated as part of construction and operation of the Seven Oaks Dam flood control project.

Therefore, impacts of the Project are considered as occurring on half of the biological resources within the 3.5 acres, or 1.7 acres. Due to the low acreage of impacted habitat, the relative abundance of chaparral vegetation in the region and vicinity, the relative abundance in the region of plant and wildlife species associated with this plant community, and the location of the impact within an area expected to be disturbed due to reservoir operations, the permanent loss of 1.7 acres of chaparral would be less than significant.

MITIGATION MEASURES

Although this impact would be less than significant, implementation of MM BIO-1 through MM BIO-6, as applicable, would further reduce the impact. As described above, Muni/Western will implement this series of measures at all construction sites in native habitat including sites where the site-specific impact has been found to be less than significant.

MM BIO-1: Muni/Western will minimize disturbance to native habitats and listed and non-listed sensitive species by the implementation of the following measures at construction sites prior to and during construction. Where ground disturbance is required, the Muni/Western program will include the following:

Restricting Disturbance

- Restriction of staging, construction activities, equipment storage, and personnel to existing disturbed areas (such as roads, pads, or otherwise disturbed areas) to the maximum extent feasible.
- Clearly marking and delineating the limits of the staging areas as well as the construction corridors/zones in the field and graphically on all final construction drawings or blueprints. Personnel and equipment will be prohibited in native habitats outside the construction limits.
- Biologically sensitive areas, including individuals or colonies of listed and non-listed sensitive plant species and wildlife species, will be identified and delineated in the field prior to ground disturbance (see MM BIO-3) and will be clearly marked graphically on all final construction plans or blueprints so they will be avoided to the maximum extent feasible.
- Using methods to minimize the construction corridor width to the maximum extent feasible in sensitive habitats, such as transporting and stockpiling excavated materials in disturbed areas off the right-of-way (ROW), or into other parts of the ROW, by truck or conveyor belt.

Employee Training

- Implementation of an employee training program. Muni/Western's program will include an initial meeting with all personnel presented by a qualified biologist familiar with all affected species, habitats, and permit conditions. The employee training program will include a discussion of each species, all applicable laws, the permit conditions, and the potential penalties for violating permit conditions. The employee training program will be conducted before construction activities begin. Regular updates will occur during weekly tailgate meetings with construction personnel, and newly hired personnel will be informed of the permit conditions as well as the habitat and species issues before working on the Project site.

On-Site Monitoring

- Biological monitoring of habitat clearing activities and removal of sedentary animals, both common and sensitive, within the ROW prior to clearing. This will require a qualified biologist to be at the location of habitat removal before clearing to attempt to remove animals where visible and, during removal activities, to ensure that no inadvertent impacts to adjacent habitats occur. Weekly inspections of the ROW perimeter near work areas will also reduce the potential for inadvertent impacts to adjacent habitat.

Best Management Practices (BMPs)

- Dust control. All areas of mechanical ground disturbance, including dirt access roadways, will be consistently moistened to reduce the creation of dust clouds. The frequency of watering will be consistent with the desired goal and in accordance with regional standards and BMPs.

- Erosion control. Devices such as straw bales and "v" ditches will be installed in areas where construction activities may directly or indirectly cause increased erosion or sediment deposition on adjacent habitats.

- Routine removal of trash from construction areas. All refuse, including non-construction materials such as paper and miscellaneous food packaging materials, will be removed from the ROW to prevent littering of the adjacent habitat areas outside of the ROW. At a minimum, site clean-ups should occur weekly.

Listed Species Protection Measures

- In areas where the SBKR is present, either within or adjacent to the ROW, Muni/Western will install exclusionary fencing where appropriate to reduce the potential for SBKR entering the ROW. Specifications for the fencing will be particular to the goal of SBKR exclusion and will be approved by the USFWS. Muni/Western may not install fencing in certain areas such as boulder-strewn washes where fence construction may cause substantial habitat disturbance. Following the installation of fencing, the animals within the ROW will be trapped and released within adjacent suitable habitat outside the ROW. These methods will be approved by the USFWS.

- In areas where the SBKR is present, either within or adjacent to the ROW, Muni/Western will limit construction activities to daylight hours (approximately 7:00 A.M. to 6:00 P.M.). During night hours, no activities that would unnaturally increase the light or noise within adjacent occupied habitat will occur.

- In areas where the SBKR, CAGN, least Bell's vireo, or southwestern willow flycatcher are present, either within or adjacent to the ROW, Muni/Western will avoid or reduce construction activities in the vicinity of occupied habitat during the breeding season. Avoidance will take place from March 1 through June 30. In certain areas, avoidance of southwestern willow flycatcher will continue through July 31. Where complete avoidance is not possible, construction activities will be conducted in a manner that attempts to minimize disturbance during early morning hours and avoids the most sensitive breeding months of April and May.

- In areas where preconstruction sensitive species surveys and other seasonally limited activities such as seed collection and plant propagation are needed, Muni/Western will prepare a calendar of when such activities need to be accomplished and incorporate this into design and construction schedules to ensure that the surveys can be conducted in the appropriate season without causing delays.

MM BIO-2: Muni/Western will develop a Habitat Revegetation, Restoration, and Monitoring Program (Program), obtaining input from CDFG and USFWS, for implementation in all habitat areas directly affected by construction activities. The Program will include the following measures:

Invasive Species Control

- Where appropriate and feasible, the area to be disturbed will be treated to kill invasive exotics species and limit their seed production before initiating any earthmoving activity with the objectives of (1) preventing invasive species from spreading from the disturbance area, and (2) removing weed sources from the salvaged topsoil. Herbicides will be used only by a licensed herbicide applicator and may require notification to property owners or resource agencies. The treatment will be completed before earthmoving in order for this mitigation to have its intended effect (e.g., the treatment would need to occur before target species set seed).

Topsoil Salvage and Replacement

- In areas where vegetation and soil are to be removed, the topsoil will be salvaged and replaced, where practicable. This may be accomplished using two lifts, the first to salvage the seed bank, and the second to salvage soil along with soil biota in the root zone. Soil will be stockpiled in two areas near the Project site, with the seed bank labeled to identify it. Topsoil will be replaced in the proper layers after final reconfiguration of disturbed areas. Where presence of extensive deposits of boulders and cobbles limit the opportunity to salvage topsoil and make the above-mentioned procedure infeasible, Muni/Western will salvage available surface material and stockpile it for replacement on the surface of the restored area. Stockpiles will be covered if the soil is to be left for an extended period to prevent losses due to erosion and invasion of weeds.

Habitat Rehabilitation and Revegetation

- Muni/Western will develop and implement plans and specifications for replanting areas disturbed by the Project. Replanting will be with native species propagated from locally collected seed or cuttings, and, if applicable, will include seed of sensitive species that would be impacted during construction activities.

- Monitoring procedures and performance criteria will be developed by Muni/Western to address revegetation and erosion control. The performance criteria will consider the level of disturbance and the condition of adjacent habitats. Monitoring will continue for 3-5 years, or until performance criteria have been met. Appropriate remedial measures, such as replanting, erosion control or weed control, will be identified and implemented if it is determined that performance criteria are not being met.

MM BIO-3: Before ground disturbance or other activities, qualified botanists and wildlife biologists will survey all proposed construction, staging, stockpile, and access areas for presence of state- or federally listed plant or wildlife species. Preconstruction surveys will occur during the appropriate season and in accordance with established protocols (if required). These surveys will be conducted in all construction areas that occur in riparian, RAFSS, RSS, chaparral, or other native habitats. These surveys are for the purpose of documenting their locations relative to the construction areas and avoidance where feasible.

Colonies of state- or federally listed plants will be clearly marked, mapped, and recorded along with the numbers of individuals in each colony and their respective condition. Locations of listed animal species will also be marked, mapped, and recorded. To the maximum extent feasible, construction areas and access roads will be adjusted to avoid loss of individual listed plants and animals and damage to habitats supporting these species. Individuals of listed wildlife species in the ROW, other than birds, will be captured by biologists with the appropriate permits and relocated to suitable habitat outside the ROW.

MM BIO-4: Where impacts to listed plant species are unavoidable, Muni/Western will develop and implement, together with the listing agency, a salvage, propagation, replanting, and monitoring program that would use both seed and salvaged plants constituting a representative sample of each colony of the species that would be affected. The program will include measures to perpetuate the genetic lines represented to the maximum extent feasible. The program will be approved by the appropriate resource protection agencies before its implementation. Activities involving handling of state- or federally listed plant species, if necessary, may require permits or a memorandum of understanding from the USFWS or CDFG.

The Muni/Western salvage, propagation, replanting, and monitoring program will incorporate provisions for re-creating suitable habitat and measures for re-establishing self-sustaining colonies of listed plant species, should they be affected on the various Project sites. The program will include provisions for monitoring and performance criteria, including an annual assessment of progress, and provisions for remedial action if performance criteria are not being met.

MM BIO-5 and MM BIO-6 are intended to mitigate loss or disturbance to non-listed sensitive animal and plant species. These include species that are recognized by local, regional, or statewide authorities as rare (e.g., CNPS List 1B, List 3 species, and List 4 species, species of local concern) or meet the CEQA definition of endangered or threatened but are not protected by state or federal endangered species statutes.

MM BIO-5: Prior to ground disturbance or other activities, qualified wildlife biologists will survey all proposed construction, staging, stockpile, and access areas for presence of non-listed sensitive wildlife species. Preconstruction surveys will occur during the appropriate season and in accordance with established protocols (if required). These surveys will be conducted in all construction areas that occur in native habitats. In the event that non-listed sensitive wildlife species are observed in the impact area during these pre-Project surveys, Muni/Western will implement the following measures:

- Locations of non-listed sensitive animals found during the surveys will be marked, mapped, and recorded. Locations of burrowing animals will be avoided where feasible.
- Individuals of non-listed sensitive wildlife species encountered in the ROW, other than birds and other mobile species, will be captured if possible and relocated to suitable habitat outside the ROW.
- Where nesting of non-listed sensitive bird species is found to occur within the ROW, vegetation clearing will be conducted outside the nesting season.

MM BIO-6: Prior to ground disturbance or other activities, qualified botanists will survey all proposed construction, staging, stockpile, and access areas for presence of non-listed sensitive plant species. Preconstruction surveys will occur during the appropriate season and in accordance with established protocols (if required). These surveys will be conducted in all construction areas that occur in native habitats. In the event that non-listed sensitive plant species are observed in the impact area during pre-Project surveys, Muni/Western will implement the following measures:

- Colonies will be clearly marked, mapped, and recorded along with the numbers of individuals in each colony and their respective condition. To the extent feasible, construction areas and access roads will be configured to avoid or minimize loss of individual plants and damage to occupied habitats.
- Where impacts to non-listed sensitive plant species are unavoidable, Muni/Western will develop and implement a salvage, propagation,

replanting, and monitoring program that will use both seed and salvaged plants constituting an ample and representative sample of each colony.

RESIDUAL IMPACTS

The residual impact would be less than significant.

3.3.2.3.2 Santa Ana River Construction Area

Impact BIO-2. *Construction of the Plunge Pool Pipeline would disturb and temporarily remove riparian, wetland, and stream habitat and cause mortality in common riparian wildlife species. This would be a significant impact.*

Construction of the Phase III Plunge Pool Pipeline would result in the temporary removal of most, if not all, riparian, wetland, and stream vegetation and wildlife habitat immediately downstream of the plunge pool that has developed since construction activities in the riverbed were completed in 1999. Any areas not removed could be affected by dewatering activities to keep the trench dry. The construction corridor would be approximately 120 to 300 feet wide with a trench width of about 120 feet. Approximately 1 acre of this immature habitat, as well as the values it provides for wildlife, and erosion and sediment control, would be temporarily lost as a result of construction.

Project construction would result in the unavoidable mortality to wildlife species in the ROW, especially species that are dormant at the time of construction and species that are relatively sedentary and unlikely to avoid the activity by leaving the area. Construction activity would also cause more mobile species such as birds and medium and large mammals to avoid the construction area during the construction period, incrementally reducing the amount of habitat available to them during the construction period. The construction activity would also result in the temporary loss of foraging habitat for common wildlife in surrounding habitat areas.

Construction of Phase III of the Plunge Pool Pipeline would result in the removal of riparian and wetland habitat and would temporarily reduce wetted habitat by more than an acre, a significant impact (see Table 3.3-4).

MITIGATION MEASURES

This impact will be mitigated by implementing **MM BIO-1** and **MM BIO-2** (described above), with the objective of restoring an equal or greater amount of riparian and wetland habitat compared to that impacted by construction.

RESIDUAL IMPACTS

Residual impacts would include the temporary loss of riparian, wetland, and stream vegetation and wildlife habitat, and some unavoidable mortality of common wildlife species. Impacts would gradually decrease over several years as the area re-vegetates and wildlife populations increase. Because the habitat that would be affected has developed within several years following a construction disturbance, the functions and values of the habitat could likely be replaced within a short time (a few years), and therefore the residual impact would be less than significant.

The proposed mitigation measures are designed to mitigate Impact BIO-2 to a less than significant level. However, since the Project would cause changes to the SAR channel, a process over which both the USACE and the CDFG have regulatory authority, other actions resulting from coordination with these agencies may also be implemented.

Impact BIO-3. *Construction of the Plunge Pool Pipeline would disturb and remove upland vegetation and wildlife habitat, including RAFSS, and cause mortality in common wildlife species. This would be a significant impact.*

Construction of Phases I, II, and III of the Plunge Pool Pipeline would remove primarily RAFSS with small amounts of other plant communities. Most of the RAFSS is along the 2-mile Phase II pipeline corridor with a smaller amount in the Phase I corridor (4,000 feet), and very little along the Phase III corridor (3,000 feet). Construction activities within the pipeline corridor would also fragment and cause degradation of adjacent RAFSS habitat due to noise, human presence, and dust. The large diameter of the pipeline and required depth of burial (up to 20 feet of cover) mean that the construction ROW would be up to 300 feet wide, which would result in removal or disturbance of vegetation in up to 20 acres for the Phase I pipeline, 51 acres for the Phase II pipeline, and 11 acres for the Phase III pipeline (see Table E-6-1 in Appendix E). Assuming a 36-foot maximum depth of excavation (20 feet of cover plus 15 feet of pipe and 1 foot of bedding), the width of the area where soil would be excavated would range from about 87 to 123 feet, for side slopes of 1:1 to 1.5:1 (horizontal to vertical), respectively. These are conservative assumptions, and the actual area of excavation may be reduced wherever the burial depth is less than 20 feet. The area used for equipment access and storage of excavated material would be up to 180 feet wide.

Project construction would also result in some unavoidable mortality of wildlife species in the ROW, especially species that are dormant during construction and species that are relatively sedentary and unlikely to avoid the activity by leaving the area. Construction activity would also cause more mobile species such as birds and medium and large mammals to avoid the construction area during the construction period, effectively reducing the amount of habitat available to them during the construction period.

In the western portion of the Phase II alignment, the proposed alignment would diverge from Greenspot Road and would bisect an area of contiguous RAFSS habitat, fragmenting it. This would impact the adjacent habitat by affecting animal movement, pollination, or seed dispersal, and potentially facilitate the spread of invasive plant species. The strip of RAFSS habitat between the pipeline corridor and Greenspot Road (about 700 feet wide and 26 acres) would be separated from the remainder of the contiguous RAFSS habitat by the disturbed corridor. The narrowness of this habitat fragment makes it especially vulnerable to indirect effects that would be additive to the direct construction effects.

Removal of the approximately 20 acres in the Phase I alignment and 51 acres in the Phase II alignment of native vegetation and wildlife habitat (predominantly RAFSS) coupled with partial isolation of a 26-acre strip of adjacent RAFSS habitat would be a significant impact due to the size of the area affected, its status as a CDFG highest priority community, its overall scarcity, and the time required to regenerate the community, especially the more mature phases which are estimated to have taken more than 100 years to develop (see also Table 3.3-4).

MITIGATION MEASURES

Implementation of mitigation measures to minimize the area of disturbance and to restore the habitat after construction (**MM BIO-1** and **MM BIO-2**) would reduce this impact but not to a level of less than significant. Implementation of **MM BIO-7**, relocating Phase II of the Plunge Pool Pipeline to the edge of the sensitive habitat adjacent to Greenspot Road, would avoid bisecting the habitat, and would consolidate construction activities adjacent to existing disturbed areas at the northern edge of the habitat.

MM BIO-7: To reduce impacts on biological resources, Muni/Western will realign pipelines to avoid sensitive resources and habitat to the maximum extent feasible. Specifically, Muni/Western will realign Phase II of the Plunge Pool Pipeline northward and place it adjacent to Greenspot Road (see Figure 3.3-7). This will put the Project-related disturbance at the edge of the habitat and avoid bisecting the intermediate to mature RAFSS habitat along the western portion of the alignment.

If it is infeasible to implement MM BIO-7, then the residual impact could be compensated by implementation of MM BIO-8, which is intended to compensate for permanent or long-term losses of sensitive RAFSS habitat as a result of installation of permanent facilities or long-term construction impacts that cannot be fully mitigated by MM BIO-1, MM BIO-2, and MM BIO-7.

MM BIO-8: To compensate for permanent or long-term losses of RAFSS habitat and RAFSS habitat value, Muni/Western will acquire, for every 1 acre impacted, a minimum of 1 acre of good quality habitat of similar or greater habitat value than the RAFSS area impacted by the Plunge Pool Pipeline and dedicate it in perpetuity as a habitat conservation easement area, or other appropriate designation, and provide funding for its future management as native habitat in perpetuity. The acquired RAFSS habitat area would ideally be contiguous with existing habitat already set aside in the WSPA or other dedicated RAFSS habitat. If good quality habitat in such a locality is not available for purchase, availability of other RAFSS habitat will be investigated, with the objective of obtaining good quality habitat near the Project area.

RESIDUAL IMPACT

With implementation of MM BIO-1 (limiting construction disturbance) and MM BIO-2 (top soil salvage and revegetation) alone (without MM BIO-7 or MM BIO-8), residual impacts would still be significant. Despite best efforts, it may not be possible to fully restore the structure and function of this community in the foreseeable future. The uncertainty is related to the width of the corridor and the proportion of it that would be profoundly disturbed by excavation, which affects the likelihood of restoring suitable soil profiles and function. Although the top 12 inches of topsoil are proposed to be salvaged, stockpiled, and replaced following backfilling of the pipeline trench, mechanical difficulties caused by the mixture of small and large rocks, cobbles, and boulders intermixed with the finer soil particles would make this difficult to accomplish successfully. Conventional methods of scraping off the surface soil would cause the rocks, cobbles, and boulders to separate from the gravel and finer soil particles.

Certain features of the habitat that may be important to threatened and endangered species are expected to take at least several decades to regenerate, for example, cryptogamic soil crusts, and large shrubs such as sugar bush. Local wildlife populations would be expected to recover gradually over time to a level equivalent to the quality of the regenerated habitat.

As discussed under the environmental setting, the area disturbed by construction of the 78-inch diameter Foothill Pipeline in 1977 is still sparsely vegetated and clearly visible more than 25 years after construction, however, there was no documented effort to revegetate that pipeline with native plant species.

However, MM BIO-1 and MM BIO-2 in combination with MM BIO-7 or MM BIO-8 would reduce Impact BIO-3 to less than significant.

Potential Impacts of MM BIO-7. Implementation of MM BIO-7 would not change the Project's impacts related to surface water and groundwater hydrology and water quality; geology, soils, and minerals; land use; air quality; recreational resources; aesthetics; or hazards and hazardous materials.

Temporary impacts to agricultural resources would be greater than impacts for the Project. The proposed pipeline placement called for in MM BIO-7 would result in a shifting of the 300-foot construction corridor. A construction corridor of 300 feet would temporarily cause impacts to agricultural land within the pipeline construction vicinity. As would occur with the Project, about 11 acres of Farmland of Statewide Importance would be disturbed by construction, but with implementation of MM BIO-7 an additional 3.5 acres of farmland, designated as Prime Farmland, would be temporarily disturbed by construction. While this is a greater impact than under the Project, this impact would be temporary and would not cause a conversion of the land to non-agricultural use.

With implementation of MM BIO-7, impacts to cultural resources would be similar to those described for the Project with the following exceptions:

- The MM BIO-7 alignment would avoid potential impacts to the Grove House/Well Site (CA-SBR-5526H).
- MM BIO-7 may impact a historic cobble/mortar foundation (CA-SBR-5978H), two historic well sites (CA-SBR-5979H), and a historic wagon road (CA-SBR-8094H), which would be avoided by the Project. Impacts to the two historic wells (CA-SBR-5979H) could be mitigated with a fence or protective barrier.

With implementation of MM BIO-7 noise impacts would be slightly increased compared to the Project. Noise impacts would be greater for persons living north of Greenspot Road.

As is the case with the Project, it would be necessary with MM BIO-7 to install the Plunge Pool Pipeline Phase II under approximately 300 feet of Greenspot Road. However, with MM BIO-7, the portion of Greenspot Road crossed by the pipeline is further to the west. The pipeline could be constructed under the road in one of three ways: (1) crews would tunnel under Greenspot Road and the road would remain open; (2) a portion of Greenspot Road would be closed for approximately 1 month while crews trenched and installed pipe; or (3) a portion of Greenspot Road would be closed for approximately 3 months and a 2,600-foot-long, up to 40-foot-wide detour would be placed in the SAR Wash just south of, and parallel to, the existing road, the majority of the detour road residing in the westerly portion of the construction corridor proposed in MM BIO-7 (see Figure 3.3-7). Compared to the Project, the length of the detour road would be greater (2,600 feet versus 1,500 feet). The detour road would be sited to avoid locations of Parry's spineflower (*Chorizanthe parryi* var. *parryi)* and Plummer's mariposa lily (*Calochorotus plummerae*) (see Figure 3.3-4 sheet 4). Also to further minimize the construction corridor in the SAR Wash, as part of MM BIO-7, two lanes of Greenspot Road would be closed from Cone Camp Road to just west of the "s" curve (about ¾ of a mile). In this segment Greenspot Road would be used for staging equipment, meaning the construction corridor in the SAR Wash would be reduced from about 300 feet to 120 feet for this westerly portion of the Plunge Pool Pipeline. Due to the high speeds traveled on Greenspot Road and the road curvature, there is limited sight distance on this roadway and encroachment by construction equipment could present a hazard. However, with implementation of standard traffic control measures (see MM PS-5 in section 3.13 [Public Services, Utilities, and Transportation]) this impact would be less than significant.

Impact BIO-4. *Construction of the Plunge Pool Pipeline would disturb or remove non-listed sensitive plant species, such as Plummer's mariposa lily (Calochortus plummerae) and Parry's spineflower (Chorizanthe parryi var. parryi), and their habitat. This would be a significant impact.*

Construction of the Plunge Pool Pipeline (Phases I and II) would remove individuals and habitat for Plummer's mariposa lily, which was observed in two portions of the Phase II proposed pipeline corridor (Figure 3.3-4, sheets 3-5), within intermediate-phase RAFSS. Construction of the Phase II and western part of the Phase I alignments would also remove numerous colonies and habitat of Parry's spineflower (Figure 3.3-4, sheets 3-5). Monitoring plots for this species were observed adjacent to the corridor at the west end of the Plunge Pool Pipeline alignment adjacent to the Metropolitan Inland Feeder pipeline (Figure 3.3-4, sheet 5).

No individuals of the state- and federally listed endangered Santa Ana River woolly-star or Slender-horned spineflower were found in the pipeline corridor during initial reconnaissance surveys conducted for this Project during July 2001 and during subsequent focused surveys conducted in March, April, and June 2003. In addition, neither species has been reported along the corridor (USACE 2000). Documented Santa Ana River woolly-star and Slender-horned spineflower populations are however located less than 1 mile to the south of the Phase II corridor (USACE 2000), and the habitat in the Phase II corridor appears potentially suitable although not ideal for either species. The focused surveys conducted during 2003 included direct observations of known populations of both species to verify their growth stage and appearance on the date of the survey, therefore it is unlikely that individuals of either species were overlooked during the focused surveys.

Loss of individuals and habitat of Parry's spineflower and Plummer's mariposa would be a significant impact because of the substantial amount of habitat affected (more than 1 acre), the scarcity of remaining suitable habitat, and the sensitive status of these species.

MITIGATION MEASURES

In addition to **MM BIO-1** and **MM BIO-2,** which would minimize the habitat area impacted and provide for habitat restoration measures, **MM BIO-6** is intended to facilitate avoidance or minimization of construction impacts on non-listed sensitive plant species and to restore populations and habitat where construction impacts are unavoidable. Implementation of **MM BIO-7** would relocate the western portion of the Plunge Pool Pipeline to the edge of the sensitive habitat, adjacent to Greenspot Road, consolidating the construction activity adjacent to existing disturbance at the northern edge of the habitat and reducing the direct and indirect impacts to these species.

RESIDUAL IMPACTS

With implementation of MM BIO-1, MM BIO-2, and MM BIO-6 alone (without MM BIO-7), residual impacts would be long term and significant because of the extent and severity of the soil disturbance associated with construction of the Plunge Pool Pipeline and uncertainties in restoring the habitat, coupled with potential difficulty associated with re-establishing these plant species. There would be additional indirect impacts related to habitat fragmentation on the adjoining habitat at the western end of the alignment. The fact that neither species was observed in recently disturbed areas suggests that short-term recovery of the species and habitat to pre-disturbance levels is unlikely. In the mid to long term, it is likely that Parry's spineflower and its habitat would recover based on the presence of colonies in an area that was disturbed by pipeline construction more than 25 years ago. Adoption of MM BIO-7 (mitigating alignment of Phase II Plunge Pool Pipeline segment) in addition to MM BIO-1, MM BIO-2, and MM BIO-6, would reduce this residual impact to less than significant.

Impact BIO-5. *Construction of the Plunge Pool Pipeline could disturb or remove habitat potentially occupied by listed wildlife species including the CAGN and the SBKR. This would be a less than significant impact.*

The majority of the vegetation proposed for removal for the Phase I and Phase II pipeline segments is RAFSS, with a small amount of RAFSS and RSS in the Phase III segment, and is potentially suitable habitat for two listed wildlife species, the federally listed threatened coastal CAGN and the federally listed endangered SBKR. Although the habitat type being removed, in general, is known to support these species, the habitat within the area of impact is low to moderate quality due to disturbances in the past (e.g., Foothill Pipeline construction), the continued disturbance by Greenspot Road traffic, and lack of influence from SAR fluvial dynamics. Focused surveys for both the CAGN and the SBKR were conducted in 2003 and resulted in no observations or any indication of either species' presence within or adjacent to the Plunge Pool Pipeline corridor. In addition, the CAGN is extremely rare in the region, and no breeding pairs have been recorded from the area. The potential for impacts to either listed species would be less than significant.

In addition to the impacts to potential habitat in general for these species, a portion of the habitat being removed is within USFWS-designated Critical Habitat areas for both species. Modification of habitat within designated Critical Habitat boundaries requires consultation and authorization from the USFWS. The designation at this location is likely a result of the more cursory level of defining boundaries used by the USFWS for such large scale mapping efforts. Without site specific information to indicate otherwise, the area would be reasonably perceived to be a contiguous part of the larger RAFSS community of the SAR alluvial fan which is known to support the SBKR and, on very rare occasions, dispersing CAGN. In addition, Critical Habitat may include areas that represent important locations for future occupation and species recovery. Site specific information gathered during the numerous studies conducted as part of this Project, including focused surveys for both species throughout this area, indicates that the Plunge Pool Pipeline corridor area does not harbor the primary constituent elements and is consequently unlikely to be essential to SBKR or CAGN conservation.

MITIGATION MEASURES

The following measures are recommended to further reduce these less than significant impacts: **MM BIO-1, MM BIO-2**, and **MM BIO-3**. Implementation of **MM BIO-7** would relocate the western portion of the Plunge Pool Pipeline to the edge of the sensitive habitat, adjacent to Greenspot Road, consolidating construction activity adjacent to an existing disturbed corridor at the northern edge of the habitat and would further reduce direct impacts on potential habitat for these species.

RESIDUAL IMPACTS

This impact is expected to be less than significant prior to mitigation and further reduced following mitigation. However, since the Project would modify designated critical habitat, a process over which the USFWS has regulatory authority, other actions resulting from coordination with the USFWS may also be implemented.

Impact BIO-6. *Construction of the Plunge Pool Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species such as the burrowing owl and the San Diego horned lizard. This impact would be less than significant.*

The plant communities proposed for removal during construction of Phases I, II, and III of the Plunge Pool Pipeline and adjacent areas are likely to support a number of non-listed sensitive wildlife species, such as burrowing owl and San Diego horned lizard. Construction activities would cause a temporary loss of habitat for these species, disturb individuals in adjacent areas, and potentially cause mortality of individuals in the construction zone as described in Impact BIO-3. Because populations of these species are generally not as localized, or rare as listed threatened or endangered species that are afforded protection under state and federal statutes, loss of individuals is not expected to substantially affect regional populations. Thus, the temporary loss of habitat, potential mortality of a few individuals, and indirect effects of construction on adjacent habitat would be an adverse but less than significant impact to regional populations of non-listed sensitive species.

MITIGATION MEASURES

The following measures are recommended to further reduce these less than significant impacts: **MM BIO-1, MM BIO-2,** and **MM BIO-5**.

RESIDUAL IMPACTS

This impact is expected to be less than significant prior to mitigation and further reduced following mitigation.

Impact BIO-7. *Construction of the Low Flow Connector Pipeline would disturb and remove upland vegetation and wildlife habitat and cause mortality in common wildlife species. This impact would be less than significant.*

Approximately 2,250 feet of the 3,500-foot-long Low Flow Connector would be constructed within the same trench and at the same time as Phase III of the Plunge Pool Pipeline (see Figure 2-4). As a result, no additional impacts would occur for this portion of the Low Flow Connector. The 750 feet of Low Flow Connector Pipeline upstream of the plunge pool, not in the Plunge Pool Pipeline corridor, would be shallowly buried or above ground on piers in an area that was disturbed during construction of Seven Oaks Dam. The remaining downstream 500 feet of the Low Flow Connector Pipeline would pass through a re-vegetated area and across an unnamed channel. Construction of the two Low Flow Connector Pipeline segments not within the Plunge Pool Pipeline corridor would result in the temporary removal of roughly 2 acres of primarily terrestrial/upland habitat. The majority of this habitat was previously disturbed by construction of Seven Oaks Dam. A small amount of unvegetated riverbed within the SAR may also be temporarily disturbed. The habitats that would be affected consist primarily of sparsely vegetated areas that had been planted and/or hydro-seeded with native species characteristic of RSS by the USACE as mitigation following construction of Seven Oaks Dam. The downstream end of this pipeline would cross an existing, unnamed channel to connect to the existing Greenspot Pipeline. This channel is located east of the SAR corridor and behind the existing rock levee, thus is physically separated from the SAR. Any water in this channel would likely be temporarily diverted during construction activities. This channel supports moderate surface flows from water captured well upstream from Seven Oaks Dam that eventually emerges from the SCE powerhouse and discharges into the SAR via the channel. A mixture of native and non-native herbaceous and shrub species have reestablished in this channel since construction of Seven Oaks Dam and restoration of the disturbed area. Because this channel is limited in its extent, supports low quality habitat, receives water from an existing series of pipes, water percolates into the SAR within several hundred feet of the SCE powerhouse, and flows are not hydrologically or hydraulically connected to any other emergent groundwater or surface water, this channel is likely to support only small numbers of common wildlife species.

Construction of the Low Flow Connector Pipeline would also result in temporary direct and indirect impacts to common wildlife species occurring within and adjacent to the ROW as described under Impact BIO-3. However, the loss of wildlife habitat, including foraging habitat for common wildlife in surrounding habitat areas, and mortality to common wildlife species are considered to be localized and of minor importance because most of the area is expected to support only the most ubiquitous wildlife species of the area due to the poor quality of the habitat.

Construction of the 1,250 feet of Low Flow Connector Pipeline not in the Plunge Pool Pipeline corridor would affect about 3 acres, assuming a construction corridor 100 feet wide. Since the corridor would include the access road to Seven Oaks Dam, the actual habitat disturbance would be closer to 2 acres. Because most of the affected habitat has been recently disturbed and re-vegetated for less than 5 years, has limited habitat value, and is surrounded by other disturbed habitat, the temporary construction impacts on vegetation, wildlife habitat, and populations of common wildlife species would be less than significant.

MITIGATION MEASURES

The following measures are recommended to further reduce these less than significant impacts: **MM BIO-1** and **MM BIO-2**. These measures would also help to restore that habitat following completion of construction activities.

RESIDUAL IMPACTS

Impacts, including short-term loss of vegetation and wildlife habitat and localized short-term reductions in populations of common wildlife species, would be less than significant prior to mitigation and further reduced following mitigation. The habitat as well as local wildlife populations would likely recover to their present condition within a few years.

Impact BIO-8. *Construction of the Low Flow Connector Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species. This impact would be less than significant.*

As described under Impact BIO-7, only 1,250 feet of the 3,500-foot Low Flow Connector Pipeline would be constructed outside the Phase III Plunge Pool Pipeline corridor. Most of the native habitat proposed for removal and adjacent areas are dominated by low quality RSS, and are likely to support a small number of individuals of non-listed sensitive wildlife species. Non-listed sensitive species potentially occurring in the area include loggerhead shrike, black-chinned sparrow, and the San Bernardino mountain kingsnake. In addition to temporary loss of habitat, Project construction would result in some unavoidable mortality of non-listed sensitive wildlife species in the ROW and disturb wildlife in adjacent habitats, as described under Impact BIO-3. Because populations of non-listed sensitive species are not typically as isolated as listed species and the amount of habitat to be affected is minimal and/or of low quality, this impact is not expected to substantially affect regional populations of non-listed sensitive species and represents an adverse but less than significant impact.

MITIGATION MEASURES

The following measures are recommended to further reduce these less than significant impacts: **MM BIO-1, MM BIO-2,** and **MM BIO-5**.

RESIDUAL IMPACTS

This impact is expected to be less than significant prior to mitigation and further reduced following mitigation.

Impact BIO-9. *Construction of the Morton Canyon Connector II Pipeline would disturb and remove upland vegetation and wildlife habitat and cause mortality in common wildlife species. This impact would be less than significant.*

Construction of the 4-foot diameter Morton Canyon Connector II would result in removal of vegetation and wildlife habitat and mortality of individuals of common wildlife species along its approximately 1,900-foot alignment. The affected vegetation consists mostly of ruderal vegetation and a very small amount of disturbed RAFSS, RSS, and riparian scrub that is dominated by scattered mulefat plants. Project construction would also result in some unavoidable mortality to common wildlife species in the ROW and would temporarily disturb wildlife in adjacent habitats, as described under Impact BIO-3, including well-developed riparian habitat in Morton Canyon. Assuming a 100-foot wide construction ROW, approximately 4.4 acres of habitat would be impacted during installation of this pipeline. However, no wetland vegetation would be directly affected.

The overall impact on vegetation and wildlife would be less than significant because of the minimal amount of native habitat disturbance and the low number of animals likely to be affected.

MITIGATION MEASURES

Measures **MM BIO-1** and **MM BIO-2** are recommended to further reduce this less than significant impact.

RESIDUAL IMPACTS

Impacts would include short-term loss of vegetation and wildlife habitat and localized short-term reductions in populations of common wildlife species, and would be less than significant prior to mitigation and further reduced following mitigation. The habitat as well as local wildlife populations would be expected to recover to their present condition within a few years.

Impact BIO-10. *Construction of the Morton Canyon Connector II Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species. This impact would be less than significant.*

Habitat proposed for removal may potentially support a variety of non-listed sensitive wildlife species. These may include, but are not limited to, species such as the loggerhead shrike, San Diego woodrat, and San Bernardino mountain kingsnake. In addition to temporary loss of habitat, construction would result in some unavoidable mortality of individuals of these sensitive species in the ROW and temporary disturbance to individuals in adjacent habitats, as described under Impact BIO-3. Because populations of non-listed sensitive species are not typically as isolated as listed species and the amount of habitat to be affected is minimal and low in quality, this impact is not expected to substantially affect regional populations of non-listed sensitive species and represents an adverse but less than significant impact.

MITIGATION MEASURES

The following measures are recommended to further reduce these less than significant impacts: **MM BIO-1, MM BIO-2,** and **MM BIO-5**.

RESIDUAL IMPACTS

These impacts are expected to be less than significant prior to mitigation and further reduced following mitigation.

3.3.2.3.3 Devil Canyon Construction Area

Impact BIO-11. *Construction of the Devil Canyon By-Pass Pipeline would disturb and remove upland, wetland, and riparian vegetation and wildlife habitat and cause mortality in common wildlife species. This impact would be significant.*

Construction of the Devil Canyon By-Pass Pipeline would result in direct removal of between approximately 1.9 to 3.2 acres of vegetation and wildlife habitat, including riparian and wetland habitat at the crossing of Devil Canyon Creek, and mortality of individuals of common wildlife species, assuming a 150-foot construction disturbance corridor along either of the two pipeline alignment options, respectively (see Figure 2-7). Most of the affected habitat appears to have been RSS habitat that was recently disturbed by installation of the Metropolitan Inland Feeder. This habitat has been reseeded and currently supports a sparse cover of native shrubs including brittlebush, California buckwheat, and deerweed. Both alignment options cross a drainage that supports southern willow scrub vegetation, dominated by dense growth of willows, cottonwoods, and alders outside of the recently disturbed area, and a dense, rapidly developing cover of the same species within the previous construction disturbance, with individual trees over 20 feet tall. Both options would be constructed entirely within the recently disturbed area, except for a short portion of the proposed pipeline that traverses about 40 feet of coastal scrub vegetation that re-grew after an earlier construction disturbance.

Outside the riparian area, the loss of wildlife habitat, including foraging habitat for common wildlife in surrounding habitat areas, and mortality of common wildlife species are considered to be localized and of minor importance because the area is expected to support only the most ubiquitous wildlife species of the area due to the poor habitat quality. In addition, this impact would be temporary and is not expected to reduce common wildlife populations below self-sustaining levels in the region. The riparian area serves as habitat for a variety of wildlife species, especially birds and amphibians, and this function would be temporarily lost as a result of Project construction.

Construction of the Devil Canyon By-Pass Pipeline (under either alignment option) would result in the removal of riparian and wetland habitat, a significant impact (see Table 3.3-4).

MITIGATION MEASURES

Implementation of **MM BIO-1** and **MM BIO-2** would minimize impacts on habitats affected by construction of the Devil Canyon By-Pass Pipeline and help to restore that habitat after construction.

RESIDUAL IMPACTS

Residual impacts would be less than significant with implementation of the mitigation measures. The habitats and populations that would be affected at this site, including the riparian and wetland habitat, have regenerated within a few years to their current state, following complete removal as a result of pipeline installation for another project. It is therefore expected that, with mitigation, the habitat as well as local wildlife populations would likely recover to their present condition within a few years.

The proposed mitigation measures are designed to mitigate Impact BIO-11 to less than significant. However, since the Project (under either option for the Devil Canyon By-Pass Pipeline) would cross a drainage and potential wetlands, a process over which both the USACE and the CDFG have regulatory authority, other actions resulting from coordination with these agencies may also be implemented.

Impact BIO-12. *Construction of the Devil Canyon By-Pass Pipeline could disturb habitat potentially occupied by listed and non-listed sensitive wildlife species. This impact would be less than significant.*

As previously described, the habitat proposed for removal is sparsely vegetated and unlikely to support a wide diversity of wildlife species, although a few non-listed sensitive species that are more common in the region, such as the rufous-crowned sparrow and the northern red-diamond rattlesnake, may occasionally forage within this Project construction area. The temporary loss of habitat, disturbance of individuals in surrounding habitat areas, and potential mortality of individuals of non-listed sensitive species would be localized with few individuals likely to be affected due to the poor quality of most of the habitat. Because populations of non-listed sensitive wildlife species are not typically as isolated as those of listed species, loss of individuals is not expected to substantially affect regional populations and represents an adverse but less than significant impact.

MITIGATION MEASURES

The following measures are recommended to reduce the potential for impacts to sensitive species: **MM BIO-1**, **MM BIO-2**, and **MM BIO-5**.

RESIDUAL IMPACTS

These impacts are expected to be less than significant prior to mitigation and further reduced following mitigation.

3.3.2.3.4 Lytle Creek Construction Area

Impact BIO-13. *Construction of the Lower Lytle Creek Pipeline would disturb or remove upland vegetation and wildlife habitat and cause mortality in common wildlife species. This impact would be less than significant.*

Most of the alignment of this proposed pipeline occurs within the unvegetated roadway shoulder of Riverside Avenue and at the proposed staging area. Less than 1 acre of native vegetation would be disturbed at the southern end of the pipeline corridor adjacent to the Fontana Power Plant. This habitat is adjacent to disturbed areas but at least some of it appears to contain elements of RAFSS or RSS habitat, both of which are CDFG highest priority communities. These habitat types are prevalent in nearby undisturbed areas on the alluvial fan, and these communities are likely to support a variety of common wildlife species. However, populations in this area are likely depressed due to the activities of humans, cats and dogs, noise, and nighttime lighting given its location immediately adjacent to a power plant, roadway, and housing developments. In addition to the habitat loss, construction would likely result in mortality of individuals of common wildlife species as described under Impact BIO-2.

Because the affected habitat patches are small, disturbed, and adjacent to existing developed areas, their value to wildlife is limited; therefore, the temporary construction impacts on vegetation, wildlife habitat, and populations of common wildlife species would be less than significant.

MITIGATION MEASURES

The following measures are recommended to further reduce these less than significant impacts on vegetation and wildlife habitat: **MM BIO-1** and **MM BIO-2**.

RESIDUAL IMPACTS

Residual impacts, including short-term loss of vegetation and wildlife habitat and localized short-term reductions in populations of common wildlife species, would be less than significant prior to mitigation and further reduced following mitigation.

Impact BIO-14. *Construction of the Lower Lytle Creek Pipeline could disturb or remove habitat potentially occupied by non-listed sensitive wildlife species. This impact would be less than significant.*

Habitat proposed for removal is likely to support several non-listed sensitive wildlife species. As previously described, the habitat proposed for removal is located adjacent to heavily disturbed areas that are unlikely to support a wide diversity of wildlife species. However, the habitat may potentially support a few non-listed sensitive wildlife species, such as the rufous-crowned sparrow and the northern red-diamond rattlesnake. The temporary loss of habitat, disturbance of individuals in surrounding habitat areas, and potential mortality of individuals of non-listed species would be localized with few individuals likely to be affected due to the disturbed nature of surrounding habitat. Because populations of non-listed sensitive species are not typically as isolated as listed species, loss of individuals is not expected to substantially affect regional populations. Therefore the temporary loss of habitat and indirect effects of construction on adjacent habitat represents an adverse, but less than significant impact to regional populations of these species.

MITIGATION MEASURES

The following measures are recommended to further reduce these less than significant impacts: **MM BIO-1, MM BIO-2,** and **MM BIO-5**.

RESIDUAL IMPACTS

These impacts are expected to be less than significant prior to mitigation and further reduced following mitigation.

3.3.2.4 Project Operations and Maintenance

3.3.2.4.1 Seven Oaks Dam and Reservoir Area

Impact BIO-15. *Seasonal water conservation storage could alter the ecology of the Seven Oaks Dam and Reservoir Area. This would be a less than significant impact.*

Impacts of Project operations would include annual filling of the reservoir up to 2,418 feet in elevation. Although this process would alter the ecology of the area of inundation, resulting in loss of essentially all biological resources currently occupying the area, this impact was addressed as part of the Seven Oaks Dam flood control project. As described under construction impacts, the Seven Oaks Dam flood control project assumed 100 percent loss of biological resources located within the reservoir area up to elevation 2,425 feet, and provided mitigation for this loss. As a result, Project operations would not result in any additional impacts upstream of the dam. Adverse effects associated with increased aquatic habitat and duration of inundation, such as establishment of introduced fish species, are not expected due to the brevity of inundation as well as operating procedures that maintain a dry segment of river between the reservoir and upper wetted reaches. No mitigation measures are required.

3.3.2.4.2 Santa Ana River Area

The analysis of potential biological effects associated with Project diversions is presented after an assessment of the effects that implementation of the Project could have on stream flows in the SAR. This assessment is undertaken for a number of segments of the SAR starting at the plunge pool and progressing downstream. Impacts are assessed for the following stream segments: Segment B – Seven Oaks Dam to just above Cuttle Weir (Segment A is above the Seven Oaks Dam); Segment C – Cuttle Weir to just above the confluence with Mill Creek; Segment D – Mill Creek confluence to just above "E" Street; Segment E – "E" Street to just above the RIX and Rialto effluent outfall; Segment F – RIX and Rialto effluent outfall to just above Riverside Narrows; and Segment G - Riverside Narrows to Prado Dam. This segment scheme is consistent with the hydrologic modeling approach used in section 3.1.

Two analyses have been performed, one for storm flows (and associated overbank flows) and one for non-storm day stream flows.

Overbank Flows. Proposed diversions at the plunge pool (or at Cuttle Weir) would result in decreased flows continuing downstream within the SAR, and this decrease in flow may incrementally reduce the potential for overbank flooding. The term "overbank flooding" is used to describe the condition in which flows reach a height greater than the river banks and spill out of the main channel and onto adjacent uplands. Overbank flooding can lead to habitat renewal that is believed to be important to the establishment and persistence of sensitive resources associated with the SAR alluvial fan, including RAFSS, SBKR, and Santa Ana River woolly-star. Overbank flooding has potential ecological importance along the SAR between Cuttle Weir and the San Bernardino International Airport because of the presence of these sensitive resources, which are restricted to that portion of the Project area. Table 3.3-5 describes overbank flow characteristics with and without the Project for SAR segments that experience overbank flows.

Non-Storm Day Flows. Non-storm day flows represent 67 percent of all days in the period of analysis (water year 1966-67 through water year 1999-2000). The Project, through its diversions, would result in an incremental reduction in non-storm flows during both the winter and summer season. The effect of Project diversions on non-storm day flows diminishes as one proceeds downstream and becomes essentially indistinguishable from No Project conditions within Segment F. Segment G was identified and included in the analysis because of the important biological resources in Prado Flood Control Basin. The analysis does not extend further downstream because of the lack of detectable river flow-related effects downstream. Table 3.3-6 describes non-storm day flows with and without the Project for SAR Segments B through G.

Impact BIO-16. *Reduction in frequency and extent of flood flows could adversely impact RAFSS by reducing the frequency and extent of habitat renewal processes in this natural community type. This impact would be less than significant.*

This impact focuses on impacts to RAFSS as a natural community. RAFSS is also an important habitat for sensitive species within the SAR alluvial fan, such as Santa Ana River woolly-star and SBKR, and potential impacts related to overbank flooding and these sensitive species are discussed in Impact BIO-17.

Between Cuttle Weir and the Mill Creek confluence (Segment C), Project diversions (up to 1,500 cfs) would decrease the potential for high flows to flood elevated terraces within the channel during maximum releases from Seven Oaks Dam (7,000 cfs). This potential for a reduction in the frequency of natural physical disturbance and community restructuring across these terraces could result in the eventual succession of early and possibly intermediate RAFSS to mature RAFSS. The frequency of flood scouring events on these terraces between Cuttle Weir and the Mill Creek confluence would be reduced from an average of once every 50 years to once every 140 years.

With regard to RAFSS as a natural community type, the likely consequence of this change in the flood regime would be a gradual maturation of the vegetation and succession toward an alluvial chaparral, with some species disappearing from the mix and others appearing. These changes would occur on a time scale of decades to centuries. In Segment C, projected change in

Table 3.3-5. SAR Overbank Flow Characteristics with and without Project

SAR Segment	*Overbank Flow Characteristics*
Segment B Seven Oaks Dam to just above Cuttle Weir	The channel in this segment was severely disturbed by activities associated with construction of Seven Oaks Dam and it has the capacity to convey releases from the dam without overbank flooding. Thus, it will not be discussed further in the context of overbank flooding.
Segment C Cuttle Weir to just above the confluence with Mill Creek	In this segment, RAFSS, SBKR, and Santa Ana River woolly-star are known to exist within or near the SAR channel between Greenspot Bridge and the confluence with Mill Creek, where they could potentially be affected by flooding during high releases (at or near 7,000 cfs) from Seven Oaks Dam. Although flooding outside of the main channel would not occur in this area, terraces and islands between the banks support pioneer to intermediate RAFSS, individuals of Santa Ana River woolly-star, and appear to be suitable for SBKR. Assuming that some or all of the in-channel habitat would be inundated by a 50-year storm with the dam in place, it is possible that the Project-related diversion of 1,500 cfs would cause them not to be flooded. The return interval for a flood 1,500 cfs larger than the 50-year flood in this segment upstream from the Mill Creek confluence would be about 140 years.
Segment D Mill Creek to just above "E" Street	As described in Chapter 2 (Project Description), historic overbank flooding has been documented at a few breakout locations within the SAR alluvial fan. Although these breakouts are largely due to Mill Creek flows, upstream Project diversions during peak flows would reduce the total volume of water in the SAR channel at these points and may reduce the frequency and extent of overbank flooding. The largest breakout point has historically occurred just below the confluence with Mill Creek (Figure 3.3-8). Based on historical records and modeling analysis (USACE 2000), flows of approximately 15,500 cfs or greater at the confluence would be expected to result in overbank flooding and inundation of approximately 684 acres without Project diversions. With Project diversions, the area of inundation would be reduced by about 29 acres to approximately 655 acres. In a 100-year flood, the reduction would be roughly 21 acres. This reduction may affect a variety of biological resources present within the potential inundation area, located primarily in USGS Township 1S, Range 3W, Section 12. Under current conditions (i.e., with Seven Oaks Dam in place), a flood reaching 15,500 cfs is expected to occur once every 50 years on average. With the Project (1,500 cfs diversion) in place, a correspondingly larger flood would be necessary to inundate the same area. Such a flood would be expected to occur once every 56 years on average.

Table 3.3-6. Non-Storm Day Flow Characteristics for SAR Segments with and without Project

SAR Segment	*Non-Storm Day Flow Characteristics*
Segment B Seven Oaks Dam to just above Cuttle Weir	Under Phase I and Phase II of the Plunge Pool Pipeline (proposed Muni/Western diversions at Cuttle Weir), a reduction in flows would occur downstream of Cuttle Weir; while under Phase III (proposed Muni/Western diversions at the plunge pool), flows would be reduced downstream of the plunge pool. Thus, flows in this reach of the SAR would only be affected during Phase III of the Plunge Pool Pipeline implementation. All three Phases of the Project have the same effect on flows in segments downstream of Cuttle Weir. Table 3.1-11 in section 3.1 (Surface Water Hydrology) provides estimates of flows within this segment of the SAR under historical (pre-Seven Oaks Dam), No Project (post-Seven Oaks Dam), and Project (Phase III of the Plunge Pool Pipeline) conditions on non-storm days. As indicated, median non-storm daily flows under No Project conditions within this segment range from 3 to 8 cfs in all months except those of July, August, and September when they reach 23 cfs. Higher flows in these three months are a direct result of the draining of the debris pool behind Seven Oaks Dam to meet USACE operating criteria. With the Project, flows in all but two months would have a median of 3 cfs. The largest changes, when compared to No Project, would occur in July, August, and September (20 cfs reduction in flow attributable to diversions by Muni/Western) with minor changes in the remaining months. The majority of this segment experiences consistent daily non-storm flows throughout the year of at least 3 cfs. This small flow is continuous in the upper portion of this segment prior to being diverted by senior water rights holders. The constancy of this flow is due to its origin from groundwater upwelling behind the dam and spilling into the plunge pool, resulting in perennial flow.
Segment C Cuttle Weir to just above the confluence with Mill Creek	Non-storm day median flows within this segment under No Project conditions are zero cfs (see Table 3.1-14). Essentially, no flow is expected to occur in this reach under non-storm conditions throughout the year. As a result, Project diversions would not result in any further reductions of flow within the segment of the river.
Segment D Mill Creek to just above "E" Street	No Project non-storm daily median flows within this segment range from 0 to 2 cfs in most months, except in July and August when the median flow is 10 cfs (see Table 3.1-15). The increased flows in these months are attributable to releases made from Seven Oaks Dam in order to drain the debris pool. With Project diversions, the largest reduction in flows occurs in July and August with a reduction of 10 cfs. Aside from the months of July and August, non-storm day flow in this segment is due to flow from Mill Creek.

Table 3.3-6. Non-Storm Day Flow Characteristics for SAR Segments with and without Project (continued)

SAR Segment	*Non-Storm Day Flow Characteristics*
Segment E "E" Street to just above the RIX and Rialto effluent outfall	Median daily non-storm flows within this segment are present under No Project conditions and range from 6 to 17 cfs from June to September with a small median flow of 1 cfs in January (see Table 3.1-16). All other months exhibit zero median daily non-storm flows. Project-related reductions in non-storm flows within this segment are limited to the high flow months. Project diversions would result in reductions of up to 3 cfs in June, up to 16 cfs in July, up to 17 cfs in August, and up to 12 cfs in September. These reductions coincide with the Project diversion of releases from Seven Oaks Dam that are made to meet operating criteria and that would otherwise increase SAR flows within these months in this segment of the SAR.
Segment F RIX and Rialto effluent outfall to just above Riverside Narrows	Median non-storm day flows within the SAR at a point just below the RIX and Rialto discharge remain relatively constant throughout the year, ranging from 61 to 83 cfs (see Table 3.1-17). A peak in median daily non-storm flows occurs in the summer months and tapers off by September. With Project diversions, SAR flow reductions within this segment are relatively minor. Throughout most of the year, estimated flow reductions resulting from Project diversions are less than 1 cfs, representing no more than a 2 percent change. Exceptions occur from July to September, where reductions are up to 15 cfs. These changes represent up to an 18 percent reduction. With the Project, median daily flows would consistently measure between 61 and 70 cfs year-round. The effect of the Project diversion on SAR flows is substantially reduced below the RIX and Rialto outfall location and continuing downstream through this segment. Essentially, as the existing flows increase, the Project diversion amounts become a smaller portion of the total flow. As a result, the Project's effect becomes proportionally smaller and continues to diminish as flows from other tributaries and water treatment plants increases. The upper portion of this segment is expected to have flows very similar to those described above while the lower portion is expected to have slightly increased baseflows due to input from minor sources and further diminished Project effects. Also resulting from the substantial perennial flow, riparian habitat is much more prominent in this segment than in other upstream segments.
Segment G Riverside Narrows to Prado Dam	Within this segment, several additional sources provide for further increased flows including treated effluent discharge from the cities of Riverside, Corona, and Western Municipal and Inland Empire Utilities Agency. In addition, groundwater levels rise to the surface and flow downstream throughout most of this segment. Riparian habitat within this segment is extensive, covering most of the riverbed and most of Prado Flood Control Basin. Project effects are expected to diminish within downstream segments as a result of increased baseflows. Consequently, effects on flow resulting from the Project diversion are expected to be negligible within this segment.

flood frequency from a return interval of 50 years to a return interval of 140 years would be expected to result in a gradual but measurable change (maturation) in vegetation on terraces and banks within the channel. From the standpoint of the RAFSS natural community these changes are not necessarily adverse. Mature RAFSS tends to be scarce relative to the other representations of RAFSS (e.g., immature, intermediate). Mature RAFSS, because it typically is further from the active river channel, tends to be in areas more easily developed than other ages of RAFSS and has been reduced in extent even more than the younger types. Therefore with regard to the RAFSS natural community, a decrease in flood frequency could result in the creation of more mature RAFSS. Change to a more mature RAFSS is a less than significant impact and no mitigation is required.

Just downstream from the confluence with Mill Creek (Segment D), Project-related 1,500-cfs diversions would reduce the area affected by overbank flood inundation by about 4 percent in a 50-year flood and less than 3 percent in a 100-year flood. In effect, Project-related diversions would increase the time between flood-generated inundation events in these areas. The frequency of overbank flooding events would be reduced from an average of once every 50 years to once every 56 years. A small change in flooding frequency (i.e., 6 years) would not have a noticeable or ecologically meaningful effect on the vegetation and habitat in this segment and effects would be less than significant and no mitigation is required.

Impact BIO-17. *Reduction in frequency and extent of overbank flooding could adversely affect SBKR and Santa Ana River woolly-star habitat. This impact would be significant between Cuttle Weir and Mill Creek and less than significant downstream of the confluence with Mill Creek.*

SBKR and Santa Ana River woolly-star are associated with relatively open habitats classified as pioneer to intermediate phase RAFSS. The younger age of these communities is directly correlated to the time since the last flood disturbance. Without this type of disturbance, RAFSS habitat would be expected to gradually mature into a community that is "less preferred" or possibly uninhabitable by the SBKR. Based on observations in existing plant communities and extrapolation backwards to an estimated time of disturbance, it is believed that Santa Ana River woolly-star also exists primarily in habitats that have been disturbed by flooding or other cause, and this species gradually disappears with increasing time since disturbance, possibly as a result of competition from more slowly colonizing, longer-lived plant species. Santa Ana River woolly-star is associated primarily with sandy habitats disturbed in the last 50 years or so, although it can be found in older habitats. Therefore, absent disturbance, the expected habitat maturation process would likely have an adverse effect on Santa Ana River woolly-star population size and reproduction, and numbers of individuals of this species could be expected to diminish gradually over time (decades) until an event precipitates another round of habitat renewal and reproduction. Any effect on Santa Ana River woolly-star would be very localized to the vicinity of the low flow channels in this segment.

Just downstream from the confluence with Mill Creek (Segment D), Project-related 1,500 cfs diversions would reduce the area affected by overbank flood inundation by about 4 percent and less than 3 percent, respectively, in 50- and 100-year floods. In effect, Project-related diversions would increase the time between flood-generated inundation events in these areas. The frequency of overbank flooding events would be reduced from an average of once every 50 years to once every 56 years. As described in Table 3.3-4, a change in the recurrence interval of

30 years or more is anticipated to have an adverse effect on Santa Ana River woolly-star and SBKR habitat. A small change in flooding frequency (e.g., from a 50-year to a 56-year estimated return interval) would not have a noticeable or ecologically meaningful effect on the vegetation and habitat in this segment and Project impacts on SBKR and Santa Ana River woolly-star downstream of the Mill Creek confluence would be less than significant. Although the impacted area is likely to be occupied by both species, they are not expected to be adversely affected due to the lack of noticeable change in habitat conditions.

Between Cuttle Weir and the Mill Creek confluence (Segment C), Project diversions (up to 1,500 cfs) would decrease the potential for high flows to flood about 10 acres of habitat on terraces within the channel during maximum releases from Seven Oaks Dam (7,000 cfs). The frequency of flood scouring events on these terraces would be reduced from an average of once every 50 years to once every 140 years. Based on field reconnaissance and existing data, the habitat within the areas of potential reduction in flood flow frequency is suitable for SBKR and has a high probability of being occupied. As described in Table 3.3-4, a change in the recurrence interval of 30 years or more is anticipated to have an adverse effect on Santa Ana River woolly-star and SBKR habitat. A change in the flood recurrence interval of 90 years and the reduction in associated physical disturbance and community restructuring across these terraces could result in the eventual succession of early and possibly intermediate RAFSS to mature RAFSS. This habitat change could adversely affect SBKR and Santa Ana River woolly-star on terraces within the channel in Segment C, a significant impact.

MITIGATION MEASURES

This impact could be minimized by implementing MM-BIO-9 (monitoring and removing invasive non-native plant species that diminish value of SBKR and Santa Ana River woolly-star habitats within and adjacent to the channel from Seven Oaks Dam to Mill Creek) and MM BIO-10 (implementing, together with the USFWS and CDFG, a program to restore/renew habitat). These measures may be modified and additional measures may be identified as part of compliance with federal and state endangered species act requirements.

MM BIO-9: Muni/Western will monitor and remove invasive non-native species establishing in the channel and adjacent RAFSS habitats between Seven Oaks Dam and Mill Creek. Target species include species of tamarisk or salt cedar (*Tamarix* spp.), fountain grass (*Pennisetum setaceum*), and giant reed (*Arundo donax*). These species establish in habitats suitable for SBKR and Santa Ana River woolly-star and have the potential to spread further into adjacent suitable habitat areas. Initial control will be established using a combination of physical removal and herbicidal treatment using appropriate environmental safeguards. Two to several follow-up treatments would be anticipated during the first year with follow-up monitoring and treatments at least once annually in ensuing years.

MM BIO-10: Muni/Western will develop a program, together with the USFWS and CDFG, to selectively restore SBKR and Santa Ana River woolly-star habitat by using habitat manipulation, either by mechanical means or high pressure water, to remove vegetation and leave freshly deposited sand and silt, simulating the habitat-renewing aftermath of natural flooding. This will be done using an adaptive management approach with input from the USFWS and CDFG. If the high pressure water method is used, water will be piped by Muni/Western to areas of suitable habitat. A high-pressure nozzle will be directed at localized areas of habitat determined to be suitable for SBKR and Santa Ana River woolly-star after renewal. The nozzle will be hand-operated or operated from a light vehicle. Treatments will be accomplished in a randomized block design to allow experimental testing of variables such as duration and intensity of spray, addition of clean sand, season of disturbance, application of seed vs. allowing natural dispersal, etc. A rigorous monitoring program funded by Muni/Western will be established to enable the differences among experimental treatments to be determined. The primary indicator of success will be related to development of habitat characteristics identified with pioneer to intermediate RAFSS habitat within which SBKR and Santa Ana River woolly-star populations have been documented. These characteristics are documented in the literature and will be specified as part of the Muni program. The program will be adjusted appropriately as results from earlier efforts become available. The design and implementation of the ongoing effort will be funded by Muni/Western and conducted by representatives of Muni/Western with input from the USFWS and CDFG.

RESIDUAL IMPACTS

Implementation of the recommended mitigation would reduce the impact to less than significant by offsetting anticipated reduction in flood frequency and related habitat renewal with management activities that renew habitat and remove invasive plant species that are encroaching on the habitat occupied by these species.

Impact BIO-18. *Changes in non-storm day flows caused by the Project could affect aquatic habitats and species downstream of the point of diversion. This impact would be less than significant.*

Within Segment B, plunge pool to Cuttle Weir, reductions in average non-storm day flows would occur throughout the year when water is diverted from the plunge pool under Phase III of the Plunge Pool Pipeline. There would be no change in flows through this segment prior to implementation of Phase III of the Plunge Pool Pipeline. Aquatic habitat is present within this segment but is limited to the water column within the main channel. With the Project, flows within this segment would be reduced to 3 cfs year-round. Although reductions would occur, the continued flow of 3 cfs would likely be sufficient to support the aquatic community that currently exists in this segment. In addition, no sensitive aquatic species are expected to occur here. Consequently, the reductions in flow within this segment would result in less than significant impacts on aquatic habitats and associated species.

Within Segments C and D from Cuttle Weir to "E" Street, reductions are negligible throughout the year due to the lack of flows under No Project conditions. Consequently, no impact to aquatic resources is expected.

Segment E has increased flow relative to upstream segments due to the inflow from tributaries. As a result, Project effects are further reduced and the Project would have a less than significant impact on aquatic species and habitats within this segment.

In Segment F, the proportion of flow attributable to releases from Seven Oaks Dam and from flows at the Project diversion point is extremely small. Consequently, changes resulting from Project diversions in this segment are minor and the effects of the Project on aquatic resources are less than significant.

Segment G from Riverside Narrows to Prado Dam, includes an extensive aquatic environment largely due to the presence of Prado Flood Control Basin. Both the basin and the SAR support large populations of aquatic species within a variety of aquatic habitat types. The effects of the Project within this segment would be essentially undetectable due to the minimal reduction relative to the total flow. Impacts to aquatic resources within this segment are expected to be less than significant. No mitigation is required.

Impact BIO-19. *Changes in storm flows caused by the Project could affect the Santa Ana sucker downstream of the point of diversion. This impact would be less than significant.*

Changes in peak storm flows are not expected to adversely affect the Santa Ana sucker, although there is a slight potential that lower velocities in storm peaks could degrade habitat by removing less fine sediment from river bed gravels potentially used for spawning. Such impacts are less likely in the downstream habitats (below the RIX and Rialto discharge channel) where the species is found due to the small Project-related effect on total flow in these areas. These flow changes could result in benefits to this species by reducing flood flows that may otherwise wash some individuals downstream.

Designated Critical Habitat for the Santa Ana sucker is located in Segments C, D, and E (from Cuttle Weir to the RIX and Rialto effluent outfall), although the species is not currently supported in this stretch of the SAR. Project diversions would have no effect on sediment input from tributaries and would have less than significant impacts on sediment transport in these segments of the river as described in section 3.1 (Impact SW-9). The minor decrease in frequency of gravel and cobble transport during flood events between Mill Creek and “E” Street would not adversely affect critical habitat or the physical habitat occupied by the Santa Ana sucker. Thus, impacts on the Santa Ana sucker would be less than significant, and no mitigation is required.

Impact BIO-20. *Changes in non-storm day flows caused by the Project could affect the Santa Ana sucker downstream of the point of diversion. This impact would be less than significant.*

The following discussion is limited to the reaches in which Santa Ana sucker is present. This species is present or potentially present within the lowest three SAR segments analyzed. Within Segment E (“E” Street to the RIX and Rialto effluent outfall), a small amount of historically suitable habitat occurs, with a single record of observation. The potential to support this species in this segment has been substantially diminished due to re-routing of water treatment plant effluent to a new location further downstream. It is likely that a large proportion of the non-storm flow in the historical data for this segment was effluent outflow that no longer exists. Consequently, the potential to support the Santa Ana sucker is substantially reduced. The effects of the Project on this species within this segment would be less than significant due to the unlikely presence of the species.

Habitat within Segment F (from the RIX and Rialto effluent outfall to Riverside Narrows) is suitable for the Santa Ana sucker nearly throughout. In addition, populations of this species have been detected in several locations within this segment. The effects of the Project within this segment, as previously described, are extremely small. In a similar fashion, the effect of the Project within Segment G (Riverside Narrows to Prado Dam) is expected to have even less of an effect. As a result, the Project is not expected to adversely affect the Santa Ana sucker.

Impact BIO-21. *Changes in non-storm day flows caused by the Project could affect riparian and wetland habitat and species downstream of the point of diversion. This impact would be less than significant.*

Within Segment B (Seven Oaks Dam to Cuttle Weir) and with implementation of Phase III of the Plunge Pool Pipeline, there would be substantial reductions in average non-storm day flows throughout the year. Riparian and wetland habitat is present throughout most of this segment. As described above, with the Phase III Plunge Pool Pipeline in place, Project diversions would occur at the plunge pool and flows within this segment would be reduced to 3 cfs year-round. Although reductions would occur, the continued flow of 3 cfs on non-storm days would likely be sufficient to support the small amount of riparian habitat that exists in this reach and a measurable reduction in habitat is not expected. Common plant and wildlife species associated with the riparian and wetland habitat in this segment are therefore unlikely to be adversely affected. In addition, no sensitive aquatic species are expected to occur here. Reductions in non-storm flows within this segment would result in less than significant impacts on riparian and wetland habitat and associated species. Reduction in storm flows within this segment are not expected to adversely affect riparian resources and would therefore be less than significant and may aid in their expansion due to reduced scouring. Without Phase III of the Plunge Pool Pipeline, Project diversions would take place at Cuttle Weir and flows in Segment B would not be affected.

Within the subsequent downstream segments, riparian and wetland habitat gradually transitions, from very scarce to absent between Cuttle Weir and Mill Creek, to extensive just above Prado Flood Control Basin. The Project's effect on flows is greater in the upstream portions although the amount of habitat is relatively small. This effect is further diminished continuing downstream as flows from other tributaries and sources become predominant and Project-related effects become indiscernible in the furthest downstream segments. Consequently, the Project would have a small effect on those areas with a small amount of wetland and riparian habitat and virtually no effect in those areas that support substantial amounts of riparian habitat and associated species. Reductions in flow within these lower five segments would result in less than significant impacts on riparian and wetland habitat and associated species. No mitigation is required.

Source: Imagery captured February 2002.

Figure 3.3-1. Santa Ana River Woolly-Star Distribution

Figure 3.3-2. Slender-Horned Spineflower Distribution

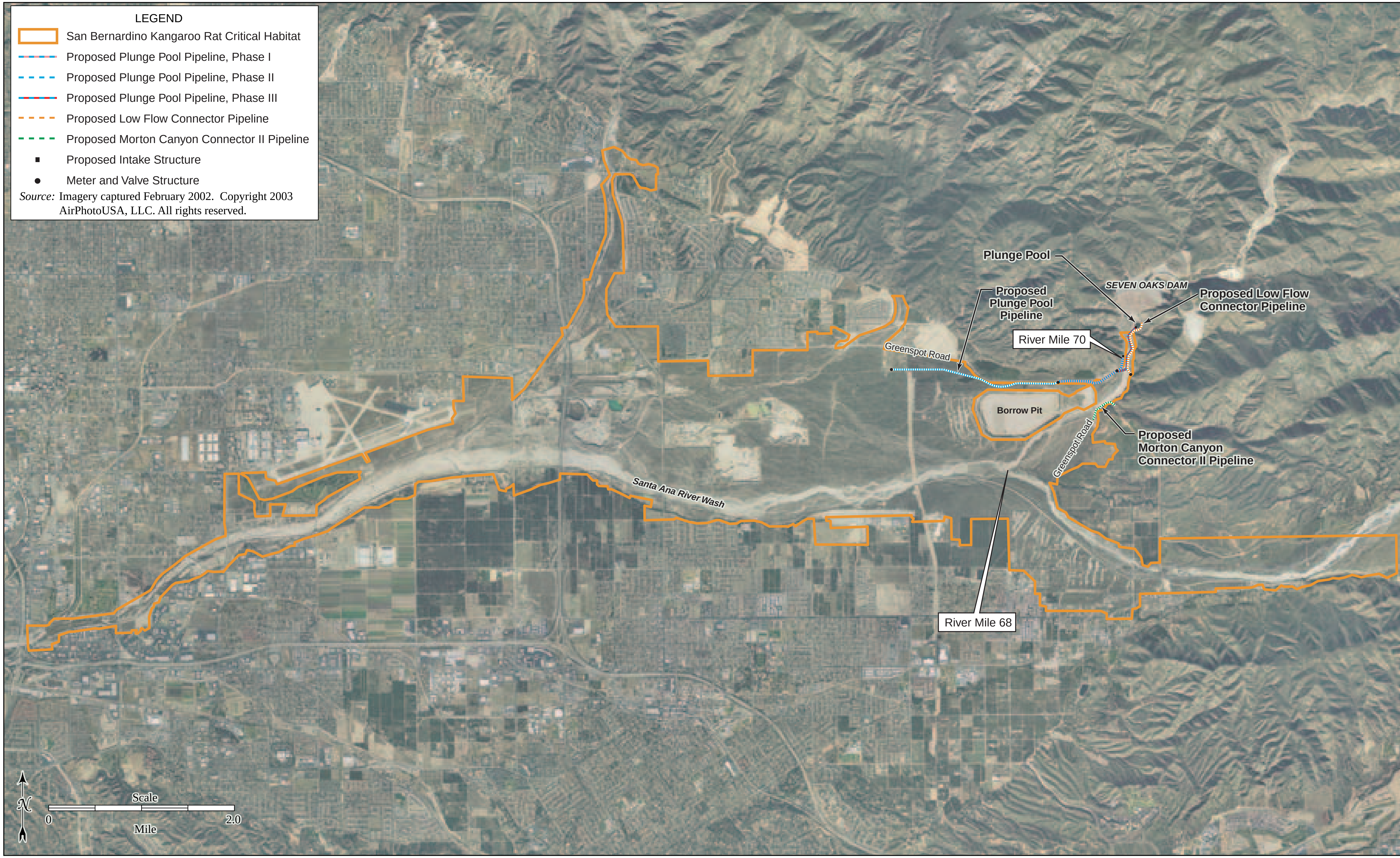


Figure 3.3-3. San Bernardino Kangaroo Rat Critical Habitat

Source: Imagery captured February 2002.

Figure 3.3-4. Santa Ana River Construction Area Land Cover Types
(Sheet 1 of 5)

Figure 3.3-4. Santa Ana River Construction Area Land Cover Types
(Sheet 2 of 5)

Source: Imagery captured February 2002.

Figure 3.3-4. Santa Ana River Construction Area Land Cover Types
(Sheet 3 of 5)

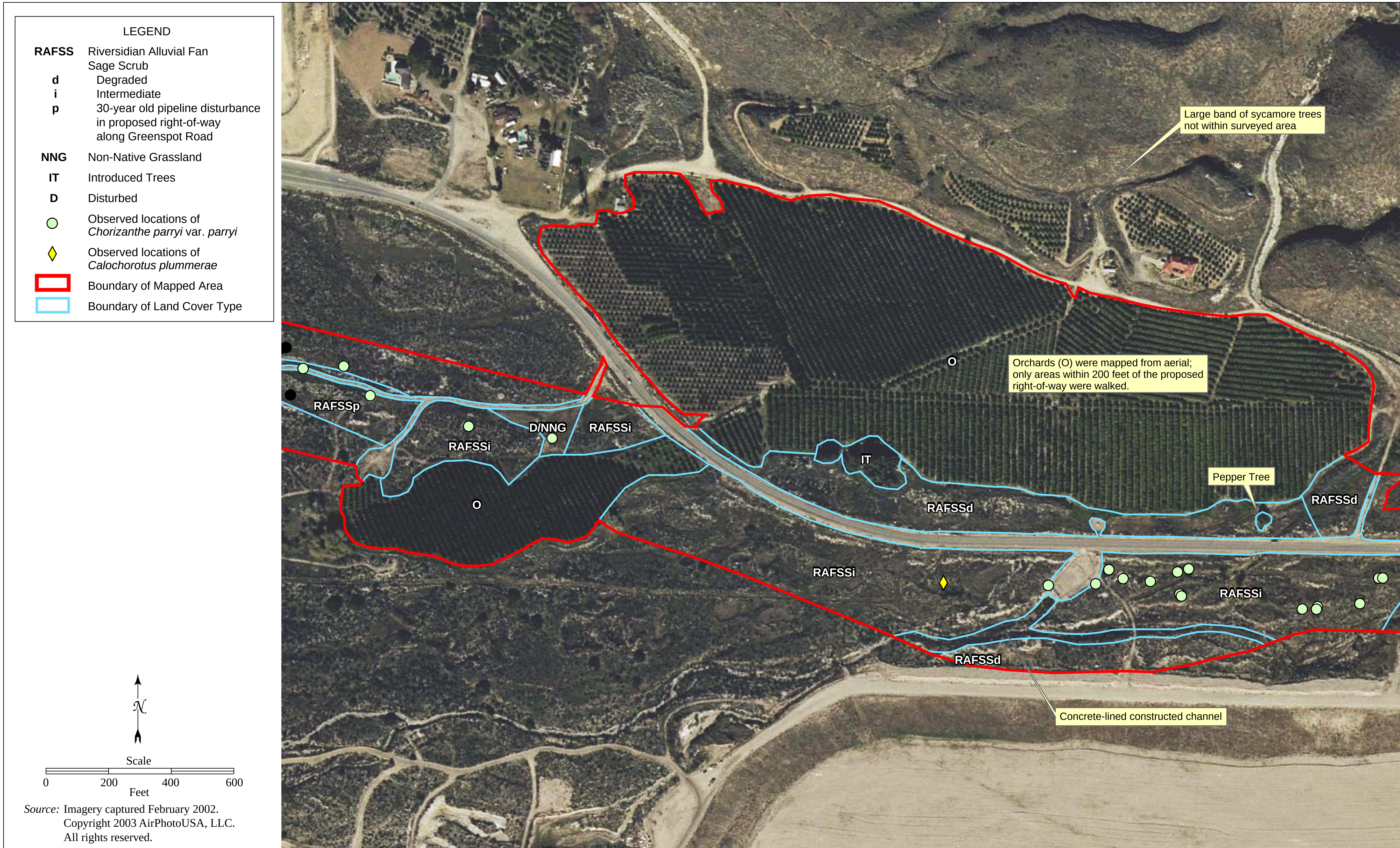


Figure 3.3-4. Santa Ana River Construction Area Land Cover Types
(Sheet 4 of 5)

LEGEND

RAFSS	Riversidian Alluvial Fan Sage Scrub
i	Intermediate
p	30-year-old pipeline disturbance in proposed right-of-way along Greenspot Road
D	Disturbed
●	Observed locations of *Chorizanthe parryi* var. *parryi*
◆	Observed locations of *Calochorotus plummerae*
▭ (red)	Boundary of Mapped Area
▭ (blue)	Boundary of Land Cover Type

N

Scale

0 200 400 600

Feet

Source: Imagery captured February 2002.

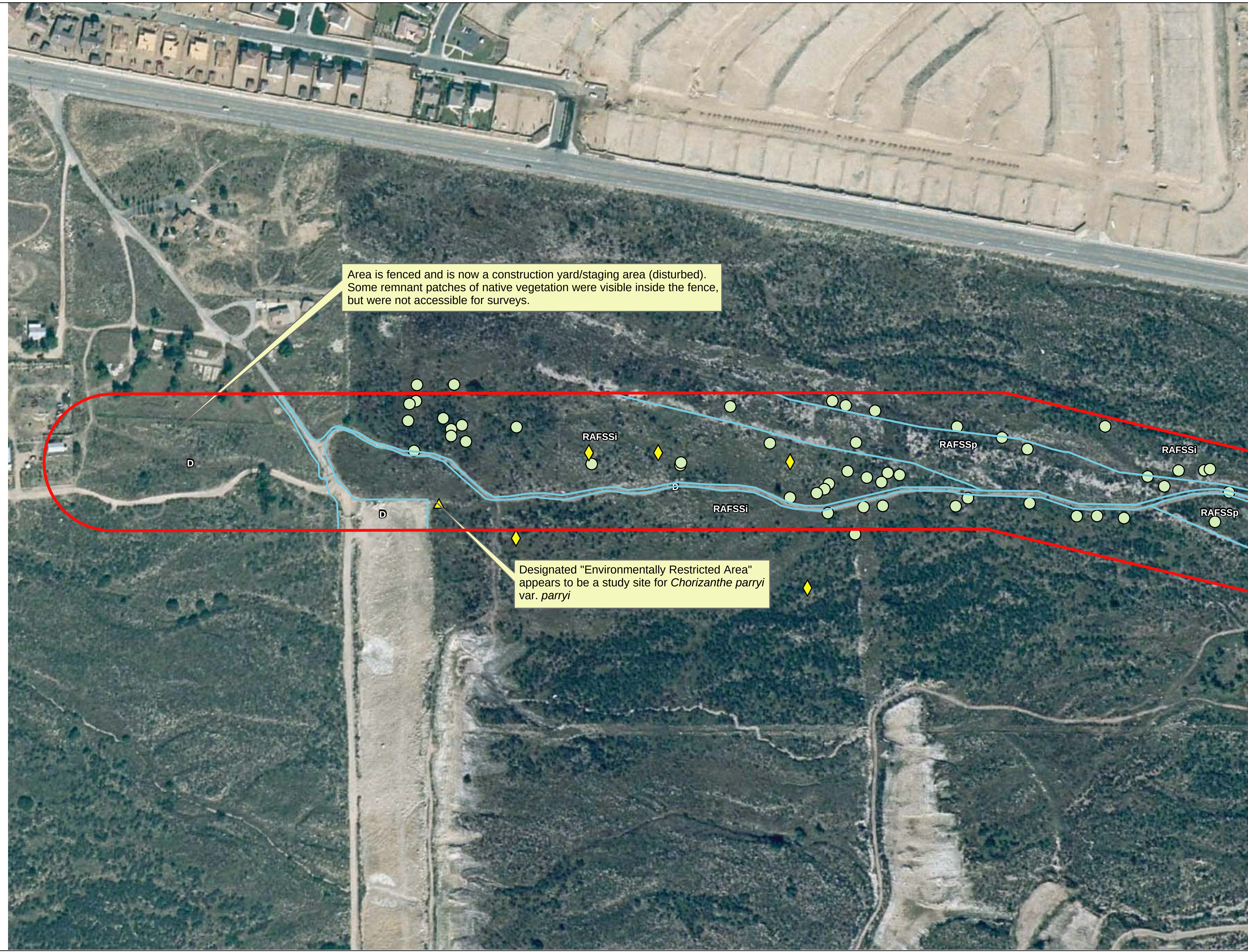


Figure 3.3-4. Santa Ana River Construction Area Land Cover Types
(Sheet 5 of 5)

LEGEND

RAFSS	Riversidian Alluvial Fan Sage Scrub
d	Degraded
i	Intermediate
SCWRW	Southern Cottonwood-Willow Riparian Woodland
RSS	Riversidean Sage Scrub
MC	Mixed Chaparral
D	Disturbed
RR	Rip Rap
	Boundary of Mapped Area
	Boundary of Land Cover Type

N

Scale
0 200 400 600
Feet

Source: Imagery captured February 2002.

Figure 3.3-5. Santa Ana River Construction Area Land Cover Types (Morton Canyon and Vicinity)

Source: Imagery captured February 2002.

Figure 3.3-6. Devil Canyon Construction Area Land Cover Types

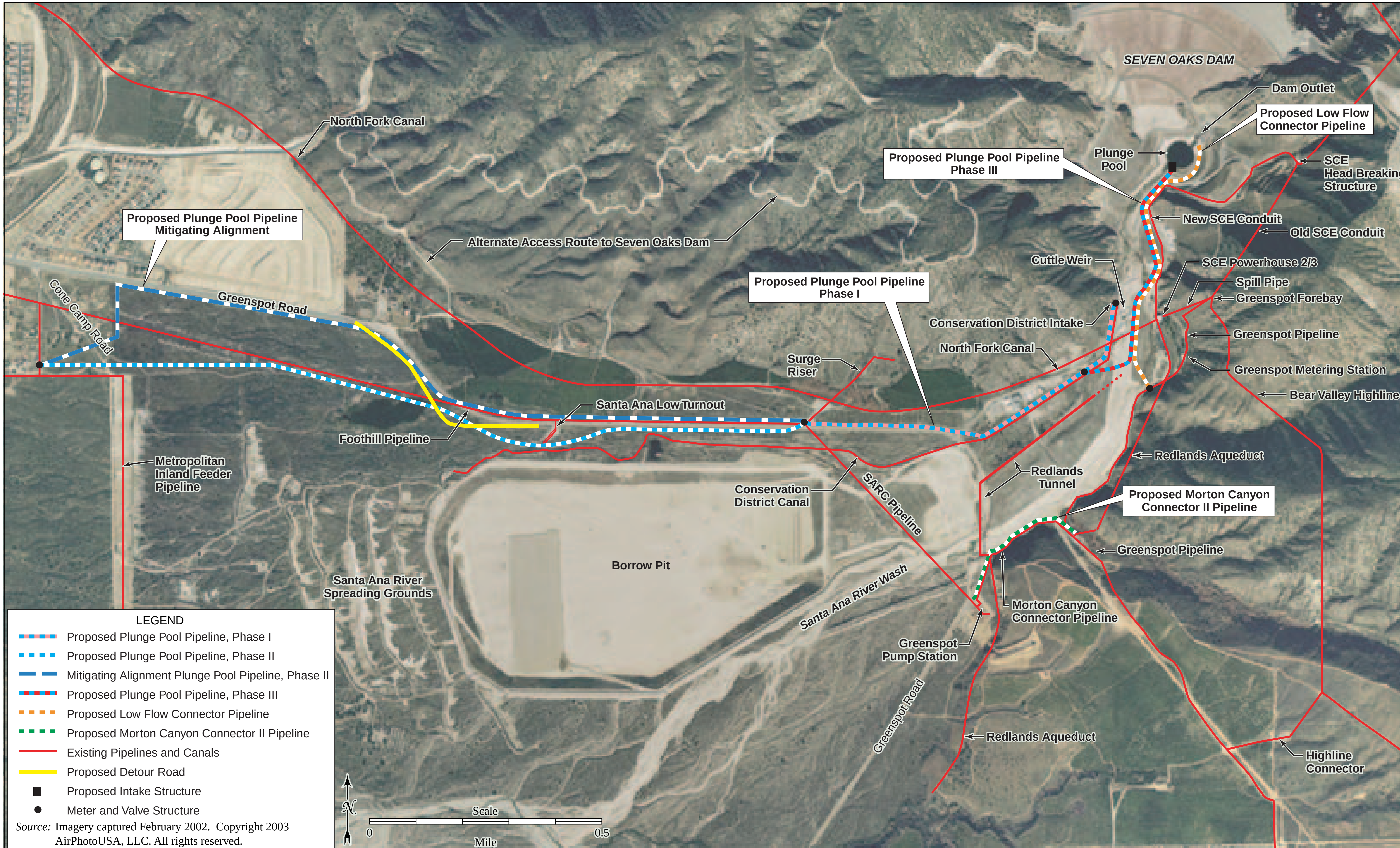


Figure 3.3-7. Proposed Plunge Pool Pipeline Biological Resources Impact Mitigating Alignment

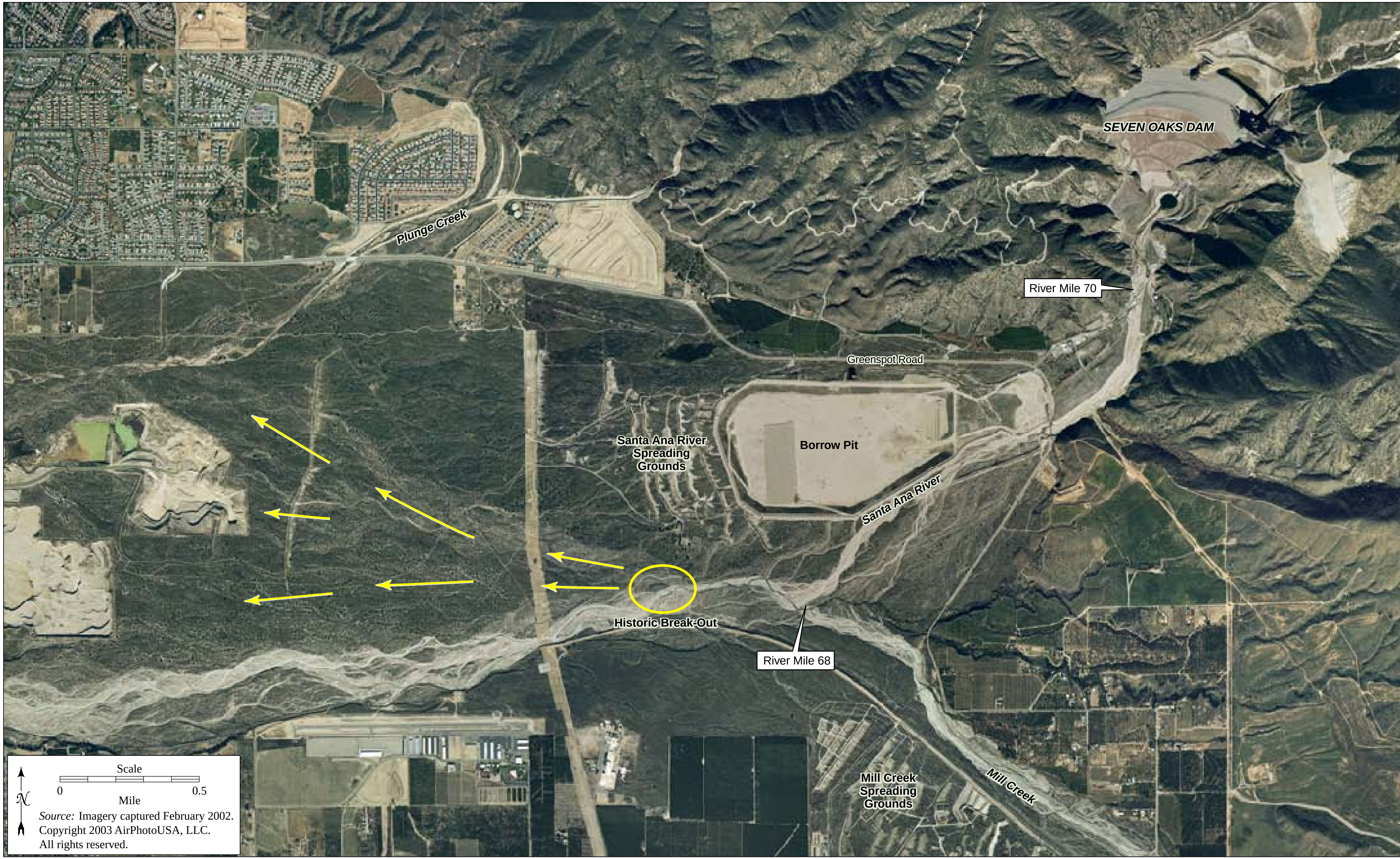


Figure 3.3-8. Santa Ana River Historic Break-Out

3.4 GEOLOGY, SOILS, AND MINERAL RESOURCES

This section addresses geology, soils, and mineral resources in the vicinity of the Project-related construction activities and for areas associated with operational activities of the Project. Subjects discussed in this section are closely related to section 3.1 (Surface Water Hydrology and Water Quality), e.g., potential erosion-induced sedimentation associated with the Project is discussed in both sections. Section 3.4 focuses on erosion associated with potential seismically-induced pipeline rupture, as well as erosion associated with Project grading and construction. Section 3.1 focuses on potential changes in stream scour and associated erosion due to Project-induced changes in SAR flow volumes.

Similarly, the subjects of liquefaction and subsidence are related to both geology and groundwater levels. Section 3.4 discusses potential Project-related changes in groundwater levels and their effects on the potential for liquefaction and subsidence. Section 3.2 (Groundwater Hydrology and Water Quality) discusses only generally Project-related effects of changes in groundwater levels in the SBBA. A description of the groundwater modeling undertaken in support of the impact analysis is summarized at the beginning of section 3.2 and in Appendix B (Groundwater Hydrology).

3.4.1 Environmental Setting

3.4.1.1 Regulatory and Institutional Setting

Active Faults

The Alquist-Priolo Earthquake Fault Zoning Act (APEFZA), passed in 1972, was intended to mitigate the hazard that surface faulting could present for structures occupied by persons. The passage of this state law owes much to the effects experienced as a direct result of the 1971 San Fernando Earthquake. This seismic event resulted in extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. Surface rupture, however, is the most easily avoided seismic hazard.

The main goal of the APEFZA is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The APEFZA addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Earthquake hazards such as liquefaction and seismically induced landslides associated with non-surface fault rupture are addressed later.

The APEFZA requires the State Geologist to establish regulatory zones, known as Earthquake Fault Zones, around the surface trace of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects are defined to include all land divisions and the construction of most structures intended for human occupancy. Before a project can be permitted, cities and counties must require that a geologic investigation be undertaken to demonstrate that proposed buildings would not be constructed across active faults. Setbacks of 50 feet from active fault strands are generally required for construction of habitable structures (California Geological

Survey 2002a). Structures intended for human occupancy are not proposed as part of this Project and, therefore, construction setbacks from active fault strands would not be required.

Other Earthquake Hazards

The Seismic Hazards Mapping Act of 1990 was created to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure. In accordance with this law, the State Geologist is required to delineate various seismic hazard zones and it is incumbent on cities and counties to regulate certain development projects within these zones. Cities and counties must withhold development permits for a site within such a zone until the geologic and soils conditions of the project site are investigated and appropriate mitigation measures, if any, are incorporated into the development plans. San Bernardino and Riverside counties are not, as yet, included in the seismic hazard mapping program (California Geological Survey 2002b).

Geologic Policy GE-11 of the San Bernardino County General Plan (adopted 1989 revised 2002) requires that all essential structures be designed and constructed to withstand ground-shaking forces of a minor earthquake without damage; of a moderate earthquake without structural damage; and of a major earthquake without collapse. Essential structures are defined as utilities and infrastructure that would be crucial for maintaining basic public services after a large earthquake. Essential structures include police, fire, and communication systems; Emergency Operations Centers; electric power inter-tie systems; power plants; small dams; utility substations; sewage treatment plants; water-works; local gas and electric distribution lines; aqueducts; major pipelines; major highways, bridges, and tunnels; ambulance services; public assembly sites with 300 or more capacity; and schools.

Geologic Policy GE-11 further states that essential structures shall be designed and constructed to remain functional following a major earthquake and shall be engineered to withstand maximum probable ground motion accelerations. Water supply pipelines are typically considered essential structures. San Bernardino and Riverside counties public works departments have the authority to oversee the implementation of special construction techniques across fault zones.

Mineral Resources

The Surface Mining and Reclamation Act of 1975 (SMARA) was enacted to promote conservation of the State's mineral resources and to ensure adequate reclamation of lands once they have been mined. Among other provisions, SMARA requires the State Geologist to classify land in California for mineral resource potential. The four categories include: Mineral Resource Zone (MRZ)-1, areas of no mineral resource significance; MRZ-2, areas of identified mineral resource significance; MRZ-3, areas of undetermined mineral resource significance; and MRZ-4, areas of unknown mineral resource significance.

The distinction between these categories is important for land use considerations. The presence of known mineral resources, which are of regional significance and possibly unique to that particular area, could potentially result in non-approval or changes to a given Project if it were determined that those mineral resources would no longer be available for extraction and consumptive use. To be considered significant for the purpose of mineral land classification, a mineral deposit, or a group of mineral deposits that can be mined as a unit, must meet marketability and threshold value criteria adopted by the California State Mining and Geology Board. The criteria vary for different minerals depending on the following: (1) whether the minerals are strategic or non-strategic, (2) the uniqueness or rarity of the minerals, and (3) the commodity-type category (metallic minerals, industrial minerals, or construction materials) of the minerals (CDMG 1995). The State Geologist submits the mineral land classification report to the State Mining and Geology Board, which transmits the information to appropriate local governments that maintain jurisdictional authority in mining, reclamation, and related land use activities. Local governments are required to incorporate the report and maps into their general plans and consider the information when making land use decisions (CDMG 1995).

3.4.1.2 Project Construction Areas

Regional Geologic Setting

The major components of the Project are located within the San Bernardino Valley, in a structural depression located between the San Jacinto Fault on the southwest, and the San Bernardino Mountains on the north and northeast (Figure 3.4-1). The northwestern boundary is defined by the San Gabriel Mountains and Cajon Pass. The Badlands and Crafton Hills define the southern and southeastern boundary of the valley (Dutcher and Garrett 1963, USGS 1971).

The topographic features in and around this area are primarily the surface expression of complex faulting and minor folding, modified by erosion and deposition by streams. Just north of the San Andreas Fault, the crestline of the San Bernardino Mountains rises abruptly more than 5,500 feet above the valley floor. In the northern part of the area are the Shandon Hills, Wiggins Hill, Perris Hill, and several other unnamed hills and knobs composed of igneous and metamorhphic rocks, which rise 50 to 550 feet above the valley floor (USGS 1971).

The Bunker Hill Dike is a well-known physiographic feature, located between the cities of Colton and San Bernardino. The dike consists of a series of almost parallel topographic ridges associated with the San Jacinto Fault. Bedding planes dip eastward at angles as great as 30 degrees where well exposed (Dutcher and Garrett 1963, USGS 1971).

The Crafton Hills and Reservoir Canyon Hill are underlain by crystalline bedrock and are completely surrounded by faults, representing an uplifted block. The hills are separated from the San Bernardino Mountains by a west-northwest-trending fault trough, located between the Oak Glen and San Andreas fault zones. The Badlands consist of sharply crested ridges separated by steep-sided, flat-bottomed ravines, which are typical of badlands topography. The deeply entrenched San Timoteo Canyon separates the Badlands from the Crafton Hills (USGS 1971).

Large amounts of alluvium were deposited at the base of the San Bernardino Mountains during the late Pleistocene (past 500,000 years),+ as many of the streams incised canyons into the uplifted mountain blocks. These late Pleistocene alluvial fan and fluvial deposits constitute older alluvium, which is the major fresh water-bearing unit of the San Bernardino Valley. Reddish, poorly sorted sand, gravel, boulders, and clay typify these deposits. Recurrent tectonic movement throughout the late Pleistocene caused interruptions in the erosion-depositional cycle. The older alluvial fans and terraces were dissected, locally buried or uplifted, and are now found at different altitudes along the flanks and in the canyons of the adjacent hills and mountains. Quaternary terrace deposits are equivalent to older alluvium in age and are similar in appearance and lithology. These deposits occur in the mountains on canyon walls, as flat topped remnants of a once more continuous older alluvial plain. The maximum thickness of the older alluvium deposits is not accurately known, but may be as great as 835 feet in the Pressure Zone of the San Bernardino Valley. Elsewhere in the valley, the thickness does not exceed 600 feet and thins towards the margins of the basin (Dutcher and Garrett 1963, USGS 1971).

Younger alluvium of Holocene age (i.e., less than 11,000 years old) unconformably overlies older units throughout the valley, consisting of unweathered sands, gravels, and clays. The younger alluvium is generally present above the water table; therefore, it is not an important supplier of water to wells. These deposits, in combination with thin river-channel deposits, are generally very permeable, thus providing avenues for rapid percolation of precipitation and applied water into the underlying older alluvium (Dutcher and Garrett 1963, USGS 1971).

3.4.1.2.1 Seven Oaks Dam and Reservoir Construction Area

TOPOGRAPHY

The Seven Oaks Dam and Reservoir is located within the Upper SAR Canyon, along the southern margin of the San Bernardino Mountains, approximately 1 mile upstream from the mouth of the canyon, at the confluence of the SAR and Government canyons, a minor tributary drainage. The elevation of the canyon floor at the dam is 2,060 feet above msl. Several hanging valleys and alluvial terraces, probably created by the rapid uplift of the San Bernardino Mountains and equally rapid down-cutting by the SAR, can be identified on the steep walls of the canyon (USACE 1997).

The proposed alignment of the upstream access road that would be relocated as part of the Project traverses relatively steep topography adjacent to the SAR bed. The proposed new intake structure road traverses the upstream (i.e., north) side of the existing dam, which is moderately steep, at a slope gradient of 2:1 to 1.5:1 (horizontal to vertical). This proposed road alignment also traverses an existing steep to very steep rock slope, with a gradient of approximately 1:1 to 1:4, which abuts the dam. The proposed construction staging area is located just upstream of the dam on the relatively flat SAR bottom.

STRATIGRAPHY

The major rock units in the vicinity of the dam and reservoir are gneiss and quartz diorites, which are metamorphic rocks. The gneissic rocks are foliated and often highly sheared. Intruding the gneissic rocks are quartz diorites of Cretaceous age, which form the western dam abutment and a portion of the streambed foundation for the dam. These rocks are moderately to strongly jointed and fractured (USACE 1997).

Recent streambed alluvium fills the canyon bottom to depths in excess of 100 feet and colluvium mantles parts of the canyon walls. Dissected remnants of several generations of

Quaternary-age stream deposits are present at this location. Each deposit appears as patches of boulder conglomerate outcropping on the walls of the canyon. The SAR Canyon is floored by unconsolidated sand, gravel, cobble, and boulder-size clasts, randomly deposited within the 500- to 1,000-foot wide main channel of the canyon (USACE 1997).

SOILS

The USDA Soil Conservation Service has not mapped surficial soils in the Project area; however, soils in the SAR Canyon floor can likely be classified as Psamments and Fluvents, which are frequently flooded areas consisting of sandy and gravelly material in intermittent streambeds of the SAR and other major creeks. Some areas consist of cobbles, stones, and boulders. During flood events, alluvium from streambanks is freshly deposited and partly reworked (USDA Soil Conservation Service 1980). The proposed alignment of the new intake structure road is located on artificial fill deposits of the existing dam embankment.

MINERAL RESOURCES

The SAR Canyon has been classified as MRZ-3, an area of undetermined mineral resource significance.

3.4.1.2.2 Santa Ana River Construction Area

TOPOGRAPHY

The Santa Ana River Construction Area is located at the mouth of the Upper SAR Canyon, along the southern margin of the San Bernardino Mountains. The south branch of the San Andreas Fault Zone, which traverses the Project area, follows the southwest-facing margin of the San Bernardino Mountains (see Figure 3.4-2).

The construction area extends from the lower confines of the SAR Canyon to the broad alluvial Santa Ana Wash area. The topography along the pipeline alignments is generally gently sloping to the south within the SAR Canyon, then generally trending west-southwest, within the SAR Wash (Figure 3.4-2). Where the proposed pipeline alignments are located within existing roadways, they locally abut moderately steep to very steep cut and fill slopes. For example, the Plunge Pool Pipeline Phase II would traverse an existing roadway across an engineered slope immediately southeast of the plunge pool. Similarly, the Low Flow Connector and Morton Canyon Connector II would be located along the base of moderately steep to very steep west- and northwest-facing slopes, respectively.

STRATIGRAPHY

Younger alluvium, 15 to 400 feet thick, underlies the area. Active river channel deposits underlie the upper portion of the proposed Plunge Pool Pipeline Phase II, the Low Flow Connector, and the upper portion of the Morton Canyon Connector II. These deposits are comprised of unconsolidated alluvium of major drainage channels, which have been subject to stream flood from the adjacent San Bernardino Mountains and have not (until construction of the Seven Oaks Dam) been controlled by flood control measures. These deposits, which are generally devoid of vegetation due to shifting of channels during flooding, consist of coarse bouldery alluvium (CDMG 1976). Geomorphologic and soil evidence suggest that these materials were deposited within approximately the last 500 to 1,000 years (Matti and Carson 1991).

Alluvial fan deposits underlie the western portion of the proposed Plunge Pool Pipeline (Phases I and II) and the southern portion of the Morton Canyon Connector II. This material is comprised of unconsolidated deposits of young coarse alluvium, consisting of coarse bouldery alluvium near mountain fronts, grading to pebbly and cobbly alluvium with increasing distance from the mountains (CDMG 1976). Geomorphologic and soil evidence suggests that these materials were also deposited within approximately the last 500 to 1,000 years (Matti and Carson 1991).

Older alluvium underlies the younger alluvium and consists of unconsolidated coarse gravel, sand, silt, and clay of fluvial origin that contain interbeds of thick, fine-grained silt and clay (SBVMWD 1998).

SOILS

Surficial soils in the area consist of Tujunga-Soboba association, dominantly brownish soils, that are coarse-textured throughout, occur on nearly level to moderately sloping topography, are excessively drained, and are very deep on alluvial valley floors (USDA Soil Conservation Service 1980). The general coarseness of these soils reduces the likelihood of expansive soils along the proposed pipeline alignments, as soil expansion typically occurs in finer, clay-rich soils. Soil expansion and contraction, resulting from repeated wetting and drying of clay-rich soils, often causes damage to structure foundations and buried infrastructure, including pipelines.

FAULTING AND SEISMICITY

At least four major active or potentially active fault zones are found in southwestern San Bernardino County, including the San Jacinto Fault; the Chino-Corona segment of the Elsinore Fault; the Cucamonga Fault, and the San Andreas Fault (Figure 3.4-1). Numerous minor faults associated with these larger faults may also represent substantial hazards.

From 1890 to 1923, the San Bernardino region experienced five substantial earthquakes with estimated local magnitudes or 6 or greater. Each of these earthquakes resulted in energy release roughly equivalent to the energy released in the 1971 San Fernando Earthquake, which caused 64 deaths and cost $550 million in damage. Historically, the San Jacinto Fault Zone, which passes through Rialto, San Bernardino, and Colton and continues south into the San Jacinto Valley in Riverside County (see Figure 3.4-1), is the most active fault zone in southern California. The most recent earthquakes on this fault have been centered in Riverside and San Diego counties. It has been 52 years since a significant earthquake occurred in the San Bernardino region and it appears that a moderate to large earthquake may be overdue somewhere along the northern segment of the San Jacinto Fault Zone in this area (Fife et al. 1976).

In 1857, a magnitude 8+ (estimated) earthquake occurred on the San Andreas Fault and the ground was ruptured for 200 to 275 miles, from near Cholame to Cajon Pass, and possibly as far south as the San Gorgonio Pass. The recurrence interval for a magnitude 8 earthquake along the total length of the fault is estimated to be between 50 and 200 years. It has been 147 years since the rupture in 1857. Most geologists and seismologists believe stress is building on the San Andreas Fault because of the resistance created by the curvature of the fault in southern California and will eventually be released in an earthquake similar to the 1857 event. A maximum credible earthquake (MCE) of Richter magnitude 8.5 is expected along the San Andreas Fault, with an associated maximum ground acceleration of 0.8 g (percent gravity). The MCE is the largest reasonable earthquake at a particular fault, without regard or consideration of how often the earthquake might occur (the return period). A magnitude 7.5 earthquake on the San Jacinto Fault would subject most of the San Bernardino area to ground acceleration over 0.5 g, with higher accelerations in the mountains. The Elsinore-Whittier and Cucamonga faults are capable of producing ground accelerations in the San Bernardino area up to 0.7 g and 0.5 g, respectively (CDMG 1976).

The south branch of the San Andreas Fault traverses the Project area at the mouth of the SAR Canyon (Figure 3.4-2). The MCE expected for the area adjacent to Seven Oaks Dam is a magnitude 8.0+ event along the south branch of the San Andreas Fault, with a peak rock acceleration of 0.7 g for a 40- to 50-second duration. A maximum probable event of magnitude 7.5 to 8.0 was used in the design of the dam. Such an earthquake would cause severe ground shaking in the vicinity of the Project, including the Pressure Zone. The main release of seismic energy would occur at the mouth of the SAR Canyon, in the vicinity of the proposed Plunge Pool Pipeline alignment (Phases I and II). However, the predicted great earthquake could occur anywhere along the San Bernardino Mountains segment of the fault. Secondary faulting associated with the MCE on the south branch of the San Andreas Fault can also be expected in areas not within the main fault zone (USACE 1997). The California Geological Survey (2002a) has designated much of the Project area within an Alquist-Priolo Earthquake Fault Zone (APEFZ).

Other active faults located in the region include the San Jacinto Fault, located approximately 8 miles southwest of the construction area, at the closest point; the Chicken Hill Fault, located approximately 4 miles southeast of the construction area, along the southeast side of the Crafton Hills; and the active Cucamonga Fault, located approximately 18 miles west-northwest of the construction area, at the closest point (CDMG 1976, 1979) (Figure 3.4-1). Any of these faults, as well as other more distant active faults, are capable of producing significant ground shaking in the Project area.

LIQUEFACTION

The potential for liquefaction is present throughout much of the SBBA. The Santa Ana River Construction Area is located in an area of moderate to moderately high liquefaction potential due to the presence of shallow groundwater and the proximity to several active faults (Matti and Carson 1991). See section 3.4.1.3 for detailed information related to the occurrence of liquefaction.

SUBSIDENCE

Subsidence due to groundwater withdrawal has been, and remains, a concern in the alluvial valleys of San Bernardino County. The entire alluvial valley area in southwestern

San Bernardino County has experienced subsidence from groundwater withdrawal. See section 3.4.1.3 for detailed information related to the occurrence of subsidence.

MINERAL RESOURCES

The southern and western portions of the construction area, located within the broader Santa Ana Wash, have been classified as MRZ-2, areas of identified mineral resource significance. The areas contain known resources of concrete-grade aggregate, which is widely used in the construction industry and therefore an important commodity. Sand and gravel have been produced from the SAR and Wash since the early 1900s. The Upper Santa Ana Wash has been identified as one of the best aggregate deposits in the State (CDMG 1987, 1995).

Younger alluvial materials used for aggregate vary in thickness from about 15 to 390 feet, due to tectonic activity in the area, which has created upwarps, where thinning occurs, and downwarps, where thickening of the deposits occurs. These younger alluvial materials consist of boulders, gravel, sand, and minor clay layers. The upper SAR area, in the vicinity of the Project, includes clasts of quartz-monzonite, with smaller amounts of gneissic granite, granite, aplite, and quartz-diorite. Older alluvium, which underlies the younger alluvium, is not suitable for use as concrete aggregate (CDMG 1995).

3.4.1.2.3 Devil Canyon Construction Area

TOPOGRAPHY AND STRATIGRAPHY

The Devil Canyon Construction Area is located on a gently sloping Quaternary alluvial fan emanating from Devil Canyon, located immediately to the north. The topography slopes gently to the south in this area. Unconsolidated deposits of young, coarse-grained, bouldery alluvium underlie this construction area (CDMG 1976).

SOILS

Surficial soils in the Project area consist of Soboba stony loamy sand, dominantly grayish-brown soils, that are coarse-textured throughout, occur on nearly level to gently sloping topography, are excessively drained, and are formed on alluvial fans in granitic alluvium (USDA Soil Conservation Service 1980). The general coarseness of these soils reduces the likelihood of expansive soils along the proposed pipeline alignment.

FAULTING AND SEISMICITY

The south branch of the San Andreas Fault traverses the mouth of Devil Canyon, approximately 500 feet north of the construction area. See section 3.4.1.2.2 regarding the seismic potential of this fault. In addition, the California Geological Survey (2002a) has designated this portion of the San Andreas Fault within an APEFZ.

Two other active faults are also located in the vicinity of the Project area. The San Jacinto Fault is located approximately 3.5 miles southwest of the construction area, at the closest point. The active Glen Helen-Loma Linda Fault is located approximately 2.5 miles southwest of the construction area (CDMG 1976, 1994). Any of these faults, as well as other more distant active faults, are capable of producing substantial ground shaking in the construction area.

LIQUEFACTION

The Devil Canyon construction site is located in an area of moderate liquefaction potential due to the presence of shallow groundwater and the proximity to several active faults (Matti and Carson 1991). See section 3.4.1.3 for detailed information related to the occurrence of liquefaction.

SUBSIDENCE

See the preceding Santa Ana River Construction Area discussion regarding subsidence in the San Bernardino Valley.

MINERAL RESOURCES

The Devil Canyon Construction Area falls within an area that has been classified as MRZ-3, an area of undetermined mineral resource significance (CDMG 1995).

3.4.1.2.4 Lytle Creek Construction Area

TOPOGRAPHY AND STRATIGRAPHY

The topography of the Lytle Creek Construction Area slopes gently to the southeast, parallel to nearby Lytle Creek. The area is underlain by Quaternary alluvial fan deposits, consisting of unconsolidated deposits of young, coarse-grained, bouldery alluvium, and older alluvium which ranges from unconsolidated older alluvial deposits (fanglomerate) to indurated older decomposed clay-rich alluvium (CDMG 1976).

SOILS

Surficial soils in the construction area consist of Tujunga loamy sand and gravelly loamy sand. These soils generally consist of excessively drained, nearly level to moderately sloping soils that form on alluvial fans in granitic alluvium. The soil is typically brown to pale-brown and highly permeable (USDA Soil Conservation Service 1980).

FAULTING AND SEISMICITY

The Lytle Creek Construction Area lies approximately 1,000 feet southwest of the San Jacinto Fault and approximately 4.5 miles southwest of the south branch of the San Andreas Fault. The California Geological Survey (2002a) has designated the nearby San Jacinto Fault Zone within an APEFZ. See section 3.4.1.2.2 regarding the potential seismicity associated with these faults. In addition, the active Glen Helen-Loma Linda Fault is located 2 miles northeast of the Project area. Any of these faults, as well as other more distant active faults, are capable of producing substantial ground shaking in the construction area.

LIQUEFACTION

The Project area is located on the south side of the San Jacinto Fault, where shallow groundwater is not present and, therefore, the potential for liquefaction is low (Matti and Carson 1991). See section 3.4.1.3 for detailed information related to the occurrence of liquefaction.

SUBSIDENCE

See the preceding Santa Ana River Construction Area discussion regarding subsidence in the San Bernardino Valley.

MINERAL RESOURCES

The Lytle Creek Construction Area includes both MRZ-2, areas of identified mineral resource significance, and MRZ-3, an area of undetermined mineral resource significance (CDMG 1995).

3.4.1.3 Project Operations Areas

Groundwater conditions at construction sites and throughout the SBBA have the potential to be influenced by Project operations. Because of this, liquefaction and ground subsidence are addressed in detail below.

Liquefaction

Liquefaction is a form of seismically induced ground failure. In cohesionless, granular material having low relative density, such as loose sandy sediment, seismically-induced vibrations can disturb the particle framework, leading to increased compaction of the material and reduction of pore space between the grains. If the sediment is saturated, water occupying the pore spaces resists this compaction and exerts pore pressure that reduces the contact stress between the sediment grains. With continued shaking, transfer of intergranular stress to pore water can generate pore pressures great enough to cause the sediment to lose its strength and change from a solid state to a liquid state. This mechanical transformation can cause various kinds of ground failure at or near the ground surface.

The liquefaction process typically occurs at depths less than 50 feet below ground surface. Diminished susceptibility as depth increases is due to the increased firmness of deeper sedimentary materials. The depth to groundwater and distance to the causative fault affect the relative susceptibility to liquefaction. Much of the San Bernardino Valley is located in an area of liquefaction susceptibility (Figure 3.4-3). The most likely scenario for significant liquefaction to occur in the San Bernardino Valley would be as a result of an earthquake on the adjacent San Andreas, San Jacinto, or Cucamonga faults (Matti and Carson 1991).

The main zones of elevated liquefaction susceptibility within the San Bernardino Valley are associated with shallow groundwater that occurs under the modern flood plains of Cajon Creek, Warm Creek, and the SAR. Recently deposited Holocene sediments that would be expected to have lower penetration resistance and higher susceptibility than older sediments underlie these areas. However, even the older Holocene and uppermost Pleistocene sediments have elevated susceptibilities comparable to those in the younger deposits, and this fact accounts for zones of high and moderately high susceptibility that extend away from the modern flood plains and into adjacent areas underlain by older deposits (Matti and Carson 1991).

In the southern part of the SBBA, on the northeast side of the San Jacinto Fault, there is approximately 1,200 feet of unconsolidated and partly consolidated, water-bearing deposits. In the area between Warm Creek and the SAR, the upper confining member of this aquifer acts to restrict vertical flow, causing semi-confined conditions in the upper 50 to 100 feet of saturated materials. This area is considered the Pressure Zone of the SBBA. Historically, this scenario resulted in perched, very shallow groundwater conditions, at times rising to ground surface level, which locally flooded buildings in the City of San Bernardino and increased the potential for liquefaction. Groundwater pumping since the early 1900s increased the minimum depth to groundwater in this area to 50 feet by the 1960s but, during the 1970s and 1980s, groundwater was locally within 10 feet of the ground surface beneath the City of San Bernardino (CDMG 1976, Matti and Carson 1991). See section 3.2 and Appendix B (Groundwater Hydrology) for additional information pertaining to the Pressure Zone of the SBBA.

Subsidence

Subsidence is the phenomenon where the soils and other earth materials underlying a site settle or compress, resulting in a lower ground surface elevation. The two types of subsidence of major concern in San Bernardino County are tectonic subsidence and subsidence due to groundwater withdrawal. Tectonic subsidence, which can total many feet, is primarily of concern during very large earthquakes, when subsidence could occur instantaneously. Subsidence due to groundwater withdrawal can be superimposed on (i.e., add to) tectonic subsidence in large sedimentary basins in tectonically active regions, such as the SBBA (CDMG 1976).

Subsidence due to groundwater withdrawal has been, and remains, a concern in the alluvial valleys of the SBBA. Thick, poorly consolidated alluvial deposits, such as those found in the SBBA, may be subjected to subsidence if a large quantity of water is removed. Even relatively small percentages of montmorillonite clay, micaceous minerals, or organic debris, if present, will increase the possibility of subsidence. One of the greatest potential subsidence problems involves aquifers with artesian areas. The amount of subsidence that a confined aquifer system will experience is a function of soil particle size, shape, and mineralogy; geochemistry of pore water and of pore water in contiguous aquifers; and compression. The area located within the City of San Bernardino, immediately northeast of the San Jacinto Fault (Figures 3.4-1 and 3.4-3), is a former artesian area due to semi-confined groundwater conditions (CDMG 1976).

The entire alluvial valley area in southwestern San Bernardino County has experienced subsidence from groundwater withdrawal. The USGS estimates that a maximum of approximately 1.3 feet of subsidence occurred from about 1943 to 1969, immediately east of the San Jacinto Fault, near Loma Linda, due to a decline in water levels of approximately 350 feet (DWR 1970a and 1970b, CDMG 1976).

In general, the type of subsidence that occurs as a result of groundwater extraction is uniform in nature, rather than differential, and generally does not cause damage to individual small structures (DWR 1970a and 1970b, CDMG 1976, Diaz Yourman & Associates 2003). However, subsidence does affect structures sensitive to slight changes in elevation, such as highways, canals, pipelines, drains, sewers, and particularly hydraulic structures subject to high pressures (CDMG 1976).

In addition, earth fissures and surface faulting sometimes occur together with subsidence due to groundwater withdrawal, resulting in damage to overlying structures and infrastructure. Such ground failure occurs as a result of localized differential compaction and/or ground extension, together with downwarping of the sediments. Earth fissures and surface faulting associated with man-induced land subsidence have been reported in at least 18 alluvial basins in 12 areas in the United States; the SBBA is not included as one of these 12 areas (Holzer 1984). However, in the San Bernardino area, large cracks have formed in the ground surface in the Yucaipa area in the years following heavy withdrawal of water for irrigation. These cracks may be the result of groundwater withdrawal or possibly hydrocompaction[1]. About 600 acres are underlain by artesian aquifers in Yucaipa (CDMG 1976).

3.4.2 Impacts and Mitigation Measures

3.4.2.1 Impact Assessment Methodology

3.4.2.1.1 General Approach

This section describes impacts and, where appropriate, mitigation measures pertaining to geologic, seismic, soil, and mineral resource conditions at construction sites, as well as throughout the SBBA. While impacts are evaluated with respect to seismicity, slope stability, erosion, differential settlement, and mineral resources, the following methodology section focuses on liquefaction and subsidence, as impacts associated with these geological phenomena are based on groundwater modeling. The occurrence of both liquefaction and subsidence depends on depth to groundwater, therefore, groundwater modeling can predict whether these phenomena are more likely under Project scenarios than under the No Project. Specific information on groundwater modeling tools and modeling processes is provided in Appendix B (Groundwater Hydrology).

3.4.2.1.2 Liquefaction

In evaluating liquefaction hazards, the standard references are California Division of Mines and Geology Special Publication 117 (CDMG 1997) and *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California* (SCEC 1999). These publications are based on original research by Seed and Idriss (1971, 1982), with subsequent refinements by Seed et al. (1983), Seed and De Alba (1986), and Seed and Harder (1990).

---

[1] Hydrocompaction is the subsidence of shallow soils (with high porosity) as a result of adding water to the land surface.

In order to be susceptible to liquefaction, potentially liquefiable soils must be saturated or nearly saturated. In general, liquefaction hazards are most severe within 50 ft of the land surface, but on a slope near a free face or where deep foundations go beyond that depth, liquefaction potential should be considered at greater depth. If it can be demonstrated that any potentially liquefiable materials present at a site (i) are currently unsaturated (e.g., are above the water table), (ii) have not previously been saturated (i.e., are above the historic high water table), and (iii) are highly unlikely to become saturated (given foreseeable changes in the hydrologic regime), then such soils generally do not constitute a liquefaction hazard that would require mitigation (CDMG 1997). Much of the SBBA is located in an area of moderate to high liquefaction susceptibility as can be seen in Figure 3.4-3 (Matti and Carson 1991).

In order to assess the potential significance of Project effects, a two-fold comparison is made between groundwater levels under Project conditions and: (1) groundwater levels that would exist under No Project conditions; and (2) the relationship to an absolute threshold value, defined here as 50 feet below ground surface elevation. This comparison process is represented graphically as a decision flow chart in Figure 3.4-4. The decision process results in one of four impact determinations: significant, less than significant, and two beneficial classes. The first criterion (No Project conditions) determines whether the impact is classed as beneficial or not. The second criterion (50-foot threshold) further differentiates between (a) significant and less than significant, and (b) two categories of beneficial. Each of the four impact determinations are color-coded in Figure 3.4-4 (and later in Figures 3.4-9 through 3.4-12) for ease of interpretation.

As an example, in determining Project-related impacts, a comparison is first made to see if groundwater levels under Scenarios A through D are closer to the surface than under No Project conditions. Secondly, Project groundwater levels are evaluated to determine if they are less than 50 feet from the ground surface. If the answer is yes to both questions, the flow chart results in a finding of significant impact (red color). In other words, a liquefaction impact is considered significant if the Project raises groundwater levels compared to No Project conditions, and the resulting groundwater levels are less than 50 feet below ground surface elevation. Other impacts follow the decision chart in a similar manner. The lower section of Figure 3.4-4 graphically illustrates impact determination for a hypothetical case.

Hydrographs have been developed for 34 locations, each of which is located on Figure 3.4-5. These 25 index wells and 9 spreading grounds are listed in Table 3.2-16. An example of the application of the impact determination process for liquefaction is given for the single hydrograph of Index Well 12 (Lower Kelly) displayed in Figure 3.4-6. This figure shows annual groundwater levels at IW12 for each of the Project scenarios and No Project. Land surface elevation and 50 feet below land surface are also indicated. For the most part, groundwater levels under all Project scenarios are deeper than under the No Project. Both Project and No Project groundwater levels remain deeper than 50 feet below land surface except for one year, when No Project conditions result in a depth of 50 feet.

Impact determinations, identical to those discussed immediately above, are made for groundwater levels at each of the 34 locations within the SBBA, for each of 39 years and under each of the four Project scenarios. Thus, for example, there are over 5,000 separate impact determinations made with regard to groundwater levels. The full array of these impact determinations are presented later in this section as a series of figures (Figures 3.4-9 through

3.4-12). Each of these figures provides a generalized view of Project impacts throughout the SBBA as measured at 34 locations over 39 years. As can be seen from an inspection of these figures, all impact categories are evident with regard to groundwater levels, i.e., significant, less than significant, and beneficial.

In addition, modeling has been completed to determine the projected geographical extent of shallow groundwater, i.e., less than 50 feet from the ground surface, under Project and No Project conditions, throughout the SBBA (see Appendix B for more detail). Liquefaction impacts are evaluated on a basin-wide level, using maps derived from this modeling process. Figure 3.4-7 illustrates conditions under Project Scenario A and No Project. This represents the spatial extent of the area susceptible to liquefaction potential in year 2022 (the year in which the greatest surface expanse is susceptible). As can be seen from Figure 3.4-7, there are different areas within the SBBA that show liquefaction potential due to shallow groundwater. However, compared to conditions under the No Project, there is less liquefaction potential within the Pressure Zone under Project Scenario A.

3.4.2.1.3 Subsidence

Thresholds describing unacceptable levels (i.e., rate or amount over a given area) of ground subsidence have not been established by geological organizations such as the CDMG or USGS, nor by internationally recognized engineering societies, such as the American Society for Testing and Materials, which establishes engineering standards for a variety of industries. Therefore, two highly respected geotechnical engineering firms (Geotechnologies, Inc. of Burbank, California, and Diaz Yourman & Associates of Santa Ana, California) were contacted in an effort to develop a quantitative significance criteria associated with ground subsidence due to groundwater withdrawal (personal communication, R. Knur 2003; Diaz Yourman & Associates 2003). Both firms work in the areas of geotechnical investigations of distressed foundations due to subsidence, differential settlement, and slope failure.

Geotechnologies, Inc. provided two documents routinely used in determining unacceptable quantities of subsidence or slope distortions, at which building damage would occur and repairs would be required:

- A graph from an article by Bjerrum (1963), illustrating the point (i.e., with increasing ground movement) where certain types of structural damage occur. This graph illustrates that cracking in panel walls first occurs at a ground/building floor slope of 1/300 (or about 1 inch over 25 feet) and structural damage occurs generally starting at a slope of 1/150 (or about 1 inch over 12 feet).
- An article by Grant et al. (1974) indicates that a building that experiences movement due to a slope of 1/300 will probably suffer some damage. However, similar to liquefaction, this paper stresses that this probability is site-specific (due to soil types) and that damage does not necessarily occur where the ground movement exceeds 1/300.

Diaz Yourman & Associates (2003) provided a summary table of thresholds at which angular distortion would occur, based on different types of construction and eight different research authors, including Bjerrum (1963) and Grant (1974), both of whom were cited by Geotechnologies, Inc. This table indicated that building damage could occur, due to subsidence, at ground distortion slopes varying from 1/150 to 1/750 (or 1 inch over 12.5 feet to 1 inch over 62.5 feet). Higher ground distortion slopes can be tolerated for non-critical structures, and lower angular distortions can be assigned for critical structures. Allowable distortions are also a function of the building type and foundation system. Examples of non-critical structures include structures that can tolerate minor damage to the building (wall cracks, cracked slabs, etc.) without impairing its serviceability. Most structures can be assigned to this category. Examples of critical structures are buildings that house machinery or equipment that is very sensitive to movements or monumental buildings, such as museums that cannot tolerate cracks. Diaz Yourman & Associates indicate that while the values assigned to critical and non-critical structures can be used as guidelines, specific values should be based on detailed studies of individual structures during building/foundation design or assessment.

However, although applicable in determining unacceptable levels of structural deformation subsequent to ground subsidence, the thresholds used by Geotechnologies, Inc. and Diaz Yourman & Associates cannot be predicted (e.g., based on modeling), thus creating difficulties in determining a level of significance. Therefore, a subsidence threshold of 0.01 ft/year has been recommended as a maximum allowable subsidence rate, due to project-related changes in groundwater levels. This threshold is based on a site-specific subsidence study in a similar hydrogeologic basin, the Santa Clara Valley in the southern San Francisco Bay area (Geoscience 1991). The Santa Clara Valley is a relatively deep, alluvial-filled basin, bounded by faults on two sides, similar to the SBBA. The Santa Clara Valley has similar hydrogeology to the SBBA in that the northern portion of the basin contains a confined zone, created by a clay layer of low permeability (similar to the Pressure Zone of the SBBA), whereas the remainder of the basin is unconfined and has generally high permeability (DWR 2003b). This subsidence threshold has been unofficially adopted by the USGS in studies of other basins.

Subsidence modeling was completed for the four Project scenarios (A through D), using the groundwater flow model and the PRESS subsidence model. The PRESS model is a modified version of a program initially developed by Helm for one-dimensional simulation of aquifer system compaction, in Pixley, California (Helm 1975). Revisions were made in 1979-1980 by the Harris-Galveston Coastal Subsidence District (Espey, Huston & Associates, Inc. 1979), which included changes in format, plotting and input/output routines. Specifically, the modifications allow for multiple aquifers and simplification of input preparation.

The PRESS model computes ground surface subsidence resulting from a given change in potentiometric head within a system of aquifers. Both the virgin (non-elastic) and rebound (elastic) compressibilities of the clay layers (aquitards) are taken into account when estimating total subsidence.

The program uses the one-dimensional Terzaghi consolidation theory with some simplification of parameters to relate a time history of potentiometric head changes to a time history of subsidence. The total ground surface subsidence, as a function of time, is computed by summing up the individual subsidence occurring in each clay layer. Calibration of the model to historically measured subsidence using observed changes in potentiometric head for a given lithology allows prediction of future subsidence.

Water level impacts were simulated at City of Riverside well Raub #8, located on the southeast corner of Waterman and Orange Show Road. This well was selected from a collection of wells with recorded geophysical logs in the SBBA because it is located in the Pressure Zone nearest to the area of maximum historic subsidence (CDMG 1976) and had the largest cumulative thickness of clay layers. An idealized lithologic log for Raub #8 was constructed from the short normal resistivity geophysical log. Clay layers and their thicknesses were identified and six compacting intervals were approximated. The values of virgin compressibility, elastic compressibility, and pre-compaction stress were uniform for all compacting intervals, as determined during the calibration process. Vertical hydraulic conductivity was chosen from calibrated values from wells similar in lithology, but located in the Chino groundwater basin.

3.4.2.2 Significance Criteria

The criteria used to determine the significance of an impact on geology, soils, and mineral resources are based on the model initial study checklist in Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss or injury involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42.
  - Strong seismic ground shaking.
  - Seismic-related ground failure, including liquefaction.
  - Landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

The impact discussion does not address the following issues since the Project would not:

- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; and
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (International Conference of Building Officials 1994), creating substantial risks to life or property.

There are a number of potential impacts that would not occur at specific locations and which are not discussed further. They include the following:

- No known mineral resources are present in the Devil Canyon Construction Area;
- The Lytle Creek Construction Area is located primarily in and along paved roads that traverse a developed, primarily residential area, therefore, it is unlikely that this area would be mined in the future for mineral resources;
- No operational impacts would occur with respect to geology at the Seven Oaks Dam and Reservoir;
- Model results indicate that no liquefaction impacts would occur due to Project-related groundwater spreading in the Rialto-Colton Basin (i.e., Cactus Spreading and Flood Control Basins), San Timoteo Basin (i.e., Garden Air Creek), and Yucaipa Basin (i.e., Wilson Spreading Grounds), as groundwater would remain below a depth of 50 feet from land surface under all Project scenarios;
- Subsidence impacts would not occur at any of the Project-related construction sites, since groundwater levels would not be lowered under any Project scenario at these locations; and
- The upper water bearing zone in the area of Lytle Creek and Cactus Basins Pipeline (Lytle Creek Construction Area) is unsaturated, therefore liquefaction would not occur during Project construction due to historical high groundwater levels.

3.4.2.3 Project Construction

3.4.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Impact GEO-1. *Implementation of seasonal conservation storage would include modification of the trash rack of the intake structure and drilling into bedrock to provide additional anchors for the structure. These activities may result in significant impacts associated with sedimentation and erosion at the base of the dam. Substantial erosion may also occur during these short-term construction activities through the use of berms to divert water flow, resulting in significant impacts.*

Demolition and modification of the trash rack section of the intake structure and drilling to install additional anchors would occur during the dry summer months to reduce potential soil erosion and sedimentation. Construction of Seven Oaks Dam and the impermeable grout curtain beneath it causes sub-surface water to rise to the surface. Berms would be constructed to divert these surface water flows away from construction activities. Debris from the demolition and drilling activities is unlikely to discharge into surface water flows; however, in the unlikely event that this occurred, substantial erosion and sedimentation impacts could occur. This is considered a significant impact. Substantial short-term erosion may also occur through use of diversion berms during demolition and drilling activities, resulting in significant impacts.

MITIGATION MEASURES

MM GEO-1: Before beginning construction, a sedimentation and erosion control plan will be prepared by Muni/Western and submitted to the SARWQCB for approval. In addition, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared by Muni/Western and submitted to the SARWQCB for approval prior to construction. Where possible, erosion control measures will be implemented by Muni/Western before beginning work in the rainy season. To minimize short-term impacts associated with erosion and off-site siltation of the SAR, standard erosion and sediment control features will be used during and immediately after grading and excavations.

RESIDUAL IMPACTS

Residual impacts would be less than significant because MM GEO-1 would provide appropriate erosion control measures during modification of the trash rack.

Impact GEO-2. *Substantial erosion and sedimentation may occur during grading and excavation activities associated with construction of new access roads at the dam and immediately upstream, resulting in significant impacts.*

Construction activities such as cut and fill grading operations associated with facilities may contribute substantial erosion and sedimentation.

MITIGATION MEASURES

MM GEO-1 would reduce erosion-related impacts in the Seven Oaks Dam and Reservoir Construction Area.

RESIDUAL IMPACTS

Residual impacts would be less than significant, because MM GEO-1 would provide appropriate erosion control measures during cut and fill grading operations.

3.4.2.3.2 Santa Ana River Construction Area

Impact GEO-3. *Substantial erosion and sedimentation may occur during grading and excavation activities associated with construction of new pipelines and related appurtenances, resulting in significant impacts.*

As described in Appendix C, construction in the Santa Ana River Construction Area would involve the disturbance of approximately 133 acres, excavation of 1,786,000 cubic yards (cy) of soil, and more than 45 construction vehicles and other equipment. The extensive ground disturbance could result in substantial erosion and sedimentation. This would be a significant impact to water quality.

MITIGATION MEASURES

MM GEO-1 would reduce erosion-related impacts in the Santa Ana River Construction Area.

RESIDUAL IMPACTS

MM GEO-1, requiring implementation of erosion control and water quality protection measures during construction, would reduce Impact GEO-3 to a less than significant level.

Impact GEO-4. *Discharge of groundwater from dewatering wells during excavation activities could cause substantial short-term sediment scour and erosion at the point of discharge, resulting in significant impacts.*

A substantial increase in erosion due to dewatering activities may lead to increased siltation of local drainages and the SAR, resulting in significant water quality impacts.

MITIGATION MEASURES

MM GEO-2: Muni/Western will direct the contractor to install, prior to de-watering activities, energy dissipation devices at discharge points to prevent erosion. Sedimentation basins (such as straw bales lined with filter fabric) will be used at dewatering discharge points to prevent excess downstream sedimentation. These basins will be constructed before dewatering and regularly maintained during construction, including after storm events, to keep them in good working order.

RESIDUAL IMPACT

Residual sediment scour and erosion impacts would be less than significant, because MM GEO-2 would provide appropriate erosion control measures during de-watering activities.

Impact GEO-5. *Excavation of large temporary slopes to accommodate pipeline installation, at gradients as steep as 1:1 (horizontal to vertical), in unstable geologic units, could result in significant impacts associated with on-site landslides or collapse.*

Topography along the proposed pipeline alignments is generally gently sloping within the SAR Canyon and Santa Ana Wash. However, proposed pipeline alignments abut moderately steep to very steep cut and fill slopes at a number of locations. For example, the Plunge Pool Pipeline Phase III would traverse an existing roadway across an engineered slope immediately southeast of the plunge pool. Similarly, the Low Flow Connector and Morton Canyon Connector II would be located along the base of moderately steep to very steep west- and northwest-facing slopes, respectively. These steep cut and fill slopes may be disturbed by Project construction. Temporary cut slopes with a 1:1 gradient and up to 35 feet deep, associated with installation of the Plunge Pool Pipeline Phase III and Low Flow Connector Pipeline, would result in a trench up to 120 feet wide and a total construction corridor width of up to 300 feet.

Construction trench cut slopes would be constructed in generally loose, coarse-grained river deposits. Excavation of such material could result in slope failure and associated disruption of construction, damage to equipment, and possible injury to workers. Excavation of such large temporary slopes in unstable geologic units could result in significant impacts associated with on-site landslides or collapse.

MITIGATION MEASURES

MM GEO-3: Muni/Western will implement recommendations established in a site-specific geotechnical report, prepared by a qualified geotechnical engineer or engineering geologist. The report recommendations will be based on a comprehensive evaluation of slope stability, seismic, and soil conditions that may affect construction of the pipelines and related facilities. Recommendations will be consistent with provisions of California Code of Regulations, Title 8, Construction Safety Orders.

Project grading and excavations will be observed by a geotechnical engineer, engineering geologist, or other qualified representative, to verify compliance with recommendations of the geotechnical report.

The geotechnical investigation will be completed in accordance with:

- CDMG Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (CDMG 1997); and
- Southern California Earthquake Center, *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in Californi*a (SCEC 1999).

RESIDUAL IMPACTS

Implementation of MM GEO-3 would provide appropriate slope stability measures during excavation activities, thus, reducing potential impacts to a less than significant level.

Impact GEO-6. *Project construction in the Santa Ana River Construction Area would result in loss of availability of a known mineral resource. However, impacts would be less than significant.*

The southern and western portions of the Santa Ana River Construction Area, located within the broader Santa Ana Wash, lie in an area classified as MRZ-2, i.e., areas of identified mineral resource significance. This area contains known resources of concrete-grade aggregate and the Upper Santa Ana Wash has been identified as one of the best aggregate deposits in the State of California. However, pipeline and related facility construction would only preclude access to aggregate in a corridor with a maximum width of approximately 120 feet. Therefore, Project-related construction would not result in the loss of appreciable quantities of a known mineral resource. Impacts would be less than significant and no mitigation is required.

3.4.2.3.3 Devil Canyon Construction Area

Impacts GEO-3, GEO-4, and **GEO–5** apply to the Devil Canyon Construction Area.

Construction of the Devil Canyon By-Pass Pipeline could occur at any time of year, including the winter rainy season. Erosional impacts associated with grading and excavations would be similar to those described for the Plunge Pool Pipeline in the Santa Ana River Construction Area. In addition, excavation dewatering could result in substantial erosional impacts. Impacts are considered significant. Excavation of temporary slopes in unstable geologic units could result in significant impacts associated with on-site landslides or collapse.

MITIGATION MEASURES

MM GEO-1, **MM GEO-2**, and **MM GEO-3** will be applied to reduce construction-related impacts in the Devil Canyon Construction Area.

RESIDUAL IMPACTS

Implementation of MM GEO-1 and MM GEO-2 applied to sedimentation and erosion impacts, and MM GEO-3 applied to erosion and slope stability impacts would reduce potentially significant impacts to less than significant.

3.4.2.3.4 Lytle Creek Construction Area

Impact GEO-3, GEO-4, and **GEO–5** apply to the Lytle Creek Construction Area.

Construction of pipelines in the Lytle Creek area could occur at any time of year, including the winter rainy season. Erosion impacts would be similar to those described for Plunge Pool Pipeline Phase II in the Santa Ana River Construction Area. In addition, excavation dewatering could result in substantial erosional impacts. Impacts are considered significant. Slope stability impacts would be similar to those described for the Devil Canyon Construction Area. Impacts are considered significant.

MITIGATION MEASURES

MM GEO-1, **MM GEO-2**, and **MM GEO-3** will be applied to reduce construction-related impacts in the Lytle Creek Construction Area.

RESIDUAL IMPACTS

Implementation of MM GEO-1 and MM GEO-2 applied to sedimentation and erosion impacts, and MM GEO-3 applied to erosion and slope stability impacts would reduce potentially significant impacts to a level of less than significant.

3.4.2.4 Project Operations and Maintenance

Potential impacts attributable to Project operations are addressed for (i) the Project construction areas, since these areas will contain the newly installed pipelines and associated minor facilities, and (ii) the area of the SBBA.

3.4.2.4.1 Project Construction Areas

SEVEN OAKS DAM AND RESERVOIR CONSTRUCTION AREA

Impacts associated with operations are not anticipated in the Seven Oaks Dam and Reservoir Construction area.

SANTA ANA RIVER CONSTRUCTION AREA

Impact GEO-7. *Multiple faults in the Santa Ana River Construction Area, including the San Andreas Fault Zone, could produce strong seismic ground shaking that would expose structures to substantial adverse effects. Indirect impacts are considered significant.*

The MCE expected for the Santa Ana River Construction Area is a Richter magnitude 8.0+ event along the south branch of the San Andreas Fault, with a peak rock acceleration of 0.7 g for a 40- to 50-second duration. The main release of seismic energy during an earthquake on the San Andreas Fault in this area would occur at the mouth of the SAR Canyon, in the vicinity of the proposed Plunge Pool Pipeline alignment. The proposed Plunge Pool Pipeline traverses the active San Andreas Fault in the vicinity of Greenspot Road (see Figure 3.4-2). A large earthquake on the San Andreas Fault in the vicinity of the Project construction area could result in fault surface rupture, which could damage the Plunge Pool Pipeline.

In addition, several other active faults are located in the vicinity of the Project area. Any of these faults, as well as other more distant active faults, are capable of producing significant ground shaking at the construction area, which could expose Project structures to substantial adverse effects. However, because of its large diameter, rupture of the Plunge Pool Pipeline as a result of a seismic event could result in uncontrolled releases of large quantities of water in the vicinity of Greenspot Road. Release of water from a ruptured pipeline would immediately flow into the SAR. No structures are located immediately downstream of this portion of the proposed pipeline route. Similarly, because the pipeline route traverses the northern edge of the SAR floodplain, it is unlikely that new structures would be built immediately downstream of the pipeline.

Such a release of water from a ruptured pipe could damage Greenspot Road, the Conservation District Canal, and the Santa Ana River Crossing Pipeline, as well as create deep erosional gullies, resulting in substantial erosion-induced siltation of nearby waterways. Similar damage could occur to other existing downstream structures if pipeline rupture were to occur on other portions of the Plunge Pool Pipeline as a result of strong seismically induced ground shaking. For example, a rupture upstream of the Cuttle Weir could result in damage to the new SCE conduit, located immediately adjacent to the Plunge Pool Pipeline, and rupture in the western portion of the Plunge Pool Pipeline could result in damage to the Metropolitan Inland Feeder Pipeline. Therefore, indirect impacts associated with pipeline rupture would be significant.

MITIGATION MEASURES

MM GEO-4: Muni/Western will implement seismic-related recommendations contained in a site-specific geotechnical report, as discussed in MM GEO-3, to minimize seismically induced damage to the pipeline.

MM GEO-5: A water flow shut-off mechanism will be installed by Muni/Western at the Plunge Pool Pipeline Intake Structure to terminate flow following a large earthquake in the vicinity of the site.

MM GEO-6: Muni/Western will complete emergency repairs to the pipeline and/or related facilities, in the event of seismically induced damage. MM GEO-1 and

MM GEO-2 will be applied to reduce erosion-related impacts associated with soil disturbance during emergency repairs.

RESIDUAL IMPACTS

Even with implementation of MM GEO-1 and MM GEO-2, providing appropriate erosion control in the event of a large release of water; implementation of MM GEO-4, requiring appropriate seismic design; and implementation of MM GEO-5 and MM GEO-6, ensuring that the water flow ceases and that emergency repairs are completed in the event of failure, substantial damage may still occur to Greenspot Road, the Conservation District Pipeline, and the Santa Ana River Crossing-Pipeline. Therefore, impacts remain significant and unavoidable.

Impact GEO-8. *Seismically induced liquefaction in the Santa Ana River Construction Area could result in pipeline damage and/or failure. Indirect impacts are considered significant.*

Project operations, under Scenarios A through D, would result in no impacts to groundwater levels throughout most of the modeling period (2000 to 2039) as can be seen in the hydrograph of Figure 3.4-8. However, groundwater levels would be lowered during a short period, compared to No Project conditions. Because the potential for liquefaction decreases with increased depth to groundwater, Project-induced groundwater lowering would temporarily result in beneficial liquefaction impacts.

The Project construction site is located in an area of existing shallow groundwater and moderate liquefaction susceptibility (Figure 3.4-3). Regardless of Project-induced changes in groundwater levels, the proposed pipeline could, during operation, be subject to liquefaction in the event of a large earthquake. Liquefaction-induced ground failure could result in pipeline damage and/or failure, even with implementation of modern engineering and construction practices. Indirect impacts associated with the release of a large quantity of water would be similar to those described for Impact GEO-7 and would be significant.

MITIGATION MEASURES

MM GEO-1, MM GEO-2, MM GEO-4, MM GEO-5, and **MM GEO-6** will be applied to reduce liquefaction-related impacts.

RESIDUAL IMPACTS

Even with implementation of MM GEO-1 and MM GEO-2, providing appropriate erosion control in the event of a large release of water; implementation of MM GEO-4, requiring appropriate seismic design; and implementation of MM GEO-5 and MM GEO-6, ensuring that the water flow ceases and that emergency repairs are completed in the event of failure, substantial damage may still occur to downstream structures. Therefore, impacts remain significant and unavoidable.

Impact GEO-9. *The Santa Ana River Construction Area is located on a geologic unit that could become unstable due to differential settlement associated with the Project, and potentially result in collapse. Impacts are considered less than significant.*

The proposed pipelines are located on alluvium, which is subject to tectonic subsidence and differential settlement. However, the pipelines would be underlain by a bed of sand/aggregate to cushion the pipe and provide a uniformly compacted soil surface onto which the pipe would be laid, thus minimizing impacts due to tectonic subsidence and differential settlement. Impacts are considered less than significant and no mitigation is required.

DEVIL CANYON CONSTRUCTION AREA

Impacts GEO-7 and **GEO-9** apply to operations at the Devil Canyon Construction Area.

With the exception of surface fault rupture, operational seismic impacts would be similar, but less, than those described for the Santa Ana River Construction Area. Both the nearby San Andreas Fault and other more distant active faults are capable of producing significant ground shaking at the construction area, which could expose Project structures to substantial adverse effects, even with implementation of modern engineering and construction practices. Severe seismically induced ground shaking could result in rupture of the Devil Canyon By-Pass Pipeline. A release of water from the 4.5-foot diameter pipeline would likely not damage any downstream structures. Indirect impacts would be less than significant and no mitigation is required.

Impact GEO-10. *Historic groundwater conditions could expose structures in the Devil Canyon Construction Area to substantial adverse effects involving seismically induced liquefaction. Impacts are considered less than significant.*

The Project construction site is located in an area of moderate, historic liquefaction susceptibility (Figure 3.4-3). Regardless of Project-induced changes in groundwater levels, the proposed pipeline could, during operation, be subject to liquefaction in the event of a large earthquake. Seismically induced liquefaction could result in rupture of the Devil Canyon By-Pass Pipeline. A release of water from the 4.5-foot diameter pipeline would likely not damage any downstream structures. Indirect impacts would be less than significant and no mitigation is required.

LYTLE CREEK CONSTRUCTION AREA

Impacts GEO-7 and **GEO-9** apply to operations at the Lytle Creek Construction Area.

With the exception of surface fault rupture, operational seismic impacts would be similar, but less than those described for the Santa Ana River Construction Area. Both the nearby San Jacinto Fault and other more distant active faults are capable of producing significant ground shaking at the construction area, which could expose Project structures to substantial adverse effects, even with implementation of modern engineering and construction practices. Severe seismically induced ground shaking could result in rupture of the San Gabriel Valley Municipal Water District Lytle Pipeline (Lytle Pipeline) and the Cactus Basins Pipeline. A release of water from the 4.5-foot diameter pipelines would likely not damage any downstream structures. Indirect impacts would be less than significant and no mitigation is required.

3.4.2.4.2 San Bernardino Basin Area (SBBA)

As discussed previously for the Project construction areas, changes in groundwater levels could influence the potential for liquefaction and subsidence within the SBBA. Under Project Scenarios A through D, as well as under No Project conditions, there are periods when groundwater levels are expected to be less than or equal to 50 feet below the land surface. The areas where this condition can be anticipated within the SBBA include: (1) Lytle Basins, (2) SAR Channel and SAR Spreading Grounds, (3) Mill Creek Spreading Grounds, (4) Warm Creek, (5) Upper Cajon Creek, (6) Devil Canyon Spreading Grounds, (7) the Pressure Zone, and (8) Waterman Canyon Spreading Grounds (see Figure 3.2-1). All of these spreading grounds are located in the forebay of the SBBA and are therefore representative of potential liquefaction in that portion of the basin.

The geographical extent of the surface area subject to high groundwater varies between Project scenarios and No Project conditions. Table 3.4-1 describes the surface area, under maximum spatial extent conditions (Year 2022), subject to liquefaction both within and outside the Pressure Zone of the SBBA. Figure 3.4-7 illustrates the area within the SBBA subject to liquefaction under Scenario A for year 2022. Figures 3.4-9 through 3.4-12 summarize the impact determinations under each of the Project scenarios (using the methodology described in section 3.4.2.1.2) at the 25 index wells and 9 spreading ground locations in the SBBA.

Within the Pressure Zone of the SBBA, the area exposed to potential liquefaction is reduced under all Project scenarios compared to No Project conditions. The reduction is greatest under Project Scenario A (Figure 3.4-7). For that portion of the SBBA located outside the Pressure Zone, implementation of the Project scenarios also results in smaller areas subject to high groundwater conditions than under No Project conditions. For the SBBA as a whole, implementation of any of the Project scenarios would result in a smaller area subject to high groundwater conditions than under No Project conditions.

Impact GEO-11. *The surface area exposed to liquefaction potential within the Pressure Zone of the SBBA under all Project scenarios is less than under No Project conditions. This is considered a beneficial impact.*

As can be seen in Figure 3.4-7, there is a net reduction in the area within the Pressure Zone of the SBBA exposed to the potential for liquefaction. Under Project Scenario A, the area exposed to liquefaction potential is reduced substantially, especially in the vicinity of the SAR. The area susceptible to liquefaction is reduced from 5,835 acres under No Project to 1,204 acres under the Project, a reduction of 79 percent (see Table 3.4-1). There are small areas that would experience high groundwater conditions under the Project that would not have high groundwater conditions under No Project conditions. However, none of these areas are located within the Pressure Zone. The only areas of high groundwater remaining would be located immediately adjacent to the channel of the SAR and along the channel of the lower portion of Warm Creek.

The spatial extent of high groundwater conditions shown in Figure 3.4-7 is representative of a single year and the numerical description of the area susceptible to liquefaction in Table 3.4-1 represents the maximum area covered in all 39 years. The year 2022 was chosen as the worst case since it is the year of highest anticipated precipitation during the 39-year modeling period and the year of highest liquefaction potential. Of the two index wells located within the

Pressure Zone for which hydrographs have been developed, neither exhibits significant impacts during the 39-year forecast period. Figure 3.4-6 shows the hydrograph for one of these representative locations, i.e., IW12 (Lower Kelly well). Inspection of this hydrograph shows that at no time are groundwater levels under any Project scenarios simultaneously closer to the ground surface than 50 feet and higher than would be the case under No Project conditions, resulting in no significant impacts.

Table 3.4-1. The Maximum Areal Extent of Potential Liquefaction in the SBBA

Project Scenario	*Extent Within Pressure Zone (acres)*[1]	*Extent Outside Pressure Zone (acres)*
No Project	5,835	25,516
Scenario A	1,204	19,681
Change from No Project	*-4,631*	*-5,835*
(Percent Reduction)	*(79%)*	*(23%)*
Scenario B	1,204	20,067
Change from No Project	*-4,631*	*-5,449*
(Percent Reduction)	*(79%)*	*(21%)*
Scenario C	3,736	22,984
Change from No Project	*-2,099*	*-2,532*
(Percent Reduction)	*(36%)*	*(1%)*
Scenario D	3,797	23,448
Change from No Project	*-2,038*	*-2,068*
(Percent Reduction)	*(35%)*	*(8%)*

[1] The extent of acreage within the Pressure Zone does not include the river channels in this area. If liquefaction were to occur in the river channel, it is unlikely to damage buildings or harm persons, as there are no habitable structures in the river channel.

Figure 3.4-8 further exemplifies Project-related liquefaction impacts in the Pressure Zone of the SBBA. This graph illustrates the relationship between the quantity of water recharged in the Santa Ana River Spreading Grounds and the SAR channel and the spatial extent of high groundwater in the Pressure Zone. A number of scenarios were modeled, including Project Scenarios A, B, C, and D. As the amount of recharge and spreading in the Santa Ana River Spreading Grounds and SAR Channel increases, the percent reduction in the cumulative area susceptible to liquefaction decreases, i.e., the more spreading that takes place in the Santa Ana River Spreading Grounds, the greater the area susceptible to liquefaction in the Pressure Zone. There are other variables that contribute to the liquefaction area, such as spreading in other locations. However, due to the greater hydraulic conductivity of the SAR and Mill Creek, in comparison to the other creeks in the SBBA, almost 50 percent of the surface inflow for the entire SBBA is derived from the SAR and Mill Creek combined (see Table 3.4-2). This accounts for the large influence of recharge on shallow groundwater and associated liquefaction potential in the Pressure Zone. An integral part of the Project is the diversion of water from the SAR and its redistribution to spreading grounds located (for the most part) in the forebay section of the SBBA. Thus, beneficial liquefaction-related impacts would occur under all Project scenarios.

Table 3.4-2. Contribution to Total Surface Inflow to San Bernardino Basin Area (SBBA)

Source of Inflow	*Average Annual Inflow to SBBA (afy)*	*Percent of Total Inflow to SBBA*
Gaged Inflow	**146,600**	**90%**
Lytle Creek	32,900	20%
Lone Pine Creek	9,100	6%
Devil Canyon Creek	2,500	2%
Waterman Creek	2,200	1%
East Twin Creek	3,800	2%
City Creek	6,400	5%
Plunge Creek	6,300	4%
Santa Ana River at Mentone	52,500	32%
Mill Creek at Yucaipa	1,200	17%
San Timoteo Creek	146,600	1%
Mountain Front Runoff	**16,200**	**10%**
Total All Inflow	**162,800**	**100%**

Under all Project scenarios there are more beneficial and less than significant impacts than significant impacts (Table 3.4-3). Significant impacts of potential liquefaction account for 10 percent or less of all impact determinations. Most significant impacts are concentrated in the forebay area (refer to Figures 3.4-9 through 3.4-12). This is due to the artificial recharging of water in the forebay at spreading ground locations. Beneficial impacts for all scenarios range from 44 to 49 percent of all impacts and are concentrated mainly in the Pressure Zone and intermediate areas of the basin. See Table 3.4-3.

Table 3.4-3. Frequency of Liquefaction Impact Determinations

Project Scenario	*% Significant*	*% Less than Significant*	*% Beneficial*
A	10	46	44
B	8	44	48
C	8	43	49
D	9	42	49

Impact GEO-12. *The surface area exposed to liquefaction potential outside the Pressure Zone of the SBBA (including the forebay and the intermediate area), under all Project scenarios, is less than under No Project conditions. This is considered a beneficial impact.*

For those sections of the SBBA located outside the Pressure Zone, implementation of the Project scenarios results in smaller areas subject to high groundwater conditions that under No Project conditions. As can be seen from Figure 3.4-7, there is a net reduction in the area located outside the Pressure Zone of the SBBA exposed to the potential for liquefaction. Much of this reduction is located along the SAR channel. The Project decreases the amount of surface flow in the river channel, thereby affecting the shallow groundwater in the vicinity. Under Project Scenario A, the maximum area exposed to liquefaction potential (i.e., during the wettest year) is reduced from 25,516 acres under No Project conditions to 19,681 acres under the Project, a reduction of 23 percent (see Table 3.4-1). There are areas that would experience high groundwater conditions under the Project that would not have high groundwater conditions under No Project conditions. However, there is a net reduction in the area exposed to liquefaction potential. Therefore, beneficial impacts would occur.

Impact GEO-13. *High groundwater conditions could occur in the vicinity of Devil Canyon, Lytle Creek, and Mill Creek, located in the forebay of the SBBA. This is considered a significant impact.*

The areas affected by high groundwater conditions occur in the vicinity of Devil Canyon, Lytle Creek, and Mill Creek. To illustrate this condition, the hydrograph for the Lytle Basins Spreading Ground is presented as Figure 3.4-13. There are periods when groundwater levels during Project operations are both less than 50 feet from the ground surface and above the levels that would be expected under No Project conditions. The most evident periods are between WY 2017 and WY 2026, and between WY 2032 and WY 2038. Shallow groundwater levels during these time periods could result in liquefaction-induced damage to existing infrastructure and structures during a large earthquake on a nearby or regional fault. This would be a significant impact. Similarly, as shown in the summary of impact determinations in Figures 3.4-9 through 3.4-12, significant impacts would occur in several other areas within the forebay, including in the vicinity of Devil Canyon, Lytle Creek, and Mill Creek.

MITIGATION MEASURES

MM GEO-7: Muni/Western will implement a groundwater level monitoring program using data from Index Wells (see Figure 3.4-5). This information will be used in conjunction with forecasts of groundwater levels derived from the Muni/Western integrated surface and groundwater models to identify trends in groundwater levels and identify changes directly attributable to the Project. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni/Western will direct Project water spreading to limit high groundwater conditions in the vicinity of Devil Canyon, Lytle Creek, Mill Creek, and areas in the forebay and intermediate area of the SBBA.

RESIDUAL IMPACTS

Even with implementation of MM GEO-7, recommending that water supplies be diverted away from liquefaction prone areas, groundwater may still occur within 50 feet of the ground surface for limited periods of time. Therefore, impacts are significant and unavoidable.

Impact GEO-14. *Project-related groundwater levels within the intermediate area of the SBBA would locally rise to within 50 feet of the ground surface, resulting in significant impacts.*

Figure 3.4-14 is a hydrograph of well IW8 located in the intermediate area of the SBBA, between the Pressure Zone and the forebay. As illustrated in this hydrograph, water levels would rise under all Project scenarios, but would predominantly remain at a depth greater than 50 feet below ground surface. Similarly, of the 11 wells modeled within the intermediate area (see Figures 3.4-9 through 3.4-12), projected groundwater levels were within 50 feet of the ground surface only in well IW8, during WY 2019 and WY 2022. Although Project-related groundwater levels would result predominantly in less than significant and beneficial impacts, localized shallow groundwater conditions in WY 2019 and WY 2022 would result in significant impacts.

MITIGATION MEASURES

Mitigation **MM GEO-7** would be applied to reduce liquefaction-related impacts.

RESIDUAL IMPACTS

Even with implementation of MM GEO-7, recommending that water supplies be diverted away from liquefaction prone areas, groundwater may still occur within 50 feet of the ground surface for limited periods of time. Therefore, impacts are significant and unavoidable.

Impact GEO-15. *Subsidence rates in excess of 0.01 ft/yr would occur in the Pressure Zone from WY2010 to WY2017. This is considered a significant impact.*

As seen in Figure 3.4-15, the land surface showed little sign of subsidence as of 1945 at Raub #8 well (located in the Pressure Zone). With the advent of drawdowns, however, through 1969, land subsided 1.3 feet. Under No Project condition, little subsidence occurs until around 2015, at which time a fall occurs (Figure 3.4-15). This fall in ground surface elevation would take place under No Project and Project conditions. Greater subsidence would occur under Project conditions, however. In addition, the rate at which subsidence would occur would exceed the significance criteria of 0.01 ft/yr for the period between WY 2010 and WY 2017. Impacts would be significant.

MM GEO-8: Muni/Western will implement a groundwater level monitoring program using data from Index Wells (see Figure 3.4-5). This information will be used, in conjunction with forecasts of groundwater levels derived from Muni/Western integrated surface and groundwater models, to identify trends in groundwater levels and isolate changes attributable to the Project. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni/Western will direct Project water spreading to limit the potential for subsidence in the Pressure Zone area of the SBBA.

RESIDUAL IMPACTS

Even with implementation of MM GEO-8, recommending that water supplies be diverted toward subsidence prone areas, subsidence may still occur at a rate in excess of the significance criteria of 0.01 ft/yr. Therefore, impacts are significant and unavoidable.

This page intentionally left blank.

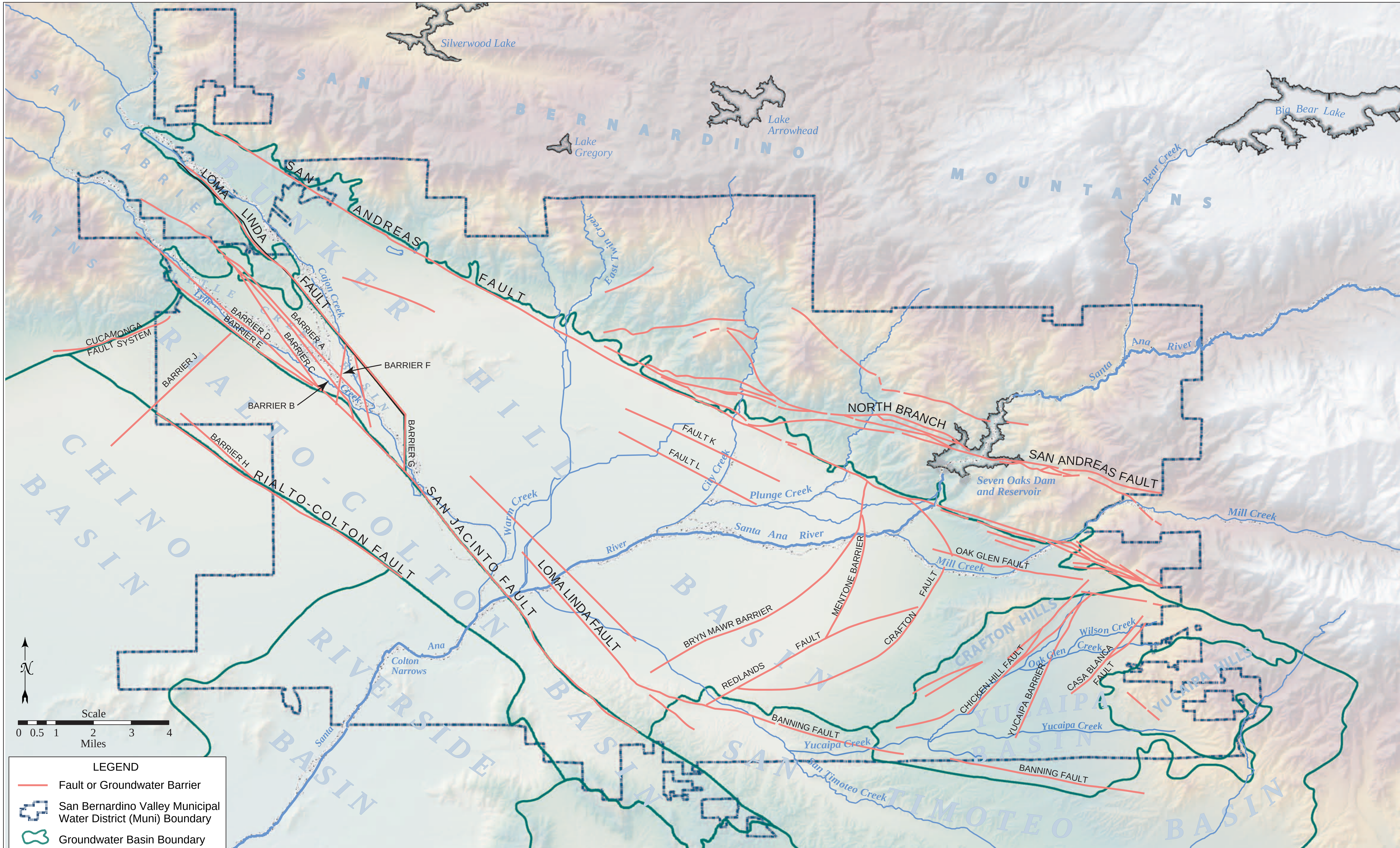


Figure 3.4-1. Faults and Groundwater Barriers in the Vicinity of the San Bernardino Basin Area (SBBA)

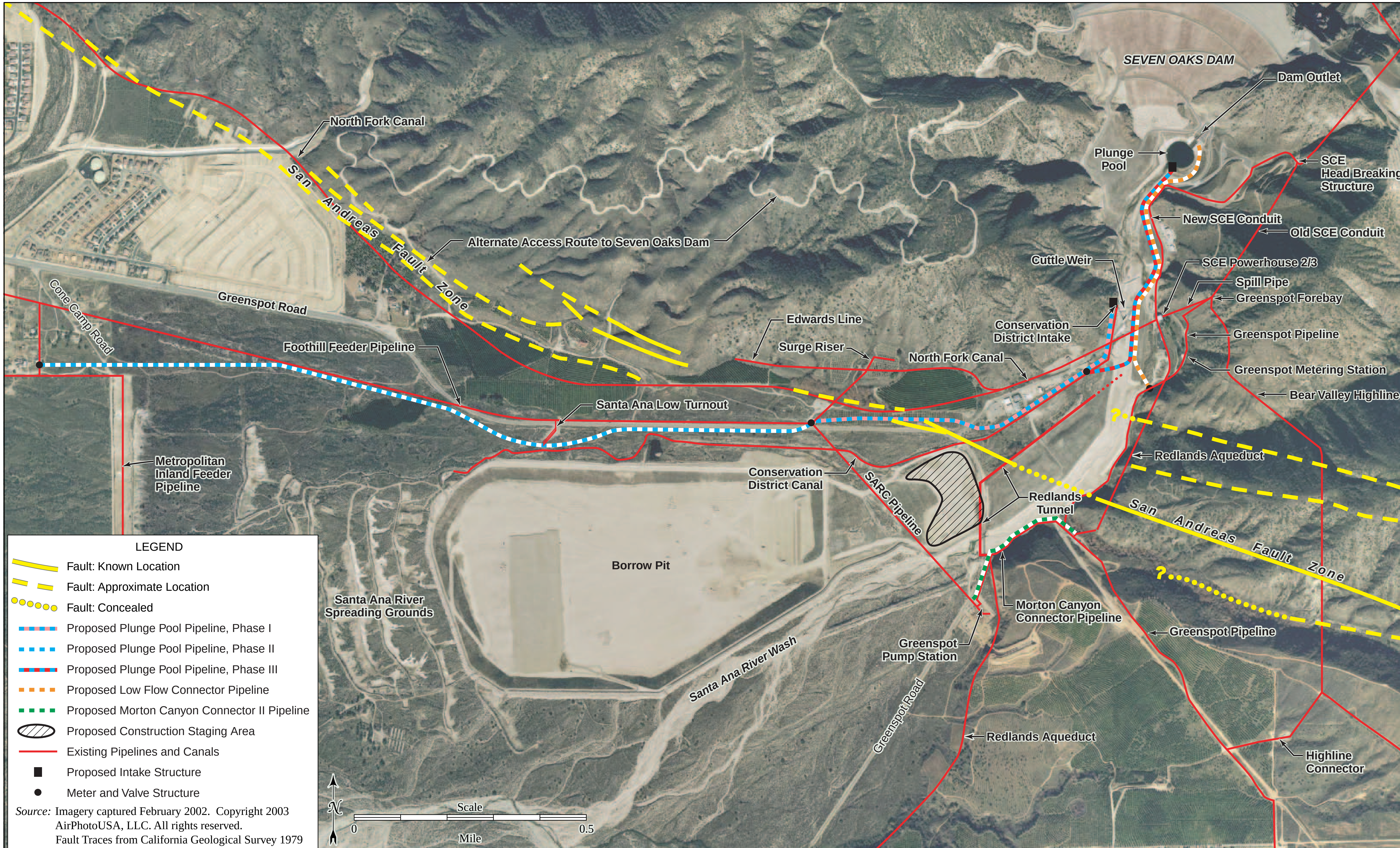


Figure 3.4-2 San Andreas Fault Zone in the Vicinity of the Santa Ana River Construction Area

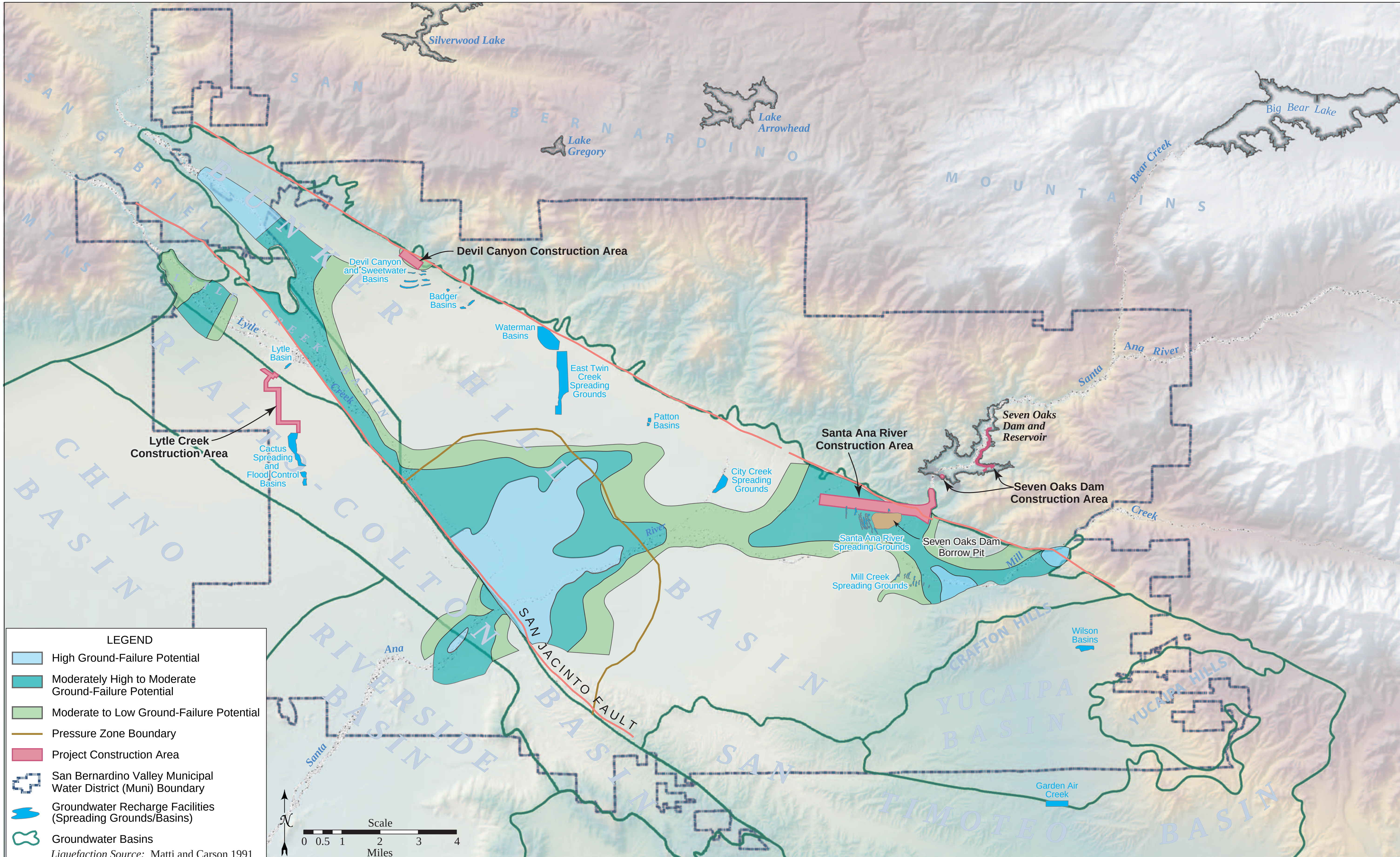


Figure 3.4-3. Liquefaction Potential in the San Bernardino Basin Area (SBBA)

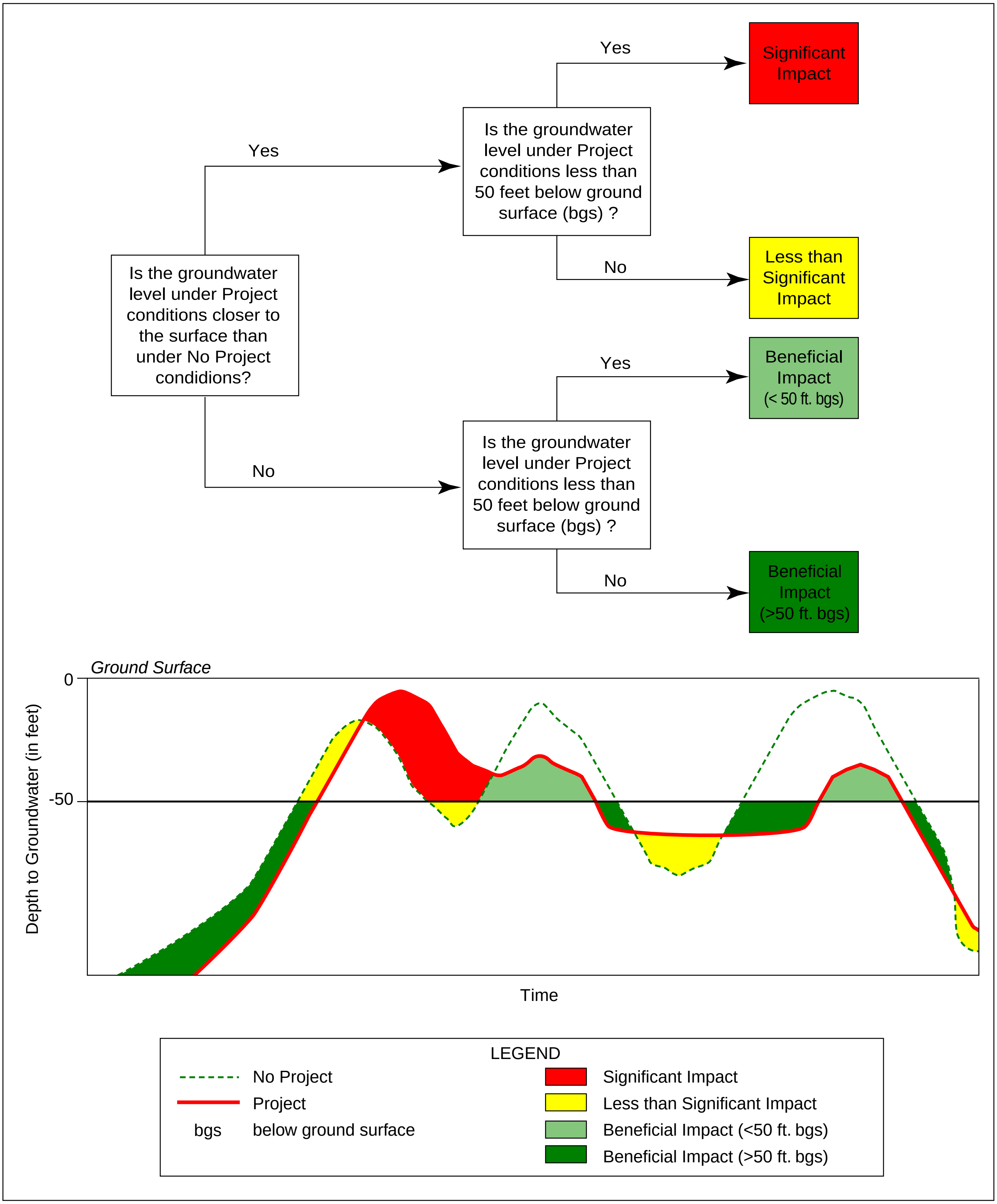


Figure 3.4-4. Groundwater Levels and Liquefaction Impact Determination Methodology

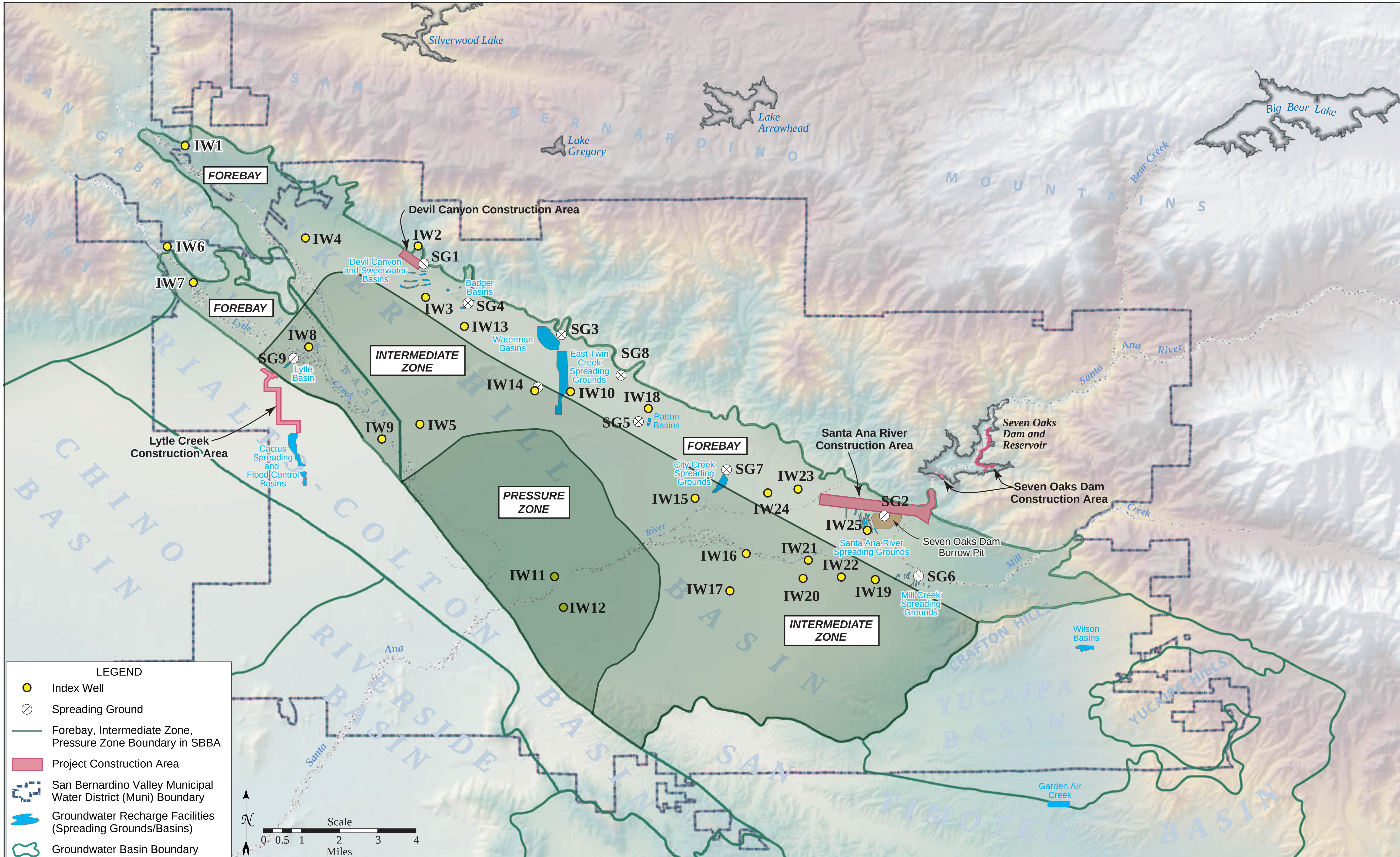


Figure 3.4-5. Location of Index Wells and Spreading Grounds in the San Bernardino Basin Area (SBBA)

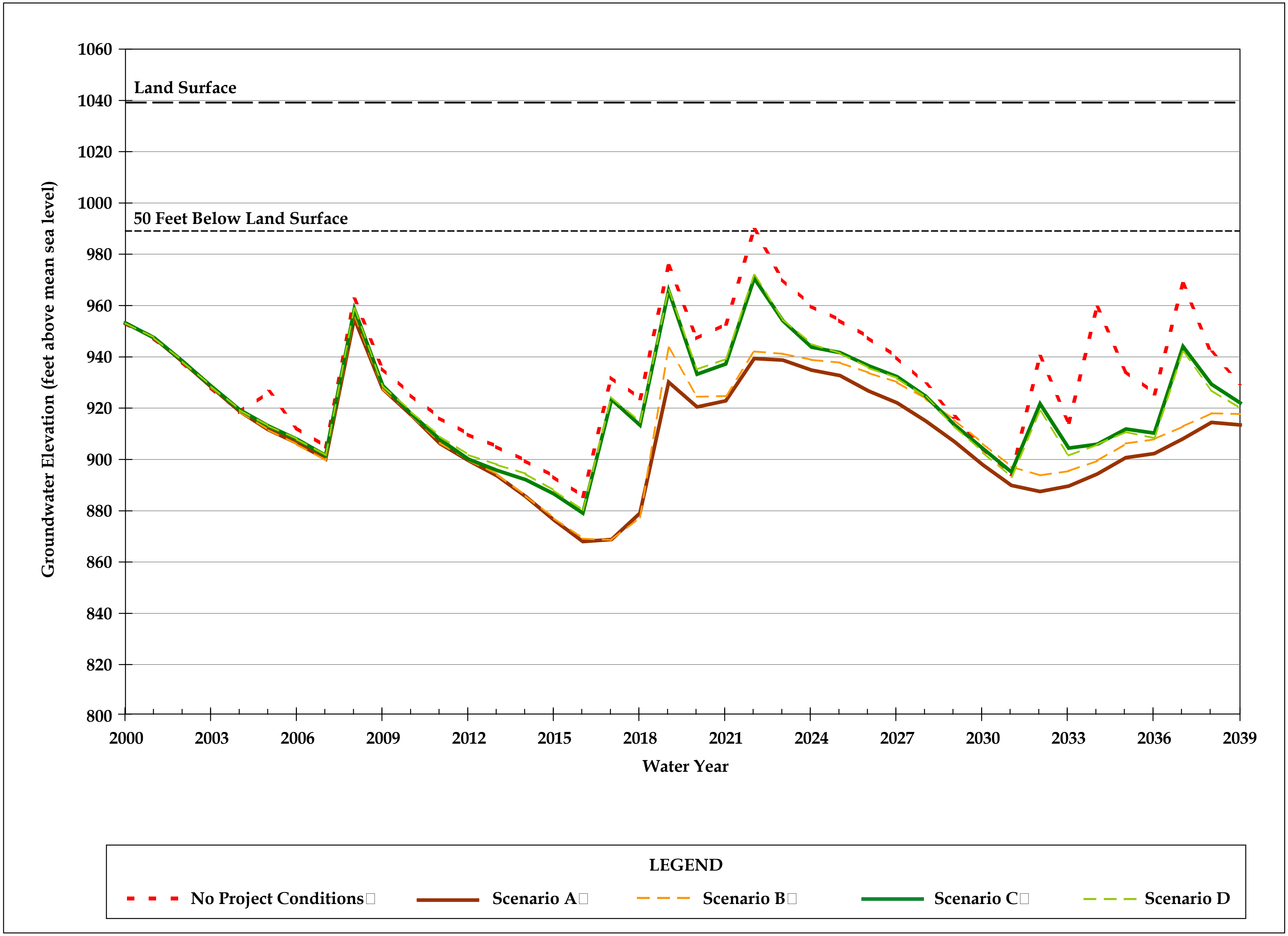


Figure 3.4-6. Hydrograph for Index Well IW12, Lower Kelly

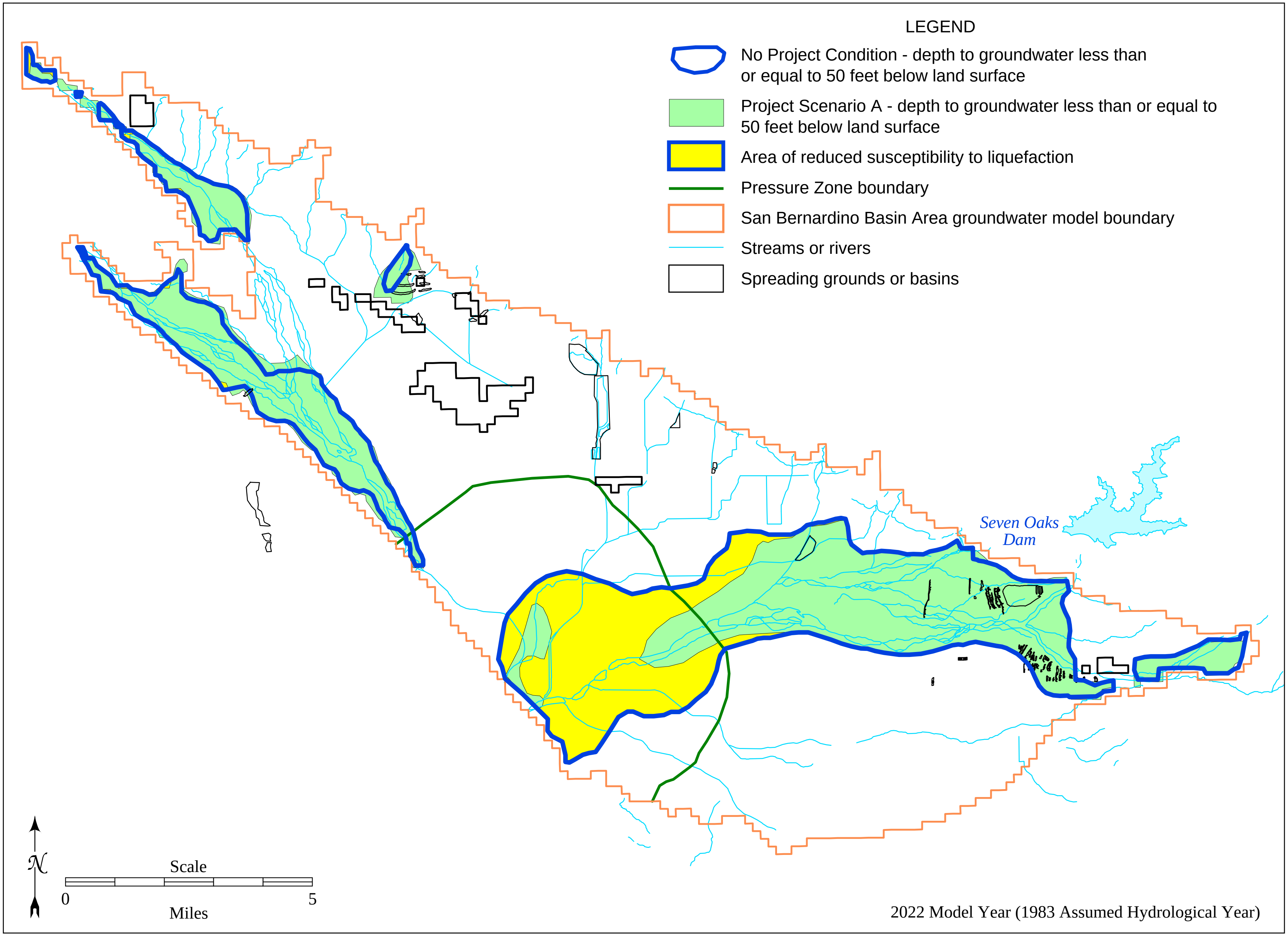


Figure 3.4-7. Projected Area Susceptible to Liquefaction in the SBBA (Scenario A)

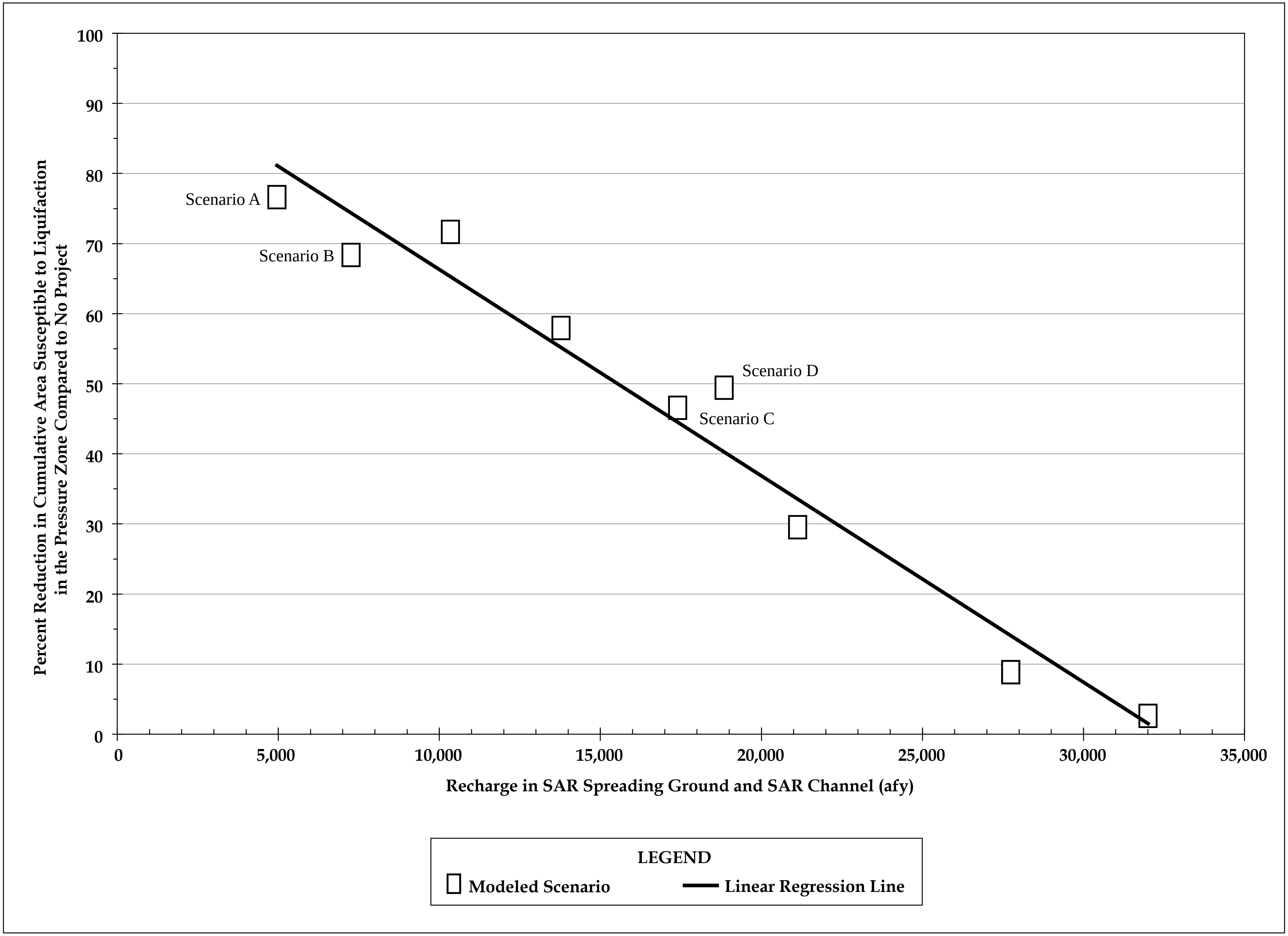


Figure 3.4-8. Relationship between Recharge and Area Susceptible to Liquefaction in the Pressure Zone of the SBBA

Figure 3.4-9. Annual Liquefaction-Related Impacts - Scenario A

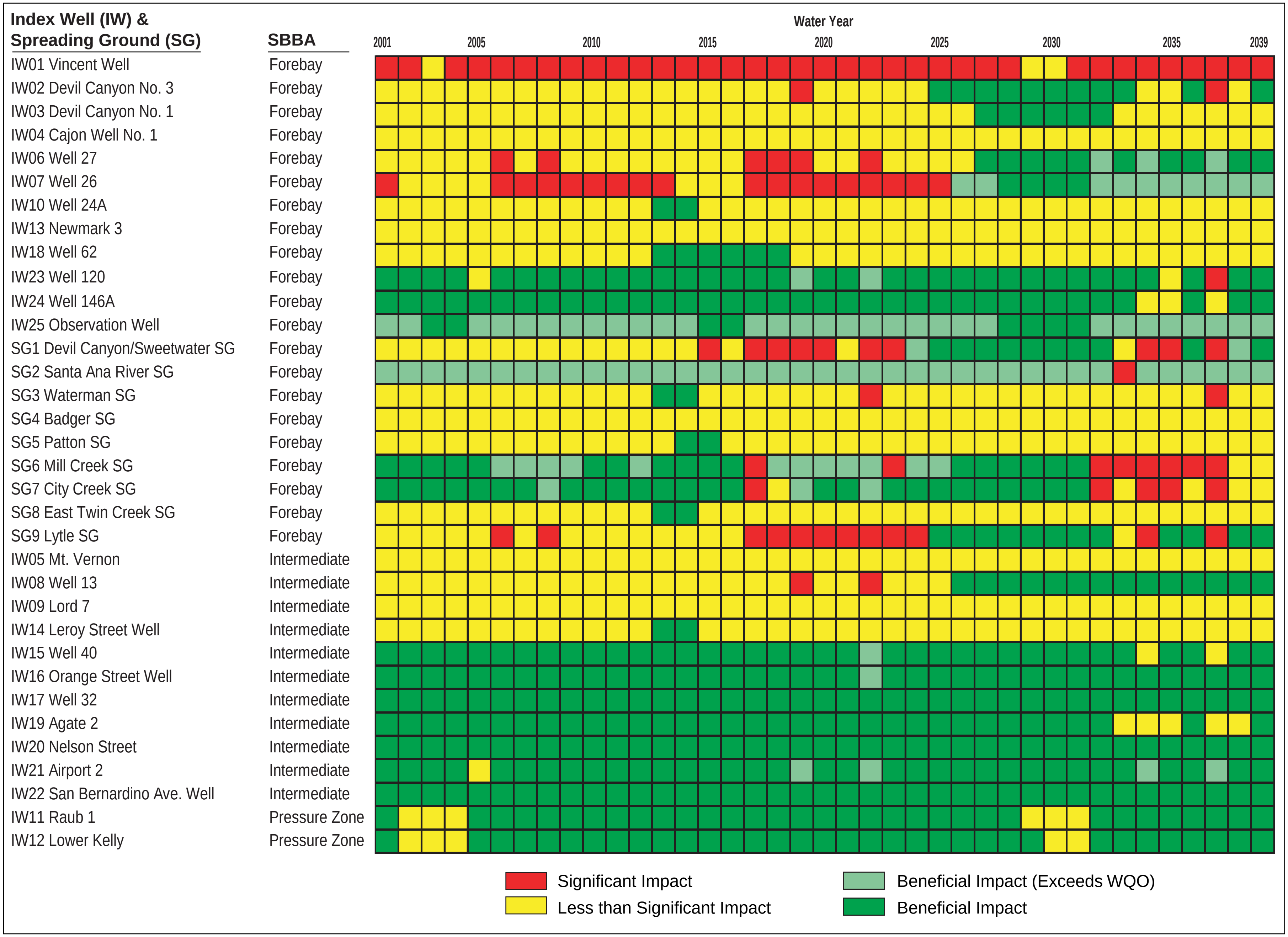


Figure 3.4-10. Annual Liquefaction-Related Impacts - Scenario B

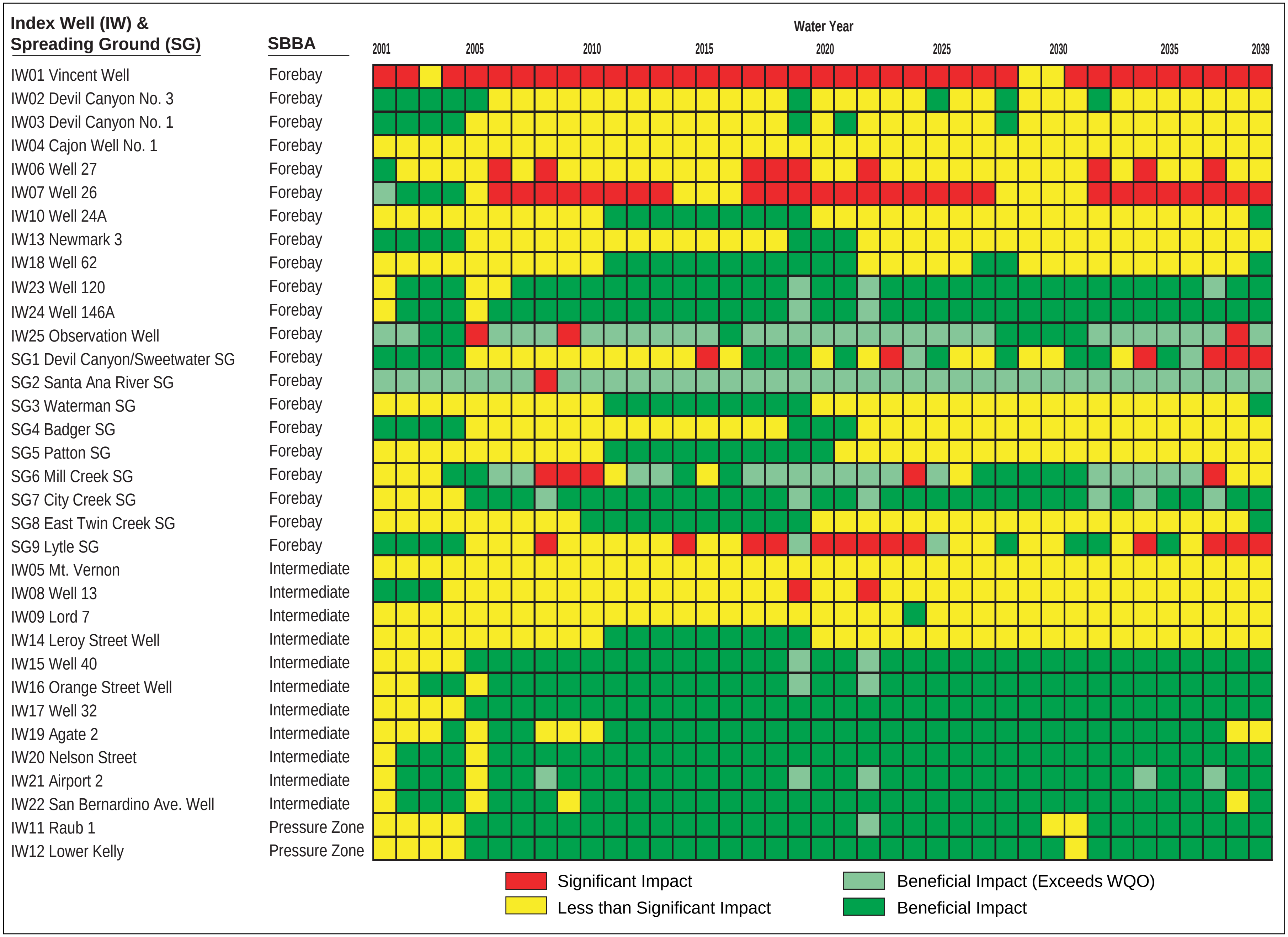


Figure 3.4-11. Annual Liquefaction-Related Impacts - Scenario C

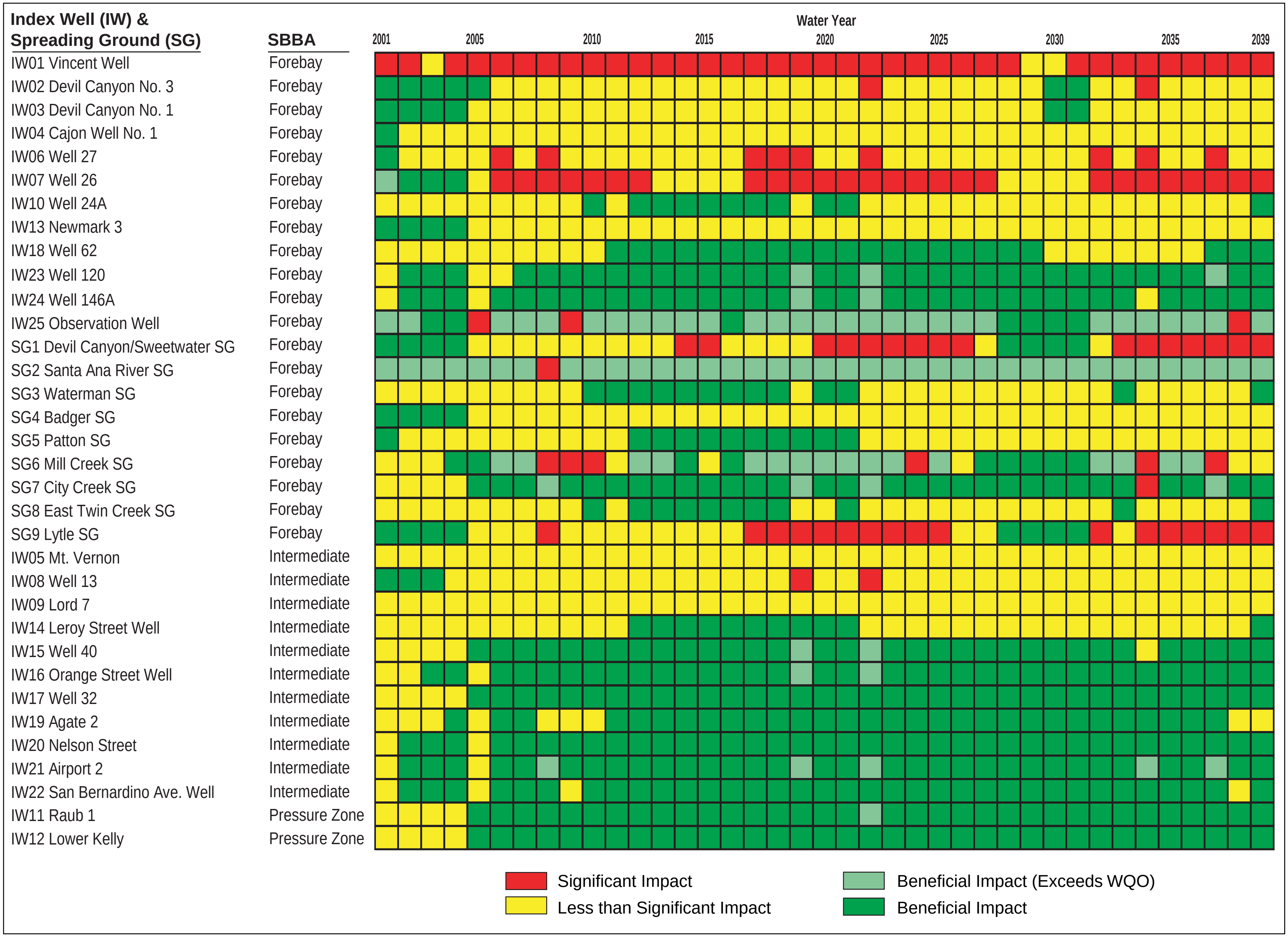


Figure 3.4-12. Annual Liquefaction-Related Impacts - Scenario D

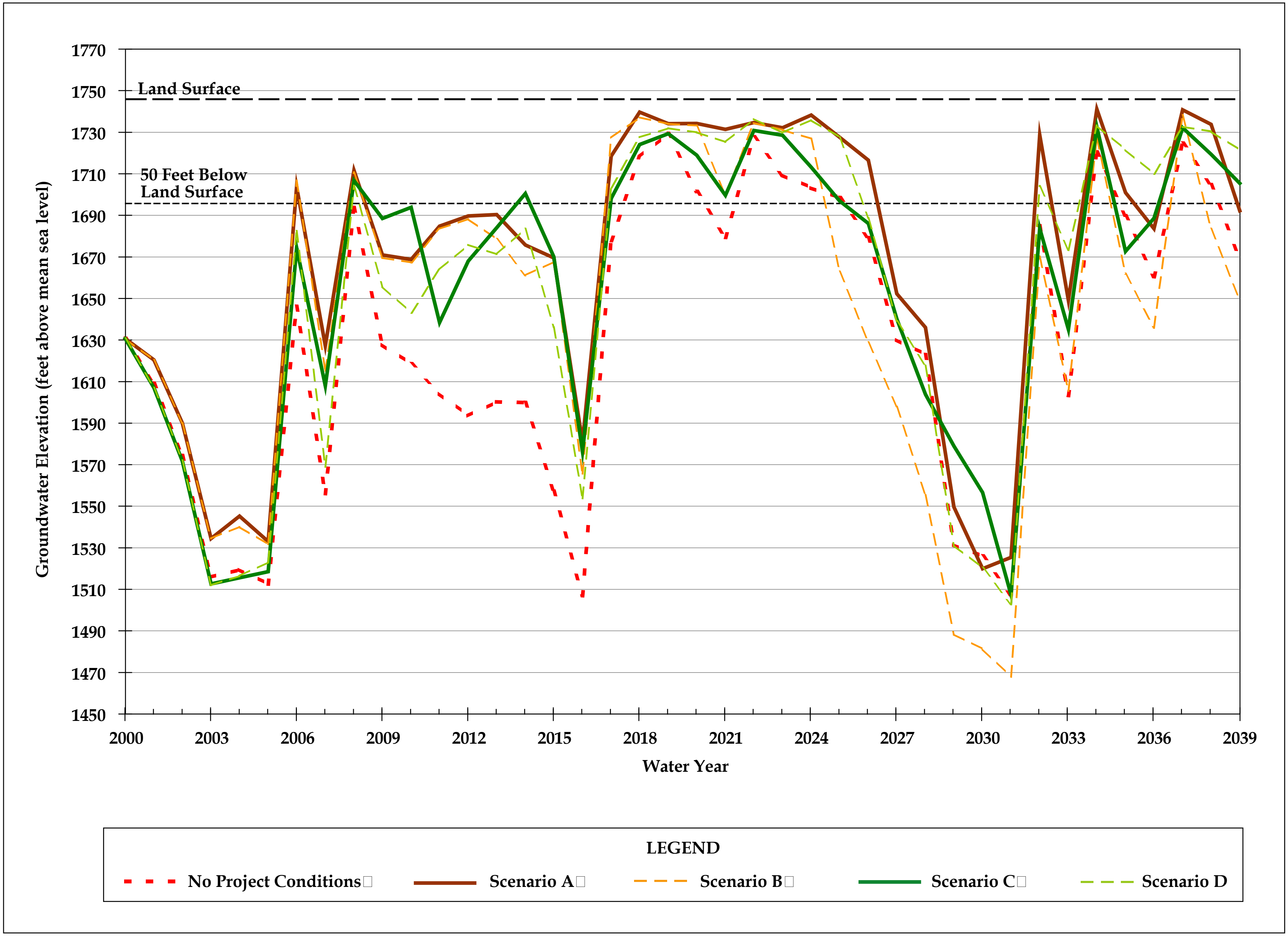


Figure 3.4-13. Hydrograph for SG9, Lytle Basins Spreading Grounds

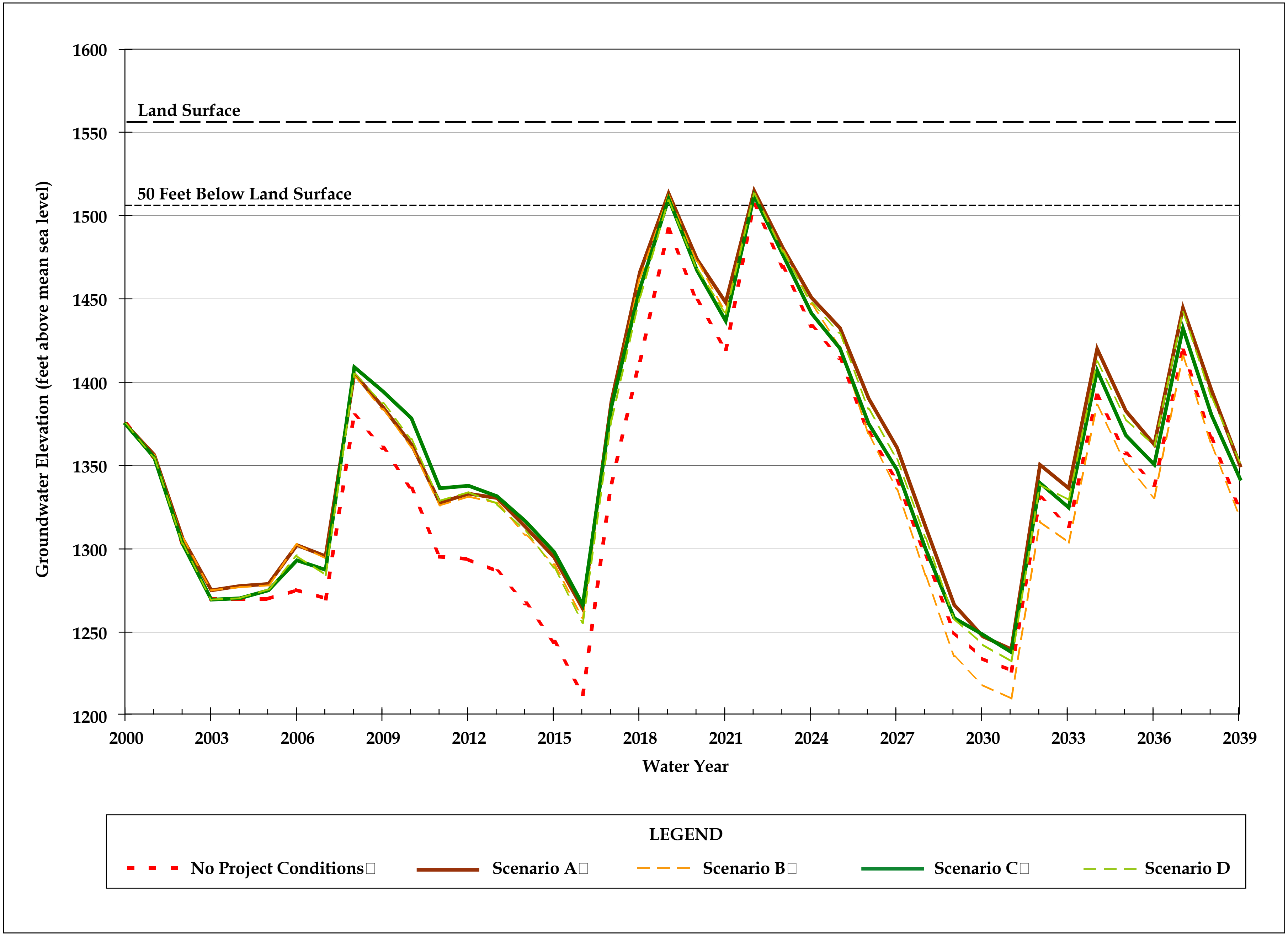


Figure 3.4-14. Hydrograph for IW8, Well B

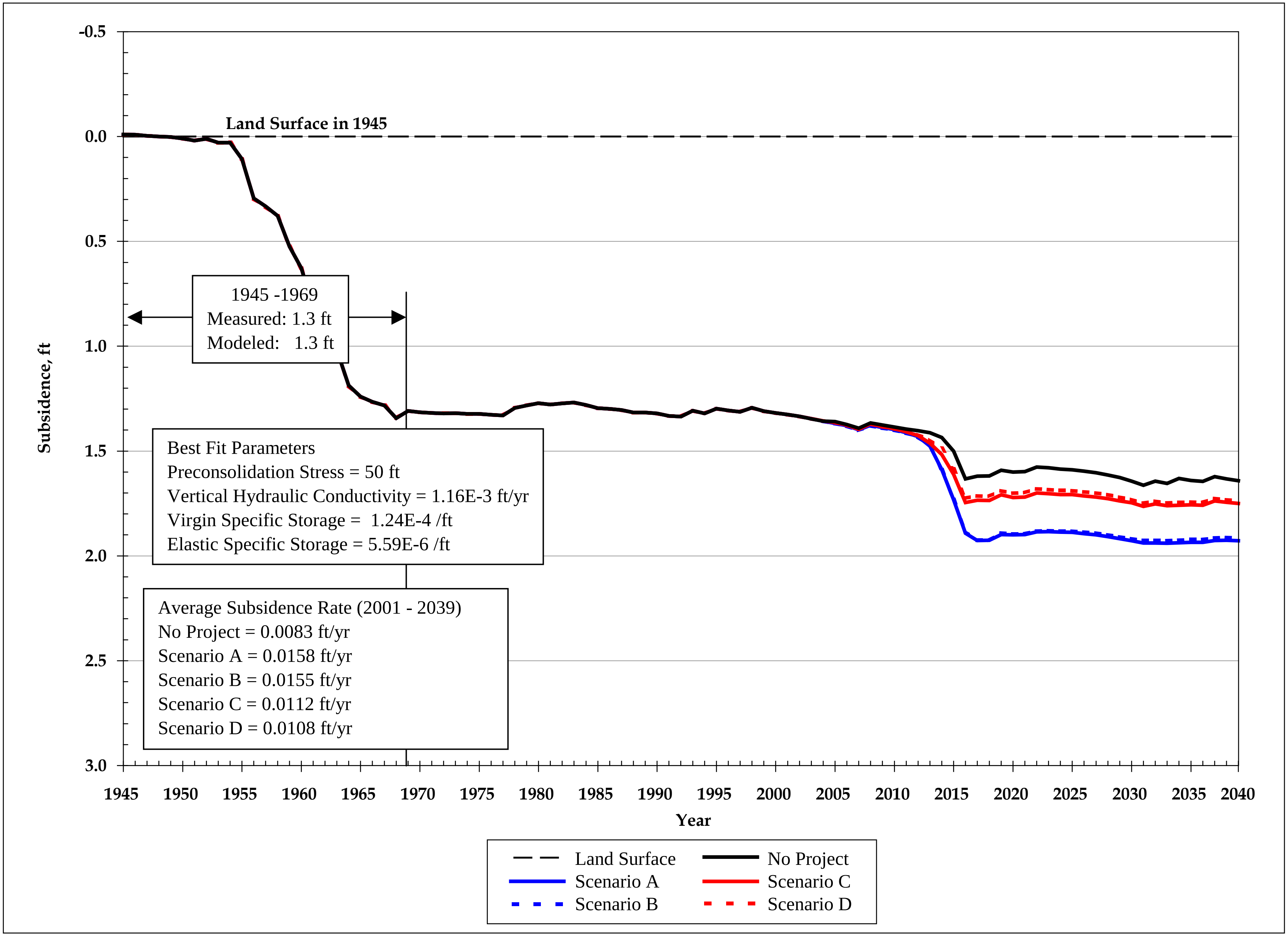


Figure 3.4-15. Model Predicted Subsidence at Raub #8 Well

3.5 LAND USE AND PLANNING

3.5.1 Environmental Setting

Section 15125(d) of the State CEQA Guidelines requires that an EIR discuss any inconsistencies between the proposed project and applicable regional and general plans. General plans adopted by counties and cities include policies that serve as a guideline for their development. The Project's consistency with relevant policies (or portions of policies) of each general plan applicable to construction and operation of water utilities is addressed below under section 3.5.2.5. General plans also identify land use designations for specific sites, which must be consistent with zoning designations. The land use and zoning designations for each site where construction would occur are discussed below in section 3.5.1.2.

3.5.1.1 Regulatory and Institutional Setting

The regional and general plans that are relevant to the Project and that are discussed below include:

- San Bernardino National Forest Land and Resource Management Plan;
- U.S. Bureau of Land Management Area of Critical Environmental Concern;
- U.S. Army Corps of Engineers Woolly-Star Preserve Area;
- Western Riverside County Multi-Species Habitat Conservation Plan;
- County of San Bernardino General Plan and Zoning Ordinance;
- City of Highland General Plan and Zoning Ordinance;
- City of Rialto General Plan and Zoning Ordinance;
- City of San Bernardino General Plan and Zoning Ordinance; and
- California Government Code.

3.5.1.1.1 San Bernardino National Forest Land and Resource Management Plan

The U.S. Forest Service (USFS) has jurisdiction over land uses in the San Bernardino National Forest. The *San Bernardino National Forest Land and Resource Management Plan of 1988* (USDA Forest Service 1988) directs the management of the forest, and its goal is to provide a management program that reflects a mix of activities that allows both the use and protection of forest resources, fulfills legislative requirements, and addresses local, regional, and national issues.

The San Bernardino National Forest is divided into 15 management areas based on (1) combinations of watersheds that have similar characteristics, (2) wilderness areas, and (3) potential wilderness areas. The Seven Oaks Dam and adjacent areas are located in the Central Section of the San Gorgonio District of the Santa Ana Management Area. Much of the area in this District is classified as the Santa Ana Recreation Area, a designation designed to provide continued protection of the recreation values for which it was established.

The management for this area emphasizes (1) fire management, (2) recreation (dispersed recreation opportunities in the lower SAR area), and (3) other integrated activities (including wildlife management and non-motorized recreation).

3.5.1.1.2 U.S. Bureau of Land Management (BLM) Area of Critical Environmental Concern (ACEC)

The BLM designated an Area of Critical Environmental Concern (ACEC) in the SAR in 1994. The purpose of the ACEC designation is to protect and enhance the habitat of federally listed plant species occurring in the area while providing for the administration of valid existing rights (BLM 1996). The species of concern in the SAR area include the Santa Ana River woolly-star, the Slender-horned spineflower, and the San Bernardino kangaroo rat. The BLM manages over 1,100 acres that are part of the ACEC, as shown in Figure 3.5-1. Although the establishment of the ACEC is important in regard to conservation of sensitive habitats and species in this area, the administration of valid existing rights supercedes BLM's conservation abilities in this area. Existing rights include a withdrawal of Federal lands in this area for water conservation through an act of Congress, February 20, 1909 (Pub. L. 248). The entire ACEC is included in this withdrawn land and may be available for water conservation measures, such as the construction of percolation basins, subject to compliance with the Act.

3.5.1.1.3 U.S. Army Corps of Engineers Woolly-Star Preserve Area (WSPA)

To protect significant populations of the Santa Ana River woolly-star (a federally protected plant species), lands within the corridor of the SAR and portions of the alluvial fan terraces were set aside as a conservation area. The WSPA is a 764-acre area located west of the Greenspot Bridge that crosses the SAR (Figure 3.5-1). The WSPA was established as mitigation in the 1990s by the USACE and local sponsors to address impacts related to the construction of Seven Oaks Dam.

3.5.1.1.4 Western Riverside County Multi-Species Habitat Conservation Plan (MSHCP)

The MSHCP is a comprehensive, multi-jurisdictional plan that focuses on the conservation of species and their habitats in western Riverside County. The plan area includes all unincorporated land in Riverside County west of the crest of the San Jacinto Mountains to the Orange County line, as well as the jurisdictional areas of a number of cities. The MSHCP establishes a conservation area of more than 500,000 acres and focuses on the conservation of 146 species.

3.5.1.1.5 County of San Bernardino General Plan and Zoning Ordinance

The land use designation for the Seven Oaks Dam site specifies that the U.S. Forest Service has jurisdiction over the land use in this area (USACE 1997). Both the Plunge Pool Pipeline (Phase III and the northerly portion of Phase II) and the Low Flow Connector Pipeline are located in San Bernardino County, which has designated this area as Resource Conservation in both its zoning ordinance and general plan. Water pipelines are allowed as an "additional use," subject to a Conditional Use Permit (County of San Bernardino Development Code [Section 84.0410]). Muni and Western, however, are public agencies as defined under the California Government Code, so would not be obligated to comply with this permit requirement.

3.5.1.1.6 City of Highland General Plan and Zoning Ordinance

The portion of Phase I of the Plunge Pool Pipeline that is west of the entrance road to the dam and Phase II of this pipeline would be located in an area recently annexed to the City of Highland. The area northwest and northeast of Greenspot Road is designated as Agricultural/Equestrian in both the City of Highland General Plan and Zoning Ordinance, and the area south of Greenspot Road is designated as Open Space in both documents. The Morton Canyon Connector II Pipeline also would be located in the City of Highland in an area designated as Agricultural/Equestrian. The proposed pipelines are permitted uses in these areas (personal communication, B. Meikle 2002).

3.5.1.1.7 City of Rialto General Plan and Zoning Ordinance

The Lower Lytle Creek and Cactus Basins pipelines would be located in the City of Rialto. The area traversed by the pipelines includes the following land use and zoning designations: Low Density Residential, Medium Density Residential, Industrial Park, and Reservoirs/Wells/Energy. Pipelines are allowed in areas with these land use designations subject to engineering permits and review by Public Works staff (personal communication, D. Montag 2002).

3.5.1.1.8 City of San Bernardino General Plan and Zoning Ordinance

The Devil Canyon By-Pass Pipeline would be located in the City of San Bernardino. The pipeline would be located in an area zoned Public Flood Control (PFC) District and designated as such in the City of San Bernardino General Plan. The PFC designation does not expressly allow, or disallow, water transmission pipelines (personal communication, B. Steckler 2002).

3.5.1.1.9 California Government Code

The California Government Code contains statutes addressing the subject of the applicability of local land use controls on public water facilities. Section 53090 defines "local agency" to include an agency of the state (other than the state, cities, counties, rapid transit districts, and rail transit districts) for the local performance of governmental or proprietary functions within limited boundaries. Muni and Western are local agencies under this definition. Government Code Section 53091(d) states that building ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water; and Section 53091(e) states that the zoning ordinances of a county or city do not apply to the same facilities. It is the practice of Muni and Western to voluntarily comply with the standards specified in applicable land use and building code regulations.

3.5.1.2 Project Construction Areas

3.5.1.2.1 Seven Oaks Dam and Reservoir Construction Area

The Seven Oaks Dam and reservoir are located on land owned by the U.S. Forest Service for which the USACE has obtained a permanent easement for flood control operations. This land is not open to the public and is largely surrounded by undeveloped open space within the San Bernardino National Forest. The construction area is largely undeveloped, but a powerhouse operated by SCE, transmission lines, and water conveyance facilities are located along the SAR north of the dam. The Santa Ana Divide Trail is located about 0.5 mile west of the dam.

3.5.1.2.2 Santa Ana River Construction Area

The Low Flow Connector Pipeline and Phase III of the Plunge Pool Pipeline would extend southward from the Seven Oaks Dam plunge pool. Between the dam and the gated entryway to the dam, the pipelines would be placed in a narrow canyon that contains facilities associated with dam operations, gaging stations, a pump house, a power plant, power lines, pipelines, and an unoccupied residential structure. The area north of the entrance gate is not open to the public. The area to the west of the mouth of the canyon is in open space south of Greenspot Road, and agricultural activities occupy land to the north. The Morton Canyon Connector II Pipeline would be located along the edge of the SAR main channel on the east side just north of the Greenspot Bridge. It would parallel the existing Morton Canyon Connector Pipeline. The surrounding area includes agricultural and open space uses.

3.5.1.2.3 Devil Canyon Construction Area

The Devil Canyon By-Pass Pipeline would be located in the City of San Bernardino just south of the SWP Devil Canyon Power Plant and Afterbays. The proposed alignment lies just north of a residential area and west of the campus of California State University San Bernardino. This already heavily disturbed area is owned by the State of California, Department of Water Resources and contains a number of major water pipelines, along with numerous associated surface structures. In addition, there are access roads and staging facilities.

3.5.1.2.4 Lytle Creek Construction Area

The alignment of the Lower Lytle Creek Pipeline is bordered by residential uses west of Linden Avenue and south of Riverside Avenue and by industrial uses to the north and east of Linden Avenue. The Cactus Basins Pipeline would be located in a primarily residential area interspersed with some industrial uses.

3.5.1.3 Project Operations Area

Project operations would primarily involve groundwater recharge in the Muni service area. The service area has a diverse array of land uses, covers approximately 352 square miles, and includes portions of the San Bernardino Valley, the Crafton Hills area, and the Yucaipa Valley. The service area contains numerous cities and communities including San Bernardino, Redlands, Rialto, Colton, Highland, Loma Linda, and Yucaipa. The extent of both the Muni and Western service areas is shown in Figure 2-1.

3.5.2 Impacts and Mitigation Measures

3.5.2.1 Methodology

This section addresses direct land use impacts by assessing potential conflicts of Project-related construction and operations activities with existing and planned land uses. This section also addresses the consistency of the applicable portions of the Project with the plans and policies of the U.S. Forest Service, San Bernardino County, and the cities of Highland, Rialto, and San Bernardino.

A discussion of two proposed (but as yet, not adopted) plans is included for informational purposes: (1) the multi-species habitat management plan (MSHMP) being prepared, as required, under the terms of the Biological Opinion issued by the U.S. Fish and Wildlife Service regarding the operation of Seven Oaks Dam; and (2) the Land Management and Habitat Conservation Plan for the Upper Santa Ana River Wash (Wash Plan). While the Project is not subject to local zoning ordinances, the Project's consistency with these ordinances is addressed in compliance with CEQA requirements. Consistency with the growth management policies of regional and local planning agencies where development could occur as an indirect impact of the Project is addressed in Chapter 4.

3.5.2.2 Significance Criteria

The criteria used to determine the significance of an impact on land use and planning are based on the model initial study checklist in Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would:

- Physically divide an established community;
- Conflict with existing or adjacent land uses;
- Conflict with any applicable land use plan, policy, or regulation of any agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect; or
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

3.5.2.3 Project Construction

Project components would not physically divide an established community. The Project would include use of: Seven Oaks Reservoir that is surrounded by open space within the San Bernardino National Forest; underground pipelines that generally follow existing roads; and above-ground pipelines in an area used solely to access Seven Oaks Dam.

3.5.2.3.1 Seven Oaks Dam and Reservoir Construction Area

The Project would require the realignment of sections of two existing roads and modification of the intake structure tower. These construction activities, however, would not interfere with flood control operations at the dam and would not change the underlying land use of any affected areas. Nor would construction result in conflicts with open space or other land uses in the area since access would not be impeded and no other restrictions would occur. Thus, construction activities would not conflict with the U.S. Forest Service management plan for this area.

3.5.2.3.2 Santa Ana River Construction Area

All of Phase III and the eastern section of Phase I of the Plunge Pool Pipeline and the Low Flow Connector Pipeline would be located adjacent to existing roadways in an area that is inaccessible to the public and that contains facilities associated with dam operations and hydropower production. This is an area designated in the City of Highland General Plan for open space. The Morton Canyon Connector II Pipeline parallels the existing Morton Canyon Connector I Pipeline along a section of Greenspot Road. Construction of these pipelines, which would be placed underground in public areas, would not conflict with existing land uses and they are considered permitted uses in these areas by the County of San Bernardino and the City of Highland, respectively.

3.5.2.3.3 Devil Canyon Construction Area

The Devil Canyon By-Pass Pipeline would be located in a heavily disturbed area that already contains a number of pipelines. Although the proposed pipeline would not be an expressly permitted use under the current zoning, the underground installation of the proposed pipeline would not interfere with flood control uses of this area and would not conflict with existing land uses.

3.5.2.3.4 Lytle Creek Construction Area

The Lower Lytle Creek and Cactus Basins pipelines would be installed underground, follow existing streets, and are permitted uses. They would not conflict with existing land uses.

3.5.2.4 Project Operation and Maintenance

Operation of the Project would not conflict with adopted land use plans and other resource management plans.

Specifically with regard to Seven Oaks Dam and Reservoir, implementation of seasonal water conservation storage would extend, possibly by several months, the length of time water could be stored compared to No Project conditions. The addition of a seasonal water storage function to the reservoir would not adversely impact the flood control functions of the Seven Oaks Dam and reservoir. Access upstream of the dam to hydropower and water conveyance facilities would be maintained and existing transmission lines and water conveyance facilities would not be affected. Additionally, operation of the reservoir for seasonal water conservation storage would not adversely affect the management activities of the U.S. Forest Service or conflict with its management plan.

LU-1. *Increases in groundwater levels, due to Project operations, could conflict with existing land uses and limit future use of property in the Pressure Zone of the SBBA, a less than significant impact.*

The integrated surface water and groundwater models developed for the Project (and described in detail in Appendix A [Surface Water Hydrology] and Appendix B [Groundwater Hydrology]) were used to evaluate changes in groundwater level at a number of index wells and spreading grounds throughout the SBBA, including wells in the Pressure Zone (see section 3.2 for a description of the index wells). Under conditions where groundwater is close to the ground surface, this can have implications regarding the appropriateness of certain land uses in such areas. Based on discussions with local agencies, it was determined that a land use conflict could occur if static water levels at one or more index well(s) in the Pressure Zone increased by an average of more than 10 feet during a repetition of the 39-year base period hydrology when compared to static water levels under No Project conditions.

Based on model results, it is estimated that static groundwater levels at index wells located in the Pressure Zone would not rise, on average over the 39-year forecast period, by more than 10 feet when compared against No Project conditions under any of the Project scenarios. Therefore, this is a less than significant impact and no mitigation is required.

3.5.2.5 Consistency with Adopted Plans and Policies

3.5.2.5.1 Consistency with the San Bernardino County General Plan

The San Bernardino County General Plan contains the following goals applicable to water projects:

- Provide a balanced hydrological system in terms of withdrawal and replenishment of water from groundwater basins.
- Plan and construct new water distribution and treatment systems on the basis of the County's adopted growth forecast.

Muni/Western seek the right to divert from the SAR and put to beneficial use up to a maximum of 200,000 af per year of unappropriated water. The Project will improve reliability of supplies by effective conjunctive use, maximize conservation of local water sources, and reduce dependence on outside water sources. As described in Appendices A and B, the Project has been designed consistent with Muni/Western's obligations to preserve safe yield of the SBBA groundwater basin as defined by the *Western* Judgment. The Project would be consistent with San Bernardino County goals applicable to water projects.

Impact LU-2. *Project construction and operation could be inconsistent with San Bernardino County policies related to maintaining water utilities during seismic events, a significant impact.*

San Bernardino County has the following goals applicable to water utilities:

- Because many structures with important functions and potentially severe consequences of failure do not fall under County control (i.e., dams, utility installations, transportation structures), the County shall encourage utility companies to institute orderly programs of installing cut-off devices on utility lines, starting with the lines that appear to be most vulnerable and those which serve the most people. Adequate emergency water supplies shall be established and maintained in areas dependent upon water lines which cross active fault zones.

MITIGATION MEASURES

MM GEO-5 specifies that "a water flow shut-off valve shall be installed at the Plunge Pool Intake Structure for the purpose of terminating flow following a large earthquake in the vicinity of the site."

RESIDUAL IMPACTS

Adoption of MM GEO-5 would make the Project consistent with the San Bernardino County goals as stated above and reduce the level of impact to less than significant.

3.5.2.5.2 Consistency with the City of Highland General Plan

The City of Highland General Plan contains the following goal applicable to water projects:

- Provide adequate future utility services, including water, for City residents.

The Project would capture and put to beneficial use local water supplies that would otherwise leave the basin during storm flows. The Project would improve reliability of supplies by effective conjunctive use, maximize conservation of local water sources, and reduce dependence on outside water sources. The Project would be consistent with City of Highland General Plan goals applicable to water projects.

3.5.2.5.3 Consistency with the City of Rialto General Plan

The City of Rialto General Plan contains goals related to the use of open space for groundwater recharge and identifies the Cactus Spreading and Flood Control Basins as an important facility that can retain its primary function while also serving other open space objectives. The city considers groundwater aquifers underlying the city as very important for both storage and as a source of potable water to meet the increasing demands of a growing region. Specifically, the City of Rialto General Plan identifies the goal of optimal use of the Cactus Spreading and Flood Control Basins area.

Under the Project, the Cactus Basins Pipeline would convey water to the existing Cactus Spreading and Flood Control Basins, which would be used to recharge water from the SAR. This use would be consistent with the goal identified above.

3.5.2.5.4 Consistency with the City of San Bernardino General Plan

The City of San Bernardino General Plan has multiple policies, goals, and objectives related to creating and maintaining water supply, transmission, distribution, storage, and treatment facilities to support land uses and upgrading existing deficient systems and expanding, where necessary, within the City. It is the City's goal to provide for the construction and maintenance of water supply, transmission, distribution, storage, and treatment facilities to support existing and new development.

The Project would require the installation of new transmission pipelines to enhance the reliability of the water supply for existing and planned land uses and would be consistent with these policies, goals, and objectives.

3.5.2.5.5 Non-Adopted Plans

CEQA requires that EIRs consider consistency between a project and adopted plans. However, the following discussion of two proposed plans (as yet not fully formulated or adopted) in the Project area is provided for informational purposes. A determination of whether the Project would be consistent with these plans is not possible at this time since the plans have not been adopted and may be subject to change.

MULTI-SPECIES HABITAT MANAGEMENT PLAN (MSHMP)

The MSHMP would implement actions called for in the Biological Opinion (BO) issued in December 2002 by the U.S. Fish and Wildlife Service (USFWS) that resulted from Section 7 consultations between the USFWS and the USACE concerning the operation of Seven Oaks Dam.

The BO outlines conservation measures that must be taken to mitigate adverse impacts anticipated to special status species (San Bernardino kangaroo rat, Santa Ana River woolly-star, and Slender-horned spineflower) and attributable to operation of Seven Oaks Dam. These conservation measures were described in detail in the Biological Assessment published in August 2000 and are repeated in the BO. They include development and implementation of an MSHMP; directed studies of population trends and habitat relationships, threats to the species, and life requirements; experimental studies of the effectiveness of different habitat management techniques; implementation of habitat management for the WSPA and on a larger scale over the Santa Ana Wash than covered by the experimental treatments; and expansion of habitat management measures beyond current boundaries, if approved, authorized, and funded. The MSHMP would be implemented within the boundaries of the WSPA, which are shown on Figure 3.5-1.

The Project is not expected to impede implementation of the MSHMP. Since the latter is still in the early planning stages, it would not be affected by short-term construction impacts of the Project. The Project could affect special status species that would be covered by the MSHMP, but not within the confines of the WSPA. Potential impacts to these species are addressed in section 3.3 (Biological Resources).

LAND MANAGEMENT AND HABITAT CONSERVATION PLAN FOR THE UPPER SANTA ANA RIVER WASH (WASH PLAN)

In 1993, representatives of numerous public and private entities representing water, mining, flood control, wildlife, and municipal interests formed a Wash Committee to address local mining and related land use issues in the Santa Ana Wash. The Wash Committee was subsequently expanded to address all the land functions in the Wash Planning Area (WPA). Participants include elected officials from San Bernardino County and the cities of Highland and Redlands, the Conservation District, and BLM. The Wash Committee, in conjunction with the USFWS, CDFG, mining interests, and flood control agencies have proposed a Wash Plan designed to address land use, recreational, mineral resource extraction, and habitat conservation concerns on the alluvial fan and flood plain along the SAR downstream of Seven Oaks Dam. A Draft EIS/EIR is expected in late 2004.

The Wash Plan is intended to coordinate and accommodate existing and future activities anticipated to occur in the Wash Plan Area, such as water conservation, flood control, extraction and processing of aggregate mineral resources, protection and conservation of sensitive and listed native species and habitat, and recreation planning, including a portion of the Santa Ana River Trail system.

It is anticipated that the Project would not impede implementation of the Wash Plan. Since the latter is still in the early planning stages, it would not be affected by short-term construction impacts of the Project. The Project could affect species and habitat that would be addressed by the Plan. Such potential impacts are addressed in section 3.3 (Biological Resources).

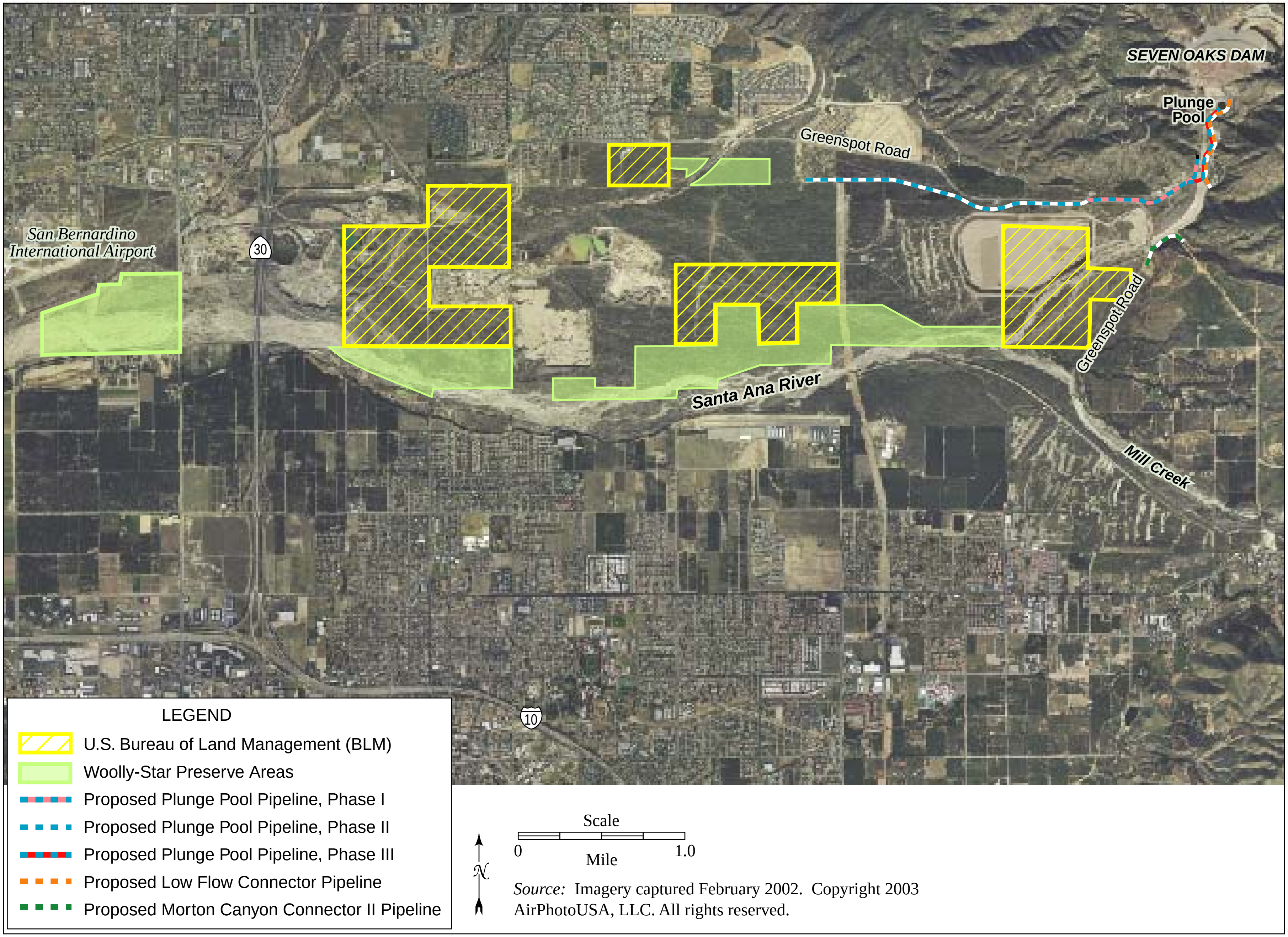


Figure 3.5-1. Santa Ana River Wash: Bureau of Land Management (BLM) Property and Woolly-Star Preserve Area

3.6 AGRICULTURAL RESOURCES

This section addresses impacts associated with the conversion of "Important Farmland" (as defined by and shown on maps prepared by the State of California Farmland Mapping and Monitoring Program) to non-agricultural use as a result of implementation of the Project. The discussion also addresses potential conflicts with land zoning designations and lands subject to Williamson Act contracts.

3.6.1 Environmental Setting

The service areas of Muni/Western are contained within Riverside and San Bernardino counties. In 2000, agricultural land in Riverside County mapped under the Farmland Mapping and Monitoring Program totaled 609,590 acres (California Department of Conservation [CDC] 2004). Of this area in agricultural land use, approximately 80 percent (over 484,000 acres) was classed as Important Farmland. Important Farmland includes the following categories: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance (these categories are defined in Table 3.6-1).

Table 3.6-1. Land Use Categories Used in the Farmland Mapping and Monitoring Program

Land Use Category	*Definition*
Prime Farmland	Farmland with the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.
Farmland of Statewide Importance	Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.
Unique Farmland	Farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the 4 years prior to the mapping date.
Farmland of Local Importance	Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee.
Grazing Land	Land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The minimum mapping unit for Grazing Land is 40 acres.
Urban and Built-up Land	Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.

Table 3.6-1. Land Use Categories Used in the Farmland Mapping and Monitoring Program (continued)

Land Use Category	*Definition*
Other Land	Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines; borrow pits; and water bodies smaller than 40 acres. Vacant and nonagricultural land greater than 40 acres and surrounded on all sides by urban development is mapped as Other Land.
Water	Perennial water bodies of at least 40 acres.
Source: CDC 2003.	

Agricultural land in San Bernardino County totaled 1,001,955 acres with approximately 4 percent (almost 45,000 acres) classed as Important Farmland (CDC 2004). The amount of land in each of the Important Farmland categories in Riverside and San Bernardino counties and within the service areas of Muni/Western is shown in Table 3.6-2.

Table 3.6-2. Important Farmland (acres) in Riverside and San Bernardino Counties, 2000

County	*Prime Farmland [1]*	*Farmland of Statewide Importance [2]*	*Unique Farmland [3]*	*Farmland of Local Importance [4]*	*Important Farmland [1]+[2]+[3]+[4]*
Riverside County	150,984	49,431	40,950	243,456	484,821
San Bernardino County	25,665	10,616	3,644	4,816	44,741
Muni Service Area	6,989	1,292	1,229	2,370	11,880
Western Service Area	11,166	4,605	20,453	27,538	63,762
Source: CDC 2004.					

The amount of Important Farmland is declining throughout California because of conversion to other uses, including in Riverside and San Bernardino counties. In Riverside County, Important Farmland declined by approximately 3 percent from 1998 to 2000 (CDC 2004). In San Bernardino County, Important Farmland declined by approximately 12 percent during the same two-year period (CDC 2004).

Table 3.6-3 shows the changes in amount of Important Farmland in the Muni/Western service areas from 1984 to 2000 while Figure 3.6-1 provides a geographical representation of these changes. As is evident from the information contained in Table 3.6-3, in the Muni service area, land in each of the categories of Important Farmland declined between approximately 20 and 40 percent, while in the Western service area the percent decline ranged from approximately 8 to 54 percent.

Table 3.6-3. Change in Amount of Agricultural Land (acres), 1984 to 2000

Farmland Category	*1984 (acres)*	*2000 (acres)*	*Difference*	
			Number (acres)	*Percent Change (1984-2000)*
MUNI SERVICE AREA				
Farmland of Local Importance	3,974	2,370	-1,604	-40.36%
Prime Farmland	9,368	6,989	-2,379	-25.39%
Farmland of Statewide Importance	2,023	1,292	-731	-36.13%
Unique Farmland	1,533	1,229	-304	-19.83%
WESTERN SERVICE AREA				
Farmland of Local Importance	33,239	27,538	-5,701	-17.15%
Prime Farmland	24,078	11,166	-12,912	-53.63%
Farmland of Statewide Importance	7,174	4,605	-2,569	-35.81%
Unique Farmland	22,157	20,453	-1,704	-7.69%
Source: CDC 2004.				

Under the Williamson Act, local governments may enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. Land held under such contracts is assessed, for property tax purposes, at a reduced rate.

In Riverside County, approximately 65,000 acres of Prime Farmland and 7,000 acres of non-Prime Farmland are enrolled in Williamson Act contracts (CDC 2002). In San Bernardino County, approximately 1,500 acres of Prime Farmland and 4,200 acres of non-Prime Farmland are enrolled in Williamson Act contracts (personal communication, J. Squires 2002). There are no Williamson Act lands that would be affected by the Project (personal communication, J. Squires 2002).

3.6.1.1 Regulatory and Institutional Setting

Individual counties and municipalities regulate agricultural land uses primarily through the adoption of land use plans, policies, and zoning that restrict the location, type, and intensity of land development and use that is allowed. In addition, under the Williamson Act mentioned above, agricultural lands may be protected by local governments.

The CDC has the primary responsibility for statewide regulation and reporting related to agriculture, including Important Farmland. Important Farmlands are afforded special protection due to their importance to agricultural production. Table 3.6-3 contains definitions of land use categories employed by the Farmland Mapping and Monitoring Program. The USDA, Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service [SCS]), has categorized and defined Important Farmlands based on a number of factors, including the physical and chemical characteristics of the soil and the suitability of the land for crop production.

3.6.1.2 Project Construction Areas

3.6.1.2.1 Seven Oaks Dam and Reservoir Construction Area

The Seven Oaks Dam and Reservoir Construction Area contains no designated Important Farmland, as defined by the CDC. The construction area would be within the boundary of the San Bernardino National Forest and, therefore, no agricultural zoning is present.

3.6.1.2.2 Santa Ana River Construction Area

Several areas near the proposed Plunge Pool Pipeline alignment are currently under active agricultural use and support citrus groves. A portion of this construction area is designated as Important Farmland, as shown in Figure 3.6-2. Farmland of Statewide Importance is located along the proposed alignment of the western portion of Phase I of the proposed Plunge Pool Pipeline.

The westernmost half of Phase I of the proposed Plunge Pool Pipeline would be located on land that is zoned Agricultural/Equestrian (A/EQ). The A/EQ zone expressly permits and protects the keeping of large animals and light agricultural activities (City of Highland 1987). The proposed Morton Canyon Connector II Pipeline would also be located primarily within the A/EQ zone with the easternmost section located in the San Bernardino National Forest. The proposed use of the land under the Project would not be incompatible with current zoning (City of Highland 1987; personal communication B. Meikle, 2004).

3.6.1.2.3 Devil Canyon Construction Area

None of the Project facilities in the Devil Canyon Construction Area would be located on Important Farmland. Each of the two potential alignments of the Devil Canyon By-Pass Pipeline would be located primarily on land designated as Urban and Built-Up Land (see Table 3.6-3 for a definition of Urban and Built-Up Land). Approximately 25 feet of the western end of each alignment would be located on land designated as Grazing Land. None of this land is zoned for agricultural use (see section 3.5).

3.6.1.2.4 Lytle Creek Construction Area

None of the Project facilities in the Lytle Creek Construction Area would be located on Important Farmland. The Cactus Basins Pipeline would be located primarily on Urban and Built-Up Land (portions of the southern section along Cedar Avenue, West Casmalia Street, and Spruce Avenue would be on land designated as Other Land). The Lower Lytle Creek Pipeline would be located entirely on Urban and Built-Up Land. None of this land is zoned for agricultural use (City of Rialto 1992a; personal communication D. Montag, 2004).

3.6.1.3 Project Operations Areas

Areas that could be affected by Project operations include those that would require routine and periodic maintenance activities. Agricultural resources would be affected only by Project construction activities and, therefore, Project operations areas are not discussed further.

3.6.2 Impacts and Mitigation Measures

3.6.2.1 Methodology

Impacts on agricultural resources from construction and operation of the Project are based on whether Project-related facilities or activities would significantly impact any agricultural resources.

3.6.2.2 Significance Criteria

The criteria used to determine the significance of impacts on agricultural resources are based on the criteria contained in Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use; or
- Conflict with existing zoning for agricultural use or a Williamson Act contract; or
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Important Farmland to non-agricultural use.

3.6.2.3 Project Construction

3.6.2.3.1 Seven Oaks Dam and Reservoir Construction Area

The Seven Oaks Dam and Reservoir Construction Area does not contain land (a) classified as Important Farmland, (b) under a Williamson Act contract, or (c) zoned for agriculural use. Therefore, there would be no impact to agricultural resources in this construction area. No mitigation is required.

3.6.2.3.2 Santa Ana River Construction Area

There are no Williamson Act contract lands in the construction area. Although a portion of Phase I of the Plunge Pool Pipeline, as well as the Morton Canyon Connector II Pipeline, would be located on land zoned A/EQ, public utilities such as those proposed by the Project are allowed in this designation (personal communication B. Meikle, 2002). Thus, no conflict with agricultural zoning would result from the construction of the Project. Moreover, the Project pipelines would be installed underground and pre-existing surface conditions would be restored, to the extent feasible, upon completion of construction activities.

Impact AG-1. *Construction of the westernmost portion of Phase I of the Plunge Pool Pipeline would result in the temporary conversion of approximately 11 acres of Important Farmland (i.e., Farmland of Statewide Importance) to non-agricultural use. This would be a less than significant impact.*

The westernmost portion of Phase I of the Plunge Pool Pipeline would be located on Farmland of Statewide Importance (see Figure 3.6-2). Approximately 11 acres (comprised of the western portion of Phase I of the Plunge Pool Pipeline (a 300 foot-wide corridor, 0.3 miles long) of Farmland of Statewide Importance would be temporarily converted to non-agricultural use during construction of the pipeline. However, construction would be completed within a 17-month period, the Project pipelines would be installed underground, and pre-existing soils and surface conditions would be restored upon completion of construction activities. Following construction, the agricultural land would be returned to pre-construction condition and farming operations could resume. This impact is considered less than significant and no mitigation is required.

3.6.2.3.3 Devil Canyon Construction Area

The discussion presented in section 3.6.2.3.1 above applies to this construction area and no impact on agricultural resources is anticipated. No mitigation is required.

3.6.2.3.4 Lytle Creek Construction Area

The discussion presented in section 3.6.2.3.1 above applies to this construction area and no impact on agricultural resources is anticipated. No mitigation is required.

3.6.2.4 Project Operation and Maintenance

Project operations such as the diversion and conveyance of water from the SAR and groundwater recharge activites would not impact agricultural resources.

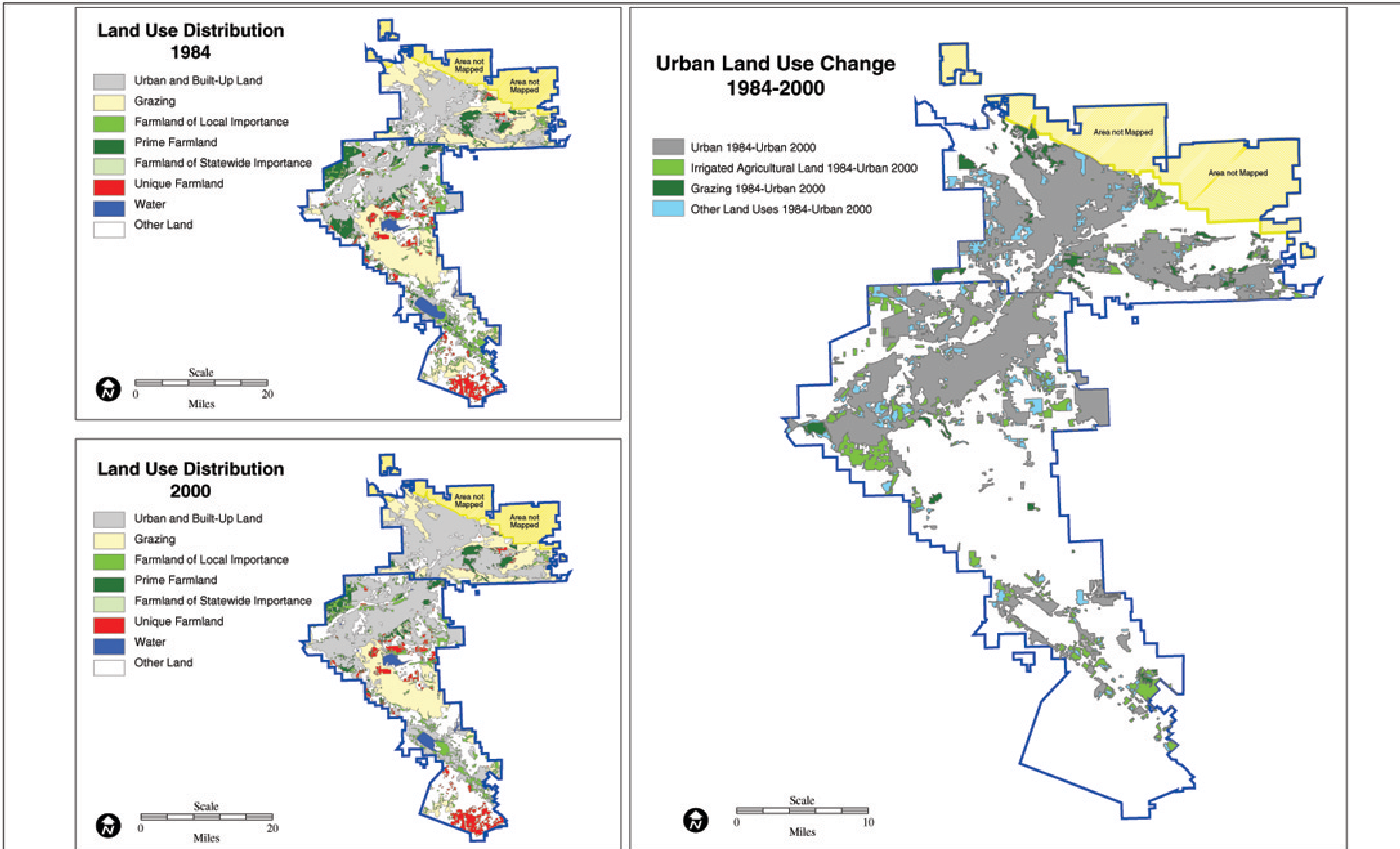


Figure 3.6-1. Land Use Change, 1984-2000 in the Muni/Western Service Area

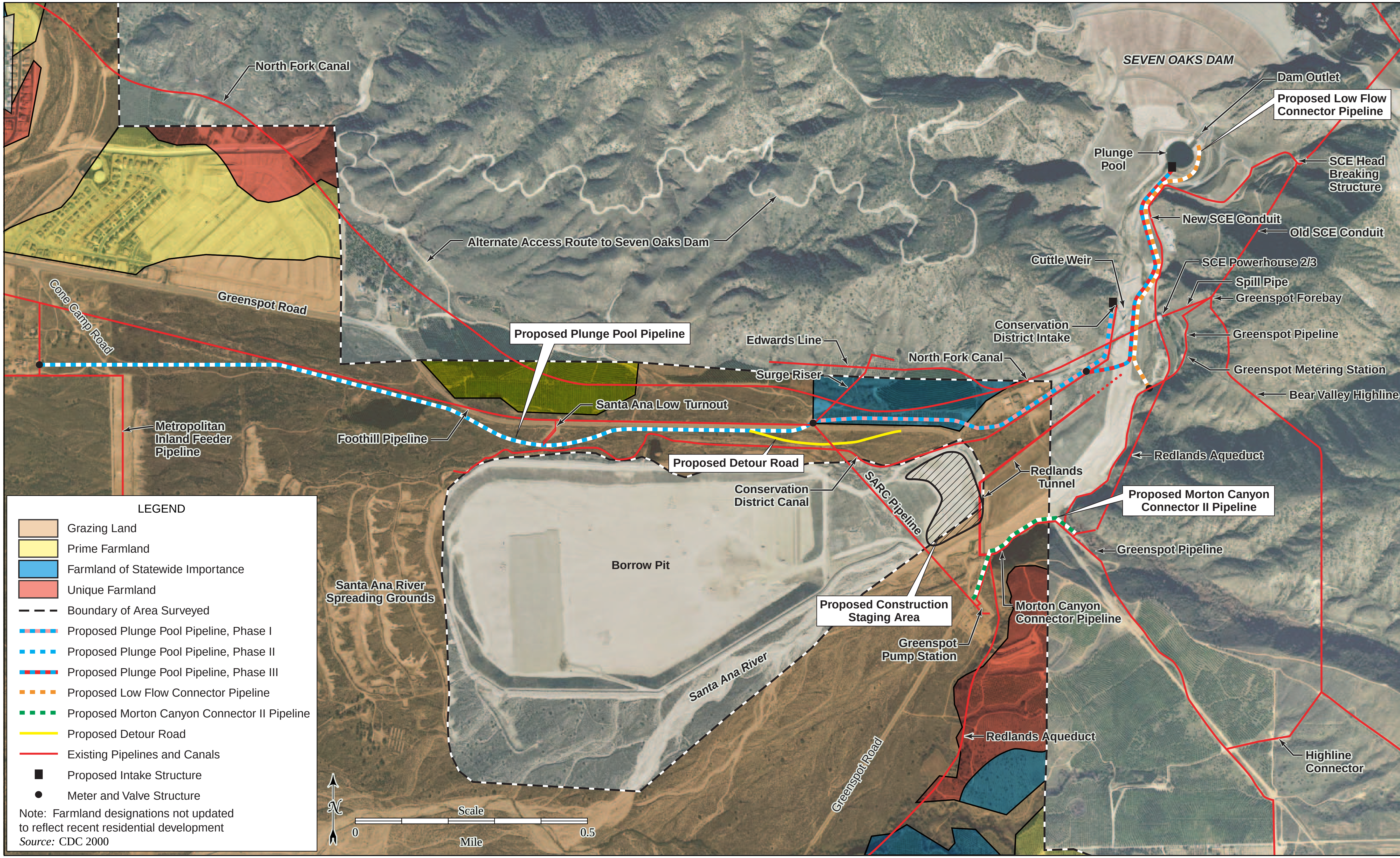


Figure 3.6-2. Distribution of Important Farmland

3.7 RECREATIONAL RESOURCES

Recreational resources refer to neighborhood and regional parks and areas used for recreational activities such as hiking, biking, camping, birding, hunting, horseback riding, hang-gliding, and off-road vehicle use.

3.7.1 Environmental Setting

3.7.1.1 Regulatory and Institutional Setting

Public recreational resources are subject to federal, state, or local management plans, depending on the agency that has jurisdiction over the resource. Such plans designate areas that are to be used for recreational purposes and specify management strategies for those lands. A portion of the San Bernardino National Forest, administered by the U.S. Department of Agriculture Forest Service (USDA Forest Service), is located within the Project area. The *San Bernardino National Forest Land and Resource Management Plan of 1988* (USDA Forest Service, 1988) sets out policies and procedures for management of the forest. The forest is divided into 15 management areas based on (1) combinations of watersheds that have similar characteristics; (2) wilderness areas; and (3) potential wilderness areas. The Seven Oaks Dam is located in the Santa Ana Management Area. This management area is further divided into districts and sections; the dam is in the Central Section of the San Gorgonio District. In this district, much of the area between the San Gorgonio Wilderness to the west and the SAR is classified as the Santa Ana Recreation Area. This designation is to provide continued protection of the recreation values for which it was established. Much of the Central Section is characterized as steep, rugged, and inaccessible terrain predominately covered with hardwood and chaparral.

The management emphasis for this area is (1) fire management; (2) dispersed recreation opportunities in the lower SAR portion of the management area; and (3) other integrated management direction. This latter category includes wildlife management emphasis on habitat enhancement for species within conifer and chaparral; the treatment of chaparral to achieve wildlife management objectives; management activities that emphasize protection of the integrity of significant riparian areas (as well as sensitive plant and wildlife habitat); and emphasis on non-motorized recreation in the area upstream of the Seven Oaks Dam.

3.7.1.2 Project Construction Areas

3.7.1.2.1 Seven Oaks Dam and Reservoir Construction Area

The Seven Oaks Dam and Reservoir were not designed for and are not used for recreational purposes. The San Bernardino National Forest is used for a variety of recreational activities, such as hiking, mountain biking, camping, hunting, exploration, and horseback riding (USACE 1997). Public access to the dam and reservoir area is restricted, however, and no campsites or other developed areas are present in the vicinity. The Santa Ana Divide Trail runs in a northeasterly direction approximately 0.5 mile west of the dam. There are no roads providing direct public access to the areas where construction activities would occur. Access to Seven Oaks Dam and SCE facilities in the canyon is via a guarded road that joins Greenspot

Road just west of the Greenspot Bridge over the SAR. The road providing alternative access to the dam from the west is gated (see Figure 2-4).

3.7.1.2.2 Santa Ana River Construction Area

The Santa Ana River Construction Area is not used for recreational purposes. The area north of the secured entryway to Seven Oaks Dam is not open to the public. The area immediately adjacent to the remainder of the SAR Construction Area contains orchards to the north that are privately owned and an extensive publically owned area to the south that was used as a borrow pit during construction of the Seven Oaks Dam. The most westerly portion of the Plunge Pool Pipeline alignment traverses a section of the alluvial fan of the SAR that is mostly under the control of local and federal public agencies and is not open to the public. There is new residential development occurring in the vicinity of Greenspot Road and Cone Camp Road. The trailhead of the Morton Ridge Trail, which runs in an east-west direction in the San Bernardino National Forest, lies approximately 500 feet east of the easterly end of the proposed Morton Canyon Connector II Pipeline alignment.

3.7.1.2.3 Devil Canyon Construction Area

None of the proposed facilities in the Devil Canyon Construction Area would be constructed on land that is used for recreational purposes. The Devil Canyon Powerplant and Afterbays – facilities of the State Water Project (SWP) that are not open to the public – are located immediately to the north of the Project pipeline. To the south of the Project area are the Devil Canyon and Sweetwater spreadings grounds, facilities also not open to the public. About a mile to the southeast is the campus of California State University San Bernardino (CSUSB) and east of Devil Canyon spreading grounds is a residential area. Located just to the north of CSUSB adjacent to lands of the San Bernardino National Forest is the Andy Jackson Airpark used for hang-gliding and paragliding activities.

3.7.1.2.4 Lytle Creek Construction Area

None of the proposed facilities in the Lytle Creek Construction Area would be constructed on land that is used for recreational purposes. The alignment of the proposed Lower Lytle Creek Pipeline runs along a major urban arterial road with residential development on the south side and aggregate extraction and processing facilities on the north. The Cactus Basins Pipeline traverses a mostly residential area and at one point passes within half a block of the City of Rialto Birdsall Park located on North Linden Avenue. The park contains baseball/softball fields, public picnicking facilities, a children's playground and picnic shelters.

3.7.1.3 Project Operations Areas

The Project has the potential to directly affect the hydrologic regime of the SAR, especially in segments between the plunge pool and the confluence of Mill Creek. The most noticeable effect would be an increase in the number of days in which there would be reduced or no flow in the river channel. The recreational resources for these segments of the SAR are described above in sections 3.7.1.2.1 and 3.7.1.2.2. Indirect impacts from operations are addressed in Chapter 4 (Growth-Inducing Effects and Growth-Related Impacts).

3.7.2 Impacts and Mitigation Measures

3.7.2.1 Methodology

Project components were evaluated to determine the extent to which they could impact existing recreational resources.

3.7.2.2 Significance Criteria

The following criteria used to determine the significance of an impact related to recreation are based on the model initial study checklist contained in Appendix G of the State CEQA Guidelines and modified to address potential project-related impacts. The Project would result in a significant impact if it would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial deterioration of the facility would occur or be accelerated;
- Result in the construction or expansion of recreational facilities that may result in adverse environmental impacts not discussed as part of the project; or
- Cause the direct, substantial physical degradation of either public recreation uses or public recreational facilities, resulting in decreased recreational opportunities.

3.7.2.3 Project Construction

3.7.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Construction activities at the dam (modification of the intake structure and its access road) and in the vicinity of the reservoir (realignment of the road providing upstream access) would not directly affect recreational resources since these areas are not open to the public and are not used for recreational purposes. Nor would these Project-related activities physically affect the Santa Ana Divide Trail, which lies about 0.5 mile west of the dam. Those using the trail could be exposed to noise from construction activities for a period of less than a year. Project-related construction activities in the Seven Oaks Dam and Reservoir Construction Area would not cause direct, substantial physical degradation of public recreational uses or facilities or decrease recreational opportunities. Impacts on recreational resources would be less than significant and no mitigation measures would be required.

3.7.2.3.2 Santa Ana River Construction Area

In the SAR Construction Area, none of the localities that would experience construction activities or be used for construction staging are used for recreational purposes. Thus, no direct impacts to recreation from Project-related construction activities would occur. Morton Ridge Trail, which lies approximately 500 feet east of the easterly end of the Morton Canyon Connector II pipeline, would not be physically disturbed by construction activities, nor would access to the trail be restricted. Those using the western portion of the trail could be exposed to noise from construction activities for a period of up to 2 years during installation of the Low Flow Connector, Morton Canyon Connector II, and Plunge Pool (Phase I) pipelines. As in the case for the Seven Oaks Dam and Reservoir Construction Area, impacts on recreational resources would be less than significant and no mitigation measures would be required.

3.7.2.3.3 Devil Canyon Construction Area

The hang-gliding and paragliding recreational activities near the Devil Canyon Construction Area could experience temporary impacts during construction activities for up to 18 months related to access, noise, and air quality. As in the case of the two previous construction areas, impacts on recreational resources would be less than significant and no mitigation measures would be required.

3.7.2.3.4 Lytle Creek Construction Area

The Lytle Creek Construction Area contains limited recreational facilities that could experience impacts from Project-related construction activities. As with other construction areas, however, impacts on recreational resources would be less than significant and no mitigation measures would be required.

3.7.2.4 Project Operations and Maintenance

The Project would not directly result in increased population or otherwise result in the increased use of parks or recreational facilities. Nor does the Project include recreational facilities or require the construction or expansion of recreational facilities. The use of Seven Oaks Dam and Reservoir for seasonal water conservation storage would not affect recreational activities since (i) any reservoir pool would not carry over from one year to the next; and (ii) the area that would be affected by the inundation is not accessible to the public and is not used for recreational purposes. Conserved water would be present in the reservoir infrequently and then for only about a 3-month period and, thus, conditions would not be suitable for recreational uses. Project maintenance activities would not affect areas used for recreational purposes.

Project-related changes in the hydrologic regime of the SAR, such as a higher frequency of zero-flow and reduced-flow days in selected segments of the river, would not substantially impact recreational uses of the river and its environs.

3.8 AIR QUALITY

3.8.1 Environmental Setting

Air quality at a given location can be described by the concentrations of various pollutants in the atmosphere. Pollutants are classified into two general types: (1) "criteria" pollutants, and (2) toxic compounds. Criteria pollutants are pollutants for which national and state ambient air quality standards have been set. Toxic compounds, known as hazardous air pollutants (HAPs) by the federal government and as toxic air contaminants (TACs) by the State of California, are toxic air pollutants that have been determined to present some level of cancer risk and/or acute and chronic health risks to the general public. Units of concentration for both of these types of pollutants are generally expressed in part per million (ppm) or micrograms per cubic meter ($\mu g/m^3$).

Implementation of the Project would produce air quality impacts primarily from construction activity emission sources. There could be some operational emissions from sources associated with maintenance activities, but these would be negligible and would not produce significant impacts.

Project actions could affect a geographical area that includes portions of San Bernardino and Riverside counties (see Figure 1-1). The potentially affected areas are within the South Coast Air Basin (SCAB). The SCAB is a 6,600-square-mile area encompassing all of Orange County and the non-desert portions of San Bernardino, Los Angeles, and Riverside counties. The SCAB is bounded by the Pacific Ocean to the west and the San Bernardino, San Gabriel, and San Jacinto mountains to the north and east. Because air quality is a regional issue, air quality conditions and applicable air quality standards are described for the entire SCAB. Likewise, the description and assessment of Project impacts from both construction and operations is not discussed for small geographical areas, but for all Project activities regardless of their location.

3.8.1.1 Regulatory and Institutional Setting

Air quality regulations were first initiated with the passage of the Federal Clean Air Act (CAA) of 1969. This act established the National Ambient Air Quality Standards (NAAQS) for "criteria pollutants" and delegated the regulation of air pollution control to the states. The criteria pollutants are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and lead. In states where the NAAQS were exceeded, the CAA required preparation of a State Implementation Plan (SIP), which detailed how states would meet the standards within specified time frames.

In California, the California Air Resources Board (CARB) was designated as the responsible agency for all air quality regulations. CARB in turn delegated this responsibility to the local and regional air quality management districts. The South Coast Air Quality Management District (SCAQMD) has the authority to regulate stationary sources of air pollution in the SCAB. The following is a summary of the federal, state, and local air quality rules and regulations that apply to the Project.

Federal Statutes and Regulations

The Environmental Protection Agency (EPA) designates all areas of the United States as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. The criteria used for nonattainment designations vary by pollutant: (1) an area is in nonattainment for O_3 if its NAAQS has been exceeded more than three discontinuous times in 3 years, and (2) an area is in nonattainment for any other criteria pollutant if its NAAQS has been exceeded more than once per year. With regard to the NAAQS, EPA classifies the SCAB as being in "extreme" nonattainment for O_3 and "serious" nonattainment for CO and PM_{10}. The terms "extreme" and "serious," as defined by the CAA Amendments of 1990, are used to describe the severity of the nonattainment area problem. The nonattainment classifications are, from best to worst, "marginal," "moderate," "serious," "severe," and "extreme." The SCAB is in attainment of the NAAQS for NO_2 and SO_2. The SCAB was historically in nonattainment of the NAAQS for NO_2, however, because national emission standards for new vehicles and a state vehicle emissions testing program have reduced emissions, the region has attained the NO_2 standard since 1991. As a result, the EPA in September 1998 re-designated the SCAB as attainment of the NO_2 NAAQS and the region is now considered a maintenance area for NO_2.

The CAA Amendments of 1990 (1990 CAA) revised the planning provisions for areas that do not meet the NAAQS. The 1990 CAA identified new nonattainment classifications and compliance dates, specific emission reduction goals, requirements to demonstrate reasonable further progress towards attainment, and more stringent sanctions for failure to attain or meet interim milestones. The requirements and compliance dates for reaching attainment are based upon the severity of nonattainment classifications. Because the SCAB was classified by the EPA as an "extreme" O_3 nonattainment area, the SCAQMD was required to design a plan that would bring the region into attainment of the 1-hour O_3 standard by November 15, 2010.

State Regulations

The CAA delegated to each state the authority to establish air quality rules and regulations. The adopted rules and regulations must be at least as restrictive as the federal requirements. In response, CARB established the California Ambient Air Quality Standards (CAAQS), which are more restrictive than the NAAQS, and include the following pollutants for which there are no federal standards: hydrogen sulfide, sulfates, and visibility reducing particles. The CAAQS and NAAQS are presented in Table 3.8-1.

The California Clean Air Act of 1988, as amended in 1992 (CCAA), Health & Safety Code 40918-40920, outlined a program to attain the CAAQS for O_3, NO_2, SO_2, and CO by the earliest practical date. However, areas in nonattainment for PM_{10}, sulfates, lead, hydrogen sulfide, or visibility were not expressly required to develop an attainment plan under the CCAA. Since the CAAQS are more stringent than the NAAQS, attainment of the state standards requires emission reductions beyond what are needed to attain the NAAQS.

CARB designates areas of the state that are in attainment or nonattainment of the CAAQS. An area is in nonattainment for a pollutant if its CAAQS has been exceeded more than once in 3 years. Presently, the SCAB is in extreme nonattainment for O_3, severe nonattainment for CO, and nonattainment for PM_{10}. The SCAB is in attainment of the CAAQS for NO_2 and SO_2.

Table 3.8-1. California and National Ambient Air Quality Standards

Pollutant	*Averaging Time*	*California Standards* [a,c]	*National Standards* [b]	
			Primary [c,d]	*Secondary* [c,e]
Ozone (O_3)	1-hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)	Same as primary
	8-hour	---	0.08 ppm (157 $\mu g/m^3$)	Same as primary
Carbon monoxide (CO)	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	---
	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	---
Nitrogen dioxide (NO_2)	Annual	---	0.053 ppm (100 $\mu g/m^3$)	Same as primary
	1-hour	0.25 ppm (470 $\mu g/m^3$)	---	---
Sulfur dioxide (SO_2)	Annual	---	0.03 ppm (80 $\mu g/m^3$)	---
	24-hour	0.04 ppm (105 $\mu g/m^3$)	0.14 ppm (365 $\mu g/m^3$)	---
	3-hour	---	---	0.5 ppm (1,300 $\mu g/m^3$)
	1-hour	0.25 ppm (655 $\mu g/m^3$)	---	---
Respirable Particulate Matter (PM_{10})	Annual	20 $\mu g/m^3$ [f]	50 $\mu g/m^3$ [g]	Same as primary
	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as primary
Fine Particulate Matter ($PM_{2.5}$)	Annual	12 $\mu g/m^3$ [h]	15 $\mu g/m^3$ [i]	Same as primary
	24-hour	---	65 $\mu g/m^3$ [j]	Same as primary
Lead	30-day	1.5 $\mu g/m^3$	---	---
	Quarterly	---	1.5 $\mu g/m^3$	Same as primary
Hydrogen sulfide	1-hour	0.03 ppm (42 $\mu g/m^3$)	---	---
Sulfates	24-hour	25 $\mu g/m^3$	---	---
Visibility reducing particles [g]	8-hour (10 AM to 6 PM PST)	In sufficient amount to reduce visibility to less than a 10-mile nominal visual range when the relative humidity is less than 70%.	---	---

Table 3.8-1. California and National Ambient Air Quality Standards (continued)

Notes:

a. California standards for O_3, CO, SO_2 (1 hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. The standards for SO_2 (24-hour), sulfates, lead, and hydrogen sulfide are not to be equaled or exceeded.

b. National standards, other than O_3 and those based on annual averages, are not to be exceeded more than once a year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

c. Concentration expressed first in units in which it was promulgated. Equivalent units given in parenthesis are based on a reference temperature of 25 degrees Celsius (^{o} C) and a reference pressure of 760 millimeters (mm) of mercury (1,013.2 millibars). All measurements of air quality are to be corrected to a reference temperature of 25^{o} C and a reference pressure of 760 mm of mercury; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

d. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

e. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

f. Measured as an arithmetic mean. New standard promulgated by CARB on June 20, 2002.
Measured as an arithmetic mean.
New standard promulgated by CARB on June 20, 2002.
Three-year average.
Three-year average of 98th percentile measurements.

g. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

Source: Santa Barbara Air Pollution Control District (APCD) 2002; CARB 2002a.

Similar to the federal system, the CCAA requirements and compliance dates for reaching attainment are based upon the severity of nonattainment classifications.

Local Regulations

The SCAQMD and the Southern California Association of Governments (SCAG) first developed an *Air Quality Management Plan* (*AQMP*) for the SCAB in 1979 to demonstrate attainment of the NAAQS. This plan was approved by EPA and helped to reduce emissions, but the SCAB did not attain the NAAQS. The *1979 AQMP* was revised in 1982, but this plan was unable to show compliance with the O_3 and CO NAAQS and was disapproved by the EPA. Subsequent revisions to the *1982 AQMP* in 1989 demonstrated attainment of all national and state standards by 2007, with the exceptions of the state standards for O_3 and PM_{10}. This plan contained short- and long-term emission control strategies and was partially approved by the EPA as the SCAB portion of the California SIP. Subsequent to the passage of the CCAA by the California Legislature, the SCAQMD and SCAG completed the *1991 AQMP*, which demonstrated attainment of all NAAQS, responded positively to CCAA performance tests, dealt with global climate change, addressed the stratospheric ozone depletion problem, and evaluated air toxic issues. To meet continuing state and federal mandates, SCAQMD and SCAG produced the *1994 AQMP*. This document proposed attainment of all ambient air quality standards by the year 2010, except the state standards for O_3 and PM_{10}. This plan has been approved by the EPA as meeting the goals of the 1990 CAA and was the federally enforced air quality plan in the SCAB until May 2000.

The EPA did not approve the *1997 AQMP*, an update to the *1994 AQMP*, as it did not meet all requirements of the 1990 CAA, including appropriate control measures, adequate demonstration of attainment, and reasonable further progress in emission reductions.

However, the SCAQMD submitted a 1999 amendment to this plan, which the EPA approved in May 2000. This *1999 Revised Ozone Plan* adequately demonstrates attainment of the national O_3 standard by the 2010 deadline by committing to the implementation of additional emission control measures and achievable emission reductions. The 1999 revised O_3 Plan replaced the *1994 AQMP* as the federally enforced air quality plan in the SCAB. The SCAQMD updated the *1999 Revised Ozone Plan* in 2002, but this plan has not yet been federally approved.

SCAQMD Rules and Regulations

The SCAQMD has developed the *SCAQMD Rules and Regulations* to regulate stationary sources of air pollution in the SCAB (SCAQMD 2002). CARB reviews stationary source permit applications in the SCAB to ensure that these rules and regulations are implemented. The Project would comply with all applicable SCAQMD rules and regulations. A summary of the more pertinent SCAQMD rules that could apply to the Project is provided below:

- *Rule 201 – Permit to Construct*. This rule requires anyone that installs equipment that will emit air contaminants to first obtain a Permit to Construct (PTC). For example, diesel-powered stationary equipment associated with pumping would be required to obtain a PTC.
- *Rule 403 – Fugitive Dust*. This rule prohibits emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area, such that the dust remains visible beyond the emission source property line. A person conducting active operations shall utilize one or more of the applicable best available control measures to minimize fugitive dust emissions from each fugitive dust source type. Large operations (in excess of 100 acres of disturbed surface area or any earth-moving operation that exceeds 10,000 cubic yards of earthmoving or throughput three times in a year) shall either implement control measures identified in the rule or obtain an approved fugitive dust emissions plan from the SCAQMD. This rule would apply to fugitive dust generated during large-scale grading or earth-moving activities.

3.8.1.2 Project Construction Areas

The Project construction areas are the areas wherein construction and/or maintenance activities would occur. Air pollutant emissions would be released from the vehicles and equipment used during these activities.

Existing Air Quality

Air quality within the SCAB has improved since the inception of air quality monitoring in 1976. This improvement is mainly due to lower polluting on-road motor vehicles and the implementation of emission reduction strategies by the SCAQMD. This trend toward cleaner air has occurred in spite of continued population growth. While monitors throughout the SCAB exceeded the national 1-hour O_3 standard on 208 days in 1977, the number of exceedance days in 2001 was only 36, which is one of the lowest years on record. However, the number of exceedances in 2001 is still greater than for any other region in the nation.

Ozone is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. These precursors are mainly nitrogen oxides

(NO_x) and volatile reactive organic compounds or gases (ROC or ROG). The maximum effects of precursor emissions on O_3 concentrations usually occur several hours after they are emitted and many miles from the source. Ozone concentrations are highest during the warmer months and coincide with the seasons of maximum solar radiation.

Inert pollutant concentrations (generally, pollutants other than O_3 and its precursors) tend to be the greatest during the winter and are a product of light wind conditions and surface-based temperature inversions. Maximum inert pollutant concentrations are usually found near an emission source. For example, the main sources of CO emissions are motor vehicles and the highest ambient CO concentrations are found near congested transportation arteries and intersections.

Table 3.8-2 presents the maximum pollutant levels monitored at the San Bernardino 4th Street monitoring station during the period 1999-2001 (CARB 2002b). Table 3.8-3 presents the monitoring data from the Rubidoux station for this same period. The data in Tables 3.8-2 and 3.8-3 are representative of conditions in San Bernardino and Riverside counties, respectively.

Table 3.8-2. Maximum Pollutant Concentrations Monitored in San Bernardino County [a]

Pollutant	*Averaging Time (Units)*	*Maximum Concentration by Year*			*Number of Days Federal Standards Exceeded*			*Number of Days State Standards Exceeded*		
		1999	2000	2001	1999	2000	2001	1999	2000	2001
Ozone	8-hour (ppm)	0.132	0.126	0.144	30	23	38	NA	NA	NA
	1-hour (ppm)	0.159	0.149	0.184	14	7	18	45	48	56
Nitrogen Dioxide	Annual (ppm)	0.035	0.032	0.030	0	0	0	NA	NA	NA
	1-hour (ppm)	0.139	0.106	0.114	NA	NA	NA	0	0	0
Carbon Monoxide	8-hour (ppm)	4.11	4.14	3.26	0	0	0	0	0	0
PM_{10}	Annual (µg/m^3)	50	44	45	0	0	0	1	1	1
	24-hour (µg/m3)	134	108	106	0	0	0	33	32	31
$PM_{2.5}$	Annual (µg/m^3)	25.6	25.9	26.1	1	1	1	1	1	1
	24-hour (µg/m3)	121.4	89.8	78.5	4	2	5	NA	NA	NA

Note: NA = Not Applicable.
a. *Source:* CARB 2002b (4th Street monitoring station, City of San Bernardino).

Table 3.8-3. Maximum Pollutant Concentrations Monitored in Riverside County [a]

Pollutant	Averaging Time (Units)	Maximum Concentration by Year			Number of Days Federal Standards Exceeded			Number of Days State Standards Exceeded		
		1999	*2000*	*2001*	*1999*	*2000*	*2001*	*1999*	*2000*	*2001*
Ozone	8-hour (ppm)	0.110	0.112	0.119	22	26	33	NA	NA	NA
	1-hour (ppm)	0.142	0.140	0.143	3	3	7	38	42	41
Nitrogen Dioxide	Annual (ppm)	0.025	0.022	0.024	0	0	0	NA	NA	NA
	1-hour (ppm)	0.132	0.094	0.150	NA	NA	NA	0	0	0
Carbon Monoxide	8-hour (ppm)	4.43	4.15	3.49	0	0	0	0	0	0
PM_{10}	Annual (μg/m^3)	64	54	54	1	1	1	1	1	1
	24-hour (μg/m^3)	153	139	136	1	0	0	46	68	76
$PM_{2.5}$	Annual (μg/m^3)	31.0	28.3	31.0	1	1	1	1	1	1
	24-hour (μg/m^3)	111.2	119.6	98.0	9	11	17	NA	NA	NA

Note: NA = Not Applicable.

a. *Source:* CARB 2002b (Rubidoux monitoring station).

South Coast Air Basin Emissions

Table 3.8-4 summarizes the air emissions that occurred in the SCAB during 2002 (CARB 2004). The 2002 inventory represents the most recent annual emissions inventory available for the SCAB. The SCAB emissions inventory is periodically updated for planning purposes (1) to forecast future emissions inventories, (2) to analyze emission control measures, and (3) for use as input data for regional air quality modeling. Table 3.8-4 shows that the largest contributors to ROG, CO, and NO_x air pollutants in the SCAB are on-road vehicles. On-road motor vehicles account for approximately 42 percent of the ROG, 74 percent of the CO, and 59 percent of the NO_x emitted in the SCAB. Other mobile sources (such as vessels and trains) are the largest source of sulfur oxide (SO_x) emissions, i.e., 48 percent. The largest source of PM_{10} emissions (77 percent) is the miscellaneous processes category that includes sources such as residential fuel combustion, farming operations, construction/demolition activities, and paved road dust.

Climate/Meteorology

The climate of the Project region is classified as Mediterranean, characterized by hot, dry summers and mild, wet winters. The number of days with precipitation in the SCAB varies substantially from year to year, producing a wide range of annual precipitation totals. Storm conditions are usually followed by periods of clear skies, cool temperatures, and gusty southwest to northwest winds as these systems move eastward. The annual precipitation for the general area of San Bernardino and Riverside counties has averaged 16.5 inches over the period 1927 through 2001 (WRCC 2002). About 90 percent of the annual rainfall occurs during the months of November through April, with the highest monthly average of 3.5 inches in February. This wet-dry seasonal pattern is characteristic of most of California. Generally, precipitation is lower along the coastline and increases inland towards higher terrain.

The average high and low temperatures in the San Bernardino/Riverside area in August are 96.5 degrees Fahrenheit (°F) and 60.9 °F, respectively. January average high and low temperatures are 66.1 °F and 39.3 °F (WRCC 2002). Temperatures near the coast are generally less extreme than inland regions, due to the moderating effect of the ocean.

The proximity of the Eastern Pacific High and a thermal low-pressure system in the desert interior to the east produces an onshore airflow from the southwest in the region for most of the year. Sea breezes transport air pollutants from the coast toward the interior regions (i.e., eastward) in the afternoon hours most of the year. Easterly winds (winds from east to west) are attributed to nocturnal and wintertime land breezes. These land breezes may extend many miles offshore during the colder months of the year until daytime heating reverses the flow back onshore. High pollutant impacts can occur during these conditions when land breezes transport onshore emissions over the ocean, then return them back onshore with the onset of the sea breeze to recombine with local emissions.

During the fall and winter months, the Eastern Pacific High can combine with high pressure over the continent to produce light winds and extended inversion conditions in the region. These stagnant atmospheric conditions often result in adverse pollutant concentrations in the SCAB. Excessive build-up of high pressure in the region can produce a “Santa Ana” condition, characterized by warm, dry, northeast winds (i.e., winds from the northeast) in the SCAB and

Table 3.8-4. Estimate of Average Daily Emissions (Tons) by Major Source Category for the South Coast Air Basin – Year 2002

SOURCE CATEGORY	ROG		CO		NO_X		SO_X		PM_{10}	
	Amount	%	*Amount*	%	*Amount*	%	*Amount*	%	*Amount*	%
Stationary Sources										
Fuel Combustion	14.4	1.77	62.5	1.36	95.2	8.75	10.7	16.59	7.6	2.46
Waste Disposal	5.6	0.69	0.8	0.02	1.8	0.17	0.2	0.31	0.4	0.13
Cleaning and Surface Coatings	72.3	8.90	0.2	0.00	0.2	0.02	0.1	0.16	0.2	0.06
Petroleum Production & Marketing	31.7	3.90	9.2	0.20	6.6	0.61	14.5	22.48	1.2	0.39
Industrial Processes	20.7	2.55	5.5	0.12	10.0	0.92	3.2	4.96	6.3	2.04
Total Stationary Sources	144.7	17.81	78.0	1.70	113.7	10.47	28.7	44.50	15.6	5.08
Area-wide Sources										
Solvent Evaporation	161.0	19.82	--	--	--	--	--	--	0.0	0.0
Miscellaneous Processes	24.3	2.99	155.3	3.38	31.5	2.89	0.4	0.62	238.9	77.23
Total Area-wide Sources	185.3	22.81	155.3	3.38	31.5	2.89	0.4	0.62	238.9	77.23
Mobile Sources										
On-Road Vehicles	339.6	41.80	3,407.4	74.08	645.5	59.32	4.6	7.13	18.0	5.81
Other Mobile Sources	139.7	17.19	869.7	18.91	293.3	26.95	30.8	47.75	19.3	6.23
Total Mobile Sources	479.3	58.99	4,277.1	92.99	938.8	86.27	35.4	54.88	37.4	12.04
Natural Sources										
Total Natural Sources	3.1	0.38	89.0	1.94	4.1	0.38	--	--	17.5	5.66
South Coast Air Basin Total	**812.5**	**100.00**	**4,599.4**	**100.00**	**1,088.2**	**100.00**	**64.5**	**100.00**	**309.3**	**100.00**

Source: CARB 2004.

offshore regions. Santa Ana winds often ventilate the SCAB and prevent the build-up of air pollutants.

3.8.1.3 Project Operations Areas

Existing air quality for the Project operations areas would be the same as that described in section 3.8.1.2 for the Project construction areas.

3.8.2 Impacts and Mitigation Measures

3.8.2.1 Methodology

Pollutant emissions from Project-related activities were calculated using the most current emission factors and calculation methods as described below and included in Appendix F. Calculated emissions were then compared to the significance criteria to determine their potential level of impact.

3.8.2.2 Significance Criteria

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. Impact criteria in Appendix G of the State CEQA Guidelines that reflect these standards and regulations have been tailored and augmented to make them directly applicable to the Project. The Project would have a significant impact on air quality if its emissions:

- Conflict with or obstruct implementation of the applicable air quality plans;
- Exceed an ambient air quality standard or substantially contribute to an existing or projected air quality standard violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable national or state ambient air quality standard (including emission increases that exceed SCAQMD emissions significance thresholds as shown in Table 3.8-5);
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors that affect a substantial number of people; or
- Expose the public to substantial concentrations of TACs.

These thresholds would apply to either short-term Project construction or long-term Project operation time frames.

The Initial Study (attached as Appendix D) determined that Project development would not result in the exceedance of the following criteria and therefore these criteria are not discussed further:

- Conflict with or obstruct implementation of the applicable air quality plans.
- Create objectionable odors that affect a substantial number of people.

Table 3.8-5. SCAQMD Emissions Significance Thresholds

Phase/Pollutant	*Daily (pounds)*	*Calendar Quarter (tons)*
CONSTRUCTION		
Carbon Monoxide	550	24.75
Nitrogen Oxides	100	2.50
PM10	150	6.75
Reactive Organic Compounds	75	2.50
Sulfur Oxides	150	6.75
OPERATIONS		
Carbon Monoxide	550	NA
Nitrogen Oxides	55	NA
PM10	150	NA
Reactive Organic Compounds	55	NA
Sulfur Oxides	150	NA
Source: CEQA Air Quality Handbook (SCAQMD 1993).		

3.8.2.3 Project Construction

Air quality impacts during construction would primarily be related to combustive and fugitive dust emissions from mobile and stationary construction equipment and vehicles.

3.8.2.3.1 Seven Oaks Dam and Reservoir, SAR, Devil Canyon, and Lytle Creek Construction Areas

Because the impacts of air emissions are considered on a Basin-wide level, it is not appropriate to examine the four construction areas separately. Instead the air quality analysis considers the impact of total Project emissions occurring in the SCAB at any given time, whether these emissions occur from a single source area or from a combination of source areas.

Impact AQ-1: *Emissions from construction activities would not exceed a criteria pollutant ambient air quality standard for O_3, CO, NO_2, PM_{10}, and $PM_{2.5}$, substantially contribute to an existing or projected air quality standard violation, or expose sensitive receptors to substantial pollutant concentrations. Emissions of these pollutants would be considered to present an adverse, but less than significant impact.*

Construction of Project-related conveyance facilities would produce both combustive emissions (ROC, NO_x, CO, PM_{10}, and $PM_{2.5}$) and fugitive dust emissions (PM_{10}). Due to the mobile nature of most proposed construction emission sources and the short duration of proposed construction activities, Project construction combustion emissions would not produce substantial impacts in a given location. Therefore, combustive emissions from Project construction equipment would not exceed any air quality standard or contribute substantially to an existing or projected air quality standard violation. Because the Project would have to comply with SCAQMD Rule 403, fugitive dust emissions would be controlled and PM_{10} emissions during construction would be minimal outside the construction areas and would not violate any air quality standard or contribute substantially to an existing or projected air quality standard violation. Project construction emissions would result in adverse but less than significant impacts to ambient air quality standards and sensitive receptors. No mitigation is required.

Impact AQ-2: *Emissions from construction activities would exceed the daily and calendar quarter SCAQMD emission significance thresholds for ROC, CO, NO_x, and PM_{10} which is considered a significant impact.*

Project construction activities would involve the use of numerous types of heavy-duty equipment and trucks that would produce emissions of nonattainment pollutants, including ROC, CO, NO_x, PM_{10}, and $PM_{2.5}$ (due to fuel combustion and fugitive dust). Table 3.8-6 presents estimates of the emissions that would occur from these proposed construction activities. Project-related emissions of ROC, CO, NO_x, and PM_{10} would exceed the daily SCAQMD thresholds. The SCAQMD calendar quarter thresholds for ROC, NO_x, and CO would also be exceeded. The impact would be significant.

MITIGATION MEASURES

Because Project emissions of ROC, CO, NO_x, and PM_{10} would exceed the SCAQMD thresholds (Impact AQ-2), the following mitigation measures would be implemented:

MM AQ-1: Muni/Western will encourage the contractor to use emulsified diesel fuel in construction equipment, where feasible. Use of this alternative diesel fuel would reduce NO_x and PM emissions by 14 and 62.9 percent, respectively, from conventional diesel (CARB 2001).

MM AQ-2: Muni/Western will encourage the contractor to use the newest diesel-powered equipment available.

RESIDUAL IMPACT

Table 3.8-6 shows that the use of emulsified diesel fuel in all proposed construction equipment (MM AQ-1) would result in maximum daily emissions of ROC, CO, NO_x and PM_{10} of 296.1, 1,937.9, 2,364.0, and 58.4 pounds, respectively. Use of emulsified diesel fuel would result in maximum calendar quarter emissions of ROC, CO, NO_x, and PM_{10} of 9.6, 61.7, 75.7, and 1.8 tons, respectively. This measure would reduce PM_{10} emissions from construction to below the SCAQMD significance thresholds (see Table 3.8-6), but significant unavoidable impacts related to ROC, CO, and NO_x emissions would still occur.

This analysis does not provide a quantification of the effectiveness of MM AQ-2. However, use of year 1995-manufactured equipment or newer would result in substantially lower NO_x emissions, compared to the year 1987-manufactured equipment used in the analysis here.

Impact AQ-3: *Construction of the conveyance facilities would expose the public to some concentrations of TACs. The impact would be considered adverse, but less than significant.*

Table 3.8-6. Emissions Associated with Project-Related Construction Activity [a]

Construction Area	DAILY EMISSIONS (POUNDS)			
	ROC	*CO*	*NOx*	*PM10*
Seven Oaks Dam and Reservoir Area				
Dam and Access Roads	39.7	222.8	386.4	21.4
SAR Area				
Plunge Pool Pipeline – Phase I	66.9	441.6	586.0	33.4
Plunge Pool Pipeline – Phase II	67.4	450.6	588.7	33.5
Low Flow Connector (LFC) – Suspended	32.9	224.1	316.6	16.9
LFC and Plunge Pool Pipeline – Phase III	56.7	319.8	541.9	30.4
Plunge Pool Pipeline Intake Structure	11.9	78.4	110.9	6.0
Morton Canyon Connector II	32.1	216.1	310.2	16.6
Devil Canyon Area				
Devil Canyon By-Pass	21.5	150.3	203.8	10.9
Lytle Creek Area				
Lower Lytle Creek Pipeline	37.3	262.6	351.0	18.8
Cactus Basins Pipeline	51.3	331.7	504.5	27.02
Maximum Daily Emissions (Pounds/Day) [b]	296.1	1,937.9	2,731.3	150.9
Mitigated Daily Emissions (Pounds/Day) [c]	296.1	1,937.9	2,364.0	58.4
SCAQMD Daily Thresholds (Pounds/Day)	75	550	100	150
Impact	Significant	Significant	Significant	Significant
Maximum Calendar Quarterly Emissions (Tons) [d]	9.6	61.7	87.8	4.9
Mitigated Calendar Quarterly Emissions (Tons) [c]	9.6	61.7	75.7	1.8
SCAQMD Calendar Quarterly Thresholds (Tons)	2.5	24.75	2.5	6.75
Impact	Significant	Significant	Significant	Less than Significant

Notes:

a. Details of emission calculations are provided in Appendix F.

b. Maximum daily emissions occur in Spring of construction year 1 during concurrent construction of Intake Tower Access Road, Plunge Pool Pipeline – Phase 1, Plunge Pool Pipeline – Phase 2, Plunge Pool Pipeline Intake Structure, Devil Canyon By-Pass, Lower Lytle Creek Pipeline, and Cactus Basins Pipeline.

c. Mitigation measures include the use of alternative diesel fuel.

d. Maximum quarterly emissions occur in Spring of construction year 1 during concurrent construction of Intake Tower Access Road, Plunge Pool Pipeline – Phase 1, Plunge Pool Pipeline – Phase 2, Plunge Pool Pipeline Intake Structure, Devil Canyon By-Pass (1 month only), Lower Lytle Creek Pipeline (2 months only), and Cactus Basins Pipeline.

Project construction equipment would emit TACs in the form of particulate emissions from diesel-powered on- and off-road equipment. However, the TACs emitted from this equipment would not produce substantial health impacts at a given location due to the mobile nature of the sources and the short duration of proposed construction activities. Project construction emissions of TACs would produce less than significant impacts to public health. No mitigation is required.

3.8.2.4 Project Operation and Maintenance

Operational air quality emissions associated with the Project would be limited to equipment and vehicles used during routine and periodic maintenance activity on the pipelines. These sources and the duration of maintenance activities would be intermittent and minor in nature. Emissions from these sources would be negligible and would therefore cause less than significant impacts. No mitigation is required.

3.9 CULTURAL AND PALEONTOLOGICAL RESOURCES

Cultural resources include prehistoric and historic archaeological sites, districts, and objects; standing historic structures, buildings, districts, and objects; and locations of important historic events, or sites of traditional/cultural importance, as defined in the State CEQA Guidelines Section 15064.5. The analysis of cultural resources, including prehistoric and historic sites, provides information about the cultural heritage of both local and regional populations. Prehistoric sites range from small specific-activity areas like stone tool manufacturing stations or acorn processing sites that can be found in remote mountainous areas, to the remains of large village sites normally found along major drainages where fresh water would be easily accessible. Cultural resources from the historic period include individual structures such as irrigation ditches and bridges, as well as large historic districts that contain multiple architectural features.

Paleontologic resources are the recognizable remains of once-living, non-human organisms. Identified as fossils, these resources represent a record of the history of life on the planet dating as far back as approximately 4 billion years. Paleontologic resources can include shells, bones, leaves, trails, and other fossilized floral or faunal materials. These resources provide valuable information on evolution, climatology, and taxonomy and can provide information for measuring time in earth history as well as for understanding ancient environments and geographies.

3.9.1 Environmental Setting

Prehistoric Background. The most reliable evidence of initial human occupation of California puts the date at about 12,000 years ago. The first inhabitants focused on hunting large Pleistocene mammals, the largest of which became extinct by about 10,000 years ago. Subsequently, human behavior changed in response to modification of the natural environment. For southern California, this period is represented by the San Dieguito complex and is associated mainly with hunter-gatherer flaked stone tools, such as scrapers, choppers, and large projectile points. The Millingstone Horizon (or La Jolla complex on the coast) dates from between approximately 7,500-3,000 years ago, as the climate became both warmer and drier. This period contrasts with the San Dieguito complex because it contains ample evidence of plant use, especially in the form of manos and metates (types of grinding implements). About 5,000 years ago, temperatures began to decline and effective precipitation increased. Technological changes associated with this Intermediate Period, including the use of mortars and pestles associated with acorn processing, suggest that people reacted to the changing environment by making use of new foods. The Late Prehistoric period is associated with the migration of Great Basin Shoshonean speakers, which occurred sometime after 1,500 years ago. The bow and arrow first appears in southern California around this same time, along with an increasing population, larger and more permanent settlements, and expanding trade throughout southern California. By approximately 1,000 to 1,500 years ago, continuation of these trends resulted in the development of groups that had a material culture essentially identical to the ethnographic groups first encountered by the Spanish in the 1500s.

Ethnographic Background. When the Spanish first arrived in the 1500s, California was occupied by a diverse population of Native Americans speaking around 90 separate languages and belonging to as many as 500 distinct ethnic groups (Moratto 1984). At the time of this contact, the Serrano inhabited the region within which the Project is located. Neighboring groups included the Cahuilla, as well as coastal groups such as the Gabrielino and Luiseño. The Serrano territory encompassed the San Bernardino Mountains east of Cajon Pass, continuing north to Victorville, east to Twentynine Palms, and south to the Yucaipa Valley (Bean and Smith 1978a). Cahuilla territory was bounded to the north by the San Bernardino Mountains, to the south by Borrego Springs and the Chocolate Mountains, to the east by the Colorado Desert, and the west by the San Jacinto Plain and the eastern slopes of the Palomar Mountains (Bean 1978). Both groups used a wide range of wild food resources, such as acorns and piñon nuts, deer, sheep, rabbit, fish, and quail. They also had similar settlement patterns, with higher elevation villages situated in well-watered canyons or on alluvial fans near streams and springs and lower elevation villages located near natural springs (Moratto 1984).

Gabrielino territory covered most of present-day Los Angeles and Orange counties, from Aliso Creek in the south to Topanga Creek in the north as well as all of the Los Angeles Basin (Bean and Smith 1978b). The territory of the Luiseño encompassed an area roughly from Agua Hedionda Creek north to Aliso Creek on the coast, and inland to Santiago Peak and Palomar Mountain (Bean and Shipek 1978). Settlements were situated near water courses and consisted of both sedentary (year-round) villages and smaller temporary campsites. The Gabrielino collected acorns, yucca, and piñon nut, and hunted various types of small mammals, deer, fish, and shellfish. Acorns were an important food source to the Luiseño, but they also used various seeds, greens, bulbs, roots, and fruits, as well as large and small terrestrial game.

Historic Background. European contact with California began in the 1500s, when mariners such as Juan Cabrillo and Francis Drake explored the California coast. However, it was not until the late 1700s that the Spanish established a continuous presence. Most Spanish colonial activity focused on missions established in the coastal zone, e.g., San Gabriel (1771), San Juan Capistrano (1776), and San Luis Rey (1798). Missions were the center of Spanish influence in the region and affected native patterns of settlement, culture, trade, industry, and agriculture. The operation of the missions also resulted in the disintegration of Native American cultural patterns, depopulated the interior, and left much of the country open to Euroamerican settlement (Castillo 1978).

Following the Mexican Revolution of 1821, California became part of the Republic of Mexico. Legal secularization in Mexico later resulted in confiscation of mission lands, which were then granted or sold for farming and ranching. In San Bernardino County, eight such "ranchos" were granted, including the Rancho San Bernardino that covered both the San Bernardino and Yucaipa valleys (Brock et al. 1986). A shift from stock raising to farming and more intensive land uses marked the advent of the American Period, which started with the American seizure of California in 1846. In 1851, a group of nearly 500 Mormon colonists moved from Salt Lake City to their newly acquired Rancho San Bernardino. They established the town of San Bernardino and built some of the first networks of water ditches. Although most of the Mormon community was recalled to Salt Lake in 1857, their presence provided a stable influence and demonstrated that this isolated area could support a growing population (Brock et al. 1986). New settlers soon replaced the Mormon community and the regional population increased. This was soon followed by the establishment of regular stage routes between San Bernardino and Los Angeles, an extension of the railroad to the San Bernardino region, development of a local citrus industry and early water companies, and establishment of pioneering hydroelectric facilities.

3.9.1.1 Regulatory and Institutional Setting

A cultural resource is "historically significant" if it meets the following criteria for listing on the California Register of Historical Resources (California Register) (PRC §5024.1[c], Title 14 California Code of Regulations [CCR], Section 4852):

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- Is associated with the lives of persons important in our past;
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- Has yielded, or may be likely to yield, information important in prehistory or history.

Some of the cultural resources discussed in the following section have been previously evaluated for significance using federal, not state, significance criteria. The federal significance criteria are stated in the eligibility requirement for nomination to the National Register of Historic Places (National Register) (36 CFR § 60). To qualify for the National Register, a property must possess integrity of location, design, setting, material, workmanship, feeling, and association and also meet one or more of the following eligibility criteria:

- Is associated with events that have made a significant contribution to the broad patterns of history;
- Is associated with the lives of persons significant in the past;
- Embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; or
- Has yielded, or may be likely to yield, information important in prehistory or history.

Due to the similarity in significance criteria for the California Register and the National Register, it is assumed that any resource previously determined eligible or ineligible for listing on the National Register would be equally eligible or ineligible for listing on the California Register.

3.9.1.2 Project Construction Areas

3.9.1.2.1 Seven Oaks Dam and Reservoir Construction Area

A site records and literature search at the San Bernardino Archeological Information Center (SBAIC) at the San Bernardino County Museum was performed on February 1, 2001, to identify all recorded cultural resources and previous investigations within a ½-mile corridor that contains the new intake road for the Seven Oaks Dam and the re-routing of the road providing access upstream of the dam. Other modifications to the dam would not impact cultural resources and are not discussed further. The Seven Oaks Dam and Reservoir area was previously surveyed by qualified archaeologists as part of the construction of Seven Oaks Dam (USACE 1997). The Project-related construction areas were included in this original survey area, although some of the areas through which the relocated upstream access road would pass fall within tracts that were not surveyed due to steep slopes (Brock et al. 1986). The Native American Heritage Commission (NAHC) was also consulted with regard to recorded Native American sacred sites. According to a letter from the NAHC dated September 6, 2002, there are no recorded sacred sites in this area.

According to the record search and survey reports, one historic district, three prehistoric resources, and 14 historic resources are located in the record search area (Table 3.9-1). The historic district, called the SCE System Historic District, has 13 contributing features located both above and below Seven Oaks Dam (Secord 1985)[1]. Features located above the dam include the SCE Santa Ana River Powerhouse No. 1 (SAR 1), its equipment, and related outbuildings and structures; a house site at SAR 1; the SCE Santa Ana River Powerhouse No. 2 (SAR 2), its equipment, and related outbuildings and structures; house sites at the SAR 2; and a 50-foot section of the Lennon-type flume and all tunnels associated with the SAR water conduit system. Many of these features were either demolished or extensively renovated during the construction of Seven Oaks Dam, severely comprising the historic integrity of the entire system. Prior to the demolition, alteration, or other deterioration of the contributing features specifically associated with the SCE System Historic District, a Historic American Engineering Record (HAER) of the Santa Ana River Hydroelectric System (Swanson and De Vries 1992) was prepared under the terms of a Memorandum of Agreement (MOA) between USACE, California State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP).

Three prehistoric sites are located in the record search area, two of which are bedrock metates used for grinding plant material and one is a stone tool processing site (see Table 3.9-1). The 14 recorded historic resources relate to early aqueducts, travel routes, or SCE's hydroelectric system, and many were previously evaluated for site significance by the USACE as part of the construction of Seven Oaks Dam.

Of the 18 recorded cultural resources located in the record search area, six (SCE System Historic District, CA-SBR-5502H, CA-SBR-6005H, P1061-4H, PSBR-09H, and PSBR-60H) are recorded near the proposed realigned road providing access upstream of the dam and could be impacted by the Project. No cultural resources are located within the construction corridor of the proposed intake structure access road or within the construction staging area.

Realigned Upstream Access Road. The cultural resources recorded within the construction corridor of the proposed road realignment include the SAR 2 water conduit system (SCE System Historic District, P1061-4H), the SCE Santa Ana River Powerhouse No. 3 (SAR 3) water conduit system (SCE System Historic District, PSBR-60H, CA-SBR-6005H), the SCE Transmission Lines (SCE System Historic District, PSBR-09H), and the SAR 2 operator housing site (CA-SBR-5502H). The following information is taken from site record forms, except where noted.

---

1 Some features associated with the SCE System Historic District were also assigned individual site numbers by SBAIC and are, therefore, listed individually in Table 3.9-1. For example, part of the SAR 3 water conduit system is listed as PSBR-60H.

Table 3.9-1. Recorded Cultural Resources in the Seven Oaks Dam and Reservoir Construction Area

Site Number[a]	*Resource Significance*[b]	*Potentially Impacted*[c]	*Cultural Resource Description*
HISTORIC DISTRICT			
SCE System Historic District (NRHP-E-[87-1])	S	Yes	Historic district with 13 contributing features; some of these features are listed separately below.
PREHISTORIC SITE			
CA-SBR-5449	N	No	Bedrock metate. Formally determined not eligible for listing on the National Register according to USACE (1988).
CA-SBR-5450	N	No	Bedrock metate and battered cobble. Formally determined not eligible for listing on the National Register according to USACE (1988).
CA-SBR-5504/H	N	No	Lithic scatter (stone tool processing) and electrical pole stump. Formally determined not eligible for listing on the National Register according to USACE (1988).
HISTORIC SITE			
CA-SBR-1609H	-	No	Location of 1926 tent camp of 400 workers reconstructing a 1904 water flume; adjacent to or part of SBR-5503H.
CA-SBR-5501H	-	No	Historic trash dump probably related to a tent camp dating to first quarter of 20th century. The National Register database indicates the site is eligible for listing on the National Register, but USACE (1988) says it was formally determined not eligible for listing with SHPO concurrence.
CA-SBR-5502H	N	Yes	Small settlement by plant employees adjacent to SCE SAR Powerhouse No. 2. The remains of the housing site were formally determined not eligible for listing on the National Register (de Barros 1993; Foster et al. 1989). Note that the powerhouse is a contributing feature to the SCE System Historic District.
CA-SBR-5503H	N	No	Laird-Hill complex historic settlement probably occupied between 1891-1948. The National Register database indicates the site is ineligible for listing on the National Register.
CA-SBR-5505H	N	No	Two human graves dated ca. 1916-1918; graves were moved according to site record. Formally determined not eligible for listing on the National Register according to USACE (1988).
CA-SBR-6005H	P	Yes	Bear Valley Highline Aqueduct beginning at the gaging station of the SCE SAR Powerhouse No. 2 and running south/southeast to Crafton Hills. Part of this system is also listed as PSBR-60H (see below).

Table 3.9-1. Recorded Cultural Resources in the Seven Oaks Dam and Reservoir Construction Area (continued)

Site Number[a]	*Resource Significance*[b]	*Potentially Impacted*[c]	*Cultural Resource Description*
			HISTORIC SITE
CA-SBR-8094H	P	No	Historic wagon road ca. 1860s (aka Bear Valley and Redlands Tollroad). No recorded segments are located near the proposed realigned road providing access above Seven Oaks Dam or construction staging area.
P1061-4H	P	Yes	Part of the SCE SAR Powerhouse No. 2 water conduit system; associated tunnels are a contributing feature to the SCE System Historic District (de Barros 1993).
P1061-6H	-	No	Historic artifact scatter ca. 1907-1918. The National Register database indicates the site is eligible for listing on the National Register, but USACE (1988) says it was formally determined not eligible for listing with SHPO concurrence.
P1061-7H	-	No	Santa Ana Well No. 2 built in 1930. The National Register database indicates the site is eligible for listing on the National Register, but USACE (1988) says it was formally determined not eligible for listing with SHPO concurrence.
P1064-6H	N	No	Warm Springs (hot springs). Formally determined not eligible for listing on the National Register according to USACE (1988).
P1064-7H	N	No	Early road/wall. Formally determined not eligible for listing on the National Register according to USACE (1988).
PSBR-09H	P	Yes	SCE Transmission Lines, ca. 1899+. Part of the transmission system is a contributing feature to the SCE System Historic District.
PSBR-60H	P	Yes	Part of the SCE SAR Powerhouse No. 3 water conduit system; associated tunnels are a contributing feature deemed significant to the SCE System Historic District (de Barros 1993). This system overlaps with the Bear Valley Highline Aqueduct (CA-SBR-6005H).

a Site numbers beginning with a "P" are considered "pending sites" that have not been assigned an official site number.

b Determined significant (S), potentially significant (P), potentially insignificant (I), not significant (N), unknown significance or not evaluated (-) based on the National Register database, site record forms, or evaluation reports (Brock et al. 1986, Arnold et al. 1987, Hornbeck and Botts 1988, USACE 1988, Foster et al. 1989, de Barros 1993).

c A resource is considered potentially impacted if it is within 25 feet of a road alignment or within a construction staging area.

The SAR 2 water conduit system (SCE System Historic District, P1061-4H) includes the flumes, tunnels, and other features that connected SAR 1 and SAR 2. Water was carried underground almost the entire length of the system through 12 tunnels (7,571 feet) constructed between 1890 and 1905, two siphons (634 feet), and one or two flumes (255 feet or 486 feet, depending on source). The tunnels associated with the conduit system are considered a contributing element, deemed significant, of the SCE System Historic District. The proposed road realignment crosses one segment of the conduit system, the penstock or pressure pipe that delivered water from the SAR 2 forebay to the powerhouse. During construction of the Seven Oaks Dam, the penstock was replaced with a new penstock pipe and the old overflow pipe was removed (personal communication, Vann 2004).

The SAR 3 water conduit system (SCE System Historic District, PSBR-60H, CA-SBR-6005H) includes the flumes, tunnels, and other features that connected SAR 2 and SAR 3. Some of the conduit system was originally built for the Santa Ana Canal (constructed in 1892) and was later incorporated into the Bear Valley Highline Aqueduct (CA-SBR-6005H). The flowline consisted of approximately 550 feet of siphons, 5,500 feet of tunnels, and 7,200 feet of flume. The tunnels associated with the conduit system are considered a contributing element, deemed significant, of the SCE System Historic District. During construction of the Seven Oaks Dam, the water conduit system between SAR 2 and the dam was rerouted into a new pipeline and the old flume system was removed (personal communication, Vann 2004).

The SCE Transmission Line (SCE System Historic District, PSBR-09H) originated at SAR 1 and ran the length of the upper Santa Ana Canyon, crossing the Santa Ana River between SAR 2 and SAR 3. The transmission line was originally constructed in 1899, and was one of the first to use "transpositioning" and the Redlands insulator. The line was completely overhauled in 1912-1913, and all wooden poles were replaced with metal towers or towers of a similar construction (Swanson and De Vries 1992). As of 1985, several of the metal towers between SAR 1 and SAR 2 were still in use (Secord 1985). The National Register nomination form for the SCE System Historic District (Secord 1985) includes a sample transmission tower located near SAR 3 as a contributing feature, deemed significant, of the SCE System Historic District. During the construction of the Seven Oaks Dam, the transmission line was moved to a higher elevation (2,585 feet above mean sea level [msl] elevation), and the old towers were removed (personal communication, Vann 2004).

The SAR 2 operator housing site (CA-SBR-5502H), directly adjacent to SAR 2, was used to house plant workers and their families during the early 20th century. Although the original homes were destroyed, building foundations, cemented boulder terraces, and trash scatters were recorded during a cultural resource survey related to the construction of Seven Oaks Dam (Brock et al. 1986). This site was originally included as a contributing feature of the SCE System Historic District (Secord 1985). However, based on subsequent archaeological testing (Foster et al. 1989), the site was recommended as ineligible for listing on the National Register, and SHPO agreed with the determination in a letter dated August 1, 1990 (de Barros 1993).

Intake Structure Access Road. No cultural resources are located within the construction corridor of the proposed intake structure access road.

Construction Staging Area. No cultural resources are located within the boundaries of the proposed construction staging area. Although part of the SCE Transmission Line (SCE System Historic District, PSBR-09H) once traversed the staging area, the line was re-routed at a higher elevation during construction of Seven Oaks Dam.

Paleontologic Resources. According to previous investigations of the SAR area (Brock et al. 1986, Arnold 1987, USACE 1988), the Santa Ana Canyon and the SAR Wash have no sensitive areas for paleontologic resources. Due to past ground disturbance and low paleontologic sensitivity, there is little potential for paleontologic resources in the Seven Oaks Dam and Reservoir Construction Area.

3.9.1.2.2 Santa Ana River Construction Area

Site records and literature searches at the SBAIC at the San Bernardino County Museum were performed on February 1, 2001, and August 9, 2002, to identify all recorded cultural resources and previous investigations within a ½-mile corridor that contains the proposed Plunge Pool Pipeline, Low Flow Connector, Morton Canyon Connector II pipeline alignments, and construction staging area. At least 21 cultural studies have been conducted in the record search area, including eight pedestrian surveys, seven cultural resource overviews, five resource evaluations, and one archaeological monitoring report (SAIC 2004b). Many of these studies were conducted for the USACE and were associated with the construction and operation of Seven Oaks Dam. Other studies related to (i) USFS's management of the San Bernardino National Forest; (ii) SCE's license to operate the Santa Ana River Hydroelectric system; and (iii) the construction of one of various water pipeline projects running through the area. The NAHC was also consulted with regard to recorded Native American sacred sites. According to a letter from the NAHC dated September 6, 2002, there are no recorded sacred sites in this area.

The record search demonstrated that most of the Santa Ana River Construction Area had been previously surveyed for cultural resources, except for about a 1-mile stretch of the proposed Plunge Pool Pipeline alignment near Greenspot Road and the northern portion of the proposed construction staging area. SAIC conducted a pedestrian survey on September 20, 2002, which included the un-surveyed stretch of Greenspot Road as well as areas within about 150 feet south of the road. SAIC conducted a second pedestrian survey on March 25, 2003, to cover all previously un-surveyed portions of the proposed staging area. No new cultural resources were identified during either survey. Both survey areas are located within the SAR Wash, which has a typical wash landscape of rocks and cobbles. Modern trash was noted along the roadway, and there were a number of ditches associated with Conservation District water spreading operations south of the road. A large borrow pit excavated during the construction of Seven Oaks Dam is located within the proposed staging area. No new historic resources were identified in either survey area, and the SAR Wash has no potential for prehistoric or buried cultural resources due to historic flooding events (Brock et al. 1986).

According to the record search (Table 3.9-2), one historic district, 30 recorded historic resources, and no prehistoric resources are located within a ½-mile corridor along the proposed Plunge Pool Pipeline, Low Flow Connector, and Morton Canyon Connector II pipeline alignments. The SCE System Historic District is described above in section 3.9.1.2.1. Features associated with the historic district located below the dam include the SAR 3, its equipment, and related outbuildings and structures; structures associated with SAR 3 water intake and outflow; and a

Table 3.9-2. Recorded Cultural Resources in the SAR Construction Area

Site Number[a]	*Resource Significance*[b]	*Potentially Impacted*[c]	*Cultural Resource Description*
			HISTORIC DISTRICT
SCE System Historic District (NRHP-E-[87-1])	S	No	Historic district with 13 contributing features; some of these features are listed separately below. SAIC site visit confirmed that no extant feature is located within 150 feet of a pipeline alignment.
			HISTORIC SITE
CA-SBR-5505H	N	No	Two human graves dated ca. 1916-1918; graves were moved according to site record. Formally determined not eligible for listing on the National Register according to USACE (1988). SAIC site visit confirmed the graves are no longer in original location.
CA-SBR-5508H	N	No	SAR Wash diversion culvert and historic debris, probably dates ca. 1900-1930s. USACE determined it was not significant with SHPO concurrence (USACE 1988). SAIC site visit confirmed that no remnants exist within proposed staging area.
CA-SBR-5516H	S	No	SCE SAR Powerhouse No. 3 and former employee residences associated with the SCE System Historic District. SAIC site visit confirmed that no existing historic feature is located within 150 feet of a pipeline alignment.
CA-SBR-5526H	N	Yes	Grove House/Well Site associated with orange production in first half of 20th century. USACE determined it was not significant with SHPO concurrence (USACE 1988).
CA-SBR-5972H	I	No	Concrete boxes for water control equipment belonging to Muni; less than 50 year old construction. It is likely not significant due to its recent age (Arnold et al. 1987).
CA-SBR-5974H	I	No	Small historic can scatter.
CA-SBR-5975H	P	No	Residential site with foundation.
CA-SBR-5978H	P	No	Cobble/mortar foundation. SAIC site visit confirmed the presence of cobble walls and foundations, rock lined irrigation ditches associated with adjacent orange groves, and remnants of ornamental planting.
CA-SBR-5979H	P	No	Two well sites with drilling towers/pump houses.
CA-SBR-5980H	P	No	Irrigation ditch, diversion box, pump house.
CA-SBR-5986H	P	No	Cobble-lined canal junction with control gates. It is potentially significant due to its intact condition (Arnold et al. 1987). SAIC site visit confirmed that these features are located outside the fenced area of the proposed staging area.

Table 3.9-2. Recorded Cultural Resources in the SAR Construction Area (continued)

Site Number[a]	*Resource Significance*[b]	*Potentially Impacted*[c]	*Cultural Resource Description*
			HISTORIC SITE
CA-SBR-5987H	I	No	Hole-and-cap can scatter; possible construction camp. It is likely not significant due to lack of data potential (Arnold et al. 1987). SAIC site visit noted that this site has deteriorated since its original recordation; it is located outside the fenced area of the proposed staging area.
CA-SBR-6005H	P	No	Bear Valley Highline Aqueduct beginning at the gaging station of the SCE SAR Powerhouse No. 2 and running south/southeast to Crafton Hills. Part of this system is also listed as PSBR-60H (see below).
CA-SBR-6544H	P	Yes	North Fork Canal (aka High-Line Ditch); originally built as an earthen ditch in 1858, extensively remodeled.
CA-SBR-6848H	-	No	Cram & Van Leuven Ditch (ca. 1858) irrigation complex with associated earthen ditches. SAIC site visit confirmed that no remnants exist within 150 feet of a pipeline alignment.
CA-SBR-7215H	-	No	Z.O. Smith property ca. 1892-1920s including road, orchard, irrigation canal, irrigation system.
CA-SBR-8094H	P	No	Historic wagon road ca. 1860s (aka Bear Valley and Redlands Tollroad). SAIC site visit confirmed that no remnants exist within 150 feet of a pipeline alignment.
CA-SBR-8546H	P	Yes	Redlands Canal, constructed ca. 1877 by East Redlands Water Company.
IA-1063-01H	I	No	Isolated artifacts: license plate, decal on porcelain bowl, small plate.
P1064-01H	-	No	Sunnyside Ditch; constructed 1874. SAIC site visit confirmed that no remnants exist within 150 feet of a pipeline alignment.
P1064-08H	N	No	USGS Gaging Station constructed after 1938 flood. Formally determined ineligible for listing on the National Register according to USACE (1988). SAIC site visit confirmed that a gaging station is no longer at this location.
P1064-09H	P	Yes	Francis Cuttle Weir Dam, 1932; a portion of the dam appears to have been removed in association with demolition of Orange Avenue Bridge.
P1064-10H	N	No	Orange Avenue Bridge constructed in 1892. USACE determined it was not significant with SHPO concurrence (USACE 1988). SAIC site visit confirmed the bridge has been removed.
P1064-21H	P	No	Mentone Irrigation Company Pipeline.
P1064-22H	P	Yes	Francis Cuttle Weir/Old Orange Avenue Bridge. See P1064-09H and P1064-10H.

Table 3.9-2. Recorded Cultural Resources in the SAR Construction Area (continued)

Site Number[a]	*Resource Significance*[b]	*Potentially Impacted*[c]	*Cultural Resource Description*
			HISTORIC SITE
P1064-33H	S	Yes	Greenspot Bridge No. 54C-368 (historic truss bridge) built in 1912 and moved to this location in 1933. Caltrans determined it was eligible for listing on the National Register with SHPO concurrence (Hatheway 1987a).
P1064-39H	N	No	Historic refuse scatter. USACE determined it was not significant with SHPO concurrence (USACE 1988). SAIC site visit confirmed that no remnants exist within proposed staging area.
PSBR-09H	S	No	SCE Transmission Lines, ca. 1899+. Part of the transmission system is a contributing feature to the SCE System Historic District. SAIC site visit confirmed that no remnants exist within 150 feet of a pipeline alignment.
PSBR-22H	-	No	Judson and Brown Ditch. SAIC site visit confirmed that no remnants exist within proposed staging area.
PSBR-60H	S	No	Part of the SCE SAR Powerhouse No. 3 water conduit system; associated tunnels are a contributing feature deemed significant to the SCE System Historic District (de Barros 1993). This system overlaps with the Bear Valley Highline Aqueduct (CA-SBR-6005H). SAIC site visit confirmed that no extant feature is located within 150 feet of a pipeline alignment.

a Site numbers beginning with a "P" are considered "pending sites" that have not been assigned an official site number.

b Determined significant (S), potentially significant (P), potentially insignificant (I), not significant (N), unknown significance or not evaluated (-) based on the National Register database, site record forms, or evaluation reports (Brock et al. 1986, Arnold et al. 1987, Hatheway 1987a, Hornbeck and Botts 1988, USACE 1988).

c A resource is considered potentially impacted if it is within 150 feet of a pipeline alignment to accommodate a 300-foot construction corridor (the maximum size proposed for the Santa Ana River Construction Area) or within a construction staging area.

metal transmission tower near SAR 3[2]. The SAR 3 powerhouse building was demolished and rebuilt in the same location using modern materials; it is now called the SAR 2/3 powerhouse. A few stone walls to the east and southeast of the powerhouse, a clapboard garage, and the Auxiliary Diversion that brings water from the SAR to the Division Box adjacent to the powerhouse still exist. None of these extant features are located within a construction corridor or within the construction staging area.

Most of the 30 recorded historic resources relate to early aqueducts, irrigation canals, travel routes, or SCE's hydroelectric system (Table 3.9-2). During SAIC's two pedestrian surveys, the team visited all previously recorded sites potentially affected by the Project and determined that

2 Some features associated with the SCE System Historic District were also assigned individual site numbers by SBAIC and are, therefore, listed individually in Table 3.9-2. For example, the SAR 3 powerhouse is listed as CA-SBR-5516H.

some resources recorded from historic maps, such as the Redlands Toll Road (CA-SBR-8094H) and the Cram & Van Leuven Ditch (CA-SBR-6848H), no longer exist in the vicinity of the proposed pipelines and would not be impacted by the Project. Other resources, such as the Orange Avenue Bridge and the SAR 3 powerhouse building, were either demolished or extensively renovated during the construction of Seven Oaks Dam, and no longer retain their historic integrity. SAIC's survey determined that, of the 30 recorded historic resources located in the record search area, three are presently located within the construction corridor of the proposed Plunge Pool Pipeline, two within the construction corridor of the proposed Low Flow Connector pipeline, and two within the construction corridor of the proposed Morton Canyon Connector II pipeline alignment. These could be impacted by the Project. SAIC's survey confirmed that no cultural resources are located within the proposed construction staging area or the proposed temporary detour of Greenspot Road.

Plunge Pool Pipeline. Three cultural resources within the construction corridor of the proposed Plunge Pool Pipeline alignment include the Francis Cuttle Weir Dam (P1064-09H, P1064-22H), part of the North Fork Canal (CA-SBR-6544H), and the Grove House/Well site (CA-SBR-5526H). The following information is taken from site record forms, except where noted.

The Francis Cuttle Weir Dam (P1064-09H, P1064-22H) (Figure 3.9-1) was built in 1932 by what is now known as the Conservation District to stabilize the flow of the river and convey excess flow to a weir intake for groundwater spreading. It is a component of an early 1930s systemic water engineering project developed in this region of Southern California. Typical of these early containment structures, it was constructed of poured concrete on top of mortar and cobble. Located west of the SAR 2/3 powerhouse, part of the dam structure ran under the historic Orange Avenue Bridge (P1064-10H, P1064-22H) until the bridge was recently demolished and replaced during the construction of Seven Oaks Dam. About one-third of the dam appears to have been covered with fill material when the new bridge and road were built. The remaining sections of the dam and associated diversion structure appear to have remained intact. SAIC conducted an assessment of the Francis Cuttle Weir Dam to determine its eligibility for inclusion on the California Register (SAIC 2004c). The weir was determined to be potentially eligible for listing on the California Register, because it is "associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage" (CEQA Guidelines Section 15064.5 [A]). The capture and distribution of water underlay the settlement and development of Southern California and was a critical component of the regional agricultural economy. The visible portion of the weir is one of the few intact vestiges of the original historic groundwater spreading system. It is characteristic of infrastructure projects initiated in the second quarter of the 20th century and that played a supportive role in the growth of the urban areas of Southern California.

The North Fork Canal (CA-SBR-6544H), also known historically as the High-Line Ditch, was originally built as an earthen ditch in 1858. The canal has been relocated and improved over time, and is currently owned and operated by the North Fork Water Company. The canal starts west of the SAR 2/3 powerhouse, where a riveted metal pipe (River Crossing Pipeline) diverts water from the afterbay (Division Box) of the powerhouse and carries it across the SAR Wash to the North Fork Weir (see photograph in Figure 3.9-1). This raised pipeline replaced an old wooden flume that was destroyed in a 1937 flood (Vann 1994). Portions of the raised pipeline were replaced at least two times between 1938 and present day, once in 1946 and more recently in 1971 (Hornbeck and Botts 1988). The pipe also was given additional support frames, and part of the pipe was enclosed in a tunnel lining enclosure and covered with fill for a haul road during construction of Seven Oaks Dam (personal communication, Vann 2002). From the North Fork Box, the open ditch canal runs along the west side of the canyon, somewhat parallel to the Santa Ana Canyon Road. The portion of the canal that crosses the Santa Ana Canyon Road was replaced with a pipe during construction of the Seven Oaks Dam (personal communication, Vann 2004). After the road crossing, the canal continues as an open ditch for more than 100 feet, at which point it becomes an enclosed canal running southwest past the USACE buildings and then west through the orange orchards north of Greenspot Road. The North Fork Canal has never been formally evaluated for potential listing on the California Register or the National Register, but Brock et al. (1986) considered it possibly eligible for listing on the National Register during a pedestrian survey associated with the construction of Seven Oaks Dam.

The Grove House/Well Site (CA-SBR-6544H) contains remains of a house foundation, aqueducts, a well, an engine mount, four cobble/boulder platforms, and refuse debris. The well and orange grove were established in the late 1920s. The house was built after 1940 as a caretaker's residence, and was demolished in the 1970s. The USACE determined this site to be not significant and ineligible for listing on the National Register, and SHPO concurred with this determination (USACE 1988).

Low Flow Connector Pipeline. The proposed Low Flow Connector Pipeline alignment runs parallel to the proposed Plunge Pool Pipeline along most of its route. The only two cultural resources within the construction corridor of the proposed Low Flow Connector Pipeline – the Francis Cuttle Weir Dam (P1064-09H, P1064-22H) and the River Crossing Pipeline associated with the North Fork Canal (CA-SBR-6544H) – are also located within the construction corridor of the proposed Plunge Pool Pipeline, and are described above.

Morton Canyon Connector II Pipeline. Two cultural resources within the construction corridor of the proposed Morton Canyon Connector II Pipeline alignment are the Greenspot Bridge (P1064-33H) and part of the Redlands Canal (CA-SBR-8546H). The Greenspot Bridge (P1064-33H) is a single span Camelback truss bridge crossing the SAR Wash along Greenspot Road (Figure 3.9-1). This bridge was originally constructed in 1912 for crossing the Mojave River near Victorville. It was moved to its present location in 1933, and has been periodically rebuilt following major floods on the SAR. The bridge rests on a rock and earthen embankment with concrete footings to the north, and it sits on concrete footings and a large rock and concrete retaining wall to the south. A date stamped on the top of the retaining wall reads March 21, 1939. An auxiliary diversion of the Redlands Canal passes through a square hole (approximately 4 feet wide and 3 feet high) in the retaining wall (colloquially known as the "Hole in the Wall"). The Redlands Canal diversion through the "Hole in the Wall" has been unusable and, for practical purposes, abandoned since at least 1983 (Vann 1994) (see photograph in Figure 3.9-1). In 1984-85, the Morton Canyon Connector I (a 36-inch diameter pipe) was inserted through the retaining wall immediately below the "Hole in the Wall." The space around the pipe was filled with concrete and the "Hole in the Wall" was restored to its original size and shape. Caltrans determined that the Greenspot Bridge is eligible for listing on the National Register, and SHPO concurred with this determination (Hatheway 1987a).

The Redlands Canal was originally built in 1885 by the East Redlands Water Company. The canal has been extended and improved over time, and is currently about 6.7 miles long, extending from the afterbay of the SAR 2/3 powerhouse to the Mentone Reservoir. Most of the open canal was covered with an arch in the late 1920s, and two tunnels between the SAR 2/3 powerhouse and Morton Canyon were dug in 1947. The original headgate structure for the Redlands Canal is adjacent to Greenspot Road, south of Greenspot Bridge, but this structure is no longer used (Vann 1994). The Redlands Tunnel, created in 1881 as part of the Judson and Brown Ditch, is now connected to the Redlands Canal. The tunnel begins in the middle of the canyon mouth and originally extended over 1,500 feet (Hornbeck and Botts 1988). According to an 1888 description, the tunnel also had a 600-foot diagonal branch leading toward the northern wall of the canyon. Water carried by the Redlands Tunnel currently crosses under Greenspot Road and then is transported through a metal pipeline to the Redlands Canal (the metal pipeline is not considered part of the historic tunnel). The Bear Valley Mutual Water Company currently operates and manages the Redlands Tunnel and pipeline as well as the Redlands Canal (Vann 1994). The Redlands Canal and associated features have never been formally evaluated for potential listing on the California Register or the National Register, but Brock et al. (1986) considered it possibly eligible for listing on the National Register during a pedestrian survey associated with the construction of Seven Oaks Dam.

Greenspot Road Detour. No cultural resources are located within the construction corridor of the Greenspot Road detour.

Construction Staging Area. No cultural resources are located within the boundaries of the proposed construction staging area.

Paleontologic Resources. According to previous investigations of the SAR area (Brock et al. 1986, USACE 1988), the Santa Ana canyon and the SAR Wash have no sensitive areas for paleontologic resources. Due to past ground disturbance and low paleontologic sensitivity, there is little potential for paleontologic resources in the Santa Ana River Construction Area.

3.9.1.2.3 Devil Canyon Construction Area

A site records and literature search at the SBAIC at the San Bernardino County Museum was performed on November 11, 2002, to identify all recorded cultural resources and previous investigations within a ½-mile corridor of the proposed Devil Canyon By-Pass Pipeline alignment. At least five cultural studies have been conducted within the ½-mile search area, including three pedestrian surveys and two cultural resource inventories (SAIC 2004b). One of the previous pedestrian surveys, which was conducted in association with Metropolitan's Inland Feeder Project, covered the entire alignment for the proposed Devil Canyon By-Pass Pipeline. The NAHC was also consulted with regard to recorded Native American sacred sites. According to a letter from the NAHC dated September 18, 2003, there are no recorded sacred sites in this area.

According to the record search and survey reports (Table 3.9-3), five recorded historic resources and no prehistoric resources are located within a ½-mile of the proposed Devil Canyon By-Pass Pipeline. Three of the resources are related to early water conveyance (e.g., diversion canals, water ditches, pump house), one is a historic refuse deposit, and the other is a remnant of the

Devil Canyon Toll Road. There are no recorded resources within the construction corridor of either proposed Devil Canyon By-Pass Pipeline optional alignment or within the proposed construction staging area; the closest recorded resource is located about 500 feet east of the staging area. In addition, the Project would be located adjacent to the existing Inland Feeder Pipeline, where extensive ground disturbance occurred during its construction. Due to past ground disturbance, there is little potential for buried archaeological or paleontologic resources in the Devil Canyon Construction Area.

Table 3.9-3. Recorded Cultural Resources in the Devil Canyon Construction Area

Site Number[a]	*Resource Significance*[b]	*Potentially Impacted*[c]	*Cultural Resource Description*
SBR-6354H	-	No	Diversion channels, retaining structure with pump house & well head, and retaining wall (3 loci).
SBR-9859H	-	No	Buried pre-WWII domestic refuse deposit.
SBR-9860H	-	No	Well & water conveyance system.
PSBR-19H	-	No	Devil Canyon Toll Road.
P1071-22H	-	No	Muscupiabe Land & Water Company Ditch.

a Sites numbers beginning with a "P" are considered "pending sites" that have not been assigned an official site number.

b Determined significant (S), potentially significant (P), potentially insignificant (I), not significant (N), unknown significance or not evaluated (-) based on the National Register database, site record forms, or evaluation reports (Foster et al. 1991).

c A resource is considered potentially impacted if it is within 75 feet of the Devil Canyon By-Pass Pipeline alignment to accommodate a 150-foot construction corridor or within a construction staging area.

3.9.1.2.4 Lytle Creek Construction Area

A site records and literature search at the SBAIC at the San Bernardino County Museum was performed on November 11, 2002, to identify all recorded cultural resources and previous investigations within a ½-mile corridor that contains the Lower Lytle Creek Pipeline, Cactus Basins Pipeline, and the construction staging area. At least 14 cultural studies have been conducted within this ½-mile search area, including nine pedestrian surveys, one cultural resource inventory, and four cultural resource assessments (SAIC 2004b). The record search demonstrated that only some of the Lytle Creek Construction Area had been previously surveyed for cultural resources. Most of the proposed Cactus Basins Pipeline had never been surveyed. SAIC conducted pedestrian surveys on March 25, 2003, and March 17, 2004, to identify potential cultural resources along Spruce Avenue, Casmalia Street, Cedar Avenue, West Summit Avenue, and Linden Avenue. The pipeline route follows an asphalt road bounded by concrete sidewalks, with large residential or industrial developments on either side of the road along most of the route. Extensive ground disturbance would have occurred from the construction of the road network, nearby buildings, and associated utilities. No new cultural resources were identified during the pedestrian surveys.

Table 3.9-4. Recorded Cultural Resources in the Lytle Creek Construction Area

Site Number[a]	*Resource Significance*[b]	*Potentially Impacted*[c]	*Cultural Resource Description*
PREHISTORIC SITE			
SBR-1420	-	No	Food processing site.
HISTORIC SITE			
SBR-6109H	-	No	"Old Zanja" irrigation ditch. SAIC site visit confirmed that no remnants exist within 50 feet of a pipeline alignment.
SBR-6110H	-	No	Canaigre Ditch. SAIC site visit confirmed that no remnants exist within 50 feet of a pipeline alignment.
SBR-6699H	P	Yes	Fontana Powerhouse & associated features.
SBR-6700H	I	No	West Valley Water District Sandbox & associated features (previously known as the West San Bernardino County Water District).
SBR-6708H	P	No	Lytle Creek Land and Improvement Company Spreading Ground & associated features.
SBR-6709H	-	No	Diversion box for the Fontana Powerhouse.
SBR-6780H	-	No	Subterranean reservoir, historic debris, & modern trash.
SBR-6872H	-	No	Flood control gates, abandoned well head, & associated features.
P1072-33H	-	No	Historic house and corn patch.
P1072-63H	N	No	Nandon residence. SAIC site visit confirmed that this residence no longer exists.
PSBR-33H	-	No	Rialto Canal. SAIC site visit confirmed that no remnants exist within 50 feet of a pipeline alignment.
PSBR-34H	-	No	Old Town Ditch.

a Sites numbers beginning with a "P" are considered "pending sites" that have not been assigned an official site number.

b Determined significant (S), potentially significant (P), potentially insignificant (I), not significant (N), unknown significance or not evaluated (-) based on the National Register database, site record forms, or evaluation reports (Van Wormer and Langenwalter 1990).

c A resource is considered potentially impacted if it is within 50 feet of a pipeline alignment to accommodate a 100-foot construction corridor (the maximum size proposed for the Lytle Creek area) or within a construction staging area.

According to the record search (Table 3.9-4), 12 recorded historic resources and one prehistoric resource are located within a ½-mile corridor that contains the Lower Lytle Creek Pipeline, Cactus Basins Pipeline, and the construction staging area. The prehistoric site contained remains of food processing (e.g., grinding stones), while ten historic resources relate to early water conveyance (e.g., canals, diversion weir, powerhouse, flood control gates) and two are historic residences. During SAIC's pedestrian surveys, the team visited all previously recorded sites potentially affected by the Project and determined that some resources recorded from historic maps and other records, such as the "Old Zanja" irrigation ditch (CA-SBR-6109H), Rialto Canal (PSBR-33H), and Canaigre Ditch (CA-SBR-6110H), no longer exist in the vicinity of the proposed pipelines. Of the 13 cultural resources recorded in the record search area, only one is presently located within the construction corridor of the proposed Lower Lytle Creek Pipeline alignment. No cultural resources are located within the construction corridor of the proposed Cactus Basins Pipeline alignment or within the construction staging area. The NAHC was also consulted with regard to recorded Native American sacred sites. According to a letter from the NAHC dated September 18, 2003, there are no recorded sacred sites in this area.

Lower Lytle Creek Pipeline. One cultural resource, the Fontana Powerhouse complex (CA-SBR-6699H), is located adjacent to the proposed Lower Lytle Creek Pipeline alignment as it turns north from Riverside Avenue. The powerhouse was built in 1917 by the Fontana Power Company, and the complex consists of a stucco building, related outflow conduits, and an underground, concrete covered penstock. The SAIC pedestrian survey also noted the remains of a small residential building north of the powerhouse, which may have been the housing site for the operator of the powerhouse. The powerhouse complex is still in use and is currently operated by the California Edison Power Company (Van Wormer and Langenwalter 1990). The powerhouse has never been formally evaluated for potential listing on the California Register or the National Register, but Van Wormer and Langenwalter (1990) considered it possibly eligible for listing on the National Register since this facility played an important role in the early development of the local area.

Construction Staging Area. No cultural resources are located within the boundaries of the proposed construction staging area.

Paleontologic Resources. According to previous investigations (San Bernardino County Museum Association 1981), the Lytle Creek Construction Area has a low potential for paleontologic resources. In addition, most of the proposed construction is located within an urbanized area, which has had extensive ground disturbance from construction and historic flooding. Due to past ground disturbance and low paleontologic sensitivity, there is little potential for paleontologic resources in the Lytle Creek Construction Area.

3.9.1.3 Project Operations Areas

Project operations would not require the (i) construction of new facilities, (ii) modification of existing facilities, nor (iii) change to the existing operation of these facilities, except as discussed above under *Project Construction Areas*.

3.9.2 Impacts and Mitigation Measures

3.9.2.1 Methodology

Direct impacts on cultural resources are primarily associated with ground disturbance activities and are evaluated based on the significance criteria identified below.

3.9.2.2 Significance Criteria

Section 15064.5 (State CEQA Guidelines) indicates a project may have a significant environmental effect if it causes "substantial adverse change" in the significance of an "historical resource" or a "unique archaeological resource" as defined or referenced in State CEQA Guidelines Section 15064.5(b,c) (1998). Such changes include "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired" (State CEQA Guidelines 1998 Section 15064.5 [b]).

An impact on cultural resources is considered significant, therefore, if it adversely affects a resource that is listed on, or eligible for listing on, the California Register or is otherwise considered a unique or important archaeological resource under CEQA. The significance criteria outlined below are based on the Initial Study checklist in Appendix G of the State CEQA Guidelines. In general, a project may have an adverse effect on a cultural resource if it would:

- Cause a substantial adverse change in the significance of a historical resource as defined in State CEQA Guidelines Section 15064.5;
- Cause a substantial adverse change in the significance of an archeological resource pursuant to State CEQA Guidelines Section 15064.5;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- Disturb any human remains, including those interred outside formal cemeteries.

3.9.2.3 Project Construction

3.9.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Realigned Upstream Access Road. Ground disturbance associated with rerouting of the upstream access road to a higher elevation would entail cutting the road into the hillside to form the roadbed of an unpaved road. The only cultural resource within the construction corridor of the proposed access road realignment is the SAR 2 operator housing site (CA-SBR-5502H).

The SAR 2 water conduit system (SCE System Historic District, P1061-4H), the SAR 3 water conduit system (SCE System Historic District, PSBR-60H, CA-SBR-6005H), and the SCE transmission lines (SCE System Historic District, PSBR-09H) were relocated during construction of the Seven Oaks Dam and no longer exist within the proposed construction corridor (see section 3.9.1.2.1). Therefore, the proposed construction of the realigned access road would not impact these resources.

Impact CR-1. *Construction of the realigned upstream access road would cause a less than significant adverse change in the significance of the operator housing complex associated with SAR 2.*

The proposed alignment of the access road crosses through the mapped location of the operator housing complex associated with SAR 2 (CA-SBR-5502H). It is possible that some of the historic features on the northern portion of the site may be impacted during construction. However, the

SAR 2 operator housing site was determined to be not significant and ineligible for listing on the National Register, and SHPO concurred with this determination. Therefore, impacts to historic resources associated with this site would be less than significant. No mitigation is required.

Intake Structure Access Road. No cultural resources are located within the construction corridor of the new intake structure access road. Due to previous ground disturbance at this location during the construction of Seven Oaks Dam and the absence of recorded cultural resources, no direct impacts on cultural resources would occur.

Construction Staging Area. No cultural resources are located within the boundaries of the proposed construction staging area. Due to previous ground disturbance at this location during the construction of Seven Oaks Dam and the absence of recorded cultural resources, no direct impacts on cultural resources would occur.

Paleontologic Resources. Due to past ground disturbance and low paleontologic sensitivity, there is little potential for paleontologic resources in the Seven Oaks Dam and Reservoir Construction Area. No direct impacts on paleontologic resources would occur.

Unanticipated Discoveries

Impact CR-2. *Destruction of an unanticipated cultural or paleontological resource because of construction activities would cause a substantial adverse change in the significance of the resource pursuant to Section 15064.5 of CEQA.*

It is possible, although highly unlikely, that an unanticipated cultural or paleontological resource may be encountered during construction. If an unanticipated archaeological resource, paleontological resource, or human remains are discovered during construction, the resource could be destroyed or disturbed, or removed from its historic/geologic context. This would result in a significant impact on cultural or paleontological resources.

MITIGATION MEASURES

MM CR-1: In the event of an unanticipated archaeological or paleontological resource discovery during construction, all ground disturbances within 150 feet of the discovery will be halted or redirected to other areas until the discovery has been documented by a qualified archaeologist or paleontologist, and its potential significance evaluated consistent with CEQA. Resources considered significant will be avoided by Project redesign. If avoidance is not feasible, the resource will be subject to a data recovery mitigation program, as appropriate. If human remains are discovered, the County Coroner will be contacted, and all procedures required by the California Health and Safety Code Section 7050.5, State CEQA Guidelines Section 15064.5(e), and PRC Section 5097.98 will be followed.

RESIDUAL IMPACT

With implementation of MM CR-1, Impact CR-2 would be reduced to a less than significant level.

3.9.2.3.2 Santa Ana River Construction Area

Plunge Pool Pipeline (Phase I). Two cultural resources are located within the construction corridor of the Plunge Pool Pipeline, Phase I: the Francis Cuttle Weir Dam (P1064-09H, P1064-22H) and part of the North Fork Canal (CA-SBR-6544H).

Impact CR-3. *Construction of the Plunge Pool Pipeline (Phase I) would cause a substantial adverse change in the significance of the Francis Cuttle Weir Dam, a potentially significant historical resource as defined in Section 15064.5 of CEQA.*

The Francis Cuttle Weir Dam is a potentially significant cultural resource. Therefore, if proposed construction demolishes or materially alters in an adverse manner those physical characteristics that convey its historical significance and that justify its inclusion on, or eligibility for inclusion on, the California Register, it would be a significant impact. Construction of the Plunge Pool Pipeline, Phase I, would require either the modification of the existing intake structure associated with the Francis Cuttle Weir Dam, or construction of a new intake structure immediately north of those facilities. It may be necessary to demolish the entire historic intake structure and weir, depending on final engineering designs for the Project. Extensive modification of the existing intake structure or physical demolition of the entire intake structure and weir would impair or completely remove the remaining intact portions of the historic Francis Cuttle Weir Dam. This would result in a significant impact on cultural resources.

MITIGATION MEASURES

MM CR-2: Proposed construction of the Plunge Pool Pipeline will avoid physical impacts to the Francis Cuttle Weir Dam to the extent feasible. In the event that any portion of the Francis Cuttle Weir Dam would be modified or demolished, a qualified architectural historian will prepare a historic recordation of the Francis Cuttle Weir Dam, in the context of the Conservation District's groundwater spreading system. The recordation will conform to the standards of either the Historic American Buildings Survey (HABS) or the Historic American Engineering Record (HAER).

RESIDUAL IMPACT

With implementation of MM CR-2, Impact CR-3 would be reduced but not eliminated. Available mitigation measures, short of preservation, would not reduce impacts of demolition below the threshold of significance. This is an unavoidable significant impact.

Impact CR-4. *Construction of the Plunge Pool Pipeline (Phase I) would cause a substantial adverse change in the significance of the North Fork Canal, a potentially significant historical resource as defined in Section 15064.5 of CEQA.*

The North Fork Canal is a potentially significant cultural resource. Therefore, if proposed construction adversely impacted the physical features that convey the canal's historic significance, it would be a significant impact. The construction of the Plunge Pool Pipeline, Phase I, has the possibility of impacting two sections of the North Fork Canal.

The proposed pipeline alignment would impact about a 300-foot section of the canal that runs under and adjacent to the Santa Ana Canyon Road. Most of this impacted section was recently converted from an open ditch to an underground pipe during construction of the Seven Oaks Dam and, therefore, the historic integrity of this section has been previously compromised. Installation of the Plunge Pool Pipeline would remove the underground pipe temporarily and replace it in-kind after installation of the Project pipeline. In addition, a small portion of the adjacent open ditch would be converted to a pipe. This change would not impact the physical features that convey the historic significance of the North Fork Canal since the historic integrity of this portion of the North Fork Canal was previously compromised and the conversion of a small portion of additional open ditch is minor compared to the 8 miles of existing canal system. Therefore, this construction method would have minimal impact on the historic integrity of the North Fork Canal and would result in a less than significant impact on cultural resources. No mitigation is required.

About 1,000 feet of the North Fork Canal would also fall within the construction corridor of the Plunge Pool Pipeline, Phase 1, when the proposed pipeline extends through the orange groves north of Greenspot Road. This canal segment, which would be located at the northern edge of the buffer zone of the construction corridor, consists of an enclosed canal near the ground surface. Although the canal would not be directly impacted by the trenching activities, heavy equipment could be driven over the canal, which could cause some of the canal system to collapse under the weight. Destruction of 1,000 feet of the historic canal system could affect the historic integrity of the North Fork Canal, resulting in a significant impact on cultural resources.

MITIGATION MEASURES

MM CR-3: Prior to construction activities along the segment of the Plunge Pool Pipeline, Phase I, aligned north of Greenspot Road, the location of the North Fork Canal will be precisely mapped on engineering design plans to identify where the canal falls within the construction corridor. Temporary fencing will be placed 5 feet south of the canal along the portion of the canal that falls within the construction corridor to provide a small buffer area, and no heavy construction equipment or vehicles will be allowed north of the fencing.

RESIDUAL IMPACT

With implementation of MM CR-3, Impact CR-4 would be reduced to a less than significant level.

Plunge Pool Pipeline (Phase II). One cultural resource, the Grove House/Well site (CA-SBR-5526H), is located within the construction corridor for the Plunge Pool Pipeline, Phase II.

Impact CR-5. *The construction of the Plunge Pool Pipeline (Phase II) would cause a less than significant adverse change in the significance of Grove House/Well site.*

The Grove House/Well site is located approximately 100 feet south of the proposed pipeline alignment, and within the buffer zone of the proposed construction corridor. It is possible that some of the historic features on the northern portion of the site, such as the unmortared cobble/boulder pads, may be impacted during construction. However, the Grove House/Well site was determined to be not significant and ineligible for listing on the National Register, and SHPO concurred with this determination. Therefore, impacts to historic resources associated with this site would be less than significant. No mitigation is required.

Plunge Pool Pipeline (Phase III). The intake structure associated with the Plunge Pool Pipeline would be located adjacent to the existing plunge pool, where extensive ground disturbance occurred during the construction of Seven Oaks Dam. No existing cultural resources are located within the construction corridor of the proposed intake structure. Due to previous ground disturbance at this location and the absence of recorded cultural resources, no direct impacts on cultural resources would occur from construction of the intake structure.

Two cultural resources are located within the construction corridor of the Plunge Pool Pipeline, Phase III: the Francis Cuttle Weir Dam (P1064-09H, P1064-22H) and part of the North Fork Canal (CA-SBR-6544H).

Impact CR-6. *The construction of the Plunge Pool Pipeline (Phase III) would cause a substantial adverse change in the significance of the Francis Cuttle Weir Dam, a potentially significant historical resource as defined in Section 15064.5 of CEQA.*

The Francis Cuttle Weir Dam is a potentially significant cultural resource. Therefore, if proposed construction activities adversely impacted the physical features that convey the dam's historic significance, it would be a significant impact. Part of the weir is currently covered by a bridge and road that was built during the construction of Seven Oaks Dam. Trenching activities associated with the Plunge Pool Pipeline, Phase III, would demolish this bridge and road and the underlying weir. Demolition of a portion of the weir during trenching activities would impair the remaining intact portions of the historic Francis Cuttle Weir Dam, which would result in a significant impact on cultural resources.

MITIGATION MEASURES

MM CR-2 would reduce impacts on the historic integrity of the Francis Cuttle Weir Dam.

RESIDUAL IMPACT

With implementation of MM CR-2, Impact CR-6 would be reduced but not eliminated. Available mitigation measures, short of preservation, would not reduce impacts of demolition below the threshold of significance. This is an unavoidable significant impact.

Impact CR-7. *The construction of the Plunge Pool Pipeline (Phase III) would cause a less than significant adverse change in the historic integrity of the North Fork Canal, a potentially significant historical resource as defined in Section 15064.5 of CEQA.*

The North Fork Canal is a potentially significant cultural resource. Therefore, if proposed construction adversely impacted the physical features that convey the canal's historic significance, it would be a significant impact. The proposed pipeline alignment would cross directly under one section associated with the North Fork Canal, the River Crossing Pipeline, which is a riveted metal pipe that diverts water from the afterbay of the SAR 2/3 powerhouse. The proposed Plunge Pool Pipeline would cross under the existing metal pipe by burrowing through the recent fill material. This construction method would have no impact on the historic integrity of the North Fork Canal. If this construction method is not possible, it might be necessary to remove part of the existing metal pipe during installation of the new pipeline. A section of the metal pipe would be removed temporarily and replaced in-kind after installation of the new pipeline. This construction method would have minimal impact on the historic integrity of the North Fork Canal and would result in a less than significant impact on cultural resources. No mitigation is required.

Low Flow Connector Pipeline. Most of the proposed Low Flow Connector Pipeline would be installed within the same trench as the proposed Plunge Pool Pipeline, Phase III. Impacts and mitigation measures would be the same as discussed above (see Impacts CR-6 and CR-7).

The northern and southern portion of the Low Flow Connector deviate from the Plunge Pool Pipeline alignment and would entail excavating a separate trench for the installation of the pipe. No existing cultural resources are located within either construction corridor, and both areas were previously disturbed during the construction of Seven Oaks Dam. Due to previous ground disturbance at these locations and the absence of recorded cultural resources, no direct impacts on cultural resources would occur from the construction of these segments of the Low Flow Connector Pipeline.

Morton Canyon Connector II Pipeline. There are two cultural resources located within the construction corridor of the Morton Canyon Connector II Pipeline: part of the Redlands Canal (CA-SBR-8546H) and the Greenspot Bridge (P1064-33H).

Impact CR-8. *The construction of the Morton Canyon Connector II Pipeline would cause a less than significant adverse change in the historic integrity of the Redlands Canal, a potentially significant historical resource as defined in Section 15064.5 of CEQA.*

The Redlands Canal is a potentially significant cultural resource. Therefore, if proposed construction adversely impacted the physical features that convey the canal's historic significance, it would be a significant impact. The proposed pipeline alignment would run parallel to the Redlands Canal for most of its route, and would cross under the canal in one place. The new pipeline would cross the canal near the head of Morton Canyon, where the canal is composed of a concrete pipe. The concrete pipe would be supported in place and kept in service during construction. This construction method would have minimal impact on the historic integrity of the Redlands Canal and would result in a less than significant impact on cultural resources. No mitigation is required.

Impact CR-9. *The construction of the Morton Canyon Connector II Pipeline would cause a substantial adverse change in the significance of the Greenspot Bridge, a significant historical resource as defined in Section 15064.5 of CEQA, if the pipeline is installed through the "Hole in the Wall" at Greenspot Bridge.*

The Greenspot Bridge is a significant cultural resource. Therefore, if proposed construction adversely impacted the physical features that convey the bridge's historic significance, it would be a significant impact. The Morton Canyon Connector II pipeline would be installed under the upstream section of the retaining wall of the Greenspot Bridge, leaving the wall intact, and would avoid using the "Hole in the Wall." After construction is complete, the new pipeline would not be visible from the bridge. This construction method would have no impact on the historic integrity of the Greenspot Bridge or its associated features. If this construction method is not possible, it might be necessary to install the Morton Canyon Connector II Pipeline through the "Hole in the Wall," similar to the previous installation of the Morton Canyon Connector I. If the structure of the retaining wall has to be altered for the installation of the proposed pipeline, this could affect the historic integrity of the Greenspot Bridge and its associated features, which would result in a significant impact on cultural resources.

MITIGATION MEASURES

MM CR-4: If it is necessary to install the Morton Canyon Connector II Pipeline through the "Hole in the Wall" within the retaining wall of Greenspot Bridge, construction activities will be confined to previously disturbed sections only and the wall will be restored to pre-Project conditions. Prior to construction, a qualified architectural historian will review the final construction designs of the Morton Canyon Connector II Pipeline to verify avoidance of significant impacts to any Greenspot Bridge feature.

RESIDUAL IMPACT

With implementation of MM CR-4, Impact CR-9 would be reduced to a less than significant level.

Greenspot Road Detour. No cultural resources are located within the construction corridor of the Greenspot Road detour. Due to previous ground disturbance at this location during the construction of Seven Oaks Dam and the absence of recorded cultural resources, no direct impacts on cultural resources would occur.

Construction Staging Area. No cultural resources are located within the boundaries of the proposed construction staging area. Due to previous ground disturbance at this location during the construction of Seven Oaks Dam and the absence of recorded cultural resources, no direct impacts on cultural resources would occur.

Paleontologic Resources. Due to past ground disturbance and low paleontologic sensitivity, there is little potential for paleontologic resources in the Santa Ana River Construction Area. No direct impacts on paleontologic resources would occur.

Unanticipated Discoveries. **Impact CR-2** also applies to the Santa Ana River Construction Area.

MITIGATION MEASURES

MM CR-1 would reduce unanticipated impacts on cultural resources.

RESIDUAL IMPACT

With implementation of MM CR-1, Impact CR-2 would be reduced to a less than significant level.

3.9.2.3.3 Devil Canyon Construction Area

Devil Canyon By-Pass Pipeline. No existing cultural resources are located within the construction corridor of the proposed Devil Canyon By-Pass Pipeline. Due to previous ground disturbance at this location and the absence of recorded cultural resources, no direct impacts on cultural resources would occur from construction of the pipeline.

Construction Staging Area. The construction staging area for the Devil Canyon By-Pass Pipeline would be located on a 1-acre parcel within the disturbance corridor of the existing Inland Feeder Pipeline. Due to previous ground disturbance at this location and the absence of recorded cultural resources, no direct impacts on cultural resources would occur from construction of the pipeline.

Paleontologic Resources. Due to extensive ground disturbance from the Inland Feeder Pipeline, there is little potential for paleontologic resources in the Devil Canyon Construction Area. No direct impacts on paleontologic resources would occur.

Unanticipated Discoveries. **Impact CR-2** also applies to the Devil Canyon Construction Area.

MITIGATION MEASURES

MM CR-1 would reduce unanticipated impacts on cultural resources.

RESIDUAL IMPACT

With implementation of MM CR-1, Impact CR-2 would be reduced to a less than significant level.

3.9.2.3.4 Lytle Creek Construction Area

Lower Lytle Creek Pipeline. One cultural resource, the Fontana Powerhouse and associated features (CA-SBR-6699H), is located adjacent to, but outside, the construction corridor of the Lower Lytle Creek Pipeline.

Impact CR-10. *The construction of the Lower Lytle Creek Pipeline would cause a less than significant adverse change in the historic integrity of the Fontana Powerhouse complex, a potentially significant historical resource as defined in Section 15064.5 of CEQA.*

The Fontana Powerhouse is a potentially significant cultural resource. Therefore, if proposed construction activities adversely impacted the physical features that convey the historic significance of the powerhouse complex, it would be a significant impact. Installation of the pipeline would not directly impact any features associated with the powerhouse. The Lower Lytle Creek Pipeline would be installed adjacent to the powerhouse, and the pipeline would deliver water to an open ditch that currently receives water from the Fontana Powerhouse. A new concrete box would be constructed at the end of the pipeline, which would bubble water into the open ditch behind the powerhouse. After construction is complete, the only visible portion of the pipeline would be the concrete box, which would lie level with the existing ditch. The pipeline would not be visible from the powerhouse since it would be installed underground. This construction method would have minimal impact on the historic integrity of the Fontana Powerhouse or its associated features and would result in a less than significant impact on cultural resources. No mitigation is required.

Cactus Basins Pipeline. No recorded cultural resources are located within the construction corridor of the Cactus Basins Pipeline. Due to previous ground disturbance along the proposed pipeline route and the absence of recorded cultural resources, no direct impacts on cultural resources would occur.

Construction Staging Areas. No cultural resources are located within the boundaries of the proposed construction staging area. Due to previous ground disturbance at this location and the absence of recorded cultural resources, no direct impacts on cultural resources would occur.

Paleontologic Resources. Due to past ground disturbance and low paleontologic sensitivity, there is little potential for paleontologic resources in the Lytle Creek Construction Area. No direct impacts on paleontologic resources would occur.

Unanticipated Discoveries. **Impact CR-2** also applies to the Lytle Creek Construction Area.

MITIGATION MEASURES

MM CR-1 would be applicable in reducing unanticipated impacts on cultural resources.

RESIDUAL IMPACT

With implementation of MM CR-1, Impact CR-2 would be reduced to a less than significant level.

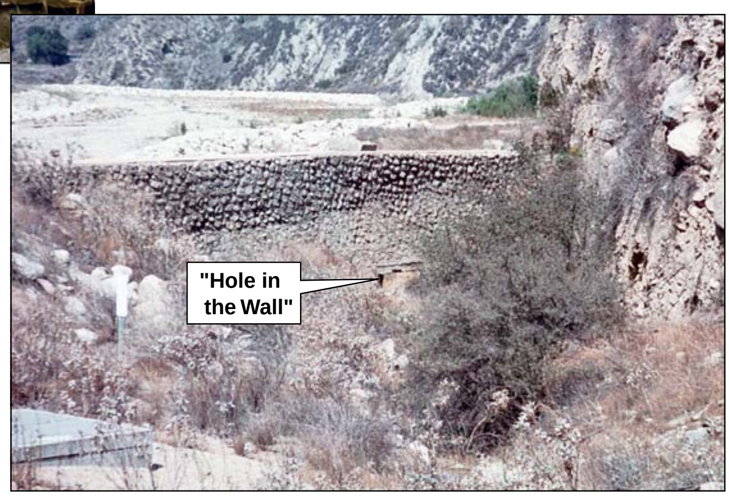
3.9.2.4 Project Operations and Maintenance

Normal Project operations, including routine and periodic maintenance, would have no impact on any cultural resource since no new ground disturbance or facility modifications would be involved.

Francis Cuttle Weir Dam and
Associated Diversion Structure

Greenspot Bridge
Over the Santa Ana River

Section of the North Fork Canal
Crossing the Santa Ana River



The "Hole in the Wall" in the
Greenspot Bridge Retaining Wall

Figure 3.9-1. Selected Historic Resources in the Vicinity of the Santa Ana River Construction Area

3.10 NOISE

3.10.1 Environmental Setting

Noise is defined as unwanted sound from either stationary or transient sources that could disrupt normal activities or diminish the quality of the environment. Typical noise levels of familiar sources are presented in Figure 3.10-1. Because of the large range over which humans hear, the decibel (dB), a logarithmic scale, is used to measure noise. This scale allows for presentation of results on a scale from 0 dB (threshold of hearing) to 140 dB (threshold of pain). The measurement scale is usually presented in an adjusted form, the dBA, in order to reflect normal human hearing by de-emphasizing the very low and very high frequencies. This adjustment is referred to as "A-weighting."

The human auditory system is not sensitive to subtle changes in sound levels. A 1-dB change is hardly perceptible to the human ear. With a doubling of the sound level (a 3-dB increase), there would be a perceived increase of only 25 percent. It requires a 10-dB increase for a perceived doubling of the sound level.

Because of the logarithmic nature of decibels, when two noise events in the same area happen at the same time, if the lower level is more than 10 dB below the higher level, then the lower level does not noticeably contribute to the final aggregate noise level. For this reason, if the background ambient noise level is around 50 dB, it would not usually contribute to the overall noise level experienced at a location when construction activity (typically with a noise level in excess of 60 dB) occurs nearby.

Various noise descriptors have been developed for the measurement of transient noise, where sound levels change continuously over a given period. Studies have been conducted that relate sound levels expressed by these descriptors to levels of annoyance experienced by humans as well as levels that are physiologically hazardous. The simplest descriptor is the Leq (energy equivalent sound level) which averages the sound levels from a variety of sources over a given period. A more common approach taken for noise impact studies is to average sound levels (either measured or estimated) over a 24-hour period. The day-night noise level (Ldn) is such a descriptor. This descriptor adds a 10-dB penalty to noise that occurs between 10 PM and 7 AM, reflecting the increased annoyance attached to noise during these hours. Another common noise descriptor, similar to the Ldn, is the Community Noise Equivalent Level (CNEL). For the CNEL, an additional 5 dB penalty is added to sound levels occurring in the early evening between 7 PM and 10 PM. Ldn and CNEL are generally considered to be equivalent descriptors of the community noise environment within ± 1.0 dBA.

3.10.1.1 Regulatory and Institutional Setting

Noise and land use guidelines have been developed by a number of federal and state agencies. These include the Federal Highway Administration (FHWA), the Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD), and the State of California. In addition, county and local governments develop noise elements as part of their general plans. These elements provide guidelines for recommended maximum sound levels for various land uses. Noise ordinances may also be developed and adopted.

The Project would occur in the County of San Bernardino and the cities of Highland, Rialto, and San Bernardino. The San Bernardino County General Plan, adopted on July 1, 1989 and revised in 1999, includes a Noise Element. Noise standards adopted in the General Plan are shown in Table 3.10-1. They reflect the County's objectives for long-term noise level standards. The City of Highland has developed a Noise Element (October 27, 1992) for its General Plan. It does not, however, deal directly with construction noise. The City has also not promulgated a noise ordinance. The City of San Bernardino has developed a Noise Ordinance (Chap. 8.54 of the Municipal Code) that addresses construction noise and restricts certain construction equipment from operating between 10 PM and 7 AM.

Table 3.10-1. San Bernardino County Interior/Exterior Noise Level Standards

LAND USE		Ldn OR CNEL (dB)	
Categories	*Uses*	*Interior**	*Exterior***
Residential	Single and multi-family, duplex, mobile homes	45	60**
Commercial	Hotel, motel	45	60***
	Commercial retail, restaurants	50	N/A
	Office building, R&D, Professional offices	45	55
	Entertainment halls	45	N/A
Institutional/Public	Hospital, nursing home, school classroom, church, library	45	65
Open Space	Park	N/A	65

* Indoor environment excluding bathrooms, kitchen, toilets, closets and corridors.

** Outdoor environment limited to private yard of single family units and patios.

*** An exterior noise level of up to 65 dB (or CNEL) will be allowed provided exterior noise levels have been substantially mitigated and interior noise exposure does not exceed 45 dB with windows and doors closed.

Source: County of San Bernardino General Plan 1989a (abbreviated Figure II-8).

The City of Rialto has developed a Noise Element (1991), but has not approved a city noise ordinance. The proposed standards in Exhibit 16 of the City's Noise Element are similar to those in Table 3.10-1. Whereas the Noise Element suggests that the City develop standards for construction noise, the Noise Element's attached model noise ordinance explicitly exempts construction activities.

3.10.1.2 Project Construction Areas

3.10.1.2.1 Seven Oaks Dam and Reservoir Construction Area

The Seven Oaks Dam and Reservoir Construction Area lies within the steep-walled Santa Ana River Canyon and there are no existing residences located within a 1-mile radius of the dam. About ½-mile west of the dam, there is the U.S. Forest Service Santa Ana Divide Trail. Persons using this trail may be potentially affected by activities at the dam. Noise sources contributing to the ambient noise in the construction area consist primarily of natural sounds such as wind and birds, occasional high-altitude aircraft overflights, and maintenance vehicles. Based on a characterization of the area, Ldn levels are currently estimated in the 40 to 50 dBA range.

3.10.1.2.2 Santa Ana River Construction Area

The noise environment in the Santa Ana River Construction Area tends to be either relatively quiet or dominated by vehicles passing on nearby roads. The noise sensitive receptors in this area are the few isolated residences and the recently developed housing tract along the north side of Greenspot Road. Users of the Morton Canyon Ridge Trail, about 500 feet east of the proposed Morton Canyon Connector II Pipeline construction area, would also be noise-sensitive receptors. Based on a characterization of the area, Ldn levels are currently estimated in the 40 to 55 dBA range.

3.10.1.2.3 Devil Canyon Construction Area

The noise environment in the Devil Canyon Construction Area is relatively quiet. The sound of moving water can be heard from the perennial stream. There is a housing development approximately 600 feet southwest of the proposed construction area. Based on a characterization of the area, Ldn levels are estimated in the 40 to 50 dBA range.

3.10.1.2.4 Lytle Creek Construction Area

The Lytle Creek Construction Area is located within the City of Rialto. It is currently dominated by vehicular noise in the area where construction would occur. The municipal airport is south of Highland Avenue and, according to the City Noise Element, is not a major contributor to the noise environment in the vicinity where pipeline construction would occur. North of Riverside Avenue, there are noise-generating activities associated with aggregate mining operations and truck-related noise. There are numerous residences along the proposed pipeline routes. Based on the suburban/urban characterization of the area, as well as the information contained in the City Noise Element, Ldn levels are estimated to be in the 45 to 60 dBA range. Traffic noise levels depend on the numbers of vehicles, their hourly distribution, and the mix of vehicles. Typical traffic noise levels at 100 feet from the road centerline, such as on Riverside Avenue, may be 70 dBA or higher.

3.10.1.3 Project Operations Areas

Project operations and maintenance activities could potentially affect the same noise-sensitive receptors as described for construction activities.

3.10.2 Impacts and Mitigation Measures

3.10.2.1 Methodology

Sound levels generated by the construction of Project components were evaluated to determine the extent to which they would impact existing noise-sensitive receptors. Conservative assumptions were made about the mix of construction equipment and the extent of this equipment's use during a particular construction phase. For a given scenario, day-night average noise levels were calculated at a series of distances from the construction activities. These levels give an indication of the sound levels that may be experienced at residences during construction and thus help to evaluate potential impacts.

3.10.2.2 Significance Criteria

The criteria used to determine the significance of noise impacts are based on the model initial study checklist in Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would:

- Expose persons to, or generate, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in a substantial permanent increase in ambient noise levels in the Project vicinity above the noise levels that would be present without the Project; or
- Result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels that would be present without the Project.

The term "substantial temporary or periodic increase in ambient noise levels" is interpreted to include construction noise levels that exceed the exterior noise level criteria in existing noise documents or those proposed in the Noise Elements of affected jurisdictions. In particular, an L_{dn} increase of 10 dBA or more above the exterior noise criterion of 60 dBA, i.e., 70 dBA, is considered to be the significance criterion for construction noise for this analysis. This corresponds to a perceived doubling in the sound level above the exterior noise criterion.

3.10.2.3 Project Construction

3.10.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Impact NOI-1. *Construction at the Seven Oaks Dam and Reservoir Area would generate* L_{dn} *levels of less than 60 dBA at the nearest noise sensitive receptors. Construction-related noise impacts are less than significant.*

Based on the equipment that would be used at the site, noise levels from construction would generally be as shown in Table 3.10-2. These estimates of construction noise levels (L_{dn}) assume a 12-hour workday and include estimates of equipment usage (in hours per day) and the percentage of time the equipment would operate at peak power. In calculating impacts, no adjustments have been made for noise level reductions due to topographic features, sound barriers, or state-of-the-art noise reduction equipment. Based on the construction equipment required, scenarios for the three phases of construction activity were prepared: trenching; stringing the pipeline; and backfill.

Table 3.10-2. Maximum Noise Levels (Ldn) of Typical Construction Activities

Distance from Noise Source (Feet)	*Seven Oaks Dam*	*Pipeline Trenching*	*Pipeline Stringout*	*Pipeline Backfill*
50	94	91	89	86
100	88	85	83	80
200	82	79	77	74
300	78	75	73	71
400	76	73	71	68
500	74	71	69	67
600	72	69	68	65
700	71	68	66	64
800	70	67	65	63
900	69	66	64	62
1,000	68	65	63	61
1,200	67	64	62	59
1,400	65	62	60	58
1,600	64	61	59	57
1,800	63	60	59	56
2,000	62	59	58	56
2,200	61	59	57	55
2,400	61	58	56	55
2,600	60	57	56	54

Source: SAIC 2004.
Background noise level assumed to be 50 dBA.
Equipment noise levels from County of San Bernardino Noise Element, Appendix H, 1989.

Noise from localized sources (such as construction activities) typically falls off by about 6 dBA with each doubling of distance from source to receptor. When noise on the construction site is 94 dB, outdoor receptors at a distance of 2,600 feet from the construction site that have an uninterrupted view of the construction site would experience noise no greater than 60 dBA. This is the residential standard for the County of San Bernardino. Because of the isolated location of the site, there are no receptors adjacent to or in the vicinity of the site. All existing residences are located more than 2,600 feet from the Project construction area and would, therefore, be exposed to construction noise levels lower than 60 dBA. It is not expected that users of the U.S. Forest Service Santa Ana Divide Trail would be significantly affected by the Project because of the ½-mile distance separating it from the construction site. Natural and man-made structures would provide additional shielding from the construction noise at the site. The actual noise impact "envelope" would thus be smaller than 2,600 feet in many areas. Noise impacts in this construction area would be less than significant because the San Bernardino County Noise Element noise standards would not be exceeded, and residents would not otherwise be exposed to substantial increases in ambient noise levels. Impacts would be less than significant and no mitigation measures are required.

3.10.2.3.2 Santa Ana River Construction Area

Impact NOI-2. *Construction of the Plunge Pool Pipeline could expose residents near Greenspot Road to increases in ambient noise levels. Temporary L_{dn} increases of more than 10 dBA could raise the levels to more than 70 dBA. This would be a significant impact.*

The Plunge Pool Pipeline would be constructed in San Bernardino County near the Seven Oaks Dam and in the City of Highland adjacent to Greenspot Road. Construction of the Plunge Pool Pipeline and Low Flow Connector Pipeline would create high noise levels. The background noise level at the construction site was assumed to be 50 dBA.

To the north of Greenspot Road, there are a several, scattered, occupied residences and a recently constructed residential development that could be affected. At the closest point, the proposed pipeline would be approximately 600 feet from the residential development. A wall around the development currently serves as a sound barrier, potentially reducing noise levels. On the south side of Greenspot Road, there are a few residences within 500 feet of the western end of the proposed pipeline. Noise impacts in this construction area would be significant because some residents would be exposed to increases in L_{dn} levels of more than 10 dBA and noise levels at these locations would exceed the significance criterion of 70 dBA during the construction period.

MITIGATION MEASURES

MM NOI-1: A construction noise monitor, identified by the Project proponents, will be responsible for overseeing the contractor's implementation of the noise mitigation measures. The monitor will also be the point of contact for noise complaints.

Construction will occur only from Monday through Friday between 7 AM and 7 PM. No construction will occur on weekends or holidays.

Noise-generating construction equipment will be less than 10 years old or, if older, will not generate higher noise levels than new low-noise generating models. Documentation will be provided by the contractor.

Construction equipment will be accessorized with the manufacturers' recommended noise attenuation devices, such as sound mufflers or self-adjusting backup alarms, and be appropriately maintained.

In noise sensitive areas, temporary noise barriers will be located around high noise-generating equipment.

Placement of construction equipment during times of operation will take into account the location of noise sensitive receptors.

Where noise levels are expected to be high, advanced warning in writing will be given to residents in the vicinity of construction activities indicating the expected duration of the activities.

RESIDUAL IMPACT

Implementation of MM NOI-1 would reduce construction noise Impact NOI-2, however, residents close to the construction, such as near the western terminus of the Plunge Pool Pipeline, would still experience significant noise impacts. These impacts would be significant and unavoidable.

Impact NOI-3. C*onstruction of the Plunge Pool Pipeline could expose users of the Santa Ana Divide Trail to increased ambient noise levels. This would be a less than significant impact.*

Given the ½-mile distance from the U.S. Forest Service Santa Ana Divide Trail to the construction area, it is possible that trail users may perceive noise from construction of the Plunge Pool Pipeline. However, the overall sound level would be less than 60 dBA (L_{dn}). Additional reductions may occur due to topographical features and noise absorption by vegetation. Therefore, the construction noise impact to trail users would be less than significant and no mitigation measures are required.

Impact NOI-4. *Construction at the Morton Canyon Connector II Pipeline would create L_{dn} levels of less than 60 dBA at the nearest noise sensitive receptors. The construction-related noise impacts would be less than significant.*

The construction area of the proposed Morton Canyon Connector II Pipeline is remote from permanent noise-sensitive receptors such as homes. Users of the Morton Canyon Ridge Divide Trail would be affected near the trailhead, if construction activities are occurring. Noise levels at 500 feet would be about 70 dB (L_{dn}). The noise levels would diminish as trail users traverse the trail and gain distance from the construction area. Noise would only affect a small portion of the trail nearest the construction site and would impact persons who are mobile, not persons residing in permanent structures. This impact is, therefore, considered less than significant. No mitigation is required.

3.10.2.3.3 Devil Canyon Construction Area

Impact NOI-5. *The Devil Canyon By-Pass Pipeline construction activities could create L_{dn} levels at nearby residences in excess of 69 dBA and increase noise levels by more than 10 dBA. This would be a significant impact.*

Construction of the proposed Devil Canyon By-Pass Pipeline would produce a noticeable impact to residences located to the west where the nearest house is approximately 600 feet away. There are approximately a dozen houses that would be most affected by the Project. During construction, noise levels (L_{dn}) could be as high as 69 dBA during the trenching phase, although topographical features and development walls could reduce these noise levels. The activity would last a few months and may be annoying to residents. The impact would be significant because the increase would exceed 10 dB and could potentially reach the significance criterion of 70 dB.

MITIGATION MEASURES

MM NOI-1 would reduce the potential noise impact of construction activities for the Devil Canyon By-Pass Pipeline.

RESIDUAL IMPACTS

Implementation of MM NOI-1 would reduce construction noise; however, residents close to the construction would still experience significant noise impacts. These impacts would be significant and unavoidable.

3.10.2.3.4 Lytle Creek Construction Area

Impact NOI-6. *Construction of the Lower Lytle Creek and Cactus Basins pipelines could create noise levels (L_{dn}) at nearby residences in excess of 69 dBA and increase noise levels by more than 10 dBA. This would be a significant impact.*

The proposed Lower Lytle Creek Pipeline would connect the San Gabriel Valley Municipal Water District Lytle Pipeline (Lytle Pipeline) to the proposed Lytle Basins. It would be built along the urban arterial Riverside Avenue in the northern part of the City of Rialto, with a short portion around the Fontana Power Plant. In addition, a construction staging area would be built north of Riverside Avenue, next to the power plant. There are no noise sensitive receptors that would be adversely impacted by this construction.

The proposed alignment of the Cactus Basins Pipeline, located in the City of Rialto, would be located in Linden Avenue, West Summit Avenue, Cedar Avenue, West Casmalia Street, and Spruce Avenue.

Although the City of Rialto has a Noise Element (1991) in its General Plan, no ordinance has been passed addressing construction noise. However, the State CEQA Guidelines state that a temporary substantial increase may be considered significant.

Along the route of the pipeline in Rialto, approximately 70 homes, including mobile homes, have walls that serve as noise barriers for traffic and potential construction noise. Slightly fewer houses face onto the street and have no noise-attenuating walls. The number of residences that may be negatively affected could be three to five times as many, depending on lot depths and width of roads. A block wall can provide approximately a 5 to 12 dB reduction in noise levels at the house, depending upon the height and construction of the wall, the location of the house, and breaks in the wall. In addition to the attenuation of noise levels due to distance, attenuations may result from the number of rows of houses and additional walls. Depending upon the density of the houses, an additional 3 dB reduction may be obtained by the first row of houses and 1.5 dB for additional rows, up to a maximum of 10 dB. Walls around the second and additional rows of houses would further aid in reducing the noise levels.

On average, one or two 40-foot lengths of pipe would be installed per day. The road is excavated, the pipe laid and installed, and the trench backfilled prior to the next length of pipe being laid. The greatest impact would be during the 3 or 4 days that the crew is working on the street in front of any given house. Without a wall, the L_{dn} may be about 90 dBA at 50 feet from the immediately adjacent homes. With a block wall, this may be reduced by 10 dBA. As a worst case, without a wall, at a rate of two 40-foot sections of pipe laid per day, it may take more than 2 weeks from the time the noise levels rise above 70 dBA to when they fall below 70 dBA at any given home. Noise impacts in this construction area would be significant because residents would be exposed to a substantial temporary increase in ambient noise levels.

MITIGATION MEASURES

MM NOI-1 would reduce the potential short-term noise impacts associated with construction of the Lower Lytle Creek Pipeline and Cactus Basins Pipeline.

RESIDUAL IMPACTS

Implementation of MM NOI-1 would reduce construction noise impacts, however, residents close to the construction would still experience significant noise impacts. These impacts would be significant and unavoidable.

3.10.2.4 Project Operations and Maintenance

Impact NOI-7. *Maintenance activities for the proposed pipelines and facilities would not produce a noticeable noise increase for residences in the general area. The resulting impact would be less than significant.*

The occasional passing maintenance truck may add slightly to the noise environment, but would be within the normal traffic variability. During emergency repairs, noise levels may be higher if construction equipment is required for an extended period. However, emergency situations on a pipeline would be infrequent. Impacts would be less than significant and no mitigation is required.

This page intentionally left blank.

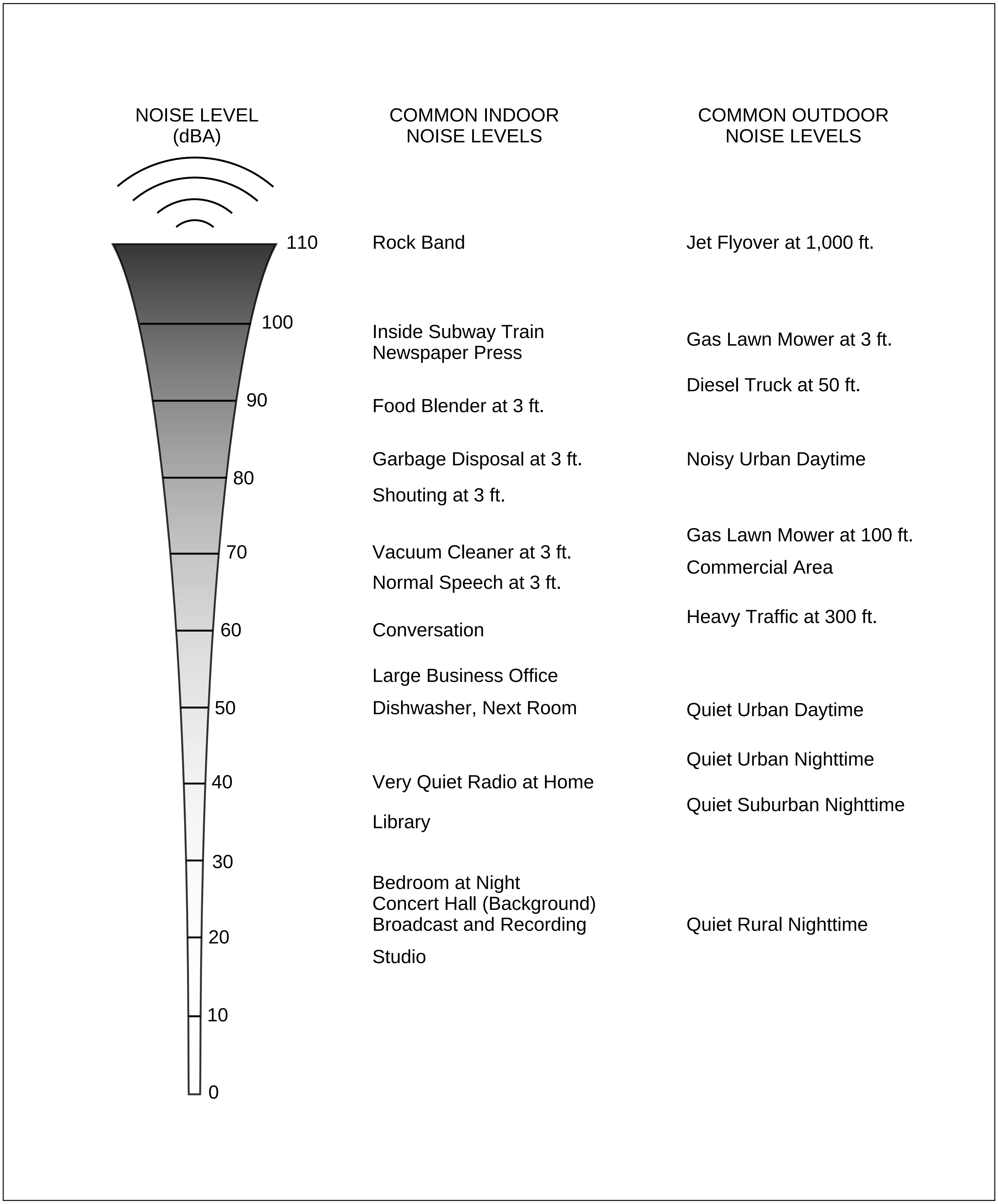


Figure 3.10-1. Typical Sound Levels in Indoor and Outdoor Environments

3.11 AESTHETICS

Visual resources consist of the natural and man-made features that give a particular environment its aesthetic qualities. These features may appear natural or be modified by human activities. Together, they form the overall impression of an area, referred to as its *landscape character*. Landforms, water surfaces, vegetation, and man-made features are treated as characteristic of an area if they are inherent to the formation, structure, and function of the landscape. Landscape character is evaluated to assess whether a project would appear compatible with the existing setting or would contrast noticeably with the setting and appear out of place.

Visual resources also have a social setting, which includes public values, goals, awareness, and concern regarding visual quality. Social setting is addressed as *visual sensitivity*, or the relative degree of public interest in visual resources and concern over adverse changes in the quality of that resource. Visual sensitivity is key in assessing how important an effect on the visual resource would be and whether it represents a significant impact. Recreational uses are generally considered to have high visual sensitivity, as are views from scenic routes or corridors.

3.11.1 Environmental Setting

The visual resources of an area vary according to the type of land use, the amount of open space, and the presence of prominent topographic features such as mountains and ridgelines or other unique features. The Muni/Western service areas are characterized by a variety of landscape features including highly developed urban areas (some with distinctive and historically significant districts), agricultural areas (including extensive citrus groves), and undeveloped open space (including the adjacent San Bernardino National Forest and Cleveland National Forest). Topography varies dramatically and includes low-lying valleys, hillsides, and steep, mountainous terrain. Major water features include the Santa Ana River basin, Lake Mathews and Prado Lake. Both service areas contain a number of incorporated cities with individual identities, as well as smaller communities. The designated state scenic highways within San Bernardino and Riverside counties include a portion of State Route 38 (SR-38) in San Bernardino County; portions of SR-62 in Riverside and San Bernardino counties; and SR-243 and SR-74 in Riverside County. San Bernardino County has also designated about 30 roads as scenic routes.

3.11.1.1 Regulatory and Institutional Setting

Adopted land use plans and policies of local jurisdictions provide the primary regulatory guidance regarding the maintenance of aesthetic resources in the Project area, although federal and state agencies also adopt plans that determine allowable changes to visual resources within their jurisdictions. The areas considered to have the greatest visual sensitivity are typically along scenic highways and wilderness or other natural areas. The primary areas of concern generally are associated with changes to prominent topographic features, changes in the character of an area with high visual sensitivity, removal of vegetation, or blockage of public views of a visually sensitive landscape.

3.11.1.2 Project Construction Areas

3.11.1.2.1 Seven Oaks Dam and Reservoir Construction Area

The visual context of this construction area is dominated by Seven Oaks Dam (see Figures 2-6). Upstream of the dam the reservoir area has a typical mountain canyon visual quality with desert scrub vegetation at lower elevations changing into a more wooded vegetation at higher elevations. Riparian habitat is present in and along the river channel in many places. Throughout the reservoir area there are a number of man-made features, including access roads and water conveyance facilities. Access to Seven Oaks Dam is restricted, so the reservoir area is not visible to the general public.

3.11.1.2.2 Santa Ana River Construction Area

In the SAR Construction Area there are two prominent visual features: Seven Oaks Dam, and the borrow pit from which much of the material used to construct the dam originated (see Figure 2-4). Construction of Seven Oaks Dam resulted in considerable modification of the surrounding topography and vegetation. Boulders covering the dam face have been painted to blend in with the color of the weathered rocks of the surrounding mountains. The area below the dam and northeast of Greenspot Road contains facilities associated with dam operations, water diversion, and hydroelectric power generation that include a pump house, power plant, power lines, pipelines, and other associated buildings. The area northeast of Greenspot Road is not open to the public and, except for the area immediately adjacent to Greenspot Road, is not visible from a public vantage point. The SAR Wash southwest of the dam, along Greenspot Road, is unimproved open space with citrus groves adjacent to the north. The grove area is zoned for residential uses and can be expected to be developed accordingly. South of Greenspot Road is the large borrow pit from which material used in the construction of Seven Oaks Dam was derived. The pit is not visible from Greenspot Road. The area where the SAR crosses under Greenspot Road is characterized by water infrastructure including a pump station and pipelines, and open space. Greenspot Road is not designated as a scenic highway, however, Greenspot Road Bridge is listed as an historical structure. The bridge can be seen in Figure 3.9-1 in section 3.9 (Cultural and Paleontological Resources).

3.11.1.2.3 Devil Canyon Construction Area

No part of the Devil Canyon Construction Area is in the vicinity of a scenic highway or visible from other sensitive public viewpoints. The construction area is located on the southern slope of the western San Bernardino Mountains just below the mouth of Devil Canyon. A considerable amount of disturbance has occurred within the immediate area of the Devil Canyon Construction Area, associated with the recent construction of the Inland Feeder pipeline (see Figure 2-7). Several major and minor water pipelines merge in this area, and many associated structures are present on the surface. In addition, there are numerous access roads and staging facilities, some of which have been paved. Located less than a quarter of a mile to the north, and visible from the construction area, is the Devil Canyon Powerplant of the State Water Project (SWP).

3.11.1.2.4 Lytle Creek Construction Area

The Lytle Creek Construction Area is located primarily within or alongside existing roads and streets serving a developed urban area (see Figure 2-8). The construction area has a varied mixture of land uses and activities that include: aggregate mining and processing facilities, a small hydroelectric power plant, a water treatment plant and water storage tanks, a mobile home park, and single family residences.

3.11.1.3 Project Operations Areas

There would be changes to the hydrologic characteristics of the SAR which could, in turn, affect aesthetics along the course of the SAR from just below Seven Oaks Dam to just upstream of Prado Dam. Descriptions of the visual character of the SAR from its headwaters in the San Bernardino Mountains to Prado Dam, are presented below.

3.11.1.3.1 Santa Ana River

For analytical purposes the SAR is divided into seven segments from upstream of Seven Oaks Dam downstream to Prado Flood Control Basin. The sequence of river segments can be seen in Figure 3.1-6 in section 3.1 (Surface Water Hydrology and Water Quality).

SEGMENT A – UPSTREAM OF SEVEN OAKS DAM

The river is confined within a steep-sided canyon throughout the length of this segment and there are a number of water diversion and hydropower facilities. There is limited public access and vehicular access is restricted to authorized vehicles. There are areas of riparian vegetation along the river channel in the canyon bottom, with surrounding steep slopes occupied by native chaparral vegetation.

SEGMENT B – SEVEN OAKS DAM TO CUTTLE WEIR

The river is still confined within a steep-sided canyon, however, recently-developed riparian vegetation occupies the bottom of the narrow canyon. The presence of this habitat is mostly attributable to the year-round surface water flow caused by upwelling of subsurface flow at the site of Seven Oaks Dam. This section of the river was thoroughly disturbed and completely denuded of vegetation during construction of the dam. This segment of the river course, to which the general public does not have access, contains numerous water conveyance facilities and the Southern California Edison SAR Powerhouse 2/3. During much of the year, surface water flow in the river is diverted at the southern end of the segment for use by agriculture and for potable water supply via the Auxiliary Diversion Canal and Cuttle Weir intake. The steep sided slopes of the canyon support native chaparral vegetation as in the upstream river segment.

SEGMENT C – CUTTLE WEIR TO THE CONFLUENCE WITH MILL CREEK

Just below Cuttle Weir, the SAR emerges from the confining upper canyon section onto the eastern end of an extensive alluvial fan or wash. The floodplain of the SAR becomes wider and stream flow is ephemeral. South of Greenspot Road Bridge the river channel is a broad, cobblestrewn wash, supporting a biological habitat referred to as Riversidean Alluvial Fan Sage Scrub (RAFSS). This habitat is comprised of low, drought-deciduous shrubs and larger evergreen woody shrubs characteristics of coastal sage scrub and chaparral plant communities. The RAFSS also includes individuals or clumps of overstory woody species such as California juniper and sugarbush. RAFSS supports populations of three threatened and endangered species: Santa Ana River woolly-star; slender-horned spineflower; and San Bernardino kangaroo rat. For most of the year (over 50 percent of all days) there is no flow in this segment of the river. When there is flow in the river, it tends to be minimal: only about 9 cfs. Only rarely (about 10 percent of the days) are there appreciable flows in this reach of the river and they are attributable to storm events. Virtually the entire area within this segment is owned by public flood control and water conservation agencies. The area outside the immediate river channel is undeveloped.

SEGMENT D – CONFLUENCE WITH MILL CREEK TO "E" STREET IN THE CITY OF SAN BERNARDINO

Much of this river segment is comprised of the expansive SAR alluvial fan and the braided river channel is about 1,800 feet wide. It is an area that has been subject to overbank flooding in the past and contains numerous remnant river channel sections and rivulets. Flow in the river, except under storm runoff conditions, is ephemeral and riparian vegetation exists along selected stretches where water is available from tributary inflow and upwelling of subsurface water. This river segment generally has little river flow and has no flow on approximately half the days in the year. Much of the area supports RAFSS as in the case of Segment C and much of the area is not accessible to the public. Sizeable aggregate extraction activities are present in the wash area. Immediately adjacent to the San Bernardino International Airport (former Norton Air Force Base), the river channel narrows and is contained between levees on both banks. On the south side of the river channel about 2 miles upstream of "E" Street is an area occupied by agricultural uses including the cultivation of row crops and citrus groves. Otherwise, areas adjacent to the river channel are occupied by urban land uses.

SEGMENT E – "E" STREET TO THE RAPID INFILTRATION AND EXTRACTION FACILITY (RIX)-RIALTO WASTEWATER TREATMENT PLANT (WWTP) OUTFALL

Below "E" Street, the channel of the SAR is narrowly confined between extensive levees. The wetted area of this river segment is generally contained in a braided channel with the surrounding riverbed and banks dry. Vegetation is sporadic in the channel, responding to the presence of upwelling subsurface water (as is the case in the vicinity of Colton Narrows) and tributary inflow. The river channel is bordered on both sides by urban land uses.

SEGMENT F - RIX-RIALTO WWTP OUTFALL TO RIVERSIDE NARROWS

The RIX Facility and Rialto WWTP provide a constant source of inflow to the SAR, contributing to the riparian vegetation present in the river channel. The floodplain of the river is confined by levees on either bank. For about 2 miles upstream of Riverside Narrows, upwelling subsurface water supports an extensive area of riparian vegetation. This segment of the river runs through a highly urbanized section of Riverside County.

SEGMENT G – RIVERSIDE NARROWS TO PRADO FLOOD CONTROL BASIN

Although confined by levees on both banks, the channel of the SAR possesses wide stretches that support extensive areas of dense riparian vegetation. The vegetation is supported by the perennial flow in the river and contains the Santa Ana River Wildlife Area. The area on either side of the channel is highly urbanized.

3.11.2 Impacts and Mitigation Measures

3.11.2.1 Methodology

Potential impacts were evaluated for views that can be observed from public viewing locations such as public roadways and parks. Each Project component was evaluated with regard to its potential to create visual impacts resulting from changes in scenic vistas, changes or damage to scenic resources, or degradation of the visual character of a site.

3.11.2.2 Significance Criteria

The criteria used to determine the significance of impacts to visual resources are based on those contained in Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would result in any of the following:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Project components would not create new permanent sources of substantial light or glare. Thus, this significance criterion is not considered further.

3.11.2.3 Project Construction

3.11.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Impact AES-1. *Project construction would result in a less than significant impact to aesthetics.*

None of this Project construction area is in the vicinity of a scenic highway or visible from other sensitive public viewpoints. The Project would result in new construction on the rear of the dam and relocation of an upstream section of road located within the reservoir area that would have temporary visual impacts. Construction impacts, however, would be short-term and the resulting structures would be consistent with the existing character of the area. In this construction area, Project-related construction activities would create less than significant visual impacts since it would not have a substantial adverse effect on a scenic vista, substantially damage scenic resources, or substantially degrade the existing visual character or quality of the site and its surroundings. No mitigation is required.

3.11.2.3.2 Santa Ana River Construction Area

Impact AES-1 would apply to construction activities in the Santa Ana River Construction Area.

No part of this Project construction area is in the vicinity of a scenic highway or visible from other sensitive public viewpoints. The new pipelines to be located in the Santa Ana River Construction Area would be installed underground and pre-existing surface conditions would be restored, to the maximum extent possible, after construction activities are complete. Large rocks (up to 10 feet in diameter) unearthed during excavation activities, however, would be placed in clusters adjacent to the pipeline routes. New infrastructure and construction for the Project would occur in an area already largely disturbed by activities such as dam construction, road building, gravel mining, and borrow pit excavation. During construction, heavy equipment and activities would be visible from Greenspot Road, but this impact would be temporary and short term. At the plunge pool, just downstream of Seven Oaks Dam, the intake structure and trash rack of the Plunge Pool Pipeline would be visible. However, this area is not visible from areas accessible to the public, and is compatible with other water-related diversion and conveyance structures in the vicinity. Therefore, short-term impacts during construction would contribute to only minor changes in the visible, physical environment and such changes are in character with the SAR Wash area. In the Santa Ana River Construction Area, the Project would not have an adverse effect on a scenic vista, substantially damage scenic resources, or substantially degrade the existing visual character or quality of the site and its surroundings. The Project would have a less than significant impact on aesthetics in this area. No mitigation is required.

3.11.2.3.3 Devil Canyon Construction Area

Impact AES-1 would apply to construction activities in the Devil Canyon Construction Area.

No part of this Project construction area is in the vicinity of a scenic highway or visible from other sensitive public viewpoints. As described above, the Devil Canyon area has been subjected to disturbance during construction, most recently, of the Inland Feeder Pipeline. During Project-related construction, heavy equipment and activities would be visible from homes situated a short distance to the southwest of the construction area. However, this impact would be temporary and would not result in significant long-term changes. The addition of a new underground pipeline would not have a significant adverse effect on a scenic vista, substantially damage scenic resources, or substantially degrade the existing visual character or quality of the site and its surroundings. No mitigation is required.

3.11.2.3.4 Lytle Creek Construction Area

Impact AES-1 would apply to construction activities at the Lytle Creek Construction Area.

The Lytle Creek Construction Area is not located in the vicinity of a scenic highway or visible from other sensitive public viewpoints. The Lower Lytle Creek and Cactus Basins pipelines would be constructed adjacent to an area that contains industrial facilities, such as a power plant, water tanks, and wells, in addition to residential development. During construction, heavy equipment and activities would be visible from homes and roadways adjacent to the construction area, but this impact would be temporary and would not result in significant long-term changes. The Cactus Basins Pipeline would not affect aesthetic resources since it would be placed entirely within existing roadways, which would be restored to pre-construction condition following its installation. Approximately 2,700 feet of the Lower Lytle Creek Pipeline would also be placed within existing streets and so would not impact aesthetic resources. The remaining 1,200 feet of the Lower Lytle Creek Pipeline would be placed underground adjacent to Riverside Avenue and the Fontana Power Plant, just south of a large aggregate material mining area (see Figure 2-8). A concrete box approximately 4 feet by 4 feet would act as the transition between the Lower Lytle Creek Pipeline and the drainage channel to the Lytle Basins. Though visible, this concrete box would be consistent with other industrial facilities and water infrastructure in the immediate vicinity. In the Lytle Creek Construction Area, the Project would not have a substantial adverse effect on a scenic vista, substantially damage scenic resources, or substantially degrade the existing visual character or quality of the site and its surroundings. Implementation of the Project would not have a significant adverse impact on aesthetics. No mitigation is required.

3.11.2.4 Project Operations and Maintenance

3.11.2.4.1 Santa Ana River

SEGMENT A – UPSTREAM OF SEVEN OAKS DAM

Impact AES-2. *Project operations would result in a less than significant impact to aesthetics in the SAR segment upstream of Seven Oaks Dam.*

Project operations could result in a higher reservoir elevation during the months of March through September than would occur under No Project conditions. Seven Oaks Dam was designed to contain runoff associated with a 350-year flood event and the spillway stands at an elevation of 2,610 feet above mean sea level (msl). As a condition of the construction of the facility, the USACE mitigated adverse impacts to habitat and associated plant and animal species within the area upstream of the dam that is below 2,425 feet above msl (the surface elevation of the reservoir under 50-year flood conditions). Under the Project, and depending on rainfall and other conditions, the reservoir could temporarily detain water up to an elevation 2,418 feet above msl during the months of March through September. Though the Project could result in a greater volume of water being retained in the reservoir than under No Project conditions, the presence of water is consistent with existing operations and consistent with the visual context of a reservoir used for flood control purposes. Because this effect is consistent with the visual setting under existing operations and since the reservoir is not in an area open to the public, impacts to aesthetics from Project operations upstream of Seven Oaks Dam and Reservoir are less than significant. No mitigation is required.

SEGMENT B – SEVEN OAKS DAM TO CUTTLE WEIR

Impact AES-2 would apply to Project operations in the SAR segment between Seven Oaks Dam and Cuttle Weir.

River Segment B is not in an area visible to the general public. Implementation of the Project would result in the diversion of waters released from the dam. However, these diversions would not include the required 3 cfs released from the dam for Senior Water Rights Claimants. It is this 3 cfs release from the dam that, for much of the year, comprises the existing flow in the river between the Seven Oaks Dam and Cuttle Weir. Since Project operations would not affect this flow, no changes to the river and its associated riparian vegetation would occur, and impacts to aesthetics would be less than significant. No mitigation is required.

SEGMENT C – CUTTLE WEIR TO THE CONFLUENCE WITH MILL CREEK

Impact AES-2 would apply to Project operations in the SAR segment between Cuttle Weir and the confluence with Mill Creek.

Implementation of the Project would result in a greater number of days throughout the year when no flow exists in the SAR channel (zero-flow days) and lower flow volumes in the channel on days when flows occur. Currently, this river segment is dry over 50 percent of the days in an average year, and, on most other days, exhibits minimal flows. The Project would increase the number of zero-flow days by about 9 percent. This increase in the number of zero-flow days associated with implementation of the Project would not noticeably change the existing visual character or quality of this segment of the river. Impacts to aesthetics would be less than significant. No mitigation is required.

SEGMENT D – CONFLUENCE WITH MILL CREEK TO "E" STREET IN THE CITY OF SAN BERNARDINO

Impact AES-2 would apply to Project operations in the SAR segment from the confluence with Mill Creek to "E" Street.

Implementation of the Project would result in lower flows in this segment of the river. Currently this river segment experienced zero flow on about 48 percent of days and on the remaining days, there is minimal flow in the river. The Project would increase the number of zero-flow days by 3 percent. This increase in the number of zero-flow days would not noticeably change the existing visual character or quality of this segment of the river, and impacts to aesthetics would be less than significant. No mitigation is required.

SEGMENT E – "E" STREET TO THE RIX-RIALTO WWTPS OUTFALL

Impact AES-2 would apply to Project operations in the SAR segment between "E" Street and the RIX-Rialto WWTPs.

From "E" Street to RIX-Rialto the river traverses a highly urbanized section of Riverside County and is channelized and confined between levees. Due to the presence of a number of tributaries, this segment of the river typically has minor flow throughout the year. The wetted area of this river segment is generally contained in a braided channel with the surrounding riverbed and banks dry. It is estimated that there would be a reduction in average monthly flow as a result of the Project for the month of July from 92 cubic feet per second (cfs) to 71 cfs. Such a reduction would not induce noticeable changes in the visual characteristics of the river area and impacts to aesthetics would be less than significant. No mitigation is required.

SEGMENT F – RIX-RIALTO WWTPS OUTFALL TO RIVERSIDE NARROWS

Impact AES-2 would apply to Project operations in the SAR segment between the RIX-Rialto WWTPs and Riverside Narrows.

Below the RIX-Rialto WWTP outfall to the SAR, flow is perennial and implementation of the Project would have a barely perceptible effect on stream flow during periods of low flow, and no perceptible effect during periods of high flow. The visual characteristics of the area along this river segment would remain unchanged with implementation of the Project and impacts to aesthetics would be less than significant. No mitigation is required.

SEGMENT G – RIVERSIDE NARROWS TO PRADO FLOOD CONTROL BASIN

Impact AES-2 would apply to Project operations in the SAR segment between Riverside Narrows and Prado Flood Control Basin.

The effect of the Project on flow in this segment of the SAR becomes increasingly attenuated compared to the immediately upstream segment, and is not measurable. In the absence of changes to the visual character of the river and surrounding areas, impacts to aesthetics would be less than significant. No mitigation is required.

3.11.2.4.2 Groundwater Recharge Facilities

Impact AES-3. *Project operations would result in a less than significant impact to aesthetics at and in the vicinity of groundwater spreading grounds.*

A number of groundwater recharge facilities (spreading basins) would be utilized with implementation of the Project. However, as described in section 3.0, these facilities would be operated within historic use parameters and the visual character of the basins would not change. Impacts to aesthetics would be less than significant. No mitigation is required.

This page intentionally left blank.

3.12 HAZARDOUS MATERIALS AND GROUNDWATER CONTAMINATION

This section addresses hazardous materials in the vicinity of Project construction areas and groundwater recharge facilities, and regional groundwater contamination plumes within the San Bernardino Basin Area (SBBA) and adjoining basins where Project-related spreading facilities are located. The section also addresses groundwater quality impacts associated with hazardous materials, in contrast to section 3.2 which focuses on groundwater quality issues not related to hazardous materials (i.e., total dissolved solids and nitrates). Although both pesticide and nitrate groundwater contamination is commonly associated with agricultural contaminant plumes, nitrates are discussed in section 3.2 since they are not considered hazardous materials.

3.12.1 Environmental Setting

3.12.1.1 Regulatory and Institutional Setting

Hazardous materials spills and related subsurface contamination (i.e., soil and groundwater contaminant plumes) in the Project area are regulated by the U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), Regional Water Quality Control Board (RWQCB), and the Hazardous Materials Division of the San Bernardino County Fire Department and Riverside County Fire Department. In addition, the California Department of Health Services (DHS) monitors drinking water.

3.12.1.2 Project Construction Areas

3.12.1.2.1 Seven Oaks Dam and Reservoir Construction Area

Environmental database reports were obtained from Environmental Data Resources, Inc. (EDR 2002a through 2002o) to identify potentially contaminated sites at and adjacent to Project areas including proposed pipeline construction sites and spreading basins. Each report focusing on sites located immediately adjacent to or hydrologically upgradient of the Project areas (see Figure 3.12-1). The direction of groundwater flow generally parallels the Santa Ana River (SAR), i.e., in a north-northeast to south-southwest direction. Potentially contaminated sites that are located immediately adjacent to or to the north and east of Project areas pose the highest potential threat. The proposed alignment of the relocated upstream access road was not covered by the EDR reports, as this is a remote backcountry corridor with no historical commercial or industrial use.

Based on review of an EDR report prepared specifically for the vicinity of this Project area (EDR 2002a), there are no sites in the immediate vicinity, or within 1 mile hydrologically upgradient (north-northeast), of the Seven Oaks Dam and Reservoir that pose a high threat with respect to environmental contamination of soil and/or groundwater.

3.12.1.2.2 Santa Ana River Construction Area

Based on a review of two EDR reports prepared specifically for the vicinity of this proposed construction area (EDR 2002a,b), there are no sites along the proposed construction alignments that pose a high threat with respect to environmental contamination of soil and/or groundwater. Two locations listed in the EDR reports along the proposed Plunge Pool Pipeline, near the mouth of the SAR Canyon at 32330 and 32400 Santa Ana Canyon Road, are associated with former construction of the Seven Oaks Dam. Odebrecht Contractors of California discharged water from dam construction dewatering wells, in accordance with a National Pollutant Discharge Elimination System (NPDES) permit. In addition, Odebrecht and C.A. Rasmussen generated and disposed of hazardous waste, such as tank bottom waste, organic solids, and aqueous solutions with 10 percent or more total organic residues. The waste was disposed of through licensed recyclers and transfer stations. No violations were noted. Dam construction has been completed and no dewatering or hazardous waste disposal occurs presently at these locations. Therefore, these two sites do not pose a high threat with respect to environmental contamination of soil and/or groundwater.

Two additional hazardous waste generators in the Project area are included in the EDR reports. A California Department of Water Resources (DWR) facility, operated and maintained by Muni (Greenspot Pump Station), located at 32052 Greenspot Road, in the vicinity of the proposed Morton Canyon Connector II, disposes of unspecified aqueous solution hazardous waste by a licensed recycler. No violations have been noted at this facility. Suncal Company, located at 30610½ Greenspot Road, north of the western portion of the proposed Plunge Pool Pipeline, also generates and disposes of tank bottom waste through a licensed recycler. No violations have been noted at this facility.

A regional groundwater contamination plume (the Redlands-Crafton plume), consisting primarily of tetrachloroethylene (PCE) (also known as perchloroethylene) and trichloroethylene or trichloroethene (TCE), is located approximately 1.5 miles hydrologically downgradient of the SAR construction area (Figure 3.12-1). See section 3.12.1.3 for additional information.

3.12.1.2.3 Devil Canyon Construction Area

The direction of groundwater flow generally follows the topographic gradient in the vicinity of this site, which is toward the south. Potentially contaminated sites that are located immediately adjacent to or north of Project areas pose the highest potential threat.

Based on a review of the EDR report prepared specifically for the vicinity of this construction area (EDR 2002c), there are no sites along the proposed construction routes that pose a high threat with respect to environmental contamination of soil and/or groundwater.

A regional groundwater contamination plume, consisting primarily of PCE and TCE, is located approximately 1.5 miles hydrologically downgradient of the Devil Canyon Construction Area (Figure 3.12-1). This groundwater contamination comprises the Muscoy and Newmark plumes. See section 3.12.1.3 for additional information.

In addition, a 500-gallon, unleaded gasoline underground storage tank (UST) is registered at the Devil Canyon Guard Station (a forest fire station), located at 3103 Devil Canyon Road. This UST location is located approximately 1/8 to 1/4 mile south and hydrologically downgradient of the proposed construction area. No violations have been noted for this UST.

3.12.1.2.4 Lytle Creek Construction Area

The direction of groundwater flow generally follows the topographic gradient in the vicinity of this site, which is toward the southeast. Potentially contaminated sites that are located immediately adjacent or to the northwest of Project areas pose the highest potential threat.

Based on a review of two EDR reports prepared for the vicinity of this Project area (EDR 2002d,e), there are no sites along the proposed construction route that pose a high threat with respect to environmental contamination of soil and/or groundwater.

The regional Muscoy/Newmark groundwater contamination plume is located approximately 2.5 miles northeast of the proposed Lytle Creek Construction Area (see Figure 3.12-1) and is therefore not an environmental threat to this portion of the Project. The Rialto-Colton perchlorate plume underlies the southern portion of the proposed pipeline construction area. This plume primarily affects aquifers being used in nearby municipal supply wells. The depth of these aquifers (greater than 50 feet) is well below the depth of proposed pipeline trenching. See section 3.12.1.3 for additional information on these groundwater contamination plumes.

In addition, several other hazardous substances spills were documented within ½ to 1 mile of the proposed pipeline construction area (EDR 2002d,e). A spill associated with industrial machinery and equipment was reported at a residence located at 6061 Riverside Avenue, in Rialto (see site LLC-1 in Figure 3.12-1), which is located hydrologically downgradient of the pipeline construction area. The DTSC did not require action or oversight activity and referred the site to another agency. Another hazardous materials spill occurred at 715 Baseline Road, in Claremont (see site CB-11 in Figure 3.12-1), which is also located hydrologically downgradient of the pipeline construction area. This property is subject to a clean-up and abatement order by the DTSC.

Two other hazardous materials spills occurred in the vicinity of the construction area, including one at 2351 North Spruce, in Rialto, located approximately 1/3 mile to the east (see site LP-11 in Figure 3.12-1) and 4800 North Riverside, in Rialto, located approximately 1/2 mile to the northwest (see site LP-10 and GP-1 in Figure 3.12-1). One gallon and 75 gallons of liquid were released at these spill sites, respectively. The latter site may be located hydrologically upgradient of the pipeline construction area, but not at a distance close enough to pose a high threat with respect to environmental contamination of soil and/or groundwater in the construction area.

Numerous other hazardous waste generators and USTs are present within 1 mile of the construction area, in a downgradient direction. Violations have not been documented for any of the hazardous waste generators, and leaking USTs are not known to have impacted groundwater.

3.12.1.3 Project Operations Areas

Project-related groundwater recharge in spreading basins located around the perimeter of the San Bernardino Valley (forebay of the SBBA) could affect existing groundwater contamination plumes.

There are several regional groundwater contamination plumes in the SBBA and the adjacent Rialto-Colton Basin. Information on these regional plumes, as well as other smaller release sites in Yucaipa, San Timoteo, Lytle, and Rialto-Colton basins, are derived from available published documents and environmental database reports obtained from EDR. These reports were reviewed for the presence of known release sites, which could have impacted groundwater and (based on information in the EDR report) have not been remediated to the satisfaction of relevant regulatory agencies. Regional plumes and smaller individual release sites are identified in Figure 3.12-1.

Although the naturally occurring regional groundwater flow generally follows local topography and creek/river flow (e.g., the SAR flows to the southwest and Lytle Creek flows to the southeast), all potential sites within a 1-mile radius of each of the spreading facilities were reviewed, as groundwater pumping can locally affect the direction of groundwater flow and, therefore, the direction of contaminant transport. The section below summarizes these known regional contamination plumes (Muscoy/Newmark, Redlands-Crafton, Norton, Rialto-Colton, and agriculture-related) and smaller hazardous substance and petroleum product release sites.

Muscoy/Newmark Plume

Project-related groundwater recharge in a number of spreading basins could affect the Muscoy/Newmark plume. They include Devil Canyon/Sweetwater Basins, Badger Basins, Waterman Basins, and East Twin Creeks Spreading Grounds. In addition, deep excavations into shallow, contaminated groundwater could potentially impair construction activities.

The Muscoy/Newmark plume consists primarily of PCE and TCE and is located north of the City of San Bernardino and has impacted city water supply wells. As of 1995, PCE and TCE in concentrations exceeding Maximum Contaminant Levels (MCLs) had been detected in 20 public water supply wells. The pattern of contamination indicates that a release or releases occurred in northwest San Bernardino and that contaminants have migrated, in a southerly direction, more than 5 miles toward the SAR. The contaminant plume is split by a major outcrop of relatively impermeable bedrock (the Shandon Hills) that divides the contaminated groundwater into an eastern branch (the Newmark plume) and a western branch (the Muscoy plume) (see Figure 3.12-1). The EPA is addressing the leading edges of the plume as two separate Operational Units (OUs). The identification, characterization, and remediation of the source of contamination will constitute a third OU. Groundwater pump and treat systems have been constructed on the leading edge of the plumes. The water is treated to drinking water standards and then delivered to local water departments. Cleanup actions are expected to last approximately 30 years (US EPA 2003c; EDR 2002c,h). It appears that cleanup efforts will be adequate to protect 32 downgradient water supply wells (Santa Ana Watershed Project Authority [SAWPA] 2002a).

Redlands-Crafton Plume

The Redlands-Crafton Plume, which is estimated to have contaminated approximately 150,000 af of groundwater, is located approximately 1.5 miles hydrologically downgradient of the proposed SAR Construction Area and the Mill Creek Spreading Grounds (US EPA 2003c). Project-related groundwater recharge in this spreading basin could affect this plume. In addition, deep excavations into shallow, contaminated groundwater could potentially impair construction activities.

Perchlorate, a chemical used in the production of solid rocket fuel, has adversely impacted groundwater supplies in the Redlands area (Figure 3.12-1). TCE, PCE, and dibromochloropropane (DBCP) are also present within this groundwater contaminant plume. DBCP is a soil fumigant previously used in agricultural areas. The TCE and PCE contamination was caused by the disposal of industrial solvents, which are present in the upper 300 to 400 feet of groundwater. The plumes affect dozens of wells in the area. Although TCE was previously present in water supply wells at concentrations over 100 ppb (above its drinking water MCL of 5 parts per billion [ppb]), TCE is currently present in water supply wells at concentrations up to 7 ppb. Perchlorate is currently present in water supply wells at concentrations up to 77 ppb (SBVMWD 1998, SAWPA 2002a).

The Redlands-Crafton Plume, which was discovered in April 1985, has a high priority Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) status and the SARWQCB is the lead agency currently overseeing additional plume characterization (EDR 2002i). Lockheed Martin Company (Lockheed) is conducting wellhead treatments for five City of Riverside production wells, within the Gage well field, to mitigate the plume that is migrating toward the Norton off-base plume (see below). Lockheed has installed granulated activated carbon treatment units at some of the Gage wells to remove TCE and has installed ion exchange units on some of these wells for the removal of perchlorate. In addition, a plan was submitted and approved by the SARWQCB that uses the City of Riverside's Gage Canal system as a barrier to the further migration of the plume. Also as required by the SARWQCB, Lockheed has prepared contingency plans, which include blending, treatment, and/or providing alternative water supply sources (SAWPA 2002a).

Norton Plume

The Norton Plume is located approximately 3 miles downgradient of the City Creek, Patton, and East Twin Creek spreading grounds. Project-related groundwater recharge in these spreading basins could affect this plume.

In June 1982, the Air Force initiated an Installation Restoration Program (IRP) at Norton AFB (now the San Bernardino International Airport) to investigate environmental contamination from past waste handling practices. From 1982 to 1988, the Air Force reviewed records and conducted site investigations of suspected waste disposal sites. IRP work identified 22 sites as possible sources of contamination or of possible public health concern due to past waste disposal practices (Agency for Toxic Substances and Disease Registry [ATSDR] 2002).

Norton AFB was placed on the National Priority List (NPL) of the Hazardous Ranking System in 1987 because of contamination detected in the base groundwater and soils. Contaminants of concern include TCE, PCE, 1,2-dichloroethylene (DCE), polychlorinated biphenyls (PCBs), various radionuclides, and metals, including arsenic, chromium, and copper. The extent of the furthest-reaching TCE plume is shown in Figure 3.12-1. In 1992, Phase I of the off-base groundwater monitoring program began with the installation of 28 off-base monitoring wells, between the southwestern boundary of Norton AFB and drinking water wells located downgradient of the base. In 1993, Phase II of the off-base groundwater monitoring program began with the installation of eight more monitoring wells to determine the lateral and vertical extent of the TCE plume. These wells were installed at multiple depths and are deeper and located further downstream from Norton AFB than the Phase I wells (ATSDR 2002, US EPA 2003c).

The San Bernardino International Airport and the nearby City of Riverside draw drinking water primarily from the middle and lower water-bearing zones of the SBBA, 250 to 1,000 feet below ground surface. The Norton TCE plume is located closer to the ground surface, primarily in the upper aquifer; however, some contamination has reached the middle aquifer, at a maximum depth of approximately 400 feet. Routine monitoring of drinking water wells on airport property, private wells in the area, and nearby public drinking water wells indicates that the water in most of the wells meets EPA drinking water standards (SBVMWD 1998, ATSDR 2002). However, several City of Riverside drinking water supply wells (e.g., Gage Canal Complex) have shown TCE levels slightly above the MCL of 5 ppb (US EPA 2003c).

Groundwater in this area generally flows from northeast to southwest. The Norton TCE plume is migrating southwesterly toward Riverside (ATSDR 2002, US EPA 2003c). Two pump-and-treat systems installed in the plume are currently slowing the migration and reducing the concentration of contaminants in the aquifer. One pump-and-treat system was installed on base in the most contaminated part of the TCE plume area in June 1992. The capacity of the system was doubled in 1995. A second pump-and-treat system was installed at the southwest base boundary in March 1995. These systems pump contaminated groundwater out of the aquifer, treat it, and then reinject it back into the aquifer. In addition, a soil vapor extraction unit and air stripping towers became operational in October 1995 to mitigate TCE contamination leaching from the soil into the groundwater. In 1997, a well plugging and closure program was completed at the airport to alleviate possible paths for migration of contaminants between the different aquifers (ATSDR 2002, US EPA 2003c).

In addition, a Water Supply Contingency Plan (WSCP) has been implemented to mitigate the effects of the Norton AFB off-base TCE plume on the municipal production well fields located southwest of the base. The WSCP includes regular sampling of approximately 80 monitoring wells and 16 to 26 production wells. Sampling indicates that TCE levels have decreased significantly since the program was implemented in 1995 (US EPA 2003c).

Rialto-Colton Plume

The Rialto-Colton plume has contaminated approximately 20 wells in Rialto, Colton, and Fontana and well-head treatment has been installed at five wells in the City of Rialto and three wells in the City of Colton. Temporary and permanent groundwater monitoring wells have also been installed. In February 2004, there were 21 Investigative Orders pursuant to California Water Code Section 13267 for soil, groundwater and investigation of records and a number of remedial actions are underway.

The Rialto-Colton contaminant plume (Figure 3.12-1) lies beneath a portion of the Lytle Creek Construction Area and Cactus Spreading and Flood Control Basins and is located approximately 1.5 miles southwest of the Lytle Basins.

Santa Fe Plume

The Santa Fe groundwater contaminant plume of the SBBA consists primarily of 1,2-DCE, TCE, and PCE (Figure 3.12-1). This plume extends to a depth of 200 feet. No groundwater remediation has been completed to date, only soil vapor extraction. The site has been capped to prevent additional contamination from reaching the groundwater table.

Agriculture Related Plumes

In addition to nitrates (see section 3.2), agricultural pesticide use has resulted in localized impairment of groundwater quality in the SBBA. The most prevalent pesticide that contaminates groundwater in the San Bernardino area is dibromochloropropane (DBCP), a soil fumigant no longer used in the area. Little is known about the occurrence and transport of DBCP in the valley-fill aquifer. The extensive agricultural lands, particularly near Redlands, were used for growing citrus crops. Application of DBCP was a routine part of citrus production for over 30 years. As land was converted from agricultural to urban use, wells were converted from agricultural to municipal supply and additional wells were drilled. Testing of groundwater from many of these wells that were converted to municipal supply revealed the presence of contaminants, such as DBCP. These contaminants may have been present previously, but would not have been considered a problem in groundwater used solely for agricultural purposes (Danskin N.D.).

Miscellaneous Release Sites

Numerous sites within 1 mile of proposed Project facilities have been identified as having releases of hazardous substances or petroleum products that could have impacted groundwater and (based on the EDR report) have not been adequately remediated by the relevant regulatory agencies. These sites are shown in Figure 3.12-1 and summarized in Table 3.12-1.

3.12.2 Impacts and Mitigation Measures

3.12.2.1 Methodology

This section describes impacts and mitigation measures, where appropriate, pertaining to hazardous materials conditions at pipeline construction sites, as well as throughout the SBBA and adjoining groundwater basins where Project-related recharge basins are present. Impact mechanisms include potential spills of fuels and other materials from construction equipment; potential encounters with contaminated soil and groundwater during construction; and potential effects of Project-related recharge on regional groundwater contaminant plumes.

To determine potential effects of the Project, the largest groundwater contaminant plumes in the SBBA were modeled as part of the analysis. These include the Redlands-Crafton, Norton, and Muscoy-Newmark plumes. Each plume may consist of several contaminants, in varying proportions. For the purposes of this analysis, the major constituent of each plume was modeled and considered to be representative of the plume's behavior. For the Muscoy-Newmark plume, PCE is the major constituent while TCE and perchlorate are the major constituents for the Norton and Redlands-Crafton plumes, respectively (see Appendix B [Groundwater Hydrology] for more detailed information on modeling results).

Table 3.12-1. Hazardous Substance and Petroleum Product Release Sites[a]

Site Name and Address	*EDR Site Number (see Figure 3.12-1)*	*Reason for Listing*	*Distance from Recharge Basin*	*Regulatory Database*
Arco #1958 1216 Calimesa Blvd. Calimesa, CA	Garden Air Creek #A2, A3 (GAC-A2, GAC-A3)	Leaking UST	½ - 1 mile west-northwest	A, K, L
Steve Tyler 1198 Calimesa Blvd. Calimesa, CA	Garden Air Creek #4 (GAC-4)	Leaking UST	½ - 1 mile west-northwest	A, C
Siders, Kathryn D. 11644 Adams Yucaipa, CA	Wilson Basins #2 (WB-2)	Unspecified hazardous materials spill	½ - 1 mile southwest	A
California Department of Forestry 11416 Bryant St. Yucaipa, CA	Wilson Basins #1 (WB-1)	Leaking UST	¼ - ½ mile southwest	E
Lockheed Propulsion Co. 1500 Crafton Ave. Redlands, CA	Mill Creek Spreading Grounds # A1, A3 (MC-A1, MC-A3)	Large groundwater contamination plume	¼ - ½ mile southwest	F, G, H, R
Safety Kleen Corp. 7979 Palm Ave. Highland, CA	City Creek #A3 (CC-A3)	Leaking UST; transport, storage, and disposal violations; chlorinated solvent spills	½ - 1 mile west-southwest	A, D, E, G, I, M, N, O, P, Q
Texaco Refining and Marketing 2402 Highland Highland, CA	Patton Basins #A2 and A3 (PB-A2, PB-A3)	Leaking UST	¼ - ½ mile west-southwest	A, C
Target Store 2380 Sterling San Bernardino, CA	Patton Basins #4 (PB-4)	Hydrochloric acid spill	½ - 1 mile west	D
Exxon Service Station #35 1998 Highland San Bernardino, CA	Patton Basins #5 (PB-5)	Leaking UST	½ - 1 mile west	A, E
3030 Del Rosa San Bernardino, CA	East Twin Creek #6 (ETC-6)	Paint spill	½ - 1 mile southeast	D
Food 'N' Fuel #23 3404 Del Rosa Ave. San Bernardino, CA	East Twin Creek #4 (ETC-4)	Leaking UST	½ - 1 mile east-southeast	A, B
Robert Williams Sheri Clark 1195 E. 28th St. San Bernardino, CA	East Twin Creek #5 (ETC-5)	Leaking UST	½ - 1 mile southeast	A, C
HUD Intown Properties 275 49th St. E. San Bernardino, CA	Waterman Basins #2 (WB-2)	Leaking UST	¼ - ½ mile northwest	A, C
Ranger Unit Headquarters 3800 Sierra Way San Bernardino, CA	Waterman Basins #3 (WB-3)	Leaking UST	¼ - ½ mile southwest	A
663 Home St. West Rialto, CA	Cactus Spreading and Flood Control Basins #11 (CB-11)	Discharge of unknown hazardous materials	¼ - ½ mile southeast	A
Larry Zelke Residence (2) 6061 Riverside Ave. Rialto, CA	Lower Lytle Creek Basins #1 (LLC-1)	Discharge of unknown hazardous materials	½ - 1 mile south	R

Table 3.12-1. Hazardous Substance and Petroleum Product Release Sites (continued)

Legend:
A = Cortese Hazardous Waste and Substance Site List (Cortese)
B = Facility Inventory Database (CA FID UST)
C = Hazardous Waste Information System (HAZNET)
D = California Hazardous Material Incident Report System (CHMIRS)
E = Leaking Underground Storage Tank (LUST)
F = Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)
G = Facility Index System/Facility Identification Initiative Program Summary Report (FINDS)
H = Spills, Leaks, Investigation, and Cleanup Cost Recovery Listing (CA SLIC)
I = San Bernardino County Hazardous Materials Permit
J = Cal-Sites Database
K = San Diego County Hazardous Materials Management Division Database (HMMD)
L = Proposition 65 Records
M = Resource, Conservation, and Recovery Information System (RCRIS) – Large Quantity Generator
N = Active UST facility
O = Corrective Action Report (CORRACTS)
P = CERCLIS no further remedial action (NFRAP)
Q = Hazardous Substance Storage Container Database (HIST UST)
R = Department of Toxic Substance Control Cal-Sites database

[a] See Figure 3.12-1 for site locations.
Source: Environmental Data Resources, Inc. 2002a through 2002o.

Concentrations levels of perchlorate, TCE, and PCE in groundwater under Project conditions are compared to those under No Project conditions for the major contaminant plumes in the SBBA, i.e., Redlands–Crafton, Norton, and Muscoy/Newmark plumes. Based on this comparison, Project impacts are categorized as significant, less than significant, or beneficial. Impacts were determined using two types of groundwater modeling results:

1. Comparisons of acreage of the contaminated plume footprint under No Project and Project conditions; and

2. The number of wells contaminated due to Project implementation compared to the number of wells contaminated under No Project conditions.

The methods used to categorize Project impacts are illustrated in Figure 3.12-2. Significant impacts can occur when either (1) there are more wells contaminated due to Project implementation than under No Project conditions; or (2) the contaminant plume footprint area under the Project is greater than that under the No Project.

With migration of a plume, the possibility exists that water supply production wells that are outside the area of contamination under No Project conditions could be contaminated with implementation of the Project. Conversely, water supply production wells that are inside the area of contamination under No Project conditions could fall outside the area of contamination with implementation of the Project. Table 3.12-2 shows the number of wells that are either (1) contaminated due to implementation of the Project, or (2) subsequently avoid contamination due to Project implementation. The latter wells would have been contaminated under No Project conditions; however, due to implementation of the Project, the wells would be in an area that escapes contamination. The same well may be contaminated in multiple years; however,

Table 3.12-2. Average Contaminated Footprint Area (acres) and Corresponding Production Well Contamination for Perchlorate, PCE, and TCE Plumes

Contaminant and Project Scenario	*No Project Footprint Area (acres)*[a]	*Project Footprint Area*[a] *(acres)*	*Difference in Footprint Area*[a] *(Project Footprint – No Project Footprint)*	*Number of Wells Contaminated due to Project Implementation Compared to No Project Conditions*[b]	*Number of Wells that Avoid Contamination due to Project Implementation Compared to No Project Conditions*[b]	*Net Number of Wells Contaminated due to Project Implementation*[b]
PERCHLORATE[c]						
Project Scenario A	1,192	1,201	+9	17	5	+12
Project Scenario B	1,192	1,211	+19	21	5	+16
Project Scenario C	1,192	1,202	+10	12	5	+7
Project Scenario D	1,192	1,203	+11	11	7	+4
TCE[d]						
Project Scenario A	1,749	1,624	-125	26	18	+8
Project Scenario B	1,749	1,630	-119	26	19	+7
Project Scenario C	1,749	1,662	-87	17	17	0
Project Scenario D	1,749	1,668	-82	16	13	+3
PCE[e]						
Project Scenario A	1,941	1,761	-180	5	7	-2
Project Scenario B	1,941	1,789	-153	5	7	-2
Project Scenario C	1,941	1,889	-53	5	5	0
Project Scenario D	1,941	1,905	-37	4	3	+1

a. Acreage averaged over the 39-year period.
b. May include wells contaminated in multiple years.
c. Redlands-Crafton Plume
d. Norton Plume and Redlands-Crafton Plume
e. Muscoy/Newark Plume

the table reflects the total number of different wells contaminated. For example, with regard to perchlorate contamination under Project Scenario A, 17 wells in total would be contaminated due to implementation of the Project. Of these 17 wells, two are contaminated in more than one year.

Table 3.12-2 also lists the extent of the contaminant plume footprint under No Project and Project scenario conditions. The spatial extent is described by the average acreage, computed over the future 39-year period utilized in the groundwater modeling and analysis. For example, in the case of perchlorate, the average area contaminated under the No Project over the 39 years is 1,192 acres. Under the Project scenarios, the corresponding extent of the contamination footprint varies between 1,201 and 1,211 acres, depending on the scenario. If the average contamination footprint area over 39 years is greater under Project than under No Project conditions, it is considered a significant impact.

3.12.2.2 Significance Criteria

In addition to the project-specific perchlorate, TCE, and PCE criteria outlined above, *State CEQA Guidelines* list several hazardous materials-related impacts that would normally be considered significant, including, if the Project were to:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school; or
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment.

The impact assessment does not address the following issues since

- There are no known hazardous materials and/or waste contamination sites, including those pursuant to Government Code Section 65962.5, located on or adjacent to the Project Construction Areas that would likely result in exposure and/or excavation of contaminated soil or groundwater during construction.
- There are no schools that might be subject to hazardous emissions or spills of hazardous or acutely hazardous materials or substances located within ¼ mile of the Project Construction Areas.
- Project operations would have no hazardous materials-related impact on Project Construction Areas.
- Project operations would have no hazardous materials-related impact on groundwater quality in the San Timoteo and Yucaipa basins.

3.12.2.3 Project Construction

3.12.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Impact HAZ-1. *The Project could create a significant hazard to the environment through the routine transport, use, and disposal of hazardous materials and waste used during grading and construction. Such hazards could occur through upset and accident conditions involving the release of construction equipment-related hazardous materials into the environment, resulting in significant impacts.*

Although the probability is low, accidental spills or leaks of pollutants such as fuels, lubricants, and hydraulic fluid during equipment operation, refueling, or maintenance could directly enter local drainages and creeks, including the SAR. Not all such accidents, however, would be in locations that could affect surface waters, but spills onto soils could percolate into the shallow groundwater if measures are not taken immediately to clean up the spill. Impacts of small spills would be short term and less than significant. However, large spills that might enter these drainages and waterways could have long-term, significant impacts on water quality. Therefore, the Project could create a significant hazard to the environment through the routine transport, use, and disposal of hazardous materials and waste used during grading and construction.

MITIGATION MEASURES

MM HAZ-1: Muni/Western will direct the contractor to wash out concrete trucks in a designated area where the material cannot run off into a stream or percolate into the groundwater. This area will be specified on all applicable construction plans and be in place before any concrete is poured. Muni/Western will direct the contractor to service construction vehicles in a manner that contains fluids, such as lubricants, within an impervious area to avoid spill-related water quality impacts.

MM HAZ-2: Muni/Western will direct the contractor to inspect and, as necessary, service all equipment before it enters the construction site and regularly thereafter, and before working immediately adjacent to the SAR or any other drainage or creek to avoid equipment leak-related water quality impacts. Muni/Western will direct the contractor to repair any leaks or hoses/fittings in poor condition before the equipment begins work.

MM HAZ-3: Muni/Western will direct the contractor to prepare a spill prevention and containment plan prior to equipment use on the site. Muni/Western will direct the contractor to follow the spill prevention plan during Project construction to prevent spill-related water quality impacts. This plan will include, but not necessarily be limited to:

a. Specific bermed equipment maintenance and refueling areas.

b. Bermed and lined hazardous material storage areas on site that are covered during the rainy season.

c. Hazardous material spill cleanup equipment on site (e.g., absorbent pads, shovels, and bags to contain contaminated soil).

d. Workers trained in the location and use of cleanup equipment.

RESIDUAL IMPACTS

Residual impacts would be less than significant since MM HAZ-1, MM HAZ-2, and MM HAZ-3 would reduce the potential for hazardous materials spill- and leak-related water quality impacts.

3.12.2.3.2 Santa Ana River Construction Area

Impact HAZ-1 would apply to construction at the Santa Ana River Construction Area.

Accidental spills or leaks of pollutants such as fuels, lubricants, and hydraulic fluid during equipment operation, refueling, or maintenance could directly enter local drainages and creeks, including the Santa Ana Wash and SAR (e.g., while working directly adjacent to or within the river) or in runoff from or water pumped from the work area.

MITIGATION MEASURES

MM HAZ-1, MM HAZ-2, and **MM HAZ-3** will be applied to reduce hazardous materials spill-related impacts during construction.

RESIDUAL IMPACTS

Residual impacts would be less than significant since MM HAZ-1, MM HAZ-2, and MM HAZ-3 would reduce the potential for hazardous materials spill- and leak-related water quality impacts.

3.12.2.3.3 Devil Canyon Construction Area

Impact HAZ-1 would apply to construction at the Devil Canyon Construction Area.

Accidental spills or leaks of pollutants such as fuels, lubricants, and hydraulic fluid during equipment operation, refueling, or maintenance could directly enter local drainages and creeks.

MITIGATION MEASURES

MM HAZ-1, MM HAZ-2, and **MM HAZ-3** will be applied to reduce hazardous materials spill-related impacts during construction.

RESIDUAL IMPACTS

Residual impacts would be les than significant since MM HAZ-1, MM HAZ-2, and MM HAZ-3 would reduce the potential for hazardous materials spill- and leak-related water quality impacts.

3.12.2.3.4 Lytle Creek Construction Area

Impact HAZ-1 would apply to construction at the Lytle Creek Construction Area.

Accidental spills or leaks of pollutants such as fuels, lubricants, and hydraulic fluid during equipment operation, refueling, or maintenance could directly enter local drainages and creeks.

MITIGATION MEASURES

MM HAZ-1, MM HAZ-2, and **MM HAZ-3** will be applied to reduce hazardous materials spill-related impacts during construction.

RESIDUAL IMPACTS

Residual impacts would be less than significant since MM HAZ-1, MM HAZ-2, and MM HAZ-3 would reduce the potential for hazardous materials spill- and leak-related water quality impacts.

3.12.2.4 Project Operations and Maintenance

3.12.2.4.1 San Bernardino Basin Area

Impact HAZ-2. *The spatial extent of the perchlorate contamination footprint under all Project scenarios is greater than that under No Project conditions. When compared to the No Project, the number of wells contaminated by perchlorate under all Project scenarios exceeds the number of wells that avoid contamination. This is a significant impact.*

As discussed in section 3.12.1, relatively large areas of perchlorate concentrations are present in groundwater in the SBBA, including the Redlands-Crafton plume (Figure 3.12-1). The information presented in Table 3.12-2 includes the area of the footprint of the Redlands-Crafton perchlorate plume under both Project and No Project conditions. The average extent of the footprint ranges from 9 to 19 acres greater under Project conditions than under No Project conditions. This is considered a significant impact for all Project scenarios.

The plume advances and disappears fastest in No Project and Project Scenarios C and D than in Scenarios A and B. This is because more recharge occurs in the Santa Ana River under the No Project or, in the case of Scenarios C and D, in the Santa Ana River and Mill Creek Spreading Grounds compared to Scenarios A and B (refer to Figures B-81 and B-83 in Appendix B Addendum).

The number of wells contaminated due to Project implementation, compared to under No Project conditions, varies between 11 and 21 (Table 3.12-2). This is higher than the number of wells (between 5 and 7) that avoid contamination due to implementation of the Project when compared to No Project conditions under all Project scenarios. This is illustrated in Figure 3.12-3, which shows the location of all wells affected by the Project under all Project scenarios over the entire 39-year forecast period.

MITIGATION MEASURES

MM HAZ-4: Using available data, in conjunction with the integrated surface and groundwater models, Muni/Western will identify groundwater trends, including plume movement and isolate changes attributable to implementation of the Project. To the extent feasible given existing infrastructure, and consistent with meeting other basin management objectives, Muni/Western will direct Project water spreading to limit adverse plume movements.

RESIDUAL IMPACTS

Following implementation of MM HAZ-4, impacts would remain significant and unavoidable, since the boundaries of the perchlorate concentration plume may continue to extend beyond what they would be under No Project conditions. Additionally, implementation of MM HAZ-4 may not be able to eliminate contamination of individual wells.

Impact HAZ-3. *The spatial extent of the TCE contamination footprint under all Project scenarios is less than that under No Project conditions. When compared to the No Project, the number of wells contaminated by TCE under Project Scenario C equals the number of wells that avoid contamination. For Project Scenarios A, B, and D, the number of wells contaminated exceeds the number of wells that would avoid contamination. This is a significant impact.*

As discussed in section 3.12.1, relatively large areas of TCE concentrations are present in groundwater in the SBBA, including the Redlands-Crafton and Norton plumes (Figure 3.12-1). There are between 82 and 125 fewer acres contaminated due to implementation of the Project compared to No Project (Table 3.12-2). This is because, for each Project scenario, the TCE plume boundary dissipates more quickly as a result of increased artificial recharge at the spreading basins upgradient of the Norton plume and increased pumping from the Pressure Zone by Plaintiffs. Therefore, beneficial impacts occur under all Project scenarios. Differences in the footprint area with implementation of the Project compared to No Project conditions vary on a year-by-year basis and, due to the spatial and temporal variability of TCE plume boundaries under Project conditions, beneficial impacts would occur intermittently and locally.

The number of wells contaminated with TCE due to Project implementation varies between 16 and 26 and is equal or greater than those that avoid contamination with implementation of the Project (between 13 and 19) under all Project scenarios. This is considered a significant impact. See Figure 3.12-4.

MITIGATION MEASURES

MM HAZ-4 will be applied to reduce significant TCE-related impacts.

RESIDUAL IMPACTS

Post-mitigation TCE impacts would still be significant and unavoidable with **MM HAZ-4**, since the TCE concentration plume boundaries may continue to extend beyond No Project condition boundaries and, thus, adversely impact wells. Implementation of MM HAZ-4 may not be able to eliminate contamination of individual wells.

Impact HAZ-4. *The spatial extent of the PCE contamination footprint under all Project scenarios is less than that under No Project conditions, which results in a beneficial impact. When compared to the No Project, the number of wells contaminated by PCE under Project Scenarios A and B is less than the number of wells that avoid contamination. For Project Scenario C the number of wells contaminated equals the number of wells that would avoid contamination. For Project Scenario D, the number of wells contaminated exceeds the number of wells that would avoid contamination. This is a significant impact.*

As discussed in section 3.12.1, relatively large areas of PCE concentrations are present in groundwater in the SBBA, including the Muscoy/Newmark plume (Figure 3.12-1). The information presented in Table 3.12-2 describes the area of the footprint of the PCE plume under both Project and No Project conditions. The average extent of the footprint is between 37 and 180 acres less under Project conditions than under No Project conditions. Differences in the footprint area with implementation of the Project compared to No Project conditions vary on a year-by-year basis and, due to the spatial and temporal variability of PCE plume boundaries under Project conditions, beneficial impacts would occur intermittently and locally.

For Scenario D, more wells become contaminated as a result of Project implementation and associated plume migration than the converse (Table 3.12-2). This is a significant impact. See Figure 3.12-5.

MITIGATION MEASURES

MM HAZ-4 will be applied to reduce significant PCE-related impacts.

RESIDUAL IMPACTS

Following implementation of MM HAZ-4, impacts would still be significant and unavoidable, since the PCE concentration plume boundaries may continue to extend beyond No Project condition boundaries and, thus impact wells. Implementation of MM HAZ-4 may not be able to eliminate contamination of individual wells.

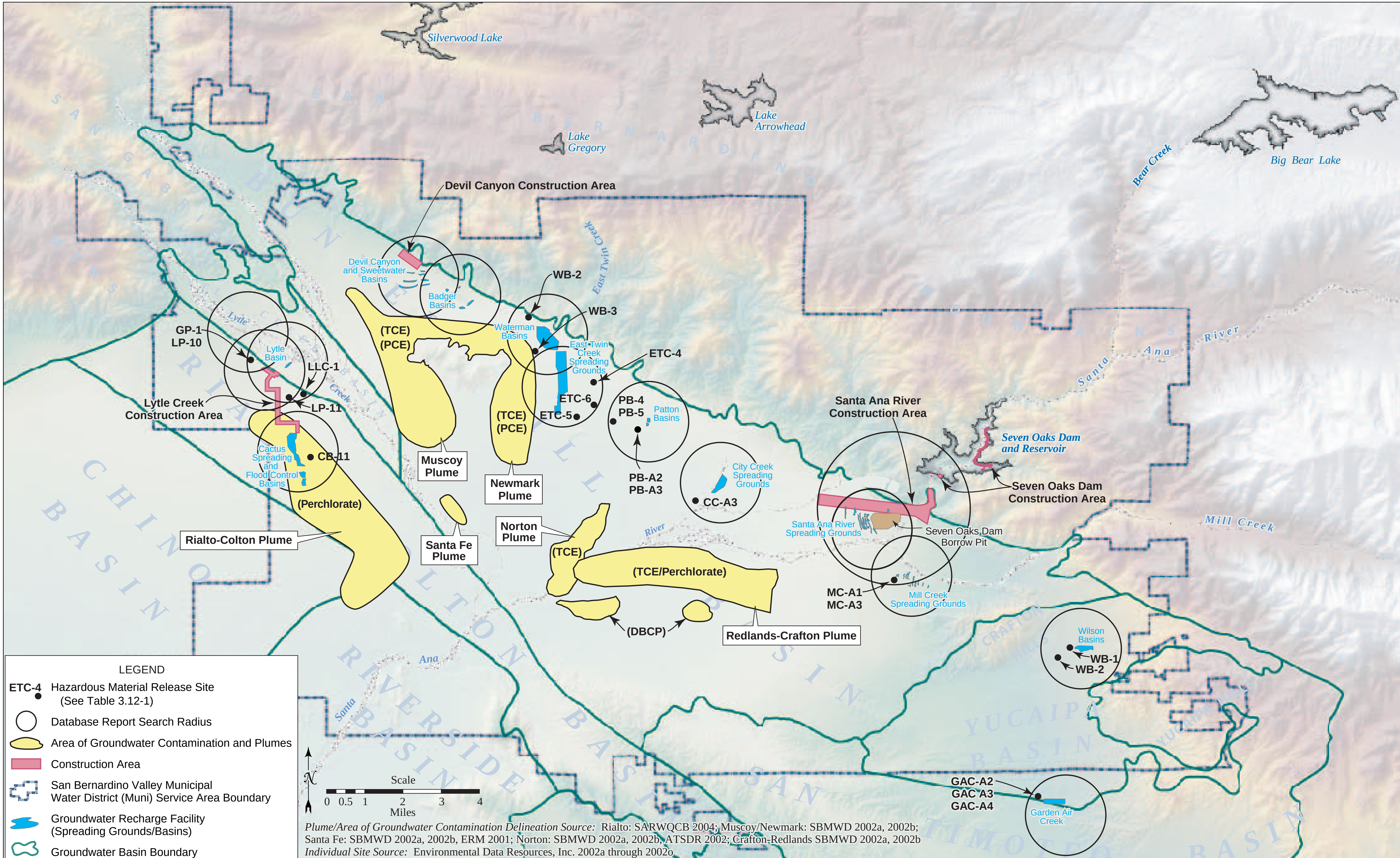


Figure 3.12-1. Known Contamination Plumes and Sites

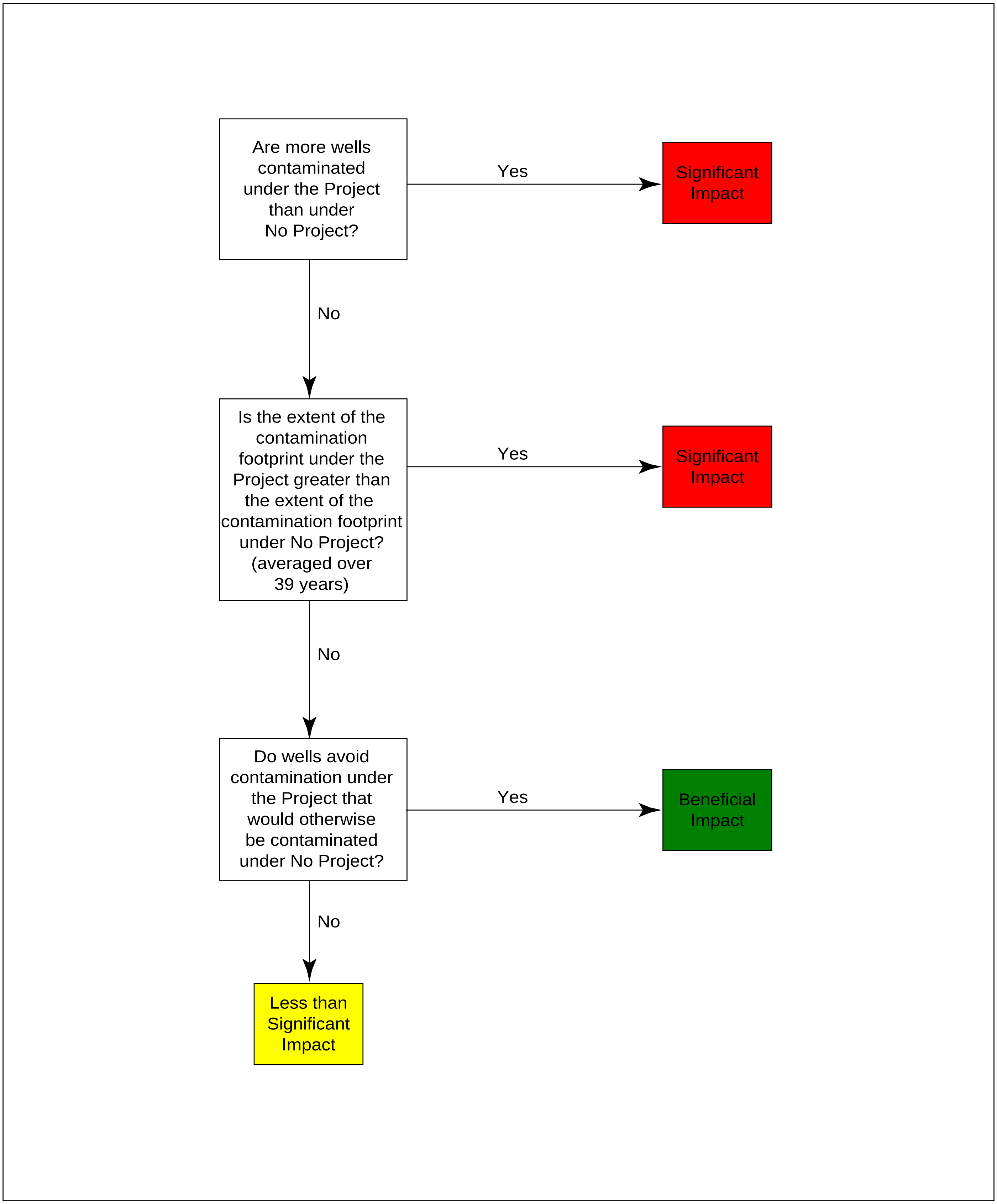


Figure 3.12-2. Relationship between Contaminated Footprint Area and Wells and Impact Significance

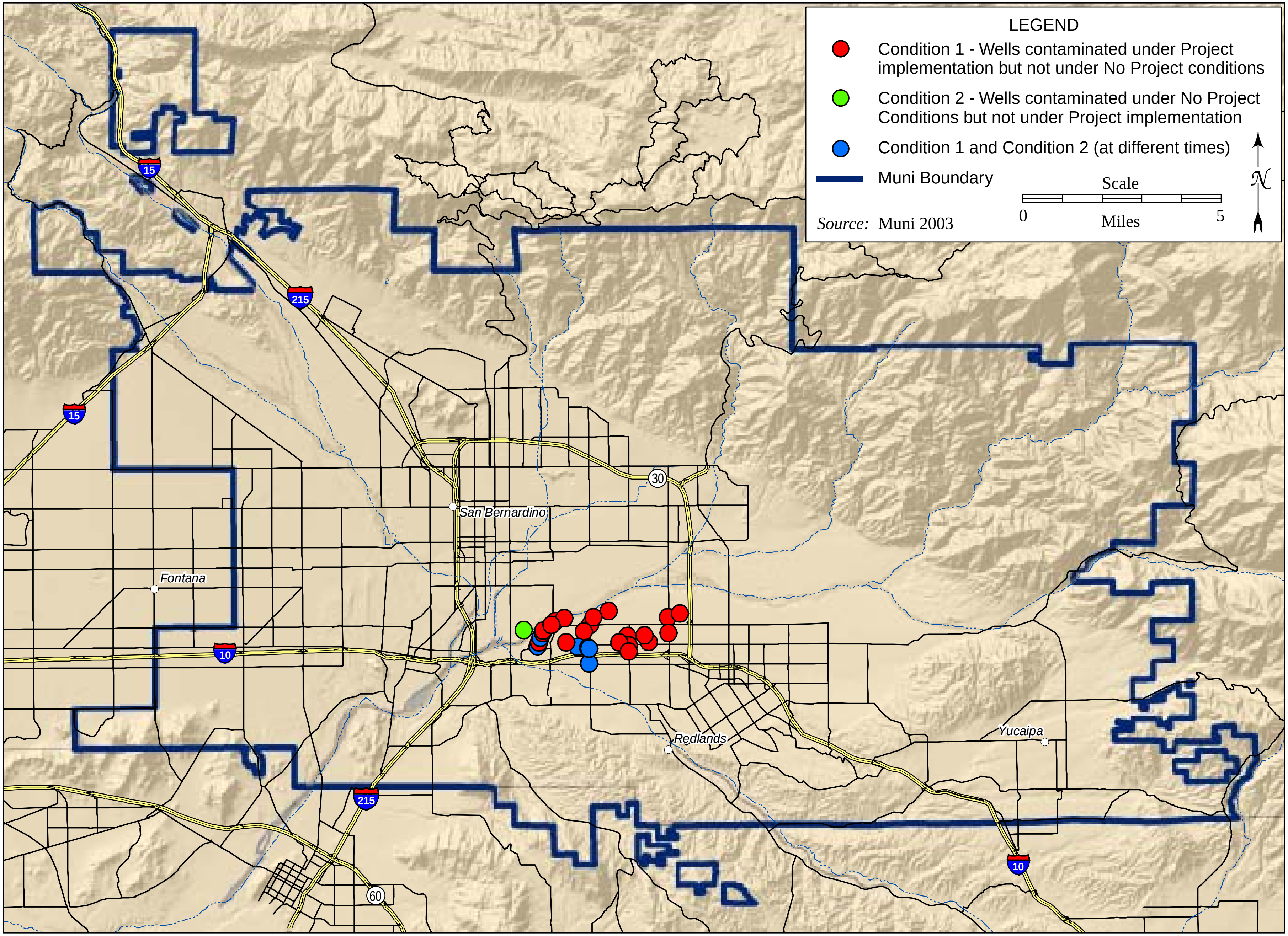


Figure 3.12-3. Perchlorate Well Contamination Impacts under all Project Scenarios

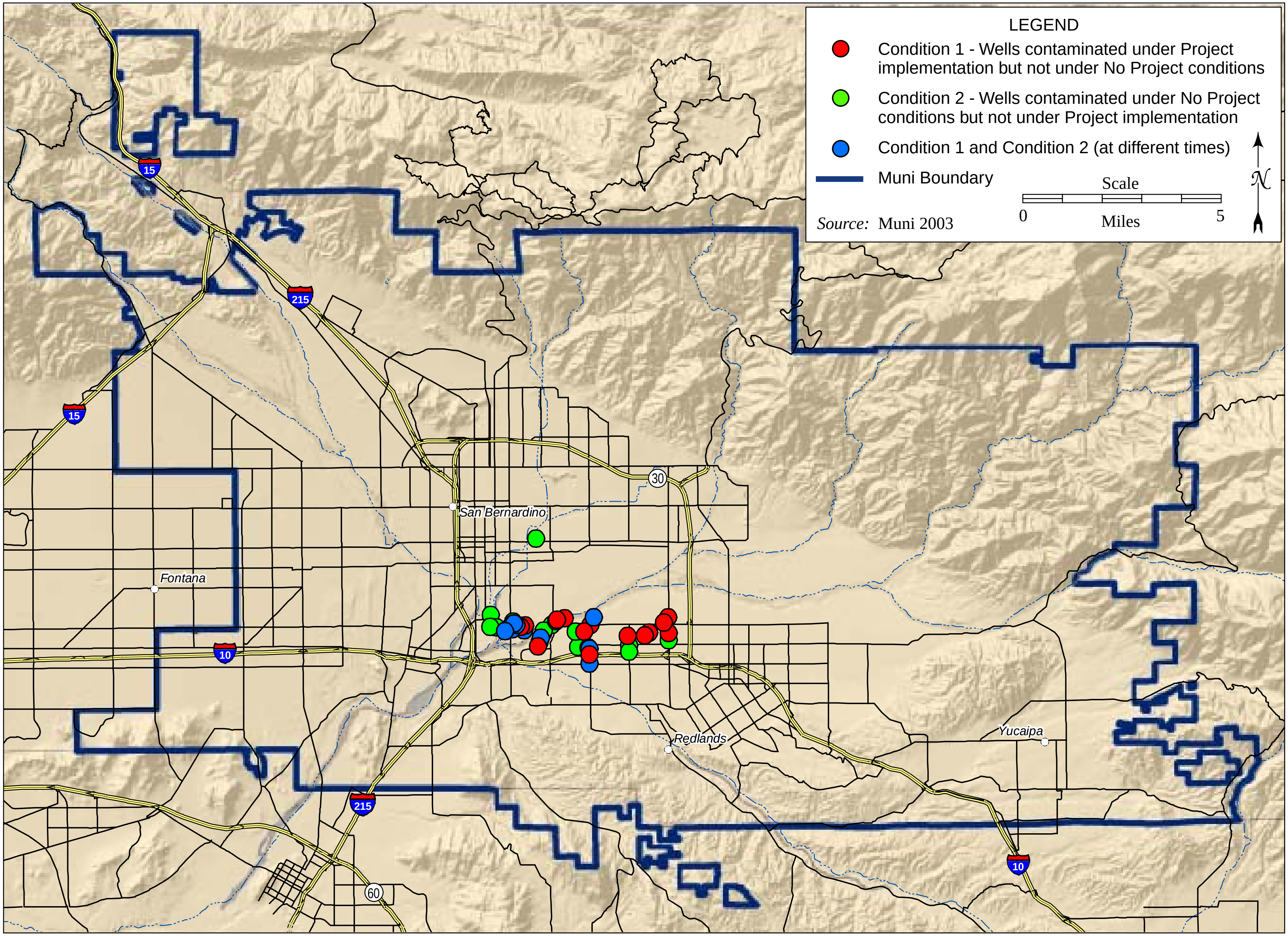


Figure 3.12-4. TCE Well Contamination Impacts under all Project Scenarios

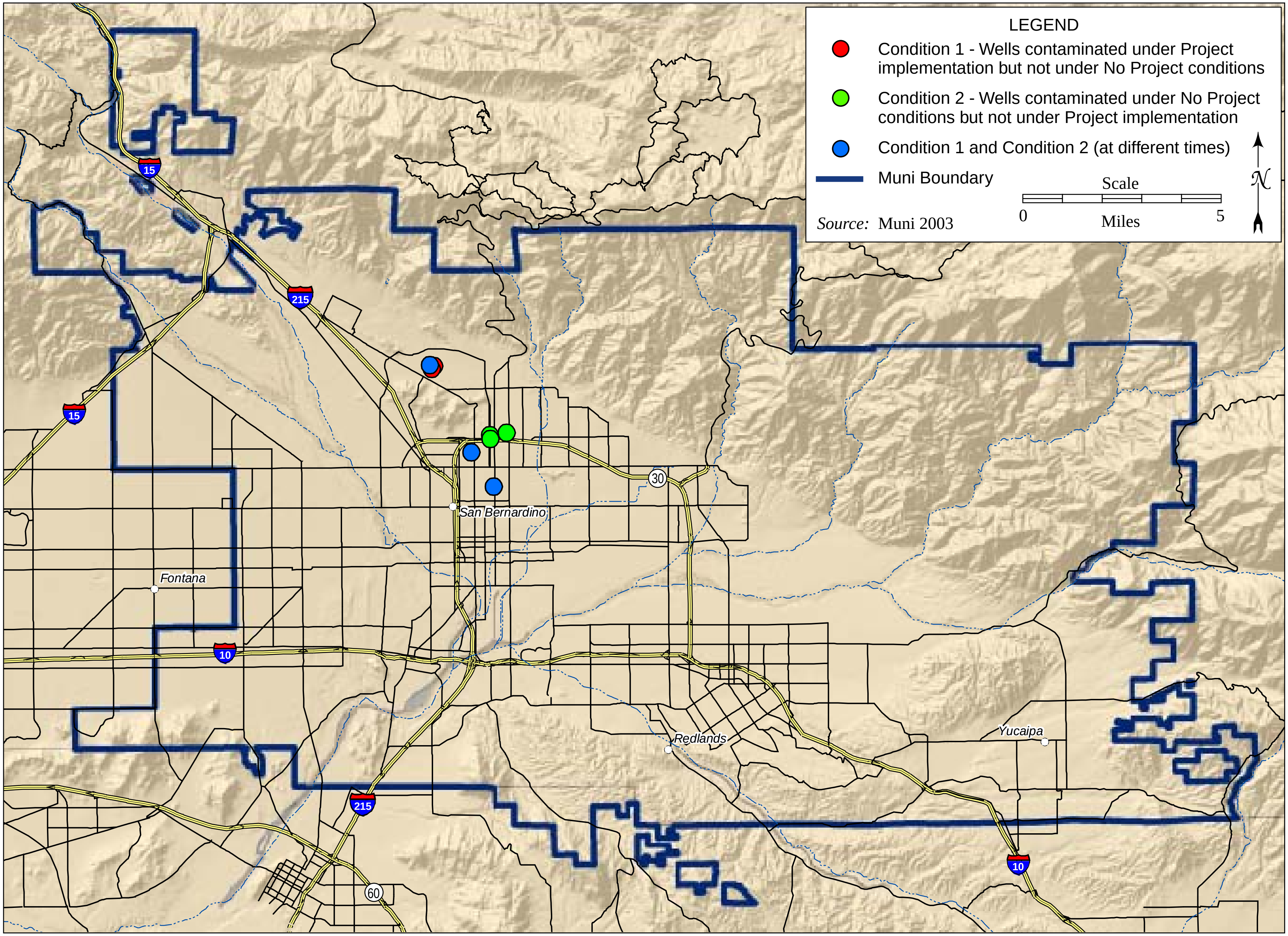


Figure 3.12-5. PCE Well Contamination Impacts under all Project Scenarios

3.13 PUBLIC SERVICES, UTILITIES, AND TRANSPORTATION

Assessment of impacts on public services has been guided by the results of an Initial Study and the comments received on that Initial Study (see Appendix D). The Initial Study identified that the Project could have a growth-inducing impact and this, in turn, would have indirect impacts on fire protection, police protection, schools, parks, and other public facilities. In terms of utilities, the Initial Study identified that growth related to the Project could result in the generation of solid waste and wastewater, the need for new and expanded water and wastewater treatment facilities, and stormwater drainage facilities. These indirect impacts related to growth are evaluated in Chapter 4 (Growth-Inducing Impacts and Growth-Related Impacts). However, the Initial Study also identified the potential impact of construction activities disrupting water utilities and Project operations resulting in the need for additional water treatment services; this potential impact is evaluated in this section. The Initial Study also concluded that impacts to transportation could result from both population growth and construction activities associated with new facilities. As noted above, impacts related to growth are evaluated in Chapter 4; temporary construction-related traffic impacts are evaluated in this section.

Therefore, based on the results of the Initial Study, this section addresses potential changes to solid waste generation, water utilities, and transportation associated with construction and operation of the Project.

3.13.1 Environmental Setting

3.13.1.1 Regulatory and Institutional Setting

Solid Waste

The California Integrated Waste Management Act of 1989 (Assembly Bill [AB] 939) requires that city and county governments plan and oversee solid waste management recycling activities. San Bernardino County estimates that landfills in the county have approximately 29 years of capacity (San Bernardino County 2002a). The Riverside County Annual Report for 2000 (dated August 2002) found that Riverside County disposal facilities should provide more than 15 years of disposal capacity based on projected growth and a 50 percent diversion rate (CIWMB 2003).

Water Utilities

Water utilities in the Project area are multi-layered and involve the SWP, regional purveyors such as Muni/Western, local municipal water retailers, local irrigation districts, hydroelectric generators, as well as federal and local flood control facilities. These various agencies own and operate numerous conveyance facilities, pump stations, and water treatment facilities and manage water resources and related infrastructure in accordance with multiple institutional arrangements. For example, Muni/Western's actions are both constrained and guided by the provisions of the *Orange County* Judgment, *Western* Judgment, and the Mill-Creek-Cooperative Project Agreement. For a description of relevant institutional arrangements, see section 3.1 (Surface Water Hydrology and Water Quality).

Transportation

Road transportation facilities in the Project area comprise a complex mix of highways and state routes under the jurisdiction of Caltrans and local roads operated by San Bernardino County, Riverside County, and numerous municipalities.

3.13.1.2 Project Construction Areas

3.13.1.2.1 Seven Oaks Dam and Reservoir Construction Area

SOLID WASTE

Solid waste originating in this construction area could be disposed of at the California Street, Colton, Mid-Valley, and/or San Timoteo landfills (San Bernardino County 2002a):

- The California Street Landfill, located at 1950 Nevada Street in the City of Redlands, is permitted to accept up to 350 tons of refuse per day. In May 2001 it was estimated that this landfill had approximately 473,888 cubic yards (cy) of disposal capacity remaining (California Integrated Waste Management Board [CIWMB] 2003).
- The Colton Landfill, located at 850 Tropic Rancho Road in the City of Colton, is permitted to receive up to 3,100 tons (or 13,297 cy) of refuse per day. As of October 1995, the estimated remaining capacity in the Colton Landfill was 380,716 cy (CIWMB 2003).
- The Mid-Valley Landfill (also called the Fontana Refuse Disposal Site), located at 2390 North Alder Avenue in Rialto, is permitted to accept 7,500 tons of refuse per day. As of July 2001 the estimated remaining capacity in the Mid-Valley Landfill was 694,058 cy (CIWMB 2003).
- San Timoteo Landfill at 31 Refuse Road in the City of Redlands is permitted to accept up to 1,000 tons of refuse per day. As of January 1996, the estimated remaining capacity in the San Timoteo Landfill was 16,271,980 cy (CIWMB 2003).

Of these landfills, the California Street Landfill is closest, approximately 13 miles to the Seven Oaks Dam and Reservoir Construction Area. The Mid-Valley Landfill is farthest, approximately 23 miles from this Project construction area.

WATER UTILITIES

Seven Oaks Dam is itself an important water utility. The dam, built by the USACE, was completed in December 1999. The dam is operated as a flood control facility by San Bernardino County, Riverside County, and Orange County flood control districts (collectively referred to as the Local Sponsors). The flood control operations involve impounding waters up to 145,600 acre-feet (af) (USACE 1997). In the reservoir area the major feature of the dam is the intake tower (see Figure 2-6).

SCE operates an extensive hydroelectric system upstream of Seven Oaks Dam. This system provides electricity but also serves as a water collector and conveyance system. The SCE system collects water from the SAR, Bear Creek, Breakneck Creek, Kellor Creek, and Alder Creek and conveys it through many miles of flumes, tunnels, and pipelines, to the Santa Ana 1 Powerhouse (upstream of Seven Oaks Dam), and eventually to the SAR 2/3 (below Seven Oaks Dam). The SCE plants on the SAR are "run-of-the-river," i.e., they operate on the flow of the stream.

TRANSPORTATION

Warm Springs Canyon Road originates behind Seven Oaks Dam following the alignment of the old Santa Ana Road/Forest Service Road 1N13 (this road was eliminated during construction of Seven Oaks Dam). Approximately 0.75 mile upstream from the dam, Warm Springs Canyon Road turns eastward to follow Warm Springs Canyon for about 5.5 miles before reaching State Highway 38 near the community of Mountain Home Village (USACE 1997). Warm Springs Canyon Road is unimproved and portions of the road are referred to as Forest Road 1S12.

A separate SCE access road originates approximately 0.75 mile upstream from Seven Oaks Dam and travels northeast along the SAR for approximately 19 miles before reaching State Highway 38 near the community of Barton Flats (USACE 1997). For most of its length the road is unimproved; only the northeastern-most portion of the road is paved. A gate at the intersection with Warm Springs Canyon Road limits upstream access to authorized users.

3.13.1.2.2 Santa Ana River Construction Area

SOLID WASTE

Solid waste from this construction area could be taken to the California Street, Colton, Mid-Valley, and/or San Timoteo landfills (San Bernardino County 2002a). Of these landfills, the California Street Landfill is closest, approximately 11 miles from the Santa Ana River Construction Area. The Mid-Valley Landfill is farthest, approximately 21 miles from this Project construction area.

UTILITIES

In the Santa Ana River Construction Area the major features of Seven Oaks Dam are the intake structure and outlet works and plunge pool (see Figure 2-4). The outlet of the dam sits at the end of a concrete-lined tunnel which connects it to the intake structure. The outlet has an 18-foot wide by 14-foot high rectangular exit channel, a valve structure, and an apron slab to the plunge pool (USACE 1997). At the valve structure a pipeline, the Plunge Pool By-Pass, directs some of the outflow to local water users. The remainder of the water flows down the apron slab to the plunge pool. The plunge pool is approximately 400 feet in diameter and acts to slow water leaving the dam and dissipate energy before water enters the SAR channel (USACE 1997).

A portion of the SCE system is also within the Santa Ana River Construction Area (see Figure 2-4). A SCE conduit runs from the Seven Oaks Dam left abutment to a head breaker structure. At the head breaker structure water can either enter the new SCE conduit or continue onto the Greenspot Forebay via the old SCE Conduit. Water conveyed to the Greenspot Forebay either enters the Greenspot Pipeline or the Bear Valley Highline. The new SCE conduit conveys water to Powerhouse 2/3 after which water either enters the River Crossing Pipeline (to the

North Fork Canal), the Redlands Aqueduct, or is returned to the river. As part of the SCE system, there are a series of power lines crossing the SAR Wash.

The North Fork Canal is the main conveyance to the north side of the SAR. A portion of the canal was replaced with pipe during the construction of Seven Oaks Dam, but the remainder is a canal lined with unreinforced masonry (personal communication, C. Vann 2004). The Redlands Aqueduct, like the North Fork Canal, originates near the SCE SAR Powerhouse 2/3. The Redlands Aqueduct is the primary conveyance for water to the south side of the SAR Wash (Vann 1994).

Also in the SAR Construction Area, the San Bernardino Valley Water Conservation District (Conservation District) diverts water by means of a low dam across the river, i.e., Cuttle Weir, and an adjacent gated intake structure located on the right bank of the SAR. From the intake structure water enters a large rectangular channel, the Conservation District Canal, and is conveyed to the Santa Ana River Spreading Grounds located about a mile to the west in the SAR Wash (Vann 1994).

Muni operates multiple facilities in the SAR Construction Area (see Figure 2-4). These facilities were constructed to provide the physical means necessary to implement the Santa Ana River – Mill Creek Cooperative Water Project Agreement. These facilities include the following:

- The Greenspot Pipeline originates at the Greenspot Forebay on the SCE system on the left bank (east) of the SAR, and moves SAR water eastward.
- The Morton Canyon Connector Pipeline, a branch of the Greenspot Pipeline, connects the Greenspot Pipeline with the Greenspot Pump Station. The Morton Canyon Connector also connects to the Santa Ana River Crossing Pipeline (SARC), which allows SAR water to be conveyed to the Foothill Pipeline.
- The Foothill Pipeline originates at the SWP Devil Canyon Power Plant Afterbays and conveys SWP water 17 miles eastward before terminating at the SARC pipeline. The Foothill Pipeline delivers water to wholesale domestic users, agricultural users, and to various spreading facilities in the SBBA. The Foothill Pipeline can also operate in "reverse flow" to move water northwest from the SAR.
- The SARC is considered a branch of the Foothill Pipeline. The primary purpose of the SARC is to move SWP water from the Foothill Pipeline to the Greenspot Pump Station and Redlands Aqueduct.

Details about the design capacities of each of these pipelines are provided in Appendix A (Surface Water Technical Appendix).

A portion of Metropolitan's Inland Feeder is located in the Santa Ana River Construction Area (see Figure 2-4). The Inland Feeder, when complete, will be comprised of 44 miles of large diameter pipeline and tunnels from the SWP Devil Canyon Afterbays in the San Bernardino Mountains to the Colorado River Aqueduct in the community of San Jacinto, Riverside County. Portions of the Inland Feeder south of the SAR became operational in late 2002. A connection between the Inland Feeder and Muni's Foothill Pipeline (near Cone Camp Road in the SAR

Wash) allows Metropolitan to convey SWP water to Diamond Valley Lake until the remaining portions of the Inland Feeder are completed.

TRANSPORTATION

Fifth Street is a secondary highway that connects Route 30 and the eastern area of the City of Highland. East of Church Street it becomes Greenspot Road. Greenspot Road runs east along the northern edge of the SAR Wash toward Seven Oaks Dam, before turning south to connect to Florida Street in unincorporated San Bernardino County. Fifth Street/Greenspot Road is the primary access to the Santa Ana River Construction Area and Seven Oaks Dam. Traffic counts[1] for 5th Street (near Boulder Avenue located about 2.5 miles west of Santa Ana River Construction Area) are provided in Table 3.13-1.

Table 3.13-1. Average Daily Traffic Summary for 5th Street

Timeframe	*Average Eastbound Traffic*	*Average Westbound Traffic*	*Total Average Traffic*	*Peak Hour*	*Peak Hour Volume*
A.M. (midnight to noon)	3,851	2,208	6,059	7:00 A.M.	1,332
P.M. (noon to midnight)	3,240	4,735	7,975	5:00 P.M.	1,203
Source: KORVE Engineering 2003.					

On 5th Street, the morning commute is primarily to the east and the evening commute is primarily to the west.

The Seven Oaks Dam Access Road, also known as Santa Ana Canyon Road, originates at Greenspot Road and is the primary route used to access Seven Oaks Dam. However, access to this road is restricted by a gate and security officer.

Alder Creek Road originates at Greenspot Road west of Santa Ana Canyon Road and travels northward into the San Bernardino National Forest. A spur road from this road can be used as an alternate access route to Seven Oaks Dam (see Figure 2-4). However, this road is gated and is closed to the general public.

Cone Camp Road originates at Greenspot Road west of Alder Creek Road. This rural standard road is used to access several homes south of Greenspot Road. Only the first approximately 1,500 feet of Cone Camp Road is publicly accessible, the remainder of the road is fenced and gated.

3.13.1.2.3 Devil Canyon Construction Area

SOLID WASTE

Solid waste from this construction area could be taken to the California Street, Colton, Mid-Valley, and/or San Timoteo landfills (San Bernardino County 2002a); see section 3.13.1.2.1. Of

---

1 Peak hour, as used in Table 3.13-1 and in this report, refers to the hour within a typical day, for a given intersection or roadway segment, when the roadway or intersection is subject to the greatest traffic volume.

these landfills, the Mid-Valley Landfill is closest, approximately 13 miles from the Devil Canyon Construction Area. The San Timoteo Landfill is farthest, approximately 21 miles from this Project construction area.

UTILITIES

Because the Devil Canyon Construction Area includes a SWP facility, the area is crisscrossed by numerous water conveyance facilities. As described earlier, both Muni's Foothill Pipeline and Metropolitan's Inland Feeder and Rialto Feeder pipelines originate at the Devil Canyon Afterbays. Also nearby is the San Gabriel Valley Municipal Water District Lytle Pipeline (Lytle Pipeline), in which Muni owns 50 percent conveyance capacity. The Lytle Pipeline serves to deliver SWP water to the westernmost portions of the Muni service area and the San Gabriel Valley. The California Aqueduct also underlies the Devil Canyon Construction Area. This portion of the California Aqueduct is approximately 28 miles long and conveys water from Devil Canyon Afterbays through urbanized areas of San Bernardino and Riverside counties before reaching the SWP terminal reservoir of Lake Perris (DWR 1999).

TRANSPORTATION

University Parkway, a north-south major arterial, is the primary road serving the Devil Canyon Construction Area as well as California State University San Bernardino. Traffic counts for University Parkway (between Freeway 215 and Kendall Drive, about 2 miles south of the construction area) are provided in Table 3.13-2.

Table 3.13-2. Average Daily Traffic Summary for University Parkway

Timeframe	*Average Northbound Traffic*	*Average Southbound Traffic*	*Total Average Traffic*	*Peak Hour*	*Peak Hour Volume*
A.M. (midnight to noon)	8,094	7,284	15,378	7:15 A.M.	3,058
P.M. (noon to midnight)	14,460	14,178	28,638	5:00 p.m.	3,587
Source: KORVE Engineering 2003.					

These traffic counts indicate a heavier traffic load on University Parkway in the evening hours than in the morning hours.

3.13.1.2.4 Lytle Creek Construction Area

SOLID WASTE

Solid waste from this construction area could be taken to the California Street, Colton, Mid-Valley, and/or San Timoteo landfills (San Bernardino County 2002a); see section 3.13.1.2.1. Of these landfills, the Mid-Valley Landfill is closest, approximately 3 miles from the Lytle Creek Construction Area. The San Timoteo Landfill is farthest, approximately 21 miles from this Project construction area.

UTILITIES

A portion of the Lytle Pipeline is located within the Lytle Creek Construction Area. As described above, the Lytle Pipeline delivers SWP water to the westernmost portions of the Muni service area and the San Gabriel Valley. Metropolitan's Rialto Feeder also traverses this area. The Rialto Feeder is parallel to the Lytle Pipeline in the Lytle Creek Construction Area.

TRANSPORTATION

The Lytle Creek Construction Area is urbanized containing freeways, major arterials, and residential streets. The street network includes the following:

- Riverside Avenue, a major arterial running roughly parallel to the Lytle Creek Wash from Interstate 15 to Highland Avenue before extending south. Omnitrans bus route 22 runs on the segment of Riverside Avenue in the Lytle Creek Construction Area (Omnitrans 2004). Riverside Avenue varies from two to four paved lanes in the Lytle Creek Construction Area but has a right-of-way for approximately four lanes (KORVE Engineering 2003). Average daily traffic on Riverside Avenue (from Linden Avenue to Alder Avenue, just west of the Project construction area), was 11,450 for year 2002 to 2003 (personal communication, J. Hunter 2004). No recent information on traffic during peak commute hours is available for Riverside Avenue near the Project construction area (personal communication, J. Hunter 2004), but the roadway was observed to have heavy, fast-moving traffic, with a high percentage of large trucks during site visits in March 2003 and March 2004.
- Linden Avenue, a secondary arterial originating at Riverside Avenue and extending south. Omnitrans bus route 22 has a stop in the segment of Linden Avenue in the Lytle Creek Construction Area. Linden Avenue has two paved lanes in the Lytle Creek Construction Area. Multiple housing developments are accessed from Linden Avenue, but these housing areas have alternate access from other roadways. No recent traffic counts are available for Linden Avenue in the Project construction area (personal communication, J. Hunter 2004), but during a site visit in March 2004 the road was observed to have light traffic primarily composed of passenger cars and light duty trucks.
- West Summit Avenue, a residential street extending between Maple Avenue and Apple Avenue. Summit Avenue has two lanes with multiple homes and driveways opening onto the street. No recent traffic counts are available for West Summit Avenue within the Project construction area (personal communication, J. Hunter 2004), but only light traffic, composed of passenger cars and light duty trucks, was observed during site visits in March 2003 and March 2004.
- Cedar Avenue, a collector street extending from West Summit Avenue south to the State Route 210 alignment. Omnitrans route 22 crosses Cedar Avenue at Bohnert Street (Omnitrans 2004). Cedar Avenue has two lanes in the Project construction area. In the portion of Cedar Avenue north of Bohnert Avenue, there are access roads to multiple housing developments but these housing areas have alternate access from other roadways. Also in the northern portion of Cedar Avenue a few homes, the West Valley Water District Cedar Reservoir, and the West Valley Water District Oliver Romer WTP

have driveway access from Cedar Avenue. South of Bohnert Avenue, Cedar Avenue has the characteristics of a residential street, with multiple homes and driveways directly accessing the roadway. Cedar Avenue is the only roadway access to a housing development surrounding La Gloria Drive. No recent traffic counts are available for Cedar Avenue within the Project construction area (personal communication, J. Hunter 2004), but only light traffic, composed of passenger cars and light duty trucks, was observed during a site visit in March 2004.

- West Casmalia Avenue, a secondary arterial running roughly parallel to the alignment of State Route 210. Casmalia Avenue varies from two to four paved lanes in the Lytle Creek Construction Area. Casmalia Avenue is the only roadway access to housing developments surrounding North Quince and North Church avenues. No recent traffic counts are available for Casmalia Avenue within the Project construction area (personal communication, J. Hunter 2004) but, during a site visit in March 2004, heavy traffic was observed during the evening rush hour related to detours during construction of State Route 210.
- State Route 210. Currently under construction, State Route 210 will be an eight-lane freeway. Completion of the freeway is expected during 2007. When complete, State Route 210 will have ramps at Ayala Drive and under crossings or over crossings at Linden Avenue and Cactus Avenue in the Project construction area.
- Spruce Avenue, a collector street extending from Bohnert Avenue south to the State Route 210 alignment. Spruce Avenue is two lanes in the Project construction area. Homes have driveway access directly from Spruce Avenue. As part of State Route 210 construction, a large drainage channel (the Cactus Channel) will be built on the southern extension of Spruce Avenue to the Cactus Spreading and Flood Control Basins and the road will be permanently closed north of Highland Avenue (San Bernardino Associated Governments [SANBAG] 2003). No recent traffic counts are available for Spruce Avenue in the Project construction area (personal communication, J. Hunter 2004), but only light traffic, composed of passenger cars, light duty trucks, and some construction equipment related to construction of the Cactus Channel was observed during a site visit in March 2004.

3.13.1.3 Project Operations Areas

Solid Waste

Changes to solid waste generation would be limited to activities in the Project construction areas.

Utilities

Though various water pipelines, pump stations, storage facilities, and groundwater recharge basins would be used to implement the Project, these facilities would be used within the bounds of design capacities and no changes to these facilities due to Project operations are anticipated (see Appendices A and B). The Project could alter groundwater recharge patterns which may affect groundwater production wells. The Project would result in changes in the mix of water sources used in the Muni/Western service areas. As demonstrated in Table 3.13-3, in the future, as demands increase in the Muni service area, it will become necessary to utilize larger quantities of imported water and imported water will become a larger percentage of the overall water supply (see Table 3.13-3 and Chapter 4). As demands increase in the Western service area, use of imported and recycled water is expected to increase.

Transportation

Changes to transportation facilities and traffic generation would be limited to activities in the Project construction areas.

Table 3.13-3. Expected Changes in Water Sources for the Muni/Western Service Areas

	MUNI SERVICE AREA		WESTERN SERVICE AREA	
Water Source	*Current*	*Future (2025)*	*Current*	*Future (2025)*
Groundwater	58%	49%	69%	60%
Local Surface Water	23%	19%	1%	2%
Imported Water	19%	27%	25%	27%
Recycled Water	0%	5%	5%	11%

Source: SAWPA 2002a.

3.13.2 Impacts and Mitigation Measures

3.13.2.1 Methodology

To evaluate potential solid waste impacts, estimated waste generation due to Project activities was compared to local landfill capacity.

To evaluate potential impacts to utilities, (a) utilities in the construction area were identified and (b) utilities potentially receiving water as part of Project operations were evaluated to determine if Project operations could require alterations, retrofit, or expansion of these utilities.

To understand the existing conditions and potential impacts to public services, a Traffic Impact Analysis was prepared in August 2003 (KORVE Engineering 2003). Information in the Traffic Impact Analysis was supplemented with site visits in March 2003 and March 2004 and discussions with staff in the public works departments of the various jurisdictions in the Project construction areas. Due to a lack of data, level of service calculations for the various roadways were not performed as part of the impact assessment.

3.13.2.2 Significance Criteria

Though the significance criteria below are based on the Initial Study checklist contained in Appendix G of the State CEQA Guidelines, they have been tailored and augmented based on the potential impacts identified during the scoping process. The Project would have a significant impact if it would:

Solid Waste

- Increase demands on the capacity of local or regional solid waste collection, handling or disposal services beyond permitted capacity; or
- Exceed published national, state, or local standards or regulations for solid waste management.

Utilities

- Require or result in construction of new water treatment facilities or expansion of existing facilities the construction of which caused environmental impacts;
- Impair groundwater production (i.e., lower average groundwater levels by more than 10 feet during a repetition of the 39-year base period hydrology);
- Result in a disruption of water supplies for a substantial period.

Transportation

- Cause a substantial increase in traffic compared to the existing traffic load and capacity of the street system;
- Substantially increase hazards to vehicles, bicycles, or pedestrians due to a project design feature;
- Result in inadequate emergency access; or
- Conflict with adopted policies, plans, or programs supporting alternative transportation.

3.13.2.3 Project Construction

3.13.2.3.1 Seven Oaks Dam and Reservoir Construction Area

SOLID WASTE

Impact PS–1. *Construction in the Seven Oaks Dam and Reservoir Area would result in a minor volume of construction debris, a less than significant impact related to solid waste.*

There will be some volume of solid waste, such as shipping cartons, shrink wrap used to secure cartons, and small items such as scrap steel, scrap pipe, scrap lumber and plywood, pipe coating tape, and lunch trash generated during construction. In this construction area solid waste generation is estimated to be no more than 40 cy per week, or one 40-cy bin. This waste generation would be within the permitted capacity of local solid waste facilities (e.g., the Colton Landfill alone can accept up to 13,297 cy/day).

Construction of the Project would generate debris from demolition and reconstruction of the trash rack of the intake structure, but this volume would be minimal. While substantial amounts of soil material would be generated during realignment of Warm Springs Canyon Road and the SCE upstream access road, this soil would be used as fill where necessary and any remaining soil would be scattered along the roadway, rather than deposited in a landfill.

Therefore impacts related to solid waste would be less than significant and no mitigation is required.

UTILITIES

Project construction would not impact the flood control function of Seven Oaks Dam. Design and construction of modifications to Seven Oaks Dam would undergo review and approval by USACE, who would examine the design and construction plans to ensure that no impairment of the dam's primary purpose, i.e., flood control, occurs during or after construction.

Project construction would have no impact on the SCE system within Seven Oaks Dam and Reservoir Construction Area. Construction in the Seven Oaks Dam and Reservoir area would not encroach on any portion of the current SCE flume, tunnel, or pipeline system. Nor would Project construction affect the flow of water through the SCE system.

TRANSPORTATION

Impact PS-2. *Construction in the Seven Oaks Dam and Reservoir Area would hinder access via the upstream road to SCE Santa Ana River facilities, an adverse but less than significant impact.*

Realigning Warm Springs Canyon Road and the SCE upstream access road could take up to 6 months, during which travel on these roads could be slowed or even periodically blocked due to the presence of construction equipment. SCE system operators use these roads on a daily basis. To avoid encountering construction vehicles, it may be necessary for SCE operators to approach SAR hydroelectric facilities from State Highway 38 rather than from Greenspot Road. This adds approximately 15 miles to the distance that must be traveled and up to 45 minutes to access SAR 1. The road providing upstream access is not open to the public. It is almost exclusively used by SCE personnel to reach hydropower facilities upstream of Seven Oaks Dam. Therefore, while adverse, this is a less than significant impact and no mitigation is required.

Impact PS-3. *Construction in the Seven Oaks Dam and Reservoir Area could contribute up to 548 daily trips (as measured in passenger car equivalents) to the surrounding street network, an adverse but less than significant impact.*

During construction activities in the Seven Oaks Dam and Reservoir Area, up to 45 construction workers would arrive at the site before the start of each shift (7:00 AM) and depart at the end of each shift (7:00 PM). Additionally, up to 53 deliveries of construction materials could occur each day. As detailed in Appendix C, it is possible that construction in the Seven Oaks Dam and Reservoir could overlap with construction of Phase I of the Plunge Pool Pipeline. If this overlap occurred, up to 37 additional construction workers would be arriving and departing for each construction shift, and up to 41 truck trips would be needed to move soil material if a rock screener[2] was not used in the Santa Ana River Construction Area; only four truck trips per day would be anticipated if a rock screener were used (see Appendix C).

Construction trucks would be scheduled to avoid peak hours of roadway traffic in the morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM). Assuming an even distribution of trucks through the remaining 8 hours of the day, there would be up to eight truck trips per hour if a rock screener is used and 12 truck trips per hour without a rock screener. In accounting for traffic volume, each truck is assumed to be comparable to about two cars, so each truck trip is counted as two passenger car equivalents. Total construction traffic resulting from construction in the Seven Oaks Dam Reservoir, combined with potential construction traffic related to construction of the Plunge Pool Pipeline Phase I, is summarized in Table 3.13-4.

Table 3.13-4. Traffic Resulting from Construction in the Seven Oaks Dam and Reservoir Construction Area and Phase I of the Plunge Pool Pipeline

Time Period	INBOUND			OUTBOUND			TOTAL	
	Workers	*Trucks[a]*		*Workers*	*Trucks[a]*		*Construction Volume*	
		w/o Rock Screener	*w/ Rock Screener*		*w/o Rock Screener*	*w/ Rock Screener*	*w/o Rock Screener*	*w/ Rock Screener*
6 to 7 AM	82	0	0	0	0	0	82	82
7 to 8 AM	0	0	0	0	0	0	0	0
8 to 9 AM	0	0	0	0	0	0	0	0
9 to 10 AM	0	24	16	0	24	16	48	32
10 to 11 AM	0	24	16	0	24	16	48	32
11 AM to 12 PM	0	24	16	0	24	16	48	32
12 to 1 PM	0	24	16	0	24	16	48	32
1 to 2 PM	0	24	16	0	24	16	48	32
2 to 3 PM	0	24	16	0	24	16	48	32
3 to 4 PM	0	24	16	0	24	16	48	32
4 to 5 PM	0	0	0	0	0	0	0	0
5 to 6 PM	0	0	0	0	0	0	0	0
6 to 7 PM	0	24	16	82	24	16	130	114
Total Per Day	82	192	128	82	192	128	548	420

Note:
a. Each truck is counted as two passenger car equivalents.

2 A rock screener is a mechanical devise that sorts soil material excavated during construction and separates it into different sizes. A rock screener is used to sort soil and rock material suitable for pipe bedding and for backfill and eliminates the need to have these materials brought in from another area. The rock screener also decreases the amount of excavated material that must later be sold or sent for disposal. An explanation of construction operations with and without a rock screener is provided in Appendix C.

An analysis of traffic conditions with construction traffic was performed by adding the construction-related traffic volumes identified in Table 3.13-4 to background traffic conditions for the year 2006, assuming a growth of 6 percent compared to existing year 2003 volumes in Table 3.13-1.

The background and Project-related traffic for the peak hours is summarized in Table 3.13-5. Traffic added by the Project would be minor (no more than 7 percent of year 2003 traffic) during the peak hours (as measured in passenger car equivalents) and well within the capacity of the roadway. In sum, the addition of Project construction traffic would not be substantial compared to the existing traffic load and capacity of the street system; this would be a less than significant impact, and no mitigation is required.

Table 3.13-5. Seven Oaks Dam Construction Area: Future Average Daily Traffic Summary for 5th Street (Between Route 30 and Boulder Avenue)

Traffic Scenarios	*Eastbound Peak Hour (2 PM)*	*Westbound Peak Hour (10:45 AM)*	*Combined AM Peak Hour (7 AM)*	*Combined PM Peak Hour (5 PM)*	*Total Daily Traffic*
2006 Background Traffic[a]	449	350	1,412	1,275	14,876
Project Added Passenger Car Equivalents w/o Rock Screener	24[b]	24[c]	0	0	548
Percent Traffic Added by Project w/o Rock Screener	5%	7%	0%	0%	4%
Project Added Passenger Car Equivalents w/ Rock Screener	16[b]	16[c]	0	0	420
Percent Traffic Added by Project w/Rock Screener	4%	5%	0%	0%	3%

Notes:

a. A growth rate of 6% was assumed for Santa Ana River area Project roadways, based on regional population growth information provided by the San Bernardino Associated Governments 2001 Regional Transportation Plan.

b. This number includes inbound traffic only.

c. This number includes outbound traffic only.

3.13.2.3.2 Santa Ana River Construction Area

SOLID WASTE

Construction of the Project would generate between 116,000 to 403,000 cy of excess soil material (depending on whether a rock screener is used), which Project proponents propose to sell to local development projects, rather than disposing in a landfill. There would be some volume of solid waste such as shipping cartons, shrink wrap used to secure cartons, and small items such as scrap steel, scrap pipe, scrap lumber and plywood, pipe coating tape, and lunch trash generated during construction. In this construction area, solid waste generation is estimated to be no more than 80 cy per week, or two 40-cy bins.

Because the Project's waste generation would be within the permitted capacity of local solid waste facilities (e.g., the Colton Landfill alone can accept up to 13,297 cy/day), there would be no impact to solid waste resulting from construction in the Santa Ana River Construction Area.

UTILITIES

Impact PS-4. *Construction of Phase III of the Plunge Pool Pipeline and Low Flow Connector could result in disruption of water supplies from the Plunge Pool By-Pass, a significant impact.*

It would be necessary to dewater and reroute a portion of the Plunge Pool By-Pass Pipeline to accommodate the Plunge Pool Pipeline (Phase III) Intake Structure. Also, the pipeline would need to be taken out of service temporarily to create a connection with the proposed Low Flow Connector Pipeline. In all, deliveries from the Plunge Pool By-Pass Pipeline could be disrupted for up to 6 months, a significant impact.

Mitigation Measures

MM PS-1: During construction, Muni/Western will arrange to use facilities of the Santa Ana River-Mill Creek Cooperative Water Project Agreement to make deliveries to local users that would otherwise receive water from the Plunge Pool By-Pass Pipeline. If exchange cannot replace disrupted delivery, Muni/Western will furnish SWP water as replacement supply.

Residual Impact

MM PS-1 would ensure continuation of water deliveries and thus reduce impacts to less than significant from disruption of the Plunge Pool By-Pass Pipeline during construction of Phase III of the Plunge Pool Pipeline and Low Flow Connector.

Impact PS-5. *Construction of Phase III of the Plunge Pool Pipeline could result in disruption of water supplies from the SCE River Crossing Pipeline/North Fork Pipeline, a significant impact.*

While it may be possible to support the SCE River Crossing Pipeline/North Fork Canal and excavate underneath, it is assumed that it will be necessary to take the SCE River Crossing/North Fork Canal out of service during construction of the Plunge Pool Pipeline Phase III. The SCE River Crossing Pipeline/North Fork Canal could be out of service for 2 months during construction of Phase III of the Plunge Pool Pipeline, a significant impact.

Mitigation Measures

MM PS-2: During construction, Muni/Western will arrange to use facilities of the Santa Ana River-Mill Creek Cooperative Water Project Agreement to make deliveries to users that would otherwise receive water via the SCE River Crossing/North Fork Canal. The affected sections of the SCE River Crossing/North Fork canal shall be replaced in-kind after construction. If exchange cannot replace disrupted delivery, Muni/Western will furnish SWP water as replacement supply.

<u>Residual Impact</u>

MM PS-2 would ensure continuation of water deliveries and thus reduce impacts to less than significant related to disruption of the SCE River Crossing/North Fork Canal during construction of Phase III of the Plunge Pool Pipeline.

Impact PS-6. *Construction of Phase I of the Plunge Pool Pipeline could result in disruption of water supplies from the North Fork Canal, a significant impact.*

Construction of Phase I of the Plunge Pool Pipeline would eliminate an approximately 300-foot section of the North Fork Canal. The portion of the North Fork Canal affected is a pipeline underneath the Santa Ana Canyon Road, but outside the road the canal is unreinforced masonry and therefore it is not feasible to support the canal during construction. This portion of North Fork Canal could be out of service for 2 months during construction of Phase I of the Plunge Pool Pipeline, a significant impact. This disruption is in addition to the interruption in service that would occur during other phases of construction (see Impact PS-5).

<u>Mitigation Measures</u>

MM PS-2 is applicable to Impact PS-6.

<u>Residual Impact</u>

MM PS-2 would ensure continuation of water deliveries and thus reduce impacts to less than significant related to disruption of the North Fork Canal during construction of Phase I of the Plunge Pool Pipeline.

Impact PS-7. *Construction of Phase I of the Plunge Pool Pipeline could result in disruption of water supplies conveyed by the Conservation District Canal, a significant impact.*

Construction of Phase I of the Plunge Pool Pipeline would eliminate an approximately 3,000-foot section of the Conservation District Canal. The portion of the Conservation District Canal affected is a cobble lined ditch and therefore it is not feasible to support the canal during construction. This portion of the Conservation District Canal could be out of service for the 17-month duration of construction of Phase I of the Plunge Pool Pipeline, a significant impact.

<u>Mitigation Measures</u>

Either **MM PS-3** or **MM PS-4** would be applicable to Impact PS-7:

MM PS-3: Deliveries that would have occurred to the Santa Ana River spreading grounds via the Conservation District Canal will instead occur via existing Muni facilities. After construction, the affected sections of the canal will be replaced with an in-kind structure.

MM PS-4: Part of the Phase I Plunge Pool Pipeline could be replaced by a tunnel, and the length of the Phase III Plunge Pool Pipeline could be shortened. As shown in Figure 3.13-1, under this mitigation measure a tunnel would be built from a point just south and west of Cuttle Weir. The tunnel would extend southwesterly through the mountains for approximately 1,600 feet. At the base of the mountains, the tunnel would transition to an underground pipeline which would extend for approximately 2,250 feet before hooking up to a valve structure at the Foothill Pipeline terminus. Under this mitigation measure, the designed conveyance capacity would be 1,500 cfs, though the operating capacity would be limited to 500 cfs until Phase II of the Plunge Pool Pipeline was completed.

In total, with this mitigation measure, alignment of the Plunge Pool Pipeline Phase I would be approximately 3,850 feet. Due to the different location of the Phase I alignment, Phase III of the Plunge Pool Pipeline would also have to be somewhat modified. Per this mitigated alignment, Phase III of the Plunge Pool Pipeline would trend westward across a more northerly part of the SAR than would occur under the Project and, as a result, this new alignment of Phase III of the Plunge Pool Pipeline would be somewhat shorter, approximately 2,000 feet long, than under the Project (2,980 feet). The Low Flow Connector would remain as proposed by the Project, 3,500 feet long, though with the modifications to the Plunge Pool Pipeline, these two pipes would have a common trench for only about 1,350 feet, rather than 2,250 feet as would occur under the proposed Project.

With this mitigation measure, the 15-foot diameter Plunge Pool Pipeline would be inside an 18-foot horseshoe-shaped tunnel. The rock through which the tunnel would be constructed is highly fractured and the steel pipe would be surrounded with concrete backfill. The tunnel would be constructed using a drill and blast method and waste rock would be sent to nearby aggregate facilities. Construction activities would last up to a year with the drilling taking about 3 months and back-filling another 3 months. Construction would occur daily 6 days per week. The route underlies lands of the San Bernardino National Forest.

<u>Residual Impact</u>

MM PS-3 would ensure continuation of water deliveries, and thus reduce impacts to less than significant levels related to disruption of the Conservation District Canal. These impacts could also be reduced to less than significant levels through MM PS-4, relocation of the Phase I Plunge Pool Pipeline.

<u>Potential Impacts of MM PS-4</u>

Implementation of MM PS-4 would not change the Project's impacts on aesthetics, hazards/hazardous materials, and agricultural resources.

MM PS-4 would benefit hydrology and water quality, because it would reduce the extent of construction in the river canyon, thereby reducing potential erosion. The reduced amount of construction in the river channel would also decrease impacts on biological resources along the Phase I and Phase III Plunge Pool Pipeline corridors.

Reduced construction within the SAR river bed would reduce potential liquefaction, erosional, and short-term slope stability impacts. Tunneling through fractured bedrock could potentially result in rock topple failures and caving, resulting in potential worker safety impacts.

Air quality impacts with MM PS-4 would be similar to the Project, i.e., construction of new facilities and modification of existing facilities would result in significant adverse impacts related to emissions of ROC, NOx, and CO. These impacts would remain significant even after application of feasible mitigation measures. However, because MM PS-4 includes construction of a 1,600-ft tunnel, the total amount of emissions generated and thus adverse impacts would be greater with implementation of MM PS-4.

With implementation of MM PS-4, potential impacts to the Francis Cuttle Weir Dam (P1064-09H) would be avoided. However with MM PS-4 a historic irrigation ditch (CA-SBR-5980H) and a historic wagon road (CA-SBR-8094H), may be affected. This alternative would also affect the North Fork Canal (CA-SBR-6544H), in a similar manner to, albeit in a slightly different location than, the Project.

With implementation of MM PS-4, there would be additional construction noise disturbance to users of the USFS Santa Ana Divide Trail (approximately 0.75 mile to the northwest of the tunnel alignment). For short intervals during blast operations, noise levels along a portion of the Santa Ana Divide Trail could approach 60 dbA. Blasting noise would not occur continuously during construction but would occur in discrete intervals during the 1-year construction process. Thus while implementation of MM PS-4 could result in greater noise impacts to users of the Santa Ana Divide Trail, impact would still be less than significant.

Construction of the mitigated alignment for Phase I of the Plunge Pool Pipeline would eliminate an approximately 300-foot section of the North Fork Canal, albeit in a different location than the Project. The portion of the North Fork Canal within the MM PS-4 alignment is in an underground pipe. Due to its placement, it may be infeasible to support the pipeline during construction, and a portion of North Fork Canal crossing the tunnel alignment could be out of service for 2 months, a significant impact. This disruption is in addition to the interruption in service that would occur during other phases of construction (see Impact PS-5). However, this impact would be mitigated to a less than significant level with implementation of MM PS-2.

Impact PS-8. *Construction of the Low Flow Connector could result in disruption of water supplies from the Greenspot Pipeline for a short period, an adverse but less than significant impact.*

Construction of the Low Flow Connector would require a junction with the Greenspot Pipeline. During construction it would be necessary to suspend use of the Greenspot Pipeline for approximately 1 to 4 weeks. Because the Greenspot Pipeline is used to move regional water supplies, interruption of the pipeline does not immediately result in decreased water deliveries from water treatment plants or decreased delivery of drinking water; this temporary suspension of operations is typical during maintenance. As is Muni's practice, prior to dewatering the pipeline, the agency would coordinate with any affected entities and provide enough notice prior to shutdown to allow affected entities to increase backup storage, turn on backup groundwater pumps, and/or arrange for increased deliveries from alternate sources. This would be a less than significant impact. No mitigation is required.

Impact PS-9. *Construction of Phase I of the Plunge Pool Pipeline could result in disruption of water supplies from the Foothill and SARC pipelines for a short period, an adverse but less than significant impact.*

Construction of Phase I of the Plunge Pool Pipeline would require a junction with the Foothill Pipeline near the SARC pipeline. During construction it would be necessary to suspend use of these pipelines for approximately 1 to 4 weeks. As described earlier, because these pipelines are used to move wholesale water supplies, interruption of the pipeline does not immediately result in decreased water deliveries from water treatment plants. This temporary suspension of operations is typical during maintenance and would not present a substantial disruption to water supplies. This would be a less than significant impact. No mitigation is required.

Impact PS-10. *Construction of Phase II of the Plunge Pool Pipeline could result in disruption of water supplies to the Inland Feeder for a short period, an adverse but less than significant impact.*

Construction of Phase II of the Plunge Pool Pipeline would require a junction with the Inland Feeder/Foothill Pipeline Intertie near Cone Camp Road. During construction it would be necessary to suspend use of the intertie for approximately a 4-week period. During this time, the Foothill Pipeline would remain in service but the Inland Feeder would have no means to receive SWP deliveries. As described earlier, because these pipelines are used to move wholesale water supplies, interruption of the pipeline does not immediately result in decreased water deliveries from water treatment plants. This temporary suspension of operations is typical during maintenance and would not present a substantial disruption to water supplies. This would be a less than significant impact. No mitigation is required.

TRANSPORTATION

Impact PS-11. *Construction of Phase II of the Plunge Pool Pipeline would temporarily alter Greenspot roadway design features, thereby increasing roadway hazards, a significant impact.*

It would be necessary to install the Plunge Pool Pipeline Phase II under approximately 300 feet of Greenspot Road. This would be accomplished in one of three ways: (1) crews would tunnel under Greenspot Road and the road would remain open; (2) this portion of Greenspot Road would be closed for approximately 1 month while crews trenched and installed pipe; or (3) this portion of Greenspot Road would be closed for approximately 2 months and a 1,000- to 1,500-foot-long, up to 40-foot-wide detour would be placed in the SAR Wash just south of the existing road (see Appendix C, Figure 1-3). Due to the high speeds traveled on Greenspot Road and the road curvature, there is limited sight distance on this roadway and encroachment by construction equipment could present a hazard. This is a significant impact.

<u>Mitigation Measures</u>

MM PS-5: Muni/Western will direct the contractor to have a qualified traffic engineer prepare and implement a traffic management plan that defines how traffic operations will be managed and maintained on roadways during each phase of construction including any detours, signage, lane closures, or utility relocation work. The traffic management plan will specify necessary lane closures, detours, any signage/lighting, flaggers, and other traffic control measures needed to avoid accidents and provide access to residents and emergency response vehicles during construction.

<u>Residual Impacts</u>

MM PS-5 would reduce hazards due to inappropriate traffic speeds, lane geometry, and sight distance and would thus reduce impacts to less than significant to Greenspot Road during construction of Phase II of the Plunge Pool Pipeline.

Impact PS-12. *Construction of the Morton Canyon Connector would temporarily alter Greenspot roadway design features, thereby increasing roadway hazards, a significant impact.*

Approximately one lane of Greenspot Road would have to be closed for approximately 2 weeks for the installation of the Morton Canyon Connector II. This lane closure would be at a different location and at a different time than the potential closure of the roadway to install the Plunge Pool Pipeline Phase II (see Impact PS-11). Due to the high speeds traveled on Greenspot Road and the road curvature, there is limited sight distance on this roadway. Any encroachment by construction equipment or alteration in the lane configuration could present a design hazard. This is a significant impact.

<u>Mitigation Measures</u>

MM PS-5 is applicable to Impact PS-12.

<u>Residual Impacts</u>

MM PS-5 would reduce hazards due to inappropriate traffic speeds, lane geometry, and sight distance, and would thus reduce impacts to less than significant to Greenspot Road during construction of Phase II of the Plunge Pool Pipeline.

Impact PS-13. *Construction of Phase I of the Plunge Pool Pipeline would block roadway access to the Seven Oaks Dam site, a significant impact.*

It could take up to 1 year to construct Phase I of the Plunge Pool Pipeline. A portion of the pipeline would be trenched through the Seven Oaks Dam access road, requiring that the road be closed to through traffic at a point just north of Greenspot Road. This would limit access to the Seven Oaks Dam operations buildings, SCE SAR Powerhouse 2/3, SCE Hydro Operations Center, and Seven Oaks Dam. This loss of access to the dam site is a significant impact.

<u>Mitigation Measures</u>

MM PS-6: Muni/Western will direct the contractor to regrade a pathway, a portion of which was formerly used as a road during the construction of Seven Oaks Dam. During Project construction in the Santa Ana River Construction Area, non-construction vehicles will be directed to this detour route; see Figure 3.13-2. This detour route will allow authorized vehicles to enter the Seven Oaks Dam access road at a point northeast of the road closure, allowing full access to the

Seven Oaks Dam operations buildings, SCE SAR Powerhouse 2/3, and Seven Oaks Dam. Muni/Western will provide security at this detour road to prevent unauthorized access to the dam site.

Residual Impacts

MM PS-6 would ensure access, including access by emergency response vehicles, to the Seven Oaks Dam site and thus reduce impacts to less than significant during construction of Phase I of the Plunge Pool Pipeline.

Potential Impacts of MM PS-6

The detour road would be created by removing small sections of boulders on the riverbank shoulders (approximately 50 feet on the east and west river banks) and then grading the entire length of the detour, excluding the riverbed. A small guard post would be placed in the section of the detour road immediately north of Greenspot Road.

As a result, biological resources could be potentially impacted by the implementation of MM PS-6.

Grading would remove a small amount of immature Riversidian sage scrub vegetation in the recently revegetated area north of Greenspot road. The habitat values of these areas, albeit minor, and erosion and sediment control would be temporarily lost as a result of construction.

Detour roadway construction would result in the unavoidable mortality to wildlife species in the right-of-way, especially species that are dormant at the time of construction and species that are relatively sedentary and unlikely to avoid the activity by leaving the area. The nearby Project construction activity would cause more mobile species such as birds and medium and large sized mammals to avoid the roadway area during the construction period, effectively reducing the amount of habitat available to them during the construction period.

Impacts could be mitigated by minimizing the disturbed areas and implementing a comprehensive re-vegetation and habitat restoration plan after construction with the objective of restoring an equal or greater amount of habitat to that impacted by roadway construction. Such a mitigation measure is described in section 3.3 (Biological Resources).

Because the existing habitat that would be affected is young and has developed within several years following a construction disturbance, it is expected that the functions and values of the habitat could be replaced within a short period of time (a few years) and therefore, with mitigation, construction of the detour road would have less than significant impacts.

One listed species, the coastal California gnatcatcher, has at least some limited potential to occur in the area of impact. To mitigate, the proposed disturbance area would be surveyed to determine the presence or absence of the coastal California gnatcatcher. If present, the roadway alignment would be adjusted to avoid breeding habitat and construction would be limited to outside the California gnatcatcher breeding season. Additional mitigation may also be required following Section 7 consultation with the USFWS. Impacts to other sensitive species potentially occurring in the area would be insignificant and would be minimized via the re-vegetation and habitat restoration plan.

Because the detour roadway crossing of the Santa Ana River would be within jurisdictional waters of the United States, a permit from the USACE would be required under Section 404 of the Clean Water Act. This area is also considered waters of the state and subject to Section 1600 of California Fish and Game Code (Stream and Lake Alteration). Additional impact minimization and mitigation measures may be identified by the USACE and CDFG as part of these permitting processes.

Impact PS-14. *Construction of the Phase III Plunge Pool Pipeline and Low Flow Connector would block roadway access to the Seven Oaks Dam site, a significant impact.*

It could take up to 9 months to install Phase III of the Plunge Pool Pipeline and the Low Flow Connector. These pipelines are located primarily in the Seven Oaks Dam access road and thus their construction would require the closure of the road from a point just west of SCE SAR Powerhouse 2/3 to the base of the dam outlet works. This closure would be at a separate time and in a separate location than the road closure that would occur during construction of Phase I of the Plunge Pool Pipeline (see Impact PS-13). Closure of the road for construction of the Plunge Pool Pipeline Phase III and the Low Flow Connector would limit access to Seven Oaks Dam and Reservoir (see Figure 3.13-2). This loss of access to the dam site is a significant impact.

Mitigation Measures

MM PS-7: During construction, Muni/Western will direct non-construction vehicles that need to access Seven Oaks Dam and Reservoir, an alternate access to Seven Oaks Dam; see Figure 3.13-2. This detour route will allow authorized vehicles to enter the dam site at the right abutment of Seven Oaks Dam. Muni/Western will provide security at this alternate access road during construction of the Phase III Plunge Pool Pipeline and Low Flow Connector to prevent unauthorized access to the dam site.

Residual Impacts

Though it would increase travel time to the dam by approximately 10 to 20 minutes (depending on conditions), MM PS-7 would ensure access, including access by emergency response vehicles, to the Seven Oaks Dam site and thus impacts reduce to less than significant during construction of Phase III of the Plunge Pool Pipeline.

Impact PS-15. *Construction in the Santa Ana River Construction Area could add up to 366 daily trips (as measured in passenger car equivalents) to the surrounding street network, an adverse but less than significant impact.*

During construction activities in the Santa Ana River Construction Area, up to 43 construction workers would arrive at the site before the start of each shift (7:00 AM) and depart at the end of each shift (7:00 PM). Additionally, up to 66 deliveries of construction materials could occur each day if the Project did not use a rock screener; only four deliveries would be needed if the Project used a rock screener (see Appendix C). Construction trucks would be scheduled to avoid peak hours of roadway traffic in the morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM). Assuming an even distribution of truck through the remaining 8 hours of the day, there would be up to nine truck trips per hour if a rock screener is used and one truck trip per hour without a rock screener. Total construction traffic resulting from construction in the Santa Ana River Construction Area is shown in Table 3.13-6.

Table 3.13-6. Traffic Resulting from Construction in the Santa Ana River Construction Area

Time Period	INBOUND			OUTBOUND			TOTAL	
	Workers	*Trucks*[a]		*Workers*	*Trucks*[a]		*Construction Volume*	
		w/o Rock Screener	*w/ Rock Screener*		*w/o Rock Screener*	*w/ Rock Screener*	*w/o Rock Screener*	*w/ Rock Screener*
6 to 7 AM	39	0	0	0	0	0	39	39
7 to 8 AM	0	0	0	0	0	0	0	0
8 to 9 AM	0	0	0	0	0	0	0	0
9 to 10 AM	0	18	2	0	18	2	36	4
10 to 11 AM	0	18	2	0	18	2	36	4
11 AM TO 12 PM	0	18	2	0	18	2	36	4
12 to 1 PM	0	18	2	0	18	2	36	4
1 to 2 PM	0	18	2	0	18	2	36	4
2 to 3 PM	0	18	2	0	18	2	36	4
3 to 4 PM	0	18	2	0	18	2	36	4
4 to 5 PM	0	0	0	0	0	0	0	0
5 to 6 PM	0	0	0	0	0	0	0	0
6 to 7 PM	0	18	2	39	18	2	75	43
Total Per Day	39	144	16	39	144	16	366	110

Note:

a. Each truck is counted as two passenger car equivalents.

An analysis of traffic conditions with construction traffic was performed by adding the construction-related traffic volumes identified in Table 3.13-6 to background traffic conditions for the year 2006, assuming a growth of 6 percent relative to existing (year 2003) traffic volumes in Table 3.13-1.

The background and Project-related traffic for the peak hours is summarized in Table 3.13-7. The Project would have little affect on AM or PM peak-hour traffic (Project construction would add no more than 5 percent to existing traffic) and, over the entire day, Project added traffic is minimal, no more than 2 percent depending on whether a rock screener is used during construction. So while the addition of Project construction traffic is adverse, it would not be substantial compared to the existing traffic load and capacity of the street system. This would be a less than significant impact, and no mitigation measures are necessary.

Table 3.13-7. Santa Ana River Construction Area: Future Average Daily Traffic Summary for 5th Street (Between Route 30 and Boulder Avenue)

Traffic Scenarios	*Eastbound Peak Hour (2 PM)*	*Westbound Peak Hour (10:45 AM)*	*Combined AM Peak Hour (7 AM)*	*Combined PM Peak Hour (5 PM)*	*Total Daily Traffic*
2006 Background Traffic[a]	449	350	1,412	1,275	14,876
Project Added Passenger Car Equivalents w/o Rock Screener	18[b]	18[c]	0	0	366
Percent Traffic Added by Project w/o Rock Screener	4%	5%	0%	0%	2%
Project Added Passenger Car Equivalents w/ Rock Screener	2[b]	2[c]	0	0	110
Percent Traffic Added by Project w/Rock Screener	less than 1%	1%	0	0	less than 1%

Notes:
a. A growth rate of 6% was assumed for Santa Ana River area Project roadways based on regional population growth information provided by the San Bernardino Associated Governments 2001 Regional Transportation Plan (SANBAG 2001) growth forecast.
b. This number includes inbound traffic only.
c. This number includes outbound traffic only.

3.13.2.3.3 Devil Canyon Construction Area

SOLID WASTE

Construction of the Project in the Devil Canyon Construction Area would generate 3,300 cy of soil material which Project proponents propose to sell to local development projects, rather than landfilling. There will be some volume of solid waste such as shipping cartons, shrink wrap used to secure cartons and small items such as scrap steel, scrap pipe, scrap lumber and plywood, pipe coating tape, and lunch trash generated during construction. In this construction area, solid waste generation is estimated to be no more than 40 cy per week.

Because waste generation of the Project would be within the permitted capacity of local solid waste facilities (e.g., the Colton Landfill alone can accept up to 13,297 cy/day), there would be no impact to solid waste resulting from construction in the Devil Canyon Construction Area.

UTILITIES

Project construction (Devil Canyon By-Pass Pipeline) would not affect deliveries from the DWR California Aqueduct or the Metropolitan Inland Feeder. Construction of the Devil Canyon By-Pass Pipeline would cross over the California Aqueduct. The California Aqueduct would not be taken out of service. Depending on alignment, the Devil Canyon By-Pass could cross near the Inland Feeder. Construction trenching would not be deep enough to affect the Inland Feeder.

TRANSPORTATION

Impact PS-16. *Construction in the Devil Canyon Construction Area could add up to 122 daily trips (as measured in passenger car equivalents) to the surrounding street network, an adverse but less than significant impact.*

During construction activities in the Devil Canyon Construction Area, up to 13 construction workers would arrive at the site before the start of each shift (7:00 AM) and depart at the end of each shift (7:00 PM). Additionally, up to 22 deliveries of construction materials could occur each day (see Appendix C). Construction trucks would be scheduled to avoid peak hours of roadway traffic in the morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM). Assuming an even distribution of truck traffic through the remaining 8 hours of the day, there would be up to three truck trips per hour. Total construction traffic resulting from construction in the Devil Canyon Construction Area is shown in Table 3.13-8.

Table 3.13-8. Traffic Resulting from Construction in the Devil Canyon Construction Area

Time Period	INBOUND		OUTBOUND		*Total Construction Volume*
	Workers	*Trucks*[a]	*Workers*	*Trucks*[a]	
6 to 7 AM	13	0	0	0	13
7 to 8 AM	0	0	0	0	0
8 to 9 AM	0	0	0	0	0
9 to 10 AM	0	6	0	6	12
10 to 11 AM	0	6	0	6	12
11 AM to 12 PM	0	6	0	6	12
12 to 1 PM	0	6	0	6	12
1 to 2 PM	0	6	0	6	12
2 to 3 PM	0	6	0	6	12
3 to 4 PM	0	6	0	6	12
4 to 5 PM	0	0	0	0	0
5 to 6 PM	0	0	0	0	0
6 to 7 PM	0	6	13	6	25
Total Per Day	13	48	13	48	122

Note:
a. Each truck is counted as two passenger car equivalents.

An analysis of traffic conditions with construction traffic was performed by adding the construction-related traffic volumes identified in Table 3.13-8 to background traffic conditions for the year 2006 assuming a growth of 4 percent compared to existing (year 2003) volumes in Table 3.13-2.

The background and Project-related traffic for the peak hours is summarized in Table 3.13-9. Traffic added by the Project is minor, no more than 25 passenger car equivalents in any given hour. The Project would have little affect on AM or PM peak-hour traffic and, over the entire day, Project added traffic would be minimal, less than 1 percent. So while the addition of Project construction traffic is adverse, it would not be substantial compared to the existing traffic load and capacity of the street system. This would be a less than significant impact, and no mitigation is required.

Table 3.13-9. Devil Canyon Construction Area: Future Average Daily Traffic Summary for University Parkway

Traffic Scenarios	*Eastbound Peak Hour (5 PM)*[a]	*Westbound Peak Hour (3:45 PM)*	*Combined AM Peak Hour (7:15 AM)*	*Combined PM Peak Hour (5 PM)*	*Total Daily Traffic*
2006 Background Traffic[b]	2,162[c]	1,761[d]	3,180	3,730	45,777
Project Construction Added Passenger Car Equivalents	0	6	0	0	122
Percent Traffic Added by Project Construction	0%	less than 1%	0%	0%	less than 1%

Notes:

a. The eastbound peak hour is the same as the combined PM peak hour.

b. A growth rate of 4% was assumed for City of San Bernardino area Project roadways based on regional population growth information provided by the San Bernardino Associated Governments 2001 Regional Transportation Plan growth forecast.

c. This number includes inbound traffic only.

d. This number includes outbound traffic only.

3.13.2.3.4 Lytle Creek Construction Area

SOLID WASTE

Construction of the Project in the Lytle Creek Construction Area would generate 49,000 cy of soil material which Project proponents propose to sell to local development projects, rather than landfilling. There will be some volume of solid waste such as shipping cartons, shrink wrap used to secure cartons and small items such as scrap steel, scrap pipe, scrap lumber and plywood, pipe coating tape, and lunch trash generated during construction. In this construction area, solid waste generation is estimated to be no more than 80 cy per week, or two 40-cy bins.

Because waste generation of the Project would be within the permitted capacity of local solid waste facilities (e.g., the Colton Landfill alone can accept up to 13,297 cy/day), there would be no impact to solid waste resulting from construction in the Lytle Creek Construction Area.

UTILITIES

Alignment of the Lower Lytle Creek and Cactus Basins pipelines would consider the location of West Valley Water District pipelines and, where possible, the pipeline alignment would avoid West Valley Water District facilities. Where Project construction must cross or underlie West Valley Water District facilities, pipelines would be supported in place and kept in service; there would be no disruption to West Valley Water District water deliveries.

The Lower Lytle Creek Pipeline would cross under the Fontana Power Plant penstock. The penstock would be supported in place, and no interruption to power plant operations would occur.

The Cactus Basins Pipeline would cross under a petroleum products pipeline. During construction, the petroleum products pipeline would be supported in place and no interruption to pipeline operations would occur.

Impact PS-17. *Construction of the Lower Lytle Creek Pipeline could result in disruption of water supplies from the Lytle Pipeline for a short period, an adverse but less than significant impact.*

Construction of the Lower Lytle Creek Pipeline would require a junction with the Lytle Pipeline within Riverside Avenue. During construction it would be necessary to suspend use of this pipeline for approximately 1 to 4 weeks. Because this pipeline is used to move wholesale water supplies, interruption of the pipeline does not immediately result in decreased water deliveries from water treatment plants. This temporary suspension of operations is typical during maintenance and would not present a substantial disruption to water supplies. While adverse, this would be a less than significant impact. No mitigation is required.

TRANSPORTATION

Impact PS-18. *Construction of the Lower Lytle Creek Pipeline would temporarily alter Riverside Avenue roadway design features, thereby increasing roadway hazards, a significant impact.*

Approximately 2,700 feet of the Lower Lytle Creek Pipeline would be installed within the right-of-way of Riverside Avenue (see Figure 2-8). Installation of the pipeline would require narrowing the travel lanes in this section of Riverside Avenue. Because of the wide right-of-way on Riverside Avenue, it should be possible to maintain at least one open lane in each travel direction. Depending on the exact alignment of the pipeline (depending on avoidance of other utilities), it may be necessary to briefly use currently unpaved portions of the right-of-way. Narrowing traffic lanes, shifting traffic to unpaved portions of the rights-of-way, and the encroachment of construction equipment into travel lanes could present a design hazard. This is a significant impact.

Mitigation Measures

MM PS-5 applies to Impact PS-18.

Residual Impacts

MM PS-5 would reduce hazards due to inappropriate traffic speeds, lane geometry, and sight distance, and thus reduce impacts to less than significant to Riverside Avenue during construction of the Lower Lytle Creek Pipeline.

Impact PS-19. *Construction would limit direct access to multiple homes along the Cactus Basins Pipeline Route, a significant impact.*

The Cactus Basins Pipeline would be installed in Linden Avenue, West Summit Avenue, Cedar Avenue, West Casmalia Street, and Spruce Avenue (see Figure 2-8). All of these roads are two lanes, with one travel lane in each direction. During construction, it would not be possible to maintain a travel lane on these roadways, so these streets would have to be closed. To limit disruption to roadways, the Cactus Basins Pipeline would be built in two-block segments. Each segment would be finished and opened to traffic before the next two-block segment of construction begins. It is anticipated that each two-block segment would be closed for up to 3 months, but construction in front of a given home or property would not last more than 7 days. There are multiple homes along West Summit Avenue, Cedar Avenue, West Casmalia, and Spruce Avenue that can only be accessed from roadways that would be closed during construction. For homes with driveways connecting to the affected roadways, a temporary bridge would be placed across the pipeline trench and these residences would be allowed use of the construction equipment lane. However, the loss of direct vehicular access by residents, public service providers, and emergency response vehicles is a significant impact. The hazard to pedestrians is also a significant impact.

<u>Mitigation Measures</u>

MM PS-5, in combination with the following, would reduce transportation impacts during Project construction:

MM PS-8: All construction contractors will provide weekly updates regarding construction schedules and road closures to local police and fire jurisdictions.

MM PS-9: All construction contractors will notify all residents in the construction area a minimum of 1 week before beginning construction.

MM PS-10: All construction contractors will coordinate construction activities with local emergency services (police, fire, paramedic), the U.S. Postal Service, school bus and Omnitrans operators, delivery services (Federal Express, United Parcel Service, DHL), and local refuse companies to ensure continuity of these services.

MM PS-11: All construction contractors will post warning signs and construct barriers to prevent pedestrians from inadvertently entering construction areas or falling into open trenches. Contractors will also ensure that Project construction areas have been properly secured before leaving the work site at the end of the day. Measures may include covering trenches and/or installing temporary fencing and safety lights.

<u>Residual Impacts</u>

Implementation of MM PS-5, and MM PS-8 through MM PS-11, would reduce impacts related to access to homes along the Cactus Basins Pipeline route. However, access by emergency response vehicles and other public services would still be limited, so Impact PS-19 would remain a significant unavoidable impact.

Impact PS-20. *Construction in the Lytle Creek Construction Area could cause a temporary disruption to bus service, a less than significant impact.*

Omnitrans bus route 22 traverses and has stops on the portion of Linden Avenue that would be closed to traffic during construction. Construction would require temporarily (approximately 4 months) detouring this route and relocating bus stops along Linden Avenue. While this disruption would be an inconvenience to transit patrons, it would not conflict with City of Rialto policies for alternative transportation. No mitigation is required.

Impact PS-21. *Construction in the Lytle Creek Construction Area could add up to 404 daily trips (as measured in passenger car equivalents) to the surrounding street network, an adverse but less than significant impact.*

During construction activities in the Lytle Creek Construction Area, up to 42 construction workers would arrive at the site before the start of each shift (7:00 AM) and depart at the end of each shift (7:00 PM). Additionally, up to 78 deliveries of construction materials could occur each day (see Appendix C). Construction trucks would be scheduled to avoid peak hours of roadway traffic in the morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM). Assuming an even distribution of truck traffic through the remaining 8 hours of the day, there would be up to 10 truck trips per hour. Total construction traffic resulting from construction in the Lytle Creek Construction Area is shown in Table 3.13-10.

Table 3.13-10. Traffic Resulting from Construction in the Lytle Creek Construction Area

	INBOUND		OUTBOUND		
Time Period	*Workers*	*Trucks*[a]	*Workers*	*Trucks*[a]	*Total Construction Volume*
6 to 7 AM	42	0	0	0	42
7 to 8 AM	0	0	0	0	0
8 to 9 AM	0	0	0	0	0
9 to 10 AM	0	20	0	20	40
10 to 11 AM	0	20	0	20	40
11 AM to 12 PM	0	20	0	20	40
12 to 1 PM	0	20	0	20	40
1 to 2 PM	0	20	0	20	40
2 to 3 PM	0	20	0	20	40
3 to 4 PM	0	20	0	20	40
4 to 5 PM	0	0	0	0	0
5 to 6 PM	0	0	0	0	0
6 to 7 PM	0	20	42	20	82
Total Per Day	42	160	42	160	404

Note:

a. Each truck is counted as two passenger car equivalents.

An analysis of traffic conditions with construction traffic was performed by adding the construction-related traffic volumes identified in Table 3.13-10 to background traffic conditions for the year 2007 (the anticipated year in which construction commences), assuming a growth of 4 percent compared to average daily traffic reported on Riverside Avenue for years 2002-2003. A growth rate of 4 percent was assumed for City of Rialto area roadways based on regional population growth information provided by the growth forecast of the SANBAG 2001 Regional Transportation Plan (SANBAG 2001). Assuming this growth rate, average daily traffic on Riverside Avenue near the Project would be 11,908. To this average daily traffic, the Project would add approximately 404 passenger car equivalents, a 3 percent increase. This temporary change in traffic would not be substantial compared to the existing traffic load and capacity of the street system, and this would be a less than significant impact. No mitigation is required.

3.13.2.4 Project Operations and Maintenance

Solid Waste

Potential impacts to solid waste relate only to construction of new facilities. Operation of the Project would not directly generate additional solid waste or otherwise affect landfill disposal capacity.

Utilities

The Project has been designed to enhance the ability to make water deliveries, and to work within existing water conveyance and storage capacities (see Appendix A). Operation of the Project would not result in a substantial disruption to water deliveries.

The Project would result in local water being used for direct deliveries, for groundwater spreading, and for exchange. The water made available by the Project would have the effect of increasing slightly the amount of local water supplies and decreasing imported water supplies, as is demonstrated in Table 3.13-11. Table 3.13-11 shows changes under Scenario A, changes in water sources would be smaller under Project Scenarios B, C, and D.

Table 3.13-11. Change in Proportion of Muni Service Area Water Derived from Local Sources versus Imported SWP Water under Scenario A

Scenario	*Year 2000*	*Year 2025*
No Project		
Local Water (Groundwater and Surface Water)	86%	68%
Recycled Water	0%	5%
Imported Water (SWP)	14%	27%
Scenario A		
Local Water (Groundwater and Surface Water)	92%	73%
Recycled Water	0%	5%
Imported Water (SWP)	8%	23%

Further, the Project would result in deliveries of both SAR water (initial deliveries) and imported SWP water (water received as part of an exchange) to the Yucaipa Water Treatment Plant (WTP), City of Redlands Hinckley and Tate WTPs, East Valley Water District City Creek WTP, and West Valley WTP (see Appendix A). All of these water treatment plants, with the exception of Yucaipa and Tate, currently receive and treat local water, SWP water, and blends of local and SWP water. The Yucaipa WTP, is being designed to treat both local, SWP, and blends of these waters. The Tate WTP is currently undergoing renovations which will allow it to treat SWP, local, and blends of these two water sources. Delivery of local water or SWP as part of the Project would not necessitate modifications to these plants. Further, the proposed allocation of water under the Project has considered the available treatment capacity at these WTPs and the proposed allocation would not exceed the existing or approved capacities of these plants (see Appendix A). Therefore, the Project would not necessitate the construction of new water treatment facilities or expansion of existing facilities.

The Project also proposes to place local water into the California Aqueduct of the SWP to facilitate exchanges with other water agencies. Before Santa Ana River water could be placed in the California Aqueduct, Muni/Western would have to petition the Transfers and Special Projects Branch of the Department of Water Resources. Per the criteria outlined in the *Interim Department of Water Resources Water Quality Criteria for Acceptance of Non-Project Water into the State Water Project* (dated March 1, 2001) and the *Implementation Procedures for the Review of Water Quality from Non-Project Water Introduced into the State Water Project* (dated March 14, 2001), the quality of the non-SWP water is compared to the ambient water quality of SWP water. The criteria reflect that the ambient quality can vary by season and by year. If the water is accepted, then monitoring is required to confirm that the water continues to meet the requirements. In this manner the water quality of the SWP system would be protected.

Impact PS-22. *Change in the pattern of groundwater recharge related to the Project could lower average groundwater levels at wells outside the Pressure Zone, thus impairing groundwater production, a significant impact.*

Based on groundwater modeling results, it is estimated that under Scenarios A and B, static groundwater levels at seven of the 23 index wells located outside the Pressure Zone would be reduced, on average over the 39-year forecast period, by more than 10 feet when compared to No Project conditions. (See Appendix B for more detail on the models and modeling results.) This is a significant impact.

MITIGATION MEASURES

MM PS-12: Per the requirements of the Seven Oaks Accord, to avoid a significant effect on groundwater levels at one or more index wells located outside the Pressure Zone, Muni/Western will spread sufficient water to maintain static groundwater levels at the affected index wells.

To implement this mitigation measure, Muni/Western will use a groundwater monitoring program based on information derived from the index wells. This information will be used in conjunction with forecasts of groundwater levels derived from Muni/Western integrated surface and groundwater models to identify trends in groundwater levels and isolate the share of change attributable to the Project. Remedial action will be implemented prior to an actual 10-foot reduction being reached, to avoid the significant impact.

RESIDUAL IMPACTS

Implementation of MM PS-12 will reduce Impact PS-22 to a less than significant level.

Transportation

Potential impacts to transportation relate to construction of new facilities. While the Project would result in additional vehicle trips to conduct maintenance on new facilities, these trips would be minor. No mitigation is required.

This page intentionally left blank.

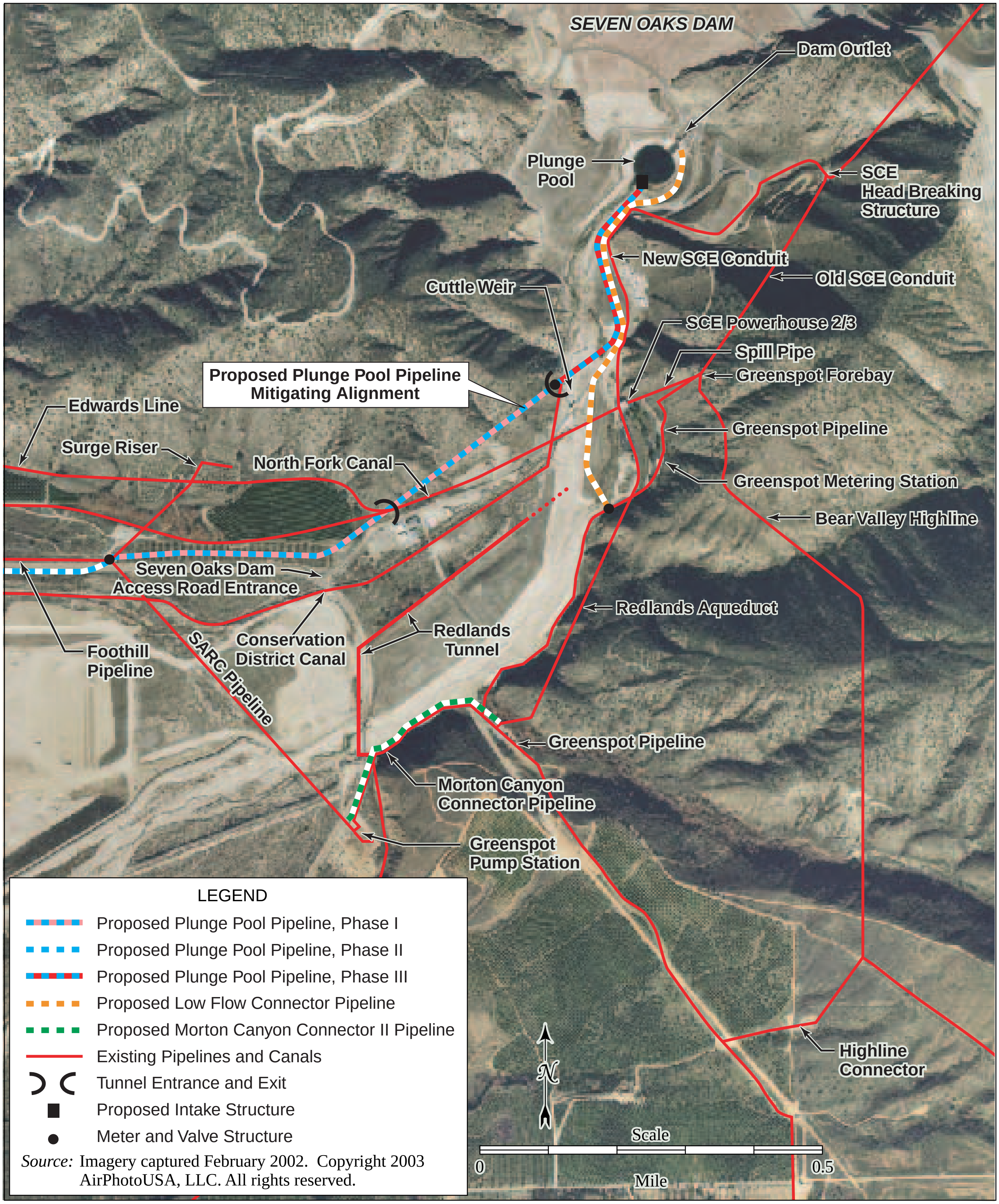


Figure 3.13-1. Proposed Plunge Pool Pipeline Mitigating Alignment for Public Services, Utilities, and Transportation

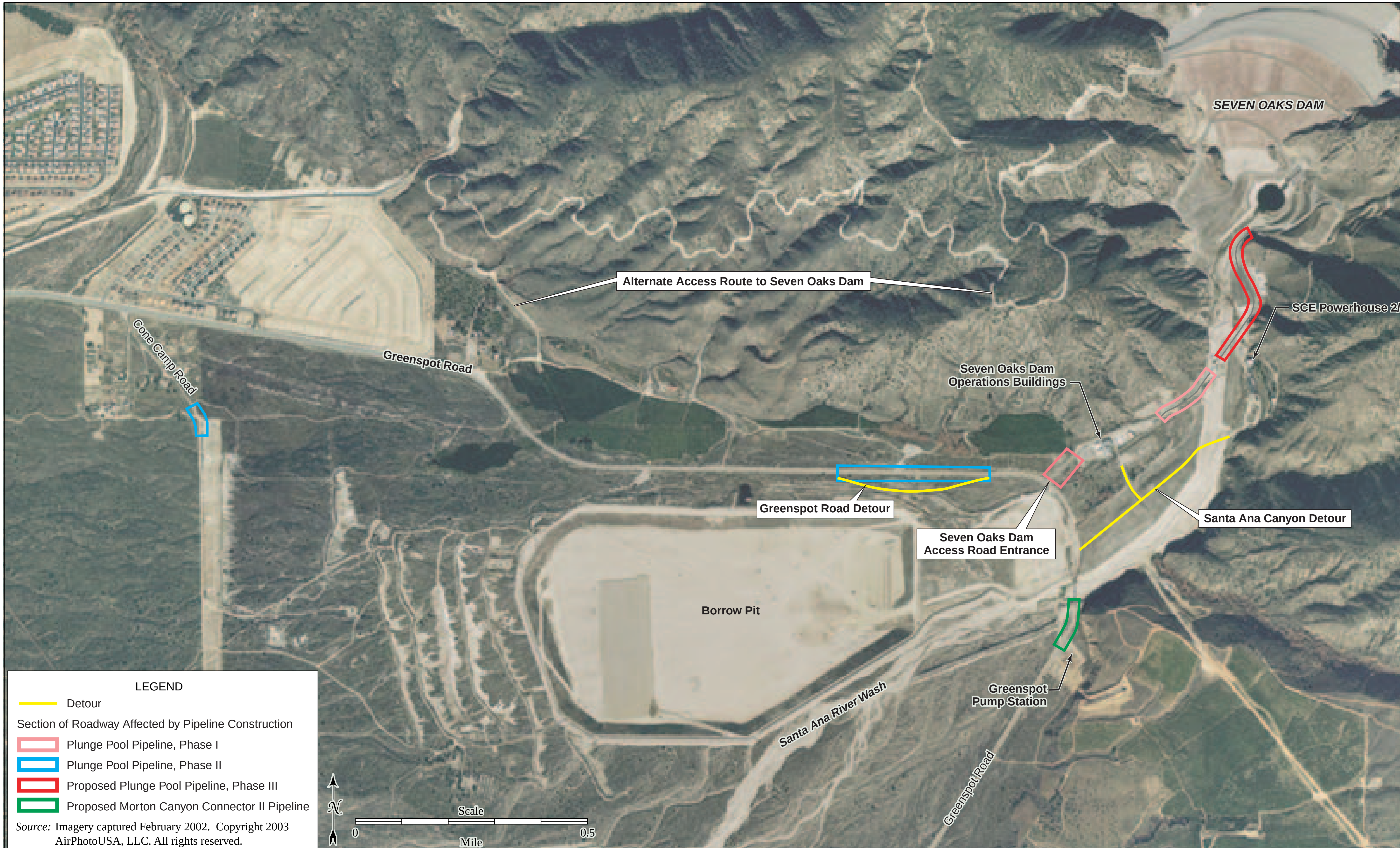


Figure 3.13-2. Detours and Roadways Affected by Proposed Pipelines

4.0 GROWTH-INDUCING IMPACTS AND GROWTH-RELATED IMPACTS

4.1 GROWTH-INDUCING IMPACTS

CEQA Requirements

CEQA Guidelines Section 15126.2(d), which discusses growth-inducing impacts of a Project, states that an EIR must discuss the ways in which a Project could:

- Foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment;
- Remove obstacles to population growth;
- Require the construction of new community facilities that could cause significant environmental effects; and
- Encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.

The Guidelines further state that it must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. This chapter analyzes the Project's potential growth-inducing impacts using the CEQA definition. Growth-related impacts associated with the Project are impacts that occur later in time or are farther removed in distance, but which are still reasonably foreseeable. For this Project, they are associated with the introduction of a supplementary water supply source and are considered synonymous with growth-inducing impacts. Indirect impacts of the Project are discussed on a resource-by-resource basis below in section 4.2 (Growth-Related Indirect Impacts).

General Factors Affecting Population Growth

Growth does not necessarily result from a single project or factor in a community. Rather, several factors affect the location, size, direction, timing, type and rate of population growth, depending on the region where the community is located. These factors include local government planning, availability of public services, natural resources, the economic climate, and political and environmental concerns. City and county planning agencies adopt and administer general and specific plans, zoning maps and ordinances, and other planning documents that contain policies and maps to identify the intensity and type of development that would be allowed in specific locations. As part of the local government development approval process, wholesale and retail water purveyors provide information on their ability to serve additional water users. However, local jurisdictions, rather than the wholesale or retail water purveyors, ultimately control development approval decisions.

Although local governments play a major role in growth management, the location and timing of growth also depend on economic factors such as the availability and cost of developable land, local and national economic cycles, interest rates, and demand for housing. Political factors include state and local laws that mandate businesses to comply with certain rules, regulations, and permitting requirements that address environmental and community concerns.

Other political decisions also impact growth, such as reducing property taxes as an incentive to attract businesses to certain communities. Quality of life issues such as crime, climate, air quality, traffic and commuting distances, as well as the availability, cost and quality of community services such as schools, transportation facilities, recreation facilities, and police and fire protection, may also be important factors influencing the timing and location of population growth.

Growth Inducement in the Muni/Western Service Areas

The Project is an action to be taken by Muni/Western to meet water demands of existing users and accommodate a portion of projected growth. The population that could be supported by newly conserved SAR water relates directly to the quantity of new water made available through implementation of the Project. Projected growth, however, also depends on assumptions used by local government decision-makers when approving new development projects.

The Project, even though consistent with local and regional population projections and plans, would remove an obstacle to population growth by providing additional local water within the Muni/Western service areas. See section 4.1.1 (Historic Population and Housing Growth in the Muni/Western Service Areas). Because it would remove such an obstacle, the Project may indirectly foster economic or population growth or the construction of additional housing within the Muni/Western service area. Potential environmental impacts from growth that could result from the Project are addressed in section 4.2 (Growth-Related Indirect Impacts) below.

Muni has the responsibility to maintain the San Bernardino Basin Area (SBBA) groundwater basins in a state of balance. The SBBA is the major source of water for a number of water purveyors (retailers) in both San Bernardino and Riverside counties. Muni is a wholesale water purveyor and, as such, does not deliver water directly to end-users. Western plays the role of wholesaler of water as well as retailer and represents the interests of a number of purveyors in Riverside County. However, neither Muni nor Western has the independent authority to approve new development in their respective service areas. This authority resides with county and municipal authorities, and the authority and responsibility for mitigating the impacts of specific development projects is primarily the responsibility of these local governments as well as local, regional, state, and federal regulatory agencies. CEQA Guidelines Section 15091(2) allows Muni/Western, as the lead agencies for this EIR, to find that mitigation for growth-related impacts is the responsibility of other public agencies, which either have adopted or should adopt such mitigation during the course of project-specific CEQA analysis. Within the Muni/Western service areas, there are numerous local governments with land use planning authority. The local governments include the counties of San Bernardino and Riverside, and 14 cities located within the service areas of Muni/Western; see Figure 1-1. The cities within the Muni service area include Colton, Grand Terrace, Highland, Loma Linda, Redlands, Rialto, San Bernardino, and Yucaipa. For Western, the respective cities include Corona, Lake Elsinore, Murrieta, Norco, Riverside, and Temecula.

Under current law (i.e., SB 221 [codified in Business & Professions Code Sections 11010, Government Code Sections 65867.5, 66455.3, and 66473.7] and SB 610 [codified in PRC Section 21151.9, Water Code Sections 10631, 10656, 10657, 10910, 10911, and 10912]), certain urban water suppliers must maintain updated water management plans and must be alerted and consulted during the development approval process. The availability of adequate public services (including water) must be demonstrated before major new development may be approved. Subdivided lands must have access to adequate public services, identified in the consumer protection Public Report issued for the subdivision, before lots within the subdivisions may be sold. SB 610 and SB 221 help to ensure that local governments approve development projects only if water supplies are adequate to serve them.

The subsections below analyze: (i) historic population and housing growth in the Muni/Western service areas; (ii) future population growth in the Muni/Western service areas; and (iii) amounts and sources of water supplies available to Muni and Western to meet future demands.

4.1.1 Historic Population and Housing Growth in the Muni/Western Service Areas

The region of influence for the Project is the two-county area comprised of San Bernardino and Riverside counties. Population figures for 1990 and 2000 for Riverside and San Bernardino counties are presented in Table 4.1-1. Over the decade of the 1990s, both counties experienced substantial increases in population: 32 percent for Riverside County (with an average annual rate of 2.8 percent annually) and just over 20 percent for San Bernardino County (1.9 percent annually). The population of the two-county region increased by over 666,000 persons or over 25 percent (2.3 percent annually) during this time period.

Table 4.1-1. Riverside and San Bernardino County Population, 1990 and 2000

Area	*Population*		*Change: 1990-2000*		
	1990	*2000*	*Number*	*Percent*	*Average Annual Percent*
Riverside County	1,170,413	1,545,387	374,974	32.0%	2.8%
San Bernardino County	1,418,380	1,709,434	291,054	20.5%	1.9%
Two-County Region of Influence	2,588,793	3,254,821	666,028	25.7%	2.3%
Source: U.S. Census 1990 and 2000.					

The number of housing units contained in the two-county region grew from about 1,026,200 in 1990 to 1,186,000 in 2000. This increase of 15.6 percent took place at an average annual rate of 1.5 percent (see Table 4.1-2). From 1990 to 2002, an average of almost 18,900 construction permits for housing units were issued each year in the two-county region (see Table 4.1-3).

Table 4.1-2. Housing Units in Riverside and San Bernardino Counties, 1990 and 2000

Area	*Housing Units*		*Change: 1990-2000*		
	1990	*2000*	*Number*	*Percent*	*Average Annual Percent*
Riverside County	483,847	584,674	100,827	20.8%	1.9%
San Bernardino County	542,332	601,369	59,037	10.9%	1.0%
Two-County Region of Influence	1,026,179	1,186,043	159,864	15.6%	1.5%
Source: U.S. Census 1990 and 2000.					

Table 4.1-3. Housing Construction Permits Issued by Riverside and San Bernardino Counties, 1990 through 2002

County	HOUSING CONSTRUCTION PERMITS													
	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*Annual Average*
Riverside County	15,362	9,283	8,220	7,274	8,015	6,806	7,540	9,747	12,527	14,154	15,025	19,012	22,255	11,940
San Bernardino County	13,250	6,809	7,251	5,778	4,809	3,892	4,822	5,448	6,127	6,767	6,471	8,405	10,219	6,927
Two-county Region of Influence	28,612	16,092	15,471	13,052	12,824	10,698	12,362	15,195	18,654	20,921	21,496	27,417	32,474	18,867

Source: U.S. Census 1990 and 2000.

4.1.2 Future Population Growth in the Muni/Western Service Areas

The Southern California Association of Governments (SCAG) adopted the "2001 RTP Socioeconomic Forecast" in April 2001 that includes population projections for consecutive 5-year increments from 2000 to 2025 for various geographic areas (SCAG 2001). Table 4.1-4 presents these data for Riverside and San Bernardino counties. The counties are projected to experience average annual growth rates of 2.5 percent and 2.0 percent, respectively, between 2000 and 2025.

Table 4.1-4. SCAG County Population Projections, 2010-2025

Area	*Population*					*Change: 2000-2025*		
	2000[a]	*2010*	*2015*	*2020*	*2025*	*Number*	*Percent*	*Average Annual Percent*
Riverside	1,545,387	2,031,000	2,245,000	2,531,000	2,832,000	1,286,613	83.3%	2.5%
San Bernardino	1,709,434	2,032,000	2,239,000	2,487,000	2,778,000	1,068,566	62.5%	2.0%
Two-County Region of Influence	3,254,821	4,063,000	4,484,000	5,018,000	5,610,000	2,355,179	72.4%	2.2%

Source: SCAG 2001.

a. Based on 2000 U.S. Census information.

Estimates of service area populations were developed for this document using U.S. Census 2000 block-level data. The service area boundaries were overlaid digitally on census maps using a Geographic Information System (GIS). Where census blocks were split by service area boundaries, the proportion of the census block contained in the service area was calculated and used to prorate the population of the particular census block to the respective service area.

It is estimated that the Muni service area had a population of about 578,000 in 2000, of which 570,000 lived in San Bernardino County. The remaining persons lived in Riverside County. The population contained in the Muni service area comprises about 34 percent of the population of San Bernardino County and less than 0.1 percent of the Riverside County population.

The Western service area, contained entirely within Riverside County, had an estimated population of 660,200 in 2000. This comprised 43 percent of the total Riverside County population.

The combined population of the two service areas in the year 2000 numbered approximately 1,238,200 persons. Western contains just under 53 percent of the combined service area population, while the Muni service area contains the remaining 47 percent.

Over the period 2000 to 2025, and using SCAG county-level population projections, the number of residents in the combined service areas of Muni/Western is projected to increase by approximately 798,000. This increase is about evenly distributed between the Muni and Western service areas. The population of the combined service areas is expected to increase by almost 65 percent over the period, as can be seen from the information presented in Table 4.1-5.

It is the responsibility of Muni and Western to provide a safe, reliable source of water to support this additional population.

Table 4.1-5. Population of Muni/Western Service Areas, 2000-2025

Service Area	*2000[a]*	*2005*	*2010*	*2015*	*2020*	*2025*	*Change: 2000-2025*	
							Number	*Percent*
Muni	578,000	661,700	723,100	794,500	878,200	992,000	414,000	71.6%
Western	660,200	735,000	802,800	865,300	952,100	1,044,200	384,000	58.2%
Combined	1,238,200	1,396,700	1,525,900	1,659,900	1,830,300	2,036,300	798,100	64.5%

Source: SCAG 2001.
a. Based on 2000 U.S. Census information for the service area populations as of April 2000.

4.1.3 Water Supply Sources

This section assesses the sufficiency of existing and potential future water supplies available to Muni/Western to meet future demand. The Santa Ana Watershed Project Authority (SAWPA) develops supply and demand projections for its member agencies using a reporting system of four categories of direct use supply sources: groundwater; imported water; surface water; and recycled water (SAWPA 2002).

As can be seen from the information presented in Table 4.1-6, demand in the combined Muni/Western service area is anticipated to increase by just over 175,000 afy (almost 35 percent) from about 504,000 afy in 2000 to 680,000 afy in 2025. It is anticipated that the greatest share (over 62 percent) would be derived from imported water supplies. Demand in the Muni service area is projected to increase by 19 percent from approximately 226,700 afy in 2000 to about 269,900 afy in 2025. Without the Project, it is projected that the large majority (over 70 percent) of the increase in demand would be met with water imported from outside the basin (i.e., State Water Project [SWP] water). The remaining demand (30 percent) would be supplied through water made available by recycling. Imported water supplies are projected to increase from just over 42,000 afy in 2000 to over 72,000 afy in 2025.

By the year 2025, it is anticipated that the total demand in the Muni service area will be met by water supplied from available sources in the following manner: 49 percent from groundwater, 27 percent from imported water, 19 percent from surface water, and 5 percent from recycled water.

For Western, demand is projected to increase by over 47 percent between 2000 and 2025 from approximately 277,900 afy to approximately 410,200 afy. The largest share (41 percent) of this increased demand will be met with supplies derived from groundwater. Additional contributions will be derived from supplies of imported water (30 percent), recycled water (24 percent), and surface water (5 percent). See Table 4.1-6.

By the year 2025, it is anticipated that total demand in the Western service area will be met by water supplied from available sources in the following manner: 60 percent from groundwater; 27 percent from imported water; 2 percent from surface water; and 11 percent from recycled water. A proportion of the additional water supply derived from groundwater and used by purveyors in the Western service area originates in the SBBA that underlies much of the Muni service area. It is the responsibility of Muni to replenish water extracted from the SBBA and maintain the safe yield of the basin. Thus, it can be expected that Muni will be required to obtain additional supplies of water to accomplish this obligation.

Table 4.1-6. Muni/Western Projected Water Supply and Demand (afy)

Source of Water Supply	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*	CHANGE: 2000-2025 *Number*	CHANGE: 2000-2025 *Percent*
MUNI AND WESTERN COMBINED								
Groundwater	324,846	348,064	357,667	366,766	375,381	379,539	54,693	16.8%
Imported Water	111,788	124,407	144,331	157,641	170,363	181,414	69,626	62.3%
Surface Water	54,200	55,610	57,020	58,430	59,840	60,840	6,640	12.3%
Recycled Water	13,710	27,409	37,156	44,895	52,633	58,312	44,602	425.3%
TOTAL	**504,544**	**555,490**	**596,174**	**627,732**	**658,217**	**680,105**	**175,561**	**34.8%**
MUNI								
Groundwater	132,205	132,205	132,205	132,205	132,205	132,205	0	0.0%
Imported Water	42,297	48,327	54,358	60,388	66,418	72,449	30,152	71.3%
Surface Water	52,200	52,200	52,200	52,200	52,200	52,200	0	0.0%
Recycled Water	0	0	3,253	6,507	9,760	13,014	13,014	NA
TOTAL	**226,702**	**232,732**	**242,016**	**251,300**	**260,583**	**269,868**	**43,166**	**19.0%**
WESTERN								
Groundwater	192,641	215,859	225,462	234,561	243,176	247,334	54,693	28.4%
Imported Water	69,491	76,080	89,973	97,253	103,945	108,965	39,474	56.8%
Surface Water	2,000	3,410	4,820	6,230	7,640	8,640	6,640	332.0%
Recycled Water	13,710	27,409	33,903	38,388	42,873	45,298	31,588	230.4%
TOTAL	**277,842**	**322,758**	**354,158**	**376,432**	**397,634**	**410,237**	**132,395**	**47.7%**

Source: SAWPA 2002.

Based on this assessment, and assuming use of the potential maximum allocation of SWP, additional supplies of water will be required to serve expected demand. It is anticipated (based on projected trends in the replenishment obligations of Muni) that these additional supplies would be required around the year 2025.

While other sources of water supply remain adequate to meet current demand, additional water made available by the Project would increase water supply reliability. Added reliability can be considered growth-inducing to the extent it removes an obstacle to growth, e.g., by making sufficient water supplies for new development projects more reliable. Certain actions, especially with regard to housing construction, are more likely to occur given the added degree of certainty, further removing an obstacle to growth. After about 2025, existing water supply sources would no longer be adequate to meet demand. At that time, local water made available through the Project would be used as a supplemental source of water rather than substituting for other supply sources.

The Project has the potential to provide Muni/Western with a water supply that will help meet water demands of existing users and accommodate a portion of projected growth. Depending on the assumptions made, the projected long-term annual average supplementary supply of water developed by the Project could range from a low of just over 11,000 af to a high of about 29,000 af. This additional source of water would be shared between Muni (72 percent) and Western (28 percent).

Assuming per capita water consumption of approximately 300 gallons per day (a value used by Western to estimate water demand per single family residence), the quantity of additional water could support between about 33,000 and 83,000 persons, i.e., approximately 4 and 11 percent of the increase in population through 2025 in the combined service areas (see Table 4.1-5). This quantity of water could support between 8,600 and 22,000 single family dwelling units within the Muni/Western service areas (Western Municipal Water District 2001b).

4.2 GROWTH-RELATED INDIRECT IMPACTS

This EIR discusses growth-related impacts in a qualitative manner based on the likely changes that could occur as a result of future land use changes and/or specific development projects within the combined service areas of Muni/Western. The Project, by making water supplies more reliable and providing a supplemental long-term water supply, would indirectly contribute to these growth-related impacts.

The EIR references impacts identified in the San Bernardino County General Plan Final EIR and the County of Riverside General Plan Draft EIR, since these documents together provide the greatest geographical coverage and comprehensive overview of environmental impacts resulting from projected growth in large portions of San Bernardino and Riverside counties. These EIRs have identified significant impacts to the following environmental resources: Aesthetics; Agricultural Resources; Air Quality; Biological Resources; Cultural and Paleontological Resources; Geology, Soils, and Mineral Resources; Hazardous Materials; Hydrology and Water Quality; Land Use and Planning; Noise; Population and Housing; Public Services, Utilities, and Transportation; and Recreation. Significant unavoidable impacts, i.e., impacts unable to be mitigated to a less than significant level, are identified for the following resources: Air Quality; Agricultural Resources; Biological Resources; Cultural and Paleontological Resources; Geology, Soils and Mineral Resources; Hydrology and Water Quality; Noise; and Public Services, Utilities and Transportation.

4.2.1 Hydrology and Water Quality

Impacts

San Bernardino County

In San Bernardino County, potential impacts to water supplies and water quality are associated primarily with the projected expansion of urban development and the associated increase in water demand (particularly the potential continued over-drafting of groundwater basins), generation of urban contaminants, and loss of natural recharge areas (due to construction of impervious surfaces). Significant, unavoidable impacts could occur in areas with existing water quality/quantity problems, inadequate water supplies or conveyance capacities to accommodate projected growth (such as portions of the Chino, Yucaipa, and Bear Valley groundwater basins), and localized groundwater contamination at several sites including former Norton Air Force Base and the Chino Airport (County of San Bernardino 1989b). However, some impacts to water resources would be significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, significant impacts include: localized flooding associated with increased development; increased stormwater runoff; and placement of habitable structures within dam inundation areas. These impacts are considered significant but mitigable. Significant but mitigable impacts to groundwater resources may also occur (particularly in the western part of Riverside County), including the potential for a net deficit in the aquifer volume, a reduction in the local groundwater table, and a reduction in groundwater recharge. Continued urbanization also has the potential to impact unique hydrologic characteristics, change hydrologic baseline conditions, and increase pollutant levels in groundwater reserves. These impacts are also considered significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

A portion of the impacts to hydrology and water quality would be reduced should local governments implement the policies of the San Bernardino County and Riverside County General Plans outlined below, although all impacts may not be reduced to less than significant. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The San Bernardino County General Plan contains a number of policies in the Water section of the Natural Resources Element. These include W-1, W-2, W-3, W-4, W-5, W-6, W-7, W-8, and W-9. In general, these measures are designed to coordinate and manage water resources throughout the county.

Riverside County General Plan

Increased localized flooding risks are addressed by the following policies found in the Safety Element of the Riverside County General Plan: S 4.1-4.6, S 4.9-4.12, and S 4.17-4.23. Additionally, the Riverside County General Plan Draft Program EIR contains the following measures to further mitigate flooding impacts: utilization of FEMA documents to minimize flood hazards; prohibition by the county of the alteration of floodways and channelization where possible; the requirement that the 10-year flood flows be contained within the top of curbs and the 100-year flood flows within the street rights-of-way; the requirement that all structures be flood-proofed from the 100-year storm flows, which may involve elevating finished floors more than 1 foot; the requirement that fully enclosed areas that are below finished floors have openings to equalize the forces on both sides of the walls; the requirement that, for low-density uses, flows are not obstructed; and compliance with existing Riverside County requirements which address flood hazards.

Significant impacts to existing hydrologic conditions and groundwater resources would be partially mitigated through the implementation of the following Multipurpose Open Space

Element policies: OS 1.1-1.3, OS 2.1-2.5, OS 3.1-3.3, OS 4.1-4.7, OS 5.1-5.3, OS 5.5, and OS 6.3. Additionally, the Land Use Element includes policies LU 5.3, LU 17.2, and LU 28.1 to address these impacts. Mitigation measures provided in the Riverside County General Plan Draft Program EIR include: the construction of water harvesting and recharge facilities when it is not practical to conserve soils suitable for groundwater recharge; incorporation of features to facilitate on-site infiltration of precipitation and/or runoff into groundwater basins; preparation of specific hydrologic studies where impacts to baseline conditions are anticipated; submission of evidence to the County that specific measures to limit interference with the hydrologic process will be implemented; development of septic systems in accordance with applicable standards established by the County; development of point source pollution reduction programs which adhere to applicable standards required by federal, state, and local agencies; water quality analyses where impacts to groundwater quality may occur; and evidence from project applicants that specific measures to limit or eliminate potential water quality impacts will be implemented.

4.2.2 Biological Resources

Impacts

The Project would accommodate a portion of projected urban development and growth, thereby indirectly impacting biological resources. Impacts to threatened and endangered species and other sensitive biological resources generally would be adverse due to the conversion and degradation of habitat.

San Bernardino County

In San Bernardino County, potentially significant and unavoidable impacts to wetlands within the Valley region (San Bernardino County includes the more urbanized "Valley" region in addition to the Mountain and Desert regions) would result from future development supported by the additional water supply. Additionally, unmitigable impacts to threatened and endangered species as well as wetland and riparian habitat areas may occur as a result of growth. Most impacts to other special status species would be mitigated to less than significant. Some residual significant impacts would remain following implementation of mitigation measures. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, potentially significant growth-related impacts to biological resources include: direct mortality to listed, proposed, or candidate species; loss of habitat occupied by such species and/or loss of sensitive habitats; and habitat fragmentation which could restrict wildlife movement. These impacts would be significant and unavoidable. Significant but mitigable impacts include the loss of oak trees or alteration of natural processes (e.g., hydrology), resulting in indirect loss of oak trees. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

A portion of the impacts to biological resources would be reduced should local governments implement the following policies of the San Bernardino County and Riverside County General Plans, although all impacts may not be reduced to less than significant. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts. Other regulatory agencies such as the USACE, USFWS, and CDFG also may impose permit conditions designed to reduce significant impacts of projects.

San Bernardino County General Plan

The San Bernardino County General Plan contains policies to mitigate significant impacts to biological resources, including policies B1, B2, B3, B4, B5, and B6 in the Biological section of the Natural Resources Element. These policies include the application of the Biotic Resources Overlay maps and the need for detailed biological reports for all projects that occur within the sensitive areas detailed on the overlays, refinement and enforcement of the mitigation plan as a condition of project approval, maintenance of biological resources, prohibition of activities that would impair the viability of sensitive resources, the development and enforcement of Habitat Conservation Plans, and development of monitoring programs. Additional mitigation measures are provided in the San Bernardino County General Plan Final EIR which address the design, implementation, monitoring, and maintenance phases of mitigation projects and are intended as a general framework to assist in the development of a comprehensive and successful county-wide mitigation program. Additionally, project-specific mitigation measures are identified in the EIR, including the requirement to permit and mitigate for impacts to wetland habitats within the Valley region and for any impact to a government-listed threatened or endangered species.

Riverside County General Plan

Although the majority of impacts to biological resources are expected to be significant and unavoidable, the Riverside County General Plan Draft Program EIR identifies policies from the Multipurpose Open Space Element of the County of Riverside General Plan as well as additional measures to lessen impacts. The General Plan policies include: OS 5.1-5.3, OS 5.5-5.7, OS 6.1-6.2, OS 8.1, OS 9.3-9.4, OS 17.1-17.3, and OS 18.1-18.2. The Riverside County General Plan Draft Program EIR measures include compliance with the Riverside County Planning Department's *Biological Report Guidelines* which require an analysis of the potential for a project to result in the mortality of sensitive species or loss of habitat; the construction of treatment wetlands outside of natural wetlands, allowing treatment of runoff from developed surfaces prior to entering natural stream systems; identification of local and regional habitat patterns, whereby sensitive habitats are connected where opportunities exist to reconnect isolated patches of sensitive habitat; avoidance of impacts that would fragment sensitive habitat; identification of local and regional habitat patterns that provide movement routes for wildlife or where opportunities exist to establish movement routes between isolated habitat patches; compliance with Oak Tree Management Guidelines, including the use of replacement plantings with acorns or oak saplings when it is determined to be biologically sound and appropriate to do so; avoidance or minimization of the interruption of natural processes in local ecosystems;

and construction of facilities to treat non-point source runoff outside natural stream systems, thereby allowing only treated runoff to enter natural stream systems.

Other Applicable Regulations

Future land development may be subject to other environmental regulations, such as Section 404 of the Clean Water Act, Section 10 of the ESA, and Section 1600 of the Fish and Game Code, and specific mitigation measures may be developed through the permitting process that reduce impacts to biological resources.

4.2.3 Geology, Soils, and Mineral Resources

Impacts

San Bernardino County

The San Bernardino County General Plan states that the County is subject to many geologic hazards including seismic hazards (the San Andreas Fault traverses the most populous portion of the County as does the San Jacinto Fault) including ground shaking, subsidence, and liquefaction. Potential impacts to new development are considered significant but mitigable. Potentially significant impacts from seiches also exist within San Bernardino County, however, impacts related to new development would be mitigable. Inundation could be associated with dam failures at the San Antonio Reservoir, Mojave River, and Lake Havasu structures in the Desert, as well as a number of smaller reservoirs in the Valley region. Portions of these projected inundation zones are located within short-term and long-term potential growth areas. Dam failure related to a seismic event could have significant, unmitigable impacts, however, within the parameters of a design earthquake event, impacts would be significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Hazards not related to seismic events include landslides, subsidence, and impacts related to expansive and reactive soils. For example, as development of the Valley region continues, urbanization will occur more frequently on steeper terrain associated with foothills and alluvial fans, increasing susceptibility to landslides. Impacts are identified as significant but mitigable. Impacts related to subsidence and expansive soils are also considered significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Significant impacts related to erosion within San Bernardino County include impacts along major drainage courses such as the SAR and some larger intermittent washes. These impacts would be mitigable to less than significant. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Impacts to mineral resources within San Bernardino County would be significant due to the loss of designated mineral resource zones. A portion of these impacts would be mitigable, however, some impacts would be significant and unmitigable including the loss of mineral resources to development or restrictive land use classifications. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, significant but mitigable impacts include: the potential for property loss or human injury resulting from development on, or adjacent to, earthquake fault zones and related ground shaking and liquefaction; landslide hazards; impacts associated with expansive soils; and soil erosion and loss of topsoil. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts. No significant impacts to mineral resources are identified in Riverside County.

Mitigation Measures

A portion of the impacts to geology, soils, and mineral resources would be reduced should local governments implement the following policies of the San Bernardino County and Riverside County General Plans, although all impacts may not be reduced to less than significant. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

San Bernardino County General Plan policies GE-1 through GE-18 would mitigate a portion of the impacts related to geology to a level of less than significance. These policies, in summary, mitigate risks from geologic hazards through a combination of engineering, construction, land use, and development standards; increased public awareness of geologic hazards; implementation of emergency preparedness; improved knowledge of geological hazards in the County; enforcement of a Countywide program for proper seismic design and construction criteria, pursuant to the direction of the County Geologist; continued work with other agencies to help prevent seismically induced failure of structures; the use of Hazard Overlay Maps to minimize development in high risk areas; and prevention of unnatural erosion by tailoring grading, land clearance, and grazing. Additional mitigation measures are noted in the San Bernardino General Plan Final EIR to further mitigate impacts related to geology. These include: the requirement that all permits require all facilities to meet appropriate geologic hazard specifications as determined by the County Geologist; inventorying of liquefaction, landslide, and seiche hazard areas; and a requirement that site-specific geotechnical investigations conducted for proposed development include an assessment of potential impacts and mitigation measures related to expansive soils and erosion. Additional project-specific mitigation measures are provided primarily to control erosion.

Mitigation measures related to mineral resource impacts include San Bernardino County General Plan polices MR-1, MR-2, MR-3, MR-4, and MR-5. These policies relate to the preservation of, and access to, mineral resources within the county as well as the environmental effects associated with mining operations. Additional mitigation measures are identified in the San Bernardino County General Plan Final EIR, which include conducting a mineral resource inventory throughout the County and requiring consideration of all known and potential mineral resources as a condition of approval for discretionary permits issued by the County.

Riverside County General Plan

The Safety Element of the County of Riverside General Plan includes policies S 2.1-2.8, S 3.1-3.14, S 7.7d, and S 7.12 which would minimize impacts to geology and soils. Additionally, Land Use Element policies LU 11.1c, LU 11.1e, and LU 11.1f, which provide guidelines for hillside development, would mitigate impacts to less than significant. The Riverside County General Plan Draft Program EIR identifies additional mitigation measures including: the development of a site-specific geologic investigation to assess seismic hazards in earthquake hazard areas; compliance with the California Building Code and the Uniform Building Code (UBC); compliance with the requirements set forth by the County Geologist to minimize seismic-related impacts; compliance with the County of Riverside Ordinance 484.2 or other local, state, or federal requirement established to control windborne erosion of topsoil; development of a Grading Plan for approval by the Riverside County Building and Safety Department or the Riverside County Geologist prior to development; and incorporation of drainage design measures, where required, to control runoff.

4.2.4 Land Use and Planning

Impacts

Residential, commercial, and industrial development that could occur in San Bernardino and Riverside counties, in part accommodated by Project-related water, could convert undeveloped, open space portions of the counties to some form of urbanized development.

San Bernardino County

Significant impacts in San Bernardino County would include incompatibility between existing land uses and planned uses, impacts to natural resources, and incompatibility among land use policies of other jurisdictions. Impacts are considered significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, potentially significant impacts would result from development in areas that are currently undeveloped, resulting in changes in the amount of land designated for community development, rural, and open space uses. Changes in the pattern of land uses would result in the development of structures or facilities within areas that are currently undeveloped. Relative to adjacent land uses, this intensification of development may contribute to, or create, significant land use impacts. The applicable General Plan policies that would mitigate these impacts to less than significant are provided below. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

The majority of the impacts to land use and planning would be mitigated to less than significant should local governments implement the following policies of the San Bernardino County and Riverside County General Plans. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The San Bernardino County General Plan contains a number of policies to mitigate land use impacts. These may be found in the Land Use/Growth Management section of the Man-made Resources Element and include policies LU-1, LU-2, LU-3, LU-4, LU-5, LU-6, LU-7, LU-8, LU-9, LU-10, and LU-11. These measures would ensure that future changes to the land use pattern result in consistency with zoning, and involve compatible land use arrangements, development intensities sensitive to the natural resources (such as limiting development in ecologically sensitive areas), and logical extensions to existing developed areas (rather than leapfrog urban sprawl). Additional measures are provided in the San Bernardino County General Plan Final EIR and include the County adoption of major city planning policies and development standards, and County contracts with cities for planning and building safety services.

Riverside County General Plan

The Land Use Element of the Riverside County General Plan includes the following policies designed to minimize impacts to land use and allow for the continued operation of non-conforming land uses as well as to ensure a coordinated planning effort between cities, service providers, and the County: LU 1.1, 1.2, 1.4 and 1.5, LU 2.1, LU 3.1-3.4, LU 6.1, LU 6.3-6.5, LU 17.4, LU 22.6, and LU 26.10. Implementation of these policies would reduce impacts to less than significant.

4.2.5 Agricultural Resources

Impacts

Growth-related impacts to agricultural resources, including Important Farmlands, could be significant because there is a potential for these lands to be converted to non-agricultural use or for changes in agricultural zoning to be approved by local jurisdictions to allow a higher density or intensity of development.

San Bernardino County

San Bernardino County contains thousands of acres which are considered potentially valuable for agricultural uses on the basis of soil characteristics. Growth could result in significant impacts which would be mitigable in some cases. However, a portion of the impacts would be significant and unavoidable, such as the loss of Important Farmlands to urban expansion. This would be particularly true in the Valley area. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, the General Plan would result in the conversion of Prime Farmlands, Unique Farmlands, or Farmlands of Statewide Importance to a variety of non-agricultural uses. These impacts are considered significant and unavoidable. However, a number of policies in the General Plan and mitigation measures identified in the Riverside County General Plan Draft Program EIR would lessen impacts to some degree. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

A portion of the impacts to agricultural resources would be mitigated to less than significant through implementation of the following policies contained in the San Bernardino County and Riverside County General Plans. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The San Bernardino County General Plan contains a number of policies to reduce impacts to agricultural resources to less than significant. Specifically, the Natural Resources Element contains policies related to Soils/Agriculture. These include policies SA-1, SA-2, SA-3, and SA-4. In general, these policies aim to preserve Important Farmlands, utilize Williamson Act contracts to maintain agricultural open space and designate agricultural preserves, support tax measures to benefit agricultural operations, encourage compatible uses in areas adjacent to agricultural operations, designate agricultural land use districts and agricultural preserves on County Resource Overlay maps, encourage relocation of agricultural operations (if necessary) within the County, and direct development into existing urban centers and away from agricultural uses.

Riverside County General Plan

The Land Use and Multipurpose Open Space Elements include the following applicable policies which would reduce impacts to agriculture: LU 16.1-16.2, LU 16.4-16.10, and OS 7.1-7.5. Additionally, the Riverside County General Plan Draft Program EIR provides mitigation measures including the establishment of an Agricultural Land Mitigation Bank, which would require any development resulting in the conversion of more than 160 acres of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to purchase credits at the ratio of 1 acre for every 4 acres converted to non-agricultural use.

4.2.6 Recreational Resources

Impacts

Inadequate opportunities for outdoor recreation adversely affects the quality of life and the enjoyment of a community. Significant growth-related impacts to recreational resources would include increased demand for recreational resources, such as public parks and trails and other recreation areas. This demand would exacerbate existing shortfalls in local parkland and may outpace the ability of public agencies to provide these resources.

San Bernardino County

In San Bernardino County, particularly in the Valley region, land supply for additional recreational resources is limited and these lands are susceptible to urbanization. As a result, the residents of the County could be underserved with regard to recreational resources. The San Bernardino County General Plan Final EIR indicates that by the year 2010, local park demand would increase by approximately 50 percent and regional park demand by 104 percent over the existing acreage in 1988 (County of San Bernardino 1989b). Impacts to recreation would be considered significant. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts. Implementation of the mitigation measures provided below would reduce impacts to less than significant.

Riverside County

In Riverside County, growth within now vacant unincorporated areas of the County will result in a substantial increase in population and residential and non-residential structures, potentially increasing the use of existing parks and recreation facilities. Based on increased population figures and current staffing levels, development associated with the General Plan would require additional neighborhood or community parkland and recreational facilities. Therefore, the General Plan could result in significant impacts on existing parks and recreation services and facilities, and would require the expansion of parks and recreational facilities as well as an associated increase in staffing. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts. Impacts would be mitigable through implementation of the General Plan policies listed below.

Mitigation Measures

Impacts to recreation would be mitigated to less than significant should local governments implement the following policies of the San Bernardino County and Riverside County General Plans. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The San Bernardino County General Plan includes policies OR-45 through OR-49 in the Open Space/Recreation/Scenic section of the Natural Resources Element. These policies strive to achieve specified parkland acreage standards per thousand persons; utilize public funding mechanisms wherever possible; obtain funding for parkland from new residential development and other funding mechanisms; regulate off-highway vehicle use to allow recreational enjoyment while protecting natural resources; and improve public access to rivers, streams, and other bodies of water. The San Bernardino County General Plan Final EIR also identifies additional mitigation measures to reduce impacts, including the need for a clearer delineation of the types of activities and locations desired for regional parklands; the need for minimum park sizes; and the need to incorporate natural features into regional parklands.

Riverside County General Plan

The Multipurpose Open Space Element of the General Plan includes policies OS 20.3 and OS 20.5-20.6, which would require that new development provide implementation strategies for the funding of new park and recreation sites, require that the development of new facilities occur concurrently with other development in an area, and discourage the absorption of dedicated park land by non-recreational uses. The Land Use Element includes policies LU 19.1-19.3 and LU 19.5, which would further mitigate impacts to recreation.

Other Applicable Regulations

California legislation (Government Code, Section 66477) allows a city or county to require, as a condition of approval of a subdivision, dedication of land or payment of a fee in lieu of dedication, or a combination of both, for park or recreational purposes. This legislation, commonly called the "Quimby Act," established a maximum parkland dedication standard of 3 acres per 1,000 population for new subdivision development, unless the amount of existing neighborhood and community parkland exceeds that limit.

4.2.7 Air Quality

Impacts

Population, employment, and manufacturing growth would result in increased air pollutant emissions and contribute to the potential exceedance of federal and state air quality standards. Toxic emissions may result from some industrial development. Additionally, mobile emissions from vehicle operations would increase, including localized CO concentrations and PM_{10} emissions. Fugitive dust emissions would also result from construction.

San Bernardino County

Growth factors directly affecting air quality in San Bernardino County include increased development, the increase in energy needs, and the increase in traffic congestion, including the worsening of identified carbon monoxide (CO) "hot spots." Impacts related to increased vehicle traffic, which could contribute to the exceedance of federal and state air quality standards, could be significant and unavoidable. However, if attainment of air quality standards is achieved, impacts would be considered significant but mitigable. Because the region's air quality attainment schedule is based on regional growth forecasts by SCAG, the additional population projected by the County (and the incorporated cities in the county) would make substantial emissions reductions more difficult. Implementation of San Bernardino County General Plan policies may help reduce additional emissions generated by future development in the county, provided attainment of criteria pollutants occurs on schedule. Otherwise, impacts would remain significant and unavoidable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, significant and unavoidable impacts to air quality would include increases in PM_{10} emissions, primarily from increased construction activity and long-term increases in air emissions from increased traffic and stationary sources. Significant but mitigable impacts would result from development which may produce air pollution that may affect sensitive receptors. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

A portion of the impacts to air quality would be mitigated to less than significant through implementation of the following policies contained in the San Bernardino County and Riverside County General Plans. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The San Bernardino County General Plan contains a number of policies to mitigate air quality impacts. Specifically, the Air Quality section of the Natural Resources Element includes policies AQ-1 through AQ-30. These policies are focused on encouraging the use of public transit, limiting the development of polluting technologies until federal standards are met, maximizing the efficiency of the transportation system, encouraging pedestrian access, increasing carpooling, conserving energy, satisfying the job housing balance, and decreasing vehicle miles traveled. Additional policies noted in the San Bernardino County General Plan Final EIR include developing a monitoring program to track the projected population increase and vehicle miles traveled for approved projects and, if projects are found to significantly exceed SCAG's growth forecasts, then approval of future projects should be limited until growth is consistent with SCAG forecasts. Project-specific mitigation measures are also provided in the EIR which include traffic management measures, such as synchronizing traffic signals to reduce emissions and requiring proposed specific plans to provide a mix of land uses so that a better job-housing balance can be achieved.

Riverside County General Plan

Although impacts related to increased PM_{10} emissions are considered significant and unavoidable, there are policies which would lessen impacts to some degree. These policies include AQ 4.0-4.10 and AQ 17.2-17.5 in the Air Quality Element of the Riverside County General Plan. Additional mitigation measures are provided in the Riverside County General Plan Draft Program EIR to control emissions from construction vehicles and equipment, including wetting and covering soil to reduce dust generated by project sites.

Impacts related to increases in long-term air emissions would be partially mitigated through the implementation of the following policies: AQ 3.1-3.4, AQ 4.1-4.8, AQ 5.1-5.3, AQ 10.1-10.4, AQ 11.1-11.4, AQ 12.1-12.5, AQ 13.1-13.3, and AQ 14.1-14.4. Impacts to sensitive receptors would be fully mitigated with the implementation of mitigation measures AQ 2.1-2.4.

Other Applicable Plans

The SCAQMD has developed the *1997 Air Quality Management Plan (AQMD)* and the *1999 Revised Ozone Plan* to bring the region into attainment with state and national ambient air quality standards. The SCAQMD is currently in the process of preparing a comprehensive plan update, the *Proposed 2003 Air Quality Management Plan* for the SCAB. The draft 2003 AQMP updates the demonstration of attainment with the federal standards for ozone and PM_{10}, replaces the 1997 attainment demonstration for the federal CO standard and provides a basis for a maintenance plan for CO for the future, and updates the maintenance plan for the federal oxides of nitrogen (NOx) standard that SCAB has met since 1992 (SCAQMD 2003). It is anticipated that adoptions and implementation of the 2003 AQMP will provide additional mitigation for significant adverse impacts to air quality.

4.2.8 Cultural and Paleontological Resources

Impacts

San Bernardino County

San Bernardino County identifies the potential for significant impacts to cultural resources due partially to the fact that the County has not been systematically surveyed and it cannot be assumed that all undeveloped areas do not contain significant prehistoric and historic sites. A portion of the impacts would be mitigable to less than significant, however, growth may result in unmitigable adverse impacts to cultural resources. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, potentially significant but mitigable impacts associated with new development include disturbance of buried human remains and destruction of historic, archaeological, and paleontological resources. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

A portion of the impacts to cultural resources would be reduced should local governments implement the following policies of the San Bernardino County and Riverside County General Plans, although all impacts may not be reduced to less than significant. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The San Bernardino County General Plan contains a number of policies to mitigate impacts to cultural resources. The Cultural and Paleontological Resources section of the Natural Resources Element includes policies CP-1, CP-2, CP-3, CP-4, CP-5, and CP-6. Generally, these policies require that cultural resource field surveys be conducted and the results included with all project submittals, the preparation of cultural resource overlays for all existing Planning Areas not covered by an overlay map, preliminary cultural resource reviews by the Archaeological Information Center, the cataloging of artifacts discovered as a result of a cultural resource investigation, and notification to the Native American Heritage Commission if projects require the excavation of Native American archaeological sites.

Riverside County General Plan

Relevant policies that would mitigate impacts to cultural resources include the following from the Multipurpose Open Space Element of the Riverside County General Plan: OS 19.2-19.10. The Riverside County General Plan Draft Program EIR identifies additional mitigation measures including: compliance with State Health and Safety Code Section 7050.5 that requires disturbance of an area to cease where human remains have been encountered until the Riverside County Coroner has made a determination of the origin and disposition; avoidance of cultural resources where possible; where avoidance of cultural resources is not possible, the planting of deterrent plant species such as prickly pear cactus to minimize public availability to the site; and additional measures if avoidance and/or preservation of cultural resources is not possible, such as having a participant-observer present from the appropriate Indian Band or Tribe during archaeological testing or excavation of a project site.

4.2.9 Noise

Impacts

Future urbanization would result in an increase in ambient noise levels due to the potential increase in associated traffic. Long-term increases in noise levels could also be associated with commercial and industrial development. Residential areas and other sensitive receptors near transportation corridors and other noise generators may experience increased noise. Development would also result in short-term increases in local noise levels from construction and grading activities.

San Bernardino County

In San Bernardino County, significant impacts include increased traffic-related noise, increased airport-related noise, increased railroad-related noise, and increased noise levels associated with commercial/industrial development. A portion of each of these impacts would not be mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, potentially significant but mitigable noise-related impacts include increased noise levels generated by construction activity and increased traffic volumes, and exposure of sensitive uses to stationary noise sources, such as industrial and commercial sources. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

A portion of the noise impacts would be mitigated to less than significant should local governments implement the following policies of the San Bernardino County and Riverside County General Plans. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The Noise Element of the San Bernardino County General Plan contains policies NO-1, NO-2, NO-3, NO-4, NO-5, and NO-6. These policies would: designate certain areas as noise impacted and disallow development in these areas without appropriate analysis of noise impacts and adequate mitigation; support methods of reducing vehicular noise; enforce the Hourly Noise Level Performance Standards for stationary and other locally regulated sources; limit truck traffic in residential and commercial areas to designated truck routes; and limit construction, delivery, and through truck traffic to designated routes. Project-specific mitigation measures include noise barriers and attenuation fences.

Riverside County General Plan

Relevant policies found in the Noise Element of the Riverside County General Plan to address significant noise-related impacts include the following: N 1.1-1.8, N 2.1-2.3, N 3.1-3.7, N 4.1-4.8, N 6.1-6.4, N 8.1-8.7, N 10.1-10.5, N 11.1-11.2, and N 12.1-12.4. Among other purposes, these measures aim to protect noise-sensitive land uses from noise-related impacts. The Riverside County General Plan Draft Program EIR identifies the following mitigation measures to further reduce significant impacts to less than significant: compliance with the County's noise ordinance construction hours; approval by the County of a construction-related noise mitigation plan prior to the issuance of grading permits for development adjacent to occupied noise-sensitive land uses; conformance to the noise exposure standard of 65 dBA L_{dn} for outdoor noise in noise-sensitive outdoor activity areas and 45 dBA L_{dn} for indoor noise in bedrooms; completion of acoustical studies and identification of mitigation measures to reduce noise impacts for specified development; and limitations on the siting of industrial development to minimize impacts to commercial/residential land uses.

4.2.10 Aesthetics

Impacts

Significant growth-related impacts to aesthetics may include changes to, or the loss of, the visual characteristics and resources of the area through the development of open space and further urbanization of hillside and natural areas. Development could result in substantial adverse effects on scenic vistas, including a loss of scenic corridors, substantial damage to scenic resources, or substantial degradation of the existing visual character or quality of individual sites and their surroundings.

San Bernardino County

In San Bernardino County, the loss of existing open space and associated viewsheds would result in significant impacts in the Valley region as well as the Mountain and Desert regions of the County. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts. Impacts would be mitigated to less than significant through implementation of San Bernardino County General Plan policies.

Riverside County

In Riverside County, the Riverside County General Plan would increase the development of urban uses, causing a substantial loss in open space and aesthetic resources. This could significantly alter existing and future public views and view corridors, which include State and County designated Scenic Highways. Impacts are considered significant but mitigable. Additionally, implementation of the General Plan would increase the effects of light and glare on existing residential uses, including the Mount Palomar Observatory, causing significant but mitigable impacts. Open space conversion would also result in significant and unavoidable impacts. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

Impacts to aesthetics would be reduced through implementation of the following policies contained in the San Bernardino County and Riverside County General Plans. However, impacts would not be fully mitigable to less than significant. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

A number of policies in the Open Space/Recreation/Scenic section of the Natural Resources Element of the San Bernardino County General Plan would reduce impacts to less than significant. These include policies OR-1, OR-2, OR-3, and OR-4, which include the use of Resource Overlay Maps to ensure that scenic corridor standards preserve existing open space or that the design of the development blend into the natural setting. The provisions include a requirement that unique features be maintained, a development review of Projects to ensure preservation of scenic values, and the regulation of new development on ridgelines. New development adjacent to a corridor would be required to provide vantage or vista points for scenic and interpretive displays, possible roadside rests, and demonstrate compatibility with the scenic qualities. In addition, all utility facilities would need to be placed underground in new developments and limitations would be placed on advertising signage.

Riverside County General Plan

Policies contained in the Riverside County General Plan would mitigate a portion of the significant impacts to aesthetic resources. Specifically, in the Land Use and Multipurpose Open Space Elements the following policies apply: LU 2.1, LU 4.1, LU 8.1, LU 8.3-8.4, LU 11.1, LU 13.1-13.8, LU 16.1, LU 16.3, LU 17.1, LU 17.3, LU 17.6, LU 19.4, LU 21.2, LU 22.10, LU 22.11, LU 26.1, LU 26.3, LU 26.10, OS 21.1, and OS 22.1-22.5. Additionally, the Riverside County General Plan Draft Program EIR states that all development projects shall be subject to the requirements of all relevant guidelines, including the community center guidelines; Riverside County supervisorial district design and landscape guidelines; and all applicable standards, policies, guidelines, and/or regulations of Riverside County or other affected entities pertaining to scenic vistas/aesthetic resources. Riverside County Ordinance No. 655, which regulates light pollution, is also identified in the Riverside County General Plan Draft Program EIR as further mitigation to reduce light and glare impacts. Lastly, five additional mitigation measures are identified which further restrict building exterior lighting and street lighting and help ensure the preservation of "dark skies."

4.2.11 Hazardous Materials and Groundwater Contamination

Impacts

San Bernardino County

Growth in San Bernardino County could allow the continued growth of hazardous waste generators in all areas of the county. This growth could result in significant impacts related to hazardous waste use and storage. Primary impacts of concern include release of contaminants through improper containment or incineration, contamination of water resources, and increased public health and safety hazards associated with hazardous waste transport activities. However, significant impacts would be mitigable to less than significant. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, no significant impacts related to hazardous materials are identified in the Riverside County General Plan Draft Program EIR. However, it is expected that impacts would be similar to those described for San Bernardino County.

Mitigation Measures

Impacts to hazardous materials would be reduced should local governments implement the following policies of the applicable General Plans. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

San Bernardino County General Plan

The San Bernardino County General Plan includes policies to reduce impacts related to hazardous materials. Specifically, the Hazardous Waste/Materials section of the Man-made Hazards Element includes policies HW-1 through HW-26. In general, these measures establish an effective and expeditious permitting process for siting hazardous waste facilities that: includes extensive public participation; ensures the protection of public health and safety when siting needed hazardous waste facilities; develops a uniform set of criteria for the siting of hazardous waste facilities in the county, including a requirement that facilities be sited only in areas with a zoning overlay of Specified Hazardous Waste Facility; and ensures coordination among agencies and county departments in the review of all hazardous waste applications within the county. The policies contained in the General Plan would mitigate significant impacts to a less than significant level.

Riverside County General Plan

Although no significant impacts are identified in the Riverside County General Plan Draft Program EIR, policies outlined in the San Bernardino County General Plan would also be applicable in Riverside County.

4.2.12 Public Services, Utilities, and Transportation

Impacts to Public Services

San Bernardino County

Growth in the San Bernardino County area could result in significant but mitigable impacts to schools, fire protection services, police services, and library services. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, significant impacts to public services include: increased need for fire emergency services and facilities; increased need for sheriff protection services and facilities; increased student population throughout unincorporated areas of the county, resulting in inadequate school capacity; increased need for library facilities; and increased need for medical facilities. All impacts are considered significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

A portion of the impacts to public services, utilities, and transportation would be mitigated to less than significant should local governments implement the following policies of the San Bernardino County and Riverside County General Plans, since they contain adequate measures to reduce or avoid such impacts. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant Project impacts.

Basic objectives of the San Bernardino County General Plan are to direct growth to areas where services can readily be provided, discourage leap frog development, and ensure new development proceeds at a pace commensurate with service provisions. Two policies in the Land Use/Growth Management section are critical to ensuring public service availability. LU-6 requires the county to determine that adequate public and private services would be available prior to issuing a development permit, and LU-7 describes the long-term, area-wide commitments to levels of service and development standards necessary for efficient capital improvement programming.

The San Bernardino County General Plan Final EIR identifies additional mitigation measures to further mitigate impacts. These include: continuing to request funding for additional personnel and equipment to maintain acceptable response times; encouraging various service agencies to devise solutions to inadequate revenue sources; considering establishing a Mello-

Roos Community Facilities district to impose taxes to finance capital and operational costs, including those for fire protection and schools; coordinating a program of fuel load management and on-site sprinkler and water storage facilities for those areas beyond desirable response times and in high fire hazard areas; evaluating law enforcement service areas to determine if boundary adjustments would improve service; adopting a public services impact fee to be levied on all new development and apportioning parts of the revenues to law enforcement; obtaining law enforcement input on major development projects to help design the project to deter crime; and adopting a public services fee to be levied on all new development and apportioning a part of the revenues to libraries.

Significant impacts to public services would be reduced to less than significant through implementation of the following Safety and Land Use Element policies of the Riverside County General Plan: S 5.2, S 5.4-5.9, LU 5.1-5.2, and LU 9.1. Additionally, mitigation measures provided in the Riverside County General Plan Draft Program EIR include: the requirement that proponents of new businesses and commercial land uses provide on-site security; coordination between the Riverside County Sheriff's Department and new homeowner's associations within the County; maintenance of 1.5 officers per 1,000 population for police protection; the requirement that development applicants pay the County Sheriff's established development mitigation fee prior to the issuance of a certificate of occupancy on any structures being developed; implementation of the Leroy F. Greene School Facilities Act of 1998 (SB 50); maintenance of 0.5 square feet of library space and 2.5 volumes per County resident; performance of periodic medical needs assessments to evaluate the current medical demand and level of medical service; and the funding by Riverside County of new construction/expansion of existing medical facilities according to the level of demand for services.

The SCAG RTP acknowledges that growth in the region is inevitable and identifies investments that will help the region accommodate growth by investing in programs and projects that will help shape the region's growth along existing and improved major transportation corridors. These include Transportation Demand Management strategies and actions such as ridesharing, telecommuting, continued outreach and education related to available transportation options, and traveler information systems.

Impacts to Utilities – Solid Waste

San Bernardino County

Growth would generate increased demand for solid waste disposal services due to construction-related and operational impacts of new land development. Due to service limitations in San Bernardino County, future growth would have a potentially significant impact on solid waste disposal capacity. Impacts are likely to be greatest in the Valley region where landfill sites are near operating limits and competition for available open space land is extreme. Proposed landfill development projects may also have adverse environmental impacts. Impacts to solid waste in San Bernardino County are considered significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, increases in population and employment could result in the incremental increase of solid waste throughout unincorporated Riverside County. This could increase the need for solid waste disposal, requiring additional landfill capacity and related support facilities. This increase is considered substantial and could result in a significant but mitigable impact. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

The San Bernardino County General Plan contains a number of policies to mitigate impacts related to solid waste. These include policies SW-1 through SW-6 in the Solid Waste Management section of the Man-made Resources Element. In general, these policies would: develop and implement methods to reduce the amount of waste being landfilled; assist the private sector in developing methods for the reuse of inert materials; reduce solid waste at the source and recycle where possible; expand existing landfills; develop a program to map all waste sites and create an environmental database; and explore new practices for disposal of specified types of waste, such as dairy waste and sludge. The San Bernardino County General Plan Final EIR also identifies project-specific mitigation measures, including the preparation of a site-specific solid waste management plan and the development of on-site source separation and recycling programs.

Impacts to solid waste would be mitigated through implementation of policies LU 5.1 and LU 5.2 in the Land Use Element of the Riverside County General Plan. Additionally, mitigation measures provided in the Riverside County General Plan Draft Program EIR include: coordination with the County's franchise hauling companies to expand curbside and commercial recycling services; use of State regulations in implementing the goals, policies, and programs identified in the Riverside County Integrated Waste Management Plan (RCIWMP) to achieve and maintain a 50 percent reduction in solid waste disposal through source reduction, reuse, recycling, and composting; county review of the RCIWMP every 5 years to determine if the practices remain consistent with waste diversion goals and objectives; and the requirement that all future commercial development provide adequate areas for the collection and loading of recyclable materials.

Impacts to Utilities – Raw Water Treatment

San Bernardino County

Growth would increase the need for potable water and consequently create an increased demand for water treatment facilities in San Bernardino County. Impacts could be significant and not mitigable in all cases. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, no significant impacts related to raw water treatment are identified.

Mitigation Measures

The San Bernardino County General Plan contains goals and policies related to raw water treatment in the Water section of the Natural Resources Element. These policies, in general, help support the goal of planning and constructing new water treatment systems on the basis of the county's adopted growth forecast and focus upon the conservation of water which would reduce the need for additional facilities.

Impacts to Utilities – Wastewater

San Bernardino County

In San Bernardino County, future growth would have significant impacts on wastewater services if the growth occurred in areas where existing services are at, or near, infrastructure and treatment capacity limits. In general, the greatest potential for such impacts exists in the Valley region where population growth is highest and many existing facilities are close to capacity. Impacts to wastewater systems in San Bernardino are considered significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Riverside County

In Riverside County, growth would generate increased volumes of wastewater, creating the need for increased wastewater treatment capacity. Due to the large-scale projected growth, this increase is considered substantial and may result in a significant impact on existing wastewater service and facilities. Impacts are considered significant but mitigable. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

Impacts to wastewater systems in San Bernardino County would be mitigable through the implementation of General Plan policies WW-1 through WW-10, which would ensure that the expansion or construction of wastewater services complies with the County's long-term environmental planning goals and that, once constructed, the facilities are monitored and regularly assessed by the County and other agencies for efficient operation and compliance with environmental protection requirements.

Significant impacts related to wastewater in Riverside County would be reduced through the implementation of policies LU 5.1-5.2 and LU 9.1 of the Land Use Element of the General Plan and through implementation of Multipurpose Open Space policy 3.1. No additional mitigation measures are required.

Impacts to Utilities – Stormwater Drainage

San Bernardino County

New construction would likely require the construction of new storm water drainage facilities or the expansion of existing facilities. These impacts are considered to be less than significant.

Riverside County

In Riverside County, increased development would result in the increase of impervious surfaces, which would substantially increase the potential stormwater runoff from areas throughout the County. Existing drainage facilities may not be adequate to accommodate the future potential increase in stormwater runoff and would result in significant but mitigable impacts. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

Polices S 4.11 and S 4.19 of the Safety Element of the Riverside County General Plan address impacts related to stormwater drainage. These polices require new projects to mitigate impacts on the carrying capacity of the local storm drain system and require that the design and upgrade of street storm drains be based on the depth of inundation, relative risk to public health and safety, the potential for hindrance of emergency access and regress from excessive flood depth, and the threat of contamination of the storm drain system from sewage effluent.

Impacts to Traffic

In general, growth-related impacts to transportation and circulation would include increased congestion on roadways resulting in decreased levels of service, interference with emergency access, and conflicts with plans relating to alternative forms of transportation. Future growth would result in increased traffic within San Bernardino and Riverside counties.

San Bernardino County

In San Bernardino County, increased traffic would result in increased congestion on numerous road and highway segments. Impacts to transportation and circulation are considered significant. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts. A portion of the impacts would be mitigable while others would remain significant and unavoidable.

Riverside County

In Riverside County, future growth would increase area-wide traffic volumes with the potential to degrade roadway and freeway performance below applicable performance standards. Impacts are considered significant and unavoidable; however, the policies and mitigation measures provided below would reduce impacts to some degree. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

Impacts to transportation and circulation would be reduced, but not necessarily entirely mitigated to less than significant. The San Bernardino County General Plan contains a number of policies in the Transportation/Circulation section to mitigate traffic-related impacts including TC-1, TC-2, TC-3, TC-4, TC-5, TC-6, TC-7, TC-8, TC-9, TC-10, TC-11, and TC-12. In summary, these policies: protect and increase the designed vehicular capacity of existing roadways; implement appropriate design standards for all highways; require safe and efficient alternative transportation facilities; strive to achieve Level of Service C on existing roadways, in part through approving only development proposals when consistent with this goal; coordinate financial plans for transportation system improvements with other agencies; designate potential evacuation routes in the county; improve public transit through coordination with other jurisdictions and agencies; and improve public access to new development.

The Circulation Element of the Riverside County General Plan includes the following relevant policies to reduce impacts to transportation and circulation: C 1.1-1.7, C 2.1, C 2.3, C 3.2, C 3.5-3.6, C 3.10, C 3.20, C 4.1-4.10, C 6.1-6.7, C 7.1-7.6, C 8.4-8.6, C 8.8, C 9.1-9.2, C 10.2, C 11.1-11.7, C 12.1-12.6, C 13.1-13.7, C 14.1, C 14.2, C 15.1-15.2, C 16.1-16.2, C 16.5, C 17.2, C 18.2, C 18.5-18.8, C 19.1-19.12, C 21.1-21.5, C 21.8-21.9, C 21.11-21.13, C 22.1-22.9, C 23.1-23.2, and C 25.1. In general, these policies would serve to design and implement a multi-modal transportation system that would serve projected future travel demand, minimize congestion, achieve the shortest feasible travel times and distances, and address future growth and development in the county. The Riverside County General Plan Draft Program EIR also includes mitigation measures including: that the county require project proponents to make a "fair share" contribution to required intersection and/or roadway improvement; that the county ensure sufficient right-of-way is reserved on critical roadways and intersections to implement the design needed to provide appropriate levels of service; and that the county add a transportation corridor (between Interstate 15 and the Orange County freeway system) to its General Plan Circulation Element, if feasible.

5.0 ALTERNATIVES

5.1 ALTERNATIVES EVALUATION PROCESS

This section analyzes alternatives to the Project. CEQA requires that EIRs examine a reasonable range of alternatives to a project or to the location of a project that would feasibly obtain most of the basic project objectives, but would avoid or substantially lessen one or more of the significant environmental impacts of the project. Project alternatives must be feasible based on specific economic, social, legal, and technical considerations. The EIR must explain the rationale for selecting the alternatives that are discussed, identify those that were eliminated as infeasible, and briefly explain why they were eliminated. The range of alternatives required in an EIR is governed by a "rule of reason," which requires the EIR to set forth a reasonable range of alternatives to inform decision-makers and the public. The EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the project objectives (CEQA Guidelines Section 15126.6[f]). An EIR need not consider an alternative whose effects cannot be reasonably ascertained and whose implementation is remote and speculative (CEQA Guidelines Section 15126.6[f][3]).

Potential alternatives were screened to develop a reasonable range of alternatives. The screening process involved determining whether preliminary alternatives could: (1) avoid the Project's direct significant effects while not adding new significant impacts; (2) meet most of the Project objectives; and (3) be feasible to implement (CEQA Guidelines Section 15126.6[b]).

The Project's significant direct impacts are summarized in Table S-1 and detailed descriptions of these impacts are included in the individual resource sections of Chapter 3. The Project's significant indirect, growth-related impacts are addressed in Chapter 4. The potential for these growth-related impacts is linked to the increase in water supply resulting from implementation of the Project. The long-term average annual amount of water made available by the Project ranges from approximately 11,000 afy to 27,000 afy, depending on Project scenario; the maximum diversion in any given year could be as much as 200,000 af. Avoiding or reducing the impacts of the Project would be feasible only by reducing water supply reliability or water supply. By so doing, it would not be possible to meet the following Project objectives considered by Muni/Western when screening potential alternatives:

- Increase water supply reliability by reducing dependence on imported water;
- Develop and deliver a new, local, high quality, long-term water supply that is needed to meet part of anticipated future demands; and
- Expand operational flexibility by adding infrastructure and varying sources of water, thereby providing Muni/Western with greater capability to match varying supply and demand.

5.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED EVALUATION

The following preliminary alternatives were eliminated from further consideration in the EIR, for the reasons stated below.

5.2.1 Imported Water from Other Systems

The use of imported water from water supply systems other than the State Water Project (SWP) was initially considered. They included the federal Central Valley Project (CVP), the Colorado River, and the Los Angeles Department of Water and Power (LA DWP) Owens River. These alternative supply systems were eliminated from further consideration because they did not meet the following criteria:

- **Ability to meet most Project objectives.** Providing an alternative source of imported water would not meet the objectives of reducing dependence on imported water, improving overall supply reliability, or delivering higher-quality local water instead of imported supplies.
- **Be feasible to implement.** Several institutional barriers would need to be overcome to implement a water transfer from these alternative water sources. For possible water transfers from CVP Contractors, the primary issue is the availability and cost of excess water supplies, and the institutional approvals necessary to transfer water between the federal and state projects. Currently, CVP contractor demands exceed supply. CVP supplies have been reduced as a result of actions to enhance anadromous fish populations and other environmental uses (e.g., "the Environmental Water Account"). Until and unless the CVP water supply and demand balance is resolved, transfers from CVP contractors will be limited both in size and duration. For any water transfer, conveyance of the transferred water in SWP facilities would also be an issue. Water from these major water projects is generally allocated to various environmental restoration projects and is not available for long-term, reliable sale or exchange. Accordingly, because any non-SWP water transfer would be complex, have greater uncertainty, and be more costly than the Project, transfers from the CVP or other water supply systems are considered infeasible at this time. Similarly, LA DWP does not have excess water available for transfer; thus, use of water from this source is infeasible at this time. Colorado River water allocations are determined in accordance with international treaty obligations, Congressional Laws and U.S. Supreme Court decree. California water management agencies have recently developed a strategy to assist California water users to reduce their dependence on surplus or unused Colorado River water and reduce their normal-year use to 4.4 million acre feet annually. This quantity is substantially less than historical usage. Future surplus allocations are not expected in the near future with current reservoir storage levels. Normal deliveries to existing user is expected to remain highly reliable.
- **Avoid the Project's direct significant effects while not adding any new significant impacts**. The Project's direct impacts result from construction and operational activities, some of which, such as construction of the Morton Canyon Connector II, may still occur under this alternative. This alternative would have similar indirect impacts (growth-

related) as the Project. Moreover, the environmental impacts of these alternative sources could be substantial within the seller's region.

5.2.2 Diversion of Unappropriated Santa Ana River Water and Use of Existing Facilities

In order to minimize the amount of pipeline construction needed and, therefore, construction-related impacts of the Project, Muni/Western evaluated the potential for actively using the existing groundwater recharge facilities owned and controlled by the San Bernardino Valley Water Conservation District (Conservation District) and the normally dry riverbed of the Santa Ana River (SAR) from Cuttle Weir to San Bernardino International Airport. To implement this potential alternative, improvements would be required to the Conservation District Canal to enable conveyance of the anticipated quantities of water diverted at Cuttle Weir. Diversion facilities would be constructed to allow the diversion of up to an additional 1,500 cfs in addition to the current capacity maintained by the Conservation District. Conveyance pipelines would be constructed from the diversion facility to the existing and improved Santa Ana River Spreading Grounds. Water that was not diverted would be allowed to recharge in the SAR channel bed.

This alternative was eliminated from further consideration because it did not meet the following criteria:

- **Ability to meet most Project objectives**. This alternative would not increase operational flexibility to either conjunctively use all portions of the regional groundwater basin in an effective manner or exchange water with neighboring water districts when conveyance capacity exists and local water supplies exceed local demand. To avoid adverse impacts to human health and safety from the increased risk of liquefaction and the potential for adversely affecting existing groundwater contamination plumes, such a water spreading activity would be limited to approximately 20,000 afy. If the diversion of this quantity of unappropriated SAR water is recharged in the Santa Ana River Spreading Grounds, the long-term average amount of water available to Muni/Western would be less than that resulting from the Project. This limitation would be particularly important during periods of high runoff when natural groundwater recharge would also be high. This alternative also would not enhance reliability.
- **Avoid the Project's direct significant effects while not adding any new significant impacts**. This alternative would avoid direct construction-related impacts of the Project, but still would require construction. While overall impacts could be less because less construction would be needed, the impacts to some resources, including biological and cultural resources, could be significant depending of the specific location of construction activities.

5.3 ALTERNATIVES CONSIDERED FOR DETAILED EVALUATION

In addition to the No Project Alternative (section 5.3.1), three broad water supply alternatives were selected for detailed analysis:

- Alternative 1 - New Local Water Supplies (section 5.3.2);
- Alternative 2 - Enhanced Conservation (section 5.3.3); and

- Alternative 3 - New Imported Water Supply (section 5.3.4).

These alternatives were developed to avoid or substantially reduce the Project's significant impacts to SAR resources by eliminating or reducing SAR diversions.

5.3.1 No Project Alternative

CEQA (CEQA Guidelines Section 15126.6[e]) requires that the No Project Alternative be analyzed to provide a comparison of the conditions that would occur with and without implementation of the proposed action or other alternatives. The CEQA Guidelines (Section 15126.6[e][1]) indicate that the No Project Alternative is not the baseline for determining whether the proposed action's environmental impacts may be significant unless it is identical to the existing environmental setting. The CEQA Guidelines (Section 15126.6[3][2]) further indicate that the analysis of the No Project Alternative shall discuss the existing conditions at the time the NOP is published, as well as what would be reasonably expected to occur in the foreseeable future if the action were not approved, based on current plans and consistent with available infrastructure and community services. If not approving the proposed action would result in predictable actions by others, such as the proposal of some other project, this consequence should be discussed.

The No Project Alternative would occur if Muni/Western chose not to go forward with the Project or if the SWRCB decided not to issue an appropriative water right permit to Muni/Western. None of the construction activities (for diversion or conveyance facilities) that are part of the Project or the diversion of SAR water by Muni/Western would occur. During periods of high sustained runoff upstream of Seven Oaks Dam, water in excess of that diverted by senior water right claimants and the Conservation District would, after detention behind the dam, be released in a controlled manner and flow downstream. For purposes of analysis, it is assumed that under No Project conditions: (1) diversions made by senior water right claimants and the Conservation District would mimic past historical patterns; (2) there would be no seasonal water conservation storage at Seven Oaks Dam; and (3) releases of water from Seven Oaks Dam would be made in accordance with the current Water Control Plan issued by the USACE and guidelines contained in the Biological Opinion issued by the USFWS.

Population in the Muni/Western service areas is forecast to increase, necessitating the delivery of greater quantities of water in the future. Without additional supplies of new water, existing supplies would become inadequate to meet anticipated demand around the year 2025. In the absence of new sources of water, it is possible that the rate of population growth could diminish due to the constrained water supply. Neither Muni nor Western has the authority to grant or deny land use development permits, since such actions are the responsibility of land use planning agencies and the rate of growth depends on the decisions of these agencies. Actions by others (including private developers) could augment water supplies in the service area (by future purchases or transfers) when demand exceeds supply. Such actions would, however, become increasingly costly. Although these actions by others are likely to occur in the future, their timing and location are uncertain and unknown and are therefore speculative. It is likely that to meet increasing demands, local water sources would be exchanged with SWP water and provided to water users, rather than increasing groundwater extractions from the SBBA. Muni has the responsibility to replace the quantity of water extracted from the basin that exceeds the safe yield by using whatever source of water they have available. The source would, in all likelihood, be comprised of SWP water that would be imported in increasing quantities up to the Table A[1] Amount allocated to Muni. Table A water could be augmented by whatever interruptible (Article 21[2]) waters were, from time to time, available from the SWP. Under the No Project Alternative, Muni/Western would fully utilize existing SWP supplies at an earlier date than under the Project.

5.3.1.1 Direct Impacts

No significant direct impacts would occur under the No Project Alternative because water diversions and releases would be made in accordance with historic and current practices and because no new construction would be required. All direct impacts associated with the Project would be avoided because construction would not be required and hydrologic and fluvial geomorphic changes to the SAR would not occur. None of the beneficial impacts of the Project would be realized. Groundwater levels in the pressure zone of the SBBA would remain as described under the existing conditions, and the risk of liquefaction would remain high. Additionally, substituting SAR water for SWP deliveries to meet water demands associated with anticipated growth would not be achieved.

5.3.1.2 Indirect Impacts

The lack of reliable water supplies would likely delay or limit regional growth and development compared to that anticipated under the Project. Indirect impacts on all environmental resources associated with anticipated development would be delayed or reduced commensurate with the reduction in regional growth and development that would be supported by the Project. Accordingly, indirect environmental impacts in the Muni/Western service area would be less than those of the Project, although it is possible that growth could be redirected elsewhere, thus changing the location of the indirect impacts.

5.3.1.3 Comparison with the Project

The No Project Alternative would require actions by others to augment water supplies, which would be costly. This alternative also would not meet any of the Project objectives. It would:

- Avoid direct Project impacts, including beneficial impacts.
- Delay or reduce indirect Project impacts because continued growth and development would be constrained by the limited water supply.

---

1 Table A is a schedule of annual entitlements as set forth in long-term SWP delivery contracts. Table A defines the maximum annual volume of SWP water that a contractor can request in a given year.

2 Article 21 water is SWP water in excess of that required to meet all demands for entitlement water and water to be stored in the SWP. Article 21 water is not delivered continuously or on a regular pattern, but is delivered when available and when SWP operations allow. Article 21 water allows a SWP contractor to take delivery of water above the approved and scheduled Table A Amount.

5.3.2 Alternative 1 – New Local Water Supplies

Water supply planning and management has not fully used all potentially available water sources within and adjacent to the Muni or Western service areas. These other water supplies have not been utilized in the past due to concerns regarding water quality, cost, or other institutional constraints.

5.3.2.1 Types of New Local Water Supplies

Three types of new local water supplies are evaluated in lieu of additional diversions of SAR water:

- Brackish groundwater desalination;
- Regional water recycling; and
- Increased groundwater extraction from the Riverside Basin.

These water supply concepts are grouped together for analysis purposes since they have a number of common attributes including: they are local sources that have not been fully utilized; they require new additional treatment; and to distribute the new water within the Muni/Western service areas they would involve construction activities with environmental impacts similar to those of the Project. It is assumed that the full amount of water available under the Project would be made available through any one of these water supplies.

Brackish Groundwater Desalination

Desalination, or desalting, is a process to create fresh water from water containing higher salt levels. Desalination can use a thermal distillation process or a membrane process (such as electrodialysis or reverse osmosis). All desalination processes produce a brine waste stream that must be disposed of. In the Santa Ana watershed, existing brine streams from desalination processes have total dissolved solids (TDS) concentrations of 3,000 to 10,000 mg/L (SAWPA 2002b). In the Santa Ana watershed, an interceptor line, called the Santa Ana Regional Interceptor (SARI), runs 93 miles from San Bernardino to an outfall near Huntington Beach in Orange County (SAWPA 2002b). The SARI has a capacity of 30 million gallons per day (mgd). In the future, it is estimated that Muni will have 7.2 mgd of capacity available in the SARI and Western will have 9.6 mgd of capacity (SAWPA 2002b).

Groundwater desalting is not currently carried out in the Muni service area (SAWPA 2002b) because opportunities for brackish groundwater desalting are somewhat limited. While elevated salts are a concern in the groundwater basins of the *Western* Judgment (SBBA, Rialto-Colton, Riverside), average TDS in all of these basins is currently below 500 mg/L (DWR 2003b). Similarly, in the Yucaipa and San Timoteo basins, the average TDS is less than 500 mg/L (DWR 2003b).

In the Western service area, two desalters provide up to 16 mgd of water for groundwater spreading and domestic use. The Arlington Desalter produces up to 6 mgd (estimated annual delivery of approximately 6,700 af) of potable water for delivery to the City of Norco and Jurupa Community Services District in the Western service area (SAWPA 2002b, Western

2003b). Though Western has connections to the Arlington Desalter, due to the pumping required to convey the water into the Western system, Western generally uses water from the Arlington Desalter only during shut-downs of the SWP. SAWPA is considering expanding the desalter to provide additional potable water supplies (OCWD 2004). The Temescal Desalter in the City of Corona, in the Western service area, currently produces 10 mgd (approximately 11,200 afy) and a 5 mgd expansion is planned. With the expansion of the Temescal Desalter and assuming full, consistent utilization of the Arlington Desalter, new water available to Western from groundwater desalination would be approximately 12,300 afy (the 5 mgd planned expansion plus 6 mgd from the Arlington Desalter). Thus, the amount of water provided would be less than the quantity that would be provided under the Project (at a diversion rate of 1,500 cfs) but within the range of anticipated average deliveries.

It is anticipated that the desalted brackish water could be made potable and, therefore, this alternative would provide a substitute water supply for the Project. Water from the desalination facility would be conveyed to the regional water delivery system by new distribution pipelines. This newly conserved water would be delivered directly for use in the Western service area. It would be delivered to the Muni service area via an exchange for other water (e.g., SWP water) with other agencies. The desalination facility would connect its brine-stream discharge to the existing SARI pipeline.

Regional Water Recycling

Water recycling is a process that provides an additional use of water following treatment by regional wastewater treatment facilities and prior to its discharge. There are a number of existing water reclamation plants within and adjacent to the Muni/Western service areas that can supply recycled water to meet non-potable water demands. Currently, effluent from a number of these plants is discharged into the Santa Ana River. Users such as golf courses, parks, and landscaping associated with schools, freeways, hospitals, cemeteries, and new residential and industrial developments could be converted from potable water-users to recycled water-users, thereby reducing the demands on existing and future potable water sources. However, the cost of recycled water is currently greater than that of additional SWP water.

Within the Muni service area, the City of San Bernardino, City of Redlands, and Yucaipa Valley water districts have existing or planned water recycling infrastructure. SAWPA has developed estimates of the amounts of recycled water potentially available in the Muni service area, for direct use and groundwater recharge, for years 2010 through 2025 (see Table 5.3-1). Demand for recycled water within the Muni service area has not been determined but it is anticipated to be greater than the long-term average amount of water that could be available.

Table 5.3-1. Estimated Volume of Recycled Water Available in the Muni Service Area (2010 to 2025)

Year	*2010*	*2015*	*2020*	*2025*
Volume of Recycled Water (afy)	6,284	12,569	18,854	25,139
Source: SAWPA 2002b.				

However, in order to realize this potential water supply in the Muni service area, many retrofits and extensive new construction would be necessary. For example, it is estimated that to implement a recycled water system yielding 9,500 afy in the City of Redlands, it would cost approximately $19.5 million and require extensive new pipelines (SAWPA 2002b). Even with planned expansion of recycled water systems, large areas in the western and southwestern sections of the Muni service area would remain without recycled water because of difficulties in achieving reverse flow from the treatment plants to the areas of use.

Within the Western service area, the cities of Corona, Norco, and Riverside have planned water recycling projects. Western currently operates a recycled water system within the former March Air Force Base, which produces approximately 800 afy of recycled water. SAWPA has estimated the amount of recycled water potentially available in the Western service area, for direct use and groundwater recharge, for years 2010 through 2025 (see Table 5.3-2). Demand for recycled water within the Western service area has not been determined but, as in the case of Muni, it is anticipated to be greater than the amount of water that could be available.

Table 5.3-2. Estimated Volume of Recycled Water Available in the Western Service Area (2010 to 2025)

Year	*2010*	*2015*	*2020*	*2025*
Volume of Recycled Water (afy)	29,159	36,403	41,513	46,623
Source: SAWPA 2002b.				

Western estimates that $135 million is needed to meet reclaimed water use goals in its service area (Western 2001a). Western also estimates that at least 43 miles of distribution pipeline (varying in diameter from 6 to 48 inches), new pump stations, storage tanks, and treatment plant upgrades would be necessary. Even with these improvements, the southern and eastern portion of Western's service area would remain without access to recycled water.

Increased Groundwater Extraction from the Riverside Basin

The Riverside-Arlington Sub-basin underlies part of the SAR Valley in northwest Riverside County and southwest San Bernardino County. Groundwater in the basin is derived from: infiltration from the SAR, underflow past the Rialto-Colton fault, underflow from the Chino Sub-basin, return irrigation flow, and deep percolation of precipitation (DWR 2003b). The total storage capacity of the Riverside-Arlington Sub-basin is estimated to be 243,000 af (DPW 1934). In the central part of the sub-basin near the City of Riverside, groundwater levels were fairly steady from 1965 through 1985, fluctuating by only about 4 feet (DWR 2003b). Municipal water pumping from the Riverside portion of the sub-basin was approximately 10,100 af during the 2000-2001 fiscal year (DWR 2003b).

Natural water quality within the Riverside-Arlington Sub-basin is calcium-sodium bicarbonate in nature. Water sampled from 46 public supply wells had an average TDS content of 463 mg/L. Information in Table 5.3-3 also indicates that a substantial groundwater contamination condition exists in this aquifer. Septic systems and the associated pollutants (such as nitrates) pose the greatest threat to the drinking water supply in the Riverside Basin

(City of Riverside 2002), while other specific constituents of concern include DBCP, TCE, and perchlorate.

Table 5.3-3. Water Quality in Public Supply Wells within the Riverside-Arlington Sub-basin

Constituent Group	*Number of Wells Sampled*	*Number of Wells with a Concentration above a Maximum Contaminant Level (MCL)*
Inorganics (Primary)	48	2
Radiological	48	11
Nitrates	51	21
Pesticides	50	19
Volatile Organic Compounds (VOCs) and Synthetic Organic Chemicals (SOCs)	50	8
Inorganics (Secondary)	38	3
Source: DWR 2003b.		

This alternative would include the construction of wells for the extraction of groundwater from the Riverside Basin and an associated water treatment system for contaminants of concern. The water treatment facilities would be constructed at the wellfield location and would be individually designed to treat specific constituents of concern including: a treatment facility to remove DBCP (which also removes TCE) through the use of granular carbon; and a resin ion-exchange process treatment facility to remove perchlorate. Treatment for perchlorate could have the additional benefit of reducing nitrates (personal communication, J. Zubeck 2003). The treated water would then pass through a chlorination station that would use chlorine gas or chlorine dioxide to disinfect the water. After completion of the treatment processes, the water would be conveyed to a blending reservoir and finally to the water supply delivery system.

Development of this water supply would include the construction of all wells and pollutant treatment facilities including the chlorination treatment plant, as well as the construction of associated pipelines, including those needed to convey water to the blending reservoir. The wellheads and treatment facilities would be constructed in close proximity to one another to minimize pipeline requirements. Each of the three anticipated treatment facilities could require a construction area of several acres, and over 4 miles of transmission lines (up to 60 inches in diameter) could be needed to convey the treated water.

5.3.2.2 Direct Impacts

Direct impacts would result from the construction of new brackish desalination, wastewater recycling or groundwater extraction and treatment facilities and the pipelines and pump stations necessary to convey this newly produced water to the existing and anticipated distribution system. Similarly, it is anticipated that any brine produced from the development of these new sources would be combined with the existing brine disposal system. Some direct impacts would also result from the operation and use of these new local water supplies. Increased use of recycled water could have detrimental effects on flows in the SAR. A high percentage of flow in the SAR (below the outfall for the RIX facility and Rialto-Colton WWTP) is effluent from wastewater treatment plants. With increased water recycling, outfall from such plants would be reclaimed rather than discharged to the SAR, thereby reducing flows in the SAR.

Surface Water Hydrology and Water Quality

Construction of new treatment and conveyance facilities would result in land disturbance, which can affect runoff from the site. Depending on the location and methods, construction of the new facilities could impact the water quality of adjacent drainage courses due to increased erosion. New pipelines are likely to be located in existing rights-of-way, thereby limiting potential erosion. Impacts related to runoff and erosion would be significant, however, incorporation of standard mitigation measures would reduce the severity of impacts.

Depending on the extent of water recycling, flows from wastewater treatment plants to the SAR could be significantly decreased, causing reduced water surface elevation, channel velocity, wetted perimeter, sediment scour, and recharge in the SAR. Due to the high proportion of flow in the Santa Ana River below the Colton Narrows that is comprised of wastewater effluent discharges, a decrease in these flows could have significant impacts. Additionally, the increased use of recycled water would concentrate the salinity of the remaining flows with potentially significant impacts to surface water quality.

Groundwater Hydrology and Water Quality

Brackish groundwater desalination and extraction and treatment of contaminated groundwater depend of a water source that is exhaustible and not readily replenished, i.e., this represents a temporary supply. The use of these supplies could result in potentially significant impacts to regional groundwater levels. Increased use of recycled water would concentrate the salinity of the remaining stream flows such that groundwater quality impacts would occur through percolation from the streambed.

Biological Resources

Construction of the new treatment and conveyance facilities could result in disturbance to sensitive terrestrial and riparian species and habitats. However, it is anticipated that the new facilities would be sited to avoid sensitive biological areas. The magnitude of flow-related biological impacts would depend on the amount and timing of recycled water management actions. Impacts relating to the changes in flow in the Upper SAR would be avoided but may be replaced with flow or water-level impacts below existing water reclamation plant discharge points.

Geology, Soils, and Mineral Resources

Depending on the location and methods, construction of the new treatment and conveyance facilities would impact overlying or adjacent geological and soil resources. Given sound engineering and management practices, impacts on geology, soils, and mineral resources would be minimized but would still result in new facilities and water pipes in areas subject to seismic shaking and liquefaction. However, since siting, engineering, and design criteria would consider such issues, these impacts would likely be reduced or avoided. Also, increased use of recycled water would reduce the overall amount of flows in the lower reaches of the SAR, possibly increasing the depth to groundwater and, thus, decreasing the potential that liquefaction and subsidence would occur. Direct impacts generally would be significant and mitigable to less than significant, although impacts associated with seismic hazards could be unavoidable.

Land Use and Planning

The potential impacts to land use and consistency with land use policies depend on the exact location of the new treatment and conveyance facilities needed to connect the plant to the local water supply system and dispose of wastewater. Given the nature of the anticipated new facilities, they would probably be sited in an area zoned for industrial uses and would, therefore, not conflict with non-industrial uses. This alternative could result in a significant impact if it conflicted with any applicable local and state plans and policies.

Agricultural Resources

Depending on the location of the new treatment and conveyance facilities and the surrounding land uses, construction could impact agricultural resources. To the extent possible, facility sites would be located to avoid active agricultural areas and potential impacts would be less than significant.

Recreational Resources

It is anticipated that new treatment and conveyance facilities would not be constructed in an existing recreation area and that this alternative would not directly increase the use of existing recreation areas. Nor would it require the construction of additional recreation areas. Impacts on recreational resources would be less than significant.

Air Quality

Construction of new treatment and conveyance facilities and/or modification of existing facilities would result in the emission of air pollutants. It is anticipated that extensive new construction would be required to expand existing water recycling systems and develop new brackish water desalination facilities. Development of additional groundwater extraction and treatment facilities would not have extensive construction and resultant air pollutant emissions. The production of energy for use in the desalination plant, however, would also increase operational air emissions. Since the air basin is in non-attainment, all direct air quality impacts would be considered significant.

Cultural Resources

Construction of new treatment and conveyance facilities and modification of existing facilities have the potential to impact historic structures, archaeological resources, paleontological resources, and/or human remains. A cultural resource records search would be required prior to any ground disturbance. A Phase I survey may be required for any staging area or areas where ground disturbance is planned. If cultural resources are disturbed, impacts could be significant. However, incorporation of standard mitigation measures would reduce the severity of impacts.

Noise

Noise impacts would occur during site preparation and construction of the new treatment and conveyance facilities and would result primarily from the use of construction equipment. Incorporation of standard mitigation measures would reduce the severity of impacts. Noise generation at the desalination or recycling plants during operations would primarily be associated with pumps and an emergency generator. During operations, noise impacts would be less than significant.

Aesthetics

Construction of desalination and recycled water facilities would impact aesthetic/visual resources. However, it is anticipated that the facilities would be located in an appropriately zoned area. Increased groundwater extraction is not expected to require substantial new above-ground facilities and would, therefore, have minimal or no direct impact on aesthetic resources. Depending on the location selected for the desalination facilities, impacts could be significant.

Hazardous Materials

It is anticipated that new construction would result in new hazards and the use of additional hazardous materials. Compliance with applicable laws and regulations would minimize the impacts of these new hazards and the use of these materials. The primary risk of upset for the proposed desalination facility relates to the possible release of hazardous chemicals to the air, land, or water. The chemicals of potential concern, based on their hazardous nature and/or quantity involved, include chlorine, caustic soda (sodium hydroxide), acid, dechlorination chemicals, and carbon dioxide. An accidental release of chemicals from the proposed desalination facility could have adverse effects on plant personnel, the general public, and terrestrial and aquatic life, depending on the location of the facility. Impacts could be significant, however, incorporation of standard mitigation measures would reduce the severity of impacts.

Public Services, Utilities, and Transportation

This alternative would result in increased demands on public services. Facility operations would generate solid waste, increasing demands on waste disposal facilities. Impacts associated with this alternative would be less than significant. Use of electric power for operation of the facilities and pumps needed to convey the water is anticipated to range from 27 to 70 million kilowatt hours (kWh) per year. This is expected to have a less than significant impact assuming that existing power generation facilities are utilized.

Construction and operation of the new facilities would result in increased traffic associated with the transportation of materials, equipment, and employees to and from the site. Existing traffic levels on surrounding freeways and roads leading to the facility would determine the level of impact on transportation. The impacts on transportation and circulation from this alternative would be less than significant because trips would be periodic and limited in number.

5.3.2.3 *Indirect Impacts*

The additional water supply made available through this alternative would induce growth within the Muni/Western service areas.

5.3.2.4 *Comparison with the Project*

This alternative would provide a similar amount of water as the Project and would partially meet the Project objectives. It would increase water supply reliability by reducing Muni/Western's dependence on imported water, although brackish groundwater is not a permanent supply. Use of recycled water would not meet the Project objective of delivering local, high quality water instead of imported supplies, since such water is limited to non-potable uses. This alternative would provide some improved operational flexibility, although as noted above, brackish water is not a permanent supply and recycled water can be used only for certain purposes. Some environmental impacts would be similar to those of the Project, and others would differ, as noted below. In summary, this alternative would result in:

- Similar construction-related impacts to surface water hydrology and water quality.
- A degradation of surface water quality in the SAR downstream of regional WWTPs associated with recycling actions.
- A greater reduction in SAR flows as a result of recycling actions.
- A greater decrease in regional groundwater levels.
- Less construction-related impacts to biological resources and potential avoidance of impacts relating to the changes in flow in the Upper SAR.
- Greater impacts to biological resources below existing water reclamation plant discharges associated with recycling actions.
- Similar impacts to geological resources, land use, agriculture, recreational resources, and public services.
- Greater air quality impacts.
- Less potential for significant impacts to cultural resources.
- Greater noise impacts during construction.
- Greater impacts to aesthetic resources.
- Greater impacts related to hazardous materials.
- Greater impacts to utilities and transportation.
- Indirect impacts associated with growth inducement would be similar to those of the Project.

5.3.3 Alternative 2 – Enhanced Conservation

Throughout the State of California, water agencies are faced with the task of developing new sources of water supply and conserving existing water resources to meet their individual projected water demands. Residential conservation remains the main focus for many agencies, but other strategies, including waste minimization, and industrial and agricultural conservation, are also under consideration. The Enhanced Conservation Alternative would provide the same amount of water as the maximum annual average provided by the Project (i.e., 27,000 afy). It is assumed that this alternative would primarily affect the Muni service area, since Western currently has an active conservation program and Western could achieve only minimal additional conservation gains. Water demand in the Muni service area is projected to increase by approximately 19 percent, from approximately 226,700 afy in 2000 to approximately 269,900 afy in 2025, a difference of 43,200 afy. Since all new urban development is mandated to use available conservation measures, to obtain the desired 27,000 afy from future growth alone, water users within the Muni service area would have to conserve over 60 percent between the years 2000 to 2025. This amount of conservation may be infeasible given that future demand assumes only about 8-10 percent conservation (SAWPA 2002a).

Thus, it is more likely that additional conservation would be required of all users. Obtaining 27,000 afy would require conservation of an additional 10 percent of the total water demand of 269,900 afy, over and above conservation measures that are already in place. As such, the Enhanced Conservation Alternative would delay the need to develop new water supply sources and the construction of associated infrastructure for delivery.

Since Muni/Western are water wholesalers, the water purveyors (retailers) in the Muni/Western service areas would implement any potential water conservation measures over and above those currently in place or planned. Detailed assessment of any future conservation programs would be required.

5.3.3.1 Direct Impacts

There would be no construction-related direct impacts. Implementation of a conservation program would, however, have impacts associated with it.

Surface Water Hydrology and Water Quality

With implementation of urban water conservation measures, such as the promotion of water saving appliances and plumbing, water discharged from wastewater treatment facilities would be less diluted and, therefore, more concentrated with pollutants. In addition, flows from wastewater treatment facilities would be reduced and the salt concentration in the effluent would increase. Impacts would be significant if water quality standards were violated.

Groundwater Hydrology and Water Quality

Groundwater quality could be adversely affected as discharged water from wastewater treatment facilities would be less diluted and contain higher concentrations of pollutants. This degraded surface water could percolate into the groundwater.

Biological Resources

Since this alternative would result in decreased discharges from wastewater treatment facilities, and discharged water would be less diluted and, therefore, more concentrated with pollutants, biological resources could be adversely affected. These could include the Santa Ana sucker (*Catostomus santaanae*), which is federally listed as threatened, and riparian and wetland habitats and the species that depend on them. Impacts would be longterm and potentially significant.

Other Resource Areas

Implementation of the Enhanced Conservation Alternative would not adversely affect the following resources:

- Geology, Soil, and Mineral Resources;
- Land Use and Planning;
- Agricultural Resources;
- Recreational Resources;
- Air Quality;
- Cultural Resources;
- Noise;
- Aesthetics;
- Hazardous Materials and Groundwater Contamination; and
- Public Services, Utilities, and Transportation.

5.3.3.2 Indirect Impacts

The Enhanced Conservation Alternative would make an additional water supply available, or extend the time period during which existing water supplies could fulfill demands. This would induce growth within the Muni/Western service areas.

5.3.3.3 Comparison with the Project

The Enhanced Conservation Alternative would provide a similar amount of water to the maximum annual average provided by the Project (about 27,000 afy) and would meet the Project objective of reducing Muni/Western's dependence on imported water. It would not meet the objective of delivering additional high quality water instead of imported supplies, and would not improve operational flexibility because it does not expand the number of water supply sources or expand the ability to move water to different locations within the Muni/Western service areas. Unlike the Project, it may not be achievable or sustainable. Muni, as a wholesaler of SWP water, does not have the authority to mandate conservation measures or change consumer water rate structures. Some of the Project's direct impacts would be avoided, although additional ones would occur. In summary, this alternative would result in:

- Avoidance of all direct construction-related impacts associated with the Project.
- Adverse impacts to surface water quality associated with reduced effluent flows from wastewater treatment facilities and attendant increased salt concentrations. Impacts would be greater than for the Project.

- Adverse impacts to groundwater quality from percolation of degraded surface water. Impacts would be greater than for the Project.
- Adverse impacts to biological resources resulting from increased pollutant concentrations due to less water being discharged from wastewater treatment plants. Impacts would be greater than for the Project.
- Less beneficial impacts related to liquefaction potential compared to the Project.
- Indirect impacts associated with growth inducement would be similar to those of the Project.

5.3.4 Alternative 3 – New Imported Water Supply

The development of new imported water sources, the acquisition of existing water sources followed by the transfer of that water for use in the Muni/Western service areas, or a combination of both approaches, is considered a feasible alternative to the Project.

5.3.4.1 Possible New Imported Water Sources

Two options for new imported water sources are considered: (1) additional SWP Table A Amount; and (2) seawater desalination.

Additional SWP Table A Amount

Muni/Western could acquire additional SWP Table A Amount, with an appropriate discounting of those contractual rights to account for the reliability of SWP deliveries (average delivery is approximately 70 percent of Table A Amount) (DWR 2002). This would require Muni/Western to acquire approximately 15,700 to 38,600 af of additional Table A Amount.

Muni/Western could seek to acquire a larger amount of SWP contract rights or rights to other water supplies (on a willing seller, willing buyer basis) than they currently hold. This additional water supply could be obtained through the acquisition of: (1) rights from other contractors for annual delivery, or (2) surplus or turn-back pool water supplies that are available in "wet" years. This alternative would use a larger proportion of the SWP facilities and capacities and may require modifications to Muni/Western facilities.

These additional imported water supplies have not been explicitly identified, but it is anticipated that they would be derived from (past or future) changes in agricultural practices in the Central Valley or Delta regions.

Seawater Desalination

This option would include two major components:

(1) The development or contribution to a seawater desalination facility and associated facilities (e.g., brine disposal facility); and

(2) The exchange of an amount of desalted water for SWP water. A likely partner in such an arrangement would be Metropolitan.

The development of (or participation in) a new water supply using a seawater desalination technique, while costly, is the primary new supply being investigated by other wholesale and retail water agencies in Southern California. Since the Project would supply between about 11,000 afy and 27,000 afy, it would be most efficient for Muni/Western to join with other water purveyors in the development of a coastal desalination facility and receive water from the SWP supplies of other participants via exchange(s) rather than receive direct delivery of desalted water. Under this option, only those facilities needed to convey water within the Muni/Western service area would be required. This would avoid the cost, institutional issues, and environmental consequences of attempting to convey desalinated ocean water directly to the Muni/Western service areas.

Seawater desalination is an alternative that is technically viable. However, production and treatment costs have historically been several times higher than those of SWP costs and conventional treatment. In 1998, DWR (1998c) reported costs in the range of $1,200 to over $2,000 per af ($3.67 to $6.13 per 1,000 gallons). However, during the 1990s, the cost of desalination decreased substantially, primarily because of the improved efficiency of the membrane technology. During that decade, the cost of desalinating seawater decreased from approximately $2,000 per af to less than $1,000 per af (California Coastal Commission 2003a). These costs generally do not include the cost of conveyance and storage. As an example, a new 25 mgd plant under construction in Tampa Bay, Florida, will produce desalinated water at $2.08 per 1000 gallons ($678 per af) (AMTA 2002). However, the Florida plant is co-located with a power plant, thus making the cost of power and brine disposal unrepresentative of this alternative. In California, the City of Carlsbad authorized the sponsor of the Tampa Bay project to conduct a feasibility study for a 56,000 af (50 mgd) plant. That report estimated a current cost of $794 per af ($2.45 per 1000 gallons) (personal communication, J. Lirarkos 2002). This cost does not include potential conveyance or additional treatment cost.

Under this alternative, Muni/Western would co-sponsor with other agencies a seawater desalting facility in exchange for SWP supplies equaling the estimated long-term average capture from the SAR. The water generated at such a facility would be supplied to nearby users. A similar amount of SWP supplies would be transferred to Muni/Western from the water purveyor in the coastal community in exchange for the water produced from the desalination plant. The most likely possibility for a SWP exchange is with Metropolitan, which has a large SWP Table A Amount and an active desalination program.

Depending on the extent of ancillary facilities included at the site, an area of 2 to 5 acres could be required. In addition to the desalination plant, the coastal facility would likely include new electrical power conveyance and control equipment, ocean water intake and salty-brine disposal structures, and a treatment water pumping plant.

5.3.4.2 Direct Impacts

Direct impacts from Project construction and operations would be avoided. Use of increased Table A Amount would not have adverse environmental impacts on the Delta because the water that would be transferred to Muni/Western would already have been allocated to another SWP Contractor. Thus, no new impacts would occur. Impacts could occur in the seller's service area, but the type of impacts would depend on the specific characteristics of that service area. Since a seller has not been identified, the location and nature of the impacts would be speculative. Thus, the analysis below addresses impacts that would occur in the Muni/Western service area from receiving additional SWP water and impacts from construction and operation of a coastal desalination plant. Although a specific site for a desalination plant has not been identified, it is assumed that it would be located along the California coast in the service area of Metropolitan. Sufficient information is available to make a generalized assessment of impacts that could occur given these assumptions.

Surface Water Hydrology and Water Quality

Use of additional Table A Amount would not adversely affect surface water hydrology or water quality, although modification of Muni/Western facilities could result in erosional impacts. Construction of the seawater desalination facility and pipelines necessary to connect to the regional water system would result in land disturbance, which could affect runoff from the site. Depending on the location and methods used, construction of the desalination facility could increase erosion, which could impact the water quality of adjacent drainage courses located in the coastal zone. Impacts could be significant but mitigable.

Groundwater Hydrology and Water Quality

This alternative would not affect groundwater hydrology or water quality. Groundwater storage would remain as described under the existing conditions.

Biological Resources

Use of additional Table A Amount would not adversely affect biological resources, although modification of Muni/Western facilities could result in impacts to wildlife and vegetation. Construction of a desalination plant could result in disturbance to sensitive terrestrial and riparian species and habitats found in coastal environments, such as the California gnatcatcher, least Bell's vireo, and raptors. However, it is assumed that the desalination plant would be sited to avoid sensitive biological areas and that impacts would be less than significant or mitigable to less than significant.

Marine resources in the vicinity of a desalination plant could be affected by: (1) the characteristics of the concentrate discharge; (2) the concentrate discharge method used; and (3) the process of feedwater intake. All desalination plants use chemicals and compounds to clean the desalting equipment, e.g., chlorine, ozone, biocides, and acids. Most of these chemicals are neutralized or removed from the brine stream before being discharged, but some minor amounts could remain in the brine stream. The California Coastal Commission estimates that brine discharge from desalination plants can have salinity twice that of seawater (California Coastal Commission 2003b). However, studies have shown that this salty water blends quickly and thus the highly saline discharge area is small and localized (City of Huntington Beach 2002). Fish are mobile and can generally avoid highly saline areas. Benthic communities, which are not mobile, would change in composition to more salt tolerant species, resulting in lower species diversity in the immediate vicinity of the discharge. Planktonic species also have limited mobility and are killed by the salinity, turbulence, and temperature of desalination brine discharge. The Draft EIR for the City of Huntington Beach Desalination Project (City of Huntington Beach 2002) found that brine stream discharge would be small, localized, and have less than significant impacts to marine biological resources. Moreover, discharges to the ocean would be subject to review and permitting by the applicable Regional Water Quality Control Board.

Intake of water to the desalination plant can impinge or entrain marine organisms. The degree of entrainment at a facility is primarily a function of the amount of water used and the location of the intake. Without mitigation, the rate of mortality due to entrainment is considered to be 100 percent (California Coastal Commission 2003b). There are methods to avoid impingement, such as screens, velocity caps, and subsurface intakes but studies demonstrate that even screens and velocity caps cannot eliminate entrainment (California Coastal Commission 2003b). However, properly designed subsurface intakes, such as beach wells or infiltration galleries, that are buried below the water column and use the overlying substrate as a natural filter are likely to minimize or completely eliminate impingement and entrainment impacts although the feasibility of this type of intake depends on having an appropriate substrate that provides the necessary permeability (California Coastal Commission 2003b).

Based on examples and analyses for proposed desalination plants in coastal California, many of these impacts to biological resources may be significant, although impacts and their significance can vary by geographic location and the configuration of facilities. The potential for impacts to biological resources is currently the subject of considerable controversy.

Geology, Soils, and Mineral Resources

Increased use of SWP water would require some modification to the Muni/Western infrastructure, however, the extent of construction, and thus the extent of impacts related to geology, soils, and minerals cannot be accurately determined.

Depending on the location and methods used, construction of a seawater desalination facility could impact overlying or adjacent geological and soil resources located in the coastal zone. However, siting, engineering, and design criteria would consider such issues, and it is assumed that these impacts could be avoided or reduced to less than significant. Direct impacts would be less than significant or mitigable to less than significant.

Groundwater levels in the pressure zone of the SBBA would remain as described under the existing conditions, and the risk of liquefaction would remain high.

Land Use and Planning

Some modifications to the Muni/Western infrastructure could be required if additional SWP water were used. This would not, however, result in land use changes.

Potential impacts to land use and consistency with land use policies from the desalination option would depend on the location of the new desalination plant and the pipelines needed to connect the plant to the local water supply system and dispose of concentrate discharge. Given the nature of a desalination facility, it is likely to be sited in an area zoned for industrial uses and would, therefore, not conflict with non-industrial uses.

Agricultural Resources

This alternative could require modification of Muni/Western facilities if additional SWP is used. Should these modifications occur in agricultural areas, it is likely that impacts to agricultural resources would be associated with short-term disruptions of agricultural activities.

Depending on the location selected and the existing surrounding land uses of the seawater desalination facility, construction of this facility could impact agricultural resources. To the extent possible, facility sites would be located to avoid active agricultural areas and the amount of land required would be comparatively small. Impacts would likely be less than significant.

Recreational Resources

This alternative could require modification of Muni/Western facilities if additional SWP water is used, however, impacts likely would be short term. Depending on the site selected for the desalination plant, coastal recreation and access could be restricted, and impacts could be significant. They could be mitigated to less than significant through the implementation of measures such as selecting sites that are not used for recreational purposes and providing public access where appropriate.

Air Quality

This alternative could require modification of Muni/Western facilities if additional SWP water is used. However the extent of construction, and thus extent of air quality impacts, would be less than significant. Providing additional Table A Amount SWP water to the Muni/Western service area could require additional pumping, which would increase the use of electrical power to operate SWP water pumps. The air quality impacts associated with the generation of this power would depend upon the specific source of the electrical generation. For example, air emissions due to power generation could range from almost zero to some finite amount, depending on whether the generation source was hydroelectric or fossil fuel-fired. Any existing fossil fuel-fired power plant that provides electricity would have to comply with all ambient air quality standards and applicable air permit conditions, such as emission offsets. Therefore, air quality impacts due to the generation of electrical power for this alternative would be less than significant. The SWP pumping plants are powered by electricity and their operation creates minimal air emissions. Therefore, implementation of this alternative would have a less than significant impact to air quality as a result of increased pumping at these plants.

Section 30253(3) of the Coastal Act requires that new development be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board. In general, air emissions from a reverse osmosis desalination plant consist only of discharges of a degassifier. The production of energy for use in the desalination plant, however, would increase air emissions and could result in a significant impact to air quality. In addition, temporary air emissions would result from construction-related activities.

Cultural Resources

Construction and modification of facilities associated with imported water have the potential to impact historic structures, archaeological resources, paleontological resources, and/or human remains. The level of impact would depend on the proximity of the proposed construction elements to any cultural resource.

Construction of a seawater desalination facility would result in ground disturbance that, depending on location, has the potential to impact historic structures, archaeological resources, paleontological resources, and/or human remains. A cultural resource records search would be required prior to any ground disturbance. A Phase I survey may be required for any staging area or areas where ground disturbance is planned. Impacts could be significant; however, incorporation of standard mitigation measures would reduce the level of impacts.

Noise

This alternative could require modification of Muni/Western facilities if additional SWP water is used. The significance of impacts would depend on the proximity of noise sensitive receptors.

Noise impacts would occur during site preparation and construction of the desalination plant and would result primarily from the use of construction equipment. However, incorporation of standard mitigation measures would reduce the severity of impacts and the plant may not be sited close to noise-sensitive receptors. Noise generation at the desalination plant during operations would primarily be associated with pumps and an emergency generator.

Aesthetics

This alternative could require modification of Muni/Western facilities if additional SWP water is used. Impacts would likely be less than significant.

Construction of a desalination facility on 2 to 5 acres of land could impact aesthetic/visual resources. It is likely that the facility would be located in an appropriately zoned industrial area; however, depending on the location selected for the desalination facilities, these impacts could be significant.

Hazardous Materials

Hazardous materials spills could occur due to use of heavy equipment during facility construction, and subsurface contamination could be encountered during Project excavations.

The primary risk of upset for a desalination facility relates to the possible release of hazardous chemicals to the air, land, or water. The chemicals of potential concern, based on their hazardous nature and/or quantity involved, include chlorine, caustic soda (sodium hydroxide), acid, dechlorination chemicals, and carbon dioxide. An accidental release of chemicals from a desalination facility could have adverse effects on plant personnel, the general public, and terrestrial and aquatic life, depending on the location of the facility.

Public Services, Utilities, and Transportation

Increased use of SWP water would not have a direct impact on public services, utilities, or transportation, although construction activities could have a temporary disruption to transportation. The significance of this impact would depend on the location and duration of construction but, even if found to be significant, would be mitigable to less than significant through standard traffic management practices. Increased electrical power would be required for pumping additional SWP water, although it is anticipated that new sources of power would not be required.

The primary impacts on public services and utilities from operation of a desalination facility would be associated with waste disposal (depending on the method selected for concentrate [filter media] disposal). Electrical power would be required for operation of the desalination plant and pumps needed to convey the water and its generation is expected to have a less than significant impact, assuming use of existing power generation facilities.

Construction and operation of a desalination facility may result in increased traffic associated with the transportation of materials, equipment, and employees to and from the site. Existing traffic levels on surrounding freeways and roads leading to the facility would determine the level of impact on transportation. These impacts likely would be less than significant, however, since trips would be periodic and limited in number.

5.3.4.3 Indirect Impacts

The additional water supply made available through this alternative would induce growth within the Muni/Western service areas.

5.3.4.4 Comparison with the Project

This alternative would provide a similar amount of water to the Project. However, in the case of the desalination plant, it would be necessary for Muni/Western to negotiate agreements with other agencies whereby imported SWP water would be exchanged in lieu of water derived directly from the desalination plant. This would not meet the Project objectives of increasing water supply reliability by reducing Muni/Western's dependence on imported water and delivering local, high quality water instead of imported supplies. Some environmental impacts would be similar to those of the Project, and others would differ, as noted below. In summary, this alternative would result in:

- Avoidance of all direct (construction- and operation-related) impacts associated with the Project, including beneficial impacts. But construction impacts at a coastal construction site and within the Muni/Western distribution system would occur.
- Less impacts related to the following resources since the extent of construction would be less than under the Project: surface water hydrology and water quality; biological resources in the Project area; and geology, soil, and mineral resources.
- Potential impacts to marine biological resources from operation of the desalination plant; the Project would have no impact on marine biology.
- Potentially similar impacts to land use and agricultural resources, although this would depend on the location of the desalination plant.
- Potentially greater impacts to recreational resources although this would depend on the location of the desalination plant.

- Greater air quality impacts during operations than those associated with the Project.
- Potentially similar impacts to cultural resources, although this would depend on the location of construction sites.
- More construction-related noise impacts, although they would depend on the proximity of noise sensitive receptors. Noise impacts during operation would be similar to those of the Project.
- Potentially greater impacts to aesthetic resources from desalination plant construction activities.
- Greater impacts to hazardous materials.
- Similar impacts related to public services, however, greater impacts related to utilities, and transportation.
- Indirect impacts associated with growth inducement would be similar to those of the Project.

5.4 COMPARISON OF ALTERNATIVES

It is possible that the feasible alternatives assessed here could be implemented, in some shape or form, simultaneously. They are complementary to a degree and each has the potential of providing additional water to meet future regional demands for water.

Table 5.4-1 compares the direct and indirect environmental impacts of each of the alternatives carried forward for detailed analysis with those of the Project. The No Project Alternative would avoid the direct impacts of the Project and would not add new impacts, but it also would not result in the same benefits as the Project. It would delay or reduce the significant indirect (growth-related) impacts of the Project in the Muni/Western service area, but these impacts could occur in other areas where projected growth could be redirected. This alternative would not augment water supply reliability, not deliver additional local, high quality water instead of imported supplies, nor improve operational flexibility, and therefore would not meet the Project objectives. Thus, it is eliminated from consideration as the environmentally superior alternative.

Alternative 1, the New Local Water Supplies Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's growth-related impacts. It would result in similar direct impacts to several environmental resources because new treatment and conveyance facilities would have to be constructed from the water sources to the existing water distribution system. Use of a regional water recycling system would result in a degradation of surface water quality in the SAR downstream of regional WWTPs, a greater reduction in SAR flows, and a greater decrease in regional groundwater levels. Impacts to air quality from the brackish water desalination and recycled water program would also be greater than under the Project. Impacts to aesthetics, hazards, utilities, and transportation would also be greater than under the Project.

Because several of the direct impacts of the New Local Water Supplies Alternative would be greater than those of the Project, this alternative is not considered environmentally superior. This alternative also would not meet all Project objectives.

Table 5.4-1. Impacts of Alternatives Compared to Those of the Project

Resource Area	*No Project*	*Alternative 1 – New Local Water Supplies*	*Alternative 2 – Enhanced Conservation*	*Alternative 3 – New Imported Water Supply*
DIRECT IMPACTS				
Surface Water Hydrology and Water Quality	–	= (construction) + (recycling)	+	–
Groundwater Hydrology and Water Quality	–	= (construction) + (recycling)	+	–
Biological Resources	–	– (construction) = (operations)	+	+
Geology, Soils, and Mineral Resources	–	=	–	–
Land Use and Planning	–	=	–	=
Agricultural Resources	–	=	–	=
Recreational Resources	–	=	–	+
Air Quality	–	+ (desalination) + (recycling) – (groundwater extraction)	–	+
Cultural and Paleontological Resources	–	–	–	=
Noise	–	+ (construction) = (operations)	–	=
Aesthetics	–	+	–	+
Hazardous Materials and Groundwater Contamination	–	+	–	+
Public Services, Utilities, and Transportation	–	= (public services) + (utilities & services) + (transportation)	–	= (public services) + (utilities & services) + (transportation)
INDIRECT IMPACTS				
	–	=	=	=

Notes:
+ Impacts of Alternative greater than impacts of Project.
= Impacts of Alternative equal to impacts of Project.
– Impacts of Alternative less than impacts of Project.

Alternative 2, the Enhanced Conservation Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's growth-related impacts. It would result in less direct impacts to all environmental resources since it would not require new construction of conveyance facilities and would not reduce flows in the SAR. Implementation of sufficient conservation measures to permanently decrease regional demand equal to the additional supply provided by the Project would have substantial institutional resistance and therefore may not be achievable and sustainable. Because the direct impacts of the Enhanced Conservation Alternative would be substantially less than the Project, it is considered environmentally superior, but it does not meet all Project objectives since it would not meet the objective of delivering additional local, high quality water instead of imported supplies, and would not improve operational flexibility because it does not expand the number of water supply sources or expand the ability to move water to different places within the Muni/Western service areas.

Alternative 3, the New Imported Water Supply Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's growth-related impacts. This alternative would result in less direct impacts in some environmental resources and more impacts in other resource areas. Overall, this alternative is not considered to be environmentally superior to the Project because of the potential for greater impacts than the Project to some environmental resources. It also would not meet the Project objectives of increasing water supply reliability by reducing Muni/Western's dependence on imported water and delivering local high-quality water in the place of imported supplies.

This page intentionally left blank.

6.0 CUMULATIVE IMPACT ANALYSIS

This chapter presents a discussion of cumulative impacts as required by CEQA Guidelines Section 15130. CEQA Guidelines Section 15355 defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental effects." CEQA Guidelines Section 15130(a)(1) provides that a "cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. An EIR should not discuss impacts which do not result in part from the project evaluated in the EIR." CEQA Guidelines Section 15130(b)(1) identifies two methods for discussing significant cumulative impacts in an EIR, "either (A) a list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or (B) a summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area-wide conditions contributing to the cumulative impact." The analysis for this Project uses the list method. The list of past, present, and probable future projects was developed through a combination of: (1) a query of the Office of Planning and Research CEQAnet database; and (2) projects known to the lead agencies (Muni and Western). The analysis identifies the combined or cumulative impacts of the Project and other projects related in time and/or location. For future conditions, the general plans of Riverside and San Bernardino counties and their associated EIRs were used.

The remainder of this chapter is divided into two sections: section 6.1 (Cumulative Impact Approach) and section 6.2 (Impacts of Cumulative Projects). Section 6.1 is organized by location (i.e., Project construction areas; Santa Ana River (SAR); and water resources in the Muni/Western service areas); it presents summaries of the direct and indirect impacts of the Project, which are described elsewhere in the EIR, and identifies the related (i.e., cumulative) projects which may affect the same geographic location. Section 6.1 outlines, for each related project, a description, CEQA status of the project, and project impacts (to the extent they are known at this time). Section 6.2 evaluates cumulative impacts for resources in a given geographic area based on the anticipated impacts of the Project combined with the probable impacts of related projects.

6.1 CUMULATIVE IMPACT APPROACH

6.1.1 Summary of Impacts of the Project

Impacts of the Project that would be either significant, or adverse but less than significant, including both direct and indirect impacts, have been identified in Chapters 3 (Environmental Setting, Project Impacts, and Mitigation Measures) and 4 (Growth-Inducing Impacts and Growth-Related Impacts) and are summarized in Table 6.1-1 by geographic area. These impacts are the basis for the subsequent cumulative impact analysis.

6.1.2 Related Projects

A number of plans, programs, and actions pertaining to water rights, water resources of the SAR, and water resources of the Muni/Western service areas could have similar impacts and

Table 6.1-1. Project Impacts by Geographic Area

Resource Area	*Seven Oaks Dam & Reservoir Construction Area*	*Santa Ana River Construction Area*	*Devil Canyon Construction Area*	*Lytle Creek Construction Area*	*Santa Ana River*	*SBBA*	*Muni/Western Service Areas*
Surface Water Hydrology and Water Quality	D	D	D	D	D		I
Groundwater Hydrology and Water Quality		D	D	D		D	I
Biological Resources	D	D	D	D	D		I
Geology, Soils, and Mineral Resources	D	D	D	D		D	I
Land Use and Planning						D	I
Agricultural Resources		D					I
Recreational Resources							I
Air Quality	D	D	D	D			I
Cultural and Paleontological Resources	D	D	D	D			I
Noise	D	D	D	D			I
Aesthetics	D	D	D	D	D		I
Hazardous Materials and Groundwater Contamination	D	D	D	D		D	I
Public Services, Utilities, and Transportation	D	D	D	D		D	I

Notes:

"D" = a given resource could be subject to a *direct* effect in a given geographic area if the Project were constructed and implemented.

"I" = a given resource could be subject to an *indirect* effect in a given geographic area if the Project were constructed and implemented.

affect similar geographic areas as the Project. A description of these plans, programs, and actions is provided below to provide background information. Figure 6.1-1 illustrates the general location of these projects. The relationship of the related projects, their environmental effects that may interact with impacts of the Project, and the geographic areas where impacts could occur are summarized in Table 6.1-2.

6.1.2.1 Proposed Land Management and Habitat Conservation Plan for the Upper Santa Ana River Wash (Wash Plan)

In 1993, representatives of numerous public and private entities representing water, mining, flood control, wildlife, and municipal interests formed a Wash Committee to address local mining issues in the SAR Wash. The Wash Committee was subsequently expanded to address all the land functions in the Wash Planning Area. Participants include elected officials from San Bernardino County and the cities of Highland and Redlands, the Conservation District, and BLM. The Wash Committee, in conjunction with the USFWS, CDFG, mining interests, and flood control interests have proposed a Land Management and Habitat Conservation Plan (Wash Plan) designed to address land use, mineral resource extraction, recreational, and habitat conservation concerns on the alluvial fan and flood plain of the SAR downstream of Seven Oaks Dam. The area covered by the Wash Plan is 4,330 acres; it starts at the SAR Canyon mouth at Greenspot Road, extends 6 miles downstream to Alabama Street in the City of Redlands, and is up to 2 miles wide.

The Wash Plan is intended to coordinate and accommodate existing and future activities anticipated to occur in the Wash Plan Area, such as

- Water conservation;
- Flood control;
- Extraction and processing of aggregate mineral resources;
- Protection and conservation of sensitive and listed native species and habitat; and
- Recreation planning, including a portion of the SAR trail system.

Anticipated Impacts

As illustrated in Table 6.1-2, the Wash Plan and the Project would both affect the SAR Construction Area and the SBBA.

As described in the Notice of Preparation/Notice of Intent dated April 22, 2004, the Wash Plan includes activities that involve ground disturbance such as development of recharge basins and sand and gravel mining. This ground disturbance could have impacts to biological, geological, air quality, cultural, noise, and aesthetic resources. Because the Wash Plan also involves alteration in the geographic distribution of land uses, it could have associated land use impacts, alter traffic distribution, and alter ambient noise conditions in the SAR Wash. The Wash Plan also involves increased artificial groundwater recharge in the SAR Wash, which could have both beneficial and harmful impacts to groundwater contaminant and groundwater plumes in the SBBA. To support the change in land uses, the Wash Plan also proposes the expansion and alteration of existing roadways, including Greenspot Road.

Table 6.1-2. Summary of Resources and Geographic Areas Affected by Both the Project and Related Projects

	GEOGRAPHIC AREA						
Resource Area	*Seven Oaks Dam & Reservoir Construction Area*	*SAR Construction Area*	*Devil Canyon Construction Area*	*Lytle Creek Construction Area*	*Santa Ana River*	*SBBA*	*Muni/Western Service Areas*
Surface Water Hydrology & Water Quality	▪ Project	▪ Project ▪ Wash Plan ▪ Master Plan ▪ EBX ▪ BO	▪ Project	▪ Project	▪ Project ▪ BO ▪ Conservation District Application ▪ Riverside Application ▪ Chino Application ▪ OCWD Application ▪ RIX Water Recycling ▪ Pilot Dewatering	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX
Groundwater Hydrology & Water Quality	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX	▪ Project	▪ Project	The Project would not impact this resource in this geographic area.	▪ Project ▪ Wash Plan ▪ Master Plan ▪ Restoration Project ▪ Conservation District Application ▪ Pilot Dewatering ▪ Riverside-Corona Feeder ▪ North/South Lake ▪ RIX Water Recycling	▪ Project ▪ Master Plan ▪ EBX ▪ Riverside-Corona Feeder
Biological Resources	▪ Project ▪ BO	▪ Project ▪ Wash Plan ▪ Master Plan ▪ EBX ▪ BO ▪ Restoration Project	▪ Project	▪ Project	▪ Project ▪ BO ▪ Conservation District Application ▪ Riverside Application ▪ Chino Application ▪ OCWD Application ▪ RIX Water Recycling	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX

Table 6.1-2. Summary of Resources and Geographic Areas Affected by Both the Project and Related Projects

	GEOGRAPHIC AREA						
Resource Area	*Seven Oaks Dam & Reservoir Construction Area*	*SAR Construction Area*	*Devil Canyon Construction Area*	*Lytle Creek Construction Area*	*Santa Ana River*	*SBBA*	*Muni/Western Service Areas*
Geology, Soils, & Mineral Resources	▪ Project	▪ Project ▪ Wash Plan ▪ Master Plan ▪ EBX ▪ Inland Feeder ▪ Restoration Project ▪ BO ▪ Conservation District Application	▪ Project ▪ Inland Feeder	▪ Project	The Project would not impact this resource in this geographic area.	▪ Project ▪ Wash Plan ▪ Master Plan ▪ Restoration Project ▪ Conservation District Application ▪ Pilot Dewatering ▪ Riverside-Corona Feeder ▪ North/South Lake	▪ Project ▪ Master Plan ▪ EBX
Land Use & Planning	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area	The Project would not impact this resource in this geographic area.	▪ Project ▪ Wash Plan ▪ Master Plan ▪ Restoration Project ▪ Conservation District Application ▪ Pilot Dewatering ▪ Riverside-Corona Feeder ▪ North/South Lake	▪ Project ▪ Master Plan ▪ EBX
Agricultural Resources	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX ▪ RIX Water Recycling
Recreational Resources	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX

Table 6.1-2. Summary of Resources and Geographic Areas Affected by Both the Project and Related Projects

	GEOGRAPHIC AREA						
Resource Area	*Seven Oaks Dam & Reservoir Construction Area*	*SAR Construction Area*	*Devil Canyon Construction Area*	*Lytle Creek Construction Area*	*Santa Ana River*	*SBBA*	*Muni/Western Service Areas*
Air Quality	▪ Project	▪ Project ▪ Wash Plan ▪ EBX ▪ Restoration Project ▪ BO	▪ Project	▪ Project	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX
Cultural & Paleontological Resources	▪ Project	▪ Project ▪ Wash Plan ▪ Mast Plan ▪ EBX ▪ Restoration Project ▪ BO	▪ Project	▪ Project	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX
Noise	▪ Project	▪ Project ▪ Wash Plan ▪ EBX ▪ Restoration Project ▪ BO	▪ Project	▪ Project	The Project would not impact this resource in this geographic area.	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX
Aesthetics	▪ Project	▪ Project ▪ Wash Plan ▪ EBX ▪ Restoration Project	▪ Project	▪ Project	▪ Project ▪ BO ▪ Conservation District Application ▪ Riverside Application ▪ Chino Application ▪ OCWD Application ▪ RIX Water Recycling ▪ Pilot Dewatering	The Project would not impact this resource in this geographic area.	▪ Project ▪ Master Plan ▪ EBX

Table 6.1-2. Summary of Resources and Geographic Areas Affected by Both the Project and Related Projects

	GEOGRAPHIC AREA						
Resource Area	*Seven Oaks Dam & Reservoir Construction Area*	*SAR Construction Area*	*Devil Canyon Construction Area*	*Lytle Creek Construction Area*	*Santa Ana River*	*SBBA*	*Muni/Western Service Areas*
Hazardous Materials & Groundwater Contamination	▪ Project	▪ Project ▪ Wash Plan ▪ Master Plan ▪ EBX	▪ Project	▪ Project	The Project would not impact this resource in this geographic area.	▪ Project ▪ Wash Plan ▪ Master Plan ▪ Restoration Project ▪ Conservation District Application ▪ Pilot Dewatering ▪ Riverside-Cornoa Feeder ▪ North/South Lake	▪ Project ▪ Master Plan ▪ EBX
Public Services, Utilities, & Transportation	▪ Project	▪ Project ▪ Wash Plan ▪ EBX ▪ Restoration Project	▪ Project	▪ Project	The Project would not impact this resource in this geographic area.	▪ Project ▪ Wash Plan ▪ Master Plan ▪ Restoration Project ▪ Conservation District Application ▪ Pilot Dewatering ▪ Riverside-Corona Feeder ▪ North/South Lake	▪ Project ▪ Master Plan ▪ EBX

Notes:
Project names used in this table are abbreviations. Full names (with the abbreviations) are provided in the subsection headings in the main body of the chapter.

6.1.2.2 San Bernardino Valley Municipal Water District Regional Water Facilities Master Plan (Master Plan)

The Project is one element within Muni's Regional Water Facilities Master Plan. Proposed improvements contained in the Master Plan would be constructed over an indefinite period of time and include approximately 139,000 feet of pipelines ranging in size from 16 to 96 inches in diameter, nine pump stations with capacities of 10 to 100 cfs, three reservoirs ranging in size from 5 million to 100 million gallons, and implementation of a groundwater management program. The overall purpose of the Muni Master Plan is to:

- Respond to anticipated changes in demands for surface water, groundwater, and groundwater pumping;
- Move groundwater from the SBBA to Muni's western service area;
- Move groundwater from the SBBA south to the areas of Colton and Reche Canyon;
- Move groundwater and SWP supplies to the eastern extent of Muni's service area; and
- Pump SBBA groundwater into the SWP California Aqueduct.

While the Master Plan includes many elements, there are specific facilities proposed in the vicinity of the Project, including the Mentone Feeder and Pipeline, Citrus Reservoir, and Mentone Pump Station. The Final Program EIR for the Master Plan noted that these Master Plan elements need further project-specific environmental analysis (SBVMWD 2001b).

The Mentone Feeder and Pipeline as envisioned in the Master Plan is a 60 to 78-inch diameter pipeline traversing south from the Foothill Pipeline (near the intersection of Greenspot Road and Cone Camp Road) to a point south of the Seven Oaks Dam borrow pit area (near the intersection of Opal Avenue and San Bernardino Avenue) then east in Madeira Avenue and Mill Creek Road to the Yucaipa area. The pipeline would be approximately 24,000 feet long, primarily located in the SAR Wash and existing road rights-of-way. The Mentone Feeder would provide supplemental capacity to the Greenspot Pipeline for conveying SWP and SAR water to the Yucaipa area; the pipeline would also provide the link necessary to move SBBA groundwater to the Yucaipa area. Associated with the Mentone Feeder is the proposed 100 million gallon (300 af) Citrus Reservoir (also called the New Mentone Reservoir) to be located at some (as yet undefined) location in the western edge of the community of Mentone. To the east, along the Mentone Feeder alignment, the Mentone Pump Station as proposed. This pump station, as proposed, would be 8,300 horsepower and have a pumping rate of 90 cfs.

Since preparation of the Master Plan, the Mentone Feeder, Citrus Reservoir, and Mentone Pump Station projects have become elements of Phase II of the state Department of Water Resources (DWR) East Branch Extension Project (EBX) (see section 6.1.2.3).

Anticipated Impacts

As shown in Table 6.1-2, both the Project and other Master Plan elements could affect the SAR Construction Area, the SBBA, and the Muni/Western service areas.

Those Master Plan elements in the vicinity of the Project, Mentone Feeder and Pipeline, Mentone Pump Station, and Citrus Reservoir could have specific impacts related to

- Potential conversion of important farmland;
- Impacts to nesting birds;
- Impacts to natural communities during construction;
- Impacts to species active at night or species vulnerable to predation at night;
- Impacts to burrowing owl;
- Loss of state and federal jurisdictional wetlands;
- Impacts to sensitive plants;
- Impacts to California gnatcatcher;
- Impacts to the San Bernardino kangaroo rat;
- Stormwater discharge of debris and sediment;
- Impacts related to the construction and placement of structures in areas subject to seismic shaking, landslides, subsidence, and liquefaction; and
- Potential for construction on contaminated sites (SBVMWD 2001b).

Implementation of the Master Plan would enhance water supply and thereby remove an obstacle to growth in the Muni/Western service areas.

6.1.2.3 East Branch Extension (EBX) Project Phase II

The EBX is a SWP project administered by DWR designed to serve the eastern portion of the Muni service area and the San Gorgonio Pass Water Agency. The project is proposed in two phases. Phase I includes facilities necessary to deliver water from the SWP Devil Canyon Powerplant Afterbays to the communities of Yucaipa and Cherry Valley. Environmental documentation for Phase I was completed in 1998, and Phase I facilities have been completed (DWR 1998a and 1998b). Phase I of the EBX uses 13.5 miles of new pipeline originating at Crafton Hills trending east and south to Yucaipa and finally Cherry Valley. Supplementing the new pipelines are two new pump stations, expansion of the Greenspot Pump Station, and a new 10-af reservoir. The project also uses 19 miles of existing Muni pipelines (DWR 1998a and 1998b).

Phase II of the EBX project would increase capacity to move water from the Devil Canyon Afterbays to Yucaipa and Cherry Valley. Phase II could include a new pipeline originating at the Muni Foothill Pipeline, traversing south across the SAR alluvial fan, then east to connect to Phase I facilities in Crafton Hills. These pipelines would be similar to the Mentone Feeder and Pipeline proposed in the Muni Water Facilities Master Plan (see section 6.1.2.2)

Anticipated Impacts

As shown in Table 6.1-2, both the Project and future EBX construction could affect the SAR Construction Area and the Muni/Western service areas.

Environmental documentation for Phase I was completed in 1998, but additional analysis is required prior to approval and construction of Phase II. The EBX Phase I EIR and its supplement indicated both short- and long-term impacts. Short-term impacts would be related to construction and would include aesthetics, air quality, erosion, release of toxic materials from construction equipment, noise, and traffic. Construction could also have impacts related to biological resources, including the rufous-crowned sparrow, California gnatcatcher, Cooper's hawk, burrowing owl, golden eagle, San Diego horned-lizard, orange-throated whiptail, western spade foot toad, loggerhead shrike, mariposa lily, the Santa Ana River woolly-star, Slender-horned spineflower, and disturbance of approximately 12 acres of Riversidean alluvial fan sage scrub (RAFSS), 33 acres of Riversidean sage scrub (RSS), and 70 acres of chaparral. Construction could also result in destruction or modification of cultural resources. Operational impacts would include long-term aesthetic changes due to the presence of visible water structures. Geological impacts that were identified related to placement of structures in an area prone to subsidence, liquefaction, seismic shaking, and the potential for pipeline or reservoir failure leading to surface water flooding. EBX operations would enhance water supply and thereby remove an obstacle to growth in the Southern California area, including the Muni/Western service areas.

6.1.2.4 The Metropolitan Water District of Southern California Inland Feeder (Inland Feeder)

The Inland Feeder will be comprised of 44 miles of large diameter pipeline and tunnels from the SWP Devil Canyon Afterbays at the base of the San Bernardino Mountains to the Colorado River Aqueduct in the community of San Jacinto, Riverside County. One of the primary purposes of the project is to allow Metropolitan to move water into reservoirs, such as Diamond Valley Lake, during periods when water is plentiful, for general water supply and as a reserve in the event of an emergency or prolonged drought. Portions of the Inland Feeder south of the SAR became operational in late 2002. A connection between the Inland Feeder and Muni's Foothill Pipeline (near Cone Camp Road in the SAR Wash) allows Metropolitan to make SWP deliveries into Diamond Valley Lake while the remaining portions of the Inland Feeder are completed.

Currently, the remaining portions of the Inland Feeder north of the SAR are under active construction. In May 2002 construction began on the `Highland' portion of the pipeline, so called due to its location in the City of Highland. This segment of the pipeline originates from the intertie with Muni's Foothill Pipeline in the SAR Wash, traverses west and northwest before entering the City Creek Channel, where it will connect to tunnels under the San Bernardino National Forest. Completion of the Highland segment is expected to be complete in October 2004; it is anticipated that the entire Inland Feeder will be operational in 2007.

Anticipated Impacts

Both the Project and Metropolitan Inland Feeder involve construction and operation of water infrastructure in the SAR Construction Area and Devil Canyon Construction Area (see Table 6.1-2). However, within these areas construction of the Inland Feeder has been completed and therefore the construction-related impacts of the Inland Feeder are included in the Project baseline.

Operational impacts of the Inland Feeder are associated with geology. Geological impacts relate to placement of structures in an area prone to subsidence, liquefaction, seismic shaking, and the potential for pipeline or reservoir failure leading to surface water flooding.

6.1.2.5 Seven Oaks Dam Borrow Pit Groundwater Conservation and Habitat Restoration Project (Restoration Project)

In constructing the Seven Oaks Dam, USACE used pervious clays and soil taken from approximately 200 acres of the historic spreading basin of the Conservation District. The Conservation District and USACE are studying the feasibility of restoring the borrow pit to improve groundwater percolation and native habitat. The preliminary restoration plan calls for the development of a series of six percolation basins interspersed with restored habitat areas (SBVWCD 2003b).

In conjunction with restoration of the borrow pit, the Conservation District has also proposed modifying their diversion canal that delivers water to the borrow pit, and creating surface storage in the vicinity of the borrow pit. As described in the Integrated Water Resources Plan for the Santa Ana Watershed (SAWPA 2002a), the Conservation District intends to bifurcate their existing canal to the spreading grounds into north and south canals. The northern canal would carry water to the borrow pit and northwesterly spreading basins. The southern canal would carry water to the borrow pit and southwesterly spreading basins. The Conservation District also proposes having surface storage available for water released from Seven Oaks Dam, in the event spreading basins are under repair, storm events exceed the infiltration rate in the spreading basins, or the groundwater basin is sufficiently full but water is still being released from the dam.

Anticipated Impacts

Geographic areas that could be affected by both the Project and the Restoration Project include the SAR Project Construction Area and the SBBA.

The Restoration Project involves activities that would cause ground disturbance, including development of recharge basins and modification of the Conservation District canal. This ground disturbance could have biological, geological, air quality, cultural, noise, traffic and aesthetic impacts. The Restoration Project could result in increased recharge in the SAR wash, which could have both beneficial and harmful impacts to groundwater and groundwater contaminant plumes in the SBBA. Prior to implementation of the Restoration Project, environmental review under NEPA and CEQA will be required.

6.1.2.6 Biological Opinion for the Operation of Seven Oaks Dam (BO)

In December 2002, the USFWS issued the final version of the BO, based on Section 7 consultations with USACE, for operations of Seven Oaks Dam. The document outlines measures that must be taken to mitigate adverse impacts anticipated to special status species (SBKR, Santa Ana River woolly-star, and Slender-horned spineflower) and attributable to operation of Seven Oaks Dam. These measures were described in detail in the Biological Assessment (BA) published in August of 2000 by the USACE. They include the following:

- Development of a Memorandum of Understanding (MOU) to establish the responsibilities of appropriate stakeholders (USACE, USFWS, San Bernardino County Flood Control District, Riverside County Flood Control District, and Orange County Flood Control District). The MOU will detail duties related to development and implementation of a Multi-Species Habitat Management Plan (MSHMP), management of a series of directed studies, and funding for habitat management measures.

  Many of the stakeholders involved in the MOU currently participate in the Woolly-Star Preserve Area (WSPA) Steering Committee. This steering committee oversees the management of the 764-acre WSPA that was established as part of mitigation for the construction of Seven Oaks Dam. It is anticipated that membership of the existing WSPA Steering Committee will be expanded and duties augmented to include decision-making for the MSHMP on a semi-annual basis.

- Development of a MSHMP that will detail the habitat management measures, as well as the decision-making process, for implementing management measures or changes in design. The MSHMP will be adaptive and allow flexibility to institute changes in study designs and/or implementation of habitat management measures based on experimental studies, monitoring results, and the decisions of the Steering Committee. The Plan will be developed by the USACE and the local sponsors, in coordination with resource agencies (including the USFWS and CDFG) and technical experts.

- Directed studies of population trends and habitat relationships, threats to the species, and life requirements.

- Experimental studies of the effectiveness of different habitat management techniques. The purpose of the studies will be to test the effectiveness of hydraulic renewal and on-ground techniques to slow habitat succession resulting from a lack of fluvial processes. Various techniques will be applied to degraded habitat areas, with pre- and post-monitoring and surveys to document changes in habitat and population dynamics. Hydraulic renewal experiments will include operation of Seven Oaks Dam coupled with the construction of diversion dikes to provide periodic controlled releases to flood designated areas of the WSPA, or prescribed other lands. This experiment may include two types of tests: controlled water releases only; and controlled releases with vegetation clearing (to mimic scouring). On-ground habitat renewal experiments will be accomplished using mechanical equipment to clear vegetation and spread sand and/or water. This experiment may include two types of tests: sand spreading by light equipment in cleared areas (with green waste debris removed); and sand placed in piles and dispersed using water from a water truck. These experimental trials and their results will be monitored.

- Implementation of habitat management in the WSPA on a larger scale than covered by the experimental treatments.
- Expansion of habitat management measures beyond current boundaries, as approved, authorized, and funded. The USACE has agreed to work with the USFWS to seek conservation or other easements from the BLM to permit habitat management measures, including flooding, on areas currently outside of the agencies' jurisdiction.

Anticipated Impacts

As illustrated in Table 6.1-2, the BO and the Project would both affect the Seven Oaks Dam and Reservoir Area, the SAR Construction Area, and the SAR.

The hydrologic modeling performed for the Project accounts for environmental habitat releases as called for in the BO. As detailed in Appendix A, it was assumed that environmental habitat releases of 1,000 cfs for 2 days would occur approximately every 5 years. All estimates of unappropriated water and all evaluations of hydrologic changes from the Project have treated these environmental habitat releases as a baseline condition.

No formal environmental impact assessment has yet been completed on the actions that could be undertaken as part of the BO, but it is anticipated that implementation of the BO could have impacts in addition to hydrologic changes related to environmental habitat releases. For example, because the BO actions include regular construction in the SAR Wash, there could be air quality impacts (temporary, but recurring), cultural resource impacts, and noise impacts (temporary, but recurring). The BO also could result in the release of large volumes of SAR water into select land parcels, which could have water quality impacts related to erosion and sedimentation in the SAR Wash and main channel. The BO also calls for water storage in Seven Oaks Dam reservoir, though does not specify the duration or frequency of such storage.

6.1.2.7 San Bernardino Valley Water Conservation District Water Right Application (Conservation District Application)

The Conservation District filed an application with the SWRCB, Division of Water Rights, for a water right permit to divert water from the SAR and Mill Creek on November 4, 2002. The Conservation District seeks to divert water (based on its historical usage prior to 1914, riparian rights, and additional water that may be made available from the operation of Seven Oaks Dam) to underground storage.

The stated reasons for the application by the Conservation District are (a) to protect the integrity of historical practices associated with the diversion of surface waters in the SAR and Mill Creek, and (b) to assist the USFWS and other resource agencies in efforts to provide habitat preservation and enhancement of endangered species, on property that the Conservation District owns, as may be required in connection with mitigation measures imposed on the operation of Seven Oaks Dam.

The total amount of water requested in the application is 174,545 af in any year, divided into two portions: 104,545 af reflecting the Conservation District's estimate of water spread in 1922 (the year of highest groundwater spreading by the Conservation District) and 70,000 af for environmental restoration. In January 2003, the Conservation District indicated to the SWRCB its desire to modify its application by reducing the SAR portion of the application by 70,000 afy. This reduction in water diversions would effectively eliminate the second stated reason for the original application associated with habitat conservation (SBVWCD 2003b). The Draft EIR on the Santa Ana River and Mill Creek Water Right Application and Groundwater Management Plan Project (June 2004) has restated the requested permit amount at 55,464 af per year which, combined with existing Conservation District licenses, would be consistent with the Conservation District's estimate of the total maximum amount of water diverted and spread in any year since 1969 (the date of the *Western* Judgment).

The application calls for the diversion of water from the SAR at two locations below Seven Oaks Dam: Cuttle Weir and the division box or afterbay of the SCE SAR Powerhouse 2/3. Water diverted at these locations would be conveyed to the SAR spreading grounds located in, and immediately west of, the Seven Oaks Dam borrow pit, via the Conservation District Canal, River Crossing Pipeline, and North Fork Canal. Additional water from the SAR would be conveyed via both the Bear Valley Highline Canal and Greenspot Pipeline, and spread (via turnouts) in the Mill Creek Spreading Basins. Waters diverted directly from Mill Creek would be conveyed to the Mill Creek Spreading Basins.

Anticipated Impacts

It is within the discretion of the SWRCB to grant one or more new rights for waters of the SAR and it is possible that some combination of the Project and Conservation District Application could be implemented. The Conservation District and the Project would both affect the SAR and the SBBA (see Table 6.1-2).

The Conservation District Application would have biological and hydrological impacts related to variations in stream flow in the SAR, and geology impacts related to placement of water within an area prone to liquefaction and within an active fault zone area (SBVWCD 2003a). Because the project involves groundwater recharge, it also has the potential to affect groundwater and groundwater contamination plumes in the SBBA. The Conservation District will have to complete environmental review under CEQA before the SWRCB will grant any water right or license.

6.1.2.8 City of Riverside Water Right Application (Riverside Application)

The City of Riverside filed an application with the SWRCB on November 6, 2002 for the right to appropriate treated effluent from the City of Riverside regional water quality control plant, effluent which currently flows into the SAR just below Riverside Narrows (RM 45.7). The City of Riverside seeks to divert up to 75 cfs year round, up to 41,400 afy. Once diverted, the water would be used for municipal irrigation of parks, schools, golf courses, and greenbelt areas. Effluent would also be used for agricultural irrigation. The City of Riverside proposes to phase the project, with the first phase involving the installation of 35,000 feet of buried transmission pipelines. Later phases would involve 47 miles of additional pipelines, three storage tanks, and seven pump stations.

Anticipated Impacts

It is within the discretion of the SWRCB to grant one or more new rights for waters of the SAR and it is possible that some combination of the Project and City of Riverside Application could be implemented. While the construction areas of the two projects do not overlap, both projects could affect resources within the SAR. The City of Riverside will have to undertake environmental review under CEQA before the SWRCB will grant any water right or license.

6.1.2.9 Chino Basin Watermaster Water Right Application (Chino Application)

The Chino Basin Watermaster filed an application with the SWRCB on November 4, 2002 for the right to appropriate water from Deer Creek, Day Creek, Etiwanda Creek, San Sevaine Creek, Chino Creek, San Antonio Creek, and Cucamonga Creek. These creeks are tributaries to Prado reservoir and the SAR near Prado reservoir. The Chino Basin Watermaster seeks to divert up to 97,000 afy using existing channels, diversion structures, and percolation basins. The Chino Basin Watermaster also proposes to construct new recharge facilities in the upper half of the Chino Basin.

Anticipated Impacts

It is within the discretion of the SWRCB to grant one or more new rights for waters of the SAR and it is possible that some combination of the Project and Chino Application could be implemented. While the construction areas of the two projects do not overlap, both projects could affect resources within the SAR. The Chino Basin Watermaster will have to undertake environmental review under CEQA before the SWRCB will grant any water right or license.

6.1.2.10 Orange County Water District Water Right Application (OCWD Application)

OCWD submitted an application to the SWRCB in November, 1992 for the purpose of confirming existing rights to SAR water (42,000 afy baseflow plus any additional storm flows reaching Prado Dam) and establishing rights to the increased volumes of water reaching Prado Dam subject to the terms of the 1969 Stipulated Judgment (*Orange County* Judgment).

OCWD has constructed, over a number of years, facilities for capturing river water to recharge the groundwater basin. These facilities capture virtually all river flows reaching Prado Dam, except during occasional peak storm flows. They have the capacity to recharge 250,000 afy and this capacity has been almost fully used in many of the last several years. OCWD has identified several projects to increase recharge and storage capacity to accommodate projected increased river flows. It is anticipated that these new facilities will provide an additional 255,000 afy of diversion capacity.

Near-term projects that OCWD plans to implement include percolation basin cleaning devices and additional recharge facilities that would add up to 99,000 afy of additional diversion capacity directly to groundwater recharge. Long-term projects under consideration by OCWD include raising Prado Dam an additional 6 feet, constructing more recharge facilities, and providing for off-river storage reservoirs.

Anticipated Impacts

It is within the discretion of the SWRCB to grant one or more new rights for waters of the SAR and it is possible that some combination of the Project and OCWD Application could be implemented. While the construction areas of the two projects do not overlap, both projects could affect resources within the SAR.

Anticipated impacts of the OCWD Application relate to construction of spreading basins and new reservoirs as well as changes to flow in the SAR. Construction activities could affect biological resources, hydrology and water quality, could cause changes in flood flow in the lower SAR, and could cause wastewater treatment plant effluent to increase as a percentage of SAR flow. OCWD will have to complete environmental review under CEQA before the SWRCB will grant any water right or license.

6.1.2.11 RIX Facility Recycled Water Use Project (RIX Water Recycling)

The City of San Bernardino in cooperation with Western Water Company has undertaken a project to sell excess tertiary effluent from the Rapid Infiltration and Extraction (RIX) wastewater treatment facility. It is estimated that approximately 18,000 afy of tertiary effluent (relative to the approximately 44,895 afy discharge) could be sold to water users in the Southern California region (City of San Bernardino Municipal Water Department [SBMWD] 2003). This sale would decrease the discharge from the RIX facility to the SAR. The City of San Bernardino has concluded that a discharge of up to 16 million gallons a day is needed to fulfill downstream obligations created by SAR adjudication, but that the remaining portion of RIX discharge is not currently obligated to downstream uses or users and is "excess," available for sale (SBMWD 2003).

Anticipated Impacts

As shown in Table 6.1-2, both the Project and the RIX Water Recycling project could affect flows in the SAR.

A Draft EIR for the RIX Water Recycling project was released in March 2003. The EIR identified potential impacts related to aesthetics, air quality, biology (vegetation, wildlife, riparian habitat, wetland habitat), cultural resources, geology, hazards, hydrology and water quality, land uses, noise, transportation, utilities, and growth inducement (California Office of Planning and Research 2003). Anticipated impacts that may compound or increase environmental effects of the Project relate to hydrology, water quality, and biology.

6.1.2.12 Pilot Dewatering Program for the Bunker Hill Basin Area of Historic High Groundwater (Pilot Dewatering)

Within the SBBA is an area referred to as the Area of Historic High Groundwater (AHHG). Under certain conditions involving multiple consecutive years of above-average rainfall, it is possible that groundwater may rise and even come to the surface in this area. Potential problems associated with high groundwater include damage to structures and underground facilities due to flooding; increased threat of injury to persons and property during a significant seismic event due to ground liquefaction; and the potential loss of additional recharge of high quality native flows because of the lack of available capacity in the aquifer (SBVMWD 2001a).

The goal of the pilot dewatering program is to increase the depth to groundwater within the AHHG to a minimum of 30 to 50 feet from the ground surface by pumping a maximum of 25,000 afy and, thus, eliminating or reducing the potential problems associated with high groundwater (SBVMWD 2001a).

The approved action includes two elements. The first element involves pumping groundwater from 19 existing production wells in the AHHG. The water is conveyed through short segments of pipeline to the existing storm drainage system and discharged into the SAR. Under conditions when some or all of the water produced from these wells meets all applicable water quality standards (possibly through blending with higher quality water), the water is discharged into existing flood control channels that eventually discharge into the river. The second element of the program involves pumping when well water does not meet all the requirements for discharge into the SAR and sufficient high-quality blend water is not available to allow the requirements for upstream discharge to be met. Under these circumstances, the extracted water is conveyed to a point further downstream on the SAR where discharge requirements will allow the action (SBVMWD 2001a).

Anticipated Impacts

As shown in Table 6.1-2, both the Project and Pilot Dewatering activities could affect the SAR and the SBBA.

Construction activities for the Pilot Dewatering would not occur in the same areas as construction for the Project. Pilot Dewatering could beneficially affect liquefaction, but operations could cause migration of groundwater plumes in the SBBA. Discharges from Pilot Dewatering activities would enhance SAR flows.

6.1.2.13 Riverside-Corona Feeder

The Riverside-Corona Feeder, proposed by Western, would recharge and extract up to 40,000 af of groundwater per year from the SBBA and convey the water through a new pipeline to purveyors in Western's northern service area. The project could involve approximately 20 wells in the SBBA pressure zone, a new pump station, and about 30 miles of pipeline generally paralleling Interstate 91 from just north of Interstate 10 in San Bernardino to just south of Interstate 15 in Corona (Western 2003a).

Anticipated Impacts

As shown in Table 6.1-2, the Project and Riverside-Corona Feeder both have effects in the SBBA. An Initial Study for the Project was released in January 2003 (Western 2003a). Anticipated project impacts relate to aesthetics, air quality, biology (sensitive species, riparian habitat, wetland habitat, biological policies), cultural resources, geology, hazards, hydrology and water quality, land uses, noise, transportation, and utilities (Western 2003a). However, construction activities would not occur in the same areas as construction for the Project. Operational impacts which could interact with impacts of the Project relate to water recharge and extraction from the SBBA.

6.1.2.14 North Lake Area and South Lake Area Project (North/South Lake)

Muni, the City of San Bernardino, and the Inland Valley Development agency have proposed the development of two lakes within the City of San Bernardino. The North Lake Area and South Lake Area projects are each components of the City's "Vision 20/20 San Bernardino" concept (also known as the "Lakes and Streams Plan"), although these two lakes are the only components contemplated at this time. The purpose of the North/South Lake project is to create lake storage for Muni, lower groundwater in the AHHG, and create opportunities for city revitalization and redevelopment.

The North Lake Area project site is 82.4 acres bounded by Baseline Street, 9th Street, "H" Street, and "E" Street in the City of San Bernardino. Currently the site is used for residential, commercial, industrial, and institutional uses. Approximately 10 acres of the site are vacant. A 44-acre lake with approximately 660 af of water storage is proposed on the site, as well as commercial, residential, and open space land uses.

The South Lake Area project site is 53.7 acres bounded by the Burlington Northern-Santa Fe railroad, Mill Street, Interstate 215, and "G" Street in the City of San Bernardino. The project site is generally vacant but is within an urbanized area. An approximately 5-acre lake is proposed. Other proposed land uses include office and retail.

Anticipated Impacts

As shown in Table 6.1-2, both the Project and North/South Lake project could affect the SBBA.

Construction activities for the North/South Lake project would not occur in the same areas as construction for the Project. The North/South Lake project could beneficially affect liquefaction, but operations could cause migration of groundwater plumes in the SBBA.

6.2 IMPACTS OF CUMULATIVE PROJECTS

This section describes cumulative impacts by resource area. For each resource and location, cumulative projects are identified, and the cumulative impacts are evaluated. Table 6.1-2 summarizes related projects which, in addition to the Project, may affect a given resource and geographic area.

6.2.1 Surface Water Hydrology and Water Quality

6.2.1.1 Seven Oaks Dam and Reservoir Construction Area

The Project is the only project identified that could affect surface water in the Seven Oaks Dam and Reservoir Area, therefore cumulative impacts are not anticipated.

6.2.1.2 Santa Ana River Construction Area

Surface water in the SAR Construction Area could be cumulatively affected by the Project and implementation of the Wash Plan, Master Plan, EBX, and BO for Operation of Seven Oaks Dam. Because some of the cumulative surface water quality impacts are associated with geology, the associated cumulative geology impacts (e.g., Impact GEO-2) as well as geology mitigation measures (e.g., MM GEO-1) are referenced in this section.

Cumulative Impact SW-1. *Construction of the Project, in combination with other identified activities, could result in substantial additional sources of erosion, sedimentation, and turbidity for runoff entering the Santa Ana River, a significant impact.*

Project activities in the SAR Construction Area include installation of pipeline facilities. Construction of Wash Plan facilities, expansion of mining operations per the Wash Plan, construction of Master Plan facilities, construction of EBX facilities, and construction of diversion dikes as part of implementing actions of the BO, could create polluted construction runoff flows. Increased erosion, sedimentation, and turbidity caused by cumulative construction activities in the runoff entering the SAR would be a significant cumulative impact.

Mitigation Measures

Project-specific **MM GEO-1,** discussed in section 3.1, would reduce construction-related impacts to erosion and water quality in the SAR Construction Area. MM GEO-1 requires a sedimentation and erosion control plan and a Storm Water Pollution Prevention Plan be prepared before construction. To comply with regulations of the Clean Water Act, construction from other related projects would also likely use similar project-specific mitigation measures. The expansion of mining facilities per the Wash Plan would also be subject to provisions of the Clean Water Act that require the control of discharges to waterways. These mitigations, applicable to both construction and operation activities, would reduce cumulative impacts related to erosion, sedimentation, and turbidity in the SAR Construction Area.

Residual Impacts

With implementation of mitigation measures, erosion, sedimentation, and turbidity would be minimized in the SAR Construction Area to a less than significant level.

Cumulative Impact SW-2. *Construction of the Project and other related projects would place structures which would redirect flood flows within a 100-year flood hazard area. This is a less than significant impact.*

The Project would place diversion structures and other infrastructure in the 100-year flood hazard area in the SAR Construction Area. These structures would be designed specifically to redirect water by diversion. The Master Plan and EBX also propose structures in the 100-year flood hazard area. Levees constructed as part of the Wash Plan and temporary berms built as part of BO habitat restoration activities would also redirect water flows.

Given the nature of the land uses in the Santa Ana River Construction Area (generally open space) and because facilities would be subject to review by SBCFCD, the potential to increase flood hazards is minimal and no mitigation is required.

6.2.1.3 Devil Canyon Construction Area

The Project is the only project identified that could affect surface water in the Devil Canyon Construction Area, therefore cumulative impacts are not anticipated.

6.2.1.4 Lytle Creek Construction Area

The Project is the only project identified that could affect surface water in the Lytle Creek Construction Area, therefore cumulative impacts are not anticipated.

6.2.1.5 Santa Ana River

Segment A – Upstream of Seven Oaks Dam

Surface water hydrology upstream of Seven Oaks Dam could be cumulatively affected by the Project and implementation of the BO for operations of Seven Oaks Dam.

Cumulative Impact SW-3. *Use of Seven Oaks Reservoir for seasonal water conservation storage under the Project and temporary water storage per the BO would alter the amount of water in storage and height of the reservoir water surface. This would increase potential for erosion within the reservoir. This is a less than significant impact.*

Project operations could result in a higher reservoir elevation during the months of March through September. In these months, any environmental habitat releases for the BO would be taken from this seasonal water conservation storage pool. If water were temporarily held behind the dam for BO environmental habitat releases in other months (October through February), the effect of the BO would be to increase the period over which water is stored and increase water detained during the flood season. Increased water conservation storage from March through September associated with the Project, and the potential increase in months with water storage due to the BO, is unlikely to result in significant erosion in the reservoir. Water for the Project and the BO would be held in an area already designated for flood storage use, and in an area that would periodically hold floodwater. Given the dam operating conditions, fluctuation of the reservoir would be minimal and wave action and resulting erosion would also be minimal. Given the nature of the geology of the reservoir, it is unlikely that stored water would create scouring activity resulting in benches. Because the potential for the Project and BO to result in erosion within the reservoir is negligible, this is a less than significant impact. No mitigation is required.

Cumulative Impact SW-4. *Use of Seven Oaks Reservoir for seasonal water conservation storage under the Project and temporary water storage per the BO could substantially degrade water quality as a result of impoundment of flows. This would be a significant impact.*

Implementation of seasonal water conservation storage per the Project could result in an impoundment of water during the warm summer months of March through September, and implementation of the BO could extend the period of storage. This impoundment of flows increases the risk of anaerobic conditions in Seven Oaks Reservoir, a significant impact.

MITIGATION MEASURES

Project-specific **MM SW-1**, discussed in section 3.1, would reduce the risk of anaerobic conditions in Seven Oaks Reservoir. MM SW-1 requires participation in a program to avoid and reverse anaerobic conditions in the reservoir.

RESIDUAL IMPACTS

MM SW-1 would reduce Cumulative Impact SW-4 to a less than significant level.

Cumulative Impact SW-5. *Use of Seven Oaks Reservoir for seasonal water conservation storage under the Project and temporary water storage per the BO would increase potential damage from seiches. This would be a less than significant impact.*

A seiche could occur within the Seven Oaks Reservoir as a result of a strong earthquake in the vicinity of the Project area. Seiche potential in Seven Oaks Reservoir is increased by Project implementation as a result of the greater volume of water stored for Project uses and temporary storage of water for BO environmental habitat releases, compared to use of the facility strictly for flood control. For conditions upstream of the dam, the area is already designated for flood storage use, so there is no impact to the area when water is stored in the reservoir. Since the reservoir design reflects planning for the potential effects of earthquake motion, and the asymmetrical shape of the reservoir minimizes the potential for damage due to harmonic buildup of seiche waves, impacts would be less than significant. No mitigation is required.

Cumulative Impact SW-6. *Use of Seven Oaks Reservoir for seasonal water conservation storage under the Project and temporary water storage per the BO would increase the potential for mudflows in the reservoir. This would be a less than significant impact.*

Potential mudflows resulting from the Project and BO would be confined to the area upstream of Seven Oaks Dam, resulting primarily from the greater volume of water in the reservoir and the longer period of water storage. The reservoir's design as a flood storage facility makes significant impacts as a result of mudflows unlikely. Therefore, impacts due to mudflows would be less than significant and no mitigation is required.

Segment B – Seven Oaks Dam to Cuttle Weir

Surface water hydrology in the SAR from Seven Oaks Dam to Cuttle Weir could be affected by the Project and BO. However, these projects do not interact in a manner to have cumulative impacts. The Project acts to decrease flows in River Segment B. Environmental habitat releases per the BO would periodically (approximately once every 5 years) increase flows in Segment B.

Segment C – Cuttle Weir to the Confluence with Mill Creek

Surface water hydrology in the SAR from Cuttle Weir to the confluence with Mill Creek could be affected by the Project and Conservation District Application.

It is within the discretion of the SWRCB to grant one or more new rights for waters of the SAR and it is possible that some combination of the Project and Conservation District Application could be implemented. Water available for diversion could be divided among the different applications. Conservation District diversions would take place at Cuttle Weir. Diversions for the Project would take place at either the plunge pool (under Phase III of the Plunge Pool Pipeline) or at Cuttle Weir. The net effect of these water right applications could be to divert all currently available unappropriated water downstream of Seven Oaks Dam. In this way the Project (which would divert all unappropriated water available below Seven Oaks Dam) and a combination of the Project and Conservation District Application would have similar impacts to surface water downstream of Cuttle Weir.

Cumulative Impact SW-7. *Combined diversions per the Project and Conservation District Application would decrease river flow and could degrade water quality. This is a less than significant impact.*

As discussed in section 3.1 under Impact SW-8, concentrations of constituents of concern increase as one progresses downstream. Combined diversions by the Project and per the Conservation District Application would result in less water flows in downstream reaches. Other related projects would further reduce flow. In Table 6.2-1, the volume of water diverted by the Project and related projects was subtracted from baseflow and the concentration of TDS was re-calculated based on the adjusted flow. Representative values for flow and TDS concentrations for points along the SAR were taken from USGS data and data provided by the San Bernardino Municipal Water Department. This method of evaluating potential changes in TDS concentration assumes the "worst-case," that all of the water diverted per the Project and Conservation District Application would have otherwise flowed downstream under the No Project when, in fact, due to evaporation and percolation, very little surface water in River Segment B is likely to have hydrologic conductivity to points downstream. But, as shown in Table 6.2-1, this "worst-case" analysis found very little change in concentration levels. No impact is detectable upstream of Cuttle Weir and the change is less than 3 percent as far downstream as the MWD Crossing gage. At Prado reservoir, because of the large inflows, no change in flow or water quality concentration would be detectable. The potential increases in TDS would approach, but not exceed, basin plan objectives (see Table 3.1-9).

A parallel analysis was undertaken for total inorganic nitrogen (TIN) and the results are presented in Table 6.2-2. Again this "worst-case" analysis found very little change. No TIN impact is detectable upstream of Cuttle Weir and as far down as the MWD Crossing gage the change is less than 5 percent. The potential increases in TIN would approach, but not exceed, basin plan objectives (see Table 3.1-9). At Prado, because of the large inflows, no change in flow or water quality concentration would be detectable.

Therefore, while diversions by the Project and related projects could cause changes in water quality, this change would be less than significant. No mitigation is required.

Cumulative Impact SW-8. *Combined diversions per the Project and Conservation District Application would significantly decrease non-storm flow in this river segment.*

Table 6.2-1. Potential Cumulative Impacts on Santa Ana River TDS

	MEDIAN BASEFLOW[a]		TOTAL DISSOLVED SOLIDS[b,c]				
Location	*No Project (cfs)*	*All Related Projects (cfs)*	*Range*	*Representative TDS under SAR Baseflow Condition for No Project (mg/L)*	*Potential TDS under SAR Baseflow Condition with Related Projects (mg/L)*	*Maximum Potential Increase (mg/L)*	*Maximum Potential Increase (%)*
Above Cuttle Weir	5	3	200-300	230	230	0	0
Below Cuttle Weir	0	0[d]	200-300	NA	NA	NA	NA
RIX & Rialto Outfall	74	46[e]	400-600	520	533	13	2.4
MWD Crossing	86	42[f]	400-600	560	576	16	2.8

Notes:

a. Non-storm day flow representing baseflow condition.

b. TDS values representative of the SAR baseflow condition at Cuttle Weir and Riverside Narrows were assigned based on the Mentone and MWD gage data under the baseflow condition as reported in USGS Water-Resources Investigations Report 03-4326.

c. The TDS value assigned for RIX and Rialto is the maximum value that occurred during (2001-2002) as reported in Table 4.4-9 of the SBMWD RIX Facility Recycled Water Sales Program PEIR, March 2003.

d. Flows represent baseflow less combined Project and Conservation District Application diversions.

e. Flows represent baseflow less combined Project and Conservation District Application Diversions, less water removed from system by RIX Water Recycling Program.

f. Flows represent baseflow less combined Project and Conservation District Application Diversions, less water removed from system by RIX Water Recycling Program, and less water per the Riverside Application.

As can be seen in Figure 3.1-15, under the No Project, flows below Cuttle Weir are typically very low; median non-storm day flow is zero cfs. With the combined diversions by the Project (assuming completion of Phase III of the Plunge Pool Pipeline) and Conservation District Application, there would be no flow in this river segment on non-storm flow days.

MITIGATION MEASURES

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion per either the Project or the Conservation District Application.

Table 6.2-2. Potential Cumulative Impacts on Santa Ana River TIN

Location	MEDIAN BASEFLOW[a]		TOTAL INORGANIC NITROGEN[b,c]			
	No Project (cfs)	*All Related Projects (cfs)*	*Representative TIN under SAR Baseflow Condition for No Project (mg/L)*	*Potential TIN under SAR Baseflow Condition with Related Projects (mg/L)*	*Maximum Potential Increase (mg/L)*	*Maximum Potential Increase (%)*
Above Cuttle Weir	5	3	0.3	0.3	0	0
Below Cuttle Weir	0	0[d]	NA	NA	NA	NA
RIX & Rialto Outfall	74	46[e]	8.5	8.9	0.4	4.2
MWD Crossing	86	42[f]	7.3	7.6	0.3	4.6

Notes:

a. Non-storm day flow representing baseflow condition.

b. TIN values representative of the SAR baseflow condition at Cuttle Weir and Riverside Narrows were assigned based on the Mentone and MWD gage data under the baseflow condition as reported in USGS Water-Resources Investigations Report 03-4326.

c. The TIN value assigned for RIX and Rialto is the maximum value that occurred during (2001-2002) as reported in Table 4.4-9 of the SBMWD RIX Facility Recycled Water Sales Program PEIR, March 2003.

d. Flows represent baseflow less combined Project and Conservation District Application diversions.

e. Flows represent baseflow less combined Project and Conservation District Application Diversions, less water removed from system by RIX Water Recycling Program.

f. Flows represent baseflow less combined Project and Conservation District Application Diversions, less water removed from system by RIX Water Recycling Program, and less water per the Riverside Application.

RESIDUAL IMPACTS

Cumulative Impact SW-8 is significant and unavoidable in the segment from Cuttle Weir to the Mill Creek Confluence.

Cumulative Impact SW-9. *Combined diversions per the Project and Conservation District Application would decrease flow in the river from Cuttle Weir to the confluence of Mill Creek, in a manner that could change sediment transport trends. This is a less than significant impact.*

It is estimated that peak discharge associated with Seven Oaks Dam, under 100-year flood conditions could be 5,000 cfs in the river segment from Cuttle Weir to Mill Creek. Combined diversions per the Project and Conservation District Application could decrease these flows by approximately 1,500 cfs, meaning flows in this segment of the river could be unable to mobilize and transport cobble and gravel. However, this river segment typically does not contribute gravel and cobble to downstream locations and thus this decrease in flow would not likely result in a change to geomorphologic processes in this river segment. Therefore this is a less than significant impact and no mitigation is required.

Segment D – Confluence with Mill Creek to "E" Street

Surface water hydrology in the SAR from Mill Creek to "E" Street could be affected by the Project and Conservation District Application (including that portion of the Conservation District application involving diversions from Mill Creek).

Cumulative Impact SW-7, a less than significant decrease in water quality resulting from decreased river flow, also applies to this river segment. See Tables 6.2-1 and 6.2-2.

Cumulative Impact SW-8, a significant impact due to decreased non-storm day flow in the river, also applies to this river segment.

Mitigation Measures

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion by either the Project or per the Conservation District Application.

Residual Impacts

Cumulative Impact SW-8 is significant and unavoidable in the segment from Mill Creek Confluence to "E" Street.

Cumulative Impact SW-9, a less than significant impact to sediment transport trends due to decreased flow in the river, also applies to this river segment. It is estimated that peak flow under the No Project during a 100-year flood event would be 25,000 cfs in the river segment from Mill Creek to "E" Street. With diversions per the Project and Conservation District Application, up to 1,500 cfs would be diverted from the SAR and up to 90 cfs would be diverted from Mill Creek per the Conservation District Application, reducing peak flow during a 100-year flood event to approximately 23,410 cfs. Because the Project and Conservation District Application would decrease flow from the upper Santa Ana Canyon, it is possible that the frequency with which sand, cobble, and gravel is mobilized and transported in this river segment could decline slightly. But the effect would be minor since Mill Creek (which is only minimally affected) dominates sediment contribution and transport in this river segment (EIP 2004). Therefore, this is a less than significant impact, and no mitigation is required.

Cumulative Impact SW-10. *Combined diversions per the Project and Conservation District Application would decrease flow in the river from Mill Creek to "E" Street in a manner that would decrease the area that is inundated by flood flows (overbank flow areas). This is an adverse but less than significant impact.*

Based on HEC-RAS modeling performed for the Project, it is estimated that the instantaneous flow in this river segment would be reduced from 25,000 cfs under the No Project to 23,410 cfs with the Project and/or a combination of the Project and Conservation District Application. The overbank velocity and water depth in this area would not be perceptibly affected by Project and Conservation District Application diversions (see Figure 3.1-17). Therefore, this is a less than significant impact, and no mitigation is required.

Segment E – "E" Street to the RIX and Rialto Wastewater Treatment Plant Outfall

Surface water hydrology in the SAR from "E" Street to the RIX and Rialto WWTP Outfall could be affected by the Project, Conservation District Application, and Pilot Dewatering Program. While the Project and Conservation District Application act to decrease river flows, the Pilot Dewatering Program increases SAR flows by pumping and releasing groundwater to the river. The volume of water released by the Pilot Dewatering Program varies by year. If the Project is implemented, it is possible that high groundwater levels would be reduced, decreasing the volume of water pumped to the river by the Pilot Dewatering Program. For this reason, it is unlikely that the Pilot Dewatering Program would release water to the river consistently or in sufficient volumes to compensate for Project and Conservation District diversions.

Cumulative Impact SW-7, a less than significant decrease in water quality resulting from decreased river flow, also applies to this river segment. See Tables 6.2-1 and 6.2-2.

Cumulative Impact SW-8, a significant impact due to decreased non-storm day flow in the river, also applies to this river segment.

Mitigation Measures

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion by either the Project or per the Conservation District Application.

Residual Impacts

Cumulative Impact SW-8 is significant and unavoidable in the segment from "E" Street to the RIX and Rialto WWTP Outfall.

Cumulative Impact SW-9, a less than significant impact to sediment transport trends due to decreased flow in the river, also applies to this river segment. It is estimated that peak flow during a 100-year flood event under No Project conditions would be 67,000 cfs in the river segment from "E" Street to RIX and Rialto effluent outfall. With the combined diversions of the Project and Conservation District Application from the SAR and Mill Creek, peak flow related to the 100-year flood event would be no more than 65,410 cfs. Because the Project and related projects would decrease flow from the upper Santa Ana Canyon, it is possible that the frequency with which sand, cobble, and gravel is mobilized and transported in this river segment could decline slightly. But the effect would be minor as City and Plunge creeks (which are unaffected by the Project and Conservation District Application) dominate sediment contribution and transport in this river segment. Therefore this is a less than significant impact and no mitigation is required.

Segment F – RIX and Rialto WWTP Outfall to Riverside Narrows

Surface water in the SAR from the RIX and Rialto WWTP Outfall to Riverside Narrows could be affected by the Project, Conservation District Application, and RIX Water Recycling Project.

Cumulative Impact SW-7, a less than significant decrease in water quality resulting from decreased river flow, also applies to this river segment. See Tables 6.2-1 and 6.2-2.

Cumulative Impact SW-8, a significant impact due to decreased non-storm day flow in the river, also applies to this river segment.

Mitigation Measures

Various potential mitigation measures involving changes in the timing, pattern, and volume of Muni/Western diversion were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow on non-storm days while still allowing a consistent and reliable diversion by either the Project or per the Conservation District Application.

Residual Impacts

Cumulative Impact SW-8 is significant and unavoidable in the segment from the RIX and Rialto WWTP Outfall to Riverside Narrows.

Segment G – Riverside Narrows to Prado Dam

Surface water hydrology in the SAR from Riverside Narrows to Prado Dam could be affected by the Project, Conservation District Application, RIX Water Recycling, Riverside Application, Chino Application, and OCWD Application.

Cumulative Impact SW-7, a less than significant decrease in water quality resulting from decreased river flow, also applies to this river segment. See Tables 6.2-1 and 6.2-2.

6.2.1.6 San Bernardino Basin Area

The Project would not impact this resource in this geographic area.

6.2.1.7 Muni/Western Service Areas

Surface water hydrology in the Muni/Western service area could be affected by the Project, Master Plan, and EBX.

Cumulative Impact SW-11. *The Project and related projects would have significant indirect effects related to growth and development in the service areas.*

Indirect impacts are described in Chapter 4. San Bernardino County has identified growth as potentially impacting water supplies and water quality through expansion of urban development and the associated increase in water demand, and generation of urban contaminants. Riverside County has identified impacts from growth related to localized flooding associated with increased development, increased stormwater runoff, and placement of habitable structures within dam inundation areas.

Mitigation Measures

MM Cumulative SW-1: The San Bernardino County General Plan contains a number of policies in the Water section of the Natural Resources Element designed to coordinate and manage water resources throughout the County (see section 4.2.1). However, with regard to water resources in San Bernardino County, significant unavoidable impacts would still occur.

The Riverside County General Plan addresses localized flooding risks in the Safety Element of the proposed Riverside County General Plan. Additionally, the proposed Riverside County General Plan Draft Program EIR contains measures to further mitigate flooding impacts including use of FEMA documents to minimize flood hazards, prohibition by the County of the alteration of floodways and channelization where possible, and the requirement that the 10-year flood flows be contained within the top of curbs and the 100-year flood flows within the street rights-of-way. These policies would mitigate impacts related to surface water in Riverside County.

Residual Impacts

Despite the policies and mitigation measures contained in the applicable general plans, significant cumulative impacts to surface water resources related to water demand and generation of urban contaminants could still occur in San Bernardino County.

6.2.2 Groundwater Hydrology and Water Quality

6.2.2.1 Seven Oaks Dam and Reservoir Construction Area

The Project is the only project identified that could affect groundwater and water quality in the Seven Oaks Dam and Reservoir Area, therefore cumulative impacts are not anticipated.

6.2.2.2 Santa Ana River Construction Area

Groundwater in the SAR Wash would be affected by the Project, Master Plan, and EBX.

Cumulative Impact GW-1. *Dewatering during Project construction, in combination with dewatering at related project locations, would result in localized, temporary lowering of groundwater levels. Impacts would be less than significant.*

Deep excavations would be required during construction of Project pipelines and related facilities. Similarly, deep excavations may be needed during construction of pipelines and pump stations for the Master Plan and EBX. Shallow groundwater may be encountered in these excavations, necessitating dewatering, which would lower the groundwater in the vicinity of the construction site. Dewatering at each construction site would be temporary, localized, and would not occur in volumes sufficient to substantially deplete groundwater supplies to the point where there would be a net deficit in aquifer volume, even with simultaneous construction activities. Therefore, impacts would be less than significant and no mitigation is required.

6.2.2.3 *Devil Canyon Construction Area*

The Project is the only project identified that could affect groundwater in the Devil Canyon Construction Area, therefore, cumulative impacts are not anticipated.

6.2.2.4 *Lytle Creek Construction Area*

The Project is the only project identified that could affect groundwater in the Lytle Creek Construction Area, therefore, cumulative impacts are not anticipated.

6.2.2.5 *Santa Ana River*

The Project would not impact this resource in this geographic area.

6.2.2.6 *San Bernardino Basin Area*

Groundwater in the SBBA would be affected by the Project, Wash Plan, Master Plan, Restoration Project, Conservation District Application, Pilot Dewatering, Riverside-Corona Feeder, North/South Lake, and RIX Water Recycling projects.

Cumulative Impact GW-2. *Project operations, in combination with related projects, would not interfere substantially with groundwater recharge to the point where there would be a net deficit in aquifer volume (i.e., groundwater storage). Impacts would be less than significant.*

Project diversions would intercept water from the SAR, which would reduce recharge in the river channel. However, the lack of recharge in the river would be offset by (1) in-lieu recharge caused by direct delivery of SAR water, which reduces purveyor pumping; (2) spreading of SAR water at other locations within the SBBA; and (3) spreading water returned from exchanges with other agencies. The net effect is to recharge these basins with the same quantity of water as without the Project; only the timing and location of recharge would be altered by the Project. Similarly, related projects such as the Conservation District Application and RIX Water Recycling facility would result in diversion of water from the SAR, which would be offset by recharge in spreading basins throughout the basin.

Per the provisions of the *Western* Judgment, the SBBA (including the Lytle Creek sub-basin) and the Rialto-Colton Basin are regulated and monitored with regard to the amount of water in storage along with extractions and additions that are made on an annual basis. The basin is maintained by ensuring that extractions do not exceed long-term natural safe yield, so that extractions made by pumping would be replenished. Because SAR water diversions would not result in a net deficit in aquifer volume, cumulative impacts would be less than significant and no mitigation is required.

Cumulative Impact GW-3. *At some wells, implementation of the Project, in combination with related projects, would increase nitrate concentrations to the point where they would exceed WQOs. This impact is significant.*

Modeling completed for the Project examined a range of spreading operations. Based on the model results, it is estimated that current and proposed amended WQOs for nitrate concentrations, established by the SARWQCB for the sub-basins of the SBBA, could be exceeded at some wells and at some times. Nitrate concentrations would also exceed concentrations under No Project conditions at some of those same wells and during similar periods. However, because water quality would vary over time, at other specific locations and at other specific times, impacts would be less than significant or beneficial.

Similarly, related projects that involve groundwater recharge or pumping in the SBBA, such as the Wash Plan, Restoration Project, Conservation District Application, Pilot Dewatering, Riverside-Corona Feeder, and North/South Lake projects, would cause both significant and beneficial impacts, due to the spatial and temporal variability of nitrate concentrations. Overlapping effects on groundwater quality of multiple project operations could locally and intermittently result in nitrate concentrations in excess of No Project conditions and established WQOs at some wells, a significant impact. Conversely, at other specific locations and at other specific times, overlapping effects of multiple projects on groundwater quality could result in nitrate concentrations less than No Project conditions and established WQOs, resulting in beneficial impacts. Therefore, Project impacts, in combination with related project impacts, would be locally and intermittently significant or beneficial, depending on the location within the basin and period of operations.

Mitigation Measures

Project-specific **MM GW-1**, evaluation of nitrate levels and selective groundwater spreading, discussed in section 3.2, would reduce nitrate level changes related to the Project. It is uncertain whether related projects would implement measures to prevent nitrate concentrations from exceeding WQOs.

Residual Impacts

Residual cumulative nitrate impacts would be significant and unavoidable. Though MM GW-1 would lower nitrate concentrations in groundwater related to the Project, this mitigation measure may not reduce to less than significant cumulative nitrate levels due to related projects at all SBBA locations.

Cumulative Impact GW-4. *At some wells, implementation of the Project, in combination with related projects, would increase TDS concentrations to the point where they would exceed WQOs. This impact is significant.*

As discussed for nitrates in Cumulative Impact GW-3, Project operations would result in significant, less than significant, and beneficial TDS-related impacts, for specific wells within the SBBA during the period of operation. Modeling completed for the Project examined a range of spreading operations. Based on these model results, it is estimated that current and proposed amended WQOs for TDS, established by the SARWQCB, would be exceeded at various locations and during multiple periods.

Similarly, related projects that involve groundwater recharge or pumping in the SBBA, such as the Wash Plan, Restoration Project, Conservation District Application, Pilot Dewatering, Riverside-Corona Feeder, and North/South Lake projects, would cause both significant and beneficial impacts, due to the spatial and temporal variability of TDS concentrations. Therefore, significant Project impacts, in combination with related project impacts, would similarly be locally and intermittently significant or beneficial, depending on the location within the basin and period of operations.

Mitigation Measures

Project-specific **MM GW-1**, evaluation of TDS levels and selective groundwater spreading, discussed in section 3.2, would reduce TDS concentrations related to the Project. It is uncertain whether or not related projects would implement measures to prevent TDS concentrations from exceeding WQOs.

Residual Impacts

Residual cumulative TDS impacts would be significant and unavoidable. Though MM GW-1 would lower TDS levels related to the Project, this mitigation may not reduce to less than significant TDS concentrations due to all related projects at all SBBA locations.

6.2.2.7 *Muni/Western Service Areas*

Groundwater in the Muni/Western service area could be affected by the Project, Master Plan, EBX, and Riverside-Corona Feeder.

Cumulative Impact GW-5. *The Project and related projects would have significant indirect effects related to growth and development in the service areas.*

In San Bernardino County, potential impacts to water supplies and water quality are associated primarily with the projected expansion of urban development and the associated increase in water demand, generation of urban contaminants, and loss of natural recharge areas (due to construction of impervious surfaces). Significant, unavoidable impacts could occur in areas with existing water quality/quantity problems and localized groundwater contamination at several sites, including the former Norton Air Force Base and the Chino Airport (County of San Bernardino 1989b). However, some impacts to water resources would be significant but mitigable. The Project and related projects would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

In Riverside County, significant but mitigable impacts to groundwater resources may also occur (particularly in the western part of Riverside County), including the potential for a net deficit in the aquifer volume, a reduction in the local groundwater table, and a reduction in groundwater recharge. Continued urbanization also has the potential to impact unique hydrologic characteristics, change hydrologic baseline conditions, and increase pollutant levels in groundwater reserves. These impacts are also considered significant but mitigable. The Project and related projects would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

MM Cumulative GW-1 The San Bernardino County General Plan contains a number of policies in the Water section of the Natural Resources Element designed to coordinate and manage water resources throughout the County (see section 4.2.1).

The Riverside County General Plan contains a number of policies in the Multipurpose Open Space Element and Land Use Element designed to avoid overdraft and groundwater contamination (see section 4.2.1).

Residual Impacts

Despite general plan policies, significant unavoidable cumulative groundwater impacts would still occur in San Bernardino County.

6.2.3 Biological Resources

6.2.3.1 Seven Oaks Dam and Reservoir Construction Area

Biological resources within the Seven Oaks Dam and reservoir area could be cumulatively affected by the Project and implementation of the BO for operation of Seven Oaks Dam.

Cumulative Impact BIO-1. *The Project and related projects could result in habitat modification in the reservoir area, a less than significant impact.*

The overall effect of the Project and BO would be to hold a greater volume of water in the reservoir more frequently. However, nearly all of the loss or modification of biological resources at this location have been previously mitigated as part of the Seven Oaks Dam project. Therefore, the cumulative effect would be less than significant and no mitigation is required.

6.2.3.2 Santa Ana River Construction Area

Biological resources in the SAR Wash would be affected by the Project, BO, Wash Plan, Master Plan, EBX, and Restoration Project.

Cumulative Impact BIO-2. *The Project and related projects would cumulatively affect, directly or through habitat modification, common species, an adverse but less than significant impact.*

Based on the relative abundance and widespread distribution of most common species and the presence of extensive open space in close proximity, including the San Bernardino Mountains and most of the SAR alluvial fan, the Project and related projects are not expected to have a significant cumulative impact on common species. In addition, similar to the Project, the related projects would undergo environmental review under CEQA and would also be required to incorporate measures to avoid, minimize, or reduce impacts. No mitigation measures are necessary.

Cumulative Impact BIO-3. *The Project and related projects would affect sensitive species, a significant impact.*

Due to the temporary removal of habitat and construction effects of the Project and related projects, several sensitive species would be impacted. Due to the highly sensitive nature of the dominant plant community of the area (RAFSS), the consequent sensitivity of the habitat of several state- and or federally listed species, and the level of uncertainty in restoration methods, the cumulative impact on these species is considered significant.

Mitigation Measures

Project-specific **MM BIO-1, BIO-2**, **BIO-3**, **BIO-4**, **BIO-5**, **BIO-6**, **BIO-7**, and **BIO-8,** discussed in section 3.3, would be applicable to reducing cumulative impacts to sensitive species. These mitigation measures include a variety of actions such as restricting the area of disturbance to the smallest size possible, training construction staff, on-site biological monitoring (including pre-construction surveys and mapping for sensitive species), implementation of BMPs, protection measures for sensitive species, control of invasive plant species, salvage and propagation of sensitive plant for use in revegetation, re-creating habitat for sensitive plant species, and habitat rehabilitation and revegetation. These measures are intended to avoid or minimize impacts on sensitive species and to restore communities and populations where impacts are unavoidable. Because other projects would also be subject to environmental compliance regulations, including CEQA, it is anticipated that related projects would implement mitigation measures similar to the Project.

Residual Impacts

Residual cumulative impacts to sensitive species would be significant and unavoidable. Though MM BIO-1 through MM BIO-8 and similar mitigation measures implemented by other projects would reduce impacts to sensitive species, these mitigation measures may not reduce impacts to sensitive species to a level of less than significant.

Cumulative Impact BIO-4. *The Project and related projects would have significant cumulative effects on RAFSS, a sensitive natural community.*

The cumulative removal of RAFSS habitat that would occur under the Project, as well as several related projects, would be significant due to the rarity of this vegetation community in the region and the uncertainties associated with restoration of this habitat.

Mitigation Measures

Project-specific **MM BIO-1**, **BIO-2**, **BIO-7**, and **BIO-8**, discussed in section 3.3, would be applicable to reducing cumulative impacts to sensitive natural communities. These measures include actions as described above under Cumulative Impact BIO-3, as well as relocating the Plunge Pool Pipeline to minimize effects on RAFSS and its associated wildlife species or purchasing and preserving RAFSS habitat. These measures are intended to avoid or minimize impacts on sensitive RAFFS habitat and to restore communities and populations where impacts are unavoidable. Because other projects would also be subject to environmental compliance regulations, including CEQA, it is anticipated that these related projects would implement mitigation measures similar to the Project.

Residual Impacts

Residual cumulative impacts to RAFSS would be significant and unavoidable. It may not be possible to fully restore the structure and function of RAFSS in a reasonable timeframe, especially in projects where there has been soil disturbance and disruption of soil profiles and function. Certain features of the sensitive community that may be important to threatened and endangered species are expected to take up to several decades or more to regenerate, for example, cryptogamic soil crusts, and junipers.

6.2.3.3 Devil Canyon Construction Area

The Project is the only project identified which could affect biological resources in the Devil Canyon Construction Area, therefore cumulative impacts are not anticipated.

6.2.3.4 Lytle Creek Construction Area

The Project is the only project identified that could affect biological resources in the Lytle Creek Construction Area, therefore cumulative impacts are not anticipated.

6.2.3.5 Santa Ana River

Biological resources in the SAR would be affected by Project operations, BO, Conservation District Application, Riverside Application, Chino Application, OCWD Application, and RIX Water Recycling Program.

Cumulative Impact BIO-5. *The Project and related projects would have less than significant cumulative effects on riparian habitat, aquatic habitat, and aquatic species downstream of Seven Oaks Dam.*

The effect of the Project and other related projects is to decrease flow in the river downstream of Seven Oaks Dam. Reductions in SAR flow would occur throughout the year, with the greatest effects in February and during the summer. Above Cuttle Weir, riparian habitat is present but would be expected to remain with sufficient flow for habitat maintenance following diversions by the Project and/or Conservation District Application. Between Cuttle Weir and the RIX and Rialto WWTP outfalls, riparian resources are much more limited and the cumulative reduction in flow is not expected to impact riparian habitat or associated species. Downstream from this point, the RIX Water Recycling Project would reduce flows by approximately 30 to 35 cfs. However, the impact analysis for that project did not identify significant impacts on biological resources. The Project would add an increment to the reduction caused by the RIX Water Recycling Project, but cumulative impacts in this reach would remain less than significant. Cumulative impacts on aquatic species, riparian habitat, and sensitive riparian plants and animals in the SAR downstream of Project diversions are expected to be less than significant. No mitigation is required.

Cumulative Impact BIO-6. *The Project and related projects would have significant cumulative effects on sensitive natural communities and habitat of sensitive species downstream of Seven Oaks Dam.*

The Project and the Conservation District Application would cumulatively reduce flood flows and would reduce overbank flooding and within-channel upper terrace scour within the upper stretch of the SAR between the Cuttle Weir and areas just downstream of the confluence with Mill Creek. Due to the highly sensitive nature of the dominant plant community of the area that would experience reduced flooding (RAFSS), the presence of habitat of several state- and/or federally listed species within the flood reduced area, and the level of uncertainty in restoration methods, the cumulative impact of reduced overbank flooding and scour is considered significant.

Mitigation Measures

Project-specific **MM BIO-9** and **BIO-10**, discussed in section 3.3, apply to reducing impacts to sensitive natural communities and habitat of sensitive species downstream of Seven Oaks Dam. These measures would remove invasive non-native species from the channel and adjacent RAFSS between Seven Oaks Dam and Mill Creek, and develop a program to selectively restore habitat for SBKR and Santa Ana River woolly-star using high pressure water, including monitoring and repeated treatments as needed. Because other projects would also be subject to environmental laws, including CEQA, it is anticipated that these related projects would implement mitigation measures similar to the Project.

Residual Impacts

Residual cumulative impacts to sensitive natural communities and sensitive species habitat would be significant and unavoidable. Though MM BIO-9 and BIO-10 and similar mitigation measures by other projects would reduce impacts, these measures may not reduce impacts to a level of less than significant. Removal of invasive non-native species is feasible and effective but would require continued efforts. The scouring method proposed is untested and its result is, therefore, uncertain. Although the basic concept is reasonable, there are many unknowns regarding the specifics and the effect of the process on the various sensitive resources, both initially and in the long term. Therefore, due to the uncertainty of the effectiveness of the proposed mitigation, cumulative impacts would remain significant.

6.2.3.6 San Bernardino Basin Area

The Project would not impact this resource in this geographic area.

6.2.3.7 Muni/Western Service Areas

Biological resources in the Muni/Western service area could be affected by the Project, Master Plan, and EBX.

Cumulative Impact BIO-7. *The Project and related projects would have significant indirect effects on biological resources related to growth and development in the service areas.*

In San Bernardino County, potentially significant and unavoidable impacts to wetlands within the Valley region would result from future development. Additionally, unmitigable impacts to threatened and endangered species as well as wetland and riparian habitat areas may occur as a result of growth. Most impacts to other special status species would be mitigated to less than significant. Some residual significant impacts would remain following implementation of mitigation measures. The Project and related projects would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

In Riverside County, potentially significant growth-related impacts to biological resources include direct mortality to listed, proposed, or candidate species; loss of habitat occupied by such species and/or loss of sensitive habitats; and habitat fragmentation which could restrict wildlife movement. These impacts would be significant and unavoidable. Significant but mitigable impacts include the loss of oak trees or alteration of natural processes (e.g., hydrology), resulting in indirect loss of oak trees. The Project and related projects would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

Mitigation Measures

MM Cumulative BIO-1: The San Bernardino County General Plan contains a number of policies in the Natural Resources Element designed to require review of biological impacts for each development project in coordination with the development and enforcement of Habitat Conservation Plans, and development of monitoring programs.

The Riverside County General Plan Draft Program EIR identifies policies from the Multipurpose Open Space Element of the County of Riverside General Plan as well as additional measures to reduce impacts to biological resources associated with growth. Policies are designed to require review of biological impacts for each development project, avoidance of habitat fragmentation, and use of constructed wetlands to treat water before it enters natural stream systems.

Residual Impacts

Despite General Plan policies, significant unavoidable cumulative biological impacts would still occur in San Bernardino and Riverside counties.

6.2.4 Geology, Soils and Mineral Resources

6.2.4.1 Seven Oaks Dam and Reservoir Construction Area

The Project is the only project identified that could affect geological resources in the Seven Oaks Dam and Reservoir Area, therefore cumulative impacts are not anticipated.

6.2.4.2 Santa Ana River Construction Area

The geology, soils, and mineral resources of the project construction areas would be affected by the Project, Wash Plan, Master Plan, EBX, Inland Feeder, Restoration Project, BO, and Conservation District Application.

Cumulative Impact GEO-1. *The Project, in combination with related projects, would expose structures to seismic ground shaking, ground failure, and liquefaction, a significant impact.*

Proposed new infrastructure at the Santa Ana River Construction Area would be subject to significant impacts due to unstable soil or slope conditions and seismically induced ground failure, due to an earthquake on one of several active faults in these areas, including the San Andreas and San Jacinto faults. Similarly, related projects involving construction, including the Master Plan and EBX, would be subject to geologic hazards and associated significant impacts.

Because of the large size of many of these pipelines, rupture as a result of seismic activity could result in the release of large quantities of water, indirectly causing damage to nearby structures and creating erosional gullies, and substantial erosion. These indirect impacts associated with pipeline rupture would be significant.

Mitigation Measures

MM GEO-4, **GEO-5**, and **GEO-6**, described in section 3.4, would reduce the potential impacts of the Project's indirect seismic impacts. Other projects are likely to also use similar mitigations to avoid seismic hazards.

Residual Impacts

Residual cumulative seismic impacts would be significant and unavoidable, because even with implementation of MM GEO-4, -5, and -6 and similar mitigation by other projects, substantial damage may still result from pipeline rupture during a seismic event.

6.2.4.3 Devil Canyon Construction Area

Cumulative Impact GEO-1, a significant impact related to placing structures in areas prone to unstable soil or slope conditions and seismically induced ground failure, also applies to the Devil Canyon Construction Area. Besides the Project, in this area the Inland Feeder will be constructed. Because of the large size of the pipelines, rupture as a result of seismic activity could result in the release of large quantities of water, indirectly causing damage to nearby structures and creating erosional gullies, and substantial erosion. These indirect impacts would be significant.

Mitigation Measures

MM GEO-4, **GEO-5**, and **GEO-6**, described in section 3.4, would reduce the potential impacts of the Project's indirect seismic impacts. Other projects are likely to also use similar mitigations to avoid seismic hazards.

Residual Impacts

Residual cumulative seismic impacts would be significant and unavoidable, because even with implementation of MM GEO-4, -5, and -6 and similar mitigation by other projects, substantial damage may still result from pipeline rupture during a seismic event.

6.2.4.4 Lytle Creek Construction Area

The Project is the only project identified that could affect geology, soil, and mineral resources in the Lytle Creek Construction Area, therefore cumulative impacts are not anticipated.

6.2.4.5 Santa Ana River

The Project would not impact this resource in this geographic area.

6.2.4.6 San Bernardino Basin Area

Geology, soils, and mineral resources in the Muni/Western service area could be affected by the Project, Wash Plan, Master Plan, Restoration Project, Conservation District Application, Pilot Dewatering Program, Riverside-Corona Feeder, and the North Lake Area and South Lake Area Project.

Cumulative Impact GEO-2. *Project-related groundwater recharge, in combination with recharge from related projects, could result in shallow groundwater conditions and increase the area susceptible to liquefaction during certain seismic events. Cumulative impacts would be significant.*

With the Project there is a net reduction in the area within the Pressure Zone of the SBBA exposed to potential liquefaction (see Table 3.4-1). However, with the Project there would be small areas in the vicinity of Devil Canyon, Lytle Creek, and Mill Creek that would experience high groundwater conditions that would not occur under No Project conditions.

Similarly, related projects that involve groundwater recharge or pumping in the SBBA, such as the Wash Plan, Restoration Project, Conservation District Application, Pilot Dewatering, Riverside-Corona Feeder, and North/South Lake projects, could result in significant impacts if groundwater levels during Project operations are both less than 50 feet from the ground surface and above the levels that would be expected under No Project conditions. Overlapping effects on groundwater levels of multiple project operations could locally and intermittently result in significant impacts if groundwater levels are both less than 50 feet from the ground surface and above the levels that would be expected under No Project conditions. Conversely, overlapping effects on groundwater levels of multiple project operations could locally and intermittently result in beneficial impacts if groundwater levels are greater than 50 feet from the ground surface and below the levels that would be expected under No Project conditions. Therefore, Project impacts, in combination with related project impacts, would be locally and intermittently significant or beneficial, depending on the location within the basin and period of operations.

Mitigation Measures

Project-specific **MM GEO-7**, discussed in section 3.4, would reduce elevated groundwater levels and liquefaction potential associated with the Project. It is uncertain whether related projects would implement measures to prevent elevated groundwater and liquefaction potential.

Residual Impacts

Residual cumulative impacts would be significant and unavoidable. Though implementation of MM GEO-7 would reduce elevated groundwater associated with the Project, this mitigation measure may not reduce to a level of less than significant, the elevated groundwater and liquefaction potential of all related projects.

6.2.4.7 Muni/Western Service Areas

Geology, soils, and mineral resources in the Muni/Western service area could be affected by the Project, Master Plan and EBX.

Cumulative Impact GEO-3. *The Project and related projects would have less than significant indirect effects related to growth and development in the service areas.*

These indirect impacts are described in Chapter 4. The majority of the cumulative development projects in the Muni/Western service areas would result in ground disturbance and associated erosion, resulting in adverse impacts to local drainages, creeks, and the SAR. These projects would be subject to NPDES stormwater regulations, which mandate implementation of a Stormwater Pollution Prevention Plan (SWPPP). Erosion control and spill prevention and control measures are required as part of a SWPPP. Each of these projects would also be subject to City and County site development standards, which require creation of a project-specific drainage plan to reduce potential flooding impacts.

In addition, as discussed for Cumulative Impact GEO-1, geotechnical impacts (e.g., seismic, slope stability) tend to be site-specific rather than cumulative in nature and each development site is subject to, at a minimum, uniform site development and construction standards relative to seismic and other geologic conditions that are prevalent within the region. Therefore, cumulative impacts would be less than significant. No mitigation is required.

6.2.5 Land Use and Planning

The Project would impact this resource only in the SBBA and the Muni/Western Service Areas.

6.2.5.1 San Bernardino Basin Area

Land use in the Muni/Western service area could be affected by the Project, Wash Plan, Master Plan, Restoration Project, Conservation District Application, Pilot Dewatering Program, Riverside-Corona Feeder, and the North Lake Area and South Lake Area Project.

Cumulative Impact LU-1. *Increases in groundwater levels, due to operations by the Project and related projects, could conflict with existing land uses and limit future use of property in the Pressure Zone of the SBBA, a significant impact*

As described in Cumulative Impact GEO-2 (section 6.2.4.4), cumulative changes in groundwater spreading could result in high groundwater levels in specific local areas which could, in turn, limit uses on overlying properties, a significant land use impact.

Mitigation Measures

Project-specific **MM GEO-7**, discussed in section 3.4, would reduce elevated groundwater levels associated with the Project. It is uncertain whether related projects would implement measures to prevent elevated groundwater.

Residual Impacts

Residual cumulative impacts would be significant and unavoidable. Though implementation of MM GEO-7 would reduce groundwater levels associated with the Project, this mitigation measure may not reduce to less than significant the impact of all related projects.

6.2.5.2 *Muni/Western Service Areas*

Land uses in the Muni/Western service area could be affected by the Project, Master Plan, and EBX.

Cumulative Impact LU-2. *The Project and related projects would have indirect significant effects on land uses related to growth and development in the service areas.*

These indirect impacts are described in Chapter 4. Land use impacts associated with growth relate to incompatibility between existing and future land uses, and the conversion of undeveloped portions of the counties to some form of urbanized development. Impacts to land use and planning would be mitigated to less than significant by local governments implementing the policies of the San Bernardino County and Riverside County general plans. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA.

Mitigation Measures

MM Cumulative LU-1: The San Bernardino County General Plan contains a number of policies designed to ensure that future changes to the land use pattern result in consistency with zoning, compatible land use arrangements, development intensities sensitive to the natural resources (such as limiting development in ecologically sensitive areas), and logical extensions to existing developed areas rather than urban sprawl (see section 4.2.4).

The Land Use Element of the proposed Riverside County General Plan includes policies designed to minimize impacts to land use and allow for the continued operation of non-conforming land uses as well as to ensure a coordinated planning effort between cities, service providers, and the County (see section 4.2.4).

Residual Impacts

With implementation of San Bernardino County and Riverside County general plan policies, impacts to land use would be less than significant.

6.2.6 Agricultural Resources

The Project would not impact this resource in any geographic areas except the SAR Construction Area and Muni/Western service areas.

6.2.6.1 Santa Ana River Construction Area

Agricultural resources in the SAR Construction Area could be affected by the Project and Master Plan.

Cumulative Impact AG-1. *The Project and the Master Plan would have direct but less than significant impacts on Important Farmland in the Santa Ana River Construction Area.*

The Project would have a less than significant, temporary, direct impact on agricultural resources in the SAR Construction Area. Construction of the westernmost portion of Phase I of the proposed Plunge Pool Pipeline would result in the temporary conversion of approximately 11 acres of Important Farmland to non-agricultural use. The Master Plan (see section 6.1.2.2) identified a significant direct impact on agricultural resources due to the potential conversion of 72 acres of Important Farmland. However, because the Project would have no permanent impact on agriculture, there would be no cumulative impact and no mitigation measures are necessary.

6.2.6.2 Muni/Western Service Areas

Agricultural resources in the Muni/Western service area could be affected by the Project, Master Plan, EBX, and RIX Water Recycling.

Cumulative Impact AG-2. *The Project and related projects would have indirect significant effects related to growth and development in the service areas.*

The Project would have significant growth-related impacts to agricultural resources, including Important Farmlands, because there is a potential for these lands to be converted to non-agricultural use or for changes in agricultural zoning to be approved by local jurisdictions to allow a higher density or intensity of development. These indirect impacts are discussed in more detail in Chapter 4. Additionally, the projects referenced above would have significant growth-related impacts and, therefore, impacts to agricultural resources would be cumulatively significant.

Mitigation Measures

MM Cumulative AG-1: Policies contained in the San Bernardino County and the Riverside County General Plans, as well as mitigation measures identified in the Riverside County General Plan Draft Program EIR, would reduce a portion of the impacts to agricultural resources to less than significant (see section 4.2.5).

Residual Impacts

Despite the mitigation measures identified in the general plans, significant and unavoidable cumulative impacts to Important Farmlands would remain.

6.2.7 Recreational Resources

The Project would not impact this resource in any geographic area except the Muni/Western service areas.

6.2.7.1 Muni/Western Service Areas

Recreational resources in the Muni/Western service area could be affected by the Project, Master Plan, and EBX.

Cumulative Impact REC-1. *The Project and related projects would have indirect significant effects related to growth and development in the service areas.*

These indirect impacts are described in Chapter 4. Recreation impacts from growth relate to conversion of recreational lands to urban uses, over use and crowding at existing recreational facilities, and need for expansion of parks and recreational facilities. Impact to recreational resources would be mitigated to less than significant by local governments implementing the following policies of the San Bernardino County and Riverside County General Plans.

Mitigation Measures

MM Cumulative REC-1: The San Bernardino County General Plan includes policies in the Natural Resources Element designed to obtain funding for parkland from new residential development; regulate off-highway vehicle use to allow recreational enjoyment while protecting natural resources; and improve public access to rivers, streams, and other bodies of water (see section 4.2.6). The Riverside County General Plan has similar policies that require new development to provide implementation strategies for the funding of new park and recreation sites, require that the development of new facilities occur concurrently with other development in an area, and discourage the absorption of dedicated park land by non-recreational uses (see section 4.2.6).

Residual Impacts

With implementation of San Bernardino County and Riverside County general plan policies, impacts to recreational resources would be less than significant.

6.2.8 Air Quality

Because the impacts of air emissions are considered on a Basin-wide level, it is not appropriate to examine the cumulative impact from various project construction areas separately. Instead, the air quality cumulative analysis considers the impact of total Project emissions occurring in the South Coast Air Basin at any given time in combination with emissions occurring from other related projects at the same time.

As shown in Table 6.1-2, there are multiple related projects that could be constructed in the Project construction areas. However, the timing of those projects is uncertain.

Cumulative Impact AQ-1. *The Project and related projects would exceed SCAQMD significance thresholds for ROC, CO, and NOx, a significant impact.*

Project construction activities would produce incremental additions of ROC, CO, and NOx pollutants in amounts greater than the SCAQMD significance thresholds. This was determined to be a significant Project impact (see section 3.8). Similarly, the addition of these significant project-related construction emissions in combination with ROC, CO, and NOx emissions from other concurrently active projects would also be considered to be a significant cumulative impact.

Mitigation Measures

Project-specific mitigation measures **MM AQ-1** and **MM AQ-2**, discussed in section 3.8, would help reduce ROC, CO, and NOx emissions and thereby help reduce cumulative impacts. Other related projects exceeding the SCAQMD significance thresholds would also likely employ similar mitigation measures. However, these mitigation measures may not reduce cumulative emissions of ROC, CO, or NOx below SCAQMD significance thresholds. No additional feasible cumulative mitigation measures are available.

Residual Impacts

Cumulative Impact AQ-1 would remain significant and unavoidable.

6.2.9 Cultural and Paleontological Resources

6.2.9.1 Seven Oaks Dam and Reservoir Construction Area

The Project is the only project identified that could affect cultural resources in the Seven Oaks Dam and Reservoir Construction Area, therefore cumulative impacts are not anticipated.

6.2.9.2 Santa Ana River Construction Area

Cultural resources in this construction area could be affected by the Project, Wash Plan, Master Plan, EBX, Restoration Project, and BO activities.

Cumulative Impact CR-1. *The Project and related projects could cause a significant adverse change in the significance of a historical or archaeological resource, destroy a unique paleonotological resource, or disturb human remains.*

The number of archaeological sites, historic structures, and other cultural resources is finite. Therefore, any project that has the potential to either disturb an archaeological site, paleontologic resource, or human remains, or affect the integrity of a historic structure, would have the potential to contribute to cumulative impacts. Project sites located close to water courses, estuaries, or the shoreline (such as those projects described in section 6.2.1) are generally considered to be within prehistorically sensitive areas, as Native American settlements were most often located close to available food resources and fresh water. Such areas often contain prehistoric archaeological sites, some of which may contain human remains. Project sites along water courses are also considered to be within historically sensitive areas, since early farmers, ranchers, and miners settled near fresh water. They often left behind old aqueducts, irrigation canals, travel routes, homesteads, and other historic structures.

The majority of the projects described above would involve either ground disturbance from new construction, modification to existing structures (some of which are potentially historic), or changes in the existing operation of a facility, and would therefore have the potential to disturb either a known or previously unidentified historic, archaeological, or paleontological resource or human remains. This would be a significant cumulative impact.

Mitigation Measures

MM Cumulative CR-1: Individual review of each of the related projects under CEQA would likely result in the identification of any significant cultural resource impacts and provide mitigation to reduce or avoid impacts.

Residual Impacts

It is not certain that all significant cumulative impacts could be successfully mitigated, given the potentially large amount of ground disturbance involved with the Project and related projects. Therefore, potential cumulative impacts on cultural resources would remain significant.

6.2.9.3 Devil Canyon Construction Area

The Project is the only project identified that could affect cultural resources in the Devil Canyon Construction Area, therefore cumulative impacts are not anticipated.

6.2.9.4 Lytle Creek Construction Area

The Project is the only project identified that could affect cultural resources in the Lytle Creek Construction Area, therefore cumulative impacts are not anticipated.

6.2.9.5 Santa Ana River

The Project would not impact this resource in this geographic area.

6.2.9.6 San Bernardino Basin Area

The Project would not impact this resource in this geographic area.

6.2.9.7 Muni/Western Service Areas

Cultural resources in the Muni/Western service area could be affected by the Project, Master Plan, and EBX.

Cumulative Impact CR-2. *The Project and related projects would have indirect significant impacts related to growth and development in the service areas.*

These indirect impacts are described in Chapter 4. Both San Bernardino County and Riverside County identify significant impacts to cultural resources due to growth and development (see section 4.2.8).

Mitigation Measures

MM Cumulative CR-2: The Natural Resources Element of the San Bernardino County General Plan contains a number of policies to mitigate impacts to cultural resources (see section 4.2.8). Generally, these policies require cultural resource field surveys with all project submittals; the preparation of cultural resource overlays for all existing Planning Areas not covered by an overlay map; preliminary cultural resource reviews by the Archaeological Information Center; the cataloging of artifacts discovered as a result of a cultural resource investigation; and notification to the Native American Heritage Commission if projects require the excavation of Native American archaeological sites.

The Multipurpose Open Space Element of the Riverside County General Plan also contains relevant policies that would mitigate impacts to cultural resources. The Riverside County General Plan Draft Program EIR identifies additional mitigation measures including compliance with State Health and Safety Code Section 7050.5 that requires disturbance of an area to cease where human remains have been encountered until the Riverside County Coroner has made a determination of the origin and disposition; avoidance of cultural resources where possible, where avoidance of cultural resources is not possible, the planting of deterrent plant species such as prickly pear cactus shall be completed to minimize public availability to the site; and additional measures if avoidance and/or preservation of cultural resources is not possible, such as having a participant-observer present from the appropriate Indian Band or Tribe during archaeological testing or excavation of a project site.

Residual Impacts

Despite the policies and mitigation measures in the San Bernardino County and Riverside County General Plans, significant cumulative impacts to cultural resources could still occur given the potentially large amount of ground disturbance related to growth and development.

6.2.10 Noise

6.2.10.1 Seven Oaks Dam and Reservoir Construction Area

The Project is the only project identified that could have noise impacts in the Seven Oaks Dam and Reservoir Construction Area, therefore cumulative impacts are not anticipated.

6.2.10.2 Santa Ana River Construction Area

Noise impacts in this construction area could result from the Project, Wash Plan, EBX, Restoration Project, and BO.

Cumulative Impact NOI-1. *The Project and related projects could result in a significant, temporary increase in ambient noise levels in the Santa Ana River Construction Area.*

The Project could cause noise levels in the vicinity of construction to temporarily exceed 70 dBA, a significant impact. If another project were to be constructed at the same time in the same area, the noise impact from the two projects may be slightly louder than the noisier project because of the manner in which noise from multiple sources are additive. Cumulative impacts would thus be significant. However, if another project were to occur at the same time, the duration of the impact would be reduced by the duration of the overlap.

Mitigation Measures

Project-specific **MM NOI-1**, which includes noise barriers, limiting construction hours, and providing advanced notification to affected residents, discussed in section 3.10, would reduce Project noise impacts but these impacts would remain significant. It is anticipated that related projects would also take measures to avoid noise impacts.

Residual Impacts

Residual cumulative noise impacts would be significant and unavoidable. Though MM NOI-1 would reduce noise levels, noise impacts of the Project would remain significant. Likewise, it is possible that noise impacts from related projects may also be significant and unavoidable even with mitigation.

6.2.10.3 Devil Canyon Construction Area

The Project is the only project identified that could affect noise sensitive receptors in the Devil Canyon Construction Area, therefore cumulative impacts are not anticipated.

6.2.10.4 Lytle Creek Construction Area

The Project is the only project identified that could affect noise sensitive receptors in the Lytle Creek Construction Area, therefore cumulative impacts are not anticipated.

6.2.10.5 Santa Ana River

The Project would not impact this resource in this geographic area.

6.2.10.6 San Bernardino Basin Area

The Project would not impact this resource in this geographic area.

6.2.10.7 Muni/Western Service Areas

Noise levels in the Muni/Western service areas could be affected by the Project, Master Plan, and EBX.

Cumulative Impact NOI-2. *The Project and related projects would have significant indirect effects related to growth and development in the service areas.*

These indirect impacts are described in Chapter 4. Both San Bernardino County and Riverside County identify significant noise impacts due to growth and development (see section 4.2.9).

Mitigation Measures

MM Cumulative NOI-1: The Noise Element of the San Bernardino County General Plan contains policies that designate certain areas as noise impacted and disallow development in these areas without appropriate analysis of noise impacts and adequate mitigation; support methods of reducing vehicular noise; enforce the Hourly Noise Level Performance Standards for stationary and other locally regulated sources; limit truck traffic in residential and commercial areas to designated truck routes; and limit construction, delivery, and through truck traffic to designated routes (see section 4.2.9).

Policies found in the Noise Element of the Riverside County General Plan aim to protect noise sensitive land uses from noise impacts. The Riverside County General Plan Draft Program EIR identifies the following mitigation measures to further reduce significant impacts to less than significant: compliance with the County's noise ordinance construction hours; approval by the County of a construction-related noise mitigation plan prior to the issuance of grading permits for development adjacent to occupied noise-sensitive land uses; conformance to the noise exposure standard of 65 dBA L_{dn} for outdoor noise in noise-sensitive outdoor activity areas and 45 dBA L_{dn} for indoor noise in bedrooms; completion of acoustical studies and identification of mitigation measures to reduce noise impacts for specified development; and limitations on the siting of industrial development to minimize impacts to commercial/residential land uses.

Residual Impacts

Despite these mitigation measures, significant cumulative noise impacts would still occur in San Bernardino County.

6.2.11 Aesthetics

6.2.11.1 Seven Oaks Dam and Reservoir Construction Area

The Project is the only project identified that could affect aesthetics in the Seven Oaks Dam and Reservoir Construction Area, therefore cumulative impacts are not anticipated.

6.2.11.2 Santa Ana River Construction Area

Aesthetics in the SAR Construction Area would be affected by the Project, Wash Plan, EBX, and Restoration Project.

Cumulative Impact AES-1. *The Project and related projects would degrade the existing visual character of the site and its surroundings, but impacts would be less than significant.*

Project-related impacts to aesthetics are due to construction. The majority of proposed pipelines would be installed underground and pre-existing surface conditions would be restored upon completion of construction activities. The intake structure and trash rack of the Proposed Plunge Pool Pipeline would be in an area that is not visible from any public vantage point and in a location characterized by the presence of existing water works.

The aesthetic impacts of the EBX and Restoration Project would also be due to construction and would be temporary. Implementation of the Wash Plan could result in changes in land use patterns, excavation and grading, and clearing open space areas to facilitate mining in the SAR Wash. While adverse, these changes would still be in the general aesthetic character of the SAR Wash area and cumulative impacts would be less than significant. No mitigation is required.

6.2.11.3 Devil Canyon Construction Area

The Project is the only project identified that could affect aesthetics in the Devil Canyon Construction Area, therefore cumulative impacts are not anticipated.

6.2.11.4 Lytle Creek Construction Area

The Project is the only project identified that could affect aesthetics in the Lytle Creek Construction Area, therefore cumulative impacts are not anticipated.

6.2.11.5 Santa Ana River

Segment A – Upstream of Seven Oaks Dam

The Project is the only project identified that could affect aesthetics in the SAR above Seven Oaks Dam, therefore cumulative impacts are not anticipated.

Segment B – Seven Oaks Dam to Cuttle Weir

Aesthetic in the SAR would be affected by the Project and BO as both affect river flow. However, these projects do not interact in a manner that would have cumulative impacts. The Project acts to decrease flows in River Segment B. Environmental habitat releases per the BO would periodically increase flows (approximately once every 5 years) in this river segment.

Segment C – Cuttle Weir to the Confluence with Mill Creek

Aesthetics in the SAR would be affected by the Project and Conservation District Application.

Cumulative Impact AES-2. *Combined diversions of the Project and Conservation District Application would result in a less than significant impact to aesthetics in SAR Segment C.*

As described in section 6.2.1, diversions by the Project or a combination of the Project and Conservation District Application would result in more zero-flow days (days when no flow exists) in the SAR channel and lower volume flows on days when flows occur. This increase in the number of zero-flow days associated with implementation of these projects would not noticeably change the existing visual character or quality of this segment of the river. Impacts to aesthetics would be less than significant. No mitigation is required.

Segment D – Confluence with Mill Creek to "E" Street

Aesthetics of the SAR from Mill Creek to "E" Street could be affected by the Project and Conservation District Application.

Cumulative Impact AES-2, a less than significant impact to aesthetics due to the change in river flow, would apply to River Segment D.

As described in section 6.2.1, decreased flow on the SAR, caused by combined diversions per the Project and Conservation District Application and decreased flow from Mill Creek related to the Conservation District Application could slightly increase the number of zero-flow days. This increase in the number of zero-flow days would not noticeably change the existing visual character or quality of this segment of the river and impacts to aesthetics would be less than significant. No mitigation is required.

Segment E – "E" Street to the RIX and Rialto WWTP Outfall

Aesthetics of the SAR from Mill Creek to "E" Street could be affected by the Project, Conservation District Application, and Pilot Dewatering Program.

Cumulative Impact AES-2, a less than significant impact to aesthetics due to the change in river flow, would also apply to River Segment E.

From "E" Street to the RIX and Rialto effluent outfall, the river traverses a highly urbanized section of Riverside County, is channelized, and confined between levees. Due to the presence of a number of tributaries, this segment typically contains surface flow throughout the year. The wetted area of this river segment is generally contained in a braided channel, with the surrounding riverbed and banks remaining dry. It is estimated that there would be a reduction in flow as a result of combined diversions per the Project and Conservation District Application (see section 6.2.1). Such a reduction would not induce noticeable changes in the visual characteristics of the river area and impacts to aesthetics would be less than significant. No mitigation is required.

Segment F – RIX and Rialto WWTP Outfall to Riverside Narrows

Aesthetics of the SAR from the RIX and Rialto WWTP Outfall to Riverside Narrows could be affected by the Project, Conservation District Application, and RIX Water Recycling Project.

Cumulative Impact AES-3. *The Project and related projects would reduce baseflow in the river segment from the RIX and Rialto WWTP Outfall to Riverside Narrows, which would be a significant impact*.

This section of river has many pleasing aesthetic qualities, such as an extensive area of riparian vegetation. This river segment is also very visible by the general population because it runs through a highly urbanized section of Riverside County. As shown in Table 6.2-1, with related projects, median non-storm day baseflow in this river segment could decrease from 74 cfs to 46 cfs (about 38 percent). This is a significant aesthetic impact.

Mitigation Measures

Various potential mitigation measures involving changes in the timing, pattern, and volume of diversions were assessed. However, no feasible mitigation measures were identified that would avoid a significant change in river flow and, in turn, aesthetics on non-storm days, while still allowing for water sales and recycling and a consistent and reliable diversion by either the Project or per the Conservation District Application.

Residual Impacts

Cumulative Impact AES-3 is significant and unavoidable.

Segment G – Riverside Narrows to Prado Dam

The Project does not affect flows in this river portion and thus would not contribute to cumulative impacts in this segment of the river.

6.2.11.6 San Bernardino Basin Area

The Project would not impact this resource in this geographic area.

6.2.11.7 Muni/Western Service Areas

Aesthetics in the Muni/Western service area could be affected by the Project, Master Plan, and EBX.

Cumulative Impact AES-4. *The Project and related projects would have significant indirect effects related to growth and development in the service areas.*

These indirect impacts are described in Chapter 4. Both San Bernardino County and Riverside County identify significant aesthetic impacts due to growth and development (see section 4.2.10).

Mitigation Measures

MM Cumulative AES-1: A number of policies in the Open Space/Recreation/Scenic section of the Natural Resources Element of the San Bernardino County General Plan would reduce impacts to less than significant. These policies include the use of Resource Overlay Maps to ensure that scenic corridor standards preserve existing open space or that the design of the development would blend in to the natural setting (see section 4.2.10).

Policies in the Riverside County General Plan would mitigate a portion of the significant aesthetic impacts. The Riverside County General Plan Draft Program EIR states that all development projects shall be subject to the requirements of all relevant guidelines, including the community center guidelines (Appendix J of the Riverside County General Plan); Riverside County supervisorial district design and landscape guidelines; and all applicable standards, policies, guidelines, and/or regulations of the County of Riverside or other affected entities pertaining to scenic vistas/aesthetic resources (Riverside County 2002). The County of Riverside Ordinance No. 655, which regulates light pollution, is also identified in the Riverside County General Plan Draft Program EIR as further mitigation to reduce light and glare impacts. Lastly, five additional mitigation measures are identified which further restrict building exterior lighting and street lighting and help ensure the preservation of "dark skies" (see section 4.2.10).

Residual Impacts

Despite these mitigation measures, significant cumulative impacts to aesthetics related to conversion of open space to urban uses would still occur in Riverside County.

6.2.12 Hazardous Materials and Groundwater Contamination

Hazards and hazardous materials would be issues for the Project, Wash Plan, Master Plan, EBX, Restoration Project, Conservation District Application, Pilot Dewatering Program, Riverside-Corona Feeder, and North/South Lake Area projects.

6.2.12.1 Seven Oaks Dam and Reservoir, SAR, Devil Canyon, and Lytle Creek Construction Areas

Cumulative Impact HAZ 1. *The Project, in combination with related projects, could create a significant hazard to the environment through the routine transport, use, and disposal of hazardous materials and waste used during grading and construction. Such hazards could occur through upset and accident conditions involving the cumulative release of construction equipment-related hazardous materials into the environment, resulting in significant impacts.*

Although the probability is relatively low, accidental spills or leaks of pollutants such as fuels, lubricants, and hydraulic fluid during equipment operation, refueling, or maintenance could directly enter local drainages and creeks, including the SAR (e.g., while working directly adjacent to the river). Such spills could occur during Project construction, as well as during construction under most of the related projects, including the Wash Plan, Master Plan, EBX, Restoration Project, Conservation District Application, Riverside-Corona Feeder, and North/South Lake Areas projects. Individual impacts of small spills would be short term and less than significant; however, because many creeks and drainages enter the SAR, simultaneous multiple small spills could cumulatively result in significant impacts to water quality of the SAR. Similarly, multiple large spills that might simultaneously enter these drainages and waterways could have long-term, significant cumulative impacts on water quality of the SAR. Therefore, the Project, in combination with related projects, could create a significant cumulative hazard to the environment through the routine transport, use, and disposal of hazardous materials used during grading and construction.

Mitigation Measures

Project-specific **MM HAZ-1**, **MM HAZ-2,** and **MM HAZ-3**, discussed in section 3.12, would reduce Project impacts due to hazardous materials spills. MM HAZ-1 requires concrete trucks to be washed in designated areas; MM HAZ-2 requires inspection of equipment for leaks; and MM HAZ-3 requires preparation of a spill prevention and containment plan. Because other projects would also be subject to environmental compliance regulations, including CEQA, it is anticipated that related projects would implement mitigation measures similar to the Project.

Residual Impacts

Residual impacts would be less than significant because MM HAZ-1, MM HAZ-2, and MM HAZ-3, as well as similar mitigation measures implemented by other projects, would reduce the potential for hazardous materials spills.

6.2.12.2 San Bernardino Basin Area

Hazards and hazardous material issues in the SBBA could be affected by the Project, Wash Plan, Master Plan, Restoration Project, Conservation District Application, Pilot Dewatering, Riverside-Corona Feeder, and North Lake Area and South Lake Area Projects.

Cumulative Impact HAZ-2. *Implementation of the Project and related projects may cause perchlorate, TCE, and PCE plumes to affect wells that would not be affected under No Project conditions. Additionally, operations of the Project and related projects may expand the footprint of the perchlorate plume. This is a significant impact.*

As discussed in section 3.12.1, contaminant plumes of perchlorate, TCE, and PCE are present in groundwater in the SBBA. Groundwater modeling indicates that contaminant concentrations would vary over the 39-year modeling period throughout the SBBA, under No Project and Project conditions. Implementation of the Project would locally and intermittently result in plumes moving and affecting wells that would otherwise not be affected. Also, under Project operations, the footprint of the perchlorate plume could expand, resulting in significant impacts.

Similarly, related projects that involve groundwater recharge or pumping in the SBBA, such as the Wash Plan, Restoration Project, Conservation District Application, Pilot Dewatering, Riverside-Corona Feeder, and North/South Lake projects, could locally and intermittently result in movement of plume boundaries, thereby affecting wells that would otherwise not be affected and could also result in the plume boundaries expanding, resulting in significant impacts. Therefore, Project impacts, in combination with related project impacts, would be locally and intermittently significant.

Mitigation Measures

Project-specific **MM HAZ-4**, discussed in section 3.12, would minimize the extent of, and migration of, contaminant plumes related to the Project. It is uncertain whether related projects would implement measures to prevent contaminant plume movement.

Residual Impacts

Residual cumulative hazardous materials impacts would be significant and unavoidable. Though MM HAZ-4 would limit changes to contaminate plume boundaries from the Project, impacts would remain significant. Likewise, mitigation measures, if implemented by related projects, may not be able to avoid significant adverse contaminant plume movement.

6.2.12.3 Muni/Western Service Areas

Cumulative Impact HAZ-3. *The Project and related projects would have significant indirect effects related to growth and development in the service areas.*

Growth in San Bernardino County could allow the continued growth of hazardous waste generators in all areas of the County. This growth could result in significant impacts related to hazardous waste use and storage. Primary impacts of concern include release of contaminants through improper containment or incineration, contamination of water resources, and increased public health and safety hazards associated with hazardous waste transport activities. The Project would accommodate a portion of the projected growth and, therefore, would contribute to these significant impacts.

In Riverside County, no significant impacts related to hazardous materials are identified in the Riverside County General Plan Draft Program EIR. However, similar impacts to those identified in San Bernardino County could be anticipated in Riverside County.

Mitigation Measures

MM Cumulative HAZ-1 The San Bernardino County General Plan includes policies to reduce impacts related to hazardous materials. Specifically, the Hazardous Waste/Materials section of the Man-made Hazards Element includes policies HW-1 through HW-26. In general, these measures establish an effective and expeditious permitting process for siting hazardous waste facilities that includes extensive public participation; ensures the protection of public health and safety when siting needed hazardous waste facilities; develops a uniform set of criteria for the siting of hazardous waste facilities in the County, including a requirement that facilities be sited only in areas with a zoning overlay of Specified Hazardous Waste Facility; and ensures coordination among agencies and County departments in the review of all hazardous waste applications within the County.

Residual Impacts

The policies contained in the San Bernardino County General Plan would mitigate the identified significant hazardous materials impacts to a level of less than significant.

6.2.13 Public Services, Utilities, and Transportation

6.2.13.1 Seven Oaks Dam and Reservoir Area

The Project is the only project identified that could affect public services to the Seven Oaks Dam and Reservoir Area, therefore cumulative impacts are not anticipated.

6.2.13.2 Santa Ana River Construction Area

Public services, utilities, and transportation in the SAR Construction Area would be affected by the Project, Wash Plan, EBX, and Restoration Project.

Cumulative Impact PS-1: *Project construction and construction of the EBX project could result in significant disruption of water supplies from water utilities in the Santa Ana River Construction Area.*

Both construction of the Project and EBX would involve connections to existing water utilities in the SAR Construction Area. As part of construction of both of these projects, it would be necessary to temporarily take multiple pipelines out of service. Deliveries from various pipelines would be disrupted for several weeks and, in some cases, several months, a significant cumulative impact.

Mitigation Measures

MM Cumulative PS-1: Muni/Western will schedule construction of the Project and EBX in different periods; or

Muni/Western will arrange to use facilities of the Santa Ana River-Mill Creek Cooperative Water Project Agreement to make deliveries to local users that would otherwise receive water from utilities affected during construction of the Project and EBX.

Residual Impact

With implementation of MM Cumulative PS-1, cumulative impacts to water utilities would be less than significant because MM Cumulative PS-1 would ensure continuation of water deliveries.

Cumulative Impact PS-2. *The Project, in combination with the identified related project, would cause an increase in traffic that is substantial in relation to existing traffic load and roadway capacity.*

Project impacts relate to construction traffic and these impacts would be temporary. The public service impacts of the EBX and Restoration Project also relate to construction traffic and would be temporary. Implementation of the Wash Plan could result in changes in land use patterns and thereby change general traffic levels and patterns.

Because construction traffic associated with the related projects would be temporary and unlikely to overlap, impacts would be less than significant. Also, these related projects would be subject to future CEQA review and mitigation, further reducing the likelihood of significant cumulative impacts. No mitigation is necessary.

6.2.13.3 Devil Canyon Construction Area

Because the Project is the only project identified that could affect public services in the Devil Canyon Construction Area, cumulative impacts are not anticipated.

6.2.13.4 Lytle Creek Construction Area

Because the Project is the only project identified that could affect public services in the Lytle Creek Construction Area, cumulative impacts are not anticipated.

6.2.13.5 Santa Ana River

The Project would not impact this resource in this geographic area.

6.2.13.6 San Bernardino Basin Area

Public services in the SBBA could be affected by the Project, Wash Plan, Master Plan, Restoration Project, Conservation District Application, Pilot Dewatering Program, Riverside-Corona Feeder, and North/South Lake project.

Cumulative Impact PS-3. *Change in the pattern of groundwater recharge from operations of the Project and related projects could lower average groundwater levels at wells outside the Pressure Zone, thus impairing groundwater production.*

Based on modeling results, it is estimated that the Project could result in lower average static groundwater levels at particular wells located outside of the Pressure Zone (see section 3.13 and Appendix B for more detail), a significant impact. Likewise other projects that involve groundwater spreading could also result in lower water levels at groundwater production wells, a significant impact.

Mitigation Measures

Project-specific **MM PS-12**, evaluation of groundwater levels and selective groundwater spreading, discussed in section 3.13, would reduce groundwater level changes of the Project. It is uncertain whether related projects would implement measures to avoid groundwater level impacts on production wells.

Residual Impacts

Residual cumulative impacts would be significant and unavoidable. Though MM PS-12 would reduce groundwater level changes due to the Project, this mitigation may not result in groundwater level changes, due to all related projects, being less than significant.

6.2.13.7 Muni/Western Service Areas

Public services in the Muni/Western service area could be affected by the Project, Master Plan, and EBX.

Cumulative Impact PS-4. *The Project and related projects would have indirect effects related to growth and development in the service areas.*

These indirect impacts are described in Chapter 4. Impacts related to solid waste would be avoided or reduced to less than significant through implementation of San Bernardino County and Riverside County general plan policies (see section 4.2.12), and no additional mitigation for solid waste is required. Impacts to water utilities could be avoided or reduced to less than significant in Riverside County, while San Bernardino County general plan policies would reduce but not avoid impacts to water utilities. San Bernardino County and Riverside County general plan policies, in combination with SCAG plans and policies, would also reduce, but not avoid, significant impacts to traffic.

Mitigation Measures

MM Cumulative PS-2: The San Bernardino County General Plan contains goals and policies related to raw water treatment in the Water section of the Natural Resources Element. These policies, in general, help support the goal of planning and constructing new water treatment systems on the basis of the County's adopted growth forecast and focus upon the conservation of water which would help reduce the need for additional facilities.

In San Bernardino County, impacts to wastewater systems would be mitigable through the implementation of General Plan policies WW-1 through WW-10, which would ensure that the expansion or construction of wastewater services is in compliance with the County's long-term environmental planning goals and that, once constructed, the facilities are monitored and regularly assessed by the County and other agencies for efficient operation and compliance with environmental protection requirements.

In San Bernardino County, impacts to transportation and circulation would be reduced, but not necessarily entirely mitigated to less than significant. The San Bernardino County General Plan contains a number of policies in the Transportation/Circulation section to mitigate traffic related impacts. In summary, these policies protect and increase the designed vehicular capacity of existing roadways; implement appropriate design standards for all highways; require safe and efficient alternative transportation facilities; strive to achieve Level of Service C on existing roadways, in part through approving development proposals only when consistent with this goal; coordinate financial plans for transportation system improvements with other agencies; designate potential evacuation routes in the County; improve public transit through coordination with other jurisdictions and agencies; and improve public access to new development.

The Circulation Element of the Riverside County General Plan includes policies to reduce impacts to transportation and circulation. In general, these policies would design and implement a multi-modal transportation system that will serve projected future travel demand, minimize congestion, achieve the shortest feasible travel times and distances, and address future growth and development in the County. The Riverside County General Plan Draft Program EIR also includes mitigation measures including the requirement that the County require project proponents make a "fair share" contribution to required intersection and/or roadway improvements; the requirement that the County shall ensure sufficient right-of-way is reserved on critical roadways and intersections to fulfill design standards needed to provide appropriate levels of service; and the requirement that the County shall add a transportation corridor to its General Plan Circulation Element, if feasible, showing a connection between Interstate 15 and the Orange County freeway system, and complete that portion of the Community Environmental Transportation Acceptability Process program involving the bi-County corridor to Orange County as a means of relieving traffic congestion along State Route 91.

The SCAG RTP has identified investments that will help the region accommodate growth. These include Transportation Demand Management strategies and actions such as ridesharing, telecommuting, continued outreach and education related to available options, and traveler information systems.

Residual Impacts

Despite these mitigation measures, raw water treatment impacts in San Bernardino County and transportation impacts in both San Bernardino and Riverside counties would remain significant.

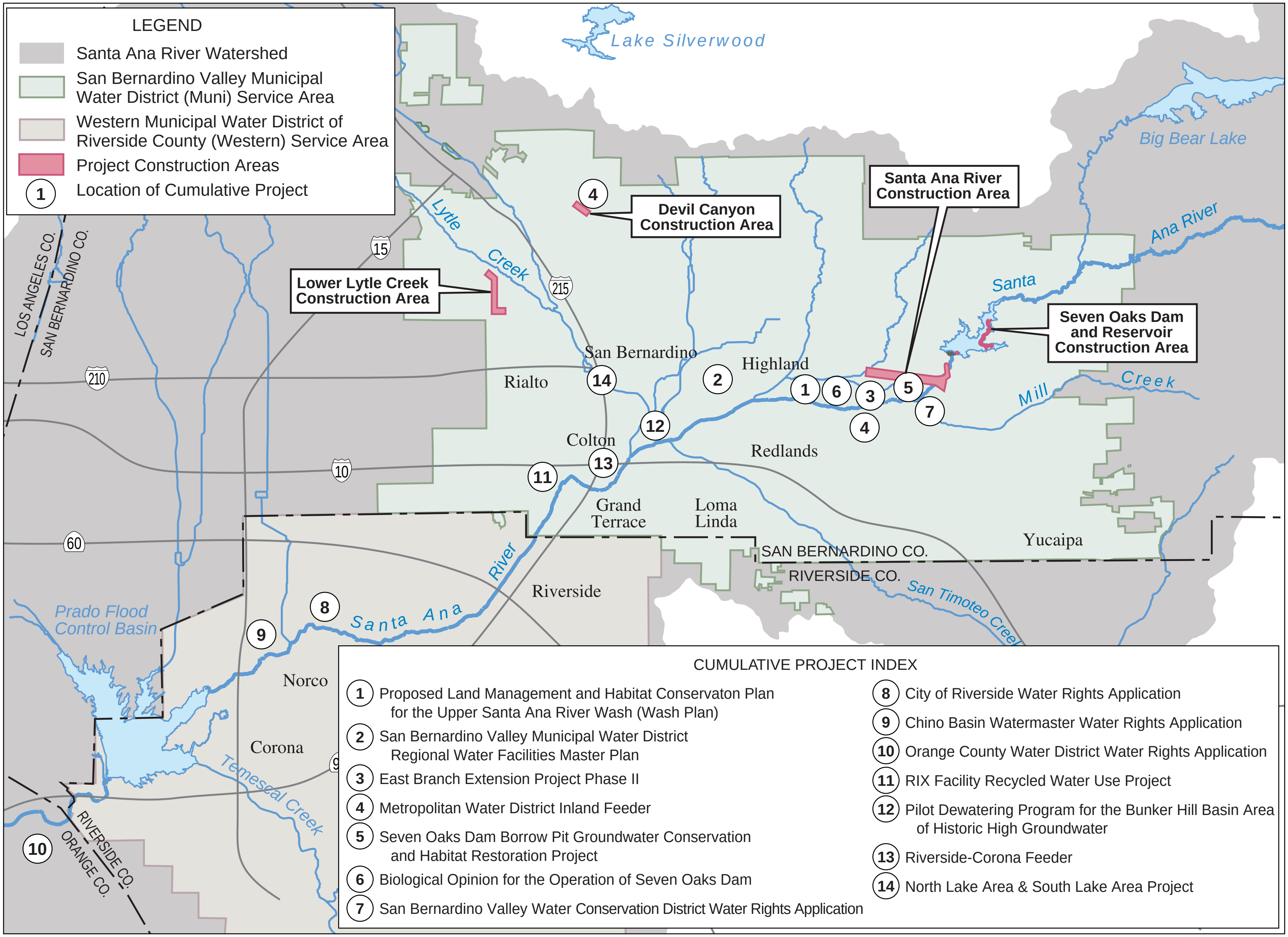


Figure 6.1-1. Location of Cumulative Projects

7.0 OTHER CEQA CONSIDERATIONS

This chapter addresses other CEQA considerations, including whether the Project would have unavoidable significant environmental impacts and involve the irreversible or irretrievable commitment of resources.

7.1 UNAVOIDABLE SIGNIFICANT IMPACTS

Implementation of the Project would result in unavoidable significant impacts in a number of resource areas. These unavoidable impacts, all of which are listed immediately below, would be associated with both the direct effects of the Project and cumulative effects of the Project when combined with other projects. Details for each of the direct impacts are contained in the respective resource sections of Chapter 3 while the cumulative impacts are described in detail in Chapter 6.

Surface Water Hydrology and Water Quality (Section 3.1):

- Impact SW-7
- Cumulative Impact SW-8
- Cumulative Impact SW-11

Groundwater Hydrology and Water Quality (Section 3.2):

- Impact GW-4
- Impact GW-5
- Cumulative Impact GW-3
- Cumulative Impact GW-4
- Cumulative Impact GW-5

Biological Resources (Section 3.3):

- Cumulative Impact BIO-3
- Cumulative Impact BIO-4
- Cumulative Impact BIO-6
- Cumulative Impact BIO-7

Geology, Soils, and Mineral Resources (Section 3.4):

- Impact GEO-7
- Impact GEO-8
- Impact GEO-13
- Impact GEO-14
- Impact GEO-15
- Cumulative Impact GEO-1
- Cumulative Impact GEO-2

Land Use (Section 3.5):

- Cumulative Impact LU-1

Agricultural Resources (Section 3.6):

- Cumulative Impact AG-2

Air Quality (Section 3.8):

- Impact AQ-2
- Cumulative Impact AQ-1

Cultural Resources (Section 3.9):

- Impact CR-3
- Impact CR-6
- Cumulative Impact CR-1
- Cumulative Impact CR-2

Noise (Section 3.10):

- Impact NOI-2
- Impact NOI-5
- Impact NOI-6
- Cumulative Impact NOI-2
- Cumulative Impact NOI-2

Aesthetics (Section 3.11):

- Cumulative Impact AES-3
- Cumulative Impact AES-4

Hazardous Materials and Groundwater Contamination (Section 3.12):

- Impact HAZ-2
- Impact HAZ-3
- Impact HAZ-4
- Cumulative Impact HAZ-2

Public Services, Utilities, and Transportation (Section 3.13):

- Impact PS-19
- Cumulative Impact PS-3
- Cumulative Impact PS-4

7.2 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES AND IRRETRIEVABLE COMMITMENT OF RESOURCES

CEQA requires that an assessment be made of the significant irreversible environmental changes which would be caused by the Project, should it be implemented and also the irretrievable commitment of resources associated with the Project.

The Project would require consumption of fossil fuels and other natural resources such as aggregate and cement.

8.0 REFERENCES

8.1 LITERATURE CITED

AMTA (American Membrane Technology Association). 2002. "How Much Does Desalted Water Cost?" *Desalting Facts*. June 18.

APCD (Santa Barbara County Air Pollution Control District). 2002. Ambient Air Quality Standards. APCD Website: accessed June 21, 2002. Available at: http://www.sbcapcd.org/sbc/T1.htm.

Arnold, J., A. Duffield, R. Greenwood, R. Hampson, and T Van Bueren. 1987. Archaeological Resources of the Seven Oaks Dam Project, Upper Santa Ana River Locality. Greenwood & Associates. Submitted to U.S. Army Corps of Engineers.

ATSDR (Agency for Toxic Substances and Disease Registry). 2002. Public Health Assessment, Norton Air Force Base, San Bernardino, California. Available at: http://www.atsdr.cdc.gov/HAC/PHA/nortonafb/nor_pl.html.

Bean, L.J. 1978. Cahuilla. In R.F. Heizer, vol. ed., *Handbook of North American Indians*, Vol. 8: California: 575-587. Washington, D.C.: Smithsonian Institution.

Bean, L.J., and F.C. Shipek. 1978. Luiseño. In: R.F. Heizer, vol. ed., *Handbook of North American Indians*, Vol. 8: California: 550-563. Washington, D.C.: Smithsonian Institution.

Bean, L.J., and C.R. Smith. 1978a. Serrano. In: R.F. Heizer, vol. ed., *Handbook of North American Indians*, Vol. 8: California: 570-574. Washington, D.C.: Smithsonian Institution.

_____ . 1978b. Gabrielino. In R.F. Heizer, vol. ed., *Handbook of North American Indians*, Vol. 8: California: 538-549. Washington, D.C.: Smithsonian Institution.

Bjerrrum, L. 1963. *Allowable Settlement of Structures*. Proceedings of European Conference on Soil Mechanics and Foundation Engineering, Wiesbaden, 3, 135-137.

BLM (Bureau of Land Management). 1996. In: USFWS. 1998. *Final Rule To List the San Bernardino Kangaroo Rat as Endangered*, Federal Register: Volume 63.

Brock, J., J. Elliott, B. Resnick, and W. Sawyer. 1986. *Santa Ana River Upstream Alternatives, Cultural Resources Survey*. Ecos Management Criteria, Inc. Submitted to U.S. Army Corps of Engineers.

CA DHS (California Department of Health Services). 2003. Perchlorate in California Drinking Water: Monitoring Update. Available at: www.dhs.ca.gov/ps/ddwem/chemicals/perchl/ monitoringupdate. Updated October 8, 2003.

CCC (California Coastal Commission). 2003a. Draft Desalination Task Force Report. September.

_____ . 2003b. Draft Report on Seawater Desalination and the California Coastal Act. August.

California Geological Survey. 2002a. Alquist Priolo Earthquake Fault Zones. Available at: http://www.consrv.ca.gov/cgs/rghm/ap/index.htm.

_____ . 2002b. Seismic Hazards Mapping Program. Available at: http://gmw.consrv.ca.gov/shmp/affected.htm#socal.

California Office of Planning and Research. 2003. RIX Facility Recycled Water Use Project. Available at: http://www.ceqanet.ca.gov/Doc_Description.asp?DocPK=551012. Accessed September 23, 2003.

CARB (California Air Resources Board). 2004. Emissions by Summary Category Reports (South Coast Air Basin). CARB Website: accessed March 12, 2004. Available at: http://www.arb.ca.gov/app/emsinv/emssumcat.php.

_____ . 2002a. News Release – Air Board Passes Stronger Particulate Matter Standards. 07-28. June 20.

_____ . 2002b. Top 4 Measurements and Days Above the Standard. CARB Website: accessed August 6, 2002. http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4.d2w/Branch.

_____ . 2001. Letter on Verification of Emission Reductions from the Use of PuriNOx Fuel. Criteria Pollutants Branch.

Castillo, E.D. 1978. The Impact of Euro-American Exploration and Settlement. In *California*, ed. By R.F. Heizer. Pp. 99-127. *Handbook of California Indians*, Vol. 8. Washington: Smithsonian Institution.

CDC (California Department of Conservation). 2004. Division of Land Resource Protection. County Conversion Tables, County, Regional & Statewide Farmland Conversion Tables. Available at: http://www.consrv.ca.gov/DLRP/fmmp/stats_reports/county_conversion_tables. htm Accessed on March 9, 2004.

_____ . 2003. Farmland Mapping and Monitoring Program, Division of Land Resource Protection. Farmland Mapping and Monitoring Program Categories. Available at: http://www.consrv.ca.gov/dlrp/FMMP/mccu/map_categories.htm. Accessed on March 1, 2004.

_____ . 2002. Williamson Act Status Reports, 1997-1998 Report of City and County Data. Available at: www.consrv.ca.gov/DLRP/lca/stats_reports/index.htm. Accessed on October 17, 2002.

CDMG (California Division of Mines and Geology). 1997. Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117.

_____ . 1995. Mineral Land Classification of a Part of Southwestern San Bernardino County: The San Bernardino Valley Area, California, DMD Open-File Report 94-08.

_____ . 1994. Fault Activity Map of California and Adjacent Areas, with Locations and Ages of Recent Volcanic Eruptions. Compiled by C.W. Jennings. Scale 1:750,000.

_____ . 1987. Mineral Land Classification of the Greater Los Angeles Area, Special Report 143, Classification of Sand and Gravel Resource Areas, San Bernardino Production-Consumption Region.

_____ . 1979. State of California Special Studies Zones, Yucaipa and Redlands Quadrangles. Scale 1:24,000.

_____ . 1976. Geologic Hazards in Southwestern San Bernardino County, California, Special Report 113. Prepared by Fife, D.L., Rodgers, D.A., Chase, G.W., Chapman, R.H. and Sprotte, E.C.

City of Highland. 1992. City of Highland General Plan and Environmental Impact Report.

_____ . 1987. City of Highland General Plan and Environmental Impact Report. November.

City of Huntington Beach. 2002. Draft EIR for the Poseidon Seawater Desalination Project. September.

City of Rialto. 1992a. City of Rialto General Plan. March.

_____ . 1992b. City of Rialto General Plan Update, Final EIR, June.

City of Riverside. City of Riverside Public Utilities, 2002 Water Quality Annual Report.

City of San Bernardino. 1989. City of San Bernardino General Plan.

CIWMB (California Integrated Waste Management Board). 2003. Results of Screening Analyses of 224 California Municipal Solid Waste Landfills. December.

County of Riverside. 2003a. Western Riverside County Multi-Species Habitat Conservation Plan. June.

_____ .2003b. County of Riverside General Plan. October.

_____ . 2002. Riverside County General Plan Draft Program Environmental Impact Report. August.

County of San Bernardino. 2002a. Countywide Integrated Waste Management Plan Five Year Review Report. Department of Public Works Solid Waste Management Division. August 2002.

_____ . 1989a. San Bernardino County General Plan. Adopted July 1989. Revised September 2002.

_____ . 1989b. County of San Bernardino General Plan Final Environmental Impact Report. April.

Danskin, W.R., McPherson, K.R., and Woolfenden, L.R. No Date. Hydrology, Description of Computer Models, and Evaluation of Selected Water Management Alternatives in the San Bernardino Area, California. USGS draft in preparation.

De Barros. 1993. Cultural Resources Inventory and Evaluation of the Santa Ana River Hydroelectric Project. Chambers Group, Inc. Submitted to Southern California Edison.

Diaz Yourman & Associates. 2003. Memo to San Bernardino Valley Municipal Water District, entitled "Geotechnical Consultation, SBVMWD Subsidence," dated November 14.

DPW (California Department of Public Works). 1934. South Coastal Basin Investigation: Geology and Groundwater Storage Capacity of Valley Fill, Bulletin No. 45.

Dutcher, L.C. and Fenzel. 1972. Groundwater outflow, Sam Timoteo-Smiley Heights area, upper Santa Ana Valley, southern California, 1927 through 1968: U.S. Geological Survey Open-File Report, 30 p.

Dutcher, L.C. and Garrett, A.A. 1963. Geologic and Hydrologic Features of the San Bernardino Area, California, with Special Reference to Underflow Across the San Jacinto Faults. USGS Water Supply Paper No. 1419.

DWR (California Department of Water Resources). 2003a. DWR ES Conference, State Water Project Water Monitoring Presentation. September.

_____ . 2003b. California's Groundwater. Bulletin 118 – Update 2003.

_____ . 2002. State Water Project Delivery Reliability Report. Final.

_____ . 2001a. Interim Department of Water Resources Water Quality Criteria for Acceptance of Non-Project Water into the State Water Project. March.

_____ . 2001b. Implementation Procedures for the Review of Water Quality from Non-Project Water Introduced into the State Water Project. March.

_____ . 1999. California State Water Project Atlas.

_____ . 1998a. Final Supplemental EIR No. 1 for the East Branch Extension Project – Phase 1. State Clearinghouse #92112068. Covering the Redesign of Portions of the San Gorgonio Pass Water Agency Water Importation Project. March.

_____ . 1998b. East Branch Extension Project – Phase 1. Final Document Approving the East Branch Extension Project – Phase 1. Final EIR. State Clearinghouse #92112068. April.

_____ . 1998c. Bulletin 160-98: The California Water Plan Update. November.

_____ . 1997. Supplemental EIR No. 1 for the East Branch Extension Project – Phase 1. Covering the Redesign of Portions of the San Gorgonio Pass Water Agency Water Importation Project. November.

_____ . 1970a. Bulletin 104-3, Meeting Water Demands in the Bunker Hill-San Timoteo Area, Geology, Hydrology, and Operation-Economics Studies, Text and Plates.

_____ . 1970b. Bulletin No. 104-5, Meeting Water Demands in the Bunker Hill-San Timoteo Area, December.

Environmental Data Resources, Inc. 2002a. The EDR Radius Map with GeoCheck. Santa Ana River Rights Application EIR, Santa Ana River Rights, Highland, CA 92346, Inquiry Number 0836658.1r, August 23.

_____ . 2002b. The EDR Radius Map with GeoCheck. Santa Ana River Spreading Grounds, San Bernardino, CA 92346, Inquiry Number 849982.15s, September 18.

_____ . 2002c. The EDR Radius Map with GeoCheck. Devil Canyon/Sweetwater Basins, San Bernardino, CA 92407, Inquiry Number 849982.17s, September 18.

_____ . 2002d. The EDR Radius Map with GeoCheck. Cactus Basins, San Bernardino, CA 92376, Inquiry Number 849982.12s, September 18.

_____ . 2002e. The EDR Radius Map with GeoCheck. Lower Lytle Creek Basins, San Bernardino, CA 92377, Inquiry Number 849982.6s, September 19.

_____ . 2002f. The EDR Radius Map with GeoCheck. Linden Ponds, San Bernardino, CA 92377, Inquiry Number 849982.5s, September 18.

_____ . 2002g. The EDR Radius Map with GeoCheck. Gravel Pits, San Bernardino, CA 92377, Inquiry Number 849982.4s, September 18.

_____ . 2002h. The EDR Radius Map with GeoCheck. Badger Basins, San Bernardino, CA 92407, Inquiry Number 849982.16r, September 18.

_____ . 2002i. The EDR Radius Map with GeoCheck. Mill Creek Spreading Grounds, San Bernardino, CA 92359, Inquiry Number 849982.14s, September 18.

_____ . 2002j. The EDR Radius Map with GeoCheck. Garden Air Creek Spreading Grounds, San Bernardino, CA 92320, Inquiry Number 849982.11s, September 19

_____ . 2002k. The EDR Radius Map with GeoCheck. Wilson Basins, San Bernardino, CA 92399, Inquiry Number 849982.8s, September 18.

_____ . 2002l. The EDR Radius Map with GeoCheck. City Creek Spreading Grounds, San Bernardino, CA 92346, Inquiry Number 849982.7s, September 18.

_____ . 2002m. The EDR Radius Map with GeoCheck. Patton Basins, San Bernardino, CA 92404, Inquiry Number 849982.13s, September 18.

_____. 2002n. The EDR Radius Map with GeoCheck. East Twin Creek Spreading Grounds, San Bernardino, CA 92404, Inquiry Number 849982.2s, September 18.

_____. 2002o. The EDR Radius Map with GeoCheck. Waterman Basins, San Bernardino, CA 92404, Inquiry Number 849982.1s, September 18.

EIP. 2004. Evaluation of the Final Rule to Designate Critical Habitat for the Santa Ana Sucker. April. Prepared for Best Best & Krieger LLP.

Espey, Huston & Associates, Inc. 1979. Predictions Relating Effective Stress and Subsidence. Press Computer Program. Houston, Texas.

Fife, D.L., Rodgers, D.A., Chase, G.W., Chapman, R.H. and Sprotte, E.C. 1976. Geological Hazards in Southwestern San Bernardino County, California. California Divisions of Mines and Geology Special Report 113.

Foster, J., J. Schmidt, C. Webber, G. Romani, and R. Greenwood. 1991. Cultural Resource Investigation: Inland Feeder Project, MWD of Southern California. Greenwood & Associates. Submitted to P&D Technologies.

Foster, J., M. Swanson, and R. Hampson. 1989. Operator Housing in the Santa Ana River Canyon. Greenwood & Associations. Submitted to USACE.

Geoscience. 1992. Evaluation of Artificial Recharge and Storage Potential of the Lytle Creek Ground Water Basins. Draft Report. October.

_____. 1991. Subsidence Thresholds in the North County Area of the Santa Clara Valley, prepared for CH2Mhill and the Santa Clara Valley Water District, October.

Grant, R., Christian, J.T., and Vanmarcke, E.H. 1974. *Differential Settlement of Buildings*. Journal of Geotechnical Engineering Division, Proceedings of ASCE, 100(GT9), 973-991.

Hanes, T. L. 1984. Vegetation of the Santa Ana River and some flood control implications. Pages 882-888 *In:* Warner, R. and K. Hendrix (eds.). *California Riparian Systems: Ecology, Conservation, and Productive Management*. Berkeley, California. University of California Press.

Hanes, T. L., R.D. Friesen, and K. Keane. 1989. "Alluvial Scrub Vegetation in Coastal Southern California." Pages 187-193. Proceedings of the California Riparian Systems Conference, September 22-24, 1988. Davis, California. USDA Forest Service Gen. Tech. Rep. PSW-110.

Hardt and Hutchinson. 1980. Development and use of a mathematical model of the San Bernardino Valley groundwater basin, California: U.S. Geological Survey Water-Resources Investigations Report 80-576, 79 p.

Hatheway, R. 1987a. *Historical and Architectural Evaluation, Seven Oaks Dam Bridges*. Greenwood & Associates. Submitted to U.S. Army Corps of Engineers.

Hatheway, R. 1987b. *History and Evaluation: The Santa Ana Canyon Road*. Greenwood & Associates. Submitted to U.S. Army Corps of Engineers.

Helm, D.C., 1975. *One-Dimensional Simulation of Aquifer System Compaction Near Pixley, California, 1), Constant Parameters*. Water Resources Research, Volume II, No. 3.

Holzer, T.L. 1984. Ground Failure Induced by Ground-Water Withdrawal from Unconsolidated Sediment. In: Geological Society of America, Reviews in Engineering Geology, Volume VI, p. 67-105.

Hornbeck, D. and H. Botts. 1988. *Seven Oaks Dam Project: Water Systems*. Area Location Systems. Submitted to U.S. Army Corps of Engineers.

International Conference of Building Officials. 1994. Uniform Building Code, Volume 2, Structural Engineering Design Provisions.

KORVE Engineering. 2003. Santa Ana River Water Rights Applications for Supplemental Water Supply EIR Traffic Impact Analysis. August.

Matti, J.C. and Carson, S.E. 1991. Liquefaction Susceptibility in the San Bernardino Valley and Vicinity, Southern California – A Regional Evaluation, U.S. Geological Survey Bulletin 1898.

Moratto, M. 1984. *California Archaeology*. Academic Press, Inc: Orlando.

Moyle, P.B. 1976. Inland Fishes of California. University of California Press, Berkeley. 405 pp.

Metropolitan (Metropolitan Water District of Southern California). 1992. Inland Feeder Project Draft Environmental Impact Report. Report No. 1064. September.

Metropolitan and USBR (U.S. Bureau of Reclamation). 1999. Salinity Management Study Final Report. Long-term Strategy and Recommended Action Plan. June.

OCWD (Orange County Water District). 2004. Water Issues Committee Meeting Agenda Item. Available at: http://www.ocwd.com/_html/agenda04_0310wic.htm. Accessed on March 26, 2004.

_____ . 2002. Notice of Preparation of an Environmental Impact Report Assessing the Orange County Water District Application to Appropriate Santa Ana River Water by Permit. August.

OEHHA (Office of Environmental Health Hazard Assessment). 2004. Announcement of Publication of the Final Technical Support Document for the Public Health Goal for Perchlorate in Drinking Water and Responses to Major Comments on the Technical Support Document: Public Health Goal for Perchlorate in Drinking Water (03-12-04). Available at: http://www.oehha.ca.gov/water/phg/perchphg31204.html. Accessed on May 10, 2004.

Omnitrans. 2004. Route Map, Route 22 North Rialto-Riverside Avenue-ARMC. Website:// http://www.omnitrans.org/routes/list/route22.shtml. Website accessed March 22, 2004.

SAIC (Science Applications International Corporation). 2004a. Results of Focused San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*) Surveys on the Santa Ana River Water Right Application for Supplemental Water Supply Project Construction Sites, San Bernardino County, California. Letter to U.S. Fish and Wildlife Service dated May 5, 2004. Contained within Technical Appendix E-2, Biological Resources.

_____ . 2004b. Phase 1 Cultural Resource Investigation for the Santa Ana River Project.

_____ . 2004c. Historic Assessment of the Francis Cuttle Weir Dam.

_____ . 2003a. Results of Focused Surveys for the Least Bell's Vireo on the Santa Ana River Water Right Application for Supplemental Water Supply Project Construction Sites, San Bernardino County, California. Letter to U.S. Fish and Wildlife Service dated December 29, 2003. Contained within Technical Appendix E-2, Biological Resources.

_____ . 2003b. Results of Focused Surveys for the Southwestern Willow Flycatcher on the Santa Ana River Water Right Application for Supplemental Water Supply Project Construction Sites, San Bernardino County, California. Letter to U.S. Fish and Wildlife Service dated December 29, 2003. Contained within Technical Appendix E-2, Biological Resources.

_____ 2003c. Results of Focused Coastal California Gnatcatcher Surveys on the Santa Ana River Water Right Application for Supplemental Water Supply Project Construction Sites, San Bernardino County, California. Letter to U.S. Fish and Wildlife Service dated December 29, 2003. Contained within Technical Appendix E-2, Biological Resources.

SANBAG (San Bernardino Associated Governments). 2003. Measure I State Route 210 - Foothill Freeway. Website:// http://www.sanbag.ca.gov/projects/mi_fwy_foothill.html. Website accessed March 22, 2004.

_____ . 2001. 2001 Regional Transportation Plan.

San Bernardino County Museum Association. 1981. Cultural Resources Assessment of the Proposed San Bernardino Valley Municipal Water District. Prepared for San Bernardino Valley Municipal Water District.

Santa Ana River Wash Coordinated Planning Activities Committee. 2000. Proposed Land Management and Habitat Conservation Plan for the Upper Santa Ana River Wash, May.

Santa Ana River Watermaster. 2003. Thirty-Second Annual Report of the Santa Ana Watermaster for October 2001 to September 2002. April.

SARWQCB (Santa Ana Regional Water Quality Control Board). 2004. Resolution No. R8-2004-0001. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate an Updated Total Dissolved Solids (TDS) and Nitrogen Management Plan for the Santa Ana Region Including Revised Groundwater Subbasin Boundaries, Revised TDS and Nitrate-Nitrogen Quality Objectives for Groundwater, Revised TDS and Nitrogen Wasteload Allocations and Revised Reach Designations, TDS and Nitrogen Objectives and Beneficial Uses for Specific Surface Waters.

_____ . 2003a. Wastewater Treatment Plants in the Santa Ana Region. Unpublished data.

_____ . 2003b. Item 11, Requests for Cleanup and Abatement Account Funds for Perchlorate Cleanup Projects. Board Meeting Minutes of April 4, 2003.

_____ . 2002. Triennial Review of the Water Quality Control Plan – Santa Ana River Basin. website: www.swrcb.ca.gov/rwqcb8/html/basin_plan_review.html. Updated July 25, 2002. Accessed April 2004.

_____ . 1995. Water Quality Control Plan Santa Ana River Basin.

SAWPA (Santa Ana Watershed Project Authority). 2002a. Santa Ana Integrated Watershed Plan. 2002 Integrated Water Resources Plan. June.

_____ . 2002b. Upper Santa Ana Regional Interceptor Planning Study. December.

SBMWD (City of San Bernardino Municipal Water District). 2003. RIX Facility Recycled Water Sales Program Environmental Impact Report.

SBVMWD (San Bernardino Valley Municipal Water Department). 2003. Change in Groundwater Storage for the San Bernardino Basin Area, Calendar Years 1934 to 2002, Executive Summary and Appendix. May.

_____ . 2001a. Addendum to the Initial Study for the Pilot Dewatering Program for the Area of Historic High Groundwater. December.

_____ . 2001b. Final Program Environmental Impact Report for the Regional Water Facilities Master Plan. February.

_____ . 1998. Initial Study, Pilot Dewatering Program for the Bunker Hill Basin Area of Historic High Groundwater. Prepared by Albert A. Webb Associates, October 20.

SBVWCD (San Bernardino Valley Water Conservation District). 2003a. Notice of preparation of a Draft Environmental Impact Report for the San Bernardino Valley Water Conservation District's Santa Ana River and Mill Creek Water Rights Application and Groundwater Management Plan and Advanced Announcement of Public Scoping Meeting on July 15, 2003.

_____ . 2003b. Letter dated February 18, 2003, to C. Patrick Milligan, President, Board of Directors, San Bernardino Valley Municipal Water District from Sterling Woodbury, President, Board of Directors, San Bernardino Valley Water Conservation District.

SBVWCD and BLM (San Bernardino Valley Water Conservation District and U.S. Bureau of Land Management). 2004. Notice of Preparation/Notice of Intent, Notice of Public Scoping Meetings. Upper Santa Ana River Wash Land Management and Conservation Habitat Plan. April.

SCAG (Southern California Association of Governments). 2001. 2001 RTP Socioeconomic Forecast. Adopted April 2001.

SCAQMD (South Coast Air Quality Management District). 2003. South Coast Air Quality Management District 2003 Draft Air Quality Management Plan. http://www.aqmd.gov/aqmp/#cap. Accessed April 3, 2003.

_____ . 2002. *Rules and Regulations*. SCAQMD Website: accessed August 6, 2002. http://www.aqmd.gov/rules/rulesreg.html.

_____ . 1999. *1999 Revised Ozone Plan*

_____ . 1997. *1997 Air Quality Management Plan.*

_____ . 1993. *CEQA Air Quality Handbook*. November.

SCEC (Southern California Earthquake Center). 1999. Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California.

Secord, P. 1985. *National Register of Historic Places Inventory – Nomination Form*. So. Cal. Edison Co. Santa Ana River Hydroelectric System. Prepared by Cotton/Beland/Associates, Inc. April 30.

Seed, H.B. and DeAlba, P. 1986. Use of SPT and CPT Tests for Evaluating the Liquefaction Resistance of Sands, in Clemence, S.P., editor, Use of In Situ Tests in Geotechnical Engineering: New York, American Society of Civil Engineers, Geotechnical Special Publication, No. 6, p. 281-302.

Seed, H.B., Idriss, I.M., and Arango, I. 1983. Evaluation of Liquefaction Potential Using Field Performance Data, Journal of the Geotechnical Engineering Division, ASCE, vol. 109, no. 3, March.

Seed, H.B. and Harder, L.F. 1990. SPT-Based Analysis of Cyclic Pore Pressure Generation and Undrained Residual Strength: Proceedings, H. Bolton Seed Memorial Symposium, BiTech Publishers, Ltd., Vancouver, v. 2, p. 351-376.

Seed, H.B. and Idriss, I.M. 1982. Ground Motions and Soil Liquefaction During Earthquakes, Earthquake Engineering Research Institute Monograph.

_____ . 1971. Simplified Procedure for Evaluating Soil Liquefaction Potential, Journal of the Soil Mechanics and Foundations Division, ASCE, vol. 97, no. SM9, p. 1249-1273.

Smith, R.L. 1980. Alluvial Scrub Vegetation of the San Gabriel River Floodplain, California. Madrono 27:126-138.

Swanson, M. and D. De Vries. 1992. Historic American Engineering Record, CA-130, Santa Ana River Hydroelectric System, San Bernardino County, CA, and Photographic Documentation. Greenwood & Associates. Submitted to ACOE.

Swift, C. C., T. R. Haglund, M. Ruiz, and R. N. Fisher. 1993. The Status and Distribution of the Freshwater Fishes of Southern California. Bull. Southern California Acad. Sci. 92(3):101-167.

SWRCB (State Water Resources Control Board). 2000. Order WR 2000-12. In the Matter of the Petitions to Revise Declaration of Fully Appropriated Streams to Allow Processing Specified Applications to Appropriate Water from the Santa Ana River. Order Amending Declaration and Directing Division of Water Rights to Proceed with Processing Specified Applications.

TRW Incorporated. 1967. Simulation Program for Planned Utilization of the San Bernardino Valley and Riverside Ground Water Basins, Second Report, Report No. 07143-6001-R000, October.

USACE (U.S. Army Corps of Engineers). 2003. HEC-RAS Version 3.1.1. Hydrologic Engineering Center.

_____ . 2002. Initial Reservoir Filling Plan, Seven Oaks Dam, San Bernardino County, California. July.

_____ . 2000. Final Biological Assessment Seven Oaks Dam, Santa Ana River Mainstem Project, San Bernardino County, California. August.

_____ . 1997. Seven Oaks Dam Water Conservation Feasibility Study Final EIS/EIR. June.

_____ . 1996. Biological Assessment Seven Oaks Dam/San Timoteo Creek Flood Control Projects. San Bernardino County, California. Prepared by Sweetwater Environmental Biologists, Inc.

_____ . 1995. Seven Oaks Dam Water Conservation Study Technical Appendices.

_____ . 1988. Santa Ana River Design Memorandum No. 1. Phase II GDM on the Santa Ana River Mainstem including Santiago Creek. Volume 1, Appendix G, Sediment Transport Study and Volume 7, Hydrology.

USDA (U. S. Department of Agriculture) Forest Service. 1988. San Bernardino National Forest Land and Resource Management Plan, Final Management Plan.

USDA Soil Conservation Service. 1980. Soil Survey of San Bernardino County, Southwestern Part, California.

US Census. 2000. 2000 Regional and County Populations, 2000 Housing Units by County and Region, 2000 Housing Construction Permits.

_____ . 1990. 1990 Regional and County Populations, 1990 Housing Units by County and Region, 1990 Housing Construction Permits.

US EPA (United States Environmental Protection Agency). 2003. Norton Air Force Base, California, EPA ID# CA4570024345. http://yosemite.epa.gov/r9/sfund/overview.nsf/ef81e03b0f6bcdb28825650f005dc4c1/671c34603a1b50098825660b007ee697?OpenDocument#descr.

USFWS (U.S. Fish and Wildlife Service). 2002. Section Seven Consultation for Operations of Seven Oaks Dam, San Bernardino County, California (1-6-02-F-1000.10) (Biological Opinion). December.

_____ . 1988. "Final Rule to List the San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*) as Endangered." *Federal Register*, Vol. 63: Number 185.

USGS (U.S. Geological Survey). 2004. Concentrations of Dissolved Solids and Nutrients in Water Sources and Selected Streams of the Santa Ana Basin, California, October 1998-September 2001. May.

_____ . 1972. Artificial Recharge in the Upper Santa Ana Valley, Southern California. USGS Open File Report 72-0261. April.

_____ . 1971. Meeting Water Demands in the Bunker Hill-San Timoteo Area: Geology, Hydrology, and Operation-Economics Studies. Memorandum Report, February.

Vann, L. Curtis. 1994. Santa Ana River Unappropriated Water Study for San Bernardino Valley Municipal Water District

Van Wormer, S. and P. Langenwalter. 1990. Lytle Creek Wash Archaeological Survey. Archaeological Resource Management Corp. Submitted to Lytle Creek Land & Resources, Inc.

Western (Western Municipal Water District of Riverside County). 2003a. Notice of Preparation, Riverside Corona Feeder Project. State Clearinghouse #2003031121. March.

_____ . 2003b. Western's Drought Proofing Projects. Available at: http://www.wmwd.com/pdfs/Projects.pdf. Accessed November 11, 2003.

_____ . 2001a. 2000 Urban Water Management Plan.

_____ .2001b. Resource Management Well Information. Retrieved from http://www.wmwd.com/wellinfo.htm August 2003. Accessed May 2004.

Western – San Bernardino Watermaster. 2002. Annual Report of the Western – San Bernardino Watermaster for Calendar Year 2001.

Woolfenden, L. R. and Koczot, K. M. 1999. Numerical Simulation of Ground-Water Flow and Assessment of the Effects of Artificial Recharge in the Rialto-Colton Basin, San Bernardino County, California, U. S. Geological Service, Unpublished Water Resources Investigation Report.

WRCC (Western Regional Climate Center). 2002. *San Bernardino, California (047723) - Period of Record Monthly Climate Summary.* Period of Record: 12/1/1927 to 12/31/2001. Desert Research Institute Website: accessed August 6, 2002. Available at: http://www.wrcc.dri.edu/cgi-bin/cliRECtM.pl?casanb.

Zembal R. and K. J. Kramer. 1984. A reconnaissance survey of biological resources of the upper Santa Ana River and Mill Creek canyons. Planning Aid Report of the U. S. Fish and Wildlife Service.

8.2 PERSONS AND AGENCIES CONTACTED OR CONSULTED

Hunter, James. City of Rialto Public Works Department. 2004.

Knur, Reinard. Geotechnologies, Inc., Burbank, California. 2003.

Lirarkos, John. San Diego Water Authority, Media Relations. 2002.

Meikle, Bruce. Associated Planner, City of Highland. 2002, 2004.

Mikland, Robert. Santa Ana Regional Water Quality Control Board. 2003.

Montag, Donn. Planner, City of Rialto. 2002, 2004.

Reiter, Robert L.. San Bernardino Valley Municipal Water District General Manager and Chief Engineer. 2002.

Squires, Jim. Sr. Associate Planner, San Bernardino County Land Use Services Department. 2002.

Steckler, Ben. Associate Planner, City of San Bernardino. 2002.

Swenerton, Ross. Chief, Environmental Review Unit 2, State Water Resources Control Board. Letter dated February 28, 2002, to San Bernardino Valley Municipal Water District and Western Municipal Water District.

Vann, L. Curtis. Consulting Civil Engineer. 2002, 2004.

Zubeck, Jeff. United States Filter. 2003.

9.0 LIST OF PREPARERS

San Bernardino Valley Municipal Water District (Muni)

Robert L. Reiter	General Manager and Chief Engineer
Randy Van Gelder	Assistant General Manager
Samuel H. Fuller	Operations Manager
Robert M. Tincher	Water Resources Manager
Raymond Brown	GIS Coordinator
Michael R. Esquer	Project Manager

Western Municipal Water District of Riverside County (Western)

John Rossi	General Manager
Don Harriger	General Manager (Retired)

L. Curtis Vann, Consulting Civil Engineer, Contractor to Muni

Curtis Vann	Construction and Operations Activities

Geoscience Support Services, Inc., Contractor to Muni

Dennis Williams	Groundwater Modeling, Task Integration Manager
Johnson Yeh	Groundwater Modeling, Task Manager
Fred Ramsing	Groundwater Modeling

Science Applications International Corporation (SAIC), Contractor to Muni

Robert Thomson	Program Manager
Christopher Clayton	Project Manager
Meredith Clement	Deputy Project Manager Surface Water Hydrology and Water Quality Public Services, Utilities, and Transportation Construction and Operations Activities
Debby Baca	Graphics
Andrew Bambauer	Surface Water Modeling
Robert Beeby	Surface Water Modeling, Task Integration Manager

Science Applications International Corporation (SAIC), Contractor to Muni (continued)

Nivan Bhuta	Surface Water Modeling
Charles Binder	Surface Water Hydrology and Water Quality Groundwater Hydrology and Water Quality
Marc Blain	Biological Resources
Lauren Brown	Biological Resources
Matt Brown	Surface Water Modeling
David Connally	Surface Water Hydrology and Water Quality
Christina Esola	Biological Resources
Lauren Everett	Public Outreach
Cay FitzGerald	Graphics
Karen Foster	Cultural Resources
Alicia Gasdick	Surface Water Hydrology and Water Quality
Albert Herson	CEQA Compliance Manager
Leslie Heumann	Historic Resources
Monica Hood	Agricultural Resources Growth-Inducing Impacts and Growth-Related Impacts
Tamara Klug	Biological Resources
Claudia Leufkens	Document Processing
Ted Mullen	Biological Resources
Thomas Mulroy	Biological Resources, Task Manager
William O'Brien	Surface Water Modeling, Task Manager
Trevor Pattison	Biological Resources
Deborah Pontifex	Document Quality Assurance and Control
Stan Powell	Surface Water Modeling
Julie Quinn	CEQA Compliance
Jeff Reece	Noise, Surface Water Modeling
Clay Rosson	Surface Water Modeling
Perry Russell	Groundwater Hydrology and Water Quality Geology, Soils, and Mineral Resources Hazardous Materials and Groundwater Contamination

Science Applications International Corporation (SAIC), Contractor to Muni (continued)

Samuel Schaefer	Surface Water Modeling
Diane Smith	Surface Water Hydrology and Water Quality
Forrest Smith	Publications Manager
Karen Stark	Document Processing, Publications
Theresa Stevens	Biological Resources
Jeremy Sutherland	Geographic Information Sciences
Rosemary Thompson	Biological Resources
Joseph Walsh	Geographic Information Sciences, Task Manager
Carolann Wolfgang	Groundwater Hydrology and Water Quality Geology, Soils, and Mineral Resources Hazardous Materials and Groundwater Contamination
Lorraine Woodman	Aesthetics Land Use and Planning Recreational Resources
Stephen Ziemer	Air Quality

KORVE Engineering, Subcontractor to SAIC

Farid Javandel	Traffic Impact Analysis

SJM Biological Consultants, Subcontractor to SAIC

Steve Montgomery	San Bernardino Kangaroo Rat Surveys

This page intentionally left blank.

10.0 ACRONYMS, ABBREVIATIONS, AND GLOSSARY OF TERMS

μg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
°C	degrees Celsius
°F	degrees Fahrenheit
AHHG	Area of Historic High Groundwater
AB	Assembly Bill
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
A/EQ	Agricultural/Equestrian
af	acre foot
AFB	Air Force Base
afy	acre feet per year
AMTA	American Membrane Technology Association
APCD	Air Pollution Control District
APEFZ	Alquist-Priolo Earthquake Fault Zone
APEFZA	Alquist-Priolo Earthquake Fault Zoning Act
AQMP	Air Quality Management Plan
ATSDR	Agency for Toxic Substances and Disease Registry
BA	Biological Assessment
BLM	U.S. Bureau of Land Management
BMP	Best Management Practice
BO	Biological Opinion
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CADHS	California Department of Health Services

CA FID UST	Facility Inventory Database (California Environmental Protection Agency)
CAGN	California gnatcatcher
CARB	California Air Resources Board
CASLIC	Spills, Leaks, Investigation, and Cleanup Cost Recovery Listing (California Regional Water Quality Control Board)
CCAA	California Clean Air Act of 1988, as amended in 1992
CCR	California Code of Regulations
CDC	California Department of Conservation
CDFG	California Department of Fish and Game
CDMG	California Division of Mines and Geology
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHMIRS	California Hazardous Material Incident Report System (Office of Emergency Services)
CIWMB	California Integrated Waste Management Board
Cl	Chloride
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
COD	chemical oxygen demand
Conservation District	San Bernardino Valley Water Conservation District

CORRACTS	Corrective Action Report
CRA	Colorado River Aqueduct
CSC	California Species of Concern (per the California Endangered Species Act)
CSUSB	California State University San Bernardino
CVP	Central Valley Project
cy	cubic yard
dB	decibel
dBA	A-weighted decibel
DBCP	dibromochloropropane
DCE	1,2-dichloroethylene
DDT	dichlorodiphenyltrichloroethane
DOP	Daily Operations Model
DRAM	Daily River Analysis Model
DTSC	California Department of Toxic Substance Control
DWR	California Department of Water Resources
EBX	East Branch Extension Project
EDR	Environmental Data Resources, Inc.
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EQAP	Environmental Quality Assurance Program
ESA	Endangered Species Act (Federal)
ESRI	Environmental Systems Research Institute
FE	A species designated as endangered per the Federal Endangered Species Act
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration

FINDS	Facility Index System/Facility Identification Initiative Program Summary Report
FSC	Federal Species of Concern (per the Endangered Species Act)
ft/s	feet per second
FT	A species federally listed as threatened per the Endangered Species Act
GIS	Geographic Information Science
gpm	gallons per minute
HAER	Historic American Engineering Record
HAPS	hazardous air pollutants
HAZNET	Hazardous Waste Information System
HIST UST	Hazardous Substance Storage Container Database
HMMD	Hazardous Materials Management Division Database
Hp	Horsepower (rating for equipment)
HUD	U.S. Department of Housing and Urban Development
HWMP	Hazardous Waste Management Plan
IRP	Installation Restoration Program
IS	Initial Study
kaf	thousand acre feet
kafy	thousand acre feet per year
kWh	kilowatt hour
Ldn	day-night noise level
Leq	energy equivalent noise level
LFC	Low Flow Connector
LUFT	Leaking Underground Fuel Tank
LUST	Leaking Underground Storage Tank
MCE	Maximum Credible Earthquake
MCL	Maximum Contaminant Level

Metropolitan	The Metropolitan Water District of Southern California
mgd	million gallons per day
mg/L	milligrams per liter
mm	millimeter
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
MRZ	Mineral Resource Zone
MSHCP	Multi-Species Habitat Conservation Plan
MSHMP	Multi-Species Habitat Management Plan
msl	mean sea level
Muni	San Bernardino Valley Municipal Water District
Muni/Western	San Bernardino Valley Municipal Water District/ Western Municipal Water District of Riverside County
Na	Sodium
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NFRAP	no further remedial action (CERCLIS)
NGVD	National Geodetic Vertical Datum
NO_2	nitrogen dioxide
NO_2-	nitrite
NO_3-	nitrate
NOP	Notice of Preparation
NOx	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List of the Hazardous Ranking System
NRCS	Natural Resources Conservation Service

O_3	ozone
OCWD	Orange County Water District
OEC	Onsite Environmental Coordinator
OEHHA	Office of Environmental Health Hazard Assessment
OPMODEL	Operations Model
OU	Operable Unit, refers to recognized pollution plume
PCBs	polychlorinated biphenyls
PCE	tetrachloroethylene
PEIR	Programmatic Environmental Impact Report
PFC	Public Flood Control
PHG	Public Health Goal
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POD	point of diversion
ppb	parts per billion
ppm	parts per million
PRC	Public Resources Code
PTC	Permit to Construct
PUB	Public Utilities Board
RAFSS	Riversidian alluvial fan sage scrub
RCIWMP	Riverside County Integrated Waste Management Plan
RCRIS	Resource, Conservation, and Recovery Information System
RIX	Rapid Infiltration and Extraction
RM	River Mile
ROC	reactive organic compounds
ROG	reactive organic gases

ROW	Right of Way
RSS	Riversidian sage scrub (in non-alluvial habitats)
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SANBAG	San Bernardino Association of Governments
SARWQCB	Santa Ana Regional Water Quality Control Board
SAR	Santa Ana River
SAR 1	Santa Ana River Powerhouse 1
SAR 2/3	Santa Ana River Powerhouse 2/3
SARC	Santa Ana River Crossing Pipeline
SARI	Santa Ana Regional Interceptor
SARSG	Santa Ana River Spreading Grounds
SARWS	Santa Ana River woolly star
SAWPA	Santa Ana River Watershed Project Authority
SBAIC	San Bernardino Archeological Information Center
SBBA	San Bernardino Basin Area
SBCFCD	San Bernardino County Flood Control District
SBKR	San Bernardino Kangaroo Rat
SBMWD	City of San Bernardino Municipal Water District
SBVMWD	San Bernardino Valley Municipal Water District
SBVWCD	San Bernardino Valley Water Conservation District
SBWRP	San Bernardino Water Reclamation Plant
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCS	Soil Conservation Service

SE	A species designated as State Endangered per the CESA
SG	Spreading Ground
SGPWA	San Gorgonio Pass Water Agency
SGVMWD	San Gabriel Valley Municipal Water District
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SKR	Stephen’s kangaroo rat
SMARA	Surface Mining and Reclamation Act of 1975
SNA	Significant Natural Area
SO_2	sulfur dioxide
SO_4	Sulphate
SOC	synthetic organic chemical
SOx	sulfur oxide
SPF	Standard Project Flood
SR	State Route
SSC	A species designated as a state species of special concern per CESA
ST	A species designated as State Threatened per CESA
SVOC	semi-volatile organic compound
SWP	California State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air pollutant
TCE	trichloroethylene
TDS	total dissolved solids
TIN	total inorganic nitrogen
TMDL	Total Maximum Daily Load
TSS	total suspended solids

UBC	Uniform Building Code
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
US EPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UWMP	Urban Water Management Plan
VOC	volatile organic compound
Western	Western Municipal Water District of Riverside County
WPA	Wash Planning Area
WQO	water quality objective
WSCP	Water Supply Contingency Plan
WSPA	Woolly Star Preserve Area
WTP	water treatment plant
WWTP	waste water treatment plant
WY	water year

This page intentionally left blank.