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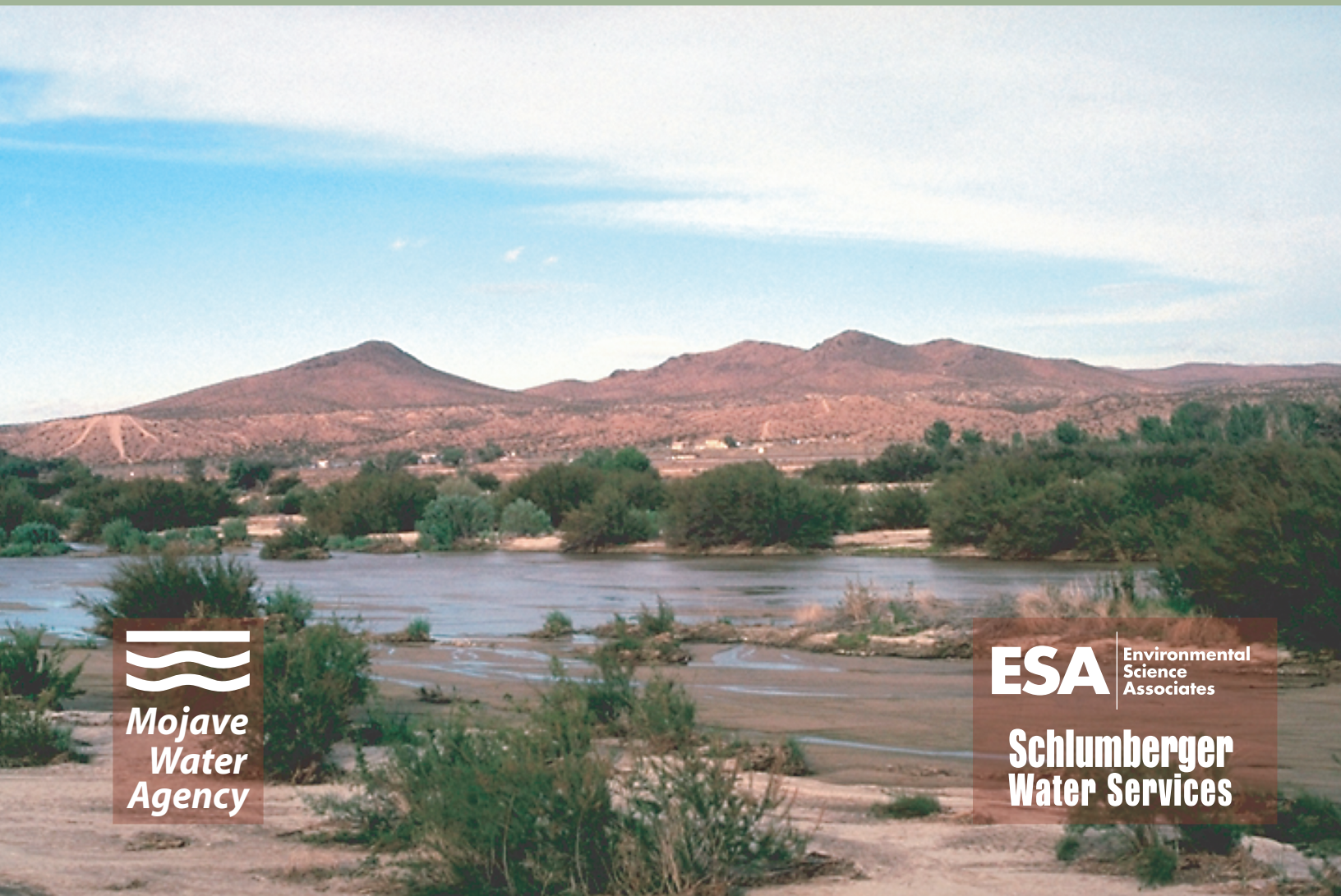
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MOJAVE WATER AGENCY 2004 REGIONAL WATER MANAGEMENT PLAN

*Program Environmental Impact Report
SCH#: 2003101119*

September 2004



**Mojave
Water
Agency**

ESA

Environmental
Science
Associates

**Schlumberger
Water Services**

Draft

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Mojave Water Agency

2004 Regional Water Management Plan

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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

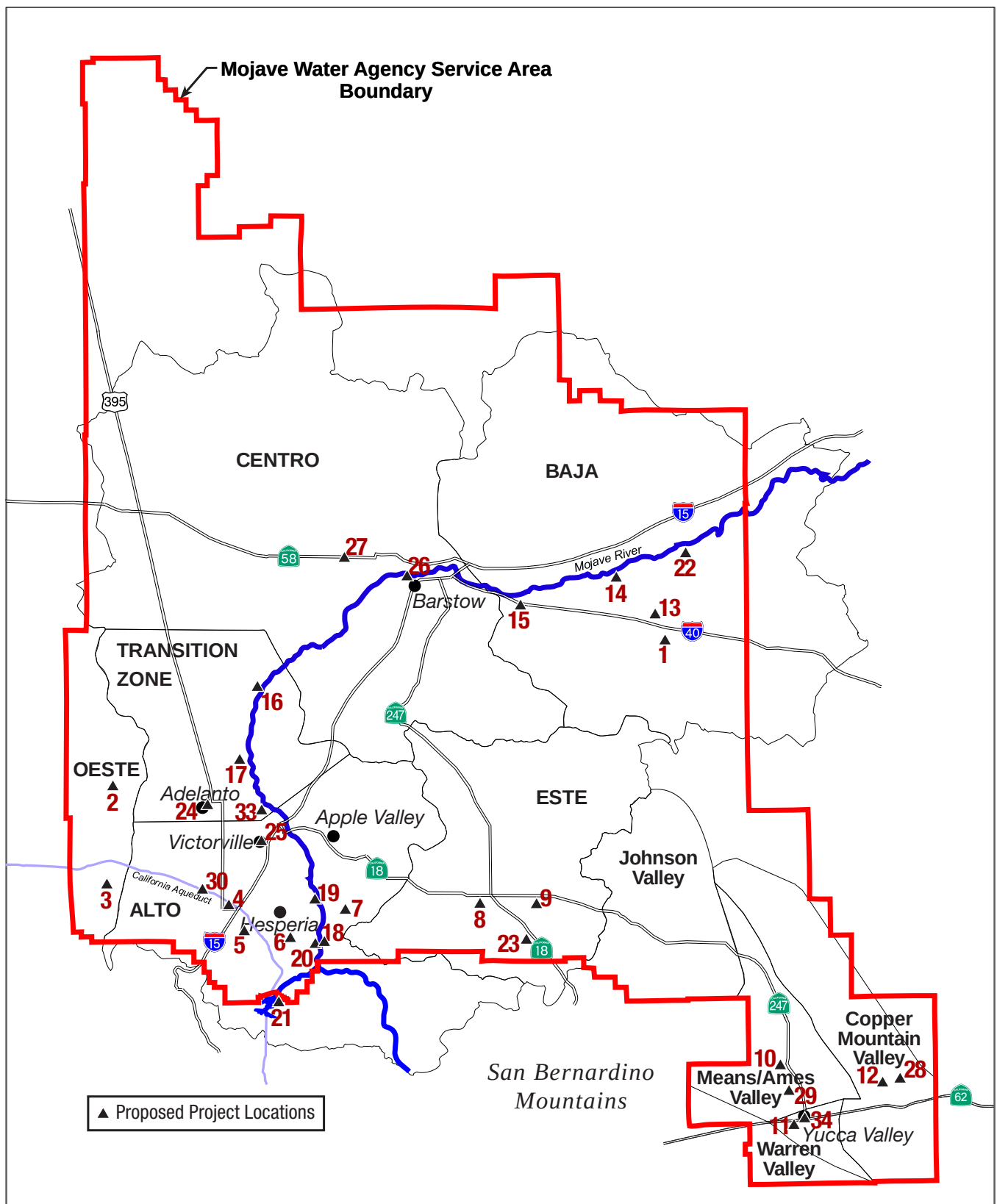
The Mojave Water Agency (MWA), as the lead agency, has prepared this Program Environmental Impact Report (PEIR) for the 2004 Regional Water Management Plan (RWMP or Plan) pursuant to the California Environmental Quality Act (CEQA). The RWMP replaces the previous RWMP completed in 1994. The RWMP evaluates water demand and supplies throughout the MWA service area and proposes projects and management actions to meet future water supply needs throughout the service area while protecting the groundwater resource. The PEIR provides a program-level evaluation of the projects and management actions proposed to meet the region's growing demands.

ES.2 MOJAVE WATER AGENCY BACKGROUND AND DESCRIPTION OF THE SERVICE AREA

The MWA was created by an act of the California State Legislature in 1959 for the purpose of managing the declining groundwater levels in the Mojave Basin Area, El Mirage Basin, and Lucerne Basin. The Johnson Valley and Morongo Basin area were annexed to the MWA in 1965. The MWA service area covers over 4,900 square miles within western San Bernardino County, as shown in **Figure ES-1**. The 2004 RWMP addresses the entire MWA service area. The MWA service area is bordered by Los Angeles and Kern Counties to the west and national forest land in the San Bernardino Mountains and Riverside County to the south. The largest communities in the MWA service area are Adelanto, Victorville, Apple Valley, Hesperia, Yucca Valley, Joshua Tree, and Barstow.

The principal aquifer underlying the MWA service area is separated into three major divisions: 1) the Mojave Regional Aquifer underlies most of the service area from the San Bernardino Mountains to the northern boundary; 2) the Mojave River Floodplain Aquifer underlies the area adjacent to the Mojave River and overlies the Regional Aquifer; and 3) the Morongo Basin/Johnson Valley Aquifer in the southeastern portion of the MWA service area. The Alto, Este, Oeste, Centro and Baja subareas are collectively referred to as the Mojave Basin Area. The northern third of the Alto subarea is referred to as the Transition Zone.

The MWA territory is divided into subunits based on hydrogeologic and political boundaries as shown in Figure ES-1. Each of these subunits has unique hydrogeologic characteristics and water production demands. The Alto Subarea encompasses most of the municipal water demand of the Adelanto, Victorville, Hesperia, and Apple Valley urban areas.



SOURCE: Environmental Science Associates, 2003

MWA RWMP / 203148 ■

Figure ES-1
Location of Mojave Water Agency Service Area,
Groundwater Subareas, and Proposed Projects

The groundwater basins underlying the MWA service area provides most of the water needs of the region. Groundwater levels have been in decline since the 1950s. Overdraft conditions persist in certain areas. The current estimated cumulative overdraft in the service area is approximately two million-acre feet.

The MWA is responsible for managing the long-term reliability of the surface and groundwater supplies within its service area. MWA is a State Water Project (SWP) contractor with an allocation of 75,800 acre-feet per year (afy) of water delivered via the California Aqueduct. MWA distributes SWP water to meet demand and reduce overdraft conditions within its service area through the Mojave River Pipeline, the Morongo Basin Pipeline, and through releases to the Mojave River channel.

ES.3 BASIN ADJUDICATION

The Mojave Basin Area is adjudicated under a stipulated judgment issued in January 1996 and affirmed in 2000. The court Judgment identifies the amount of groundwater that can be extracted by major groundwater producers and generally excludes from the Judgment minor producers using 10 afy or less. The purpose of the Stipulated Judgment is to achieve a water supply and demand balance approximating safe production practices and to address the general condition of groundwater overdraft in the Mojave Basin subareas.

The Judgment sets limits on the amount of groundwater production that can occur in each subarea without incurring an obligation to buy imported water to offset “excess” groundwater use. Each major producer has an established Free Production Allowance (FPA) that is currently in water year 2004-05 at 65 percent of its highest annual use verified for the 5-year base period from 1986-90 for non-agricultural parties in the Alto Subarea, with 80 percent for all other parties. The allocated FPA represents each producer’s share of the water supply available in a subarea. The Judgment requires that reductions in FPA occur in increments of five percent per year until the available production in each subarea is in balance with the available water supply. Producers are required to replace any water pumped above their FPA determined for the year. Replacement can occur either by paying the Mojave Basin Area Watermaster to purchase supplemental water from MWA or by transferring unused production rights within that subarea from another party to the Judgment. Obligations also exist between subareas that may result in the purchase of imported water or transfers between parties if the obligations are not met.

The Warren Valley portion of the Morongo Basin/Johnson Valley area is adjudicated pursuant to a 1977 judgment. A court-approved stipulation declared the relative rights and obligations of basin pumps, and a Watermaster was appointed to develop a physical solution to overdraft conditions. The physical solution adopted in 1991 included import of water. The Morongo Basin Pipeline began delivering water to the area in 1995.

ES.4 PROJECT OBJECTIVES

The objectives established for the 2004 RWMP through 2020 are to:

A) Balance future water demands with available supplies recognizing the need to:

- stabilize the groundwater basin storage balance over long-term hydrologic cycles,
- protect and restore riparian habitat areas as identified in Exhibit H of the Mojave Basin Area Judgment and the California Department of Fish & Game (CDFG) management plan required by Exhibit H,
- limit the potential for well dewatering, land subsidence, and migration of poor quality water,
- maintain a sustainable water supply through extended drought periods, and
- select projects with the highest likelihood of being implemented.

B) Maximize the overall beneficial use of water throughout MWA by:

- supplying water in quantity and of quality suitable to the various beneficial uses,
- addressing issues throughout the MWA service area recognizing the interconnection and interaction between different areas,
- distributing benefits that can be provided by MWA in an equitable and fair manner,
- ensuring that costs incurred to meet beneficial uses provide the greatest potential return to beneficiaries of the project(s),
- avoiding redirected impacts, and
- identifying sustainable funding sources including consideration of affordability.

Balancing future water demands with available supplies will increase water supply reliability and eliminate overdraft of the groundwater basins. Stabilized groundwater storage allows for groundwater to be available during surface water supply shortages and delivery interruptions. With a balanced basin, groundwater elevations will be relatively stable. This will reduce the potential for land subsidence and associated aquifer compaction. By limiting migration of poor water quality, available supplies will be of sufficient quality to meet drinking water objectives, thereby increasing long-term water supply reliability.

ES.5 PROPOSED PLAN

The 2004 RWMP replaces the original RWMP completed in 1994, which was evaluated in a PEIR adopted in 1994. Since that time several developments have prompted MWA to prepare a plan update. These developments include advancements in the basin adjudication process, a more refined understanding of the hydrology and hydrogeology of the service area, and the growing realization that the Mojave region can be a strategic element in the long-term management of California's water supplies.

The 2004 RWMP has been developed with substantial input from Stakeholder groups. Stakeholders include local water agencies, state and local agencies, resource management agencies, and miscellaneous community interests. The process has included a technical advisory committee (TAC) meeting bi-monthly to discuss the status of the RWMP. The TAC has provided guidance and oversight in the development of both the RWMP and the PEIR.

PLAN ELEMENTS

The Plan to be implemented consists of:

- a) Supply Enhancement Projects: projects that provide water supply enhancement either through groundwater recharge or an increase in groundwater efficiency; and
- b) Management Actions: actions that improve water quality or environmental habitat; additionally, actions that increase net water supply by implementing conservation, storage agreements or water transfers.

After evaluation of many alternatives comprising various combinations of supply enhancement projects and management actions, the 2004 RWMP process determined that:

- It is possible to meet the 2020 water demand within the service area with 10 percent municipal conservation (five percent in the Morongo Basin/Johnson Valley) and significant projected decreases in agricultural production
- Recharge of imported water supply is needed as follows:
 - Up to 41,000 afy of new recharge is needed in the Mojave Regional Aquifer
 - Up to 23,000 afy of new recharge is needed in the Mojave Floodplain Aquifer
 - Up to 2,800 afy of new recharge is needed in the Morongo Basin/Johnson Valley subarea
- Water balances can be achieved with or without a new water treatment plant in the Alto subarea
- Wellhead treatment may be needed to meet water quality standards for naturally occurring constituents

The 2004 RWMP does not identify one preferred or recommended alternative with a specific set of projects and management actions. Rather, it identifies a “menu” of potential projects and actions that MWA and other agencies can pursue along with specific overall performance expectations that need to be achieved by the ultimate set of projects and actions implemented. **Table ES-1** lists the menu of supply enhancement projects and management actions that could be implemented and these are shown on Figure ES-1. For each project, the table summarizes the type of project (Recharge of either the Regional Aquifer or the Floodplain Aquifer, Increased Recharge Efficiency, Water Treatment or Blending, Changed Source of Supply, Conservation, or Storage Agreement), the aquifer unit in which the project would be located, and the potential Implementing Agency(ies) for the project or action. The performance expectations for what the Plan are defined in the representative alternatives, described below.

TABLE ES-1
SUMMARY OF POTENTIAL SUPPLY ENHANCEMENT PROJECTS AND MANAGEMENT ACTIONS

ID No.	Project or Management Action	Type of Project / Action	Principal Aquifer	Aquifer Unit	Modeled in Preferred Alternatives	Priority	Potential Implementing Agency
1	Kane Wash Recharge Ponds	Non-Floodplain Aquifer Recharge	Mojave Regional Aquifer	Baja Regional	D5r/D6r	Moderate	MWA
2	El Mirage Recharge Ponds			Oeste Regional	No	Moderate	MWA
3	Sheep Creek Recharge Ponds			Oeste Regional	D5r/D6r	Moderate	MWA
4	Oro Grande Wash Recharge Ponds			Alto West Regional	D5r/D6r	High	MWA, VVWD ¹ , BMWD ²
5	Cedar Street Detention Basin			Alto Mid Regional	D5r/D6r	High	City of Hesperia, SBCFCD ³ , MWA
6	Antelope Valley Wash Recharge Ponds			Alto Mid Regional	D5r/D6r	High	City of Hesperia, MWA, SBCFCD
7	Recharge Facilities South of Apple Valley			Alto East Regional	D5r/D6r	Moderate	MWA
8	Recharge Ponds West of Helendale Fault			Este Regional	D5r/D6r	Moderate	MWA
9	Lucerne Valley Recharge Ponds		Morongo Basin/Johnson Valley	Lucerne Valley	No	Low	MWA
10	Means/Ames Valley Recharge Ponds			Means/Ames Valley	D5r/D6r	Moderate	HDWD, MWA, BHDVWA ⁴
11	HDWD Recharge Basin #3			Warren Valley	No	High	HDWD, MWA
12	Joshua Basin District Recharge & Pipeline			Copper Mountain Valley	D5r/D6r	Moderate	Joshua Basin Water District (JBWD), MWA
13	Newberry Springs Recharge Ponds	Floodplain Aquifer Recharge	Mojave Floodplain	Baja Floodplain	No	High	MWA
14	Minneola Recharge Ponds			Baja Floodplain	No	Moderate	MWA
15	Daggett Recharge Ponds			Baja Floodplain	No	Moderate	MWA
16	In-Lieu Supply to Silver Lakes			Transition Zone Floodplain	D6r only	Moderate	CSA70, MWA
17	Mojave River Pipeline Extension - Transition Zone	Floodplain Aquifer Recharge	Mojave Floodplain	Transition Zone Floodplain	No	Moderate	MWA
18	Rock Springs Release			Alto Floodplain	D5r/D6r	High	MWA
19	Hesperia Lakes Recharge			Alto Floodplain	D5r/D6r	High	Hesperia Park and Recreation District, MWA

¹ VVWD Victor Valley Water District

² BMWD Baldy Mesa Water District

³ SBCFCD San Bernardino County Flood Control District

⁴ BHDVWA Big-Horn Desert View Water Agency

TABLE ES-1
SUMMARY OF POTENTIAL SUPPLY ENHANCEMENT PROJECTS AND MANAGEMENT ACTIONS (CONT.)

ID No.	Project or Management Action	Type of Project / Action	Principal Aquifer	Aquifer Unit	Modeled in Preferred Alternatives	Priority	Potential Implementing Agency
20	Recharge Facilities South of Rock Springs Turnout	Floodplain Aquifer Ready	Mojave Floodplain	Alto Floodplain	No	High	MWA
21	Release SWP Water from Silverwood Lake			Alto Floodplain	No	High	MWA
22	Baja Storm Flow Retention - 2 locations	Increase Recharge Efficiency	Mojave Floodplain	Baja Floodplain	D5r/D6r	Moderate	MWA, SBCFCD
23	Cushenbury Flood Detention Basin		Morongo Basin/Johnson Valley	Lucerne Valley	D5r/D6r	Low	MWA, SBCFCD
24	Injection Wells in Mesa Area of Adelanto	Water Treatment and Blending	Mojave Regional Aquifer	Alto Mid Regional	No	High	Adelanto, MWA
25	Injection Wells in Victorville Area			Alto Mid Regional	No	High	VVWD; Victorville, Baldy Mesa Water District
26	Southern California Water Company (SCWC) Moving Wells to Serve Barstow	Change Source of Supply	Mojave Floodplain	Centro Floodplain	No	--	SCWC
27	Hinkley Water Supply Augmentation by SCWC			Centro Floodplain	D5r/D6r	Moderate	SCWC
28	JBWD Wells		Morongo Basin/Johnson Valley	Copper Mountain Valley	No	--	JBWD
29	New Supply for Pioneertown			Means/Ames Valley	D5r/D6r	High	HDWD, CSA 70, W-4, MWA
30	Regional Surface Water Treatment Plant	Water Treatment and Blending	Mojave Regional Aquifer	Alto West Regional	D6r only	Moderate	Baldy Mesa Water District, VVWD, MWA, San Bernardino County, Adelanto
31	Blending local water with Floodplain Aquifer			Alto Mid Regional	No	High	MWA and M&I Purveyors
32	Local Wastewater Treatment Plants (Alto)			Alto Mid Regional	No	High	VVWD, Victorville, Hesperia, Apple Valley, VWRA
33	Victor Valley Wastewater Reclamation Authority (VWRA) Reclamation			Alto Regional	D5r/D6r	High	VVWRA; VVWD; Victorville, Apple Valley, Hesperia

TABLE ES-1
SUMMARY OF POTENTIAL SUPPLY ENHANCEMENT PROJECTS AND MANAGEMENT ACTIONS (CONT.)

ID No.	Project or Management Action	Type of Project / Action	Principal Aquifer	Aquifer Unit	Modeled in Preferred Alternatives	Priority	Potential Implementing Agency
34	Yucca Valley Wastewater Treatment	Water Treatment and Blending	Morongo Basin/Johnson Valley	Means/Ames Valley	No	--	HDWD; Town of Yucca Valley
35	Local Wastewater Treatment Plant (Lucerne)			Lucerne Valley	No	--	
36	Individual Wellhead Treatment		All	Entire MWA	D5r/D6r	--	MWA, SCWC ⁵ , VVWD, BMWD ⁶ , Adelanto, CSA70, HDWD
37	Eradication of Non-native Plant Species	Improve Riparian Health	Mojave Floodplain	All Floodplain	No	--	MWA, MDRCD ⁷ , MWMA ⁸
38	Agricultural Conservation Programs	Conservation and Storage Agreements	All	Entire MWA	No	--	MDRCD
39	Urban Conservation Programs			Entire MWA	D5r/D6r	High	AWAC
40	Storage agreements with agencies within MWA			Entire MWA	No	High	Parties to Judgment, HDWD, JBWD, BHDVWA
41	Water banking agreements with outside agencies			Entire MWA	No	High	MWA, MWD, SCWA ⁹ , Others
42	Pre-delivering SWP Water			Entire MWA	No	High	MWA
43	Water (entitlement) exchanges			Entire MWA	No	High	MWA, MWD, SCWA

Source: 2004 RWMP.

⁵ SCWC Southern California Water Company
⁶ BMWD Baldy Mesa Water District
⁷ MDRCD Mojave Desert Resource Conservation District
⁸ MWMA Mojave Weed Management Area
⁹ SCWA Solano County Water Agency

Many of these projects and actions require further investigation to confirm their feasibility and performance, and to determine specific site locations and facility design. As feasibility studies and siting studies are conducted for these projects, and as new projects are identified, this list of recommended projects and actions will evolve. However, the current list frames the nature and magnitude of project activities that will be needed to implement the 2004 RWMP. The actual locations for future projects will require additional evaluation.

REPRESENTATIVE PLAN ALTERNATIVES

During the Plan update process, various alternative combinations of supply enhancement projects and management actions were tested to see if and how they could meet the Plan objectives and a refined set of alternatives was developed to represent the best combinations. Two alternatives (D5r and D6r) emerged as representative of the sets of projects and actions that could achieve the following:

Performance Expectations for Plan Implementation

- Bring all groundwater aquifer units in balance
- Meet 99% of total MWA demand with no significant shortage in any subarea or demand sector
- Include an attainable level of 10% municipal conservation
- Provide water quality improvements over existing conditions
- Provide benefits to all subareas without negatively impacting other areas

The specific projects and management actions that were included in the top two representative alternatives (D5r and D6r) from among the master list of potential projects and actions are indicated in Table 2-2. These two alternatives have many common features, including:

- 10% Municipal conservation in the Mojave River Basin, 5% in the Morongo Basin/Johnson Valley area
- Assumptions about reductions in agricultural water use over time (Agricultural Scenario 2)
- Water recycling: Reclamation of VVWRA discharge above 9,700 afy
- Recharge of SWP water into the Alto Mid-Regional, East Regional, and Floodplain aquifers, and into the Baja Regional, Este Regional, Oeste Regional, Warren Valley, Copper Mountain Valley, and Means/Ames Valley aquifers
- Baja and Cushenberry Canyon stormflow retention or equivalent pond recharge projects
- Water supply augmentation for Hinkley and Pioneertown
- Alto wellhead treatment

The primary difference between the two alternatives is that Alternative D5r includes a 12,000afy capacity regional treatment plant in Alto while Alternative D6r does not. However, Alternative

D6r includes in-lieu supply of SWP water to Silver Lakes (or the equivalent pond recharge projects) and larger sized recharge facilities in all Alto aquifers.

MWA and the participating agencies do not have to implement all of or only those specific projects and management actions modeled in the representative alternatives D5r and D6r, but they are committed to achieving the equivalent level of performance that the model indicated could be achieved by these two alternatives.

PROPOSED PROJECTS AND MANAGEMENT ACTIONS

Supply Enhancement Projects

Supply enhancement projects include groundwater recharge projects and projects that increase the efficiency of existing recharge operations. Groundwater recharge projects include percolation from the surface via recharge basins, injection wells, and surface deliveries in lieu of pumping groundwater (in lieu recharge).

Changed Source of Supply

Changing the source of groundwater production may be implemented to help both balance a local basin as well as improve the water supply for an area. There are three projects that involve moving the location of groundwater production and/or use to enhance water supply. As described below under Management Actions, this strategy of changing the source of supply is also proposed in some areas of the MWA service area to address water quality issues.

Water Reclamation / Water Recycling

Both regional and local water recycling treatment plant projects are included on the potential list. Water recycling, the treatment and reuse of wastewater to meet non-potable supply demands, can reduce demand for potable water, and is reliable even during a drought. Currently, the VVWRA is evaluating a reclamation alternative in Alto.

MANAGEMENT ACTIONS

These include actions that improve water quality or environmental habitat, as well as actions that increase net water supply by implementing conservation, storage agreements or water transfers.

Water Quality Improvement

Actions to improve water quality include treatment strategies to treat groundwater in specific locations (wellhead treatment) or regional water treatment to treat and deliver surface water supplies directly to users. In addition, these management actions include wastewater treatment actions to minimize the effects of septic systems on groundwater quality; blending strategies to blend surface and groundwater supplies or groundwater supplies from two or more locations; and moving or changing the source of supply.

Habitat Improvement

The 2004 RWMP supports the implementation of riparian habitat improvement actions in accordance with the Judgment, but is not designed to enforce the Judgment. The 2004 RWMP is compatible with the *Habitat Water Supply Management Plan for the Adjudicated Area of the Mojave River Basin* prepared by CDFG in accordance with the Judgment.

Conservation

Conservation efforts to be implemented under the 2004 RWMP include agricultural conservation programs and urban conservation programs. Agricultural conservation efforts could include educational programs and monetary support to implement Agricultural Efficient Water Management Practices. Agricultural conservation efforts are expected to be pursued by agencies with appropriate expertise, such as the Mojave Desert Resource Conservation District (MDRCD).

Supply and Storage Agreements / Groundwater Banking

Water transfers are proposed in order to obtain additional water supplies. MWA would enter into a contract with an entity to transfer water in wetter years when the water is surplus to the entity's needs. Other transfers include a one-time transfer of available water. In addition to water transfers, groundwater banking can provide benefits by cooperatively using available storage space in aquifers within the MWA service area.

RWMP LONG-TERM MANAGEMENT ACTIONS

The RWMP includes Management Actions that will be undertaken to help achieve the objectives of the plan, through the projects and actions described above. The Management Actions consist of 60 specific actions that can be grouped into the following seven elements:

1. Monitoring
2. Improve characterization of the basin
3. Continue long-term planning
4. Groundwater protection
5. Construction and implementation
6. Financing
7. Public Participation

MONITORING

As regional groundwater manager, MWA has the responsibility for monitoring groundwater quantity and quality, and has implemented programs to accomplish this. Court-ordered requirements compel collection of data focused on components of the water balance, which the MWA measures, compiles, and disseminates. Cooperators in monitoring efforts include local water agencies and the U.S. Geological Survey (USGS). Information collected or compiled by the MWA is utilized by local water managers and Watermasters. Actions included in the 2004 RWMP guide monitoring of Watermaster activity responsibilities, groundwater levels, water quality, water supply, population growth and development, effectiveness of water conservation

measures, precipitation, evapotranspiration, regional water level changes and land subsidence monitoring, data management systems, and extraction sites/consumption.

IMPROVING BASIN UNDERSTANDING

Recharging large quantities of water projected in the Plan will require extensive investigation of aquifer properties and storage capacities; therefore, the Plan includes aquifer characterization including infiltration testing for Management Actions. The Plan also includes actions addressing development of groundwater modeling options to determine the best locations for recharge or extraction sites and to help optimize operation of the groundwater basin. Management actions address refining estimates of water balance parameters such as groundwater flow, ungaged surface water inflows, deep percolation of precipitation estimates, and phreatophyte use in riparian areas. The Plan also includes actions that address water quality/contaminant site data management and analysis.

CONTINUE LONG-TERM PLANNING

Since its inception in the 1960s, MWA has been developing plans to guide implementation of its mission to ensure sufficient water availability for present or future beneficial uses within the MWA jurisdiction. MWA will continue its long-term planning through the 2004 RWMP efforts. Long-term planning includes a management action requiring a vulnerability assessment of security measures for water utilities. Management actions also address coordination with local planning agencies and review of applicable land use plans, to ensure that growth projections, proposed land use changes, and types of proposed uses are consistent with water planning efforts. Long-term planning will also identify post-2020 water supply demands and research options for meeting that demand and enhancing SWP supply reliability. Long-term planning addresses transportation infrastructure and regular updates of several planning procedures, including an Integrated Water Management Plan, an Urban Water Management Plan, and Groundwater Management Plan.

GROUNDWATER PROTECTION

The general goal of groundwater protection activities is to maintain the groundwater and the aquifer to ensure a reliable and high quality supply. Activities to meet this goal include continued and increased monitoring, data sharing, education and coordination with other agencies that have local or regional authority or programs. To increase its groundwater protection activities, MWA will implement management actions regarding recharge site management activities and protection of recharge areas.

CONSTRUCTION AND IMPLEMENTATION

Table ES-1 above includes the recommended priority for projects and actions in each aquifer subarea. Projects and management actions with a high priority are those expected to begin implementation within the next five years, and those with lower priority will be pursued within a ten to twenty year timeframe. Management actions guide identification of and coordination with implementing agencies.

FINANCING

Implementing the 2004 RWMP will require an array of financing mechanisms, such as bonds, grants, or low interest loans. In addition, cooperative funding agreements between MWA and other water managers in the MWA service area or cost-share agreements between MWA and local, state, or federal agencies may also provide funding for 2004 RWMP projects and management actions. Management actions call for review of funding sources, developing a Capital Improvement Program, and identification of other funding mechanisms.

PUBLIC PARTICIPATION/COMMUNITY OUTREACH

MWA will continue to consult with the Technical Advisory Committee (TAC), which was used extensively during the 2004 RWMP process. Management actions guide ongoing coordination and participation in outreach through the TAC, Alliance for Water Awareness and Conservation (AWAC), as well as through other outreach and education opportunities, such as newsletters, water symposia, web site, and Speakers Bureau.

**ES.6 CALIFORNIA ENVIRONMENTAL QUALITY ACT PROCESS
OVERVIEW**

The basic purposes of the CEQA are to (1) inform governmental decision-makers and the public about potential significant environmental effects of proposed activities, (2) identify ways that environmental damage can be avoided or significantly reduced, (3) prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures, and (4) disclose to the public the reasons why a governmental agency approved the project if significant environmental effects are involved.

In accordance with CEQA Section 15063, a Notice of Preparation (NOP) was published by MWA on October 22, 2003. The NOP was circulated to local, state, and federal agencies and other interested parties for 30 days. In accordance with Section 15105 of the CEQA Guidelines, the Draft PEIR is available for public review and comment for a 45-day review period. The PEIR has been circulated to local, state, and federal agencies and interested parties who may wish to review and issue comments on its contents. Any comments should be sent to:

Norman Caouette
Assistant General Manager
Mojave Water Agency
22450 Headquarters Drive
Apple Valley, CA 92307

During the 45-day public review period, MWA will conduct public meetings to answer questions about and receive oral comments on the Draft 2004 RWMP. All oral and written comments received on the Draft 2004 RWMP will be commented on and included in the Final 2004 RWMP PEIR.

ES.7 PROGRAM LEVEL ANALYSIS

This Draft PEIR provides a program-level review of projects and management actions proposed in the 2004 RWMP. A program-level EIR is prepared on a series of actions that are linked in some way, usually:

- Geographically.
- As a logical part in a chain of contemplated actions.
- In connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program.
- As individual activities carried out under the same authorizing statutory or regulatory authority.

Many of the proposed projects have been planned, but have not been adequately conceived or designed to allow for substantive analysis at this time. This PEIR acknowledges that some components included in the overall 2004 RWMP lack sufficient detail to allow for potential impacts of those components to be thoroughly assessed. Prior to implementation of each project, additional project-level analysis pursuant to CEQA is required to approve and construct projects.

ES.8 IRREVERSIBLE ENVIRONMENTAL CHANGES

Implementation of the individual projects would cause some irreversible environmental changes, including destruction of desert scrub habitat and potential disruption of archaeological and paleontological resources. The 2004 RWMP EIR assesses each of these impacts in Chapter 3.0 and provides mitigation measures where necessary to reduce these impacts to less than significant levels.

ES.9 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires that an EIR identify the environmentally superior alternative of a project. The recommended 2004 RWMP (D5r and D6r) would constitute the environmentally superior project since it would avoid localized groundwater overdraft conditions for each subarea throughout the MWA service area, while providing for continued regional management and oversight of the groundwater resource.

The No Project Alternative would avoid the significant impacts to air quality from construction and the cumulatively significant impacts to air quality and biological resources. Significant and unavoidable impacts associated with the secondary effects of growth would likely result under any of the proposed alternatives, including the No Project Alternative. Full implementation of the Judgment would require that groundwater overdraft conditions were alleviated. As a result, the No Project Alternative would be required to maintain regional water balance. However, groundwater modeling results indicate that certain subareas within the service area could experience localized overdraft under the No Project Alternative.

ES.10 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

CEQA Guidelines require that an EIR contain a brief summary of project impacts and mitigation measures that would reduce those impacts. **Table ES-2** contains a summary of the environmental impacts, mitigation measures identified to reduce or avoid those impacts, and a determination of the level of significance after mitigation measures have been implemented. Numerous impacts are identified as less-than-significant with no mitigation required. Impacts to air quality associated with construction and the secondary effects of growth supported by the Plan were found to be significant and unavoidable. All other impacts were either less than significant or reduced to less than significant levels through implementation of mitigation measures.

TABLE ES-2
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
3.2 WATER RESOURCES			
Impact 3.2-1: Implementation of the RWMP will increase conjunctive use of the basin to achieve water balance in each sub-area. This would be considered a beneficial effect of the project.	Operational Impact	None Required.	Beneficial.
Impact 3.2-2: Increased conjunctive use of groundwater basins and groundwater banking could result in increased fluctuations of groundwater elevations from year to year. During dry periods, groundwater elevations may decrease.	Operational Impact	None Required.	Less than significant.
Impact 3.2-3: Recharge water quality could adversely affect groundwater quality. Over the long-term, imported water would contribute to mass loading of salts and other constituents.	Operational Impact	M3.2-1 MWA shall implement groundwater monitoring programs near recharge basins to assess changes in groundwater quality.	Less than significant.
Impact 3.2-4: Recharge basins could adversely affect groundwater quality by transporting surface contamination into aquifers. In addition, where groundwater is shallow, raised groundwater elevations could encounter surface or vadose zone contamination, degrading groundwater quality.	Operational Impact	M3.2-2 Implementing agencies shall conduct Phase I site assessments for each potential recharge basin site prior to approval to assess potential for surface contamination. M3.2-3 Implementing agencies shall avoid recharging areas exhibiting shallow groundwater where surface contamination could be affected. M3.2-4 Implementing agencies shall operate recharge basins to avoid transporting contaminants into groundwater basin.	Less than significant.
Impact 3.2-5: Recharge facilities located within flood plains would be periodically subject to flood conditions.	Facility Siting Impact	M3.2-5 Implementing agencies shall ensure that recharge basins are equipped with storm flow bypass mechanisms that avoid damage to recharge basins, avoid flooding areas outside of the existing floodplain, and avoid detaining flood flows that have designated beneficial uses downstream. M3.2-6 MWA shall avoid discharging into the Mojave River during storm events that could result in flooding.	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
		M3.2-7 Implementing agencies shall ensure that revisions to floodplain insurance maps are submitted to the Federal Emergency Management Agency (FEMA) if recharge projects modify floodplains.	
Impact 3.2-6: Recharge facilities and detention facilities located within flood plains could detain flood waters that would otherwise contribute to water supply downstream.	Facility Siting Impact	See Mitigation Measure M3.2-5 .	Less than significant.
Impact 3.2-7: Construction of projects could degrade storm water runoff quality.	Construction Impact	M3.2-8 Implementing agencies shall establish standard Best Management Practices (BMPs) for construction run off protection during construction activities involving RWMP projects. BMPs selected for each project should be in place and operational prior to the onset of major earthwork on the site. Typical elements of a Storm Water Pollution Prevention Plan (SWPPP) include: • Storm runoff from the construction area should be regulated through a storm water management/ erosion control plan that may include temporary onsite silt traps and/or basins with multiple discharge points to natural drainages and energy dissipaters. Stockpiles of loose material should be covered and runoff diverted away from exposed soil material. • Equipment wash water including concrete wash water should not be allowed to run off site. • Vehicle fueling and chemical storage areas should be located within an area with adequate secondary containment. • Vehicles leaving the construction site should not track dirt onto local roadways. • After completion of grading, erosion protection should be provided on cut-and-fill slopes when the finished grade warrants.	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
3.3 BIOLOGICAL RESOURCES			
Impact 3.3-1: Construction of projects identified in the 2004 RWMP could result in the direct loss of sensitive biological communities throughout the MWA service area.	Facility Siting Impact	M3.3-1 Implementing agencies shall implement a mitigation strategy first to identify sensitive habitats in the project area and then to avoid impacts if possible. If avoidance is not possible, MWA shall minimize the impact and compensate in accordance with permitting requirements.	Less than significant.
Impact 3.3-2: Construction could result in the potential loss of common habitats.	Facility Siting Impact	None Required.	Less than significant.
Impact 3.3-3: Projects could result in the loss of special-status plant species.	Facility Siting Impact	M3.3-2 The implementing agency shall implement a mitigation strategy first to identify sensitive plants within the project area and then to avoid impacts if possible. If avoidance is not possible, the implementing agency shall minimize the impact and compensate in accordance with permitting requirements.	Less than significant.
Impact 3.3-4: Construction of projects could result in impacts to federal or state listed wildlife species. Impacts could include habitat loss, disturbance, or direct mortality.	Facility Siting Impact	M3.3-3 The implementing agency shall survey affected areas for listed species and attempt to avoid impacts to listed species if possible. If avoidance is not possible, then compensation through the permitting requirements in the Endangered Species Act would be required.	Less than significant.
Impact 3.3-5: Construction of projects could result in direct or indirect loss of wildlife species designated as candidates for federal listing as threatened or endangered or designated as state species of special concern.	Facility Siting Impact	M3.3-4 The Implementing agency shall consult with California Department of Fish and Game (CDFG) and the US Fish and Wildlife Service (USFWS) to implement a mitigation strategy first to identify sensitive species within the project area and then to avoid impacts if possible. If avoidance is not possible, the implementing agency shall minimize the impact and compensate in accordance with permitting requirements.	Less than significant.
Impact 3.3-6: Construction and operation of projects could disturb nesting raptors.	Construction Impact	M3.3-5 The implementing agency shall conduct pre-construction surveys to identify nesting raptors within the project area. If nesting raptors are identified, construction activities will be timed to avoid impacting the nest.	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
Impact 3.3-7: Elevated groundwater levels could enhance riparian habitats and wetland vegetation.	Operational Impact	None Required.	Beneficial.
Impact 3.3-8: Enhancement of Mojave River flows could enhance fish resources.	Operational Impact	None Required.	Beneficial.
3.4 LAND USE Impact 3.4-1: Proposed projects may not comply with applicable city and county land use designations and as a result may not be compatible with neighboring land uses.	Facility Siting Impact	M3.4-1 Implementing agencies shall conduct siting studies to determine the most suitable locations to place facilities. Siting studies shall consider existing and planned land uses in the vicinity of the project. Projects should be located in areas with suitable neighboring land uses wherever possible. M3.4-2 If sensitive land uses cannot be avoided, buffer zones, access controls, and visual screens could be implemented to minimize impacts. Some implementing agencies may need to obtain encroachment permits, easements or other permits such as Conditional Use Permits (CUPs) from the jurisdictional agency prior to construction activities as needed to obtain local approval.	Less than significant.
Impact 3.4-2: Project facilities could be located on important farmland or Williamson Act lands.	Facility Siting	M3.4-3 Implementing agencies shall avoid siting project facilities in areas designated as important farmland wherever possible.	Less than significant.
Impact 3.4-3: Projects may be located on lands designated by Bureau of Land Management (BLM) for other uses including potential conservation areas for sensitive species.	Facility Siting	M3.4-4 Implementing agencies shall avoid siting project facilities in areas designated as potential conservation areas wherever possible.	Less than significant.
3.5 PUBLIC SERVICES AND UTILITIES Impact 3.5-1: Construction activities could affect emergency service access.	Construction Impact	M3.5-1 Implementing agencies shall evaluate impacts to emergency access routes during construction activities, provide detours if necessary, and notify emergency service providers.	Less than significant.
Impact 3.5-2: Construction could generate significant amounts of solid waste.	Construction Impact	M3.5-2 Implementing agencies shall coordinate with the solid waste landfill operators to ensure adequate capacity is available prior to construction.	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
3.6 RECREATION Impact 3.6-1: The proposed projects could adversely affect parks or recreational facilities.	Facility Siting Impact	M3.6-1 Implementing agencies shall identify locations for recharge basins, injection and extraction wells, and reclamation and treatment plants that will minimize impacts to recreational facilities. Favorable sites would: • Require minimal alteration of existing recreational facilities, including trails; • Require minimal development of new access roads; • Minimize visual impacts to existing trails and scenic lookouts; and, • Minimize impacts to biological and geological resources of existing parks and recreational facilities. M3.6-2 For projects located in recreational areas, implementing agencies shall coordinate with the applicable recreation or park agency to identify ways to minimize impacts of the project on recreational activities. Measures may include but are not limited to: • Use of vegetation to screen proposed facilities from view of adjacent recreational land uses; • Security fencing shall be utilized to enclose facilities, as necessary. • Posting of signage indicating dates during which use of recreational areas would be restricted due to construction; • Placement of fencing to isolate construction areas and allow continued use of other areas of recreational parks and facilities; • Timing of construction activities to avoid peak recreational use seasons. M3.6-3 In the event that water transfers would result in increased frequency of water releases into Mojave	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
		River, MWA shall consult with the park and recreation agencies to ensure that recreational trails and other facilities would not be affected by the proposed actions	
3.7 AESTHETICS Impact 3.7-1: The projects and management actions could degrade the existing character or quality of the sites and their surroundings.	Facility Siting Impact	M3.7-1 Implementing agencies shall implement design guidelines consistent with local policies and programs to protect scenic values and to avoid visual intrusions. M3.7-2 Implementing agencies shall incorporate landscaping plans into final designs of large projects such as recharge basins and treatment plants to mask views of new structures.	Less than significant.
3.8 AIR QUALITY Impact 3.8-1: Construction activities associated with individual RWMP projects and management actions involving the development of new facilities and/or disturbance of land would generate substantial amounts of dust, which would result in potential health and nuisance impacts in the immediate vicinity of construction sites. Project construction would also generate other criteria pollutant emissions.	Construction Impact	M3.8-1 Implementing agencies shall establish best management practices for the reduction of air emissions for construction projects for inclusion in contractor specifications. Such measures may include restricting hours of use of construction equipment, minimizing idling, use of fuel additives or alternatives in construction equipment, implementing dust control plans that are consistent with MWA guidelines, etc. M3.8-2 MWA shall develop a standard set of dust control plan guidelines for construction activities consistent with the Mojave Desert Air Quality Management District (MDAQMD) Rule 403.2. In accordance with these guidelines, Implementing agencies shall establish best management practices for construction dust control for each project for inclusion in contractor specification. The guidelines may include the following: a. Use periodic watering for short-term stabilization of disturbed surface areas to minimize visible fugitive dust emissions. b. Ensure that loaded vehicles will not exceed 25 miles per hour on public and private earthen or gravel roads.	For most projects, construction emissions would be considered less than significant. However, some larger projects may exceed emissions thresholds. Prior to approval, emissions estimates would determine significance of individual projects. Significant, unavoidable

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
		c. Take actions sufficient to prevent project-related trackout onto paved surfaces. d. Cover loaded haul vehicles while operating on publicly maintained paved surfaces. e. Stabilize graded site surfaces upon completion when subsequent development is delayed or expected to be delayed more than 30 days. f. Reduce non-essential earth-moving activities under high wind conditions.	
Impact 3.8-2: Operation of the RWMP projects and management actions would result in operational emissions of criteria air pollutants.	Operational Impact	None required.	Less than significant.
3.9 CULTURAL RESOURCES Impact 3.9-1: Construction of new facilities which involve ground-disturbing activities has the potential to adversely affect significant prehistoric and historic archaeological resources and/or buried human remains through damage or destruction of those remains.	Construction Impact	M3.9-1 Implementing agencies shall conduct a cultural resources inventory designed to identify potentially significant resources within the area of potential effect for all projects and management actions that have the potential to impact cultural resources. The cultural resources inventory would consist of a cultural resources records search to be conducted at the Information Center of the San Bernardino County Museum; consultation with the Native American Heritage Commission (NAHC) and with interested Native Americans identified by the NAHC; a field survey where appropriate (if one has not previously been conducted); and recordation of all identified archaeological sites and historic buildings and structures on California Department of Parks and Recreation 523 Site Record forms. M3.9-2 Implementing agencies shall avoid impacts if feasible on identified cultural resources including prehistoric and historic archaeological sites, locations of importance to Native Americans, human remains, and historical buildings and structures. Methods of avoidance may include, but not be limited to, project re-route or re-design, project cancellation, or	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
		identification of protection measures such as capping or fencing. M3.9-3 Implementing agencies shall retain archaeological monitors during construction for ground-disturbing activities that have the potential to impact significant archaeological remains as determined by a qualified archaeologist.	
Impact 3.9-2: Construction of new facilities has the potential to adversely affect historic architectural resources through demolition or significant changes to the historical setting	Facility Siting Impact	M3.9-4 Implementing agencies shall identify and evaluate potentially affected historic resources prior to alterations, including relocation.	Less than significant.
3.10 GEOLOGY AND SOILS Impact 3.10-1: Strong ground motion generated during an earthquake within or in the vicinity of the service area could result in damage to facilities. Damage could occur through surface rupture, ground shaking, liquefaction, and/or landslides.	Facility Siting Impact	M3.10-1 Implementing agencies shall prepare site-specific, design-level geotechnical investigations for each site prior to the commencement of construction. Each investigation shall include an analysis of expected geologic hazards at the site. The analyses shall be in accordance with applicable City or Town ordinances and policies, and shall be consistent with the 1997 Uniform Building Code (UBC) (or any more recent version of the UBC adopted by the applicable City or Town). Recommendations made in the geotechnical report shall be incorporated into the project.	Less than significant.
Impact 3.10-2: Facilities included in the projects and actions proposed in the 2004 RWMP could be subjected to hazards related to expansive soils and settlement.	Facility Siting Impact	See Mitigation Measure M3.10-1.	Less than significant.
Impact 3.10-3: Construction related to the projects and actions proposed in the 2004 RWMP could result in soil erosion during excavation, grading, and other construction activities.	Construction Impact	See Mitigation Measure M3.2-8.	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
3.11 HAZARDS & HAZARDOUS MATERIALS Impact 3.11-1: Project construction could encounter soil during excavation that has been exposed to contamination.	Facility Siting Impact	M3.11-1 Prior to identifying recommended project locations, implementing agencies shall conduct Phase I Site Assessments to identify past uses that may have resulted in soil contamination. M3.11-2 If the Site Assessment identifies the potential for contaminated soils on proposed recharge basin sites, the implementing agency shall either conduct further analysis, redesign the project to avoid this area, or remediate the contamination pursuant to RWQCB standards prior to implementation of the project. M3.11-3 Excavated materials containing hazardous waste shall be disposed of in accordance with applicable hazardous waste transportation and disposal regulations by the implementing agency within 90 days of excavation.	Less than significant.
Impact 3.11-2: Projects could involve storing hazardous materials on site that could pose a spill hazard to neighboring land uses.	Facility Siting Impact	None required.	Less than significant.
3.12 NOISE Impact 3.12-1: Construction activities associated with individual projects and management actions involving the development of new facilities would intermittently and temporarily generate noise levels above existing ambient levels in the vicinity of those project elements.	Construction Impact	M3.12-1a Implementing agencies shall implement procedures to reduce noise generation from project construction activities. Typical noise control procedures include the following: a. Require construction contractors to comply with the construction hours and days limitations established in local noise ordinances. Night-time construction would require approval from local jurisdictions. b. Require all construction contractors to locate fixed construction equipment (e.g., compressors and generators) as far as possible from noise-sensitive receptors. c. Equipment used in the construction of individual projects and management actions shall be	Less than significant.

**TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES**

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
		muffled and maintained in good operating condition. Internal combustion engine-driven equipment shall be fitted with intake and exhaust mufflers that are in good condition. d. If pile driving is required for facility construction or sheetpiling the contract specifications for those projects shall incorporate the following requirements: - Wherever possible, sonic or vibratory pile drivers will be used in lieu of impact pile drivers. - Wherever feasible, pile holes will be pre-drilled to reduce potential noise and vibration impacts. e. Additional noise attenuating measures include changing the location of stationary construction equipment and/or staging areas; notifying adjacent residences and nearby sensitive receptors in advance of construction work; shutting off idling equipment; rescheduling construction activities; requiring on-going construction noise monitoring to assure adherence to City/County construction equipment standards; and/or installing temporary barriers around stationary construction noise sources. M3.12-1b Implementing agencies shall distribute information to residents and noise-sensitive receptors in the affected areas several weeks in advance of operations that would generate noise in excess of local standards. The information distributed should include a brief description of the operations, including the duration of the project.	
Impact 3.12-2: The operation of some of the RWMP projects and management actions could result in substantial noise increases in the vicinity of project facilities.	Facility Siting Impact	M3.12-2 Implementing agencies shall comply with local noise ordinances. In areas where pump and/or stationary equipment operation would cause noise levels to exceed the normally acceptable range for a	Less than significant.

TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
		given land use, the operation of such equipment shall not cause noise levels to increase by 5 Day-night Average Noise Level (DNL) or more. In areas where noise levels already exceed the normally acceptable range for a given land use, the operation of such equipment shall not cause noise levels to increase by 3 DNL or more. To accomplish these performance standards, the implementing agency should consider the following: a. Maximize the buffer area or setback distance between pump facilities and treatment plant/blending facility sites and noise-sensitive land uses. b. Design stationary equipment and pump enclosures such that building exhaust fans and louvers are oriented away from noise-sensitive uses. To the extent feasible, configure the facility layout such that noise-generating equipment is setback from noise-sensitive land uses. c. Incorporate equipment enclosures, fan silencers, mufflers, acoustical treatments at vent openings, acoustical panels, etc. d. Construct a perimeter wall at the site such that the line of sight between the building openings (exhaust fans and louvers) at the pump facilities, and at treatment plant/blending facility sites, and nearby sensitive receptors is effectively blocked. Effective shielding can significantly reduce noise.	
3.13 TRANSPORTATION / TRAFFIC Impact 3.13-1: Construction activity would temporarily increase traffic volumes on roadways in the project vicinity.	Construction Impact	M3.13-1 Implementing agencies shall minimize heavy-duty truck traffic associated with soil hauling and deliveries during peak traffic periods. M3.13-2 Implementing agencies shall obtain encroachment permits from local jurisdictions and Caltrans prior to construction when construction would result in	Less than significant.

**TABLE ES-1 (cont.)
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES**

Impact	Comments	Mitigation Measures	Level of Significance After Mitigation
		work within roadway easements or would require lane closures.	
4.0 Growth Impact 4-1: Implementation of projects and management actions under the 2004 RWMP would accommodate planned growth in the MWA service area. Planned growth would result in secondary environmental effects. The effects of planned growth have been identified and addressed in the EIRs on Regional Plans and General Plans for municipalities within the service area. Local land use jurisdictions have identified several significant and unavoidable impacts associated with planned growth including impacts to air quality, biological resources, geology, hydrology and water quality, land use, aesthetics, agricultural resources, noise, and traffic.	Secondary Effects of Growth	M4-1 San Bernardino County and the local land use jurisdictions within the MWA service area shall implement the General Plan policies and mitigation measures they have adopted as part of their General Plan approval process and as part of the development and land use approval process to address the growth-related impacts of their planned growth. M4-2 MWA shall implement the RWMP to address the effects of planned growth on groundwater resources and water supply services within the service area.	Significant, unavoidable
5.0 Cumulative			
Impact 5-1: Implementation of the 2004 RWMP would contribute significantly to the adverse baseline condition for air quality and biological resources.	Cumulative Impact	M-5-1 Implementing agencies shall comply with existing regulations regarding air emissions controls and biological resources permitting.	Significant, unavoidable
Impact 5-2: The 2004 RWMP's contribution to the cumulative condition for water quality, geology, mineral resources, noise and transportation would be considered less than significant.	Cumulative Impact	None required.	Less than significant
Impact 5-3: The 2004 RWMP's contribution to the cumulative condition for groundwater overdraft and public services infrastructure would be considered beneficial.	Cumulative Impact	None required.	Beneficial

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CHAPTER 1

INTRODUCTION

1.1 LEGAL BASIS FOR THE PEIR

The Mojave Water Agency (MWA), as the lead agency, has prepared this Program Environmental Impact Report (PEIR) for the 2004 Regional Water Management Plan (RWMP or Plan) pursuant to the California Environmental Quality Act (CEQA). The 2004 RWMP replaces the previous RWMP completed in 1994. The 2004 RWMP evaluates water demand and supplies throughout the MWA service area and proposes projects and management actions to meet future water supply needs equitably throughout the service area while protecting the groundwater resource. The PEIR provides a program-level evaluation of the projects and management actions proposed to meet the region's growing water demands.

1.2 PURPOSE OF THE PEIR

The MWA has prepared this PEIR to provide the public and responsible and trustee agencies reviewing this project with information about the potential effects, both beneficial and adverse, of the 2004 RWMP on the local and regional environment. This PEIR was prepared in compliance with CEQA of 1970 (as amended in the California Public Resources Code, Division 13) and the California Code of Regulations (CCR), Title 14, Chapter 3.

The RWMP identified the following key issues to be addressed in the plan.

- Current and future demands exceed supply
- Naturally occurring water quality problems
- Overdraft of the Groundwater Basins
- Riparian Ecosystem Maintenance
- Wastewater Infrastructure
- Subarea Interaction

These issues are addressed through implementation of recharge and conveyance projects and management actions. The RWMP describes the proposed projects and quantifies regional water balance with and without implementation of the plan.

The PEIR describes the existing environment within the High Desert Region and identifies potential impacts associated with implementation of various components of the project. The PEIR identifies thresholds of significance for impacts to environmental resources, and describes the

level of significance for each identified impact. Mitigation measures have been developed for reducing identified impacts. The PEIR compiles the identified impacts and mitigation measures to disclose to the public and responsible agencies potential effects of the project.

The PEIR considers the effects of the 2004 RWMP implementation with and without construction and operation of a new water treatment plant and with and without other projects considered optional such as storm water detention. The RWMP and the PEIR identifies potential water supply and environmental impacts from possible water transfers, exchanges and banking with entities from outside the MWA, and storage programs with agencies inside the MWA. The PEIR also evaluates the No Project Alternative as required by CEQA.

1.3 STAKEHOLDERS

The 2004 RWMP has been developed with substantial input from Stakeholder groups. Stakeholders include local water agencies, state and local agencies, resource management agencies, and miscellaneous community interests. The process has included a Technical Advisory Committee (TAC) meeting bi-monthly to discuss the status of the RWMP. The TAC has provided guidance and oversight in the development of both the 2004 RWMP and the PEIR.

1.4 1994 RWMP

The first RWMP was completed in June 1994. The plan developed recommendations that followed the following broad objectives:

1. Eliminate overdraft and meet future demands on the groundwater basins by obtaining additional imported water supplies and/or reducing consumptive use demands.
2. Protect the groundwater basins from degradations in water quality.
3. Participate in implementation of any judgment resulting from ongoing Mojave River adjudication.
4. Be responsive to changing conditions by modifying the present plan as necessary.
5. Work closely with local agencies and water purveyors on key issues, particularly water conservation.
6. Accomplish the above in a cost-effective and environmentally sound manner.

The components of the 1994 RWMP include the following:

- Diversions from the State Water Project (SWP)
- Water transfers
- Groundwater recharge in the Mojave River channel without improvements
- Water conservation
- Groundwater recharge in the Alto subarea
- Groundwater recharge in the Este subarea

- Groundwater recharge at Dry Lakebeds
- Morongo Basin Pipeline extension and recharge facilities
- Mojave River Pipeline and adjacent recharge basins in Centro and Baja subareas
- El Mirage aqueduct and recharge basins in the Oeste subarea.

The plan provided the details for structural and non-structural projects that could be completed in part or in full over three phases. Phase 1 projects were proposed for development over the ensuing 5 years. Phase 2 projects were anticipated during the following 5 to 10 years, as financing would allow. Phase 3 projects were considered long-term goals scheduled for completion by the year 2015.

1.5 CALIFORNIA ENVIRONMENTAL QUALITY ACT PROCESS OVERVIEW

The basic purposes of CEQA are to (1) inform governmental decision-makers and the public about potential significant environmental effects of proposed activities, (2) identify ways that environmental damage can be avoided or significantly reduced, (3) prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures, and (4) disclose to the public the reasons why a governmental agency approved the project if significant environmental effects are involved.

An Environmental Impact Report (EIR) should use a multidisciplinary approach applying social and natural sciences to make a qualitative and quantitative analysis of all the foreseeable environmental impacts a proposed project would exert on the surrounding area. As stated in CEQA Section 15151:

An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which intelligently takes an account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible.

The Draft 2004 RWMP was prepared to comply with CEQA regulations, and is to be used by local regulators and the public in their review of the potential environmental impacts of the proposed project, alternatives, and mitigation measures that will minimize, avoid, or eliminate the environmental impacts.

NOTICE OF PREPARATION

In accordance with CEQA Section 15063, a Notice of Preparation (NOP) was published by MWA on October 22, 2003. The NOP was circulated to local, state, and federal agencies and other interested parties for 30 days. The NOP consisted of the goals and objectives of the 2004 RWMP including key issues and findings. The NOP also incorporated potential projects and management actions, and a preliminary list of potential environmental impacts. MWA accepted comments on

the NOP for a 30-day period, closing on November 22, 2003. Appendix A includes a copy of the NOP. Appendix B includes a scoping report containing summaries of the comments received during the scoping meetings and written comments on the NOP. The project description assessed in this Draft PEIR has changed based on the comments received during the NOP scoping process.

PUBLIC PARTICIPATION PROGRAM

SCOPING PROCESS

Three public scoping meetings were held for the proposed project. The first scoping meeting was held during a TAC meeting open to the public on November 5, 2003, at the MWA in Apple Valley. The purpose of this first meeting was to inform interested parties of MWA intention to prepare the PEIR for the 2004 RWMP and to solicit comments and suggestions. A second scoping meeting was held in the City of Barstow City Council Chamber also on November 5, 2003. A third scoping meeting was held on November 6, 2003 at the Hi-Desert Water District (HDWD). Public notices announcing each meeting were placed in the Hesperia Star on October 28, 2003, the Hi-Desert Star on October 25, 2003, the Daily Press on October 24, 2003, and the Desert Dispatch on October 24, 2003.

DRAFT PEIR COMMENT PERIOD

In accordance with Section 15105 of the CEQA Guidelines, the Draft PEIR is available for public review and comment for a 45-day review period. The PEIR has been circulated to local, state, and federal agencies and interested parties who may wish to review and issue comments on its contents. Any comments should be sent to:

Norman Caouette
Assistant General Manager
Mojave Water Agency
22450 Headquarters Drive
Apple Valley, CA 92307

During the 45-day public review period, MWA will conduct public meetings to answer questions and receive oral comments on the Draft 2004 RWMP. All oral and written comments received on the Draft 2004 RWMP will be commented on and included in the Final 2004 RWMP PEIR.

CERTIFICATION

MWA will compile comments received on the Draft PEIR, prepare responses, and complete the Final PEIR. After the Final PEIR is complete, the MWA Board of Directors will vote to certify that the document was prepared in compliance with CEQA and that it adequately evaluates the project's potential impacts. Upon certification, MWA may proceed with project approval.

1.6 PROGRAM LEVEL ANALYSIS

This Draft PEIR provides a program-level review of projects and management actions proposed in the 2004 RWMP. A program-level EIR is prepared on a series of actions that are linked in some way, usually:

- Geographically.
- As a logical part in a chain of contemplated actions.
- In connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program.
- As individual activities carried out under the same authorizing statutory or regulatory authority.

Many of the proposed projects have been planned for the future, but have not been adequately conceived or designed to allow for substantive analysis at this time. This PEIR acknowledges that some components included in the overall 2004 RWMP lack sufficient detail to allow for potential impacts of those components to be thoroughly assessed. Prior to implementation of each project, additional project-level analysis pursuant to CEQA is required to approve and construct projects.

1.7 IRREVERSIBLE ENVIRONMENTAL CHANGES

Implementation of the individual projects would cause some irreversible environmental changes, including destruction of desert scrub habitat and potential disruption of archaeological and paleontological resources. The 2004 RWMP EIR assesses each of these impacts in Chapter 3.0 and provides mitigation measures where necessary to reduce these impacts to less than significant levels.

1.8 KNOWN AREAS OF CONTROVERSY

Section 15123 of the CEQA Guidelines requires that an EIR identify areas of controversy known to the lead agency including issues raised by agencies and the public. Few issues associated with the 2004 RWMP are controversial. MWA has developed the 2004 RWMP with input from a TAC to enable early resolution of potential issues. Issues raised during the EIR scoping process include the potential siting of a treatment plant in the Morongo Basin, the potential for salt loading in the region from importing water, and the potential for impacting groundwater quality with recharged surface water. These issues are each addressed in the EIR.

1.9 REPORT ORGANIZATION

This Draft 2004 RWMP EIR is organized into nine chapters as follows:

Chapter 1.0	Introduction
Chapter 2.0	Project Description
Chapter 3.0	Environmental Impacts and Mitigation Measures
Chapter 4.0	Growth Inducement Potential and Secondary Effects of Growth
Chapter 5.0	Cumulative Analysis
Chapter 6.0	Project Alternatives
Chapter 7.0	List of Preparers
Chapter 8.0	References
Chapter 9.0	List of Acronyms

CHAPTER 2

PROJECT DESCRIPTION – REGIONAL WATER MANAGEMENT PLAN

2.1 BACKGROUND

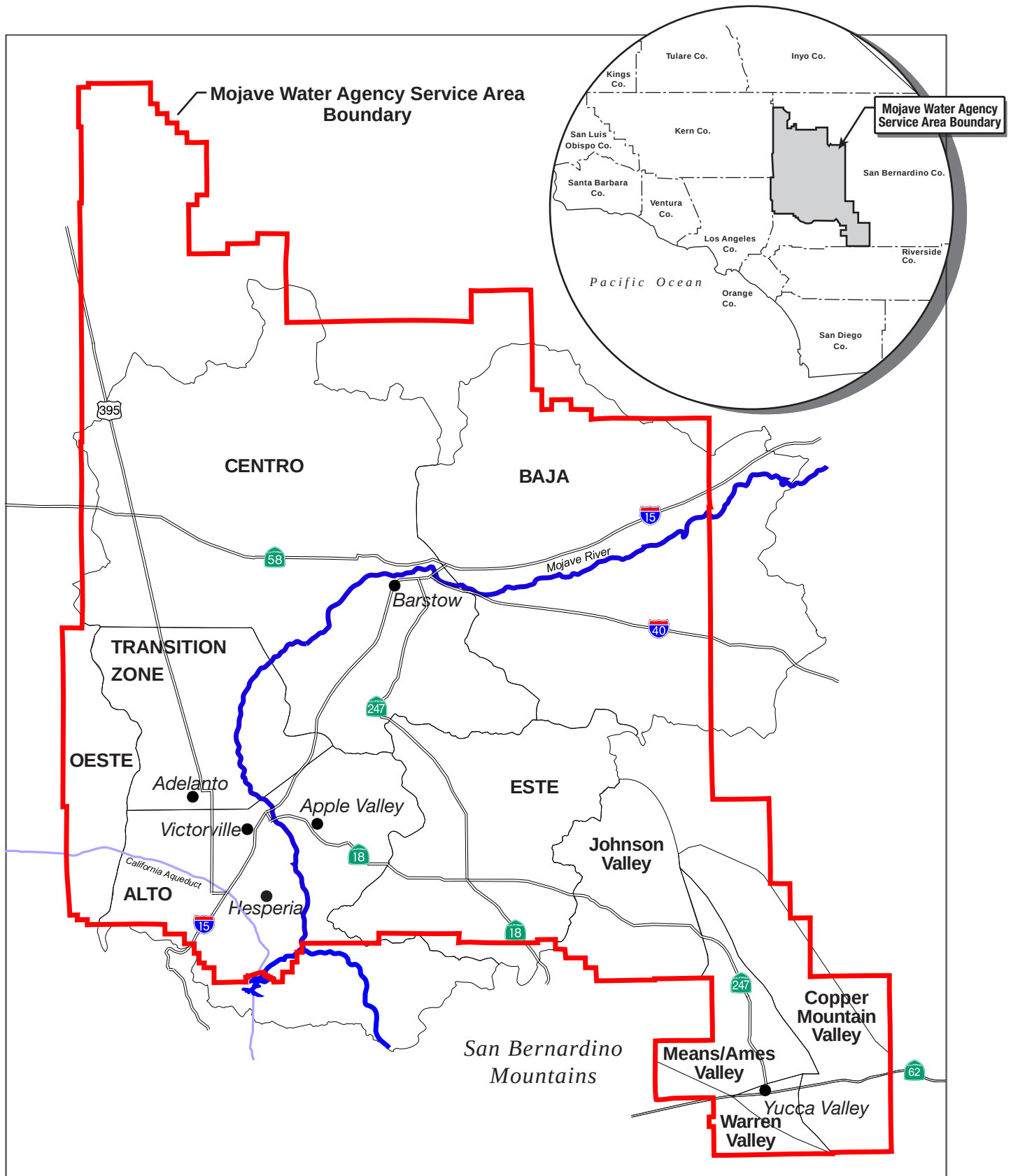
The MWA 2004 RWMP evaluates water demand and supplies throughout the MWA service area and identifies a set of projects and management actions to address the water supply needs and groundwater management objectives of the area through the year 2020. The 2004 RWMP replaces the original RWMP completed in 1994, which was evaluated in a PEIR adopted in 1994. The 2004 RWMP has been prepared to reflect the current conditions and opportunities, and the requirements of the Mojave Basin Area and Warren Valley Basin stipulated judgments.

MOJAVE WATER AGENCY BACKGROUND AND DESCRIPTION OF THE SERVICE AREA

The MWA was created by an act of the California State Legislature in 1959 for the purpose of managing the declining groundwater levels in the Mojave Basin Area, El Mirage Basin, and Lucerne Basin. The Johnson Valley and Morongo Basin area were annexed to the MWA in 1965. The MWA service area covers over 4,900 square miles within western San Bernardino County, as shown in **Figure 2-1**. The 2004 RWMP addresses the entire MWA service area. The MWA service area is bordered by Los Angeles and Kern Counties to the west and national forest land in the San Bernardino Mountains and Riverside County to the south. The largest communities in the MWA service area are Adelanto, Victorville, Apple Valley, Hesperia, Yucca Valley, Joshua Tree, and Barstow.

The principal aquifer underlying the MWA service area is separated into three major divisions: 1) the Mojave Regional Aquifer underlies most of the service area from the San Bernardino Mountains to the northern boundary; 2) the Mojave River Floodplain Aquifer underlies the area adjacent to the Mojave River and overlies the Regional Aquifer; and 3) the Morongo Basin/Johnson Valley Aquifer constitutes the southeastern portion of the MWA service area.

These primary aquifers are divided into subunits based on hydrogeologic and political boundaries as shown in Figure 2-1. Each of these interconnected subunits has unique hydrogeologic characteristics and water production demands. The Alto Subarea supplies most of the municipal water demand of the Adelanto, Victorville, Hesperia, and Apple Valley urban areas.



SOURCE: Schlumberger Water Services, 2004

MWA RWMP / 203148 ■

Figure 2-1
Mojave Water Agency Service Area

The groundwater basin underlying the MWA service area provides most of the water needs of the region. Groundwater levels have been in decline since the 1950s. Overdraft conditions persist in certain areas. The current estimated cumulative overdraft in the service area is approximately two million-acre feet.

The MWA is responsible for managing the long-term reliability of the surface and groundwater supplies within its service area. MWA is a SWP contractor with a “Table A” allocation of 75,800 acre-feet per year (afy) of water delivered via the California Aqueduct. MWA distributes SWP water to meet demand and reduce overdraft conditions within its service area through the Mojave River Pipeline, the Morongo Basin Pipeline, and through releases to the Mojave River channel.

BASIN ADJUDICATION

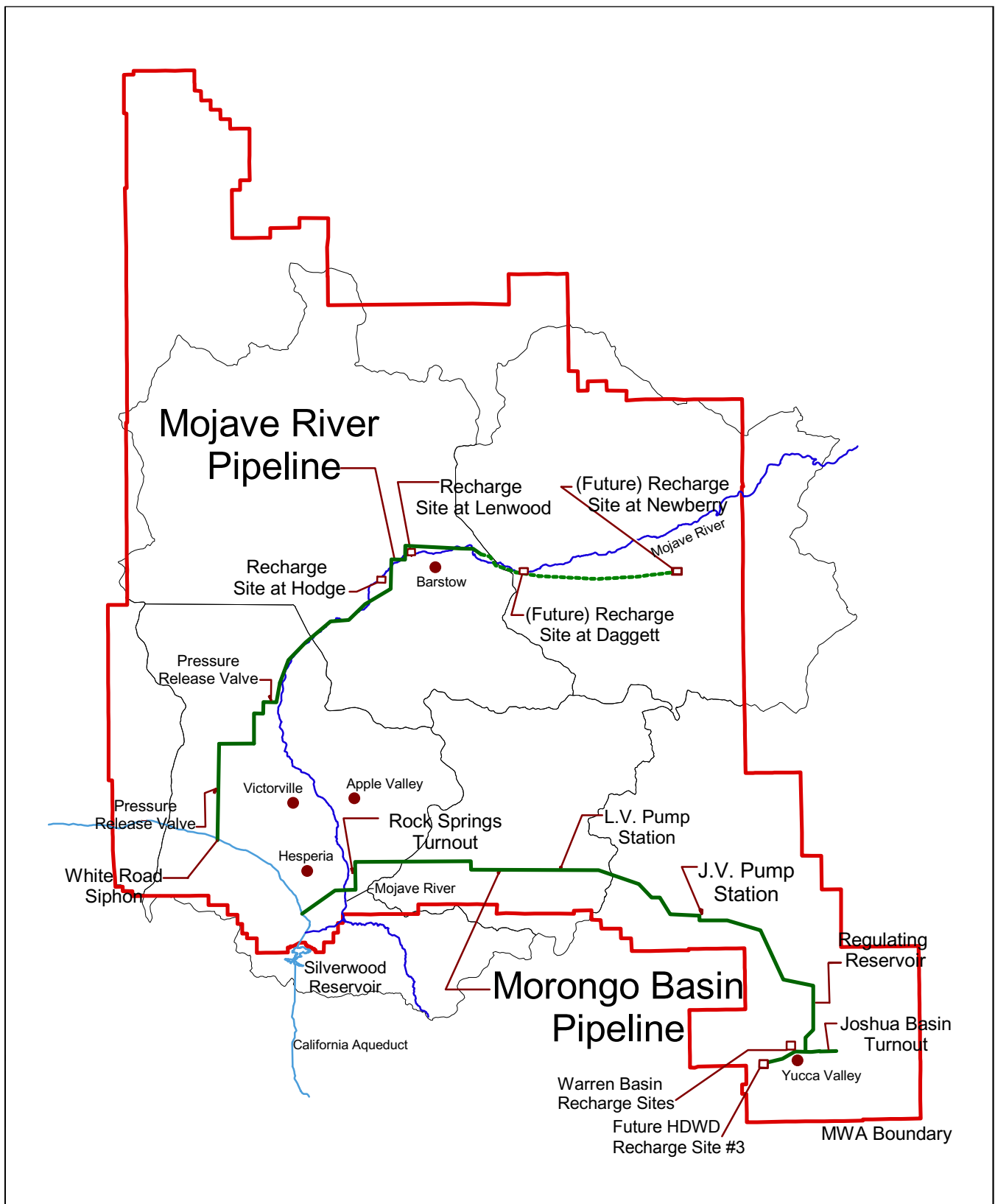
The Mojave Basin Area is adjudicated under a stipulated judgment issued in January 1996 and affirmed in 2000. The court Judgment identifies the amount of groundwater that can be extracted by major groundwater producers and generally excludes from the Judgment minor producers using 10 afy or less. The purpose of the Stipulated Judgment is to achieve a water supply and demand balance approximating safe production practices and to address the general condition of groundwater overdraft in the Mojave Basin subareas.

The Judgment sets limits on the amount of groundwater production that can occur in each subarea without incurring an obligation to buy imported water to offset “excess” groundwater use. Each major producer has an established Free Production Allowance (FPA) that is currently in water year 2004-05 65 percent of its highest annual use verified for the 5-year base period from 1986-90 for non-agricultural parties in the Alto Subarea, with 80 percent for all other parties. The allocated FPA represents each producer’s share of the water supply available in a subarea. The judgment requires that reductions in FPA occur in increments of five percent per year until the available production in each subarea is in balance with the available water supply. Producers are required to replace any water pumped above their FPA determined for the year. Replacement can occur either by paying the Mojave Basin Area Watermaster to purchase supplemental water from MWA or by transferring unused production rights within that subarea from another party to the judgment. Obligations also exist between subareas that may result in the purchase of imported water or transfers between parties if the obligations are not met.

The Warren Valley portion of the Morongo Basin/Johnson Valley area is adjudicated pursuant to a 1977 judgment. A court-approved stipulation declared the relative rights and obligations of basin pumps, and a Watermaster was appointed to develop a physical solution to overdraft conditions. The physical solution adopted in 1991 included import of water. The Morongo Basin Pipeline began delivering water to the area in 1995.

EXISTING FACILITIES AND OPERATIONS

Figure 2-2 shows the chief existing water system facilities in the MWA services area. The California Aqueduct extends across the southwest corner of the service area. The Mojave River Pipeline currently extends from the California Aqueduct north and east along the Mojave River



SOURCE: Schlumberger Water Services, June 2002

MWA RWMP / 203148 ■

Figure 2-2
Existing Recharge Basins, Turnouts and Pipelines

past Barstow to the Daggett recharge facility. Along the way, water is delivered to two other recharge basin facilities at Hodge and Lenwood. Phase 4a of pipeline construction is now underway to extend this pipeline further east to the southwest corner of the Daggett Airport. Reach 4, the final planned reach, will ultimately extend out to a portion of Newberry Springs.

The Morongo Basin Pipeline extends from the California Aqueduct east through the Morongo Basin / Johnson Valley area. This pipeline was completed in 1994 and began delivering water to the HDWD in 1995. It delivers water to the Rock Springs outlet into the Mojave River and the Warren Valley Recharge Basins. MWA also operates a recharge demonstration project at Oro Grande Wash and has begun investigating a second at Antelope Wash.

2004 RWMP DEVELOPMENT PROCESS

The first RWMP was published by MWA in 1994. Since that time several developments have prompted MWA to prepare a plan update. These developments include advancements in the basin adjudication process, a more refined understanding of the hydrology and hydrogeology of the service area, and the growing realization that the Mojave region can be a strategic element in the long-term management of California's water supplies.

The 2004 RWMP was prepared in three phases, plus an implementation phase. MWA is working with a TAC representing stakeholders throughout the MWA service area to prepare the updated Plan. Members of the TAC include representatives from San Bernardino County (County), incorporated cities, state and resources agencies, developers, municipal, agricultural and domestic water producers, concerned community representatives and other interested parties. The California Department of Water Resources (DWR) is involved as the operator of the SWP and has provided grant funding to assist the program.

The Phase 1 report¹ provides an array of projects and management actions that can both mitigate groundwater overdraft and meet the water supply needs of the area for the next two decades. Initial Phase 1 tasks focused on collecting and reviewing relevant data. Water supply and demand numbers were updated to provide both current and projected estimates of groundwater overdraft in the basin.

In Phase 2, the two best combinations of projects and management actions that address the key MWA water issues were screened and selected using a four-step process. The first step was to establish clear objectives and performance measures for evaluating potential alternatives. In steps two through four, alternative combinations of projects and management actions were assembled, evaluated and ranked based on their performance against the objectives and performance measures to identify the best alternatives.

Phase 2 resulted in identification of two recommended alternatives for further study, that are representative of the combination of projects and management actions required to achieve the Plan objectives and meet the desired performance measures over the planning horizon through 2020. The Plan centers on the conjunctive use of local groundwater and imported supplies from the State

¹ Saracino-Kriby-Snow (a Schlumberger Company), *MWA RWMP Update Phase I Report*, June 2002.

Water Project. The alternatives evaluation process identifies a prioritized package of solutions to guide MWA efforts to meet the demands of all the current and projected future uses in the planning area, consistent with the two court judgments related to the adjudication of the groundwater basins.

Phase 3 of the 2004 RWMP includes the following: preparation of the CEQA PEIR, summary of demand management actions and conservation measures, development a groundwater management plan, identification of funding sources and cost allocations including grant identification and application, and assessment of post-2020 water supply availability.

FUTURE AGRICULTURAL USE SCENARIO ASSUMPTIONS

The RWMP estimates future water consumption under two possible agricultural scenarios that bracket the potential maximum and minimum production rates.

- Agriculture Scenario 1: assumes that agricultural water used does not change from 2000 (34,900 afy) through 2020. Any current non-agricultural water deficit within the subarea and all increases in non-agricultural water uses would have to be supplied by imported water.

All regions are projected to have larger deficits in 2020 than they had in 2000. Largest water deficit difference occurs in Alto (16,800 afy in 2000 to 47,200 afy in 2020). In Centro, water demand is expected to exceed the average annual supply in 2020, causing the year 2000 water surplus to be replaced with a water deficit of about 2,700 afy. Overall, Mojave Basin Area is projected to have a water deficit of 79,100 afy on average in 2020.

In Morongo Basin/Johnson Valley Area, all subbasins except for Johnson Valley will have water deficits in 2020. Largest will be Warren Valley (1,200 afy). Excluding Johnson Valley, the Morongo Basin/Johnson Valley Area will have a deficit of 1,900 afy in 2020.

- Agriculture Scenario 2: There are significant decreases in agricultural use because agriculture would voluntarily transfer its FPA to non-agricultural uses in-lieu of purchasing replacement water. Agricultural water use would decrease from 34,900 afy in 2000 to 12,500 afy in 2020.

This assumes that rampdown under the Mojave Basin Area Judgment (1996) resumes in 2002 at 5% per year until balance is achieved between production rights and available supply as required by the judgment. Non-agricultural water used would be met by existing non-agricultural FPA and through voluntary transfers of agricultural FPA. At least 1,300 acre-feet of agricultural consumptive use (2,100 acre-feet of production) would remain in Alto, 300 acre-feet of consumptive use (500 acre-feet of production) would remain in Oeste, and 600 acre-feet of consumptive use (900 acre-feet of production) would remain in Baja.

In the Mojave Basin Area, Alto, Baja, Este, and Oeste would have smaller water deficits in 2020 than under Scenario 1. Largest deficit difference is in Baja (23,200 afy in Scenario 1 and 6,100 in Scenario 2). In Centro the projected average annual water deficits are the same under both scenarios. Because the Morongo Basin/Johnson Valley Area has little agriculture, the projected consumptive use for all subbasins is the same for both scenarios.

Overall, the Mojave Basin would have an average annual water deficit of 56,700 afy in 2020. The MWA as a whole has a projected average annual water deficit of about 58,600 afy.

Under Scenario 1, the projected long-term average annual deficit in 2020 is about 81,000 afy. Under Scenario 2, the projected long-term average annual deficit in 2020 is about 58,600 afy. The recommended Plan assumes agricultural Scenario 2 will occur and develops projects and actions necessary to balance the groundwater basins and meet existing and future supply under this assumption.

2.2 RWMP GOALS, OBJECTIVES AND NEED

The objectives established for the 2004 RWMP through 2020 are to:

A) Balance future water demands with available supplies recognizing the need to:

- stabilize the groundwater basin storage balance over long-term hydrologic cycles,
- protect and restore riparian habitat areas as identified in Exhibit H of the Mojave Basin Area Judgment and the California Department of Fish & Game (CDFG) management plan required by Exhibit H,
- limit the potential for well dewatering, land subsidence, and migration of poor quality water,
- maintain a sustainable water supply through extended drought periods, and
- select projects with the highest likelihood of being implemented.

B) Maximize the overall beneficial use of water throughout MWA by:

- supplying water in quantity and of quality suitable to the various beneficial uses,
- addressing issues throughout the MWA service area recognizing the interconnection and interaction between different areas,
- distributing benefits that can be provided by MWA in an equitable and fair manner,
- ensuring that costs incurred to meet beneficial uses provide the greatest potential return to beneficiaries of the project(s),
- avoiding redirected impacts, and
- identifying sustainable funding sources including consideration of affordability.

Balancing future water demands with available supplies will increase water supply reliability and eliminate overdraft of the groundwater basins. Stabilized groundwater storage allows for groundwater to be available during surface water supply shortages and delivery interruptions. With a balanced basin, groundwater elevations will be relatively stable. This will reduce the potential for land subsidence and associated aquifer compaction. By limiting migration of poor water quality, available supplies will be of sufficient quality to meet drinking water objectives, thereby increasing long-term water supply reliability.

NEED FOR PLAN

The 2004 RWMP identifies key issues affecting the regional groundwater basin. **Table 2-1** highlights the chief characteristics and issues for each of the aquifer subareas and indicates the overall projected need for recharge required in the three principal aquifers to meet both existing and future supply needs through 2020.

**TABLE 2-1
SUMMARY OF FINDINGS FOR EACH AQUIFER SUBAREA**

Principal Aquifer	Sub Area	Sub-Aquifer	Level of Current Overdraft	Expected Subarea Growth?	Priority for Action	Projected Recharge Requirement
Mojave Regional Aquifer	Alto	Alto Mid-Regional	High	High	High	41,000 AFY
		Alto West-Regional	High	High	High	
		Alto East Regional	Moderate	High	Moderate	
	Baja	Baja Regional	High	Low	High	
	Centro	Centro Regional	N/A	N/A	Moderate	
	Este	Este Regional	Moderate	Moderate	Moderate	
		Lucerne Valley	Low	Moderate	Low	
	Oeste	Oeste Regional	Moderate	Moderate	Moderate	
Mojave Floodplain Aquifer	Alto	Alto Floodplain	High	High	High	23,000 AFY
		Transition Zone Floodplain	Low	High	Moderate	
	Baja	Baja Floodplain	High	Low	Moderate	
	Centro	Centro Floodplain	Low	Moderate	N/A	
Morongo Basin / Johnson Valley	Este	Lucerne Valley	Low	Low	Low	2,800 AFY
	Johnson Valley	Johnson Valley	Low	Low	Low	
	Copper Mtn Valley	Copper Mtn Valley	Moderate	Moderate	Moderate	
	Means/Ames Valley	Means/Ames Valley	High	N/A	High	
	Warren Valley	Warren Valley	Low	Moderate	High	

Source: 2004 RWMP. Priority for action in each subarea is based on level of overdraft, expected growth and ability to implement.

Key issues addressed in the 2004 RWMP are as follows:

- Current demand exceeds supply; future demand will also exceed supply unless corrective actions are taken.
- Naturally occurring water quality problems affect drinking water supplies.
- Many of the groundwater basins are in overdraft.
- All but two of the subareas have riparian ecosystem maintenance issues.
- Wastewater infrastructure issues affect the subareas with the largest water demands.
- Many subareas within MWA are impacted by activities in other subareas.

Demand Exceeds Supply. The projected year 2020 water balance shows a water deficit in the Mojave Basin Area ranging from 57,200 afy to 79,600 afy. The projected year 2020 deficit for the Morongo Basin/Johnson Valley Area is 1,900 afy².

Water Quality. Water quality problems affect drinking water supplies throughout the MWA service area. The key contaminants of concern include arsenic, nitrates, iron, manganese, chromium IV, total dissolved solids (TDS), total petroleum hydrocarbons (TPH), and volatile organic compounds (VOC's).

Overdraft of Groundwater Basins. Declining groundwater levels occur in all subareas of the Mojave Basin Area and in the Morongo Basin/Johnson Valley Area. Overdraft can cause wells to run dry, water quality degradation, land subsidence, and impacts to riparian habitat.

Riparian Ecosystem Maintenance. All but two of the subareas (Oeste and Morongo Basin/Johnson Valley) have potential riparian maintenance issues.

Wastewater Infrastructure. Wastewater infrastructure issues affect the Alto, Este, and Centro subareas, as well as the Warren Valley subbasin in the Morongo Basin/Johnson Valley Area. Wastewater management and infrastructure issues include reducing wastewater discharges to the river and/or changing the point of wastewater discharge (to support water reuse) and affecting contribution of flows to downstream areas, need for infrastructure to expand wastewater collection and reduce septic system use to minimize water quality problems, and need for additional infrastructure to support expansion of water recycling to reduce potable water demands.

Subarea Interaction. Many subareas within the MWA service area are impacted by activities in other subareas that affect both water supply and water quality issues. Further, the Mojave Basin Judgment established requirements for flows between the subareas that must be met.

2.3 PROPOSED PLAN

PLAN ELEMENTS

The Plan to be implemented consists of:

- a) Supply Enhancement Projects: projects that provide water supply enhancement either through groundwater recharge or an increase in groundwater efficiency; and
- b) Management Actions: actions that improve water quality or environmental habitat; additionally, actions that increase net water supply by implementing conservation, storage agreements or water transfers.

After evaluation of many alternatives comprising various combinations of supply enhancement projects and management actions, the 2004 RWMP process determined that:

² Hi-Desert Water District reports unpublished USGS estimates of natural supply in Warren Valley that are significantly lower than those used in the RWMP. Consequently, total recharge in the Morongo Basin/Johnson Valley Area has been modeled as 2,800 afy.

- It is possible to meet the 2020 water demand within the service area with 10 percent municipal conservation (five percent in the Morongo Basin/Johnson Valley) and significant projected decreases in agricultural production
- Recharge of imported water supply is needed as follows:
 - Up to 41,000 afy of new recharge is needed in the Mojave Regional Aquifer
 - Up to 23,000 afy of new recharge is needed in the Mojave Floodplain Aquifer
 - Up to 2,800 afy of new recharge is needed in the Morongo Basin/Johnson Valley subarea
- Water balances can be achieved with or without a new water treatment plant in the Alto subarea
- Wellhead treatment may be needed to meet water quality standards for naturally occurring constituents

The 2004 RWMP does not identify one preferred or recommended alternative with a specific set of projects and management actions. Rather, it identifies a “menu” of potential projects and actions that MWA and other agencies can pursue along with specific overall performance expectations that need to be achieved by the ultimate set of projects and actions implemented. **Table 2-2** lists the menu of supply enhancement projects and management actions that could be implemented and these are shown on **Figure 2-3**. For each project the table summarizes the type of project (Recharge of either the Regional Aquifer or the Floodplain Aquifer, Increased Recharge Efficiency, Water Treatment or Blending, Change Source of Supply, Conservation, or Storage Agreement), the aquifer unit in which the project would be located, and the potential Implementing Agency(ies) for the project or action. The performance expectations for what the Plan needs to achieve have been set by the representative alternatives, which are described below.

Many of these projects and actions require further investigation to confirm their feasibility and performance and determine specific site locations and facility design. As feasibility studies and siting studies are conducted for these projects, and as new projects are identified, this list of recommended projects and actions will evolve. However, the current list frames the nature and magnitude of project activities that will be needed to implement the 2004 RWMP. **Figures 2-4 through 2-8** identify potential locations for the proposed recharge basin projects. The actual locations for future projects will require additional evaluation.

Some of the potential projects and actions identified during the 2004 RWMP process have been set aside from further analysis at this time. These include options that appear to have more constraints and/or provide less water supply benefit than other projects on the current list. Concepts that have been set-aside at this time include: Recharge ponds north of the Helendale Fault (Centro subarea), Old Woman Springs recharge basins (Este subarea), purchase of riparian land, and installation of gates on the Mojave River Dam (Alto subarea).

TABLE 2-2
SUMMARY OF POTENTIAL SUPPLY ENHANCEMENT PROJECTS AND MANAGEMENT ACTIONS

ID No.	Project or Management Action	Type of Project / Action	Principal Aquifer	Aquifer Unit	Modeled in Preferred Alternatives	Priority	Potential Implementing Agency
1	Kane Wash Recharge Ponds	Non-Floodplain Aquifer Recharge	Mojave Regional Aquifer	Baja Regional	D5r/D6r	Moderate	MWA
2	El Mirage Recharge Ponds			Oeste Regional	No	Moderate	MWA
3	Sheep Creek Recharge Ponds			Oeste Regional	D5r/D6r	Moderate	MWA
4	Oro Grande Wash Recharge Ponds			Alto West Regional	D5r/D6r	High	MWA, VVWD ³ , BMWD ⁴
5	Cedar Street Detention Basin			Alto Mid Regional	D5r/D6r	High	City of Hesperia, SBCFCD ⁵ , MWA
6	Antelope Valley Wash Recharge Ponds			Alto Mid Regional	D5r/D6r	High	City of Hesperia, MWA, SBCFCD
7	Recharge Facilities South of Apple Valley			Alto East Regional	D5r/D6r	Moderate	MWA
8	Recharge Ponds West of Helendale Fault			Este Regional	D5r/D6r	Moderate	MWA
9	Lucerne Valley Recharge Ponds		Morongo Basin/Johnson Valley	Lucerne Valley	No	Low	MWA
10	Means/Ames Valley Recharge Ponds			Means/Ames Valley	D5r/D6r	Moderate	HDWD, MWA, BHDVWA ⁶
11	HDWD Recharge Basin #3			Warren Valley	No	High	HDWD, MWA
12	Joshua Basin District Recharge & Pipeline			Copper Mountain Valley	D5r/D6r	Moderate	Joshua Basin Water District (JBWD), MWA
13	Newberry Springs Recharge Ponds	Floodplain Aquifer Recharge	Mojave Floodplain	Baja Floodplain	No	High	MWA
14	Minneola Recharge Ponds			Baja Floodplain	No	Moderate	MWA
15	Daggett Recharge Ponds			Baja Floodplain	No	Moderate	MWA
16	In-Lieu Supply to Silver Lakes			Transition Zone Floodplain	D6r only	Moderate	CSA70, MWA
17	Mojave River Pipeline Extension - Transition Zone	Floodplain Aquifer Recharge	Mojave Floodplain	Transition Zone Floodplain	No	Moderate	MWA
18	Rock Springs Release			Alto Floodplain	D5r/D6r	High	MWA
19	Hesperia Lakes Recharge			Alto Floodplain	D5r/D6r	High	Hesperia Park and Recreation District, MWA

³ VVWD Victor Valley Water District

⁴ BMWD Baldy Mesa Water District

⁵ SBCFCD San Bernardino County Flood Control District

⁶ BHDVWA Big-Horn Desert View Water Agency

TABLE 2-2
SUMMARY OF POTENTIAL SUPPLY ENHANCEMENT PROJECTS AND MANAGEMENT ACTIONS (CONT.)

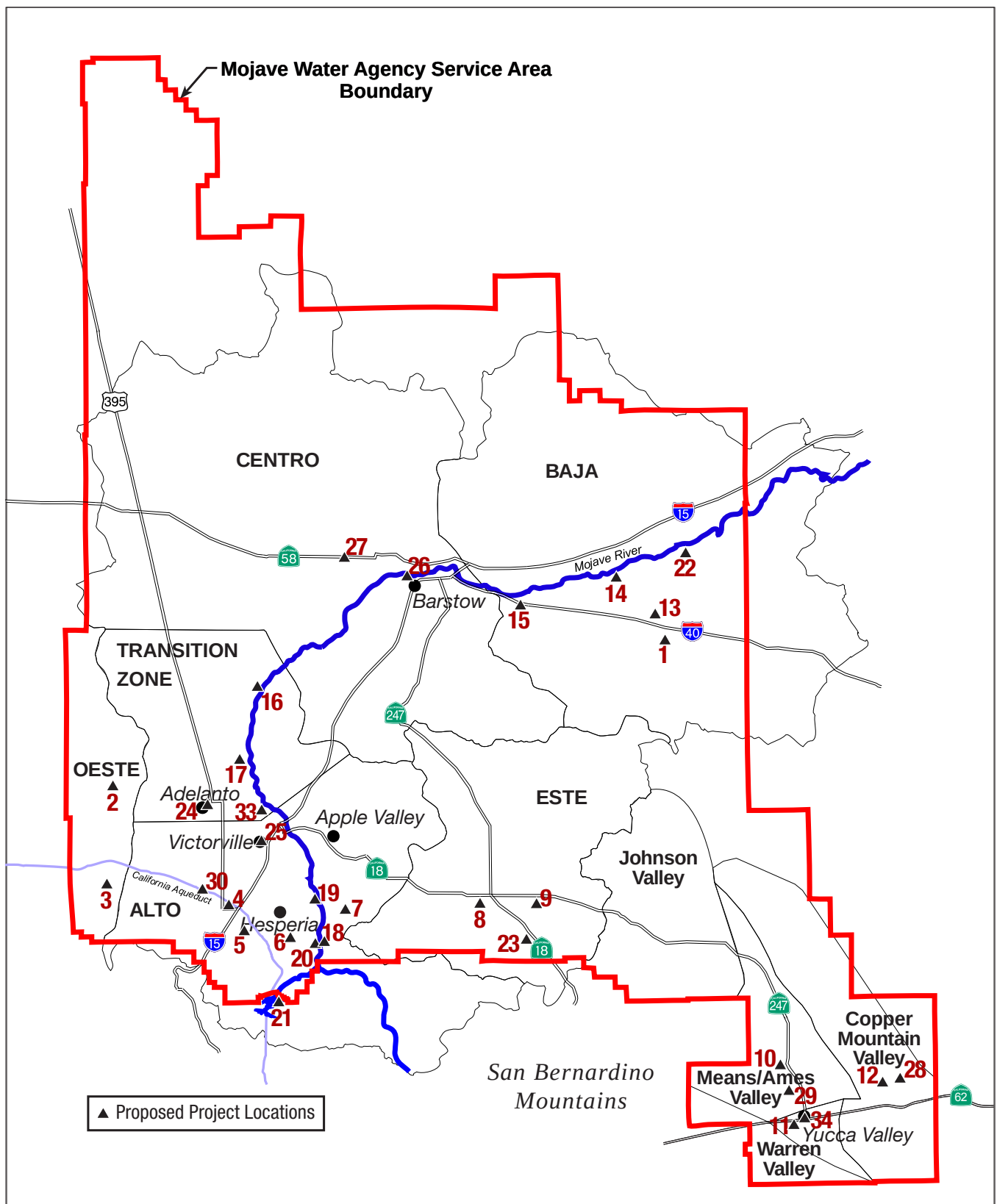
ID No.	Project or Management Action	Type of Project / Action	Principal Aquifer	Aquifer Unit	Modeled in Preferred Alternatives	Priority	Potential Implementing Agency
20	Recharge Facilities South of Rock Springs Turnout	Floodplain Aquifer Ready	Mojave Floodplain	Alto Floodplain	No	High	MWA
21	Release SWP Water from Silverwood Lake			Alto Floodplain	No	High	MWA
22	Baja Storm Flow Retention - 2 locations	Increase Recharge Efficiency	Mojave Floodplain	Baja Floodplain	D5r/D6r	Moderate	MWA, SBCFCD
23	Cushenbury Flood Detention Basin		Morongo Basin/Johnson Valley	Lucerne Valley	D5r/D6r	Low	MWA, SBCFCD
24	Injection Wells in Mesa Area of Adelanto	Water Treatment and Blending	Mojave Regional Aquifer	Alto Mid Regional	No	High	Adelanto, MWA
25	Injection Wells in Victorville Area			Alto Mid Regional	No	High	VVWD; Victorville, Baldy Mesa Water District
26	Southern California Water Company (SCWC) Moving Wells to Serve Barstow	Change Source of Supply	Mojave Floodplain	Centro Floodplain	No	--	SCWC
27	Hinkley Water Supply Augmentation by SCWC			Centro Floodplain	D5r/D6r	Moderate	SCWC
28	JBWD Wells		Morongo Basin/Johnson Valley	Copper Mountain Valley	No	--	JBWD
29	New Supply for Pioneertown			Means/Ames Valley	D5r/D6r	High	HDWD, CSA 70, W-4, MWA
30	Regional Surface Water Treatment Plant	Water Treatment and Blending	Mojave Regional Aquifer	Alto West Regional	D6r only	Moderate	Baldy Mesa Water District, VVWD, MWA, San Bernardino County, Adelanto
31	Blending local water with Floodplain Aquifer			Alto Mid Regional	No	High	MWA and M&I Purveyors
32	Local Wastewater Treatment Plants (Alto)			Alto Mid Regional	No	High	VVWD, Victorville, Hesperia, Apple Valley, VVWRA
33	Victor Valley Wastewater Reclamation Authority (VWRA) Reclamation			Alto Regional	D5r/D6r	High	VVWRA; VVWD; Victorville, Apple Valley, Hesperia

TABLE 2-2
SUMMARY OF POTENTIAL SUPPLY ENHANCEMENT PROJECTS AND MANAGEMENT ACTIONS (CONT.)

ID No.	Project or Management Action	Type of Project / Action	Principal Aquifer	Aquifer Unit	Modeled in Preferred Alternatives	Priority	Potential Implementing Agency
34	Yucca Valley Wastewater Treatment	Water Treatment and Blending	Morongo Basin/Johnson Valley	Means/Ames Valley	No	--	HDWD; Town of Yucca Valley
35	Local Wastewater Treatment Plant (Lucerne)			Lucerne Valley	No	--	
36	Individual Wellhead Treatment		All	Entire MWA	D5r/D6r	--	MWA, SCWC ⁷ , VVWD, BMWD ⁸ , Adelanto, CSA70, HDWD
37	Eradication of Non-native Plant Species	Improve Riparian Health	Mojave Floodplain	All Floodplain	No	--	MWA, MDRCD ⁹ , MWMA ¹⁰
38	Agricultural Conservation Programs	Conservation and Storage Agreements	All	Entire MWA	No	--	MDRCD
39	Urban Conservation Programs			Entire MWA	D5r/D6r	High	AWAC
40	Storage agreements with agencies within MWA			Entire MWA	No	High	Parties to Judgment, HDWD, JBWD, BHDVWA
41	Water banking agreements with outside agencies			Entire MWA	No	High	MWA, MWD, SCWA ¹¹ , Others
42	Pre-delivering SWP Water			Entire MWA	No	High	MWA
43	Water (entitlement) exchanges			Entire MWA	No	High	MWA, MWD, SCWA

Source: 2004 RWMP.

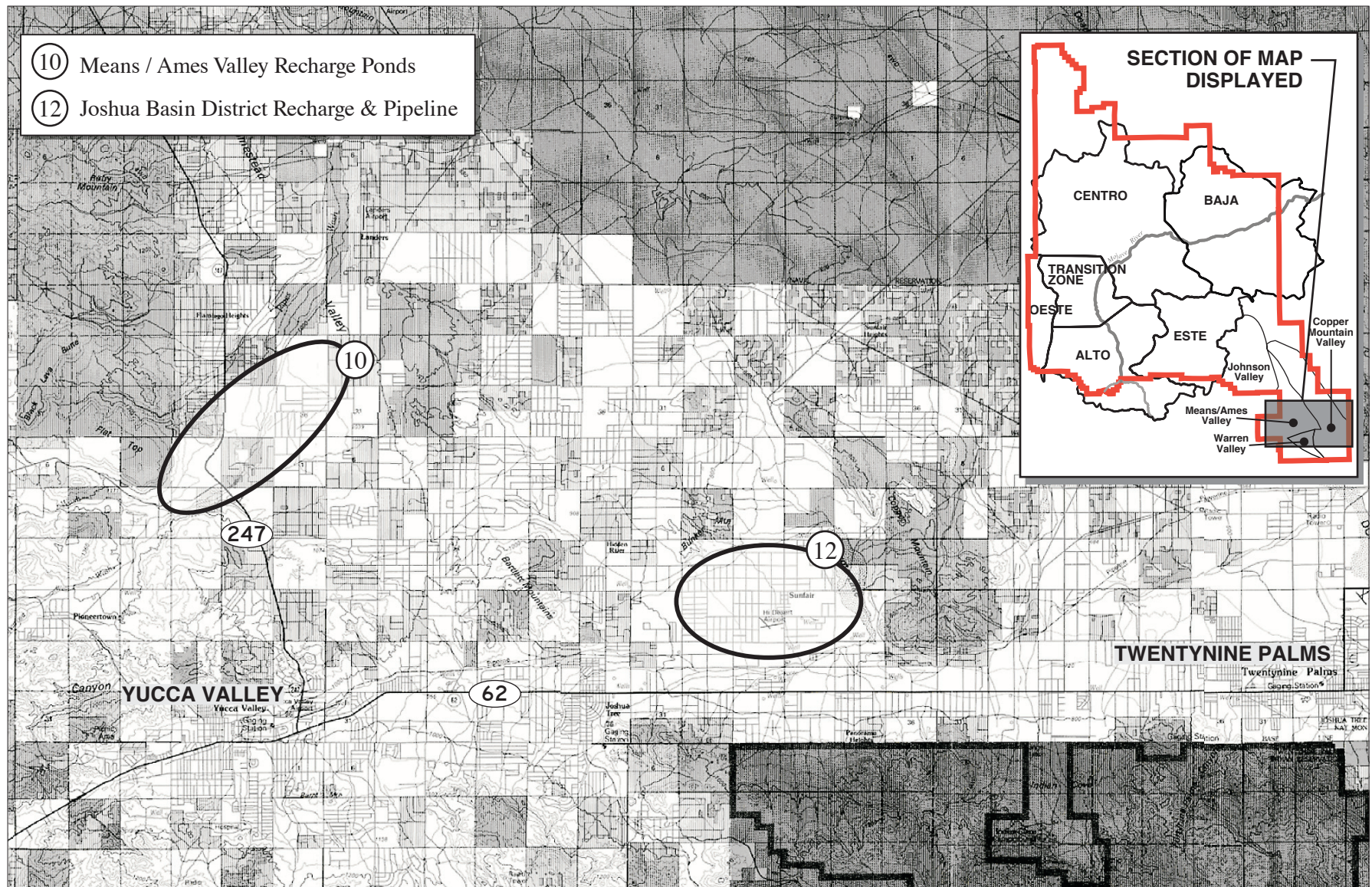
⁷ SCWC Southern California Water Company
⁸ BMWD Baldy Mesa Water District
⁹ MDRCD Mojave Desert Resource Conservation District
¹⁰ MWMA Mojave Weed Management Area
¹¹ SCWA Solano County Water Agency



SOURCE: Environmental Science Associates, 2003

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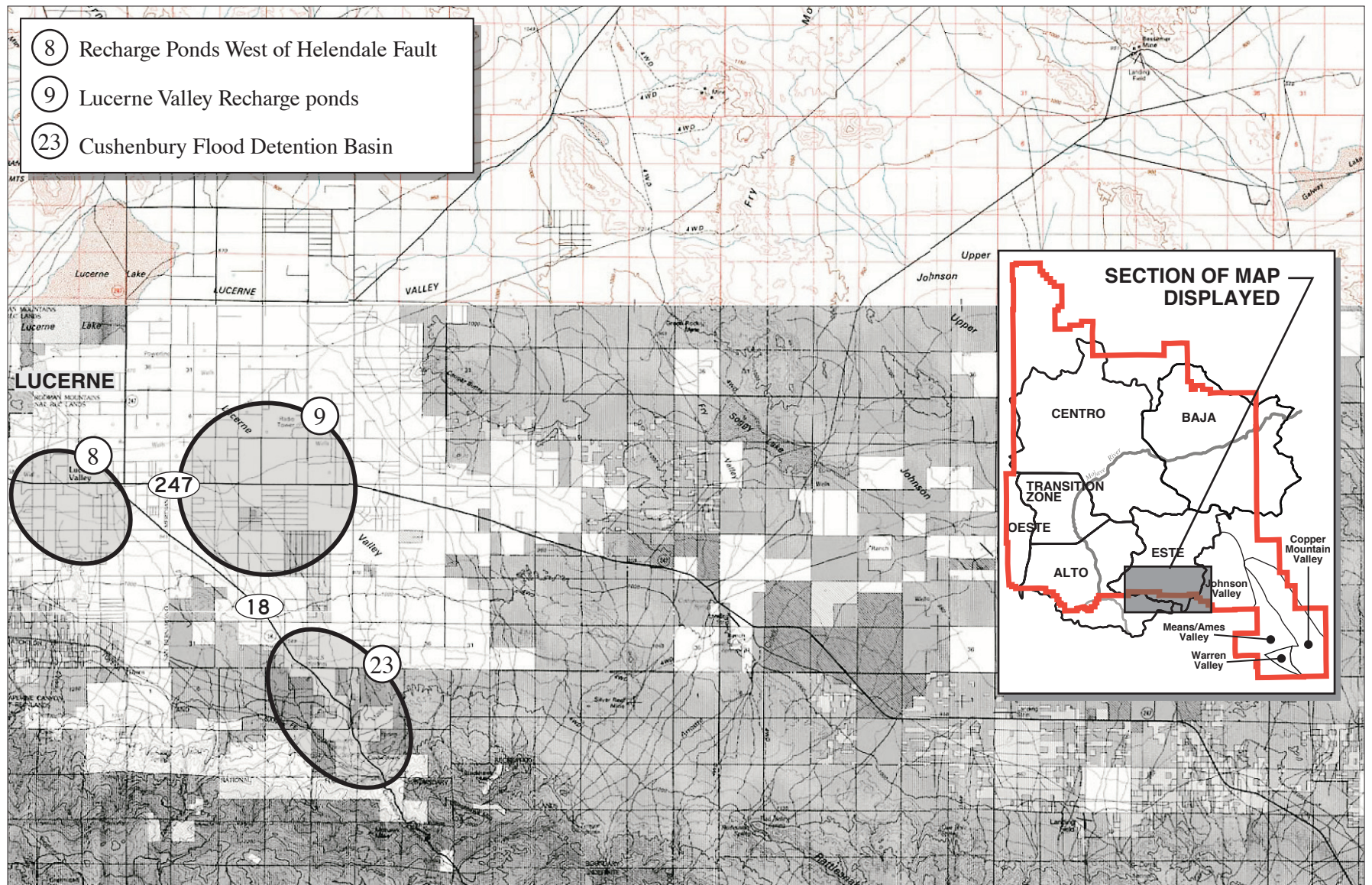
Figure 2-3
Location of Proposed Projects



SOURCE: Topo Scout Maps, Environmental Science Associates

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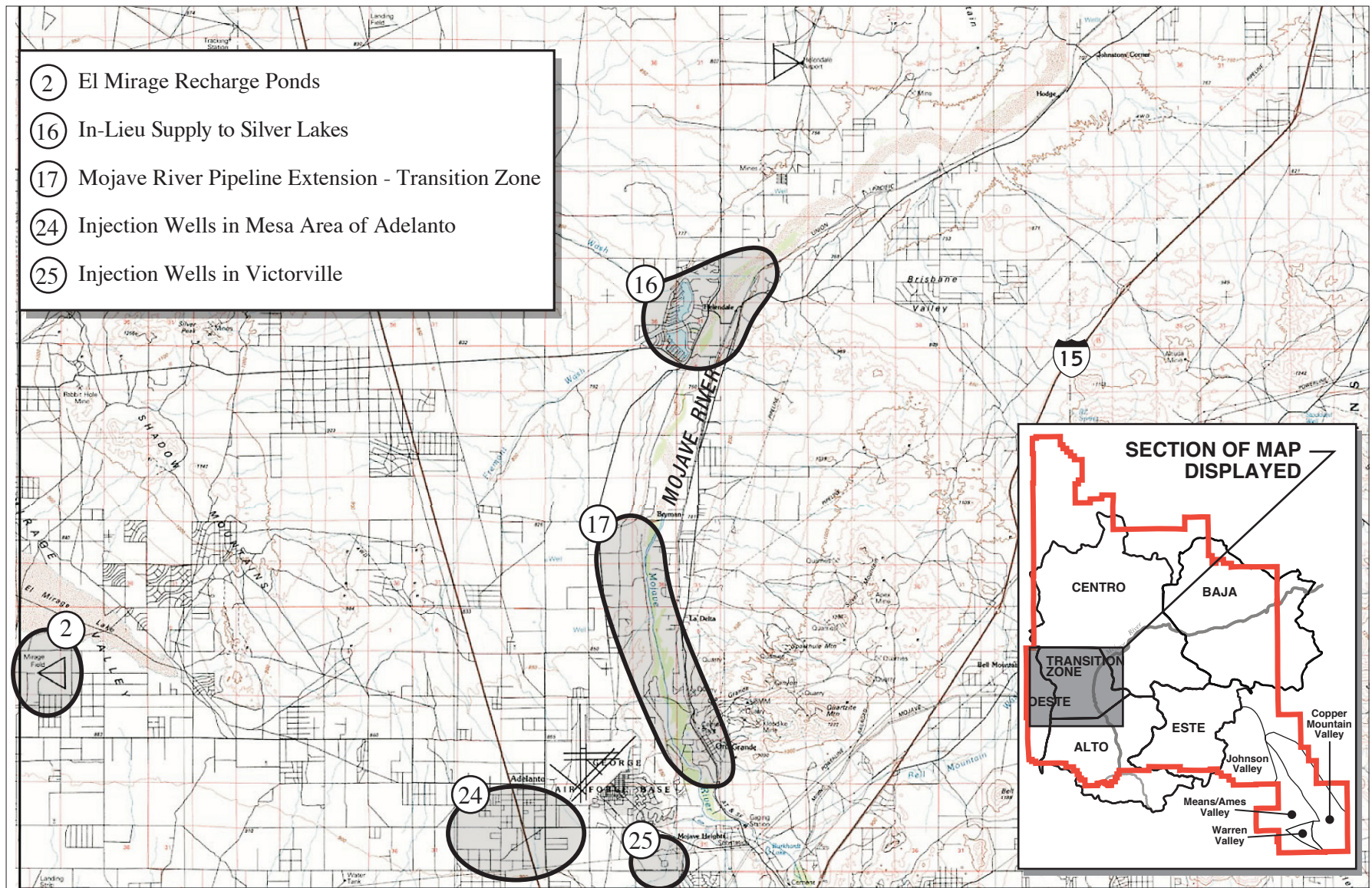
Figure 2-4
Project Locations



SOURCE: Topo Scout Maps, Environmental Science Associates

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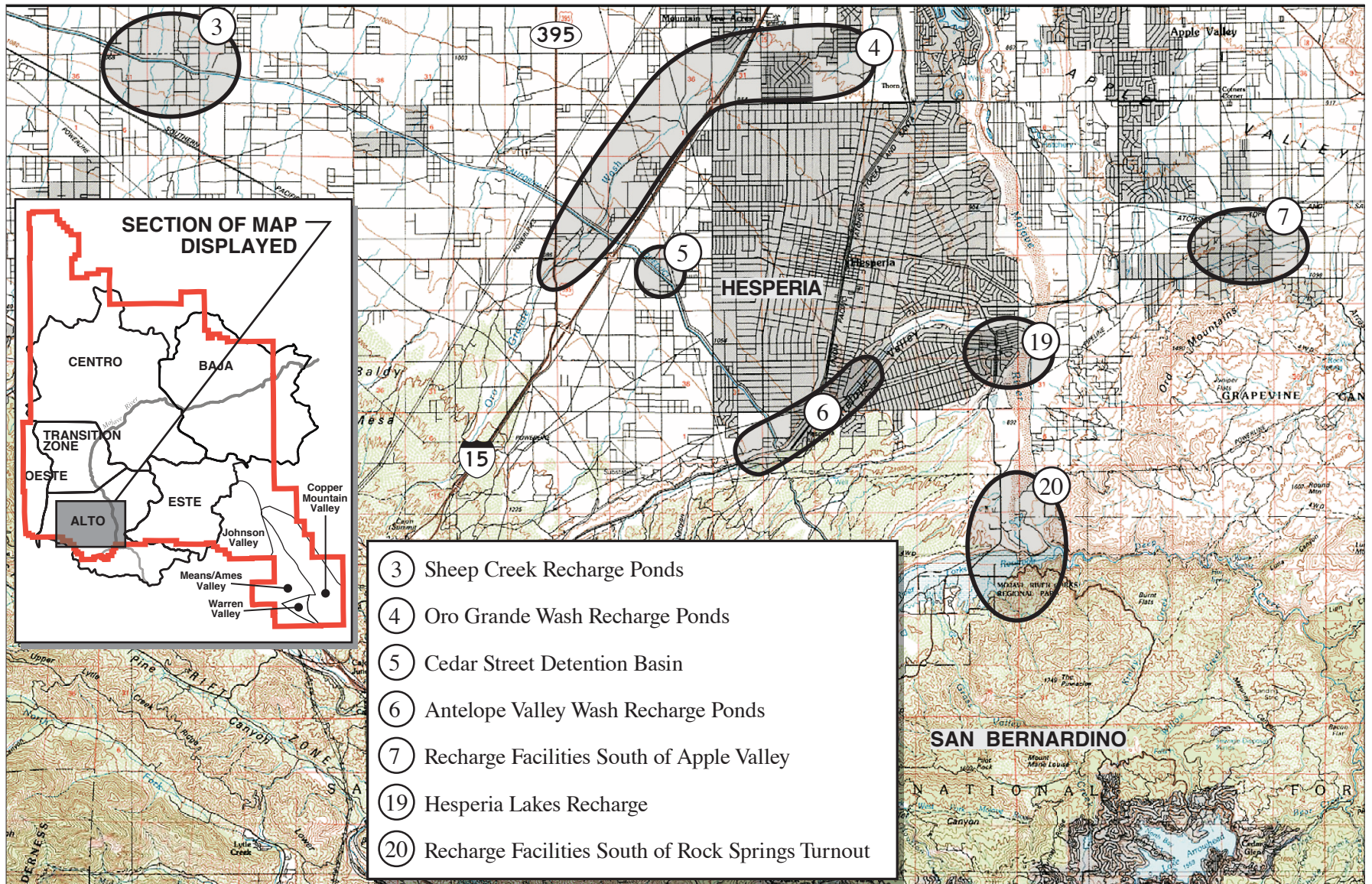
Figure 2-5
Project Locations



SOURCE: Topo Scout Maps, Environmental Science Associates

MWA RWMP / 203148 ■

Figure 2-6
Project Locations



SOURCE: Topo Scout Maps, Environmental Science Associates

MWA RWMP / 203148 ■

Figure 2-7
Project Locations

REPRESENTATIVE PLAN ALTERNATIVES

During the Plan update process, various alternative combinations of supply enhancement projects and management actions were tested to see if and how they could meet the Plan objectives and a refined set of alternatives was developed to represent the best combinations. Two alternatives (D5r and D6r) emerged as representative of the sets of projects and actions that could achieve the following:

Performance Expectations for Plan Implementation

- Bring all groundwater aquifer units in balance
- Meet 99% of total MWA demand with no significant shortage in any subarea or demand sector
- Include an attainable level of 10% municipal conservation
- Provide water quality improvements over existing conditions
- Provide benefits to all subareas without negatively impacting other areas

The specific projects and management actions that were included in the top two representative alternatives (D5r and D6r) from among the master list of potential projects and actions are indicated in Table 2-2. These two alternatives have many common features, including:

- 10% Municipal conservation in the Mojave River Basin, 5% in the Morongo Basin/Johnson Valley area
- Assumptions about reductions in agricultural water use over time (Agricultural Scenario 2)
- Water recycling: Reclamation of VVWRA discharge above 9,700 afy
- Recharge of SWP water into the Alto Mid-Regional, East Regional, and Floodplain aquifers, and into the Baja Regional, Este Regional, Oeste Regional, Warren Valley, Copper Mountain Valley, and Means/Ames Valley aquifers
- Baja and Cushenberry Canyon stormflow retention or equivalent pond recharge projects
- Water supply augmentation for Hinkley and Pioneertown
- Alto wellhead treatment

The primary difference between the two alternatives is that Alternative D5r includes a 12,000 capacity regional treatment plant in Alto while Alternative D6r does not. However, Alternative D6r includes in-lieu supply of SWP water to Silver Lakes (or the equivalent pond recharge or Mojave River recharge projects) and larger sized recharge facilities in all Alto aquifers.

MWA and the participating agencies do not have to implement all of or only those specific projects and management actions modeled in the representative alternatives D5r and D6r, but they are committed to achieving the equivalent level of performance that the model indicated could be

achieved by these two alternatives. Thus, for example, instead of pursuing the Hesperia Lakes Recharge project, which was included in the representative alternatives, the appropriate Implementing Agency could pursue recharge facilities south of the Rock Springs Turnout (Project # 25/22) as a means of developing more recharge to the Alto Floodplain aquifer. The key is to develop adequate additional recharge to each of the three principal aquifers, in the appropriate locations, and further investigations will determine which projects are the best and most viable to implement to achieve the Plan performance goals. MWA may oversee the ongoing process of various agencies evaluating and pursuing specific projects and actions within the Plan. Some projects may be implemented independently by local jurisdictions.

PROPOSED PROJECTS AND MANAGEMENT ACTIONS

This section describes the potential Projects and Management Actions listed on Table 2-2, above, in more detail to present their general characteristics first in terms of general purpose and approach followed by an overview of the facilities involved and construction and operation concepts. **Table 2-3** presents a brief description of each project and action and highlights the potential facilities required to implement the project. This general description is the basis for the program-level impact analysis conducted on these projects and management actions in this PEIR.

Many of these projects and actions require further investigation to confirm their feasibility and performance and to determine specific site locations and facility design. As various Implementing Agencies pursue projects and develop more specific project details, they will also conduct the appropriate project-level CEQA review. The Projects and Management Actions included in the Plan can be further subdivided into the types and location of activities described below.

Supply Enhancement Projects

Supply enhancement projects include groundwater recharge projects and projects that increase the efficiency of existing recharge operations.

Groundwater Recharge Projects

There are three basic approaches to groundwater recharge that are represented in the list of Projects: percolation from the surface via recharge basins, injections wells, and surface deliveries in lieu of pumping groundwater (in-lieu recharge). Most of the potential groundwater recharge projects involve recharge basins for percolation of surface water. Recharge basins could vary in size from 10 acres to over 200 acres. A total of approximately 600 acres of recharge basins could be constructed throughout the service area. An injection well project is included on the list in the Mesa Area of Adelanto because the geology in this area may not be conducive to surface recharge facilities. In addition, the opportunity for in-lieu recharge at the Silver Lakes area is also included as a project on the list.

The groundwater recharge projects are divided between projects that use SWP water for groundwater recharge and projects that use other (non-SWP) sources of water for recharge. The SWP recharge projects are further subdivided into those projects that recharge the floodplain

TABLE 2-3
DESCRIPTIONS OF PROPOSED PROJECTS AND ACTIONS AND
THE POTENTIAL FACILITIES REQUIRED TO IMPLEMENT PROPOSED PROJECTS

ID No.	Project or Management Action	Description	Existing Facilities Involved	New Facilities Required				
				Recharge Basin	Pipelines	Wells	Treatment Plant	Other
1	Kane Wash Recharge Ponds	Extend the Mojave River Pipeline to deliver water to new recharge ponds adjacent to Kane Wash. Recharge capacity: 6,000 afy.	Mojave River Pipeline	X	X			
2	El Mirage Recharge Ponds	Deliver water to new recharge ponds in this area of the Oeste subarea from new El Mirage Pipeline extending from California Aqueduct turnout #1. Estimated recharge capacity: 2,500 afy (could increase for water banking). Perched groundwater in area will affect pond siting.	California Aqueduct Turnout #1	X	X			
3	Sheep Creek Recharge Ponds	Construct new El Mirage pipeline from California Aqueduct Turnout #1 to new recharge ponds along Sheep Creek. Three potential sites identified: two south of the California Aqueduct and one north. Relatively low recharge rates requires large area or direct injection. Estimated recharge capacity: 2,500 afy (could increase for water banking).	California Aqueduct Turnout #1	X	X			
4	Oro Grande Wash Recharge Ponds	Develop new recharge ponds along or in the Wash down stream or upstream of the California Aqueduct. Facility might be able to serve dual purpose of storm water detention and recharge. Provides opportunity to recharge upgradient of BMWD and VVWD wells. Estimated recharge capacity: 8,000 afy. Requires new California Aqueduct turnout.	California Aqueduct	X	X			X
5	Cedar Street Detention Basin	Develop new recharge ponds at the east end of Cedar Street and southwesterly of the California Aqueduct. 120-acre site identified by Hesperia for storm water detention; might be able to accommodate groundwater recharge as well. Provides opportunity to recharge upgradient from City of Hesperia wells. Recharge capacity: 3,500 afy. New turnout on California Aqueduct.	California Aqueduct	X	X			X
6	Antelope Valley Wash Recharge Ponds	Deliver water from California Aqueduct or Morongo Basin Pipeline to new recharge ponds. Hesperia has identified 65-acre site in Wash south of Ranchero Road for stormwater detention that might also provide for recharge. Provides opportunity to recharge upgradient of City of Hesperia wells. May serve as aqueduct spillway in coordination with DWR. Recharge capacity: 3,500 afy (could increase for water banking or spill way). New turnout from Morongo Basin Pipeline	California Aqueduct and Morongo Basin Pipeline	X	X			X

TABLE 2-3
DESCRIPTIONS OF PROPOSED PROJECTS AND ACTIONS AND
THE POTENTIAL FACILITIES REQUIRED TO IMPLEMENT PROPOSED PROJECTS (CONT.)

ID No.	Project or Management Action	Description	Existing Facilities Involved	New Facilities Required				
				Recharge Basin	Pipelines	Wells	Treatment Plant	Other
7	Recharge Facilities South of Apple Valley	Discharge water for recharge to stream channels located south of Apple Valley that are crossed by the Morongo Basin Pipeline. Provides limited opportunity to recharge the Apple Valley area. Recharge capacity: 1,000 afy. New turnout(s) from Morongo Basin Pipeline.	Morongo Basin Pipeline	X				X
8	Recharge Ponds West of Helendale Fault	Deliver water from the Morongo Basin Pipeline to new recharge ponds west of the Fault. Estimated recharge capacity: 5,000 afy. New turnout(s) from Morongo Basin Pipeline.	Morongo Basin Pipeline	X				X
9	Lucerne Valley Recharge Ponds	Deliver water from the Morongo Basin Pipeline to new recharge pond east of the Helendale Fault. MWA has acquired a potential site. Estimated recharge capacity: 5,000 afy. New turnout(s) from Morongo Basin pipelines.	Morongo Basin Pipeline	X				
10	Means/Ames Valley Recharge Ponds	Extend the Morongo Basin Pipeline 1 to 1.5 miles to new recharge pond(s) in Pipes Wash. Install new production and monitoring wells. Estimated recharge capacity: 2,500 afy. New pipeline.	Morongo Basin Pipeline	X	X	X		
11	HDWD Recharge Basin #3	Extend the Morongo Basin Pipeline about 7,500 feet to new recharge ponds in Hydrogeologic Unit #1. Would allow HDWD to lower water levels in Unit #2 and reduce nitrate contamination. Estimated recharge capacity: 6,400 afy.	Morongo Basin Pipeline	X	X			
12	Joshua Basin Water District Recharge & Pipeline	Extend Morongo Basin Pipeline to new recharge ponds. Provides opportunity to recharge Copper Mt. Valley subbasin. Estimated recharge capacity: 1,000 afy.	Morongo Basin Pipeline	X	X			
13	Newberry Springs Recharge Ponds	Turnout from Mojave River Pipeline or 24" pipeline to new recharge site	Mojave River Pipeline	X	X			
14	Minneola Recharge Ponds	Extend Mojave River Pipeline from Daggett to new recharge ponds in the Baja Floodplain aquifer. Estimated recharge capacity: 3,600 afy.	Mojave River Pipeline	X	X			

TABLE 2-3
DESCRIPTIONS OF PROPOSED PROJECTS AND ACTIONS AND
THE POTENTIAL FACILITIES REQUIRED TO IMPLEMENT PROPOSED PROJECTS (CONT.)

ID No.	Project or Management Action	Description	Existing Facilities Involved	New Facilities Required				
				Recharge Basin	Pipelines	Wells	Treatment Plant	Other
16	In-Lieu Supply to Silver Lakes (or the equivalent recharge ponds)	Augment current groundwater pumping with SWP supply to fill recreation lakes. Swap 5,000 af of Base Annual Product for SWP supply. Estimated recharge capacity: 5,000 afy. Turnout from Mojave River Pipeline. Alternatively, SWP could be recharged into the Mojave River.	Mojave River Pipeline, Silver Lakes	X	X			
17	Mojave River Pipeline Extension - Transition Zone	Extend the Mojave River Pipeline to deliver SWP water to new recharge ponds in the Transition Zone Floodplain aquifer. Estimated recharge capacity: 2,500 afy.	Mojave River Pipeline	X	X			
18	Rock Springs Release	Discharge large volumes of SWP water from the Rock Springs Outlet to percolate into the Floodplain Aquifer. Construct extraction wells and distribution pipelines to deliver water throughout the MWA service area for direct use, blending or further recharge/storage in local basins for future use. May require temporary berms in the riverbed. Estimated recharge capacity: 40,000 afy (could increase for banking). Several miles of pipeline needed.	Rock Springs Outlet, Morongo Basin Pipeline	X	X	X		
19	Hesperia Lakes Recharge	Recharge SWP water in the Mojave River channel near the Hesperia fishing lakes. Estimated recharge capacity: 3,000 afy. Wells and distribution system needed.	Rock Springs Outlet		X	X		
20	Recharge Facilities South of Rock Springs Turnout	Similar to Hesperia Lakes Recharge concept. Construct pipeline from the Morongo Basin Pipeline to a turnout located as far south (upstream) in the Mojave River channel as possible. Estimated recharge capacity: 8,000 afy (could increase for banking). Up to 4 miles of 30-inch dia. pipeline.	Morongo Basin Pipeline	X	X			
21	Release SWP Water from Silverwood Lake	Release SWP water to Mojave River upstream of Rock Springs Outlet through Cedar Springs Dam. May require temporary earthen berms in river. Estimated recharge capacity: 25,000 afy (could increase for banking).	Cedar Springs Dam					X
22	Baja Storm Flow Retention - 2 locations	Construct seasonal (temporary) sand dams, dikes or berms in the Mojave River channel to enhance natural recharge of the Floodplain Aquifer. Two locations proposed in the vicinity of Daggett and Minneola. Estimated recharge capacity: 2,000 afy.						X

TABLE 2-3
DESCRIPTIONS OF PROPOSED PROJECTS AND ACTIONS AND
THE POTENTIAL FACILITIES REQUIRED TO IMPLEMENT PROPOSED PROJECTS (CONT.)

ID No.	Project or Management Action	Description	Existing Facilities Involved	New Facilities Required				
				Recharge Basin	Pipelines	Wells	Treatment Plant	Other
23	Cushenbury Flood Detention Basin	Divert storm flows from the San Bernardino Mountains to the Lucerne Valley subbasin to new detention/recharge ponds. Estimated recharge capacity: 400 afy.		X				X
24	Injection Wells in Mesa Area of Adelanto	Install injection wells to achieve groundwater recharge in this area because geology is not conducive to surface recharge facilities. Recharge SWP water - would require new treatment plant to treat water prior to injection. Estimated recharge capacity: 1,000 afy.			X	X	X	
25	Injection Wells in Victorville Area	Install injection wells to recharge treated SWP in this area to provide blending with native groundwater to improve water quality (e.g., arsenic). Requires construction of new water treatment plant. Estimated recharge capacity: 1,000 afy.			X	X	X	
26	SCWC Moving Wells to Serve Barstow	SCWC will move additional wells up-river from the Barstow and down-river from existing Lenwood Recharge facility to improve quality of delivered water to Barstow.	SCWC wells		X	X		
27	Hinkley Water Supply Augmentation by SCWC	SCWC to extend service to Hinkley. Install new wells and distribution system.	SCWC wells		X	X		
28	JBWD Wells	Move some of existing groundwater production to underutilized Copper Mountain Valley subbasin to reduce pumping in overdrafted Joshua Tree subbasin. Install new wells and distribution system.	JBWD wells		X	X		
29	New Supply for Pioneertown	Deliver water to Pioneertown from HDWD or BDVWA to replace CSA W-4's supply that doesn't meet health standards. Install new wells if needed and new distribution system.	HDWD or BDVWA systems		X	X		

TABLE 2-3
DESCRIPTIONS OF PROPOSED PROJECTS AND ACTIONS AND
THE POTENTIAL FACILITIES REQUIRED TO IMPLEMENT PROPOSED PROJECTS (CONT.)

ID No.	Project or Management Action	Description	Existing Facilities Involved	New Facilities Required				
				Recharge Basin	Pipelines	Wells	Treatment Plant	Other
30	Regional Surface Water Treatment Plant	Construct a new surface water treatment plant (Regional WTP ¹²) to treat SWP water for agencies in the Alto area. Direct delivery of treated SWP water would allow for in-lieu recharge by curtailing groundwater production in the Alto Basin. Install new California Aqueduct turnout and water transmission pipelines and distribution system connections.	California Aqueduct		X		X	
31	Blending local water with Floodplain Aquifer	Blending groundwater from the Floodplain Aquifer with groundwater from the regional aquifer could address local water quality issues. Install new pipelines. Could require new wells.	Existing wells		X	X		
32	Local Wastewater Treatment Plants (Alto)	Construct local or satellite wastewater treatment plants independent of VVWRA to treat wastewater and support local reuse. Estimated treatment capacity: 1,100 afy. Involves collection, treatment, storage and distribution facilities.	Existing sewer infrastructure		X		X	X
33	VVWRA Reclamation	Construct additional water recycling treatment and distribution facilities to expand the VVWRA system. Probable up-stream satellite treatment plants. Treatment capacity: 10,000 afy.	VVWRA system		X		X	
34	Yucca Valley Wastewater Treatment	Develop wastewater treatment plant to replace septic systems to improve groundwater quality. Reuse the recycled water. Estimated treatment capacity 1,100 afy. Involves collection, treatment, storage and distribution facilities.			X		X	X
35	Local Wastewater Treatment Plant (Lucerne)	Develop wastewater treatment plant to replace septic systems to improve groundwater quality. Reuse the recycled water. Estimated treatment capacity 1,100 afy. Involves collection, treatment, storage and distribution facilities.	Existing sewer infrastructure		X			X
36	Individual Wellhead Treatment	Develop wellhead treatment where needed to address local water quality issues.	Existing wells					X
37	Eradication of Non-Native Plant Species	Implement non-native plant species eradication along the Mojave River to benefit the Floodplain aquifer and riparian habitat. No new facilities required.	None					

¹² WTP Water Treatment Plant

TABLE 2-3
DESCRIPTIONS OF PROPOSED PROJECTS AND ACTIONS AND
THE POTENTIAL FACILITIES REQUIRED TO IMPLEMENT PROPOSED PROJECTS (CONT.)

ID No.	Project or Management Action	Description	Existing Facilities Involved	New Facilities Required				
				Recharge Basin	Pipelines	Wells	Treatment Plant	Other
38	Agricultural Conservation Programs	Implement agricultural conservation programs including education programs and support to implement efficient water management practices. No new facilities required.	Existing irrigation systems					
39	Urban Conservation Programs	Implement program to achieve 10% conservation in the Mojave River Basin and 5% in the Morongo/Johnson Valley Basin.						
40	Storage agreements with agencies within MWA	Parties to the Judgment (including MWA) can enter into storage agreements with the Mojave Basin Area Watermaster. Provides an opportunity to store water for future use or to meet future obligations under the judgment. Storage agreements would make use of existing facilities and new facilities developed under the 2004 RWMP in other projects.	Existing water supply and recharge infrastructure.					
41	Banking water agreements with outside agencies	Use available aquifer storage space within the MWA service area to bank imported water for an outside agency. Water typically banked in times of surplus for a right to take a portion back in times of need or by exchange for available MWA SWP allocations. Benefits include groundwater recharge and financial gain. Storage agreements would make use of existing facilities and new facilities developed under the 2004 RWMP in other projects.	Existing water supply and recharge infrastructure.					
42	Pre-delivering SWP Water	MWA would bank SWP water in subareas for future purchase and use by local pumpers. Storage agreements would make use of existing facilities and new facilities developed under the 2004 RWMP in other projects.	Existing water supply and recharge infrastructure.					
43	Water (entitlement) exchanges	MWA could pursue additional SWP exchanges, similar to current agreement with SCWA. Under this agreement MWA receives SCWA SWP water in years when SCWA has water entitlement surplus to its need; in return MWA allows SCWA to utilize some of its SWP water during periods of drought (but not more than half the quantity of SCWA water provided to MWA). Storage agreements would make use of existing facilities and new facilities developed under the 2004 RWMP in other projects.	Existing water supply and recharge infrastructure.					

aquifer and those that recharge either the Mojave Regional Aquifer or the Morongo Basin/Johnson Valley Aquifer (non-floodplain aquifer recharge). The majority of the potential groundwater recharge projects make use of imported SWP water via MWA's existing SWP entitlement. The Non-SWP recharge projects involve either increasing recharge efficiency or changing source of supply.

Increased Recharge Efficiency – Stormwater Detention

Two projects involve efforts to enhance the recharge of local stormwater flows within the service area. The Baja Storm Flow Retention project involves constructing temporary seasonal berms or dikes within the Mojave River channel, or in off-channel basins, to slow or retain storm flows so that greater percolation to the groundwater aquifer can occur. The Cushenberry Detention Basin project concept involves diversion of storm flows in the Lucerne Valley area to a recharge basin so that they may percolate and recharge the groundwater rather than running off to local dry lake areas where the flows evaporate rather than percolate.

Changed Source of Supply

Changing the source of groundwater production may be implemented to help both balance a local basin as well as improve the water supply for an area. There are three projects that involve moving the location of groundwater production and/or use to enhance water supply. As described below under Management Actions, this strategy of changing the source of supply is also proposed in some areas of the MWA service area to address water quality issues.

Water Reclamation / Water Recycling

Both regional and local water recycling treatment plant projects are included on the potential list. Water recycling, the treatment and reuse of wastewater to meet non-potable supply demands is reliable even during a drought. Reclaimed water is defined as effluent derived in any part from sewage that has been adequately and reliably treated to a high quality so that it is suitable for beneficial uses. Reclaimed water is suitable for non-potable uses such as landscape and crop irrigation, industrial processing, wetland enhancement, streamflow augmentation, and groundwater recharge. Currently, the VVWRA is evaluating a reclamation alternative in Alto. Wastewater treatment facility projects are also included on the list as a potential strategy for reducing some local water quality concerns (specifically in areas currently served by septic systems).

MANAGEMENT ACTIONS

These include actions that improve water quality or environmental habitat, as well as actions that increase net water supply by implementing conservation, storage agreements or water transfers.

Water Quality Improvement

Actions to improve water quality include treatment strategies to treat groundwater in specific locations (wellhead treatment) or regional water treatment to treat and deliver surface water supplies directly to users. In addition, these management actions include wastewater treatment action concepts to minimize the effects of septic systems on groundwater quality; blending strategies to blend surface and groundwater supplies or groundwater supplies from two or more locations; and moving or changing the source of supply.

Wellhead Treatment

Wellhead treatment is proposed in the Alto Subarea to address localized water quality problems associated with naturally occurring arsenic, in order to meet water quality standards. Wellhead treatment consists of individual treatment units located at wellheads, rather than at centralized treatment plants.

Regional Water Treatment Plant

The 2004 RWMP includes possible development of a regional water treatment plant to treat and distribute SWP water to several communities for direct use rather than groundwater recharge. This involves construction of a new treatment plant and connection to local distribution systems.

Blending

This would involve the interconnection of existing supplies; either surface and groundwater supplies or groundwater supplies from two areas, to allow blending that will improve delivered water quality.

Habitat Improvement

The 2004 RWMP supports the implementation of riparian habitat improvement actions in accordance with the Judgment. The CDFG has prepared the *Habitat Water Supply Management Plan for the Adjudicated Area of the Mojave River Basin* in accordance with the Judgment. The Judgment calls for the habitat water supply plan to guide actions to benefit the phreatophytic¹³ environment of the Mojave River in two target reaches: a 23-mile corridor extending from just south of Spring Valley Lake in Victorville to a point two and half miles northeast of the Silver Lakes development, and the 4-mile, Camp Cady Wildlife Management Area in Newberry Springs, located 15 miles northeast of Barstow.

The Judgment also requires the Watermaster to establish a Biological Resources Trust Fund for the benefit of the targeted riparian habitat areas and species identified in the Judgment (Exhibit H of the Judgment). MWA serves as the Watermaster. The Trust Fund money is derived from a Biological Resources Assessment levy of \$0.50 (in 1993 dollars) against each acre-foot of

¹³ Phreatophytic vegetation refers to vegetation that is dependant on rivers or seeps; these areas have plants whose roots can reach stream water or shallow water table and support a dense and highly diversified wildlife community.

produced water, except that no assessment shall be levied whenever the Trust fund account balance exceeds \$1,000,000 (in 1993 dollars).

The 2004 RWMP list of proposed management actions does not include specific activities for riparian habitat improvement, with one exception. Instead, through the Biological Resource Trust Fund mechanism, MWA and the 2004 RWMP will support the actions proposed by CDFG. CDFG, guided by the habitat water supply plan, will set the location, timing and priority of various management actions to improve riparian health.

The one exception is the inclusion on 2004 RWMP management action list of continued efforts to eradicate non-native plant species in the Mojave River channel. MWA is currently involved in an eradication program in partnership with the MDRCD that is outside the target requirements of the Judgment. To date, approximately 50 acres near the Mojave Regional Park and the Camp Cady area have gone through the process, targeting the removal of salt cedar (tamarisk), arrundo, and other invasive species. MWA will continue to evaluate and participate in such efforts as appropriate, in addition to work directed by CDFG in accordance with the habitat water supply plan.

Conservation

Conservation efforts to be implemented under the 2004 RWMP include Agricultural Conservation Programs and Urban Conservation Programs. Agricultural conservation efforts could include educational programs and monetary support to implement Agricultural Efficient Water Management Practices suggested. Agricultural conservation efforts are expected to be pursued by agencies with appropriate expertise, such as the MDRCD.

Urban conservation efforts include educational programs and monetary support to implement Best Management Practices (BMPs), as identified locally and by the California Urban Water Conservation Council (CUWCC). During the 2004 RWMP process, urban conservation goals of both 10 and 20 percent were evaluated. It was determined that the service area needs to try to achieve the 10 percent level goal first and that this is a more realistic assumption to incorporate into the current plan at this time. The 2004 RWMP assumes that urban demand will be reduced through conservation by at least 10 percent through the year 2020 and the supply estimates reflect this level of conservation. MWA will undertake a plan review and update (if necessary) process on a five-year cycle and once the 10 percent urban conservation goal is achieved, it will evaluate the feasibility of incorporating a higher goal into the 2004 RWMP.

To continue to make progress towards the 10 percent urban conservation commitment, MWA and several other agencies within the MWA service area formed the Alliance for Water Awareness and Conservation (AWAC) in 2003. In a AWAC memorandum of understanding (MOU), the participating agencies have committed to three goals:

- 1) Educate the local communities with the understanding of the importance of water conservation.

- 2) Provide the local communities with the tools to effectively reduce per capita consumption to targeted goals.
- 3) Reduce regional water use by 10 percent gross per capita by the year 2010 and 15 percent gross per capita by 2015 (5 percent in Morongo Basin by 2015) to achieve sustainable, reliable supply to meet regional water demands.

Because more than 60 percent of High Desert water is used outdoors, AWAC's targets include new and existing homeowners, landscape suppliers, professional and commercial landscapers, developers, commercial, industrial and institutional entities, and retail water providers and cities. The Alliance is in the process of compiling water use data from 36 water purveyors in the region and studying recent water production for each year between 1999 and 2003 to establish baseline and benchmark information against which to measure conservation progress. The 26 participating agencies include:

Apple Valley Ranchos Water Company	Joshua Basin Water District
Apple Valley County Club	Mojave Desert Resource Conservation District
Baldy Mesa Water District	Mojave Water Agency
Barstow Community College	Mojave Weed Management Area
Bighorn-Desert View Water Agency	San Bernardino County Service Area
Bureau of Land Management	Southern California Water Company
City of Adelanto	Town of Apple Valley
City of Barstow	Town of Yucca Valley
City of Hesperia	University of California, Cooperative Extension
City of Victorville	Victor Valley Wastewater Reclamation Authority
Copper Mountain College	Victor Valley Water District
Hi-Desert Water District	U. S. Bureau of Reclamation
Mojave Desert and Mountain Integrated Waste Management JPA	
Victor Valley College, Dept of Ag & Natural Resources	

Since conservation does not involve any new facilities and is not expected to result in notable physical changes to the environment, it is not evaluated further in this EIR in the impact chapters.

Supply and Storage Agreements / Groundwater Banking

Water transfers are proposed in order to obtain additional water supplies. Permanent transfers involve a sale of water rights and typically require an annual payment, a one-time acquisition payment or a combination of the two. Temporary water transfers would provide water on an irregular basis. MWA would enter into a contract with an entity to transfer water in wetter years when the water is surplus to the entity's needs. Other transfers include a one-time transfer of available water.

In addition to water transfers, groundwater banking can provide benefits by cooperatively using available storage space in aquifers within the MWA service area. Groundwater banking typically involves importing surface water provided by a project partner and storing the surface water in the groundwater basins underlying MWA. The partner banks their water during times of surplus for a right to take a portion of their water during a time of need. Groundwater banking arrangements are usually established using contracts specifying how the project would be operated.

PROPOSED FACILITIES AND TYPICAL CONSTRUCTION AND OPERATION CHARACTERISTICS

For the purposes of the PEIR impact analysis, the types of facilities required for each of the 2004 RWMP projects and management actions described above have been identified and are generally described below. Table 2-3, above, highlights the types of facilities anticipated for the proposed projects. Additional facility siting studies are needed for each of the proposed projects / actions and more detailed project design, construction and operational characteristics will be developed and reviewed as appropriate in future project-level CEQA evaluation. This Program EIR frames the types of siting, construction and operational impacts associated with the types of projects and actions included in the 2004 RWMP and describes programmatic mitigation measures to address these anticipated impacts.

Recharge Ponds

Implementation of the new recharge basins would require acquiring and clearing property, constructing the recharge basins, and installing a conveyance system. Construction of the recharge basins would consist primarily of excavation and establishing engineered berms. Construction could also require sediment removal and may include selective channel clearing. The conveyance system would include pump stations and pipelines, which could include maximum use of existing roadway and other right-of-ways.

Studies for siting recharge basin design would require analysis of the ability of near-surface soils to transmit surface water to the water table, quality of local water, potential presence of contaminants near potential recharge sites, environmental constraints including sensitive biological or cultural resources, availability and quality of the recharge water.

Pipelines – Transmission and Distribution

In most areas the pipelines could be installed in open trenches and buried with excavated fill. After the pipelines have been buried, the ground surface would be restored (e.g., repaved or revegetated). In select areas, such as crossing waterways, the pipeline could be installed using a bore and jack technique that eliminates surface disruption. Segments could be located within public rights-of-way along existing roadways, or could require permanent easements from private or public landowners.

In areas where open cut trenching is not possible due to limited construction area, geotechnical conditions, or sensitive areas (i.e., stream crossing), alternative, “trenchless”, construction techniques such as jacking and boring and directional drilling could be employed. The jacking and boring method involves the use of a horizontal boring machine or auger to drill a hole and a hydraulic jack to push a casing through the hole under the crossing. As the boring proceeds, a steel casing pipe is jacked into the hole; the pipeline is then installed in the casing. The casing is jacked using a large hydraulic jack in a pit located at one end of the crossing.

At various locations within the construction zones, staging areas would be required to store pipe, construction equipment, and other construction related items. Staging areas should be established in areas near construction zones that are open and easily accessed (i.e., vacant lots). In some cases, staging areas may be used for the duration of the project. In other cases, the staging area may also be moved to minimize hauling distances and avoid disrupting any one area for extended periods of time.

Wells – Injection/Extraction and Monitoring

Several of the potential projects involve installation of new wells. These include injection wells, and/or extraction wells along with monitoring wells. Installing a well typically requires a drill rig set up within an area of approximately 2,000 square feet. Associated vehicle access and parking areas would be required in addition to lay-down areas to temporarily store well casings and project materials. Drilling operations could occur 24-hours per day for several days depending on the depth of the wells and geologic material.

Wellhead Treatment

Wellhead treatment would involve constructing treatment facilities at the location of production wells. The facilities would typically be small storage sheds for chemicals and pumping equipment. Construction disturbance would be minimal.

Regional Water Treatment Plant

Although treatment processes vary from plant to plant, there are three basic processes: coagulation and settling, filtration, and disinfection. Water treatment plants and blending facilities would require construction of many structures and buildings, some of which could include intake piping and metering vaults, flash mixing chambers, filters, sedimentation / flocculation basins, clearwell / pump station, stabilization basins, equalization basins, plate settlers, and sludge lagoons. Facilities that would be constructed above ground could include: administration buildings, chemical buildings, access roads, and washwater treatment structures.

Concrete would likely be the primary construction material for structures. Major process piping and chemical storage tanks would likely be steel. Typical construction equipment would likely include bulldozers, back hoes, cranes, scrapers, and trucks. Construction would likely include site clearing, excavation, trenching, and earth moving, among other activities.

Wastewater / Water Recycling Treatment Plants

Reclamation projects would include municipal reuse projects typically involving providing treatment and conveyance of tertiary treated wastewater effluent for use as irrigation for roadway medians, golf courses, parks, and school yards. Industrial uses include power plant cooling water and process water. Construction activities for reclamation projects depending on the type of reuse

would involve building treatment plants, pump stations, and underground pipelines. Construction could be minimal or extensive depending on the location of the proposed project.

MASTER SCHEDULE FOR THE 2004 RWMP

Figure 2-9 shows the targeted schedule for implementation of the 2004 RWMP. High priority projects and actions are targeted for implementation in the near-term, five-year period from 2005 through 2009. Moderate priority projects and actions are targeted for implementation between 2010 and 2015, with lower priority projects and actions to be considered after 2015. As shown, the RWMP management strategies for monitoring, development of a groundwater management plan, public outreach and education and long-term planning are on going throughout the 20 year planning timeframe. A five-year review cycle is established for reviewing and if necessary, updating the RWMP.

2004 RWMP LONG-TERM MANAGEMENT ACTIONS

The RWMP includes Management Actions that will be undertaken to help achieve the objectives of the plan, through the projects and actions described above. The Management Strategies consist of 60 specific actions that can be grouped into the following seven elements:

1. Monitoring
2. Improve characterization of the basin
3. Continue long-term planning
4. Groundwater protection
5. Construction and implementation
6. Financing
7. Public Participation

MONITORING

As regional groundwater manager, MWA has the responsibility for monitoring groundwater quantity and quality, and has implemented programs to accomplish this. Court-ordered requirements compel collection of data focused on components of the water balance, which the MWA measures, compiles, and disseminates. Cooperators in monitoring efforts include local water agencies and the U.S. Geological Survey (USGS). Information collected or compiled by the MWA is utilized by local water managers and Watermasters. Actions included in the 2004 RWMP guide monitoring of Watermaster activity responsibilities, groundwater levels, water quality, water supply, population growth and development, effectiveness of water conservation measures, precipitation, evapotranspiration, regional water level changes and land subsidence monitoring, data management systems, and extraction sites/consumption.

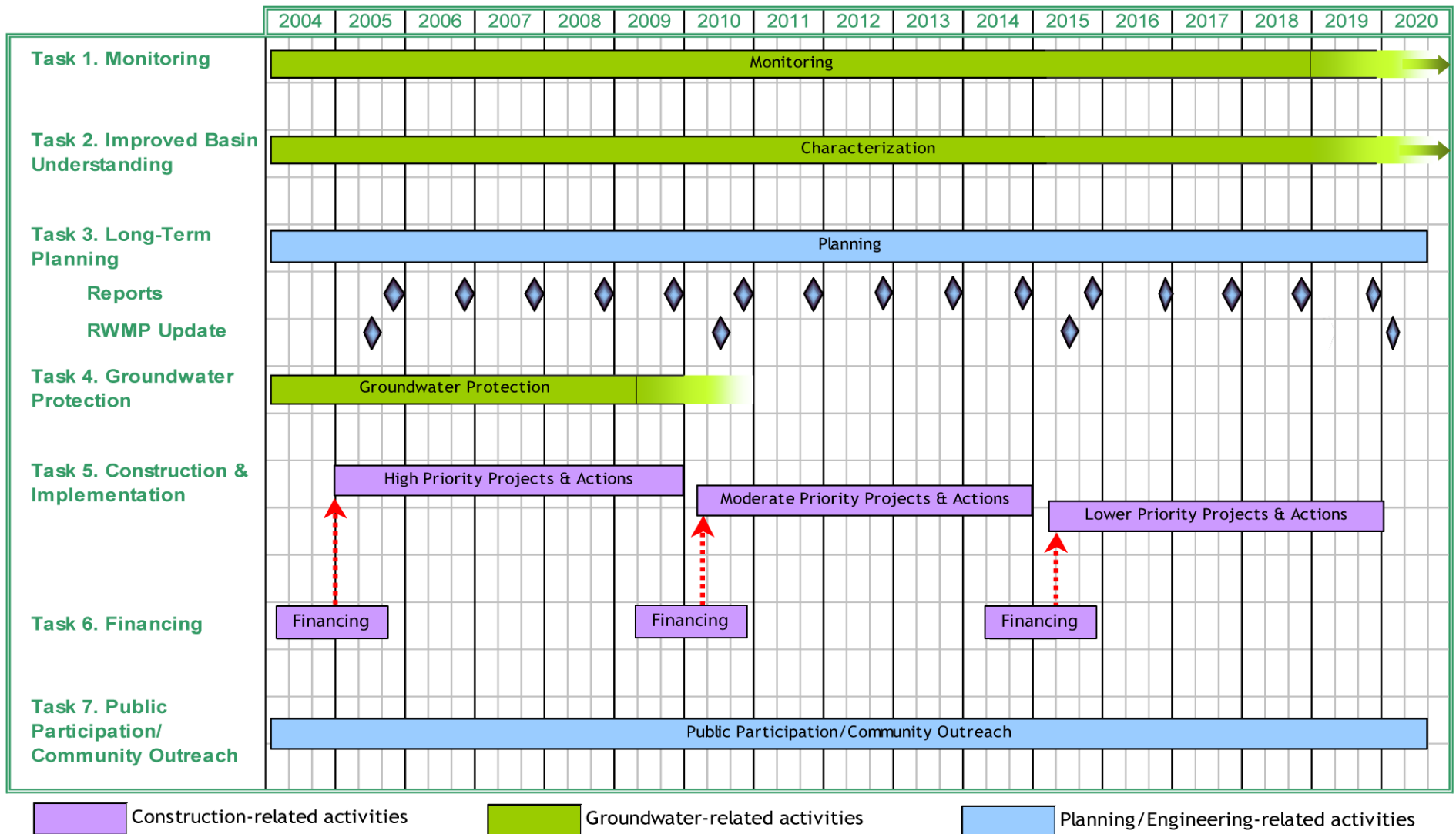


Figure 2-9 Master Schedule for MWA Management Action Plan

IMPROVING BASIN UNDERSTANDING

Recharging large quantities of water projected in the Plan will require extensive investigation of aquifer properties and storage capacities; therefore, the Plan includes aquifer characterization including infiltration testing. The Plan also includes actions addressing development of groundwater modeling options to determine the best locations for recharge or extraction sites and to help optimize operation of the groundwater basin. Management actions address refining estimates of water balance parameters such as groundwater flow, ungaged surface water inflows, deep percolation of precipitation estimates, and phreatophyte use in riparian areas. The Plan also includes actions that address water quality/contaminant site data management and analysis.

CONTINUE LONG-TERM PLANNING

Since its inception in the 1960s, MWA has been developing plans to guide implementation of its mission to ensure sufficient water availability for present or future beneficial uses within the MWA jurisdiction. MWA will continue its long-term planning through the 2004 RWMP efforts. Management actions also address coordination with local planning agencies and review of applicable land use plans, to ensure that growth projections, proposed land use changes, and types of proposed uses are consistent with water planning efforts. Long-term planning will also identify post-2020 water supply demands and research options for meeting that demand and enhancing SWP supply reliability. Long-term planning addresses transportation infrastructure and regular updates of several planning procedures, including an Integrated Water Management Plan, an Urban Water Management Plan, and a Groundwater Management Plan.

GROUNDWATER PROTECTION

The general goal of groundwater protection activities is to maintain the groundwater and the aquifer to ensure a reliable and high quality supply. Activities to meet this goal include continued and increased monitoring, data sharing, education and coordination with other agencies that have local or regional authority or programs. To increase its groundwater protection activities, MWA will implement management actions regarding recharge site management activities and protection of recharge areas.

CONSTRUCTION AND IMPLEMENTATION

Table 2-1 above includes the recommended priority for projects and actions in each aquifer subarea. Projects and management actions with a high priority are those expected to begin implementation within the next five years, and those with lower priority will be pursued within a ten to twenty year timeframe. Management actions guide identification of and coordination with implementing agencies.

FINANCING

Implementing the 2004 RWMP will require an array of financing mechanisms, such as bonds, grants, or low interest loans. In addition, cooperative funding agreements between MWA and

other water managers in the MWA service area or cost-share agreements between MWA and local, state, or federal agencies may also provide funding for 2004 RWMP projects and management actions. Management actions call for review of funding sources, developing a Capital Improvement Program, and identification of other funding mechanisms.

PUBLIC PARTICIPATION/COMMUNITY OUTREACH

MWA will continue to consult with the TAC utilized during the 2004 RWMP process. Management actions guide ongoing coordination and participation in outreach through the TAC, AWAC, as well as through other outreach and education opportunities, such as newsletters, water symposium, web site, and Speakers Bureau.

2.4 REQUIRED APPROVALS

No other agency's approval would be required to adopt the 2004 RWMP. The following agency approvals would be required to implement the proposed projects:

- Local jurisdiction plan approval
- Local jurisdiction encroachment permit for construction within local rights of way
- California Department of Transportation (Caltrans), encroachment permit for construction in state rights of way
- US Army Corps of Engineers, (Corps) Section 404 permit for actions within jurisdictional wetlands
- US Fish and Wildlife Service (USFWS), Section 7 permit for actions affecting federally listed species
- CDFG, Streambed Alteration Agreement for actions within streambeds, Section 2081 permit for actions affecting state-listed species
- Regional Water Quality Control Board (RWQCD), construction storm water runoff, water recycling requirements for reclamation projects, 401 Certification for Army Corps 404 Permits
- Mojave Desert Air Quality Management District (MDAQMD), air emissions permits for large generators and treatment plant operations.

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CHAPTER 3

ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION

3.1 INTRODUCTION

The following sections describe local setting for environmental resources in the MWA region. Potential impacts associated with implementation of the 2004 RWMP are identified. Mitigation measures are identified to avoid or minimize impacts to less than significant levels. Impacts are categorized as operational (associated with groundwater performance), construction related, and related to facility siting.

3.2 WATER RESOURCES

This chapter describes the surface water and groundwater resources within the MWA service area and evaluates potential effects to these resources resulting from the RWMP.

SETTING

The MWA service area encompasses portions of the Mojave Desert extending northward approximately 100 miles from the northern flanks of the San Bernardino and San Gabriel Mountains. These mountains reach elevations of over 10,000 feet above sea level (asl). The Mojave Desert is characterized by alluvial basins and dry lake beds with no hydrologic outlet to the ocean. The basins are generally separated by low mountain ranges. The alluvial soils are composed of water-bearing unconsolidated sediments, which harbor extensive groundwater basins throughout the Mojave Desert region. The intermittent mountain ranges consist of non-water-bearing consolidated bedrock. The region is criss-crossed by a series of northwest-trending geologic faults, resulting in offsets of geologic layering that create barriers to groundwater flow. Land surface elevations within the MWA service area range from 5,500 feet asl in the San Bernardino Mountains to 1,500 feet asl near Afton Canyon on the eastern boundary of the service area near the terminus of the Mojave River.

SURFACE WATER

The MWA service area is divided into two major surface water drainage areas:

- the Mojave River area draining northward from the San Bernardino Mountains, and
- the Morongo Basin/Johnson Valley Area east of the San Bernardino Mountains draining eastward.

Both areas drain to terminal dry lakes with no outlet to the ocean. For management purposes under the Mojave Basin Area Judgment, the Mojave River watershed is divided into five subareas: Este, Alto, Oeste, Centro and Baja. The northern third of the Alto subarea is referred to as the Transition Zone. The Morongo Basin / Johnson Valley Area is within a separate watershed in the southeast of the service area. The Morongo Basin/Johnson Valley is divided into four sub-basins: Johnson Valley, Means/Ames Valley, Warren Valley, and Copper Mountain Valley. These subbasins correspond to surface drainage areas as well as groundwater basins. **Figure 3.2-1** shows the subbasin boundaries.

The Mojave River is the main surface water drainage feature within the MWA service area draining a watershed of over 3,800 square miles¹. It is fed primarily by rainfall and snow pack from the San Bernardino Mountains. The river is formed by the confluence of two smaller streams descending from the mountains at a place called The Forks. The river bed runs north through Hesperia and Victorville through two rock outcroppings that form small narrow canyons (Upper and Lower Narrows). The river flows through the narrows northward to Barstow and eastward to Afton Canyon where it terminates at Soda and East Cronese Dry Lakes. Rainstorms in the desert can create flash flooding conditions within the riverbed and associated washes. The terminal lakes pond water only after major storm events.

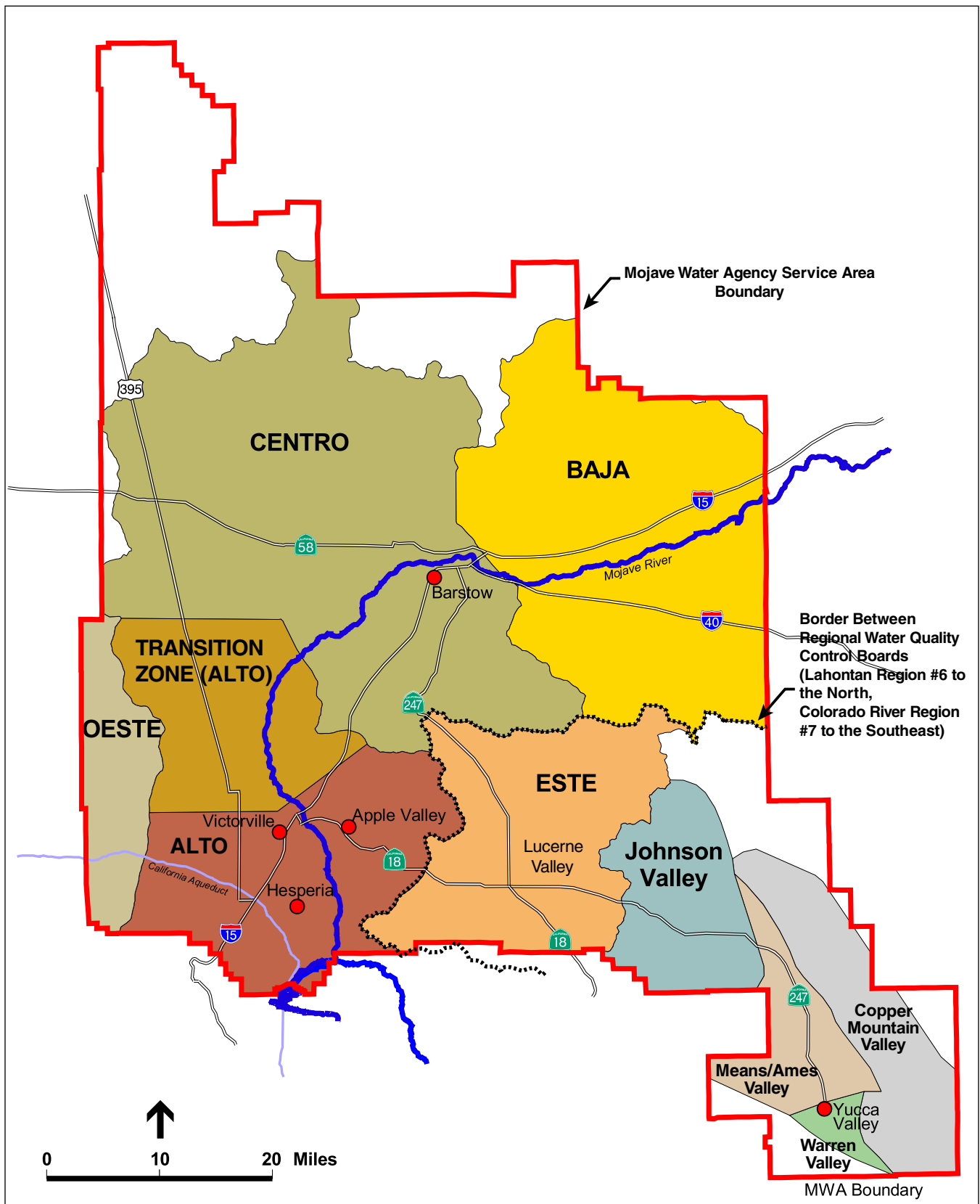
Most of the river is dry for most of the year. Some areas are fed by discharged groundwater during the summer months. At present the river is perennial (continuously flowing) only along a short section downstream of The Forks, in the vicinity of Upper and Lower Narrows and Afton Canyon and in the section immediately downstream of the Victor Valley Wastewater Reclamation Authority's treatment plant, about four miles downstream of the Lower Narrows. Non-storm flows (base flow) in the Mojave River have steadily decreased in the last 70 years as shown in **Figure 3.2-2** due to overdraft of the groundwater supply and the resulting reduced inflow of groundwater from surrounding areas.

The Morongo Basin/Johnson Valley area has no sizeable rivers, only small ephemeral streams that collect runoff from surrounding mountains during storms. The mountain stream runoff either percolates into the stream bed or, during large storm events, flows to dry lake beds where it evaporates. The area encompasses parts of five separate surface water drainages – Warren, Copper Mountain, Emerson, Means, and Johnson.

GROUNDWATER BASINS

The MWA service area is underlain by extensive groundwater aquifers within alluvial sediments that reach thousands of feet below ground surface. The largest is the Mojave River Groundwater Basin, which covers an area of 1,400 square miles. This basin is divided into the Mojave River

¹ Stamos, C.L., Martin, P., Nishikawa, T., and Cox, B.F. (2001) *Stimulation of Ground-Water Flow in the Mojave River Basin, California*. Water-Resources Investigations Report 01-4002 Version 3. U.S. Geological Survey, Sacramento, CA.



SOURCE: Schlumberger Water Services, June 2002

MWA RWMP / 203148 ■

Figure 3.2-1
MWA Watershed Subarea Map

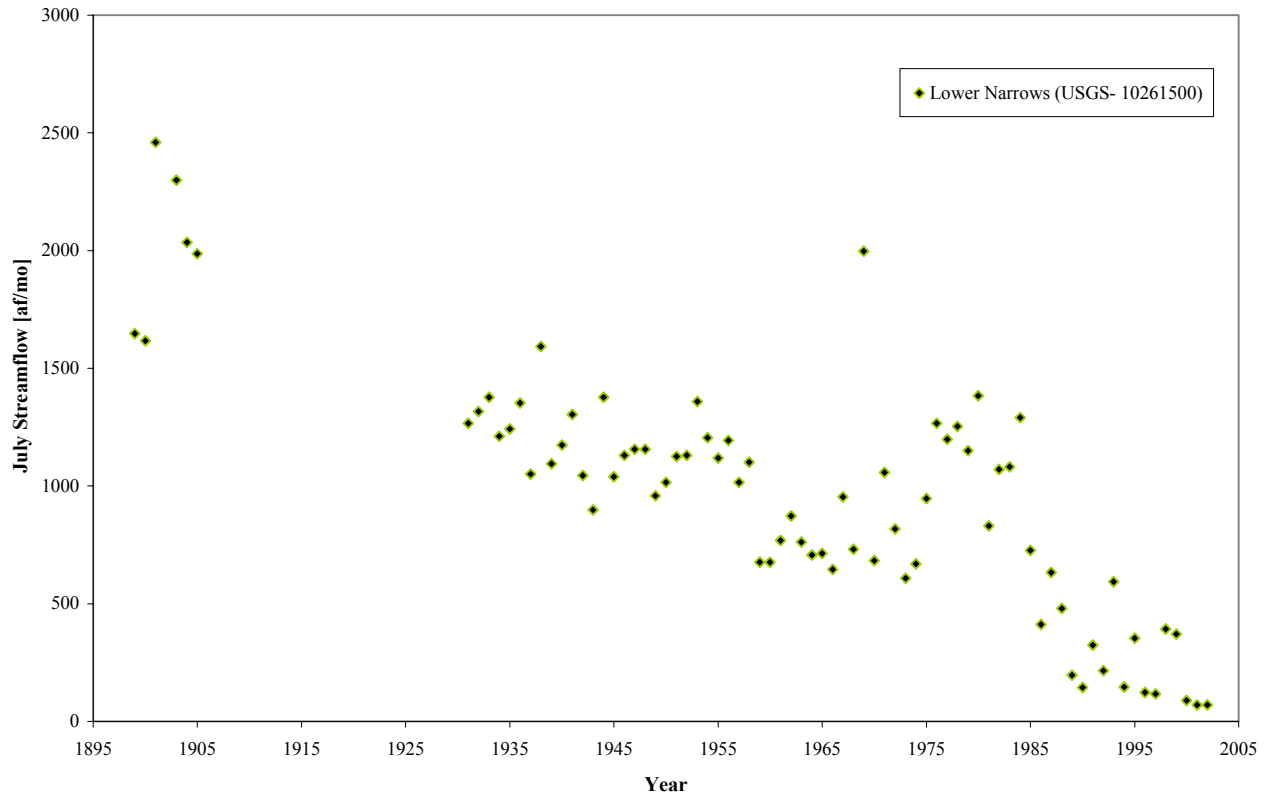
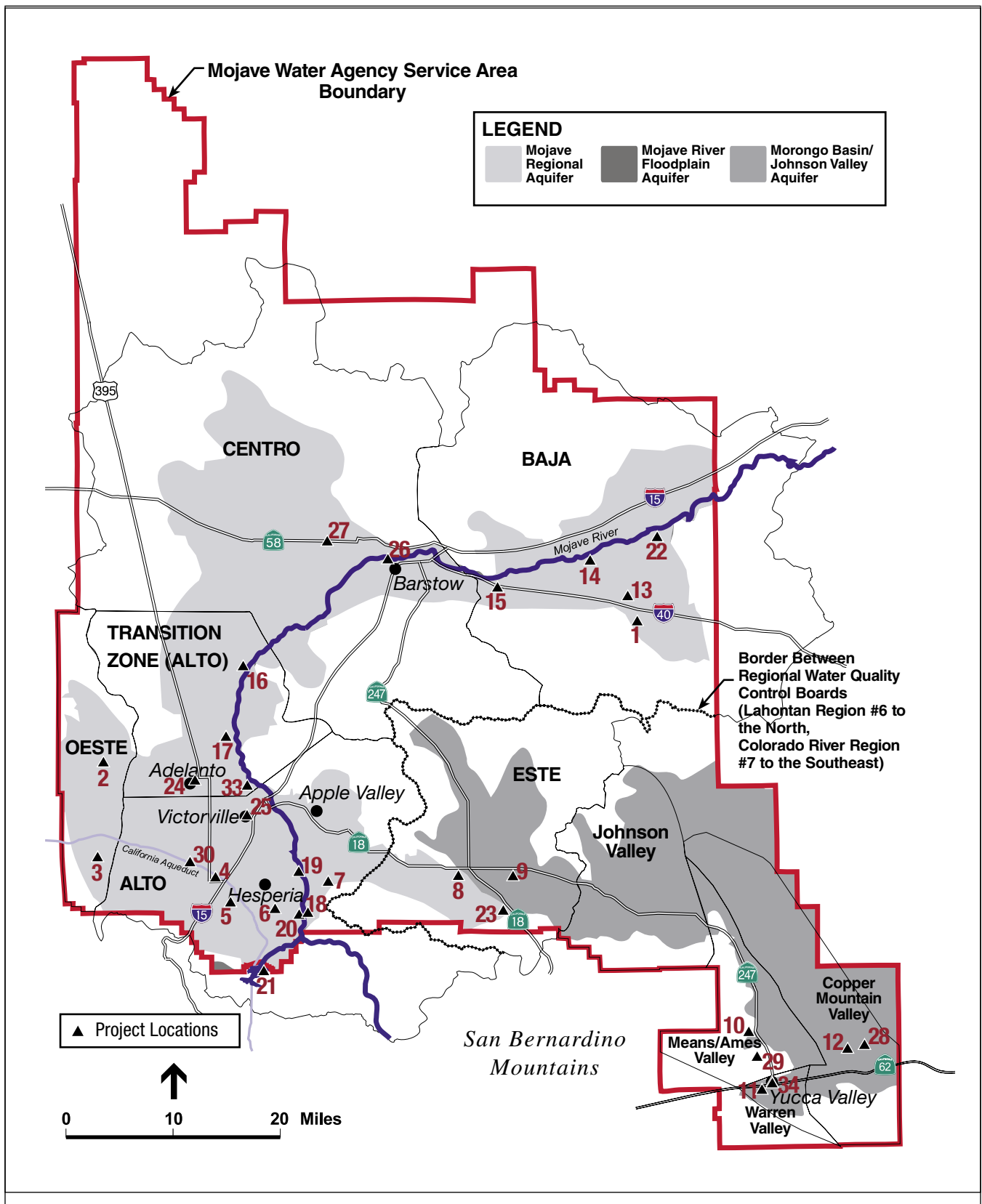


Figure 3.2-2 Mojave River July Streamflow at Lower Narrows Gage

Regional Aquifer and the Mojave River Floodplain Aquifer. In addition, the Morongo Groundwater Basin encompasses 1,000 square miles, of which about 60% lies within the MWA service area. **Figure 3.2-3** shows the aquifers within the MWA boundaries. **Table 3.2-1** provides a summary description of each subarea. Figure 3.2-3 also identifies the border between the Lahontan RWQCB (Region 6) and the Colorado River RWQCB (Region 7). The border corresponds with the western border of the Este subarea.

The groundwater basins generally exhibit interconnectivity, with groundwater flowing between subareas with varying efficiency depending on local geologic conditions. **Figure 3.2-4** shows a water table contour map and groundwater flow direction of the Mojave River and Morongo Groundwater Basins as determined from well water level measurements reported in 1998. Within the Mojave River Basin, the groundwater flow direction is generally to Barstow and then east to Afton Canyon. In the Morongo Groundwater Basin groundwater flows east-northeast.

Groundwater is recharged into the basins predominantly by infiltration from the Mojave River, storm water runoff from the mountains, and man-made recharge (from irrigation, wastewater, fish hatcheries, and imported water). Natural flows in the Mojave River are augmented SWP water delivered from the Sacramento – San Joaquin River Delta through the California Aqueduct. SWP delivered from the Sacramento – San Joaquin River Delta through the California Aqueduct. SWP water is released from Silverwood Reservoir or from turnouts along the California Aqueduct. In



SOURCE: SKS, Environmental Science Associates, 2003

MWA RWMP / 203148 ■

Figure 3.2-3
Aquifers and Subareas within Mojave Water Agency Service Area

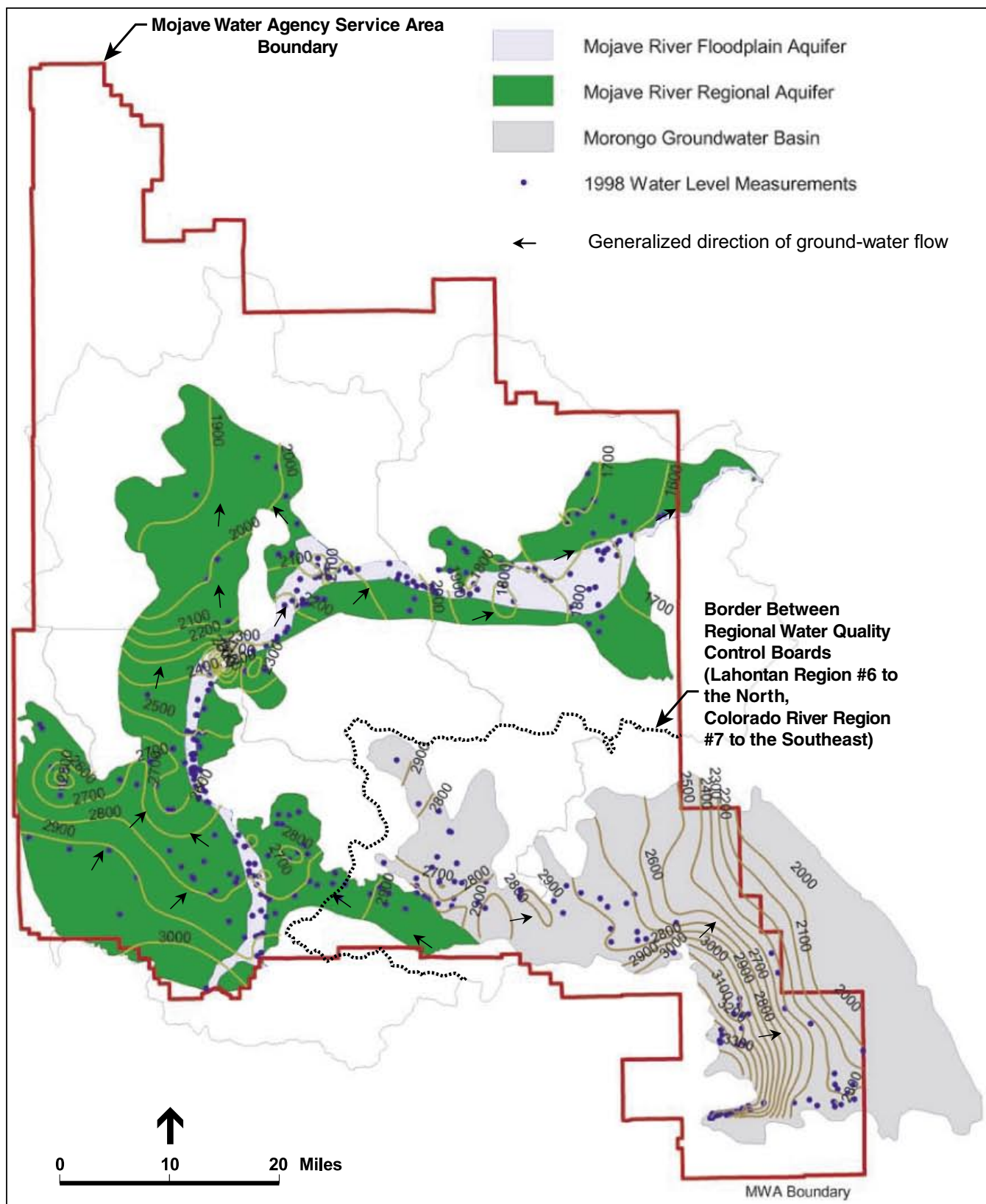
**TABLE 3.2-1
SUMMARY OF GROUNDWATER BASIN SUBAREAS**

Basin	Description	Groundwater Flow Direction
Morongo Basin / Johnson Valley Subbasins		
Warren Valley	The subbasins of Morongo Basin are recharged by infiltration from flow in ephemeral stream channels and from artificial recharge ponds ² . These subbasins are not hydrologically connected.	East/northeast
Copper Mountain Valley		
Means/Ames Valley		
Johnson Valley		
Mojave River Basin Subareas		
Este	Contains the Este regional aquifer ³ and the Lucerne Valley Basin, a hydrologically independent basin which is separated from the Mojave Groundwater Basin by the northwest-trending Helendale. Approximately 1,100 afy of groundwater flows from Este into Alto.	Regional Aquifer flows northwest. Lucerne Valley Basin is not hydrologically connected.
Oeste	Contains the Oeste regional aquifer. Approximately 800 afy of groundwater flows into Alto.	Regional Aquifer flows northeast.
Alto	Contains the Floodplain and Regional aquifers, which for this analysis have been subdivided into seven interconnected aquifers, the Alto, Transition Zone and Narrows floodplain aquifers ⁴ and the Alto West, Alto East, Transition Zone and Alto Mid regional aquifers. Local faults acting as groundwater flow barriers include the northwest-trending Helendale, Apple Valley, Narrows and Shadow Mountain faults, and the northeast trending Adelanto fault. Approximately 2,000 afy of groundwater flows from Alto to Centro.	Regional aquifers flow northeast. Floodplain aquifers flow northwest, parallel to the flow of the Mojave River.
Centro	Contains three interconnected aquifers, the Centro floodplain aquifer, and the Centro and Harper Lake regional aquifers. Two local faults affecting groundwater flow are the northeast-trending Iron Mountain fault and the northwest-trending Helendale and Mt. General faults. Approximately 1,700 afy of groundwater flows from Centro to Baja.	Regional aquifers flow north to northeast. Floodplain aquifer flows northeast, parallel to the flow of the Mojave River.
Baja	Contains two interconnected aquifers, the Baja floodplain aquifer and the Baja regional aquifer. A local fault affecting groundwater flow is the Baja fault. Approximately 400 afy of groundwater flows out of Baja and into Afton Canyon.	Regional aquifer south of the Mojave River –flows north; Regional aquifer north of the Mojave River and the floodplain aquifer flow east, parallel to the flow of the Mojave River.

² Smith, Gregory A. (2003) *Regional Water Table (2000) and Ground-Water Level Changes in the Mojave River and the Morongo Ground-Water Basins, Southwestern Mojave Desert, California*. Water-Resources Investigations Report 02-4277, USGS, Sacramento, California.

³ Regional aquifers are recharged from interaction with floodplain aquifers, deep percolation of precipitation and storm runoff from ungaged tributaries.

⁴ Floodplain aquifers are recharged directly by the Mojave River.



SOURCE: Schlumberger Water Services, June 2002

MWA RWMP / 203148 ■

Figure 3.2-4

1998 Water Contour Levels with Groundwater Flow

addition, the Morongo Pipeline and the Mojave River Pipeline convey SWP water to the Yucca Valley area and the Barstow area respectively where water is percolated into the groundwater basins.

A principle feature within the Mojave River Groundwater Basin is the connectivity of the Regional Aquifer and the Floodplain Aquifer. The younger, higher permeability, unconsolidated alluvium of the Floodplain Aquifer lies directly on top of the older, lower permeability, unconsolidated alluvium of the Regional Aquifer⁵. Historically, groundwater in the Alto and Baja subareas flowed from the Regional Aquifer to the Floodplain Aquifer, augmenting flows in the Mojave River. This trend has reversed during the period from 1931-90 for most areas due to groundwater production, so that currently flows in the Mojave River recharge the Regional Aquifer⁶. In the Centro subarea, the flow direction is reverse, flowing from the floodplain to the regional aquifer. Development in the floodplain has increased the rate of this flow from the Centro subarea.

Groundwater production began in the region in the late 1800s. By the mid-1950s long-term overdraft of the groundwater basins was observed. During this period, the majority of the production occurred within the Floodplain Aquifer. By 1994, with population in the region increasing significantly, about half of the production occurred from municipal supply wells in the Regional Aquifer. Groundwater levels have steadily decreased in the Regional Aquifer from 50 to 100 feet below historic levels. Levels in the Floodplain Aquifer decreased 20 to 30 feet but have recovered somewhat since 1990⁷. A recent study conducted jointly by the USGS and MWA suggests that groundwater levels have continued to decline since 1994 primarily in the Alto and Baja Subareas⁸.

WATER BALANCE

Groundwater supplies virtually all the water demand in the MWA service area. SWP water delivered from the California Aqueduct or from Silverwood Reservoir is currently percolated into the ground through recharge basins or through the porous Mojave River bed. Groundwater is produced by local water agencies, agricultural operations, local industries, and individual private wells.

Groundwater production is an accurate measure of the water demand within each subarea. However, a portion of the water pumped is returned to the groundwater aquifer and becomes part of the available water supply. For example, much of the water applied to agriculture, golf courses, and parks percolates back to the groundwater aquifer. The portion of the groundwater pumped that does not return to the aquifer is referred to as consumptive use. Consumptive use rates are

⁵ Stamos, C.L., Martin, P., Nishikawa, T., and Cox, B.F. (2001) *Stimulation of Ground-Water Flow in the Mojave River Basin, California*. Water-Resources Investigations Report 01-4002 Version 3. U.S. Geological Survey, Sacramento, CA.

⁶ Stamos, C.L., Nishikawa, T., and Martin, P. (2001b) *Water Supply in the Mojave River Ground-Water Basin, 1931-99, and the Benefits of Artificial Recharge*. Water Fact Sheet 122-01, USGS, Sacramento, CA.

⁷ SKS, *Regional Water Management Plan Update, Phase 1 Report*, June 2002, page 4-12

⁸ USGS, and MWA, *Regional Water Table (2000) and Ground-Water Level Changes in the Mojave River and the Morongo-Basins, Southwestern Mojave Desert, California*, Water-Resources Investigations Report, 02-1427, 2002.

used to assess water balance since they provide a more accurate picture of actual groundwater removed from the closed system. **Table 3.2-2** summarizes the current water balance within the MWA service area without surface water imports.

**TABLE 3.2-2
YEAR 2000 AVERAGE ANNUAL WATER BALANCE WITHOUT IMPORTS (AFY)**

	Net Average Annual	Consumptive Use			Surplus/ Deficit
	Water Supply (1)	Agricultural	Urban (2)	Total	
Mojave River Basin Area					
Alto	34,700	3,800	47,700	51,500	-16,800
Baja	5,600	17,700	10,500	28,200	-22,600
Centro	18,500	8,900	8,400	17,300	+1,200
Este	3,500	3,200	1,800	5,000	-1,500
Oeste	1,100	1,300	1,900	3,200	-2,100
Subtotal Mojave	63,400	34,900	70,300	105,200	-41,800
MB/JV Area					
Copper Mtn. Valley	600	0	800	800	-200
Johnson Valley	2,300	0	30	30	+2,270
Means/Ames Valley	600	0	600	600	0
Warren Valley	900	0	1,200	1,200	-300
Subtotal MB/JV (3)	2,100	0	2,600	2,600	-500
Total	65,500	34,900	72,900	107,800	-42,300

Source: Schlumberger Water Services, 2004.

- (1) Net average annual water supply is recharged precipitation, and reclaimed wastewater minus outflows. Does not include imports.
- (2) Urban uses include municipal, industrial, golf course, and recreational water uses.
- (3) Johnson Valley is not included in the Morongo Basin/Johnson Valley totals.

As shown in Table 3.2-2, the average water deficit in the Mojave River Basin area for the year 2000 is approximately 41,800 afy. The deficit reflects averaged values and does not take into account the annual variation in water supply affected by precipitation.

Baja, with a deficit of 22,600 acre-feet, and Alto, at 16,800 acre-feet, constitute most of the current water consumed in excess of native supply. Centro currently has slightly more water supply than demand. Este has a water deficit of approximately 1,500 afy and Oeste has a deficit of approximately 2,100 afy.

Johnson Valley has a surplus. Outside of the Johnson Valley, the Morongo Basin/Johnson Valley Area has an average water deficit of approximately 500 afy considering the available native supply. The Warren Valley subbasin has the largest deficit, at about 300 afy.

The volume of water available to meet water supply needs in the Mojave River Basin averages 63,400 acre-feet annually for the period 1931-2001. The Alto Subarea has the largest water supply, primarily due to proximity to the headwaters of the Mojave River. The Centro and Baja Subareas are dependent upon infrequent, large storm events for groundwater recharge. The Este

and Oeste Subareas have the least amount of supply, most of which originates from ungaged surface water. **Figure 3.2-5** shows the current water balance graphically.

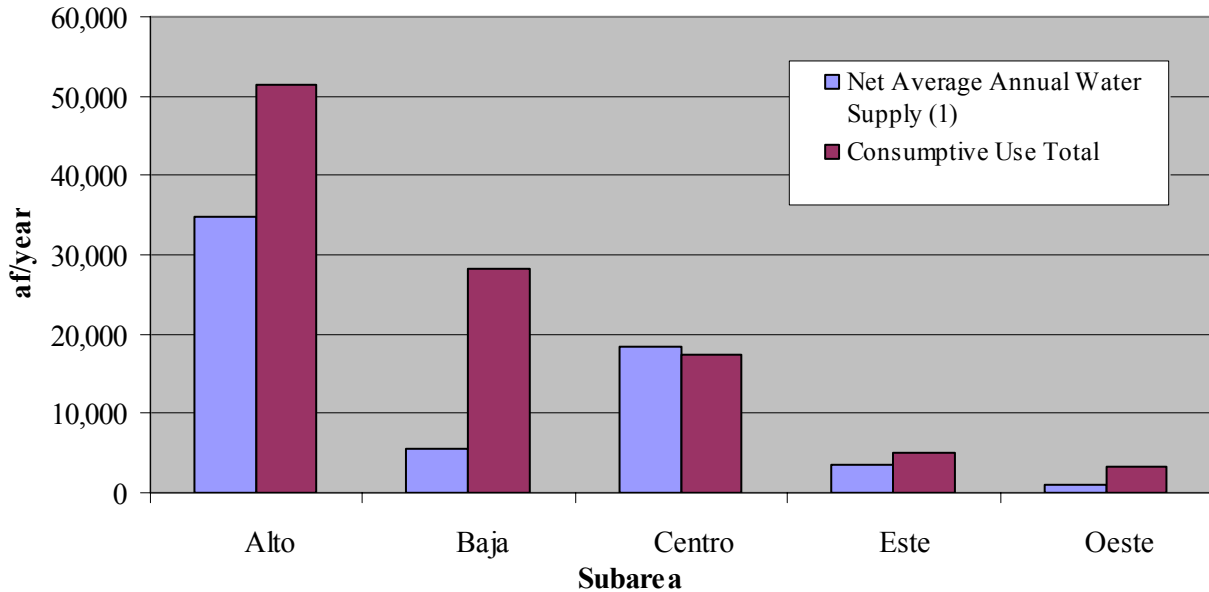


Figure 3.2-5 Year 2000 Average Annual Water Balance

MWA has a SWP Table A amount of up to 75,800 afy. This includes the addition of 25,000 acre-feet of entitlement that was purchased from the Berrenda-Mesa Water District in 1998. Imported SWP water has historically been supplied to the MWA through the Morongo Basin Pipeline and releases from Silverwood Lake. **Table 3.2-3** summarizes the imported SWP water delivered to MWA. As shown in the Table, annual deliveries vary considerably.

Imported SWP water has historically been supplied to the MWA through the Morongo Basin Pipeline - Mojave River Pipeline and releases from Silverwood Lake. Deliveries through the Mojave River Pipeline commenced in 1999. Table 3.2-3 summarizes the imported SWP water delivered to MWA. As shown in the Table, annual deliveries vary considerably.

MOJAVE BASIN AREA JUDGMENT

Triggered by the rapid growth within the MWA service area, particularly in the Victor Valley area, the City of Barstow and the SCWC filed a complaint in 1990 against upstream water users claiming that the increased withdrawals and lowering of groundwater levels reduced the amount of natural water available to downstream users. The complaint requested that 30,000 acre-feet of water be delivered to the Barstow area annually and that MWA obtain supplemental water for use in other areas of MWA's service area.

**TABLE 3.2-3
DELIVERIES OF STATE WATER PROJECT WATER TO THE MWA, 1978-2001**

Year	Lake Silverwood (1)	Rock Springs (2)	Kramer Junction (AVEK) (3)	Hodge (4)	Lenwood (5)	Hi-Desert Pipeline (6)	Total
1978	22,500	0	0	0	0	0	22,500
1979	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0
1983	24,489	0	0	0	0	0	24,489
1984	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0
1991	2,032	0	1,391	0	0	0	3,423
1992	9,334	30	1,310	0	0	0	10,674
1993	9,973	0	1,514	0	0	0	11,487
1994	819	15,434	1,399	0	0	0	17,652
1995	0	4,503	1,227	0	0	3,010	8,740
1996	0	2,134	1,316	0	0	3,977	7,427
1997	0	7,134	1,405	0	0	5,501	14,040
1998	0	2,190	1,345	0	0	2,357	5,892
1999	0	283	1,439	994	2,673	2,682	8,071
2000	0	2,451	1,361	2,144	1,476	3,930	11,362
2001	0	57	1,385	0	0	2,878	4,320

Source: Mojave Water Agency.

- (1) Lake Silverwood releases do not include releases made by DWR for purposes other than delivery to MWA. Prior to construction of the Morongo Basin Pipeline, the only means to deliver SWP water to MWA was through releases at Cedar Springs Dam at Silverwood Lake, upstream of the West Fork Gage in the Alto Subarea. The 1978 releases were part of a conjunctive use demonstration project with the DWR. The 1983 releases were non-entitlement water purchased from the Central Valley and delivered by SWP facilities.
- (2) The Rock Springs Outlet was constructed on the Morongo Basin Pipeline in 1994 to release SWP water into the Mojave River in the Alto Subarea near the City of Hesperia at Rock Springs Road approximately 5 miles downstream of the Forks. All subsequent deliveries to Alto have been made here.
- (3) The MWA has an agreement with the Antelope Valley-East Kern Water Agency (AVEK) to transfer MWA entitlement to AVEK each year sufficient to allow AVEK to transport the MWA entitlement to a power plant in the Kramer Junction area within the MWA boundary (Centro Subarea).
- (4) The Hodge recharge facility, located about 40 miles downstream of the Forks, was constructed in 1999 to deliver SWP water to the Centro Subarea from the Mojave River Pipeline.
- (5) The Lenwood recharge facility, located about 48 miles downstream of the Forks, was constructed in 1999 to deliver SWP water to the Centro Subarea from the Mojave River Pipeline.
- (6) The Morongo Basin Pipeline was completed to Landers in the Morongo Basin/Johnson Valley Area in 1994, and the Hi-Desert Pipeline extension was completed to the Town of Yucca Valley in 1995.

About a year later, MWA filed a cross-complaint which declared that the native waters of the Mojave River and underlying groundwater were insufficient to meet the current and future demands made upon them. The cross-complaint asked the court to determine the water rights of all surface water and groundwater users within the Mojave River Basin area and the Lucerne and El Mirage Basins. During the following two years, negotiations resulted in a proposed Stipulated Judgment that: 1) formed a minimal class of producers using 10 acre-feet or less per year who

were dismissed from the litigation, and 2) offered a physical solution for water production by the remaining producers.

The physical solution provides that each major producer has an established Base Annual Production (BAP) based on its highest annual use during the five-year period from 1986-90. The Watermaster and the court annually set a FPA that is 65 percent for non-agricultural parties in the Alto subarea and 80 percent for all other parties for the 2004-05 water year.

The allocated FPA represents each producer's share of the water supply available in a subarea. The Judgment requires that reductions in FPA occur in increments of five percent per year until the available production in each subarea is in balance with the available water supply. Producers are required to replace any water pumped above their FPA determined for the year. Replacement can occur either by paying for supplemental water or by transferring unused production rights within that subarea from another party to the Judgment.

WATER QUALITY

Groundwater quality in the MWA service area varies between subareas, but generally is suitable for drinking water. **Table 3.2-4** summarizes water quality throughout the MWA service area as reported in groundwater well samples. Mineral content varies depending on local geologic conditions and surface land uses. For example, agricultural operations can increase salt concentrations in underlying groundwater. In addition, salt content in shallow groundwater tends to increase with proximity to terminal lake beds. **Figure 3.2-6** provides a general picture of TDS concentrations as recorded from wells throughout the MWA service area. TDS values vary widely in the wells surveyed. Many wells reported TDS levels in excess of the secondary drinking water standard for TDS, 500 milligrams per liter (mg/l). This secondary standard, referred to in Title 22 of the CCR as a "consumer acceptance level," is based on taste and aesthetics rather than on health effects.

The principal naturally occurring water quality concern in the region is arsenic. Studies have linked long-term exposure to arsenic in drinking water to cancer and other adverse health effects. The current drinking water standard for arsenic is 50 parts per billion (ppb). The U.S. Environmental Protection Agency (EPA) is considering lowering the standard to 10 ppb⁹. Naturally occurring arsenic has been reported in wells at levels that exceed the existing drinking water standards. With the adoption of a lower standard, a substantial number of wells would exceed the standard. **Figure 3.2-7** shows recorded levels of arsenic in wells throughout the MWA service area. As shown on the figure, the areas of concern for arsenic are centered in the Lucerne Valley and along the Mojave River. At 10 ppb some BMWD and VVWD wells in the regional aquifer will not meet standards.

Groundwater quality may also be affected by surface contamination. Several known Superfund contamination sites exist within the MWA service area as shown on **Figure 3.2-8**. In addition to the Superfund sites shown on Figure 3.2-8, numerous leaking underground storage tanks have

⁹ Scheduled to go into effect January 2006.

TABLE 3.2-4
MOJAVE NATIVE GROUNDWATER QUALITY SUMMARY

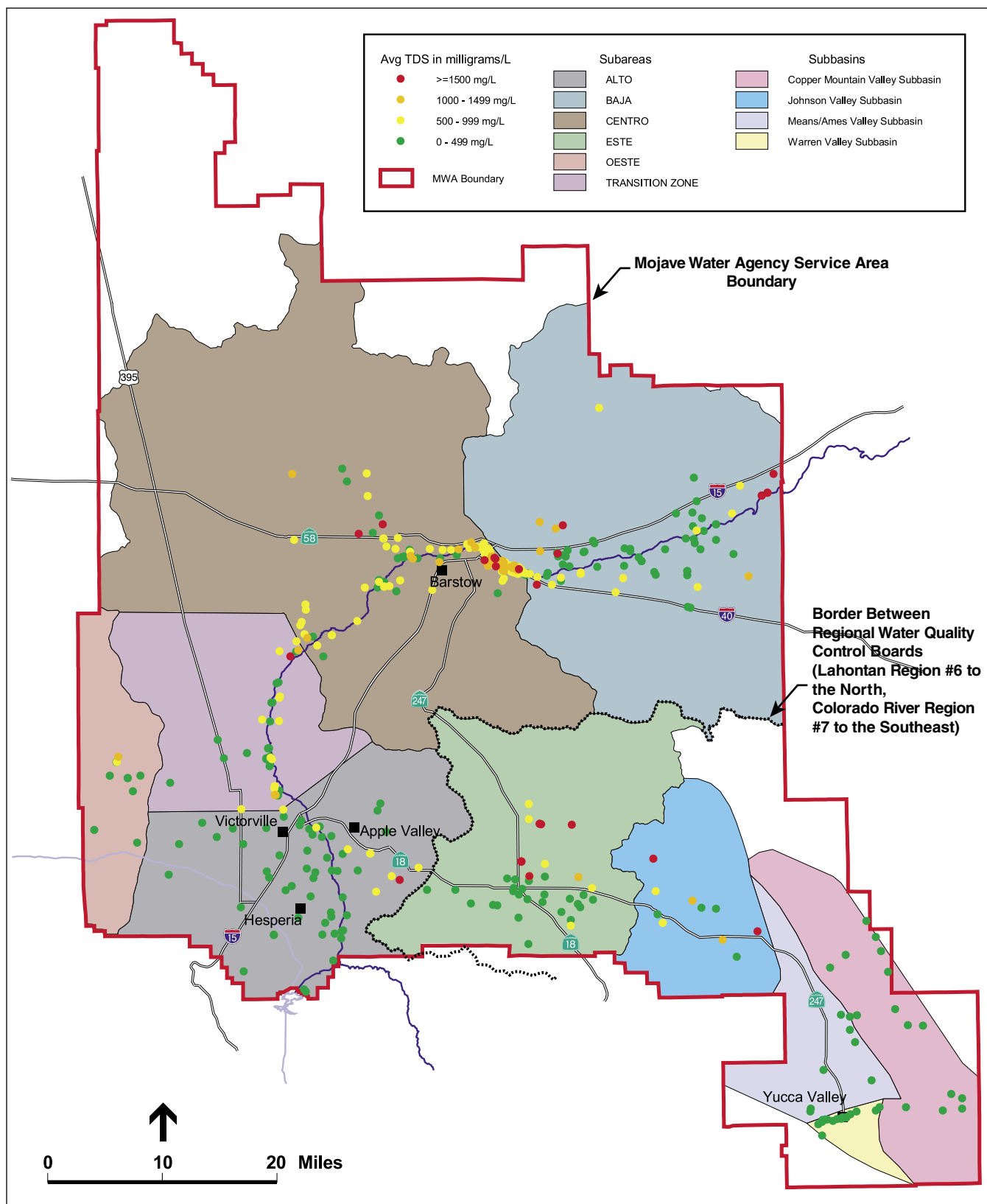
Region			Mojave Area															Morongo Basin/ Johnson Valley			
Subarea			ALTO						BAJA		CENTRO			ESTE		OESTE					
			CA DHS Drinking Water Max. Limits	SWP Water Average Concentration (2000-02)	Alto Floodplain	Alto Left Regional	Alto Mid Regional	Alto Narrows Floodplain	Alto Right Regional	Alto Transition Zone Floodplain	Alto Transition Zone Regional	Baja Floodplain	Baja Regional	Centro Floodplain	Centro Lake Harper Regional	Centro Regional	Este Lucerne Basin	Este Regional	Oeste Regional		
Constituent																		Copper Mountain Subbasin	Johnson Valley Subbasin	Means/Ames Valley	Warren Valley Subbasin
Calcium mg/L	Average	20.8	20.9	14.0	19.8	19.9	70.8	51.4	70.0	73.5	44.0	93.6	53.6	58.7	112.0	39.3	28.3	25.5	81.1	29.6	26.2
	Min		0.89	1.2	0.9	4.1	17	7.4	6.2	1.3	1.6	3.3	1.7	1.6	3.1	8	1.8	1	22	9.3	11
	Max	n/a	59	35	160	91	200	280	200	870	230	440	160	180	960	59	90	58	260	45	58
	Sample Count		50	10	71	27	41	67	25	700	140	1321	51	78	51	33	46	52	11	9	58
	Date range		7/4/1978 4/16/1999	3/2/1976 4/1/1997	4/8/1980 5/10/2000	7/25/1978 4/13/2000	4/7/1980 4/13/2000	7/11/1978 4/6/1998	5/28/1987 5/10/2000	8/20/1916 4/19/2000	11/5/1919 4/12/2000	7/21/1908 4/11/2000	8/17/1916 4/21/2000	5/22/1951 4/11/2000	4/2/1954 4/12/2000	3/11/1952 4/16/1999	6/1/1953 4/20/2000	12/5/1951 10/29/1999	7/11/1978 4/12/2000	4/20/1953 8/21/1996	10/27/1980 4/5/2000
Magnesium mg/L	Average	12.9	4.7	2.2	3.5	3.6	17.1	8.4	10.1	13.5	10.5	18.4	8.9	11.1	27.3	12.4	4.8	4.7	62.8	4.9	4.2
	Min		0.04	0.43	0.05	0.35	1.7	0.42	0.17	0	0.23	1	0.3	0	0.23	1	0.06	0.022	4.3	0.022	0.77
	Max	n/a	32	5.4	25	22	39	26	28	120	86	89	25	30	120	35	23	27	110	27	8.8
	Sample Count		48	10	71	27	41	57	25	695	139	1301	51	78	51	33	43	52	3	42	58
	Date range		7/4/1978 4/16/1999	3/2/1976 4/20/2000	4/8/1980 5/10/2000	7/25/1978 4/13/2000	4/7/1980 4/13/2000	7/11/1978 4/6/1998	5/28/1987 5/10/2000	8/20/1916 4/19/2000	11/5/1919 4/12/2000	7/21/1908 4/11/2000	8/17/1916 4/21/2000	5/22/1951 4/11/2000	4/2/1954 4/12/2000	3/11/1952 4/16/1999	6/1/1953 4/20/2000	12/5/1951 10/29/1999	7/11/1978 4/12/2000	4/20/1953 10/29/1999	10/27/1980 4/5/2000
Potassium mg/L	Average	nr	1.39	2.10	1.42	1.52	3.62	2.95	2.57	3.29	2.84	3.94	5.77	3.13	5.40	2.45	3.20	2.45	6.36	2.08	1.57
	Min		0.2	0.7	0.3	0.9	1.9	0.4	0.2	0	0	0	1.1	0	0.9	1.5	0.4	0.86	4.1	0.9	0.8
	Max	n/a	2.8	3.5	6.8	3.6	7.1	7.9	8.6	100	19	44	45	8.4	66	5.2	6.4	10	13	5.4	7.6
	Sample Count		48	11	70	28	41	55	27	698	135	1288	40	77	53	33	46	46	11	10	56
	Date range		7/11/1978 11/16/1999	4/8/1980 4/1/1997	4/8/1980 5/10/2000	7/25/1978 4/13/2000	7/11/1978 4/18/2000	7/11/1978 10/16/1997	7/11/1978 4/11/2000	8/20/1916 4/14/2000	10/20/1948 4/12/2000	7/21/1908 4/11/2000	3/16/1932 4/21/2000	10/23/1919 4/11/2000	4/2/1954 4/12/2000	7/4/1978 4/12/2000	6/1/1953 4/20/2000	1/29/1953 10/29/1999	7/4/1978 9/11/1996	4/20/1953 9/11/1996	10/27/1980 4/5/2000
Carbonate mg/L	Average	nr	19.7	13	6	3	nr	nr	6	23	5	nr	nr	14.5	8.5	nr	3.5	nr	nr	nr	nr
	Min		5	5	1	1	nr	nr	5	23	5	nr	nr	2	7	nr	1	nr	nr	nr	nr
	Max	n/a	29	21	17	6	nr	nr	7	23	5	nr	nr	27	10	nr	11	nr	nr	nr	nr
	Sample Count		3	2	17	4	nr	nr	2	1	1	nr	nr	2	2	nr	6	nr	nr	nr	nr
	Date range		1/13/1993 10/23/1997	3/20/1995 4/1/1997	3/23/1993 5/10/2000	8/19/1992 1/5/1994	nr nr	nr nr	6/23/1992 5/10/2000	11/1/1989 11/1/1989	6/24/1993 6/24/1993	nr nr	nr nr	8/2/1994 4/14/1998	10/6/1994 6/6/1995	nr nr	5/27/1993 4/1/1997	nr	nr	nr	nr
Sulfate mg/L	Average	39.6	17.4	24.7	50.4	37.0	177.8	123.1	173.3	169.7	137.8	217.0	202.4	203.0	195.6	62.9	192.5	48.8	389.1	59.6	23.2
	Min		3	3	2.3	13	3.5	13	100	1.6	21	0.6	34	12	18	28	1	9.3	100	11	7.3
	Max	250	56	170	2300	140	630	490	330	7100	1300	1200	630	860	960	160	580	370	830	190	85
	Count		70	75	142	28	41	76	27	727	141	1305	51	78	53	33	48	52	11	11	74
	Date range		7/11/1978 11/16/1999	4/8/1980 4/1/1997	4/8/1980 5/10/2000	7/25/1978 4/13/2000	7/11/1978 4/18/2000	7/11/1978 10/16/1997	7/11/1978 4/11/2000	8/20/1916 4/14/2000	9/17/1917 4/12/2000	7/21/1908 4/11/2000	8/17/1916 4/21/2000	10/23/1919 4/11/2000	4/2/1954 4/12/2000	7/4/1978 4/12/2000	6/1/1953 4/20/2000	12/5/1951 10/29/1999	7/4/1978 9/11/1996	4/20/1953 9/11/1996	10/27/1980 4/5/2000
Chloride mg/L	Average	76.1	17.3	2.4	14.8	19.6	78.1	80.8	79.7	132.7	80.8	132.2	280.4	128.3	418.4	11.6	16.3	22.4	147.3	19.9	24.4
	Min		4.1	0.5	0.1	4.1	1.5	5	2.6	12	13	15	25	6.8	4.8	5	2	5.6	30	9.6	7.1
	Max	250	90	15	170	77	700	850	250	17000	790	600	1100	630	3600	42	200	72	510	41	52
	Count		73	78	162	35	77	77	29	773	167	1386	51	85	53	33	53	52	11	11	74
	Date range		7/11/1978 11/16/1999	4/8/1980 4/1/1997	4/8/1980 5/10/2000	7/25/1978 4/13/2000	7/11/1978 4/18/2000	7/11/1978 10/16/1997	7/11/1978 4/11/2000	8/20/1916 4/14/2000	9/17/1917 4/12/2000	7/21/1908 4/11/2000	8/17/1916 4/21/2000	10/23/1919 4/11/2000	4/2/1954 4/12/2000	7/4/1978 4/12/2000	6/1/1953 4/20/2000	12/5/1951 10/29/1999	7/4/1978 9/11/1996	4/20/1953 9/11/1996	10/27/1980 4/5/2000
Fluoride mg/L	Average	0.1	0.580	0.697	0.484	0.697	0.880	1.297	0.899	0.707	1.457	0.651	1.274	1.450	0.937	0.481	0.627	1.612	1.355	1.380	0.518
	Min		0.2	0.2	0.2	0.3	0.3	0.4	0.3	0	0.3	0.1	0.3	0.2	0.19	0.1	0.26	0.06	0.3	0.4	0.14
	Max	2.0	2.9	2.9	2	1.1	3.9	7.7	3.1	8.2	11	4.2	4.5	4.6	7.1	0.9	1.4	14	4.3	4.3	1.8
	Count		50	77	143	28	42	77	29	719	143	1279	41	78	53	33	51	52	11	10	74
	Date range		7/11/1978 11/16/1999	4/8/1980 4/1/1997	4/8/1980 5/10/2000	7/25/1978 4/13/2000	7/11/1978 4/18/2000	7/11/1978 10/16/1997	7/11/1978 4/11/2000	8/1/1951 4/14/2000	10/20/1948 4/12/2000	8/8/1951 4/11/2000	2/6/1952 4/21/2000	5/22/1951 4/11/2000	4/2/1954 4/12/2000	7/4/1978 4/12/2000	6/1/1953 4/20/2000	12/5/1951 10/29/1999	7/4/1978 9/11/1996	4/20/1953 9/11/1996	10/27/1980 4/5/2000
Silica mg/L	Average	nr	19.3	14.3	19.0	20.7	35.8	26.8	28.3	25.6	27.9	24.6	46.9	33.3	24.5	32.4	16.8	19.4	20.0	21.5	27.4
	Min																				

TABLE 3.2-4
MOJAVE NATIVE GROUNDWATER QUALITY SUMMARY

Region			Mojave Area															Morongo Basin/ Johnson Valley						
Subarea			ALTO							BAJA		CENTRO			ESTE		OESTE							
			CA DHS Drinking Water Max. Limits	SWP Water Average Concentration (2000-02)	Alto Floodplain	Alto Left Regional	Alto Mid Regional	Alto Narrows Floodplain	Alto Right Regional	Alto Transition Zone Floodplain	Alto Transition Zone Regional	Baja Floodplain	Baja Regional	Centro Floodplain	Centro Harper Lake Regional	Centro Regional	Este Lucerne Basin	Este Regional	Oeste Regional	Copper Mountain Subbasin	Johnson Valley Subbasin	Means/Ames Valley	Warren Valley Subbasin	
Arsenic ug/L	Average		2	5.2	11.8	4.8	2.9	2.2	12.6	6.2	10.4	73.9	6.3	28.4	13.4	14.9	1.7	4.0	4.9	1.9	3.8	4.3		
	Min			1	1	1	1	1	1	2	0	1	0	4	0	1	1	1	1	1	1	1		
	Max			50	53	41	9	10	110	25	91	290	76	52	120	440	3	12	28	3	7	25		
	Count	10		50	8	75	34	32	54	23	181	33	181	11	39	47	22	28	25	7	5	47		
			Date range			5/27/1987 11/16/1999	7/19/1989 4/1/1997	5/27/1987 5/10/2000	5/27/1987 4/13/2000	6/7/1989 4/18/2000	5/27/1987 10/16/1997	6/3/1988 4/11/2000	2/29/1972 4/14/2000	3/15/1972 4/12/2000	3/29/1960 4/11/2000	5/24/1990 4/21/2000	5/22/1951 4/11/2000	5/25/1989 4/12/2000	5/18/1989 4/12/2000	7/20/1989 4/20/2000	2/5/1986 10/29/1999	5/19/1989 9/11/1996	6/19/1996 9/11/1996	5/17/1989 4/5/2000
Boron ug/L	Average		169	80.8	36.9	74.4	203.37	1429	364.6	530.7	384.2	931.1	1124.7	771.6	1351.0	1190.4	650.5	120.8	58.0	133.3	525.2	157.6	60.8	
	Min			10	10	10	30	10	20	20	0	0	0	20	100	20	10	10	0	77	38	30		
	Max		600	370	170	1700	390	2000	3500	1500	81000	8200	15000	6800	8800	6500	1100	230	900	2630	441	194		
	Count			53	12	89	35	76	78	27	697	139	1178	41	77	52	33	42	51	11	9	62		
			Date range			7/11/1978 11/16/1999	4/8/1980 4/1/1997	4/8/1980 5/10/2000	7/25/1978 4/13/2000	7/11/1978 4/18/2000	7/11/1978 10/16/1997	7/11/1978 4/11/2000	1/21/1932 4/14/2000	10/20/1948 4/12/2000	7/6/1932 4/11/2000	3/16/1932 4/21/2000	10/30/1950 4/11/2000	7/4/1978 4/12/2000	7/4/1978 4/12/2000	4/9/1980 4/20/2000	12/5/1951 10/29/1999	7/4/1978 9/11/1996	9/10/1954 9/11/1996	10/27/1980 4/5/2000
Dissolved Solids mg/L	Average		281.5	156.0	245.5	159.0	208.7	576.7	518.2	561.1	562.6	529.5	785.6	964.2	703.4	1141.7	287.4	395.6	241.2	912.7	275.7	219.2		
	Min			113	106	103	129	211	190	273	178	216	176	311	233	231	191	302	1	295	201	154		
	Max		500	274	364	869	619	1820	1830	1040	2220	2680	2940	2210	2270	6290	452	1040	979	1940	446	368		
	Count			48	11	69	27	40	55	26	675	133	1268	49	74	52	32	46	44	11	10	56		
			Date range			7/11/1978 11/16/1999	4/8/1980 4/1/1997	4/8/1980 5/10/2000	7/25/1978 10/27/1998	7/11/1978 4/18/2000	7/11/1978 10/16/1997	7/11/1978 4/7/1999	8/20/1916 11/18/1999	9/17/1917 4/14/1998	8/19/1916 11/19/1999	8/17/1916 4/21/2000	10/23/1919 4/7/1999	4/2/1954 4/16/1999	7/4/1978 4/6/1999	6/1/1953 4/20/2000	1/29/1953 4/14/1999	7/4/1978 9/11/1996	4/20/1953 9/11/1996	10/27/1980 4/5/2000
pH	Average		nr	7.9	8.5	8.3	8.0	7.9	7.5	7.8	7.7	8.0	7.6	8.0	7.9	7.9	7.9	8.2	8.1	7.7	7.6	7.9		
	Min			7	8	7	7	6	7	7	1	7	6	7	7	7	7	7	7	7	7	7		
	Max	6.5 (1) 8.5 (1)		10	9	10	9	9	9	9	10	9	9	9	9	9	9	9	10	8	8	8		
	Count			103	21	143	56	100	154	55	1025	213	1676	56	130	95	63	88	93	18	16	123		
			Date range			5/27/1987 9/23/1999	3/2/1976 5/9/2000	4/8/1980 5/10/2000	5/18/1988 4/13/2000	4/7/1980 4/13/2000	4/8/1980 5/9/2000	5/28/1987 5/10/2000	1/21/1932 4/19/2000	10/20/1948 4/12/2000	7/6/1932 4/11/2000	3/16/1932 4/21/2000	5/22/1951 4/11/2000	3/28/1980 5/11/2000	3/11/1952 4/16/1999	6/1/1953 4/20/2000	12/5/1951 10/29/1999	4/11/1980 4/12/2000	4/20/1953 8/21/1996	10/27/1980 4/5/2000
Nitrates mg/L	Average		0.771	0.35	0.09	1.03	1.08	nr	0.24	nr	6.13	4.40	3.50	0.16	7.78	0.88	0.76	0.45	2.21	0.73	6.06	8.51		
	Min			0.25	0.02	0.02	0.53	nr	0.07	nr	0	0	0	0.162	0.041	0.024	0.31	0.01	1.49	0.58	0.19	1.07		
	Max		10	0.49	0.53	24	1.89	nr	0.558	nr	36	42	47	0.162	47	2.01	1.09	0.76	2.68	0.98	14.5	20.6		
	Count			4	68	67	3	nr	7	nr	284	91	414	1	19	9	5	8	12	4	3	39		
			Date range			6/25/1991 5/10/1995	6/25/1991 1/17/1997	3/2/1993 1/13/1997	6/30/1992 5/10/1995	nr nr	5/29/1992 10/16/1997	nr nr	8/20/1916 4/19/2000	10/20/1948 10/27/1998	8/19/1916 11/17/1999	4/11/1998 4/11/1998	8/8/1951 12/1/1994	10/5/1994 2/1/1999	3/30/1994 9/11/1996	6/21/1991 5/22/1996	5/16/1989 8/24/1999	1/12/1993 4/15/1999	8/16/1996 10/8/1998	1/25/1994 8/24/1999

Source: Mojave Water Agency, 2002.

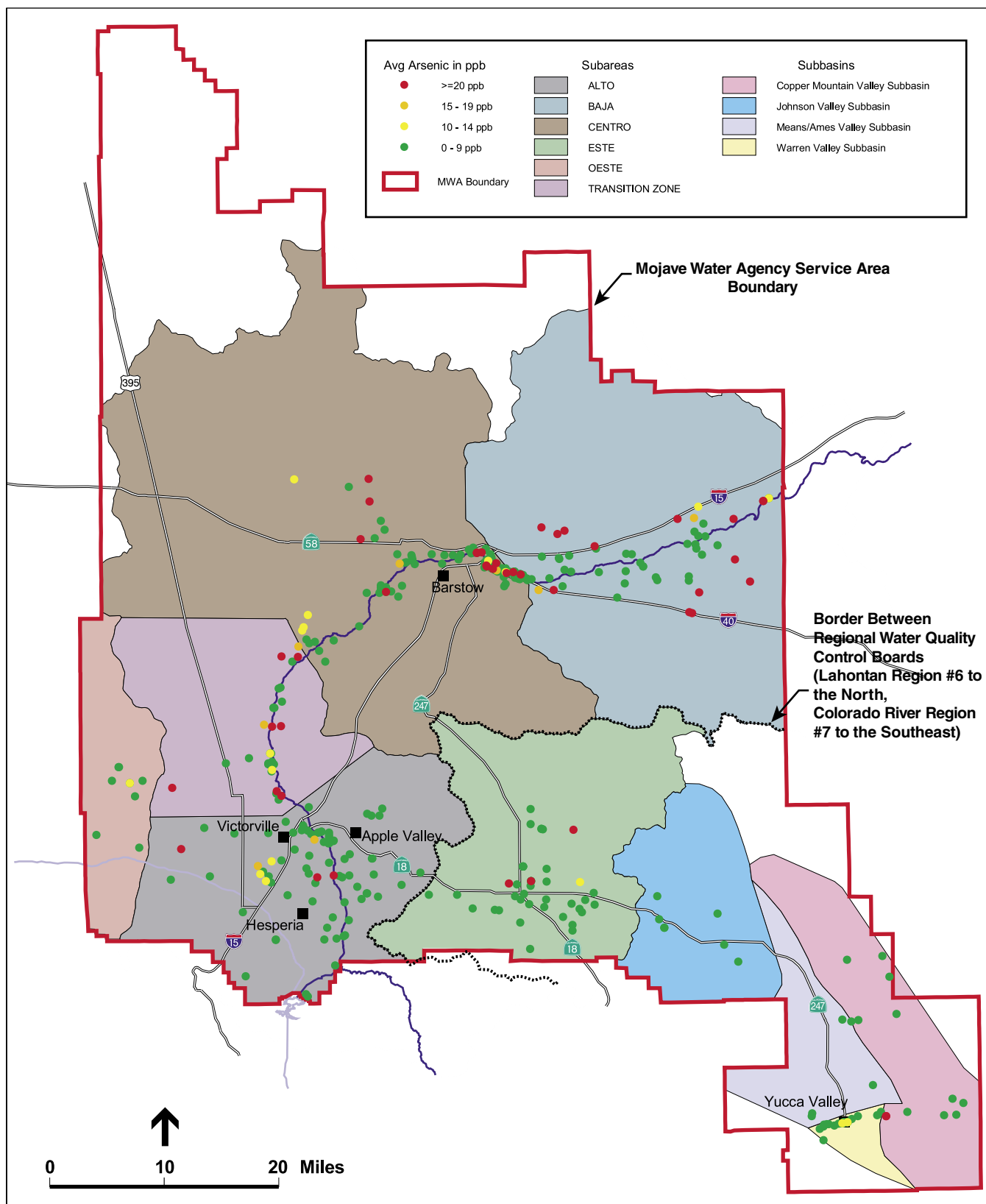
n/a- not applicable
nr- no record
(1)- US EPA range for pH



SOURCE: Schlumberger Water Services, June 2004

MWA RWMP / 203148 ■

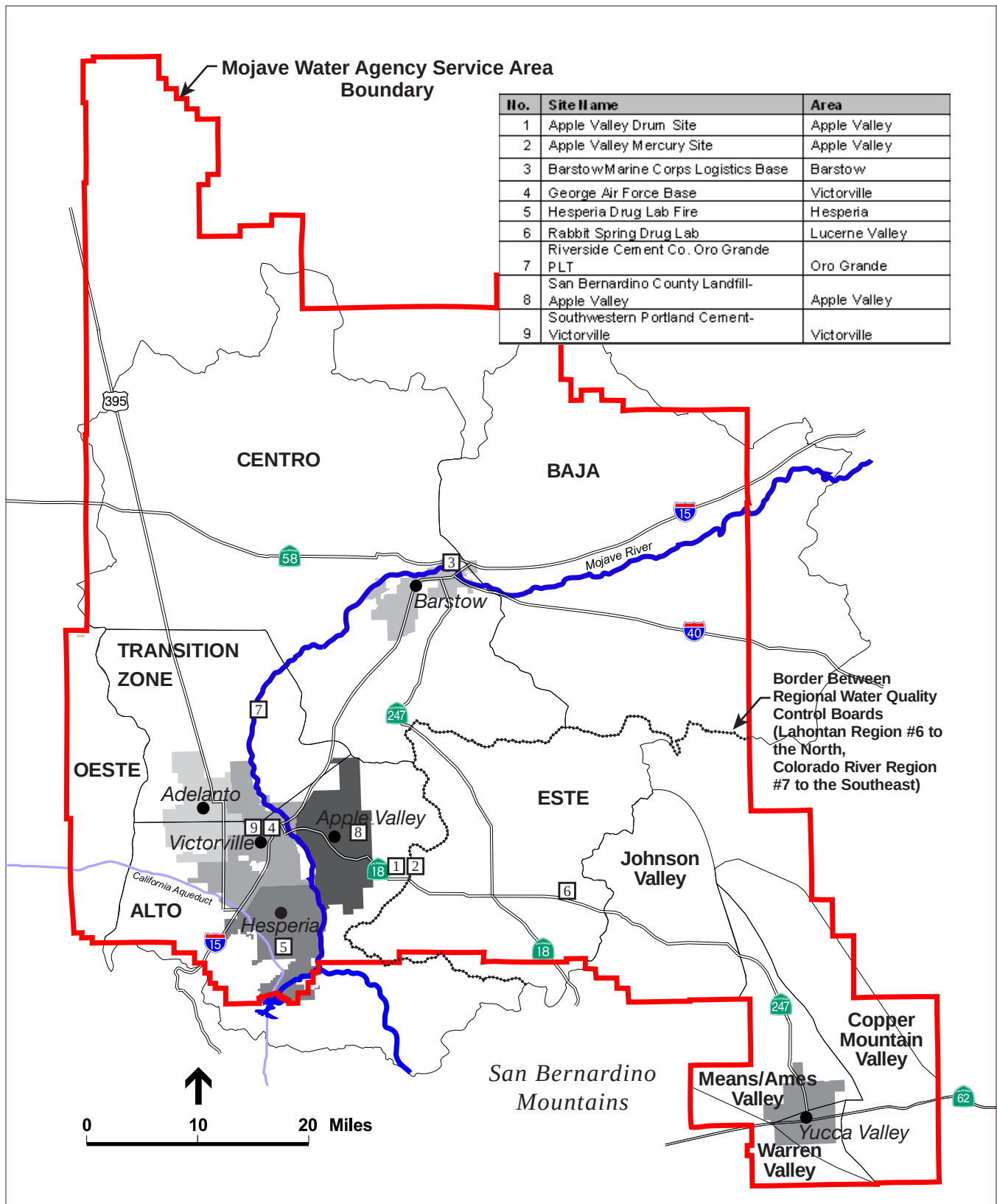
Figure 3.2-6
Groundwater Wells Measuring Total Dissolved Solids



SOURCE: Schlumberger Water Services, June 2004

MWA RWMP / 203148 ■

Figure 3.2-7
Groundwater Wells Measuring Arsenic



SOURCE: U.S.E.P.A. CERCLIS Database, June 17, 2004

MWA RWMP / 203148 ■

Figure 3.2-8
Known Superfund Contamination Sites

been reported in the region. **Table 3.2-5** lists the number of reported leaking underground fuel tanks (LUFT sites) and hazardous waste generators (RCRA-Listed sites) in major cities in the region. In addition, solid waste disposal sites may pose a threat to groundwater. **Figure 3.2-9** identifies locations of municipal solid waste disposal sites. Finally, surface land uses such as agriculture and rural residential septic systems can transport nitrates to the groundwater. **Figure 3.2-10** shows nitrate concentrations in wells throughout the MWA service area.

**TABLE 3.2-5
NUMBER OF LEAKING FUEL TANK SITES AND RCRA-LISTED
SITES IN MAJOR CITIES WITHIN SERVICE AREA**

Area	No. of Open LUFT Sites	No. of RCRA- List Facilities
Adelanto	3	27
Apple Valley	5	31
Barstow	22	51
Daggett	4	12
Helendale	1	1
Hesperia	8	53
Lucerne	2	5
Victorville	38	95
Yucca Valley	2	26

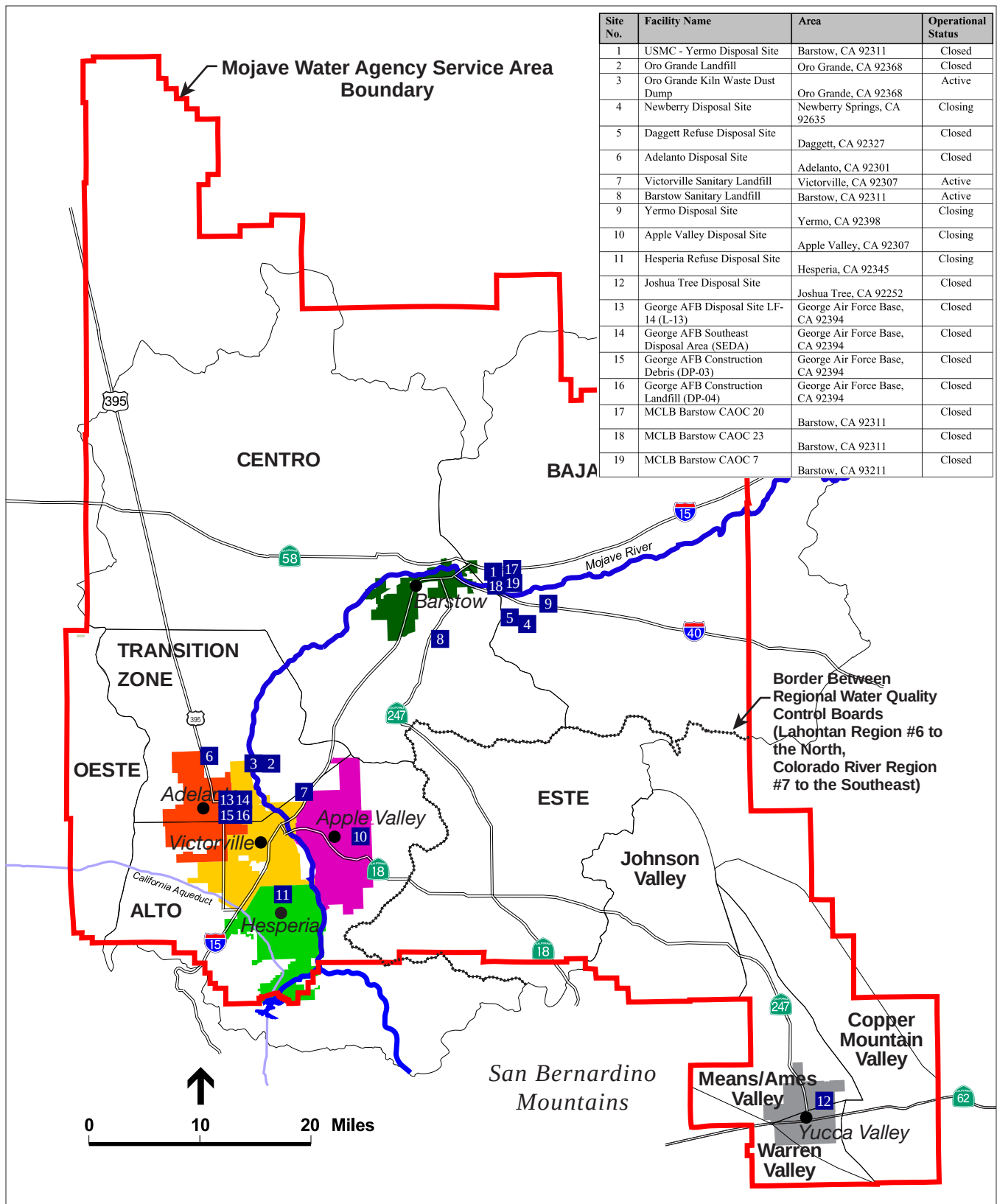
Source: RCRIS Database.

Two large wastewater treatment plants operate in the MWA service area: the VVWRA treatment plant located just downstream of the lower narrows of the Mojave River and the Barstow Wastewater Treatment Plant (WWTP) located on the eastern edge of Barstow. Both treatment plants provide secondary treatment. The VVWRA plant discharges to the Mojave River under NPDES permits issued by the RWQCB. The City of Barstow's WWTP discharges into eight unlined percolation ponds adjacent to the Mojave River. Recycled water is pumped from the percolation ponds to alfalfa fields adjacent to the Mojave River.

REGULATIONS

The U.S. EPA is the federal agency responsible for water quality management and administration of the federal Clean Water Act (CWA). The EPA has delegated most of the administration of the CWA in California to the California State Water Resources Control Board (SWRCB). The SWRCB was established through the California Porter-Cologne Water Quality Act of 1969 and is the primary State agency responsible for water quality management issues in California. Much of the responsibility for implementation of the SWRCB's policies is delegated to the nine RWQCBs. The MWA service area is split between the Lahontan Region #6, and the Colorado River Region #7 as shown in Figure 3.2-8...

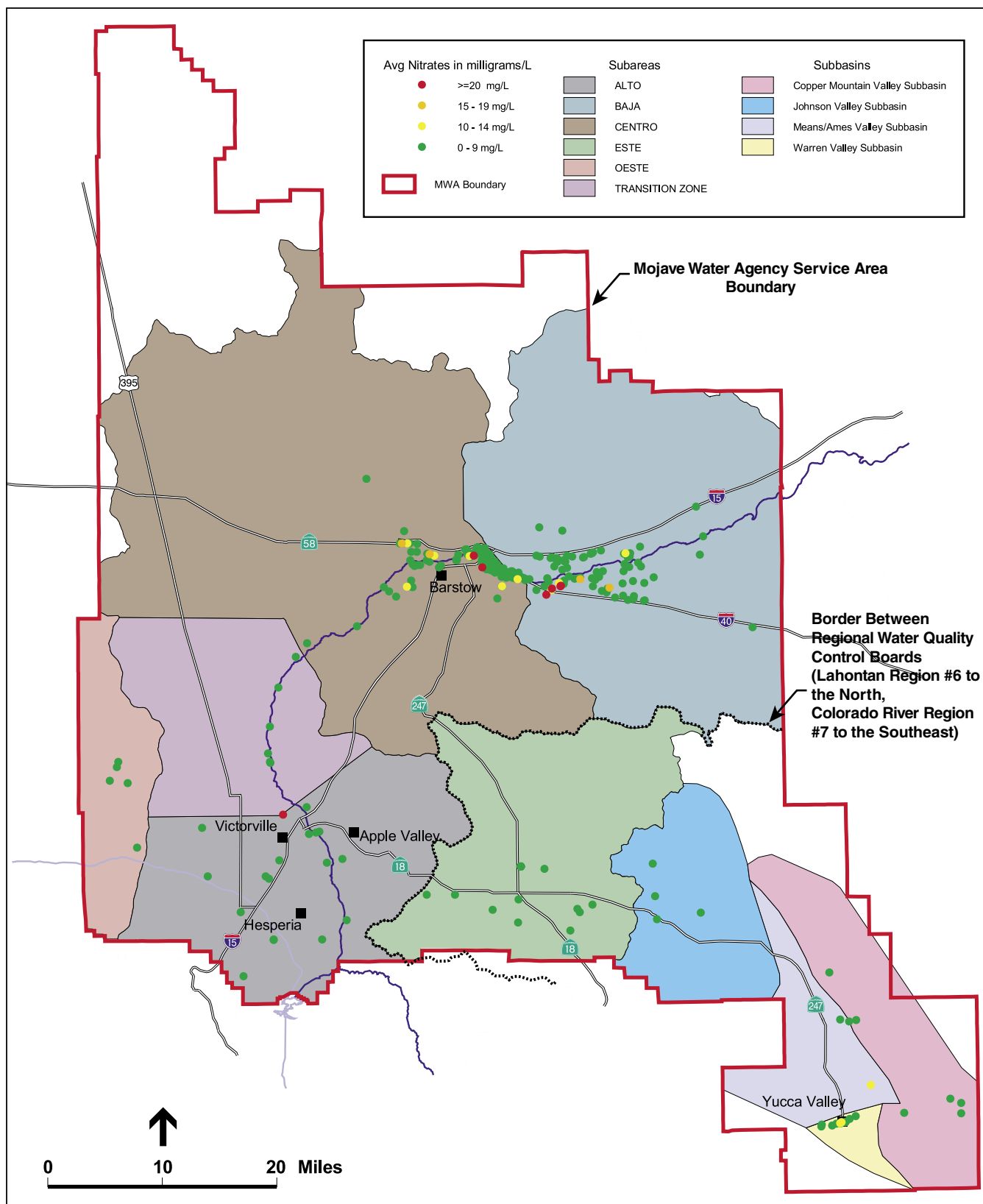
Section 402 of the CWA established the National Pollutant Discharge Elimination System (NPDES) to regulate discharges into "navigable waters" of the United States. The U.S. EPA



SOURCE: Solid Waste Information System (SWIS), June 17, 2004

MWA RWMP / 203148 ■

Figure 3.2-9
Solid Waste Disposal Sites



SOURCE: Schlumberger Water Services, June 2004

MWA RWMP / 203148 ■

Figure 3.2-10
Groundwater Wells Measuring Nitrates

authorized the SWRCB to issue NPDES permits in the State of California in 1974. The NPDES permit establishes discharge pollutant thresholds and operational conditions for industrial facilities and wastewater treatment plants. Non-point source NPDES permits are also required for municipalities and unincorporated communities to control urban stormwater runoff.

Individual storm water NPDES permits are required for specific industrial activities and for construction sites. State-wide general storm water NPDES permits have been developed to expedite discharge applications. They include the State-wide industrial permit and the State-wide construction permit. A prospective applicant may apply for coverage under one of these permits and receive Waste Discharge Requirements (WDRs) from the appropriate RWQCB. WDRs establish the permit conditions for individual dischargers.

Section 303(d) of the CWA requires the SWRCB to list impaired water bodies in the State and determine total maximum daily loads (TMDLs) for pollutants or other stressors impacting water quality. The RWQCBs are responsible for ensuring that total discharges do not exceed TMDLs for individual water bodies as well as for entire watersheds. No surface water resources in the MWA service area are included on the July 2003 list of impaired water bodies (303(d) list).

The RWQCBs also coordinate the State Water Quality Certification program, or Section 401 of the CWA. Under Section 401, states have the authority to review any federal permit or license that will result in a discharge or disruption to wetlands and other waters under state jurisdiction, to ensure that the actions will be consistent with the state's water quality requirements. This program is most often associated with Section 404 of the CWA which obligates the Corps to issue permits for the movement of dredge and fill material into and from "waters of the United States." Additionally, Section 404 requires permits for activities affecting wetlands. Prospective alterations of hydrologic features such as wetlands, rivers, and ephemeral creek beds resulting from construction require Section 404 permits.

Department of Health Service (DHS) is the state agency responsible for identifying and enforcing drinking water standards. DHS has adopted drinking water quality standards for large system water suppliers promulgated in Title 22 of the CCR. The SBCFCD is responsible for maintaining the flood control facilities within the Mojave Desert region.

IMPACT ASSESSMENT MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

The CEQA Guidelines establish that a significant impact would be expected to occur if the project would:

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there should 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).
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.
 - Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.
 - Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems.
 - Otherwise substantially degrade water quality.
 - Place within a 100-year flood hazard area structures which would impede or redirect flood flows.
 - Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.
 - Be vulnerable to inundation by seiche, tsunami, or mudflow.

Impact 3.2-1: Implementation of the RWMP will increase conjunctive use of the basin to achieve water balance in each subarea. This would be considered a beneficial effect of the project.

The 2004 RWMP develops a strategy to increase conjunctive use through the increased recharge of imported water as the principal means of achieving future water balance within each subarea. The RWMP also provides mechanisms to increase conservation, change water extraction locations for certain areas, and improve existing water quality. The 2004 RWMP identifies regions within the MWA service area that currently exhibit overdraft conditions and calculates the necessary water supply needed to achieve water balance in each subarea by the year 2020, based on projected water demand scenarios. The 2004 RWMP then identifies projects and management actions that could be implemented to achieve these projected water balances and maintain compliance with the stipulated judgment. As such the 2004 RWMP is inherently a means of avoiding adverse impacts to groundwater from over-production.

The Stipulated Judgment establishes FPAs for each major producer in the Mojave Basin Area. Producers extracting more than their allowed FPA can replace this water with imported water at a one-to-one ratio or with unused production rights within the subarea. The 2004 RWMP establishes measures to enhance water supplies and make replacement water available to each subarea where it is needed.

The 2004 RWMP identifies general locations within subareas where recharge basins could be established to augment groundwater in specific areas. Within the Mojave River Basin area, recharge basins would be located to augment either the Regional Aquifer or the Floodplain Aquifer near the Mojave River. Figures 2-4 through 2-8 identify proposed locations for siting recharge basins. SWP water would be conveyed to these locations for percolation into the ground.

Actual locations of the recharge basins could vary depending on the final designs and further analysis of land uses and permeability of underlying soils.

Program Alternatives

A master list of potential projects that could assist in meeting projected water demands in each subarea was developed by MWA with input from the TAC. The list of projects and alternatives considered for further consideration is included in Chapter 2.0, Project Description. Groupings of these projects were compiled into Program Alternatives for further assessment. A total of 18 Program Alternatives were developed and evaluated during the alternative screening process. Recommended alternatives (D5r and D6r) were identified in the alternative screening process that each would establish water balances throughout the service area. These alternatives include many of the same projects, the principal difference being the establishment of a 12,000 afy surface WTP (Project # 35) to treat SWP water, proposed under Alternative D5R.

The recommended Alternatives each assume a conservation target of 10 percent of existing consumption for the Mojave River Basin area and 5 percent for the Morongo Basin area. This difference reflects the existing conservation practices that have been implemented in the Morongo Basin area. In addition, each of the Program Alternatives assumes that the VVWRA will implement a reclamation program within the Alto subarea.

The alternatives were developed under two distinct potential scenarios for future agricultural production. Scenario 1 assumes that agricultural production would continue similar to existing (2000) conditions. Scenario 2 assumes a more realistic future condition of substantially reduced agricultural production.

Groundwater Modeling

A groundwater model was used to simulate the changes to groundwater hydrology, Mojave River flows, and pumping and return flow patterns that would result from implementation of the projects and management actions. The model was developed using the Stella 7.0 software, a simulation modeling package that allows model parameters to be changed and new results obtained quickly and easily.

The model divides the Mojave River Basin Floodplain and Regional Aquifers into 14 distinct but inter-connected aquifer units. The Lucerne Valley, Copper Mountain Valley, Means/Ames Valley, and Warren Valley aquifers are modeled independently. The model simulates groundwater storage and levels within each aquifer unit, groundwater flow between aquifer units, and leakage from the Mojave River into the aquifer units for the hydrologic period 1931-2001 using equations derived from the output of the USGS Modflow model of the Mojave River Basin.¹⁰ The model assumes varying water supplies each year over a 70-year period since 1931. This period of record includes a 30-year period of below average rainfall between 1950 and 1980.

¹⁰ Stamos, C.L., Martin, P., Nishikawa, T., and Cox, B.F. (2001) *Stimulation of Ground-Water Flow in the Mojave River Basin, California*. Water-Resources Investigations Report 01-4002 Version 3. U.S. Geological Survey, Sacramento, CA.

The model also assumes that an average of 78 percent of the SWP entitlement is available based on the projections contained in the State Water Project Reliability Report¹¹.

For each alternative, pumping and return flow quantities were determined within each subarea. The model accounts for recharge water volumes, pumping patterns, replacement water requirements of the Judgment, estimated agricultural pumping amounts, and year 2020 population projections. The computed consumptive use is subtracted from the storage within each aquifer. The model accounts for MWA's available SWP supplies, local demands, and the capacities of the Mojave River and Morongo Basin Pipelines.

MWA evaluated over 18 alternatives, each of which assumed slightly different scenarios. The development and screening of these alternatives is discussed in Chapter 6, Alternatives. Two Alternatives were recommended for implementation: D5r and D6r. The assumptions and model results for each Alternative are as follows:

	<u>D5r</u>	<u>D6r</u>
Assumptions		
Judgment Implementation	Full	Full
Agriculture Demand Scenario	Scenario 2	Scenario 2
Municipal Conservation	10%*	10%*
Regional Water Treatment Plant (afy)	12,000	0
Alto Reclamation (afy)	8,700	8,400
Rock Springs Release (afy)	10,000	10,000
Results		
Total Demands Met (afy)	199,000	198,000
Percent of Total Estimated 2020 Demand	99%	98%

* 5% in the Morongo Basin area

The model results indicate that implementation of either Alternative would provide a minimum of 98% of the total demand in the MWA service area in the year 2020. The effect on water balances in individual subareas is summarized in **Tables 3.2-6** and **3.2-7** for Alternatives D5r and D6r. **Table 3.2-8** summarizes water balance in the Morongo Basin.

The results of the model are similar for both Program Alternatives. Implementation of the projects and management actions identified in the Program Alternatives would result in balanced groundwater basins, while meeting a minimum of 98 percent of the projected demand. The Mojave River Basin would average a surplus of between 9,700 acre-feet and 9,900 acre-feet. The Morongo Basin would average a surplus of 1,000 acre-feet. The model estimates that the Alto Subarea would show a slight deficit of 1,500 acre-feet for Alternative D5r which was deemed to be essentially balanced in the analysis.

Table 3.2-9 summarizes the estimated volume of water contributed to the groundwater basins for each of the projects identified in the Program Alternatives.

¹¹ DWR, 2002.

**TABLE 3.2-6
YEAR 2020 HYDROLOGIC INVENTORY FOR MOJAVE SUBAREA ALTERNATIVE D5R
(AFY)**

Net Average Annual Water Supply						
Subarea	Este	Oeste	Alto	Centro	Baja	Entire Mojave Basin Area
Water Supply						
Surface Water Inflow						
-Gaged	0	0	71,400	0	16,900	71,400
-Ungaged	1,700	1,500	3,600	44,900	400	7,200
Subsurface Inflow	0	200	1,100	2,700	2,000	2,000
Deep Percolation of Precipitation	0	0	3,500	0	100	3,600
Imported Wastewater	2,600	0	2,800	0	0	5,400
SWP Imports	700	2,300	49,500	0	4,500	57,000
Total Supply	5,000	4,000	131,900	47,600	23,900	146,600
Outflow and Losses						
Surface Water Outflow						
-Gaged	0	0	0	17,000	8,100	8,100
-Ungaged	0	0	45,800	0	0	0
Subsurface Outflow	1,100	0	2,700	2,000	300	0
Phreatophyte Consumption	0	0	11,000	3,000	2,000	16,000
2020 Consumptive Use	3,800	3,500	73,900	20,100	11,300	112,700
Total Outflow and Loss	4,900	3,500	133,400	42,100	21,700	136,800
Total	0	500	(1,500)	6,500	2,000	9,700

Source: RWMP, SWS, 2004.

**TABLE 3.2-7
YEAR 2020 HYDROLOGIC INVENTORY FOR MOJAVE SUBAREA ALTERNATIVE D6R
(AFY)**

Net Average Annual Water Supply						
Subarea	Este	Oeste	Alto	Centro	Baja	Entire Mojave River Basin
Water Supply						
Surface Water Inflow						
-Gaged	0	0	71,400	0	16,400	71,400
-Ungaged	1,700	1,500	3,600	44,600	400	7,200
Subsurface Inflow	0	0	1,200	2,400	1,600	1,600
Deep Percolation of Precipitation	0	200	3,500	0	100	3,800
Imported Wastewater	2,600	0	2,800	0	0	5,400
SWP Imports	700	2,300	49,500	0	4,500	57,000
Total Supply	5,000	4,000	132,000	47,000	23,000	146,400
Outflow and Losses						
Surface Water Outflow						
-Gaged	0	0	0	16,300	7,800	7,800
-Ungaged	0	0	44,600	0	0	0
Subsurface Outflow	1,200	0	2,400	1,600	0	0
Phreatophyte Consumption	0	0	11,000	3,000	2,000	16,000
2020 Consumptive Use	3,800	3,500	74,000	20,100	11,300	112,700
Total Outflow and Loss	5,000	3,500	132,000	41,000	21,100	136,500
Total	0	500	0	5,900	1,800	9,900

Source: RWMP, SWS, 2004.

**TABLE 3.2-8
HYDROLOGIC INVENTORY FOR MORONGO BASIN /
JOHNSON VALLEY ALTS D5R AND D6R**

Net Average Annual Water Supply					
Subbasin	Copper Mountain Valley	Warren Valley	Means/Ames Valley	Johnson Valley	Entire Morongo Basin*
Water Supply					
SWP Imports	400	1,500	1,000	0	2,900
Net Water Supply	600	900	600	2,300	2,100
2020 Consumptive Use	1000	2,100	900	50	4,000
Net Supply	0	300	700	2,200	1,000

Source: RWMP, SWS, 2004, Table 5-12 and Appendix B Table 3.

*Totals exclude Johnson Valley

**TABLE 3.2-9
ESTIMATED VOLUME CONTRIBUTED BY INDIVIDUAL PROJECTS (AFY)**

Project/ Management Actions	Alternative		
	Subarea	D5r	D6r
Antelope Valley Wash Recharge Ponds	Alto	5,640	7,157
Cedar Street Detention Basin Recharge	Alto	5,640	7,157
Hesperia Lakes Recharge	Alto	6,345	7,885
Oro Grande Wash Recharge Ponds	Alto	8,601	12,015
Recharge Ponds South of Apple Valley	Alto	2,820	3,755
Regional Surface Water Treatment Plant	Alto	11,963	0
Silver Lakes In-Lieu Recharge	Alto	0	2,253
Rock Springs Release	Alto	7,155	7,591
Baja Stormflow Retention	Baja	2,000	2,000
Kane Wash Recharge Ponds	Baja	2,604	2,800
Alto Makeup (to Hodge and Lenwood)	Centro	909	908
AVEK	Centro	1,372	1,372
Cushenbury Wash Stormflow retention	Este	400	400
Recharge Ponds West of Helendale Fault	Este	343	369
Hi-Desert WD: Warren Valley	MBJV	1,450	1,450
Joshua Basin District Recharge and Pipeline	MBJV	393	393
Means/Ames Recharge Ponds	MBJV	1,000	1,000
Sheep Creek Recharge Ponds	Oeste	2,109	2,260
Subtotal Imports		60,744	60,762
Urban Conservation	All	15,900	15,900
VVWRA Reclamation	Alto	8,656	8,437

Source: RWMP, SWS, 2004, Appendix B, Table 3.

Summary

The model simulates 2020 demands imposed on the historical hydrology, which includes both wet and dry periods. Basins are drawn down during periods of drought. Subsequent wet years would recharge the basins, resulting in a long-term average balanced condition. The modeling provides a snapshot of future conditions with full implementation of the projects identified in the

2004 RWMP. As such, the 2004 RWMP provides a strategy to meet projected water demand, alleviate groundwater overdraft conditions, and comply fully with the Stipulated Judgment.

Implementation of the projects and management actions needed to achieve a water balance in the region will require coordination and participation from local water wholesalers and retailers. Some of the supply enhancement projects will be implemented by agencies other than MWA, with MWA acting as a cooperating agency. MWA will review projects proposed by implementing agencies and provide comments on the consistency of each project with the goals and objectives of the 2004 RWMP. MWA will also periodically update the RWMP to reevaluate population estimates, conservation programs, and water demand projections. As the regional resource manager, MWA is responsible for overseeing projects that could affect groundwater supply and quality.

In adopting the 2004 RWMP, MWA commits itself to implementing the management actions identified in the 2004 RWMP and restated in Chapter 2, Project Description. These management actions are each intended to facilitate effective management of the groundwater resources to maximize beneficial uses. As noted in the Project Description, the Management Actions consist of 60 specific actions that can be grouped into the following seven elements:

1. Monitoring
2. Improve characterization of the basin
3. Continue long-term planning
4. Groundwater protection
5. Construction and implementation
6. Financing
7. Public Participation

On-going monitoring and basin characterization efforts provide essential information for siting of supply enhancement recharge basins. Through the RWMP long-range planning efforts, MWA has conducted groundwater modeling to assist in determining the best locations for recharge or extraction sites and to help optimize operation of the groundwater basin. Implementation of the projects and management actions provides a regional benefit to groundwater resources.

Mitigation Measures

None Required.

Significance After Mitigation

Beneficial.

Impact 3.2-2: Increased conjunctive use of groundwater basins and groundwater banking could result in increased fluctuations of groundwater elevations from year to year. During dry periods, groundwater elevations may decrease.

The recharge projects identified in the 2004 RWMP are generally designed to convey imported water to specific parts of the underlying aquifers to replace water extracted and consumed. During prolonged periods of drought, this replacement water may not be available to offset extractions. Water banking operations would increase conjunctive use of basins. Surplus SWP water would be recharged into the ground within the MWA service area. This water would be repaid either by extracting at a later date when requested by the banking partner or by allowing pass-through flows on the California Aqueduct. Extraction could occur during periods of drought when pressures on the groundwater basin are already acute. In addition, if water is extracted prior to recharging surplus water, groundwater levels could decline significantly in certain areas.

Although the 2004 RWMP provides for long-term water balance, in individual years water levels may fluctuate. If groundwater levels dropped below historic lows during certain dry year periods, the risk of subsidence would increase, riparian habitats could be affected, and water levels could drop below screened depths of extraction wells. This would be considered a significant impact of the project.

MWA conducted groundwater modeling using Stella 7.0 software to assess the potential for water levels to decline below historic depths. The model compared the largest decline over the modeled hydrologic period with minimum groundwater elevation criteria. Minimum simulated elevations were compared against the average elevation of the bottoms of wells in each area to determine the potential for well dewatering and land subsidence. Drawing the water table below the bottom of wells would necessitate deepening of these wells. The scale of this modeling allows for a comparison averaged over the model zone, but does not permit a prediction of elevation at any particular location and thus cannot precisely predict elevations at specific wells such as those specified in Exhibit H of the Judgment to monitor groundwater depth in riparian areas.

As shown in **Figure 3.2-11**, the groundwater modeling concludes that water levels would not fall below the average well bottom elevation in any Mojave River Basin zone under either Alternative. However, localized dewatering at a scale smaller than the screening model zone might still occur in areas of heavy groundwater extraction or for relatively shallow wells. The Judgment provides minimum groundwater levels for certain areas that support riparian vegetation. If groundwater levels drop below these critical thresholds, funding will become available to the CDFG from the Biological Resources Trust Fund to remediate the decline as mandated in the Judgment and described in the Habitat Management Plan.

MWA does not have the authority to limit individual producers during prolonged periods of drought. The purpose of the 2004 RWMP is to minimize the potential for groundwater declines and assess available water supplies in the region. Implementation of the 2004 RWMP would reduce the potential for groundwater levels to decline below historic levels.

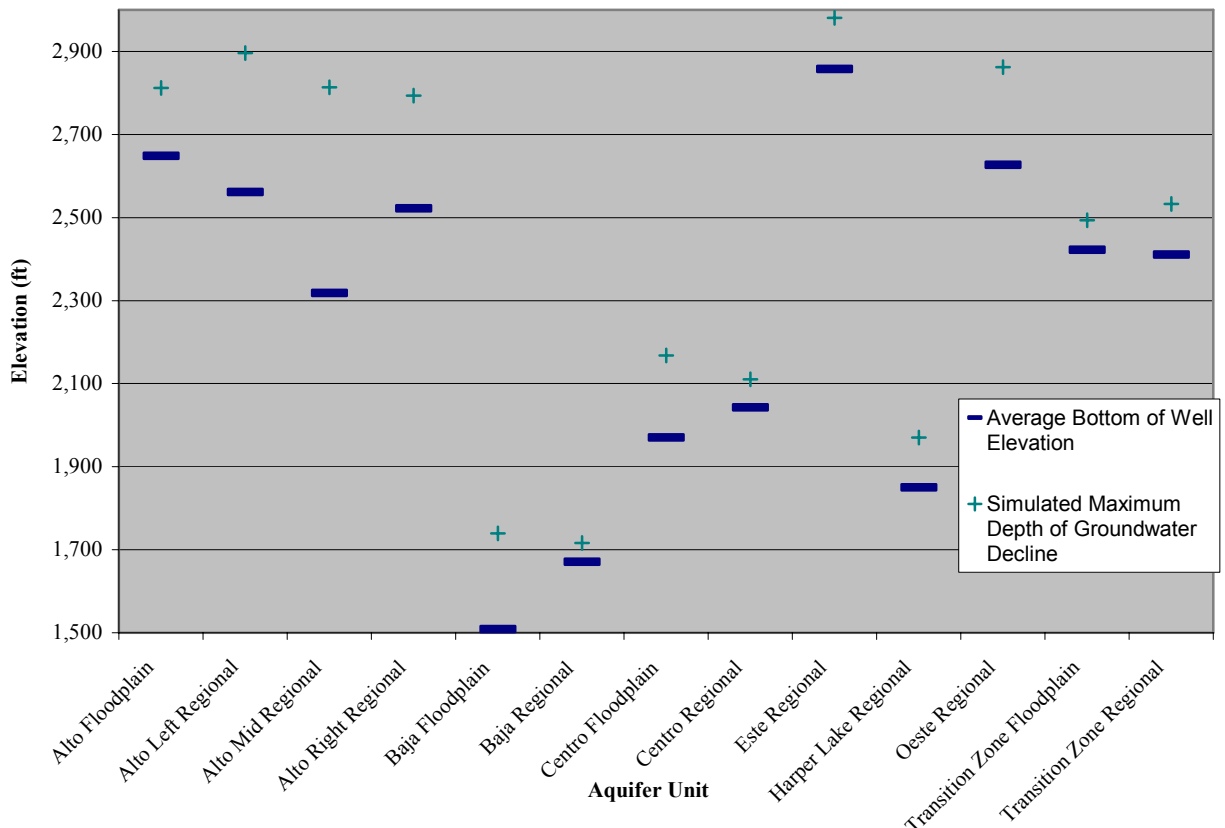


Figure 3.2-11: Average Well Bottom Elevations vs. Minimum Simulated Elevations

Mitigation Measures

None required.

Significance After Mitigation

Less than significant.

The 2004 RWMP establishes Management Actions to monitor groundwater levels and quality

Impact 3.2-3: Recharge water quality could adversely affect groundwater quality. Over the long-term, imported water would contribute to mass loading of salts and other constituents.

Water Quality

Supplemental recharge water in the MWA service area consists of either SWP water or reclaimed wastewater. Although some filtration is provided during percolation, recharge water quality can directly affect groundwater quality. Reclaimed wastewater is generally provided a minimum of secondary treatment and is produced by the VVWRA, the City of Barstow, or conveyed to the region from the mountain communities south of the service area via natural channels. Reclaimed wastewater may contain elevated TDS and nitrate concentrations. Water Recycling Requirements

issued by the RWQCB establish water quality thresholds for these constituents. Conditions of these permits generally require monitoring for adverse effects on groundwater.

SWP water is imported through the California Aqueduct and is currently recharged into the ground through periodic releases to the Mojave River and through recharge basins located along the Mojave River Pipeline and the Morongo Pipeline. SWP water quality varies substantially year to year, but is generally consistent with drinking water standards. TDS concentrations average around 300 ppm, but can vary significantly¹².

SWP water from the California Aqueduct contains high levels of both dissolved organic carbon (DOC) and bromide, and can exceed the drinking water standard for trihalomethane (THM) formation (0.10 mg/l total THMs). THMs are formed when the DOC reacts with chlorine added as a disinfectant during the water-treatment process¹³. Recharging SWP water could increase concentrations of THMs in groundwater.

Table 3.2-4 summarizes existing groundwater quality as reported in wells throughout the MWA service area. Groundwater in the region is generally good. Local municipal water purveyors provide treatment to extracted groundwater as needed to comply with DHS requirements and drinking water standards.

MWA has imported and recharged SWP water into the Alto subarea for over 25 years. MWA has conducted groundwater monitoring near the Mojave River to evaluate the effect of recharging SWP water. The 2004 RWMP would substantially increase SWP water imports, which could alter groundwater quality. Treatment of extracted groundwater conducted by water purveyors may need to be modified to reflect the changed water quality and comply with state drinking water standards.

Mass Loading

Groundwater in the Floodplain Aquifer generally flows north and east from the Alto subarea to Baja and beyond the MWA service area boundaries to Afton Canyon. Although this flow provides some flushing of water, importing water adds to the overall volume of salts and other constituents in the basin. Over a long period of time, these added constituents can accumulate and eventually pose water quality concerns. MWA analyzed total salt loading into the basin resulting from importing the full SWP entitlement over a 20-year period. **Table 3.2-10** summarizes the results of the analysis for each subarea. The calculations assume an aquifer depth of 1,000 feet, and an average SWP water TDS concentration of 281 ppm. **Appendix C** provides a summary of the analysis. The results indicate that over a 20-year planning period of importing the full SWP entitlement, salt loading from imported water would have a minimal impact on TDS concentrations. Over a longer period of time (100 years) TDS concentrations within the Alto subarea could increase by 20%. However, the concentration in Alto would remain lower than for surrounding subareas.

¹² Department of Water Resources. *Water Quality Assessment of State Water Project, 1998-99*, July 2000.

¹³ USGS, *Characterization of Dissolved Organic Carbon (DOC) Related to the Formation of Trihalomethanes (THMs) on Delta Islands*, Report No. CA516, 1999.

**TABLE 3.2-10
ESTIMATED TDS LOADING AND FUTURE CONCENTRATION**

	Este	Oeste	Alto	Centro	Baja
Inflows (lbs/year)					
Surface water inflow	462,000	408,000	20,381,000	19,787,000	15,300,000
Subsurface inflow			2,302,000	1,750,000	3,790,000
Import of wastewater	2,870,000		3,094,000		
SWP Imports	529,000	1,786,000	37,798,000		3,401,000
Total Inflow (lbs/year)	3,860,000	2,194,000	63,576,000	21,536,000	22,516,000
Total Outflow (lbs/year)	1,946,000	356,000	21,536,000	18,762,000	8,217,000
Net Inflow					
% change at year 1	0.05	0.16	0.2	0.01	0.05
% change at year 20	1.02	3.13	4.02	0.13	0.97
TDS Concentrations (ppm)					
year 0	655	396	269	813	546
year 1	655	397	270	813	546
year 20	662	408	280	814	551

Source: SWS, 2004.

Other constituents such as metals, DOC, and THMs could accumulate in a similar fashion. Over the 20-year planning period, the potential impact of mass loading into the basin would not be significant, since the importation of SWP water would not result in exceedances of drinking water regulatory thresholds. However, continued monitoring of groundwater near recharge basins and at production wells will provide data to determine the necessity to modify treatment as loading increases and drinking water standards change.

Mitigation Measure

M3.2-1 MWA shall implement groundwater monitoring programs near recharge basins to assess changes in groundwater quality.

Significance After Mitigation

Less than significant

Impact 3.2-4: Recharge basins could adversely affect groundwater quality by transporting surface contamination into aquifers. In addition, where groundwater is shallow, raised groundwater elevations could encounter surface or vadose zone contamination, degrading groundwater quality.

Groundwater recharge projects would affect groundwater quality depending on the quality of recharge water and local surface contamination. Over the course of the region's development, numerous contamination sites have been created by military, industrial, and commercial land uses. Placing recharge basins near areas of surface contamination could either transport contamination directly to the groundwater, or affect underground contamination plumes and potentially reduce the effectiveness of on-going remediation efforts. Figure 3.2-8 identifies known Superfund sites

in the MWA service area. Table 3.2-4 lists the number of known leaking underground storage tanks within major cities in the area. Placing recharge facilities near contaminated areas will require coordination with RWQCB to determine potential effects to groundwater quality.

Other facilities such as solid waste landfills and wastewater treatment plants have the potential for introducing contaminants into the ground. These facilities are permitted and monitored by the RWQCB to prevent contamination. Figure 3.2-9 identifies locations of these facilities within the MWA service area. Prior to siting recharge basins near these facilities implementing agencies would need to establish that appropriate mechanisms were in place to prevent contamination. Other old unrecorded landfill sites may exist throughout the region. Prior to siting recharge basins, environmental site assessments will determine the potential for contamination at specific sites from historic land uses such as land fills or other industrial activities.

Much of the region is not served by wastewater treatment districts. These areas utilize septic tank systems for residential and commercial wastewater treatment needs. Shallow soils in some areas may be affected by nitrates from septic systems. If rising groundwater levels encroached into soils layers that have been impacted by nitrates or other surface contamination, groundwater quality could be affected. This would only occur in areas with relatively shallow groundwater. **Figure 3.2-12** highlights these areas.

The 2004 RWMP establishes monitoring and groundwater protection Management Actions. Implementation of the 2004 RWMP and the following mitigation measures would minimize potential impacts to groundwater quality from surface contamination.

Mitigation Measures

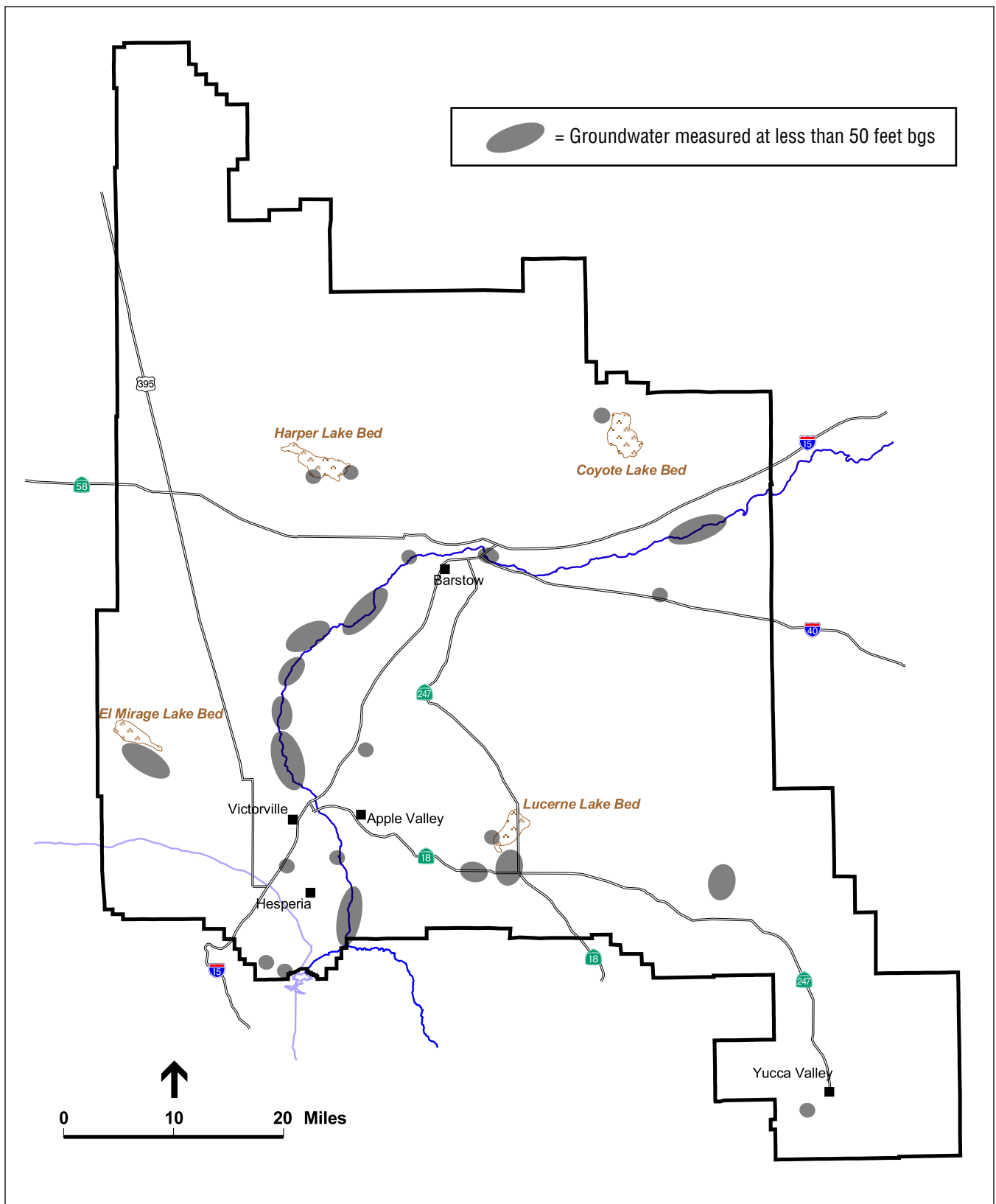
- M3.2-2** **Implementing agencies shall conduct Phase I site assessments for each potential recharge basin site prior to approval to assess potential for surface contamination.**
- M3.2-3** **Implementing agencies shall avoid recharging areas exhibiting shallow groundwater where surface contamination could be affected.**
- M3.2-4** **Implementing agencies shall operate recharge basins to avoid transporting contaminants into groundwater basin.**

Significance After Mitigation

Less than significant.

Impact 3.2-5: Recharge facilities located within flood plains would be periodically subject to flood conditions.

Recharge basins may be located within existing washes due to conducive soil types found in these low lying areas. These desert washes are generally dry. However, during local heavy rains, heavy



SOURCE: Schlumberger Water Services, June 2004

MWA RWMP / 203148 ■

Figure 3.2-12
Areas of Shallow Groundwater

flows and flash floods can occur. Improvements within these washes could be damaged during floods, or could redirect flood waters out of the washes. Within the Mojave River bed, sandy berms are created to slow down water velocity and encourage percolation. During periods of high river flow, these berms are designed to wash away without impeding the flood flows. More permanent recharge facilities within drainages could affect local floodplains. Implementation of mitigation measures would ensure that flood waters would not cause damage.

Mitigation Measures

- M3.2-5** **Implementing agencies shall ensure that recharge basins are equipped with storm flow bypass mechanisms that avoid damage to recharge basins, avoid flooding areas outside of the existing floodplain, and avoid detaining flood flows that have designated beneficial uses downstream.**
- M3.2-6** **MWA shall avoid discharging into the Mojave River during storm events that could result in flooding.**
- M3.2-7** **Implementing agencies shall ensure that revisions to floodplain insurance maps are submitted to the Federal Emergency Management Agency (FEMA) if recharge projects modify floodplains.**

Significance After Mitigation

Less than significant.

Impact 3.2-6: Recharge facilities and detention facilities located within flood plains could detain flood waters that would otherwise contribute to water supply downstream.

Recharge basins within washes and river beds could detain or slow flood flows promoting percolation further upstream than under natural conditions. This could reduce water supply in downstream areas. Implementation of mitigation measures to ensure by pass storm flows would minimize this impact.

Mitigation Measure

See Mitigation Measure **M3.2-5**.

Significance After Mitigation

Less than significant.

Impact 3.2-7: Construction of projects could degrade storm water runoff quality.

Construction of recharge basins, pipelines, well pads, and treatment plants would require the use of heavy earthmoving equipment potentially exposing soil and construction debris to storm water runoff. Operation of heavy equipment could lead to the release of oil onto the ground from engines and increase the potential for fuel spills during on-site refueling activities. Breaking of concrete would generate concrete debris and dust that could impact pH of receiving waters if washed into creek or river waters.

In addition, construction activities could add to urban runoff through concrete wash-out water and other equipment washing activities. Construction runoff adds sediment, changes pH and temperature, and introduces petroleum hydrocarbons to receiving waters. Construction projects would be subject to storm water discharge permit requirements that include preparation of Storm Water Pollution Prevention Plans (SWPPPs) and the implementation of BMPs to reduce the potential for pollutants in run off water. BMPs are individual or combined measures that can be implemented in a practical and effective manner on the project site which, when applied, prevent or minimize the potential release of contaminants into surface waters and groundwater. BMPs have been established by the RWQCB in the California Storm Water BMP Handbook for Construction (California Storm Water Quality Association (CSWQA), 2003), and are recognized as effective in reducing degradation of surface waters. The BMPs would comply with state requirements for coverage under the state-wide construction storm water discharge permit. Implementation of mitigation measures would minimize construction impacts to run off water quality.

Mitigation Measure

M3.2-8 Implementing agencies shall establish standard Best Management Practices (BMPs) for construction run off protection during construction activities involving RWMP projects. BMPs selected for each project should be in place and operational prior to the onset of major earthwork on the site. Typical elements of a Storm Water Pollution Prevention Plan (SWPPP) include:

- **Storm runoff from the construction area should be regulated through a storm water management/erosion control plan that may include temporary onsite silt traps and/or basins with multiple discharge points to natural drainages and energy dissipaters. Stockpiles of loose material should be covered and runoff diverted away from exposed soil material.**
- **Equipment wash water including concrete wash water should not be allowed to run off site.**
- **Vehicle fueling and chemical storage areas should be located within an area with adequate secondary containment.**
- **Vehicles leaving the construction site should not track dirt onto local roadways.**
- **After completion of grading, erosion protection should be provided on all cut-and-fill slopes when the finished grade warrants.**

Significance After Mitigation

Less than significant.

3.3 BIOLOGICAL RESOURCES

This chapter summarizes the pertinent findings regarding the biological setting for the Mojave Basin Area and the Morongo Basin/Johnson Valley Area. Information in this chapter is based on the 1994 RWMP, a search of the CDFG California Natural Diversity Data Base (CNDDB) (2004), and a review of relevant studies conducted in the MWA service area.

SETTING

This section includes a description of the habitats and biological communities known to occur in the MWA service area, communities considered sensitive, and those that may have jurisdictional status as wetlands or other waters of the United States under Section 404 of the federal CWA. An overview is presented of the special-status species known to occur or with potential to occur, and the policies established by local jurisdictions that pertain to biological resources in the MWA service area are described.

VEGETATION COMMUNITIES AND WILDLIFE HABITATS

Eighteen communities/habitats occur in the MWA service area; detailed vegetation descriptions and representative wildlife use are described below. The locations, distribution, importance, and jurisdictional status of habitats in the MWA service area are provided where known.¹

Figure 3.3-1 shows general vegetation types in the MWA service area. Due to the scale limitation of Figure 3.3-1, small areas of these vegetation types are not shown. As shown in the figure, the predominant habitat in the region is desert scrub. The following sections provide a brief description of several of the habitat types within the Mojave service area.

Annual Grassland

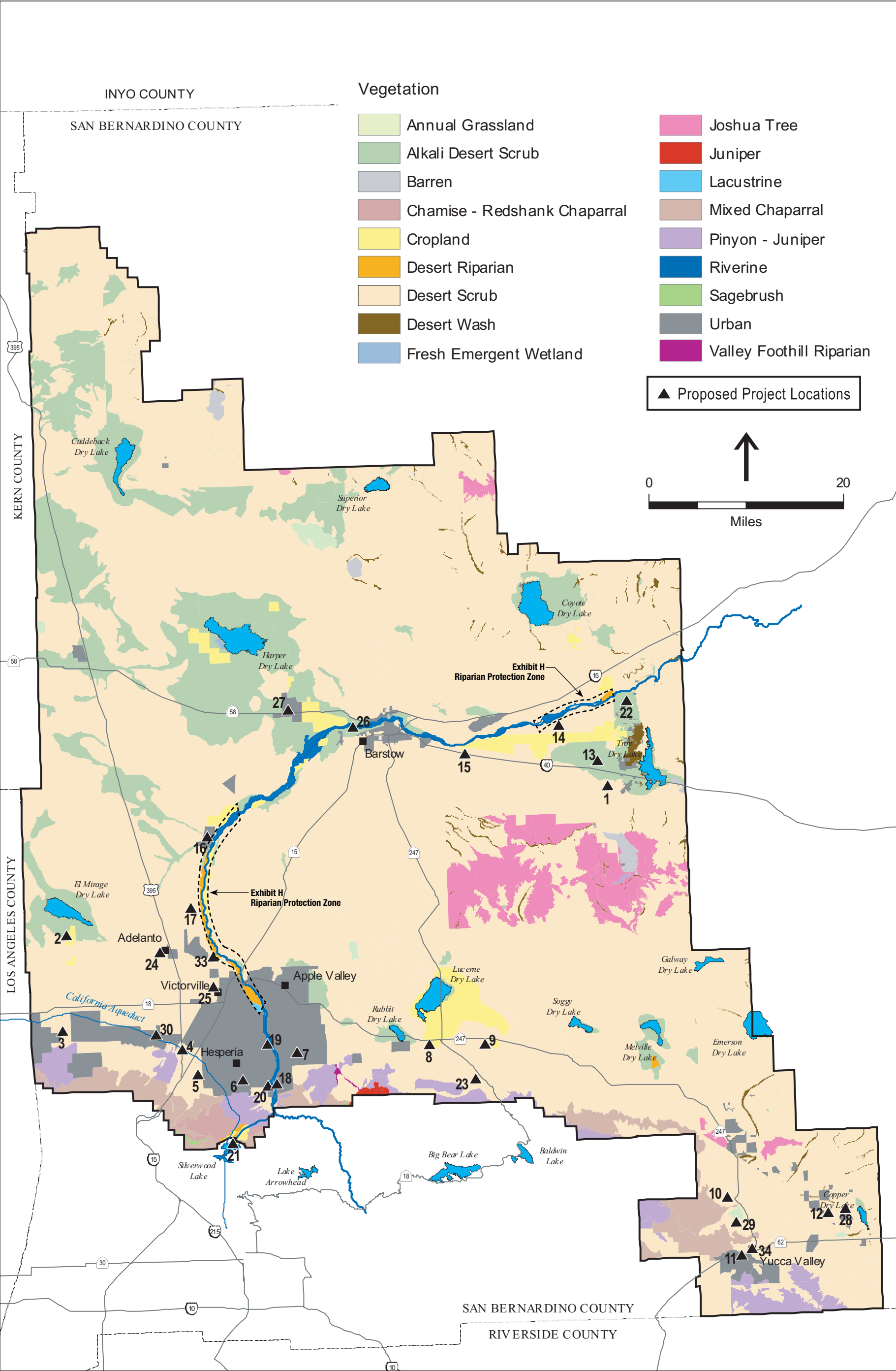
Annual Grassland habitats are open grasslands composed primarily of annual plant species. Associated species include wild oats, soft chess, and brome. Annual Grassland can be found in scattered patches throughout the MWA service area (Figure 3.3-1).

Many wildlife species use Annual Grassland habitats for foraging, but some require special habitat features such as cliffs, caves, ponds, or habitats with woody plants for breeding, resting, and escape cover. Characteristic animals that live in Annual Grassland habitats include lizards, garter snakes, California ground squirrel, burrowing owl, and prairie falcon.

Alkali Desert Scrub

Alkali Desert Scrub vegetation occurs throughout the Mojave Desert, generally at lower to middle elevations and interdigitates with a number of other arid and semiarid wildlife habitats. Examples of the halophytic phase of alkali scrub are common in California deserts, but are scattered and usually associated with dry lakes and flood plains of the Mojave River. Alkali Desert Scrub types

¹ Habitat descriptions follow Mayer and Laudenslayer (1988).



SOURCE: UCSB GAP Analysis, 1998; Thomas, 2002

Figure 3.3-1
General Habitat Area within the MWA Service Area

can generally be found surrounding the receding shores of large prehistoric lakes or alkali playas that mark the locations of dry lake beds². Associated species include saltbush, sagebrush, and creosotebush. In the MWA service area, the majority of Alkali Desert Scrub can be found in the Oeste Subarea northwest of Barstow (Figure 3.3-1).

Characteristic species that inhabit Alkali Scrub include the pallid kangaroo mouse, chisel-toothed kangaroo rat, zebra-tailed lizard, the San Emigdio blue butterfly, the Mohave ground squirrel, zebra-tailed lizard, and long-nosed leopard lizard.

Barren

Barren habitat is defined by the absence of vegetation. Any habitat with less than two percent total vegetation cover by herbaceous, desert, or non-wildland species and less than 10 percent cover by tree or shrub species is defined this way. Barren habitat may be found in juxtaposition with many different habitats, depending on the region of the state. Sand dunes with less than two percent vegetative cover are classified as barren. In desert regions, palm oasis, Joshua tree, desert wash, desert succulent shrub, desert scrub, and alkali desert scrub may all give way to a barren classification if conditions become extreme enough. In the MWA service area, two small Barren habitats can be in the Centro Subarea (Figure 3.3-1).

Where there is little or no vegetation, structure of the non-vegetated substrate becomes a critical component of the habitat. Many hawks and falcons nest on rock ledges. Plovers, stilts, and avocets rely on open ground covered with sand or gravel for constructing small scrape nests. In the desert, open sandy soil is critical as burrowing and egg-laying substrate for horned lizards and fringe-toed lizards.

Chamise-Redshank Chaparral

Chamise-Redshank Chaparral may consist of nearly pure stands of chamise or redshank, a mixture of both, or with other shrubs. This habitat is usually found below 4,000 feet on mountain ranges outside deserts. Chamise-Redshank Chaparral generally occurs below and grades into Mixed Chaparral. On desert exposures, redshank stands may occur above either Mixed Chaparral or Desert Succulent Scrub and either above or below Pinyon-Juniper. Associated species include toyon, ceanothus, and sugar sumac. In the MWA service area, Chamise-Redshank Chaparral can be found only south of Hesperia in the Alto Subarea (Figure 3.3-1).

Wildlife species found in this habitat type also are found in either Mixed Chaparral, Montane Chaparral, or Sagebrush and in shrubs beneath several woodland and forest types. The primary land management consideration is selection of alternative fire management treatments. Long-term fire suppression can lead to stand senescence and declines in deer, small mammals, birds, and reptiles. Most animal populations reach peak densities in the first two or three decades, frequently one to 15 years, after a fire.

² Fowler, D., and D. Koch, *The Great Basin*. Pages 7-102 In G. Bender, ed. Reference Handbook of the Deserts of North America. Greenwood Press, Westport, Connecticut, 1982.

Cropland

Cropland is agricultural land consisting of cultivated crops produced for consumption. Crops commonly grown in the MWA service area include pistachios, apples, pears, and alfalfa. In the MWA service area, croplands are concentrated along the Mojave River from Hesperia to east of Barstow (i.e., Yermo/Daggett area), and around Harper, El Mirage, Troy, and Lucerne Dry Lakes (Figure 3.3-1).

Many species of wildlife forage in cropland, including the red-tailed hawk, northern harrier, barn owl, horned lark, California ground squirrel, and California vole.

Desert Riparian

Desert Riparian habitats are found along permanent streams and at seeps and springs in the Mojave Desert. These habitats generally are found at elevations less than 3,000 feet. Desert Riparian habitats may be found adjacent to other desert habitats including Desert Wash, Desert Succulent Shrub, Desert Scrub, Joshua Tree, and Alkali Desert Scrub. Associated species include tamarisk, velvet ash, and mesquite.

These rare desert riparian systems are extremely important to wildlife populations. These habitats support more bird species at greater densities than other desert habitats³. The dense shrubbery and permanent water provide food, cover, and water for additional wildlife forms. Several special-status bird species are dependent on riparian woodlands for nesting, feeding, and cover. These species include the western yellow-billed cuckoo, southwestern willow flycatcher, yellow warbler, and least Bell's vireo.

In the MWA service area, Desert Riparian habitat is found primarily along the Mojave River from Victorville to Helendale, at Camp Cady, and in Afton Canyon east of the MWA service area (Figure 3.3-1). Because over 90 percent of California's riparian forests have been eliminated, impacts to Desert Riparian habitats are considered important to CDFG and USFWS, and San Bernardino County. The loss of riparian habitat in the MWA service area has been extremely severe.

Desert Scrub

Desert Scrub occurs throughout the California desert region, generally from near sea level to 4,000 feet. This community is characterized by sand dune accumulations in the desert that are stabilized or partially stabilized by "sand-dependent" vegetation. Creosotebush is often considered a dominant of Desert Scrub habitats; however, its dominance is usually owing to its tall stature rather than density⁴). Generally, Desert Scrub habitats have low species diversity;

³ England, A.S., L.D. Foreman, and W.F. Laudenslayer, Jr., *Composition and abundance of bird populations in riparian habitats of the California deserts*. Pages 694-701 In R.E. Warner and K.M. Hendrix, eds. *California Riparian Systems: Ecology, Conservation, and Productive Management*. University of California Press, Berkeley, California, 1984.

⁴ Turner, R. M., and D. E. Brown, *Mohave Desert scrub*, In D.E. Brown, ed. *Biotic Communities of the American Southwest-United States and Mexico*. *Desert Plants* 4:181-221, 1982. .

however, many plant species are found in the habitat. These species include creosotebush, catclaw acacia, desert agave, coastal bladderpod, white brittlebush, burrobush, white bursage, barrel and hedgehog cactus, branched pencil, and teddybear cholla, Palmer's coldenia, Wiggins croton, desert globemallow, jojoba, littleleaf krameria, ocotillo, beavertail pricklypear, Douglas and rubber rabbitbrush, desert sand verbena, desert senna, squaw waterweed, Anderson's wolfberry, and Mojave yucca. Forbs and grasses may include triangle evening primrose, galleta, big galleta, galletagrass, and spanishneedles. In the MWA service area, the majority of habitat is Desert Scrub (Figure 3.3-1).

Desert shrub habitats support a variety of wildlife species. Presence of standing water in winter and growth of herbaceous plants in spring, provide foraging areas and food for species in these seasons. Primary resident species are reptiles or rodents; however other wildlife species are represented. Typical species include Couch's spadefoot toad, desert tortoise, a variety of lizards and snakes including the desert iguana and common kingsnake, black-throated sparrow, various pocket mice and kangaroo rats, kit fox, coyote and bobcat.

Desert Wash

Desert Wash habitats are characterized by the presence of arborescent, often spiny, shrubs generally associated with intermittent streams (washes) or drier bajadas (alluvial deposits adjacent to washes). These habitats are found at elevations between approximately 2,500 feet and 6,500 feet. Characteristic species include catclaw, allscale, saltbush, desert willow, honeybean and screwbean mesquites, desert almond, cheesebush, skunkbrush, blackstem, and pygmy cedar. Presence of water during part of the year appears essential for the habitat to persist. Desert wash is found in washes, arroyos, and canyons of intermittent streams throughout the Mojave Desert and the MWA service area, usually below 5,000 feet (Figure 3.3-1). It is not considered a sensitive habitat except at sites where it contains special-status species and where it is considered waters of the U.S. under Section 404 of the federal CWA.

Desert Wash habitats, such as paloverde and desert ironwood associations, are important to wildlife populations. Such habitats support more bird species at higher densities than other desert habitats with the exception of dense shrubbery which also provides food and cover for other wildlife forms.

Fresh Emergent Wetland

Fresh Emergent Wetland habitat is found where standing water or saturated soil is present for all or most of the year. This habitat includes seeps and is dominated by dense strands of perennial, emergent plants. Common species include Olney's bulrush, coastal bulrush, yerba mansa, giant reed, Cooper's rush, Torrey's seepweed, saltgrass, western miterwort, and narrow- and broad-leaved cattails. Seeps contain holly-leaved water-nymph, western miterwort, broadleaf pondweed, widgeongrass, and horned-pondweed.

In the Mojave Desert and the MWA service area, wetlands are infrequent and associated with arroyos and other intermittent water runoff channels. Two occurrences of Fresh Emergent

Wetland in the MWA service area are near Rabbit Springs in Lucerne Valley and along Harper Dry Lake, which occurs at approximately 2,000 feet (Figure 3.3-1). Rabbit Springs supports seeps, which includes several special-status plant species.

Fresh Emergent Wetland is of limited extent in the RWMP region. CDFG's and San Bernardino's no-net-loss wetland policies were enacted to protect this resource. This habitat qualifies as wetland under Section 404 of the federal CWA.

Joshua Tree

Joshua Tree habitats are characterized as open woodlands of widely scattered Joshua trees with a low to more or less dense community of broad-leaved evergreen and deciduous shrubs. Joshua Tree habitats generally occur at moderate elevations in the Mojave Desert between creosotebush scrub and pinyon-juniper woodlands. Numerous shrubs are present, such as California juniper, hoary California buckwheat, longspine horsebrush, desert thorn, and cactus. Other associated species include juniper, singleleaf pinyon, and Mojave yucca. Little or no herbaceous understory exists for most of the year; however, many species of ephemeral herbs may germinate after sufficient late fall or winter rains and may flower in mid-spring.

Joshua Tree habitat extends eastward across the Mojave Desert to southwestern Utah, mostly on the slopes of mountains and mesas. Extensive stands are found in the vicinity of Halloran Summit and Mountain Pass in northeastern San Bernardino County. It is found in the MWA service area south and upslope of Victorville, From Apple Valley eastward to the Morongo Valley, and in Yucca Valley (Figure 3.3-1). The Morongo Basin pipeline extension and its proposed recharge basins and the proposed recharge basins in the Alto, Oeste, Este, and Baja Subareas are located near Joshua Tree habitats.

Because Joshua Trees are the only sizable trees in many Joshua Tree habitats, this species enhances the shrublike character of Desert Scrub habitat. Joshua Trees provide song perches, lookout posts, and nest sites for birds (e.g., ladder-backed woodpecker, cactus wren, Scott's oriole). The sharp spiny leaves provide protective havens for birds and lizards. The desert night lizard, in particular, requires fallen Joshua tree branches, dead clumps of Joshua Trees or other yucca species, or other debris for shelter.

Although locally abundant throughout the Mojave Desert, Joshua Tree habitat has continuously declined because of urban development and commercial harvesting of Joshua trees. Joshua trees are protected under the San Bernardino County Code (Title 8, Section 89.0401 et seq.) and are recognized as an important biological resource.

Juniper

Juniper habitats are characterized as woodlands of open to dense aggregations of junipers in the form of arborescent shrubs or small trees. Juniper habitats generally occur at middle elevations forming a transition between habitats at higher elevations, and habitats at lower elevations. Associated species include white fir; Jeffrey, ponderosa, and whitebark pine; and singleleaf

pinyon. Shrub species typically associated with juniper habitats include antelope bitterbrush, California buckwheat, wax currant, gray horsebrush, green Mormon-tea, curleaf mountain-mahogany, and big and black sagebrush. Typical forbs and grasses include Sandberg's bluegrass, bighead clover, Idaho fescue, one-spike oatgrass, bottlebrush squirreltail, and bluebunch wheatgrass.

Juniper berries are an important food source for wintering birds. Maser and Gashwiler (1978) found that 17 birds use juniper berries in winter. Juniper foliage is also consumed by several mammals⁵ and may be an important food source for some of these animals, especially during harsh winters.

This habitat occurs around the mountains in the Mojave Desert. It occurs on the southwestern edge of the MWA service area, mostly south of the California aqueduct, west of I-15, and east of I-15 in Hesperia (Figure 3.3-1). Juniper habitat is common through the MWA service area and is not considered a sensitive habitat.

Lacustrine

Lacustrine habitats are inland depressions or dammed riverine channels containing standing water. Typical lacustrine habitats include permanently flooded lakes and reservoirs, intermittent lakes (e.g., playas), and ponds. Lacustrine habitats occur in association with any terrestrial habitats, riverine, and fresh emergent wetland habitats. Several major dams and reservoirs are operated in the Mojave Basin. Lake Arrowhead and Lake Gregory, in the upper watershed, serve primarily recreational purposes. Silverwood Lake serves for storage, recreation, and distribution of imported water; the Mojave River Forks Dam serves for flood control purposes.

Silverwood Lake, an SWP storage facility, supports populations of warmwater game and forage fish species. Important game and forage include striped bass, largemouth bass, channel catfish, and crappie. Rainbow trout are stocked during the winter and spring months by the CDFG. Other gamefish populations are largely maintained through natural recruitment.

No fish resources are known to occur within dry lakes such as Lucerne, Rabbit, and El Mirage Dry Lakes. Other aquatic species may occur within these dry lake habitats. Several species of fairy shrimp inhabit the dry lake beds.

In the MWA service area, dry lakes include Cuddeback, Dry, Superior, Harper, Coyote, El Mirage, Rabbit, Lucerne, Melville, and Soggy Dry Lakes (Figure 3.3-1). This habitat is limited in distribution and extent. San Bernardino County values the functions provided by this habitat and has established a policy (Policy OR.37.c) to promote their retention⁶.

⁵ Maser, C., and J.S. Gashwiler, *Interrelationships of wildlife and western juniper*. Pages 37-82 In R.E. Martin, J.E. Dealy, and D.L. Caraher, eds. *Proceedings of the Western Juniper Ecology and Management Workshop*. Gen. Tech. Report PNW-74. U.S. Department of Agriculture, Forest Service, Portland, Oregon, 1978.

⁶ San Bernardino County Planning Department, *San Bernardino County General Plan*, adopted July 1989 and revised September 1995..

Mixed Chaparral

Mixed Chaparral is a structurally homogeneous brushland type dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Mixed Chaparral is a floristically rich type that supports approximately 240 species of woody plants⁷.

Dominant species in Mixed Chaparral include scrub oak, chaparral oak, and several species of ceanothus and manzanita. Individual sites may support pure stands of these shrubs or diverse mixtures of several species. Commonly associated shrubs include chamise, birchleaf mountain mahogany, silk-tassel, toyon, yerba-santa, California buckeye, poison-oak, sumac, California buckthorn, hollyleaf cherry, Montana chaparral-pea, and California fremontia. Some of these species may be locally dominant.

This habitat occurs around the mountains in the Mojave Desert. It occurs on the southwestern edge of the MWA service area, mostly south of the California aqueduct, west of I-15, and east of I-15 in Hesperia (Figure 3.3-1). It also occurs just north and west of Yucca Valley.

No wildlife species are restricted to Mixed Chaparral. Most species are found in other shrub-dominate types including Chamise-Redshank Chaparral and Sagebrush. Wildlife management considerations usually focus on selecting alternative fire management treatments.

Pinyon-Juniper

Pinyon-juniper habitats generally occur at middle elevations adjoining a number of other wildlife habitats. At lower elevations, pinyon-juniper may interface with habitats such as Joshua tree and desert scrub. At higher elevations, sagebrush, mixed chaparral, and chamise-redshank chaparral are found adjacent to pinyon-juniper. In several Mojave Desert locations, pinyons and junipers are found with white fir as mixed conifer. Other associated plant species include blackbrush, common snakeweed, narrowleaf golden bush, Parry nolina, curlleaf mountain mahogany, antelope bitterbrush, Parry rabbitbrush, chamise, redshank, Mojave yucca, and Ponderosa pine.

This community is found from 4,000 to 8,000 feet in the Mojave Desert and occurs near the drier headwaters of the South Fork Kern River. It occurs primarily along the southern edge of the MWA service area in the Alto and Este Subareas and the Morongo Basin/Johnson Valley Area on the northern slopes of the San Bernardino Mountains (Figure 3.3-1).

The pinyon-juniper habitat is a common vegetation type throughout the Mojave Desert. It is not considered a sensitive habitat type except at sites where it contains special status species. Characteristic species of this habitat include pinyon mouse, bushy-tailed woodrat, pinyon jay, plain titmouse, and bushtit.

⁷ Ornduff, R., *Introduction to California Plant Life*. University of California Press, Berkeley, California, 1974.

Riverine

Riverine habitats can occur in association with many terrestrial habitats. Riparian habitats are found adjacent to many rivers and streams. Riverine habitats are also found contiguous to lacustrine and fresh emergent wetland habitats. The Mojave River, the riverine habitat in the MWA service area, extends for approximately 100 miles from its headwaters in the San Bernardino Mountains to Soda Dry Lake, a playa near the Town of Baker. Major tributaries are the West Fork of the Mojave River, the East Fork of the West Fork of the Mojave River, and Deep Creek. Perennial surface flows in the Mojave River typically occur from near Spring Valley Lake to Helendale (as a result of groundwater emergence and discharges from the VVWRA), in the Camp Cady area east of Barstow, and in Afton Canyon.

The Mojave River supports the endemic Mojave tui chub, and a variety of introduced warmwater fish species⁸. Brown (1978) found threespine stickleback, green sunfish, mosquitofish, black bullhead, amargosa pupfish, and Mojave tui chub and arroyo chub hybrids in the Mojave River. These fish were found near Helendale, Camp Cady Ranch, Afton Canyon campground, and at Soda Springs.

The Mojave River Forks Dam does not store water except during short periods following large floods. Consequently, fish populations in the West Fork of the Mojave River below Cedar Springs Dam (Silverwood Lake) are likely present only during periods of prolonged surface flows or in reaches where perennial pool habitats exist. Potential fish species occurring in this reach are probably limited to warmwater species and are likely maintained by introductions from Silverwood Lake when releases or uncontrolled spills occur at Cedar Springs Dam.

Sagebrush

Sagebrush occurs at a wide range of middle and high elevations. At lower elevations and on drier sites, it gives way to such species as saltbrush, greasewood, creosotebush, and winterfat. At mid-elevations and on more mesic sites the habitat meets bitterbrush, curlleaf mountain mahogany, and western serviceberry. Sagebrush stands are typically large, open, discontinuous stands of big sagebrush of fairly uniform height. Often the habitat is composed of pure stands of big sagebrush, but many stands include other species of sagebrush, rabbitbrush, horsebrush, gooseberry, western chokecherry, curlleaf mountain mahogany, and bitterbrush. In the MWA service area, a small amount of Sagebrush habitat occurs south of Hesperia and west of Silverwood Lake (Figure 3.3-1).

The Sagebrush habitat is very important to wildlife because it serves as habitat for some of the more important game animals. This habitat is occupied by jackrabbits, cottontail rabbits, ground squirrels, least chipmunk, kangaroo rats, wood rats, pocket mice, deer mice, grasshopper mice, sagebrush vole, and the California bighorn sheep. Birds of the sagebrush habitat include the chukar, black-billed magpie, gray flycatcher, pinyon jay, sage thrasher, and several sparrows, and hawks. Maintenance of the habitat is essential for many of these species. Some species can

⁸ Moyle, P.B., *Inland Fishes of California*, University of California Press, Berkeley, California, 1976.

benefit from the increased diversity and forage created by the careful use of fire, mechanical brush removal, seeding, or grazing.

Urban

The structure of urban vegetation varies, with five types of vegetative structure defined: tree grove, street strip, shade tree/lawn, lawn, and shrub cover. Species composition in urban habitats varies with planting design and climate. Monoculture is commonly observed in tree groves and street tree strips. Most units of urban vegetation are relatively static in species composition because of maintenance. In the MWA service area, the major urban areas are the Cities of Hesperia, Apple Valley, Victorville, Yucca Valley, and Barstow (Figure 3.3-1).

Three urban categories relevant to wildlife are distinguished: downtown, urban residential, and suburbia. The heavily-developed downtown is usually at the center, followed by concentric zones of urban residential and suburbs. There is a progression outward of decreasing development and increasing vegetative cover. Species richness and diversity is extremely low in the inner cover. Rock dove, house sparrow, and starling comprise over 90 percent of all avian density and biomass. The urban residential zone is characterized by a denser and more varied mosaic of vegetation shade trees, lawns, hedges and planted gardens; approximately 40 percent of the land's surface is covered by impervious material. This region is characterized by a variety of bird species including scrub jay, mockingbird, and house finch. Associates in the urban residential areas include the raccoon, opossum, striped skunk, and California slender salamander.

Suburban areas with mature vegetation closely approximate the natural environment. In addition to landscaped gardens and lawns, relatively large tracts of adjacent natural vegetation such as chaparral, grasslands, and oak woodland abound. Wildlife diversity increases while species density decreases and proportionately greater numbers of native species occur. Bird species include wrentits, bushtits, plain titmouse, chestnut-backed chickadee, California quail. Common mammals are black-tailed deer, ringtail, black-tailed jackrabbit, Gopher snake and western fence lizard also occur in this zone.

Valley Foothill Riparian

Dominant species in the canopy layer are cottonwood, California sycamore, and valley oak. Subcanopy trees are white alder, boxelder and Oregon ash. Typical understory shrub layer plants include wild grape, wild rose, California blackberry, blue elderberry, poison oak, buttonbrush, and willows. The herbaceous layer consists of sedges, rushes, grasses, miner's lettuce, Douglas sagewort, poison-hemlock, and hoary nettle. In the MWA service area, a small amount of Valley-Foothill Riparian habitat occurs west of the Mojave River west of Hesperia (Figure 3.3-1).

Valley-foothill riparian habitats provide food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. At least 50 amphibians and reptiles occur in lowland riparian systems. Many are permanent residents, others are transient or temporal visitors.

SENSITIVE HABITATS

Biological habitats are considered sensitive if they are of limited extent or distribution, continuing to decline, and serve as important habitat for several dependent special-status plant and wildlife species. Sensitive habitats⁹ in the MWA service area include:

- desert riparian;
- desert wash;
- fresh emergent wetland;
- Joshua tree;
- lacustrine;
- riverine; and
- valley foothill riparian.

SPECIAL-STATUS SPECIES

Special-status species are plants and animals that are legally protected under the federal and state Endangered Species Acts (ESA) or other regulations, and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status species are species in the following categories:

- plants and animals listed or proposed for listing as threatened or endangered under the federal ESA (50 CFR 17.12 for listed plants and 50 CFR 17.11 for listed animals) and various notices in the Federal Register [proposed species]);
- plants and animals that are candidates for possible future listing as threatened or endangered under the federal ESA (69 Federal Register 24876, May 4, 2004);
- plants and animals listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 California Code of Regulations [CCR] 670.5);
- plants and animals that meet the definitions of rare or endangered under CEQA *Guidelines*, Section 15380;
- plants and animals listed as sensitive by the local U.S. Forest Service region (Forest Service Manual 2670) or Bureau of Land Management (BLM) resource area (BLM, 2004a and b);
- plants listed under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 et seq.);
- plants considered by the California Native Plant Society (CNPS) to be rare, threatened, or endangered in California (Lists 1B and 2 in Tibor, 2001).
- plants listed by CNPS as plants about which more information is needed to determine their status and plants of limited distribution (lists 3 and 4 in Skinner and Pavlik, 1994), which may be included as special-status species on the basis of local significance or recent biological information;

⁹ Sensitive habitat descriptions follow Mayer and Laudenslayer (1988).

- animal species of special concern to the CDFG (Jennings and Hayes, 1994 [amphibians and reptiles]; Moyle et al., 1995 [fish]; Remsen, 1978 [birds]; and Williams, 1986 [mammals]); and
- animals fully protected in California (California Fish and Game Code, Section 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians]; and 5515 [fish].

Special-Status Plant Species

Sixty-six special-status plant species are known to occur or have the potential to occur in the MWA service area (**Appendix D**). The CNDDDB lists 23 special-status plants that are known to occur in the MWA service area¹⁰. The CNDDDB also documents the presence of 13 special-status plant species in the vicinities of the component projects where changes in biological resources may potentially occur (**Figure 3.3-2**).

Special-status plants endemic to the MWA service area include desert cymopterus, Little San Bernardino Mountains linanthus, Mojave tarplant, Parish's phacelia, and Red Rock Poppy¹¹.

Rabbit Springs near Lucerne Valley is the only known site for Parish's alkali grass, Parish's popcorn flower, and Salt Spring checkerbloom. Alkali mariposa lily also occurs near Rabbit Springs as well as Cushenbury Springs¹². Several narrow endemic plant species found include the Mojave monkeyflower, Barstow woolly sunflower, desert cymopterus, and Lane Mountain milkvetch. Other plants found as local disjuncts (occurring at locations outside their primary range) include Parish's phacelia and crucifixion thorn¹³.

Barstow woolly sunflower and Mojave monkeyflower have been observed near the Mojave River Pipeline¹⁴. Robinson's monardella and Little San Bernardino Mountains linanthus are known to occur near the Morongo Basin Pipeline and associated recharge facilities¹⁵.

Special-Status Wildlife Species

Forty-one special-status wildlife species are known to occur or have the potential to occur in the MWA service area. **Appendix D** lists these species and their legal status, describes their habitat requirements and geographic distributions, and summarizes their known or expected occurrences in the MWA service area.

Twenty-six special-status wildlife species were documented by the CNDDDB¹⁶. **Figure 3.3-3** shows the specific locations of these species. The specific locations of two species (prairie falcon and

¹⁰ California Department of Fish and Game (CDFG), California Natural Diversity Database (CNDDDB), 2004..

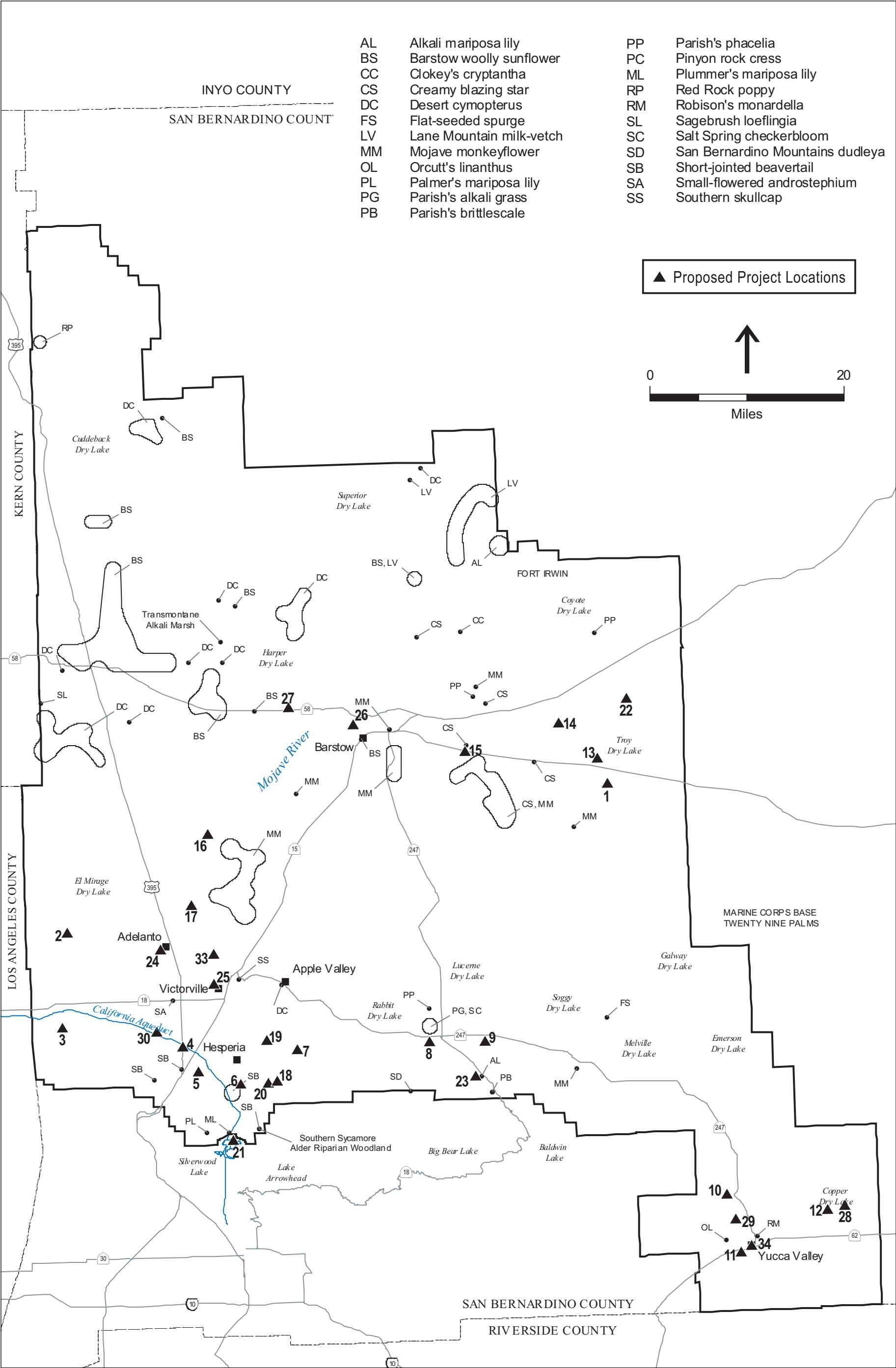
¹¹ Bureau of Land Management (BLM), County of San Bernardino, and City of Barstow, *Draft Environmental Impact Report and Statement for West Mojave Plan – A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*, Bureau of Land Management, California Desert District, Moreno Valley, California, 2003
¹² *Ibid.*

¹³ *Ibid.*

¹⁴ Jones & Stokes Associates, *Draft Program Environmental Impact Report for the Mojave Water Agency Regional Water Management Plan, prepared for Mojave Water Agency, Apple Valley, California*, 1994..

¹⁵ *Ibid.*

¹⁶ California Department of Fish and Game (CDFG), California Natural Diversity Database (CNDDDB), 2004..



SOURCE: California Natural Diversity Data Base (CNDDB), 2004; ESA 2004

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Figure 3.3-2
Approximate Locations of Known Sitings for Special-Status Plants
in the MWA Service Area

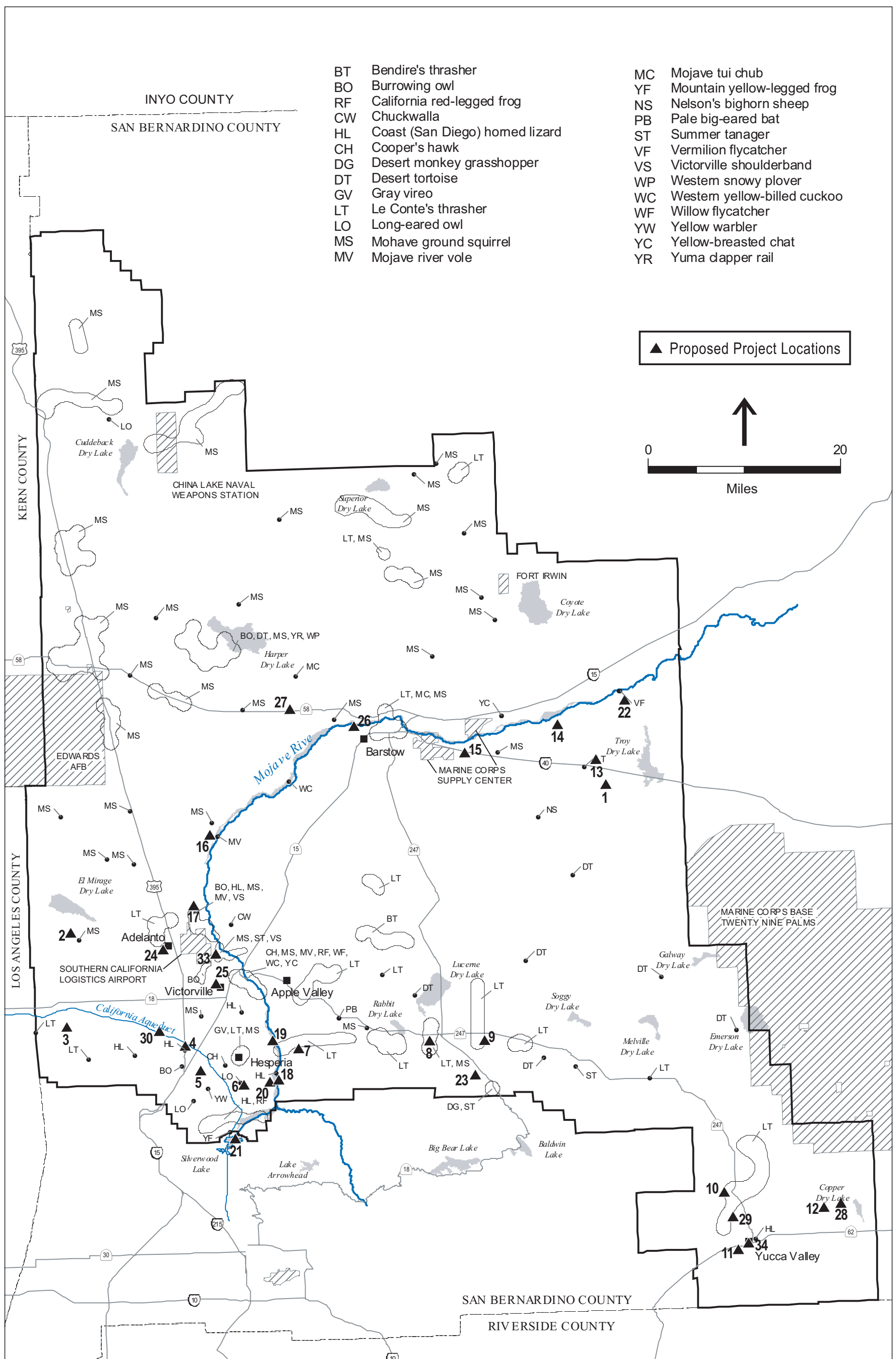


Figure 3.3-3
Approximate Locations of Known Sitings for Special-Status Animals
in the MWA Service Area

southwestern pond turtle) are suppressed by the CNDDDB due to the sensitive nature of their occurrences.

Thirteen of the 41 species are federal- and/or state-listed as threatened and endangered, including the desert tortoise, arroyo toad, California red-legged frog, western snowy plover, western yellow-billed cuckoo, southwestern willow flycatcher, bald eagle, Yuma clapper rail, least Bell's vireo, Mohave ground squirrel, Mojave tui chub, and unarmored threespine stickleback (Appendix D). The bald eagle does not nest in the vicinity of the potentially affected areas; therefore, this species would not be affected by the proposed projects. Although several species of fairy shrimp inhabit the dry lakes in the MWA service area, none are special-status species. The remaining 28 species are federal candidate species for listing as threatened or endangered, or they are designated as federal species of concern or state species of special concern (Appendix D).

Ten species are dependent on conservation of riparian habitat along the Mojave River. These species include the southwestern pond turtle, brown-crested flycatcher, least Bell's vireo, southwestern willow flycatcher, summer tanager, vermilion flycatcher, yellow-breasted chat, yellow warbler, western yellow-billed cuckoo, and Mojave River vole¹⁷.

SENSITIVE HABITATS AND AREAS

Critical Habitats

The USFWS officially designates specific areas as critical habitat for a species when listing it under the ESA. "Critical habitat" is defined as areas essential for the "conservation" of an endangered or threatened species. Two critical habitat areas have been designated within the MWA service area. They are encompassed within the Desert Wilderness Management Areas shown on **Figure 3.3-4** and are described below.

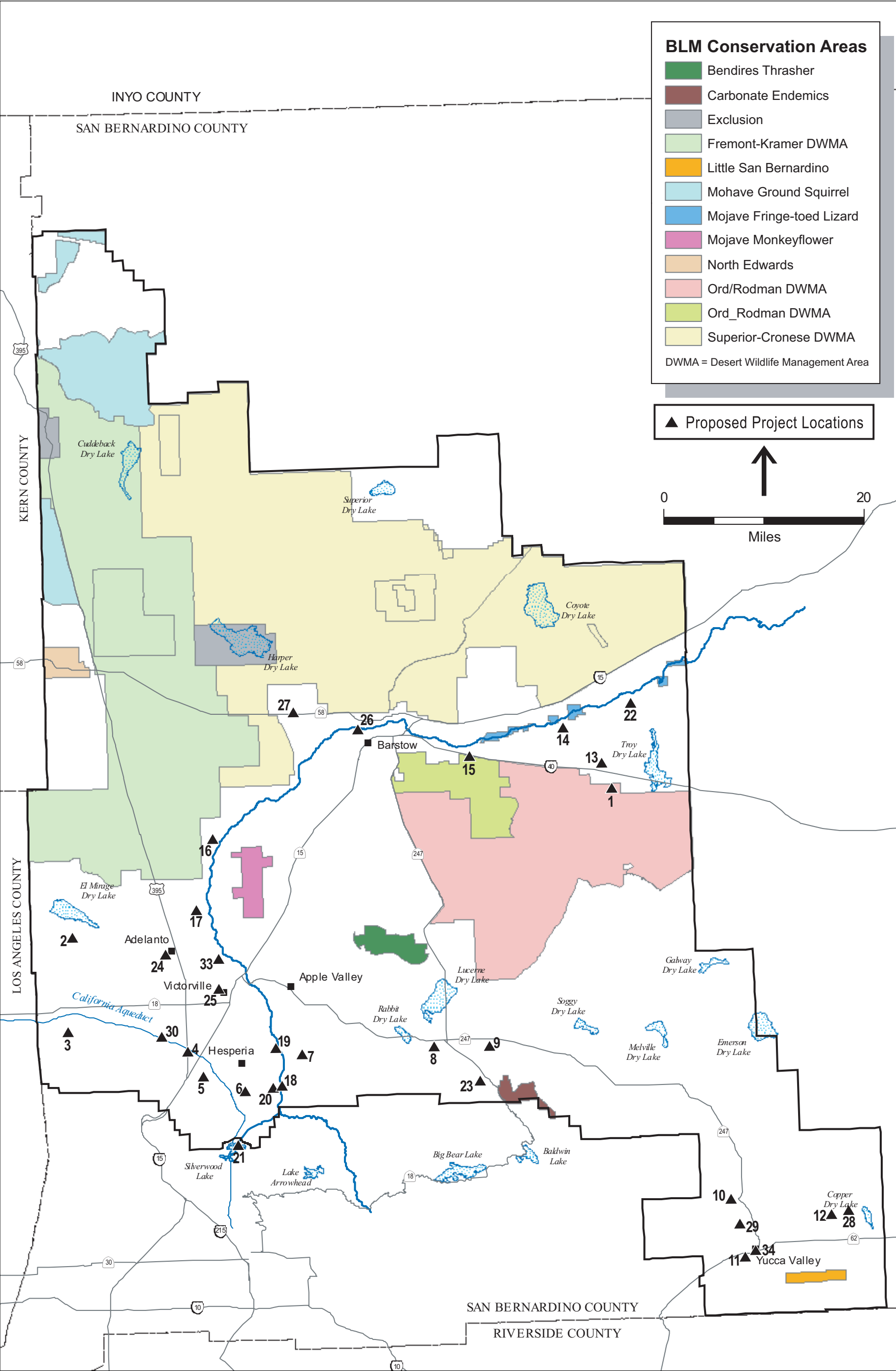
Carbonate endemic plants. Carbonate endemic plants are those whose ranges are restricted to limestone and other surfaces with high carbonate content. Critical habitat for four of the five listed carbonate endemic plant species occurs in the MWA service area. Several areas on the north slope of the San Bernardino Mountains near Lucerne Valley are critical habitat for Cushenbury milkvetch, Cushenbury buckwheat, Cushenbury oxytheca, and Parish's daisy¹⁸.

Desert Tortoise. Critical habitat for the desert tortoise occupies substantial parts of the MWA service area.

The BLM has sponsored a planning effort to locate sensitive habitat areas within the West Mojave Desert and develop conservation mechanisms to protect sensitive habitats and species in the region. The West Mojave Plan is a habitat conservation plan and federal land use plan amendment

¹⁷ Bureau of Land Management (BLM), County of San Bernardino, and City of Barstow, *Draft Environmental Impact Report and Statement for West Mojave Plan – A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*, Bureau of Land Management, California Desert District, Moreno Valley, California, 2003

¹⁸ *Ibid.*



SOURCE: Bureau of Land Management 2004; ESA 2004

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Figure 3.3-4
BLM Conservation Areas in the MWA Service Area

to the California Desert Conservation Area (CDCA) Plan that presents a comprehensive strategy to conserve and protect the desert tortoise, the Mohave ground squirrel (MGS) and nearly 100 other sensitive plants and animals and the natural communities of which they are a part. The plan provides developers of public and private projects with a streamlined program for complying with the requirements of the California and federal ESA. The plan is anticipated to be approved by BLM in 2005. Figure 3.3-4 identifies conservation areas proposed in the West Mojave Plan for sensitive habitats and species.

Sensitive Habitats

Sensitive habitats are rare or threatened areas that provide habitat for sensitive species. Mojave Narrows Regional Park provides habitat for many West Mojave target species, particularly birds. Seventeen sensitive species are found in the park¹⁹.

Camp Cady Wildlife Area is a riparian oasis on the Mojave River, located between Barstow and Afton Canyon. The CDFG manages this site for wildlife protection, and it serves as a refugium for the endangered Mojave tui chub, an endemic fish. The mesquite thickets and riparian forest support a number of declining bird species, including yellow-breasted chat, yellow warbler, summer tanager, and LeConte's thrasher. The site is important for nesting and wintering raptors, including golden eagle (*Aquila chrysaetos*), prairie falcon, and ferruginous hawk (*Buteo regalis*). The western portion of Camp Cady contains sand dunes and hummocks supporting the Mojave fringe-toed lizard (*Uma scoparia*)²⁰.

Afton Canyon contains a sensitive Mojave River riparian community and the scenic canyon in which it is located. Habitat is provided for bighorn sheep and contains nest sites for prairie falcon and golden eagle.

Harper Dry Lake, a unique alkali marsh, is recognized by BLM as a Key Raptor Area. Key Raptor Areas are locations known to be significant habitats for selected species of prey, and Harper Dry Lake is one of seven Key Raptor Areas in the Mojave Desert²¹.

Alkali wetland sites, including seeps, springs, meadows, and playas, are found in the MWA service area. Rabbit Springs is a relatively undisturbed alkali seep known to support many rare species. Other sites include Harper Dry Lake and sites along Helendale Fault.

REGULATIONS

ENDANGERED SPECIES ACT

Under the federal ESA, the Secretary of the Interior and the Secretary of Commerce jointly have the authority to list a species as threatened or endangered (16 United States Code [USC] 1533[c]). Pursuant to the requirements of the ESA, an agency reviewing a proposed project within its

¹⁹ *Ibid.*

²⁰ *Ibid.*

²¹ *Ibid.*

jurisdiction must determine whether any federal-listed threatened or endangered species could be present in the project area and determine whether the proposed project would have a potentially significant impact on such species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under the ESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3], [4]).

The USFWS also publishes a list of candidate species. Species on this list receive “special attention” from federal agencies during environmental review, although they are not protected otherwise under the ESA. The candidate species are species for which the USFWS has sufficient biological information to support a proposal to list as endangered or threatened.

USFWS has completed recovery plans for four species that occur in the MWA service area:

1. Bald Eagle (August 25, 1986). Recovery of the bald eagle was addressed on a regional basis and the Pacific Bald Eagle Recovery Plan presented criteria for downlisting to threatened status, which were achieved in 1994. Many of the eagles wintering at Lake Silverwood, Lake Arrowhead, and Big Bear Lake utilize a night roost at Las Flores Ranch. This property is included in the Summit Valley Habitat Conservation Plan (HCP) that is being prepared by the City of Hesperia.
2. Desert Tortoise (June 28, 1994). Substantial portions of the MWA service area provide habitat.
3. Mojave Tui Chub (September 17, 1984). The fish is maintained at small refugia at China Lake NAWS, Zyzzyx, and Camp Cady. Camp Cady is located within the MWA service area.
4. California Red-Legged Frog (May 28, 2002). The Forks of the Mojave River is a core area for the frog.

Recovery Plans for the Least Bell’s vireo, southwestern willow flycatcher, and carbonate endemic plants have been published in draft format and are awaiting public comment and finalization by the USFWS.

CLEAN WATER ACT (CWA) (SECTION 404)

Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance and sensitivity of wetlands has increased as a result of a growing understanding of their function as recharge areas and filters for water supplies. Following is the federal definition of a wetland.

U.S. Army Corps of Engineers (Corps) Wetland Definition

Wetlands are a subset of “waters of the United States” and receive protection under Section 404 of the CWA. The term “waters of the United States” defined in the Code of Federal Regulations (CFR) (33 CFR 328.3[a]; 40 CFR 230.3[s]) includes:

1. All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide.
2. All interstate waters including interstate wetlands. (Wetlands are defined by the federal government [CFR, Section 328.3(b), 1991] as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.)
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters²²:
 - which are or could be used by interstate or foreign travelers for recreational or other purposes; or
 - from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - that are used or could be used for industrial purposes by industries in interstate commerce.
4. All impoundments of waters otherwise defined as waters of the United States under the definition.
5. Tributaries of waters identified in paragraphs (1) through (4).
6. Territorial seas.
7. Wetlands adjacent to waters identified in paragraphs (1) through (6).
8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding the CWA jurisdiction remains with Environmental Protection Agency (EPA) (328.3[a][8] added 58 FR 45035, Aug. 25, 1993).

Regulated wetlands and other waters of the United States are subject to jurisdiction under Section 404 of the CWA. Wet areas that are not regulated would include stock watering ponds and created water quality treatment facilities.

²² Since the Solid Waste Agency of Northern Cook County (SWANCC) v. Corps decision, waters covered solely by this definition by virtue of their use as habitat by migratory birds are no longer considered "waters of the United States." The Supreme Court's opinion did not specifically address what other connections with interstate commerce might support the assertion of the CWA jurisdiction over "navigable, isolated, intrastate waters" under this definition, and the Corps is recommending case by case consideration. A factor that may be relevant to this consideration includes, but is not limited to, the following: Jurisdiction of isolated, intrastate, and nonnavigable waters may be possible if their use, degradation, or destruction could affect other "waters of the United States," thus establishing a significant nexus between the water in question and other "waters of the United States" (Corps, undated memorandum).

CALIFORNIA DEPARTMENT OF FISH AND GAME

The CDFG administers a number of laws and programs designed to protect fish and wildlife resources. One of the principal laws is the California ESA of 1984 (California ESA - Fish and Game Code Section 2050 et seq.), which regulates the listing and “take” of endangered and threatened species. A “take” of such a species may be permitted by CDFG through issuance of permits pursuant to Fish and Game Code section 2081.

Prior to enactment of the California ESA, the designation of “Fully Protected” was used by CDFG to identify species that had been given special protection by the California Legislature by a series of statutes in the California Fish and Game Code. (See §§ 3503.5, 3505, 3511, 3513, 4700, 4800, 5050, 5515.) Many fully protected species have also been listed as threatened or endangered species under the more recent endangered species laws and regulations; however, the original statutes have not been repealed, and the legal protection that is given to the species identified within them remains in place. Fully protected species may not be taken or possessed at any time; and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock. Because endangered or threatened species can be “taken” for development purposes with the issuance of a permit by CDFG, “fully protected species” actually enjoy a greater level of legal protection than “listed” species.

CDFG maintains lists for candidate-endangered species and candidate-threatened species. California candidate species are afforded the same level of protection as listed species. California also designates species of special concern, which are species of limited distribution, declining populations, diminishing habitat, or unusual scientific, recreational, or educational value. These species do not have the same legal protection as listed species or fully protected species, but may be added to official lists in the future. The “species of special concern” list is intended by CDFG as a management tool for consideration in future land use decisions.

The state’s authority in regulating activities in “waters of the U.S.” resides primarily with the CDFG and the SWRCB. CDFG provides comments on Corps permit actions under the Fish and Wildlife Coordination Act. CDFG is also authorized under the California Fish and Game Code Sections 1600–1607 to develop mitigation measures and enter into Streambed Alteration Agreements with applicants who propose projects that would obstruct the flow of, or alter the bed, channel, or bank of a river or stream in which there is a fish or wildlife resource, including intermittent and ephemeral streams. The SWRCB, acting through the RWQCB, must certify that a Corps permit action meets state water quality objectives (Section 401, CWA).

In addition to these laws and programs, the California Fish and Game Code includes several additional provisions specifically protecting raptors and egrets. [Section 3503.5 prohibits the taking, possession, or destruction of any birds in the orders Falconiformes or Strigiformes (birds-of-prey), or their nests or eggs.] Section 3505 prohibits the taking of any egret and several other species.

CEQA GUIDELINES SECTION 15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA *Guidelines* Section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in the federal ESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in the guidelines primarily to address situations in which a public agency is reviewing a project that could have a significant effect on, for example, a “candidate species” that has not yet been listed by either the USFWS or CDFG.

OTHER STATUTES, CODES, AND POLICIES AFFORDING LIMITED SPECIES PROTECTION

The federal Migratory Bird Treaty Act (16 USC, Sec. 703, Supp. I, 1989) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. [Birds of Prey are protected in California under the State Fish and Game Code, (Section 3503.5, 1992). Section 3503.5 states that it is “unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.”] Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered “taking” by the CDFG.

The federal Bald Eagle Protection Act prohibits persons within the United States (or places subject to U.S. jurisdiction) from “possessing, selling, purchasing, offering to sell, transporting, exporting or importing any bald eagle or any golden eagle, alive or dead, or any part, nest, or egg thereof.”

Vascular plants listed as rare or endangered by the CNPS²³, but which have no designated status or protection under federal or state endangered species legislation, are defined as follows:

- List 1A** Plants Believed Extinct.
- List 1B** Plants Rare, Threatened, or Endangered in California and elsewhere.
- List 2** Plants Rare, Threatened, or Endangered in California, but more numerous elsewhere.
- List 3** Plants About Which We Need More Information – A Review List.
- List 4** Plants of Limited Distribution – A Watch List.

In general, plants appearing on CNPS List 1B and List 2 are considered to meet CEQA’s Section 15380 criteria and effects to these species would be considered “significant” in this EIR.

²³ Skinner and Pavlik, 1995.

LOCAL REGULATIONS

San Bernardino County, Towns of Apple Valley and Yucca Valley, and Cities of Adelanto, Barstow, Hesperia, and Victorville have established general plan goals and policies to provide for the conservation and management of vegetation and wildlife resources that could pertain to the RWMP projects. In addition, a San Bernardino County Code has been established to protect Joshua trees (Title 8 Section 89.0401 et seq).

Adjudicated Area of the Mojave River Basin

The Riverside County Superior Court Judgment After Trial of January 10, 1996²⁴ (the Judgment) ordered certain parties in the litigation to undertake certain actions. The Judgment requires the Watermaster to establish a Biological Resources Trust Fund for the benefit of the riparian habitat areas and species identified in the Judgment. The Judgment also refers to a Habitat Water Supply Management Plan (Conservation Plan) to be prepared by the CDFG for the benefit of these riparian habitat areas and species identified in the Judgment. These riparian habitat areas and species are listed in Exhibit H of the Judgment. The Conservation Plan was released in June 2004. The species listed in Table H-1 of the Judgment are summarized in **Table 3.3-1**. Figure 3.3-1 shows the reaches of the Mojave River where the species were located in 1986-1990.

The Judgment limits the Habitat Water Supply Management Plan to the phreatophytic environment of the Mojave River floodplain. Phreatophytic vegetation is composed of riverine and seep-dependant plants whose roots can reach stream water or a shallow water table and which support a dense and highly diverse wildlife community. The areas to be covered in the Plan are shown in Exhibit H, Figure H-1, pages 1 through 5. Figure 3.3-1 identifies the riparian protection zones identified in Exhibit H. This environment (some locales are degraded from the 1986 condition) includes shallow pools and year-round flowing streams, cottonwood, willow, and mesquite forests, and an understory of willow, rushes, grasses, and reeds. Exhibit H identifies two reaches of riparian corridor as valued habitats to be protected under the terms of the Judgment. The southwestern reach is a 23-mile corridor running continuously from slightly south of Spring Valley Lakes in Victorville to a location 2.5 miles northeast of the Silver Lakes development. The eastern 4-mile reach consists of the Camp Cady Wildlife Management Area in Newberry Springs, located 15 miles northeast of Barstow. Only these two reaches of the Mojave River are designated in the Judgment. These reaches were selected because they existed in reasonable condition in the 1986 to 1990 time frame when water rights were being quantified under the Judgment. By the time the stipulating parties went before the Court in 1995, water loss-related degradation had begun at some locations. The final selection of areas to be included was based upon the 1986 - 1990 existence and the possibility of restoring the habitat losses of recent years. Omitted are areas where losses had occurred many years prior to the 1986.

²⁴ City of Barstow et al v. City of Adelanto, Riverside County Superior Court. Case No. 208568.

TABLE 3.3-1
SPECIES IDENTIFIED IN THE 1996 JUDGMENT

Subarea	Alto			Centro		Baja		
Species	Forks Dam to Upper Narrows	Upper Narrows to Lower Narrows	Lower Narrows to Helendale	Helendale to Hodge	Hodge to Barstow	Barstow to Harvard Road	Harvard Road to Mannix Wash	Afton Canyon
Purple monkeyflower	X							
Mojave monkeyflower	X		X	X	X	X		
Mojave tarplant	X							
Desert cymopterus	X							
Barstow woolly sunflower					X	X		
Victorville shoulderband	X	X						
Mojave tui chub							X	
California red-legged frog	X	X	X	X				
Southwestern pond turtle	X		X	X		X	X	X
Desert tortoise	X		X	X	X	X		
San Diego horned lizard	X							
Cooper's hawk	X	X						
Ferruginous hawk	X	X						
Swainson's hawk	X	X						
Bald eagle	X	X						
Merlin	X	X						
Prairie falcon	X	X	X	X	X	X		
Western yellow-billed cuckoo	X			X	X			
Southwestern willow flycatcher	X							
Brown-crested flycatcher		X						
Vermilion flycatcher	X					X	X	X
Le Conte's thrasher	X							
Least Bell's vireo	X							X
Yellow warbler	X							
Yellow-breasted chat	X	X			X	X		
Summer Tanager	X	X						X
Pale big-eared bat	X		X	X				
Mohave ground squirrel	X		X	X				
Mojave vole					X	X		X
Nelson's bighorn sheep								

Source: 1996 Stipulated Judgment.

IMPACT ASSESSMENT MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

Standards for determining thresholds of significance were based on Section 15065 and Appendix G of the CEQA *Guidelines*, as well as best professional judgment. Impacts on vegetation and wildlife were considered significant if the project component would result in the following:

- 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, BLM, or USFWS;
- Have a substantial adverse impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the CDFG, BLM, or USFWS;
- Have a substantial adverse effect on federal protected wetlands as defined by Section 404 of the CWA 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 native wildlife corridors, or impede the use of wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- Substantially reduce the habitat of a fish and wildlife species;
- Cause a fish or wildlife population to drop below self-sustaining levels;
- Threaten to eliminate a plant or animal community; or
- Reduce the number or restrict the range of an endangered, rare or threatened species.

CEQA Section 15380 provides that a plant or animal species may be treated as “rare or endangered” even if not on one of the official lists if, for example, it is likely to become endangered in the foreseeable future. As species of plants and animals become restricted in range and limited in population numbers, species may become listed or candidates for listing as endangered or threatened and become recognized under CEQA as a significant resource. Examples of such species are vernal pool fairy shrimp (listed by USFWS) and burrowing owl (California Species of Special Concern).

METHODOLOGY

Impacts on biological resources were identified and characterized by examining the:

- Types of resources with the potential to occur at sites that may be affected by the project component;
- Types of activities or changes likely to occur at each site;

- Probable mechanisms of interaction between the resources and the activities;
- Probable quantity or degree of changes in resources resulting from the activities; and
- The likely duration of changes in resource conditions.

Impacts would apply to each separate component project: recharge basins, pipelines, injection wells, and extraction wells. In addition, impacts are described for each management action: reclamation, wellhead treatment, water treatment plant, water transfers/banking, riparian health, and conservation.

Impact 3.3-1: Construction of projects identified in the 2004 RWMP could result in the direct loss of sensitive biological communities throughout the MWA service area.

Sensitive habitats potentially occurring in the region include the following:

- desert riparian;
- desert wash;
- fresh emergent wetland;
- Joshua tree;
- lacustrine;
- Alkali desert scrub;
- riverine; and
- valley foothill riparian.

Project activities, such as construction of recharge basins, pipelines, wells, and treatment plants could eliminate sensitive biological communities. These plant communities are rare locally and regionally and contain sensitive biological communities. **Table 3.3-2** identifies potential habitat types near proposed projects.

**Table 3.3-2
Habitat Types Potentially Affected Within Each Subarea**

Sub Area	Habitat Types	Projects
Alto: (Alto Regional Aquifer-West, Alto Regional Aquifer-East, Alto Mid Regional Aquifer, Alto Floodplain Aquifer)	Alkali Desert Scrub, Chamise Redshank Chaparral, Cropland, Desert Scrub, Desert Riparian, Lacustrine, Mixed Chaparral, Riverine, Sagebrush, Valley Foothill Riparian, Urban	4,5,6,7,18,19,20,21,25,30
Transition Zone Floodplain Aquifer	Alkali Desert Scrub, Desert Riparian, Urban	16,17,24,33
Baja: (Baja Regional Aquifer, Baja Floodplain Aquifer)	Alkali Desert Scrub, Cropland, Desert Riparian, Desert Scrub, Desert Wash, Joshua Tree, Riverine,	1,13,14,15,22
Centro Floodplain Aquifer	Alkali Desert Scrub, Desert Scrub, Cropland, Urban	26,27
Este Regional Aquifer	Alkali Desert Scrub, Cropland, Desert Scrub, Joshua Tree, Juniper, Pinyon- Juniper	8,9,23
Oeste Regional Aquifer	Alkali Desert Scrub, Cropland, Desert Scrub, Mixed Chaparral, Pinyon- Juniper, Urban	2,3
Morongo Basin/Johnson Valley: (Copper Mountain, Johnson Valley, Lucerne Valley, Means/Ames Valley, Warren Valley)	Alkali Desert Scrub, Desert Riparian, Desert Scrub, Desert Wash, Joshua Tree, Mixed Chaparral, Pinyon-Juniper, Urban	10,11,12,28,29,34

Source: UCSB GAP Analysis, 1998.

Impacts to habitats would differ for each project depending on the location and the flexibility to modify locations to avoid impacting sensitive species. Subsequent review for each project would determine the significance and mitigation strategy appropriate for each project. In general, the following mitigation strategy would ensure that impacts to sensitive habitats would be less than significant.

Mitigation Measures

M3.3-1 **Implementing agencies shall implement a mitigation strategy first to identify sensitive habitats in the project area and then to avoid impacts if possible. If avoidance is not possible, MWA shall minimize the impact and compensate in accordance with permitting requirements. The mitigation strategy is summarized below:**

Determine if Sensitive Habitats are Present. The implementing agency would retain a qualified botanist to conduct a detailed survey of habitat types present at each project site. The botanist would determine if sensitive habitats are present and delineate their extent on a map of the project area. If sensitive habitats are present, the implementing agency would attempt to avoid the impact as described below. If avoidance is not possible, then measures to minimize and compensate for loss would be implemented.

Avoid Loss of Sensitive Habitats. The implementing agency would avoid disturbing sensitive habitats if possible. Because desert wash and desert riparian typically occur over small localized areas, they could likely be avoided during project siting and design. Sensitive areas would be fenced and signs posted to restrict access during construction and, if necessary during project operation. If avoidance is not feasible, then measures to minimize and compensate for loss would be implemented.

Minimize Loss of Sensitive Habitats. The implementing agency would limit construction activities in and around sensitive habitats to the minimum area necessary. Construction zones would be clearly delineated and marked on the ground to avoid inadvertent unnecessary encroachment. Construction activities would be monitored by a biologist to ensure that impacts to sensitive areas are minimized. In addition, measures to compensate for loss of sensitive habitats would be implemented.

Compensate for Unavoidable Loss of Sensitive Habitats. If impacts to sensitive habitats could not be avoided, the implementing agency would compensate for the unavoidable loss of sensitive habitats. Compensation would involve either purchasing property with similar habitat and providing for its protection and management for wildlife value in perpetuity, or enhancing habitat values of existing conservation areas. Detailed restoration plans would be developed before project implementation for each sensitive community to be

replaced and would fully compensate for unavoidable losses. The long-term objective of the plans would be to ensure no net loss of sensitive habitats and that sensitive habitats are replaced in-kind. If the implementing agency replaces sensitive habitats that are lost or disturbed, a suggested compensation ratio from 1:1 to 3:1 is often recommended by the CDFG and/or USFWS, depending on the success expected in creating a particular habitat. However, the ratio may be increased by a resource agency depending if threatened or endangered species are being mitigated (see Impacts 3.3-3 and 3.3-5 below).

Compensation could be accomplished through conservation area management mechanisms established by the West Mojave Plan or by other means. Restoration sites would be established that would support the hydrologic, topographic, and other physical features necessary to support the affected habitats and associated species. Restoration and monitoring would be accomplished by qualified professionals with experience in arid lands, wetland restoration, and wildlife habitat needs. Performance standards for evaluating the success of restoration efforts would be determined in consultation with the resource agencies that have jurisdiction over the resources being restored. These resource agencies would include the Corps, CDFG, and USFWS. Minimum performance standards for vegetative cover, species diversity, and plant vigor would be determined; generally, restoration efforts are designed so that performance standards are met five years after project construction activities are complete.

Significance After Mitigation

Less than significant.

Impact 3.3-2: Construction could result in the potential loss of common habitats.

Construction of projects could result in the loss of common habitats and associated biological communities from facility construction. Common habitats include desert scrub, agricultural lands, barren areas, and tamarisk scrub. This impact is considered less than significant because these habitats are common and do not support sensitive species.

Mitigation Measures

None Required.

Significance After Mitigation

Less than significant.

Impact 3.3-3: Projects could result in the loss of special-status plant species.

A project could eliminate special-status plant species. Direct impacts could occur from basin and facility construction, flooding, vehicle traffic, foot traffic, and the placement of construction materials on special-status plant populations. The loss of special-status plant species is considered a significant impact. In general, the following mitigation strategy would ensure that impacts to special status plant species would be less than significant.

Mitigation Measures

M3.3-2 The implementing agency shall implement a mitigation strategy first to identify sensitive plants within the project area and then to avoid impacts if possible. If avoidance is not possible, the implementing agency shall minimize the impact and compensate in accordance with permitting requirements. This mitigation strategy is summarized below.

Conduct Site-Specific Special-Status Plant Species Surveys and Avoid Known Populations. Surveys for special-status plant species are necessary to determine their status in the appropriate habitats at the project sites. Habitat types present at the sites would be identified and the potential for special-status plant species determined. The implementing agency would conduct surveys during the period of identification for each species potentially present, usually late winter or spring (Appendix D). If special status plant species are found, the following mitigation measures, listed in order of preference, would be implemented.

Avoid Loss of Special-Status Plant Species. The implementing agency would avoid special-status plants during project implementation if possible. During project siting efforts, alternative locations or project configurations would be evaluated. As determined by a qualified botanist, populations would be fenced and signs posted to restrict activities in the area. Certain plants may be moved from the construction area and replanted in protected areas. If plants are moved, long term monitoring would be necessary to ensure survival. Plans to move sensitive plants would require approval from the appropriate resource management agency such as CDFG or USFWS. Implementation of this mitigation measure would reduce the impact to less than significant. However, if the loss of special-status plant species is unavoidable, the following measure would be implemented.

Minimize Loss of Special-Status Plant Species. The implementing agency would limit construction activities in and around special-status plant communities to the minimum area necessary so that sufficient populations remain that are self-sustaining and viable. The remaining populations should be protected and avoided. Populations would be delineated on project area maps and marked on the ground. Construction activities would be monitored by a qualified biologist to ensure that sensitive areas are avoided.

Compensate for Unavoidable Loss. Replacement of special-status plant communities would provide amounts of habitat values to plants equivalent to those present before project implementation. Replacement could involve either purchasing property with known populations of the threatened plant and providing protection and management for habitat value in perpetuity or enhancement. Enhancement could include replanting the species from the impacted seed stock. Detailed restoration plans would be developed before project implementation for each special-status plant community to be replaced and would fully compensate for unavoidable losses. The plans would be approved by CDFG or USFWS as appropriate. The long-term objective of the plans would be to ensure no net loss of special-status plant species and that the communities are replaced in-kind at a minimum ratio as described above. Mitigation for unavoidable losses would be determined in consultation with the resource agencies.

Restoration or creation sites would be chosen that would support the hydrologic, topographic, and other physical features that are specified in a detailed compensation plan that would be required to implement this measure. Preferably, restoration or creation sites should be near the area of habitat loss.

The restoration and monitoring plan would be prepared by a qualified botanist with experience in arid lands and wetland restoration. Minimum performance standards for vegetative cover, species diversity, and plant vigor that should be present five years after project construction activities have been completed would be included in the monitoring plan so that successful restoration is defined.

Significance After Mitigation

Less than significant.

Impact 3.3-4: Construction of projects could result in impacts to federal or state listed wildlife species. Impacts could include habitat loss, disturbance, or direct mortality.

Implementing a project could eliminate potential habitat for the desert tortoise and the Mohave ground squirrel. Both of these species are listed as “umbrella species”²⁵ in the West Mojave Plan²⁶. A project could disturb areas used for breeding, cover, or other activities or cause direct mortality of individual animals. Impacts to listed species, including loss of habitat, would be considered significant. The desert tortoise is a federal and state listed threatened species; the

²⁵ “Umbrella species” is a term used to describe protection of many other species under the “umbrella” of conservation for important wide-ranging species. The desert tortoise and Mohave ground squirrel habitat are used to preserve diverse and unique elements of the western Mojave Desert flora. These include Mojave monkeyflower, Barstow woolly sunflower, desert cymopterus, and Lane Mountain milkvetch.

²⁶ Bureau of Land Management (BLM), County of San Bernardino, and City of Barstow, *Draft Environmental Impact Report and Statement for West Mojave Plan – A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*, Bureau of Land Management, California Desert District, Moreno Valley, California, 2003

Mohave ground squirrel is a state threatened species. In general, implementing agencies would reduce the level of significance of this impact by utilizing the following mitigation strategy.

Mitigation Measures

M3.3-3 The implementing agency shall survey affected areas for listed species and attempt to avoid impacts to listed species if possible. If avoidance is not possible, then compensation through the permitting requirements in the Endangered Species Act would be required. This mitigation strategy is summarized below:

Conduct Pre-Construction Surveys. The implementing agency would conduct pre-construction biological surveys of prospective construction areas to determine the potential for encountering state or federal listed species. Potentially impacted protected species may include the desert tortoise, the arroyo toad, California red-legged frog, Swainson's hawk, western yellow-billed cuckoo, least Bell's vireo, and Mohave ground squirrel. If the surveys conclude that a listed species could use the site for nesting or foraging, the following mitigation measures would apply.

If these species are not found in the affected area, then no additional mitigation measures would be required. If one or more of these species are present in the affected area, then the implementing agency would implement the following measures.

Select Project Location to Avoid Affecting Wildlife Species. The implementing agency would avoid constructing facilities where these species occur. The implementing agency would contact USFWS and CDFG to determine the location and width of the buffer zone, if one is needed. If these species or their habitats cannot be avoided during construction, then the implementing agency would implement the following measure.

Develop and Implement a Mitigation Plan That Complies with Federal and State ESA. The implementing agency would develop and implement a mitigation plan for each species or groups of species with similar habitat requirements. For species that are federally listed or proposed for listing as threatened or endangered, the implementing agencies must comply with permitting requirements of the federal ESA. If no federal agency is involved with the project, the implementing agency would initiate consultation pursuant to Section 10(a) of the federal ESA, and prepare a HCP. The HCP would include measures that would minimize impacts to threatened or endangered species and measures for replacing habitat for these species.

For species that are state listed as threatened or endangered, the implementing agency would consult with CDFG. The implementing agency would negotiate

with CDFG to compensate for the loss of habitat and possible take of a state-listed species. This would require CDFG and the implementing agency to enter into a California Fish and Game Code 2081 management agreement.

Comply with the Desert Tortoise (Mojave Population) Recovery Plan. For areas where desert tortoise may be encountered, the implementing agency would comply with procedures prepared by USFWS to protect the desert tortoise (USFWS, 1994). This would include providing a habitat conservation plan to compensate for disturbance in compliance with Section 10(a)(1)(B) of the federal ESA. The implementing agency would perform the tasks described below.

The implementing agency would retain a qualified biologist to conduct preconstruction clearance surveys for desert tortoises and tortoise signs over the entire affected area and the zone of influence adjacent to the affected area (proposed groundwater recharge basins and associated staging areas). The purpose of the survey would be to locate and remove tortoises from the affected area to avoid or minimize death or injury of desert tortoises that could be caused by project implementation. A clearance survey would require 100 percent coverage of the affected area, and would focus on locating all desert tortoises above and below ground. This survey would be conducted immediately before surface disturbance of the affected area. Burrows occupied by tortoises would be hand-excavated by “authorized biologists.”²⁷ Tortoises found during clearance surveys would be relocated to appropriate habitat locations to be determined by the USFWS and CDFG. Specific methods of relocating tortoises would be determined by the USFWS and CDFG.

The implementing agency would fence the recharge basins and canals in the areas of suitable tortoise habitat to prevent desert tortoises from entering the basins. The implementing agency would contact CDFG and USFWS to determine the appropriate type of fencing to exclude tortoises from the recharge basin areas. The implementing agency would also comply with additional measures required during Section 10(a) consultation with USFWS and consultation with CDFG.

Significance After Mitigation

Less than significant.

Impact 3.3-5: Construction of projects could result in direct or indirect loss of wildlife species designated as candidates for federal listing as threatened or endangered or designated as state species of special concern.

²⁷ An “authorized biologist” is defined as a wildlife biologist who has been authorized to handle desert tortoises by the USFWS and CDFG for the project.

Implementing the projects could eliminate potential habitat for or cause substantial loss of individual animals including the following:

- Burrowing Owl
- Bendire's Thrasher
- Prairie Falcon
- Yellow-Breasted Chat
- Gray-Headed Junco
- Brown-Crested Flycatcher
- Ferruginous Hawk
- Le Conte's Thrasher
- Pallid Bat
- Townsend's Big-Eared Bat
- Merlin
- Cooper's Hawk
- Long-Eared Owl
- Yellow Warbler
- Summer Tanager
- Vermilion Flycatcher
- Gray Vireo
- Southwestern Pond Turtle
- San Diego Horned Lizard
- Two-Striped Garter Snake
- Mojave River Vole

This impact is considered significant because these species are sensitive species of concern. The mitigation strategy would be to minimize the potential for mortality of these species. This would be accomplished by conducting pre-construction surveys and by avoiding nesting season.

Mitigation Measure

M3.3-4 **The Implementing agency shall consult with California Department of Fish and Game(CDFG) and the US Fish and Wildlife Service (USFWS) to implement a mitigation strategy first to identify sensitive species within the project area and then to avoid impacts if possible. If avoidance is not possible, the implementing agency shall minimize the impact and compensate in accordance with permitting requirements. This mitigation strategy is summarized below:**

Conduct Preconstruction Surveys. Before construction of any facilities, the implementing agency would conduct surveys in the affected area to determine whether these species are occupying the site. If no such species occur in the affected area, no additional mitigation measures are required. If any of these species is present, the implementing agency would consult with CDFG.

Consult with CDFG and Implement Recommendations. The implementing agency should consult with CDFG to determine the appropriate measures for mitigating the loss of habitat for each species, if necessary, and relocating or preventing each species from entering the project site before project construction.

Conduct Nesting Surveys before Construction. Preconstruction surveys should be conducted during the peak of the breeding season (March 15-June 15). If sensitive species are not nesting in the affected area, then no additional mitigation is required. If they are nesting in the affected area, the implementing

agency would conduct pre-construction surveys. Implementation of the following mitigation measure would reduce this impact to less than significant.

Avoid Construction during the Nesting Season. The implementing agency would avoid nesting failure by constructing the project elements during the nonbreeding season (August 15-March 15).

Significance After Mitigation

Less than significant.

Impact 3.3-6: Construction and operation of projects could disturb nesting raptors.

Noise or direct activities from the construction of recharge basin facilities could disturb nesting raptors (e.g., Swainson's hawk, red-tailed hawk, and great horned owl), which are protected by the federal Migratory Bird Act. This impact is considered significant. In general, the following mitigation strategy would ensure that impacts to raptors would be less than significant.

Mitigation Measure

M3.3-5 The implementing agency shall conduct pre-construction surveys to identify nesting raptors within the project area. If nesting raptors are identified, construction activities will be timed to avoid impacting the nest. This strategy is summarized below.

Conduct Preconstruction Surveys for Nesting Raptors. The implementing agency would commission preconstruction surveys for active raptor nests from March to June. The surveys would be conducted prior to construction.

Construction Timing Restrictions. If active nests are found, the implementing agency would maintain a buffer zone (possibly 300 feet in radius) around raptor nests while they are occupied or postpone construction activities until after raptor breeding season (August 15-January 15).

Significance After Mitigation

Less than significant.

Impact 3.3-7: Elevated groundwater levels could enhance riparian habitats and wetland vegetation.

Riparian vegetation in the MWA service area is currently in a state of decline due to groundwater overdraft conditions. Recovery of groundwater levels could reverse these declines and could result in an increase in the extent of riparian habitat beyond that currently required by performance standards in the stipulated judgment and the CDFG mitigation fund. Similar effects

could occur to wetland and riparian vegetation near springs in the MWA service area, such as at Rabbit Springs. This impact is considered beneficial.

Mitigation Measure

None Required.

Significance After Mitigation

Beneficial.

Impact 3.3-8: Enhancement of Mojave River flows could enhance fish resources.

Implementation of the project could benefit fisheries including the Mojave tui chub, if continued groundwater overdraft is avoided. Improved groundwater levels could cause surface flows to increase in duration and magnitude in the Camp Cady, Afton Canyon, and Mojave Narrows areas, which are potential tui chub recovery sites. The degree to which recovery efforts would benefit would depend on the amount that groundwater overdrafting is reduced and surface water flows are improved.

Increased duration and magnitude of SWP releases into the Mojave River could support aquatic habitat in certain reaches. However, increases in fish abundance would be unlikely, since diversions would not occur on a continuous basis. SWP diversions could slightly benefit Mojave tui chub recovery by increasing groundwater levels in potential recovery areas, such as the Mojave Narrows region. Increases in groundwater levels could provide more stable and secure surface flows. This impact is considered potentially beneficial.

Mitigation Measure

None Required.

Significance After Mitigation

Beneficial.

3.4 LAND USE

REGIONAL SETTING

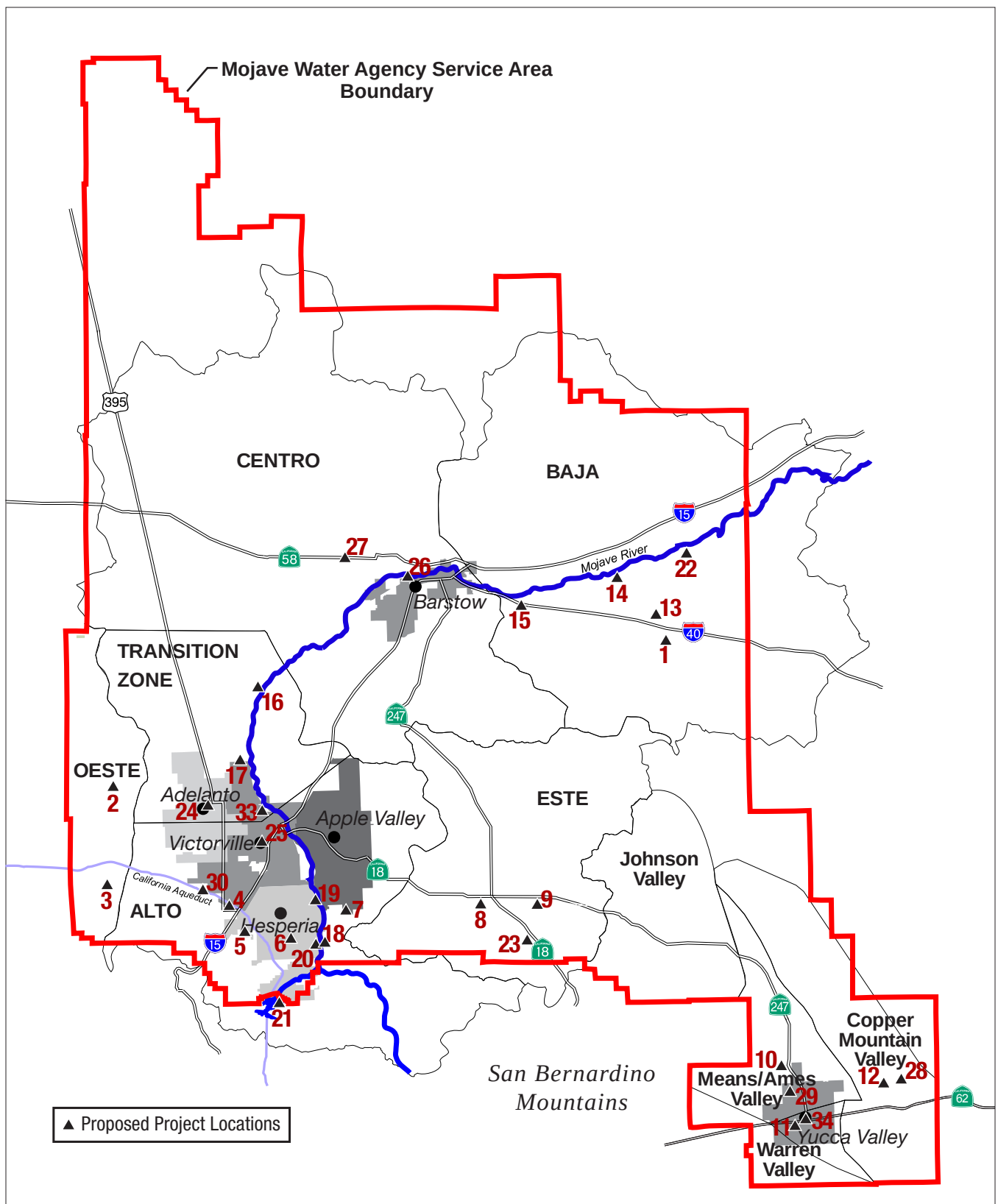
The MWA service area is located in the western portion of San Bernardino County in the Desert Region, as designated in the San Bernardino County General Plan. Since 1975, the Desert Region has been experiencing rapid growth rates and development. Population forecasts predict an increase in total population of the county of over 50 percent from 2000-2020 (Southern California Association of Governments (SCAG), 2004). The MWA service area includes the incorporated cities of Victorville, Adelanto, Hesperia, and Barstow, and the towns of Apple Valley and Yucca Valley. The locations of these municipalities are shown in **Figure 3.4-1**. **Figures 3.4-2 through 3.4-4** provide an overview of General Plan land use designations for these municipalities, as well as the County of San Bernardino.

The San Bernardino County General Plan identifies the Victor Valley subregion as one of the fastest growing areas in San Bernardino County. This area includes the cities of Victorville, Hesperia, Adelanto, and the town of Apple Valley, which are all located in close proximity to one another. The fastest growing cities in this area are currently Adelanto and Victorville, which had approximately 9 percent and 6.7 percent growth, respectively, in the year 2003 (California Department of Finance, 2004). Land in the vicinity of these cities has steadily been converted to more urban uses to accommodate the population growth experienced in these cities.

The Barstow subregion includes the City of Barstow and surrounding unincorporated communities. Most of the future growth in the Barstow Subregional Planning Area is anticipated to occur within the incorporated City of Barstow and adjacent unincorporated communities. The main constraint to development in this area is identified as the threat of shortage of potable water. Growth for the City of Barstow in the year 2003 was 0.2 percent.

The Morongo Basin subregion includes the unincorporated communities of Johnson Valley, Pioneer Town, Landers, and Joshua Tree and the incorporated Town of Yucca Valley. Development within this subregion is concentrated in the Town of Yucca Valley and the City of Twentynine Palms (which is outside of the MWA service area). Development within the Baker subregion, which overlaps in the northeast portion of the MWA planning area, is anticipated to have limited growth.

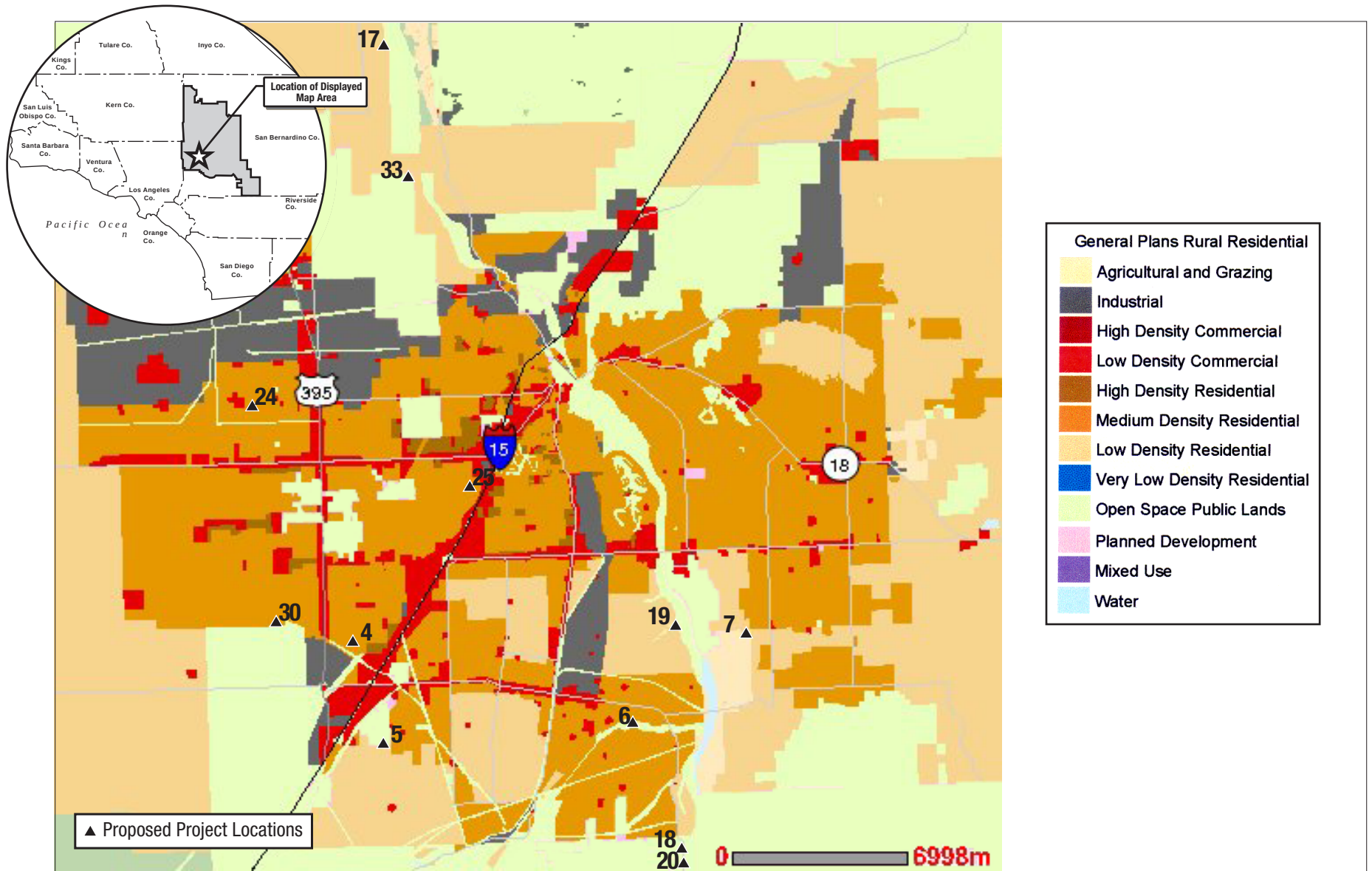
Besides suburban and residential development, the region also supports recreational and agricultural uses and contains a number of energy generation plants and other large utility pipelines. The region contains a number of state and regional parks including portions of the San Bernardino National Forest, Joshua Tree National Park, and El Mirage and Johnson Valley Off Highway Vehicle Area. More information on Recreation Resources is provided in Section 3.6. Agricultural uses in the region occur primarily in the unincorporated areas east of Barstow and in the vicinity of Lucerne Valley, with additional scattered uses along the Mojave River north of



SOURCE: Environmental Science Associates, 2003

MWA RWMP / 203148 ■

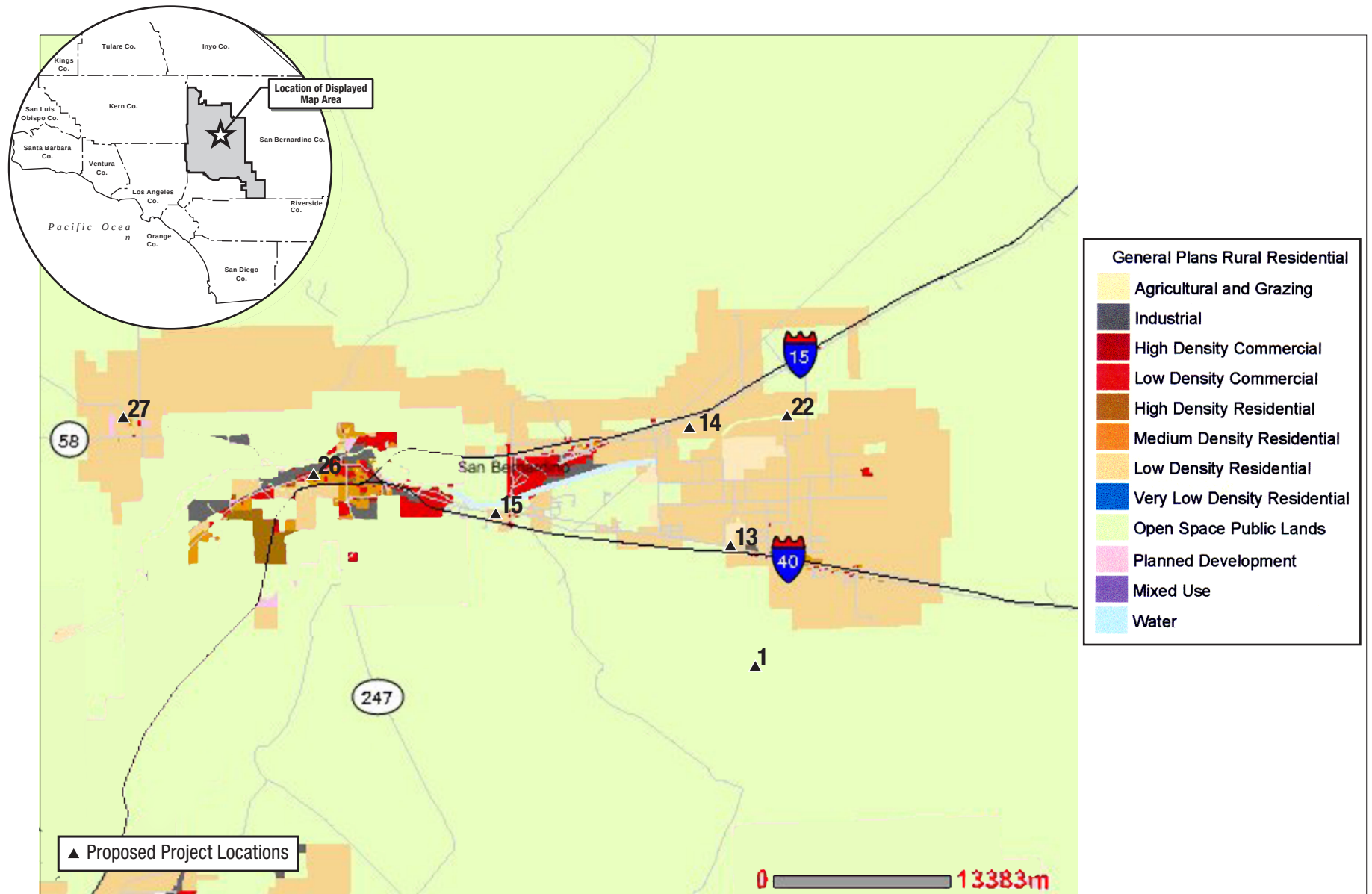
Figure 3.4-1
Location of City Boundaries



SOURCE: California Digital Conservation Atlas, 2004

MWA RWMP / 203148 ■

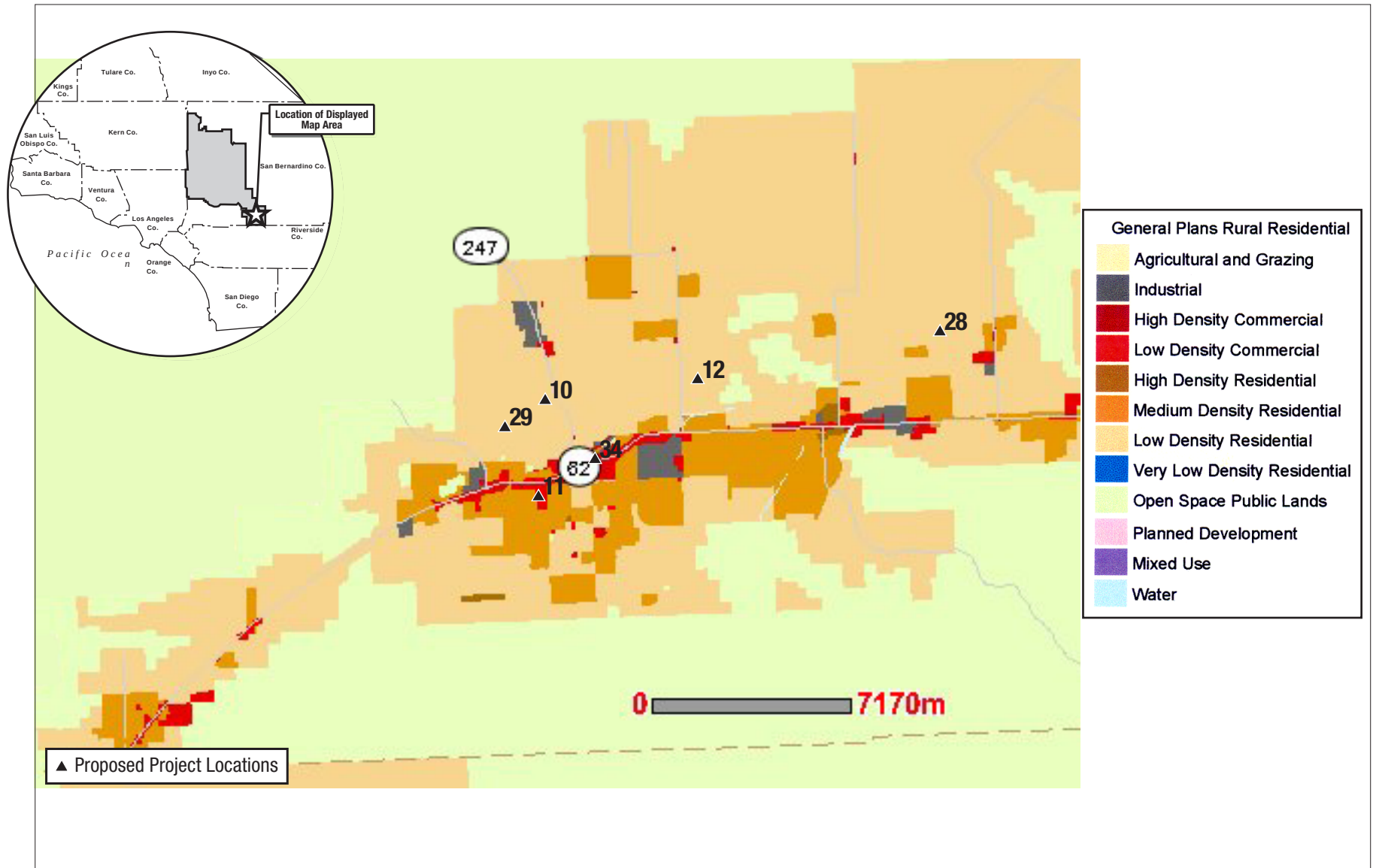
Figure 3.4-2
Victorville Area General Plan Land Uses



SOURCE: California Digital Conservation Atlas, 2004

MWA RWMP / 203148 ■

Figure 3.4-3
Barstow Area General Plan Land Uses



SOURCE: California Digital Conservation Atlas, 2004

MWA RWMP / 203148 ■

Figure 3.4-4
Yucca Valley Area General Plan Land Uses

Victorville.¹ Wind and solar energy generating plants also dot the region and electric transmission lines, water, crude oil and natural gas pipelines crisscross the region.

AGRICULTURAL RESOURCES

In 1982, the State of California created the Farmland Mapping and Monitoring Program (FMMP) within the California Department of Conservation to produce agricultural resource maps based on soil quality and land use. The FMMP categorizes agricultural resources into several distinct categories. These categories, which are based on soil surveys², include:

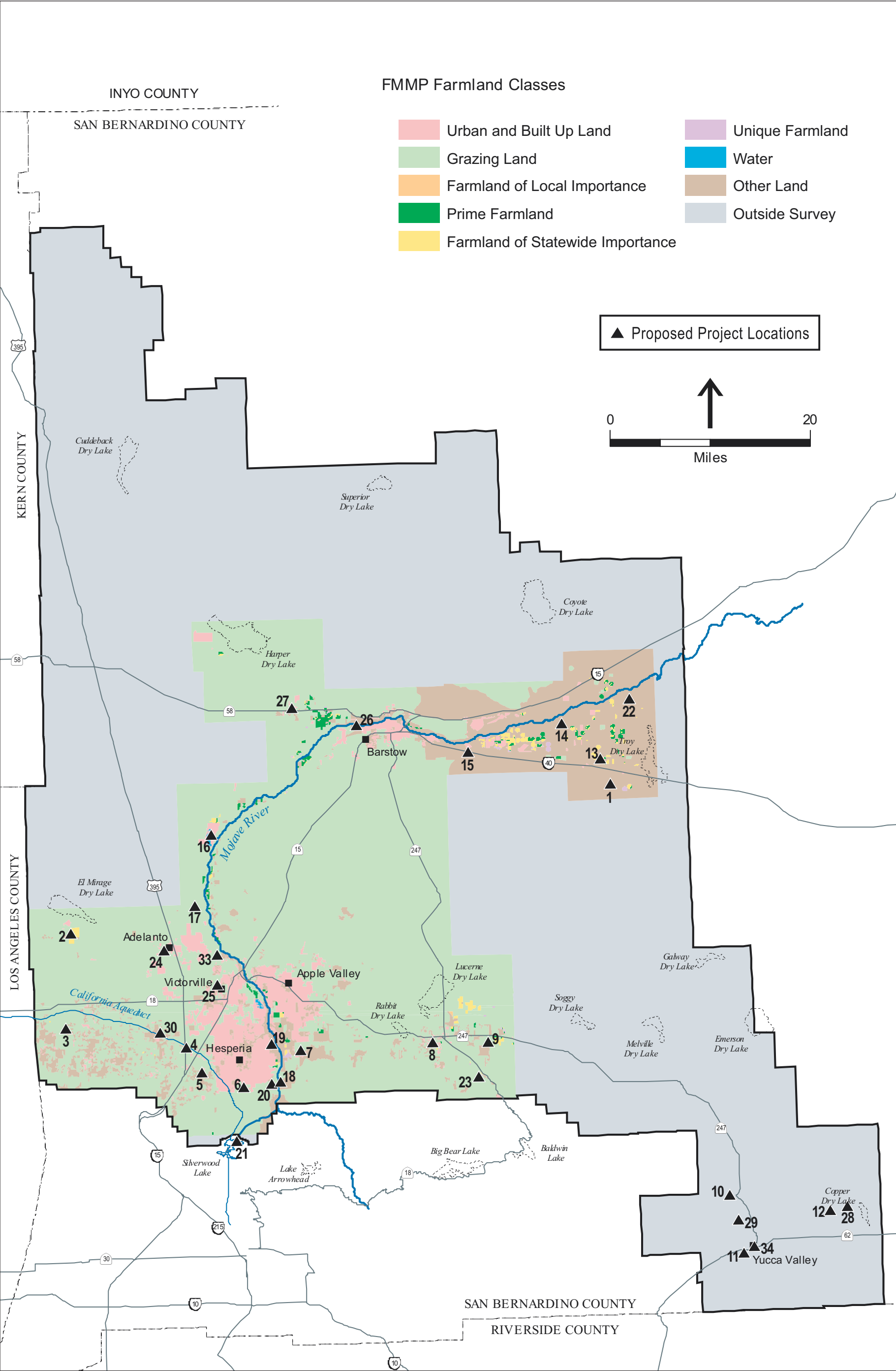
- Prime Farmland: Land with the best combination of physical and chemical characteristics able to sustain long term production of agricultural crops. This land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.
- Farmland of Statewide Importance: Land with a good combination of physical and chemical characteristics for agricultural production, having only minor shortcomings, such as less ability to store soil moisture, compared to prime farmland. This land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.
- Unique Farmland: Land used for production of the state's major crops on soils not qualifying for prime or statewide importance. This land is usually irrigated, but may include nonirrigated fruits and vegetables as found in some climatic zones in California.
- Farmland of Local Importance: Soils that would be classified as prime and statewide but lack available irrigation water. Lands planted to dryland crops of barley, oats, and wheat. Dairylands, including corrals, pasture, milking facilities, hay and manure storage areas if accompanied with permanent pasture or hayland of 10 acres or more.
- Grazing Land: Land on which the existing vegetation is suitable for grazing of livestock. The minimum mapping unit for this category is 40 acres.

Important farmland identified by U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) within the MWA service area is shown in **Figure 3.4-5**.

SAN BERNARDINO COUNTY

Agriculture land usage is scattered throughout San Bernardino County. Most of the agricultural uses are concentrated along the southern edge of the County, with a large dairy and cattle industry in the Chino area. Other major agricultural uses in the County include apples, oranges, lemons, grapefruit, grapes, various vegetables, eggs, milk, and grain. Over the past several years, agricultural uses in the County have been declining with increased levels of development and water shortages. **Table 3.4-1** details the degree to which agricultural uses exist and have existed in the County for the past several years.

¹ Southern California Association of Governments, *2001 Regional Transportation Plan Update Program Environmental Impact Report*, Map Book (Volume 4 of 4), February 1, 2001.



SOURCE: California Department of Conservation
Farmland Mapping and Monitoring Program (FMMP), 2002; ESA 2004

MWA RWMP / 203148 ■

Figure 3.4-5
Regionally Important Farmland

TABLE 3.4-1
AGRICULTURAL RESOURCES IN SAN BERNARDINO COUNTY

Land Use Category	1994-1996		1996-1998		1998-2000		2000-2002 ^a	
	1996 Acres	% Change in Acreage	1998 Acres	% Change in Acreage	2000 Acres	% Change in Acreage	2002 Acres	% Change in Acreage
Prime Farmland	30,722	- 4.0%	29,975	- 0.2%	25,665	- 14.4%	21,648	- 13.2%
Farmland of Statewide Importance	12,169	- 0.1%	12,027	- 0.1%	10,616	- 11.7%	9,708	- 14.2%
Unique Farmland	4,312	- 4.6%	3,889	- 9.8%	3,644	- 6.3%	3,412	- 7.2%
Farmland of Local Importance	5,258	- 0.7%	5,036	- 4.2%	4,816	- 4.4%	3,312	- 31.2%
Important Farmland Subtotal	52,461	- 2.8%	50,927	- 2.9%	44,741	- 12.1%	38,080	- 14.9%
Grazing Land	954,964	- 0.3%	954,229	- 0.0%	957,214	+ 0.3%	919,330	- 1.8%
Total Agricultural Land	1,007,425	- 0.4%	1,005,156	- 0.2%	1,001,955	- 0.3%	957,410	- 2.4%

^a Due to the incorporation of digital soil survey data (SSURGO) during this update, 2000 acreages for farmland, grazing and other land categories from this report may differ from those published in the 1998-2000 California Farmland Conversion Report.

Sources: California Department of Conservation, Division of Land Resource Protection. *Farmland Conversion Report*. 1994-1996, 1996-1998, 1998-2000, 2000-2002 for San Bernardino County.

Agricultural uses in the region occur primarily within the Mojave River floodplain, in the unincorporated areas east of Barstow, and in the vicinity of Lucerne Valley³ Approximately 30,000 acres of land is being irrigated at the present time along the Mojave River.⁴ Principal crops grown in the area are alfalfa, and alternate crops including barley, oats, Sudan for green chop and hay. Some land is utilized for the production of row crops, fruits and nuts, with a growing emphasis on pistachio nut production. For the most part, farmers and ranchers develop their own supply of irrigation water by drilling wells. **Table 3.4-2** details the use of water supplies for agricultural purposes in the MWA service area between 1995 and 2001. As shown in this table, water usage for agricultural purposes has been steadily declining in recent years.

TABLE 3.4-2
WATER USE FOR AGRICULTURAL PURPOSES IN THE MWA SERVICE AREA

	1995	1996	1997	1998	1999	2000	2001
Agricultural	54,400	55,100	49,000	36,600	37,700	34,900	28,600
Total Consumptive Use for the Basin	111,900	116,000	112,800	94,300	102,900	105,200	96,300

Source: Mojave Water Agency. *Regional Water Management Plan Update – Phase 1 Report*. June 2002.

³ Southern California Association of Governments, *2001 Regional Transportation Plan Update Program Environmental Impact Report*, Map Book (Volume 4 of 4), February 1, 2001.

⁴ California Association of Resource Conservation Districts. *Mojave Desert Resource Conservation District Long Range Plan 2002*, <http://www.carcd.org/wisp/mojavedesert/lr-plan.htm>, accessed May 31, 2004.

REGULATORY BACKGROUND

SAN BERNARDINO COUNTY GENERAL PLAN

The San Bernardino County General Plan was adopted in July 1989 and revised in August 1991. The General Plan established policies for a 20-year planning horizon. The plan identifies the goals, policies, and implementing action for 20 planning issues that correspond to the State of California's seven mandated plan elements. The County of San Bernardino Board of Supervisors has approved a General Plan Update (GPU) process that is anticipated to be completed mid-2006. Because the GPU has not yet been completed, this land use analysis focuses on the original General Plan from 1989.

The general plan separates the County into valley, mountain, and desert regional planning areas. The MWA service area lies entirely within the desert region. The purpose of regional planning is to provide detailed guidelines for development in specific subareas of the County. The desert region policies address open space, recreation, and scenic resources; biological resources; water; transportation/circulation; housing/demographics; and land use. The County has also adopted community/specific plans for the Phelan and Joshua Tree communities, which give more detailed policies and actions for these areas.

The San Bernardino County General Plan sets forth nine policies and actions related to water resources. These policies can be summarized as follows:

- WA-1** The County shall recognize and cooperate with all federal, state, regional and local responsible water authorities to implement and manage basin-wide water management plans for the continuous provision of potable water supply.
- WA-2** The County shall develop urgency measures to be enacted during water shortages in order to ensure an adequate and reliable supply of water at all times.
- WA-3** The County shall cooperate with state and local agencies in developing a systematic assessment of regional water supply, monitoring future development to ensure sufficient resources, and assisting in the planning and construction of new water supply and distribution facilities on the basis of adopted growth forecasts.
- WA-4** The County shall encourage the responsible water authority to require water reclamation systems and the use of reclaimed water to the maximum extent feasible and implement water conservation and water reuse measures consistent with policies/regulations on wastewater.
- WA-5** The County shall encourage new development to locate in areas that have adequate water infrastructure because long term area-wide commitments to water supply are necessary for the orderly development of urban areas.
- WA-6** The County shall encourage water conservation by encouraging the responsible authority and incorporated cities to develop water conservation measures and promoting public education programs to increase awareness about water conservation.
- WA-7** The County shall develop a program with the responsible water authority to require major industrial or commercial developments to recycle and/or provide

offsets for water consumed via purchase of imported supplies or contribution to future conveyance systems.

- WA-8** The County shall support measures that reduce impacts to water quality including but not limited to supporting reasonable water quality standards and the safe management of hazardous materials, and assisting in the development of groundwater quality management plans and water resource information systems.
- WA-9** The County shall cooperate with local water authorities to assist in the development of additional conveyance systems, facilitate interconnections between existing systems, and otherwise ensure the efficiency of water distribution systems.

BUREAU OF LAND MANAGEMENT – CALIFORNIA DESERT CONSERVATION AREA PLAN

Nearly half of the MWA service area is managed under the BLM CDCA Plan. The CDCA Plan, first adopted in 1980, includes general guidelines for uses on public desert lands and assigns “multiple-use classes” to describe different types and levels or degrees of use that are permitted within that designation. The CDCA Plan was reprinted in March 1999 with all amendments included. The Plan was designed to provide general, regional guidance for managing public lands in the desert through the 20th century. The CDCA Plan is organized into 12 elements: cultural resources; native American; wildlife; vegetation; wilderness; wild horse and burro; livestock grazing; recreation; motorized vehicle access; geology, energy, and mineral resources; energy production and utility corridors; and land-tenure adjustment.

BLM-administered land is managed according to the following multiple-use classes:

- **Class C: Controlled Use.** Land in this category includes lands that have been preliminarily recommended as suitable for wilderness designation by Congress. It will be used in the future to show those areas formally designated by Congress.
- **Class L: Limited Use.** Management of land in this category provides for lower intensity, carefully controlled multiple use of resources while ensuring that sensitive values are not significantly diminished.
- **Class M: Moderate Use.** Multiple use of lands designated for moderate use is based upon a controlled balance between higher intensity use and protection of public lands. Management of these lands is designed to conserve desert resources and to mitigate damage to those resources that permitted uses may cause.
- **Class I: Intensive Use.** This category provides for concentrated use of lands and resources to meet human needs. Mitigation of impacts on resources and rehabilitation of impacted areas will occur on these lands whenever possible.

In the Energy Production and Utility Corridors Element, the CDCA Plan sets forth certain criteria related to utility corridors that should be used to evaluate applications for future development. Decision criteria are to:

- (1) Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors;
- (2) Encourage joint use of corridors for transmission lines, canals, pipelines, and cables;
- (3) Provide alternative corridors to be considered during processing of applications;
- (4) Avoid sensitive resources whenever possible.
- (5) Conform to local plans whenever possible;
- (6) Consider wilderness values and be consistent with final wilderness recommendations;
- (7) Complete the delivery-system network;
- (8) Consider ongoing projects for which decisions have been made; and,
- (9) Consider corridor networks which take into account power needs and alternative fuel resources.

Section 3.5 provides more discussion on utility corridors.

BUREAU OF LAND MANAGEMENT WEST MOJAVE PLAN

The West Mojave Plan is a habitat conservation plan and federal land use plan amendment that presents a comprehensive strategy to conserve and protect the desert tortoise, the MGS and nearly 100 other sensitive plants and animals and the natural communities of which they are a part. The plan provides developers of public and private projects with a streamlined program for complying with the requirements of the California and federal ESA. The plan is anticipated to be approved by BLM in 2005. Figure 3.3-4 in the Biology Section shows the conservation areas proposed in the West Mojave Plan for sensitive habitats and species.

STATE LANDS COMMISSION – STATE SCHOOL LANDS

The California State Lands Commission (CSLC) was created by the California Legislature in 1938 to manage and protect important natural and cultural resources on certain public lands within the state. The CSLC jurisdiction extends to more than 120 rivers and sloughs, 40 lakes and the state's coastal waters. School lands are what remain of the nearly 5.5 million acres throughout the state originally granted to California to benefit public education. The Land Management Division of CSLC has the primary responsibility of the identification, location, and evaluation of the State's interest in these lands and its leasing and management. Public and private entities may apply to CSLC for leases or permits on state lands for many purposes including marinas, industrial wharves, dredging, sand mining, tanker anchorages, grazing, right-of-ways, bank protection, recreational uses, etc. State School Lands are scattered throughout the RWMP area, including the Morongo Basin area near Yucca Valley, the Alto subarea near Mojave River Forks Dam, and in the Centro and Baja subareas near Barstow.

CALIFORNIA DEPARTMENT OF CONSERVATION – WILLIAMSON ACT

The California Land Conservation Act of 1965, also known as the Williamson Act, is designed to preserve agricultural and open space lands by discouraging their premature and unnecessary

conversion to urban uses. Williamson Act contracts, also known as agricultural preserves, offer tax incentives for agricultural land preservation by ensuring that land will be assessed for its agricultural productivity rather than its highest and best uses. The California Department of Conservation administers the Williamson Act for the conservation of farmland and other resource-oriented laws.

CITY OF VICTORVILLE GENERAL PLAN

Incorporated in 1962, the City of Victorville is located along the Mojave River where I-5 and SR 18 meet. Victorville has experienced tremendous growth since the early 1970s and continues to be one of the fastest growing areas in the state. The current City of Victorville General Plan was adopted in 1997. The General Plan is organized into seven elements: land use, circulation, housing, noise, safety, resource, Southern California Logistics Airport community plan, and old town community plan. Each element establishes policies and goals for long-term planning. The Housing Element was revised in 2001. The general plan divides the city into thirteen distinct planning areas based on topographic features, man-made features, and land use characteristics to give specific guidelines for land use, housing, and parks and recreation policies.

The City of Victorville General Plan contains 13 categories of land use: five categories are specifically concerned with residential land use, two relate to commercial activities, two are industrial land use categories, and one category each for public/institutional, open space, specific plan, and urban conservation⁵. These designations are described in detail in the Land Use Element of the general plan.

General Plan policies pertaining to the RWMP include the following:

- **Goal 3:** Victorville as a community which provides adequate city services and infrastructure.
- **Policy 3.1:** Development will be permitted in areas where such uses are appropriate and provide for adequate roadways, infrastructure, and public services.
- **Goal 2:** Victorville as a community that recognizes the need to coordinate its management of resources with other agencies.
- **Policy 2.1:** the City will continue to participate in a cooperative effort with other agencies to monitor and review the management of resources.
- **Impact 1:** The City shall continue to monitor the programs contained within the Regional Water Management Plan and adopt those which are consistent with the City's goals and policies.

CITY OF ADELANTO GENERAL PLAN

The City of Adelanto prepared a GPU in 1994. The City of Adelanto experienced a tremendous increase in economic growth in the 1980s and 1990s. The GPU identifies constraints to future

⁵ City of Victorville, *City of Victorville General Plan*, dated July 15, 1997.

growth including drainage channels, roadways, availability of water, infrastructure, biological and geologic constraints. The following goals and policies relate to water supply.

Water Supply Goals

The City shall encourage and participate with the local water authorities to:

- Achieve a balanced hydrological system in terms of withdrawal and replenishment of water from groundwater basins.
- Continue and expand the importation of water to sustain the existing population and projected growth; actively support the completion of the SWP improvements in the Sacramento/ San Joaquin Delta and to the Colorado River Aqueduct System, and the use of water transfers and water marketing techniques.
- Achieve a reduction in the existing consumption of water by implementing conservation measures prior to approving new development in areas experiencing water supply shortages.
- Plan and construct new water distribution and treatment systems on the basis of the City's adopted growth forecast.
- Maximize the use of existing water resources through conservation programs and efficient ground and surface water management programs.
- Improve and rehabilitate water distribution systems to prevent losses from leakages and to maximize efficient water use.
- Achieve conservation, reclamation, reuse, and other refinements in water management practices as an essential part of all water supply programs, whether in urban, rural, or agricultural sectors.
- Protect and maintain high quality water with the objective being the protection of surface and groundwater from degradation, with drinking water being the highest and most beneficial use.
- Achieve the approval of new development conditioned on the availability of adequate and reliable water supplies and conveyance systems.

Water Supply Policies

Since State, regional and local water authorities are jointly responsible for developing basin-wide water management plans for provision of potable water supplies, the following policies shall be utilized.

- Coordination with all local agencies providing water service and protection to achieve effective local and regional planning.
- Promote cooperation and sharing of information.
- Provide mutual assistance in regional projects.
- Assist in the development and implementation of regional water resource management plans and the incorporation of individual district plans.

CITY OF HESPERIA GENERAL PLAN

The City of Hesperia, incorporated on July 1, 1988, is located south of Victorville between I-15 and the Mojave River. The City of Hesperia General Plan was adopted in May 1991 and includes the following seven mandatory elements: land use, circulation, housing, conservation, open space, noise, and safety. The land use element generally describes goals for areas designated as residential, commercial, industrial, public facilities, and community design.

The general plan identifies the City of Hesperia's major planning issues, as follows:

- Providing for managed growth and development,
- Providing and improving community services and facilities,
- Protecting and enhancing the quality of life,
- Expanding the local economy, and
- Protecting natural resources for existing and future residents.

General Plan policies pertaining to the RWMP include the following:

- **Policy L.P.6:** Coordinate land use planning with infrastructure provision and planning, both within the City and within the sphere of influence, to ensure adequate, convenient, and efficient provision of support services as development occurs, funded by those who benefit.
- **Policy CN.P.2:** Promote conservation of groundwater resources throughout all phases of land use planning and development review.
- **Policy CN.P.3:** Protect groundwater quality throughout the planning area, on individual sites as well as through mitigation of regional impacts.
- **Policy CN.P.10:** Participate with other agencies in developing a plan for future use of the Mojave River which provides for community recreational uses, water recharge, and protection and enhancement of riparian habitat.

TOWN OF APPLE VALLEY GENERAL PLAN

The Town of Apple valley, east of the Mojave River, situated along SR 18, has an area of approximately 68 square miles, of which approximately 75% was undeveloped at the time the general plan was adopted⁶. Historically, land uses in Apple Valley and the surrounding mountains had involved mining, quarrying, ranching, and agriculture⁷. As the Victorville/Hesperia area has grown, Apple Valley has become an increasingly more residential community, with a decreasing percentage of land devoted to agriculture.

The Town of Apple Valley General Plan was adopted in September 1991 and updated in October 1998. The following seven elements are included in the general plan: land use, housing, circulation, open space/conservation, safety, noise, and public facilities. The land use element

⁶ Town of Apple Valley, *General Program Hearing Draft Environmental Impact Report*, May 24, 1991.

⁷ *Ibid.*

provides land use designations that define the type, density, and intensity of development permitted throughout the town.

General Plan policies pertaining to the RWMP include the following:

- **Goal LU-2:** The Town will manage growth in an orderly manner in accordance with a long range plan which protects and enhances community values, and which does not exceed the provisions of requisite facilities and services.
- **Goal PF-1:** Ensure that existing and future land uses have a water supply system capable of adequately meeting normal and emergency demands to ensure the public health and safety of Town residents.
- **Policy PF-1.3:** Promote water conservation for all land uses through public education which addresses conservation practices such as reclaimed water use and, by example, through the operation of Town facilities.
- **Goal PF-2:** Establish, extend, maintain and finance a safe and efficient wastewater collection, treatment and disposal system which maximizes treatment and water recharge, minimizes water use and work within applicable laws and regulations in an attempt to prevent groundwater degradation and contamination.
- **Policy PF-2.4:** The siting of sub-regional, reclamation/treatment plant(s) in Apple Valley to relieve the dependence on the regional treatment facilities shall be promoted. Design capacity of sub-regional treatment facilities should be based upon projected land use densities as defined in the Land Use Element.

CITY OF BARSTOW GENERAL PLAN

The City of Barstow, located 35 miles northeast of Victorville along the Mojave River at the junction of Interstate 15 (I-15), Interstate 40 (I-40), and State Route 58 (SR 58), was historically a mining community and railroad center for east-west trains connecting central and southern California with Arizona and Nevada. Growth in Barstow and surrounding communities was largely influenced by operations at the nearby military installations of Fort Irwin and the Marine Corps Logistics Base⁸.

The City of Barstow General Plan (1997) is divided into six major elements and two additional elements. The major elements include community development, natural factors, hazards, cultural resources, recreation and open space, and infrastructure for public services. The two additional elements include housing and air quality. Each element contains a summary of the issues, problems, and concerns addressed in the element, and goals and policies to direct planning decisions to resolve those issues. The general plan projects conditions through 2020 to guide long-term planning. The planning area for the general plan extends outside the incorporated city to the unincorporated communities of Daggett and Hinkley on the east and west, respectively, to publicly owned hilly and steep terrain to the north, and to about one mile from the City boundary to the south. The planning area also includes an area of interest that extends for two miles on either side of I-15 to the southwest of the City limits to within a mile of Wild Wash Road. The

⁸ City of Barstow, 1997, *City of Barstow General Plan (Part B)*, dated April 18, 1997.

City of Barstow General Plan contains 17 categories of land use: seven residential designations, three commercial designations, two industrial categories, a single public facilities designation, two open space/recreation categories, and Specific Plan and mixed-use designations⁹. These designations are described in detail in the Community Development Element of the general plan.

General Plan policies pertaining to the RWMP include the following:

- **Goal II.1:** Ensure protection of water quality and quantity for the community by working in cooperation with all water purveyors in the area to preserve, augment, capture and purify all waters in the Mojave River system.
- **Policies II.1.1 through II.1.11:** These policies include general requirements for cooperating with the MWA, SBCFCD, and SCWC to monitor water use and water quality and consider long-term improvements for upgrade of sewer treatment plants and maximizing recovery of natural groundwater supplies and storm water runoff. The policies also encourage xeriscape landscaping and restrict provision of water services to new developments outside existing service areas.
- **Goal VI.6:** Ensure a water supply system capable of meeting normal and emergency demand through cooperation between the City and water purveyors.
- **Policies VI.6.1:** With input from the Lahontan RWQCB, MWA and the local water purveyor(s), annually evaluate all aspects of the potable water supply, ensure that it is adequate, and alert the legislative body of any abnormalities immediately.

TOWN OF YUCCA VALLEY GENERAL PLAN

The Town of Yucca Valley was incorporated on November 27, 1991. Yucca Valley adopted its own General Plan in December 1995. The General Plan is organized into 23 elements grouped under five categories: administration and implementation, community development, environmental resources, environmental hazards, and public services and utilities.

The Yucca Valley General Plan contains the following policies pertinent to the RWMP:

- **Policy 3:** Coordinate with the HDWD to compile an inventory of water supplies for present and future water demands.
- **Policy 4:** Regulate land use and development, and confer and cooperate with the HDWD and County Transportation /Flood Control to facilitate recharging the Warren Valley Groundwater Basin.
- **Policy 6:** Ensure the HDWD implements and develops a wastewater collection and treatment system, which will provide for long-range water quality protection and will provide for increased reclaimed water for groundwater recharge.
- **Public Buildings and Facilities, Policy 1:** Coordinate with public utilities and special districts to assure the least intrusive and most compatible integration of related buildings and facilities into the land use pattern of the community.

⁹ *Ibid.*

- **Public Utilities, Policy 1:** Assure the provision of adequate public utility services and facilities for all residents within the community.
- **Public Utilities, Policy 3:** Confer and cooperate with the HDWD to assure an adequate water system for existing and future development and maintain an adequate reservoir of water in storage facilities.
- **Public Utilities, Policy 4:** Confer and cooperate with the HDWD in determining need and developing long-term plans for the construction of a waste water treatment plant and sewer collection system to provide long-term protection of the vital groundwater basin.

IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

The CEQA Guidelines establish that a project would normally have a significant effect on existing land uses if it would:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect;
- Conflict with any applicable habitat conservation plan or natural community conservation plan;
- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the FMMP the California Resources Agency, to non-agricultural use;
- 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 Farmland, to non-agricultural use.

Impact 3.4-1: Proposed projects may not comply with applicable city and county land use designations and as a result may not be compatible with neighboring land uses.

Projects

Many of the project sites identified within the RWMP are located in areas that are currently open space or vacant land. Implementation of these projects would not generally conflict with land use descriptions and associated policies for such areas. However, some projects may be located on land that is zoned for use related to one or more of the following:

- Resource Conservation
- Agriculture
- Rural Living
- Single Residential

- Multiple Residential
- Planned Development

Land use designations and zoning related to these and other sensitive land uses may restrict development that does not fall within the uses strictly outlined by the applicable General Plan Land Use Element. In such cases, a Conditional Use Permit (CUP) may be required in order to ensure that development of a RWMP project does not conflict with the land use policies set forth by the agency with jurisdiction over the project site. Some implementing agencies may not be required to obtain CUPs from local jurisdictions, but rather would be responsible for ensuring that land uses were compatible with local policies.

The policies and land use designations used to determine compatibility of new land uses would depend on the agency with jurisdiction over each individual project location. Figure 3.4-1 shows the location of the municipalities in the MWA service area. In order to ensure compliance with local land use policies, land use designations and zoning for individual projects will be investigated on an individual basis prior to implementation of the projects. In the event that implementation of a project at a particular location would conflict with the applicable land use designation or zoning, the implementing agency would need to acquire any permits necessary for implementation of the projects or design the project to minimize potential effects.

Recharge Basins

Recharge basins would require several acres of land each. Once established they would generally be compatible with most land uses including residential uses. The basins would be considered a low intensity use since they would not generate substantial traffic or generate noise. As shown in Figure 3.4-1, the majority of recharge basin projects proposed for development within incorporated towns and cities are located at the outer edges of the municipalities, where they are less likely to conflict with land uses such as residential and commercial developments. Approval of recharge basins may require a CUP or other permit from the local jurisdictional agency. Locating recharge basins near some areas such as schools and play grounds may pose risks to public safety. Providing access control (e.g. fencing) would be necessary in these cases to avoid potential impacts.

Pipelines

Once installed, proposed pipeline projects would generally not conflict with any surrounding land uses or zoning. However, the implementing agency would be required to obtain necessary encroachment permits and easements from local jurisdictions and land owners.

Injection/Extraction Wells

Implementation of injection and extraction well projects would result in minimal above ground facilities. Injection and extraction well projects are, therefore, not anticipated to conflict with surrounding land uses. Where applicable, MWA would obtain a CUP or other permit from the local jurisdictional agency to allow for development of injection or extraction wells prior to construction activities. Access to the facilities would be limited.

Management Actions

Reclamation

Construction of reclamation plants would involve substantial ground disturbance and may not be compatible with sensitive land uses such as schools and health care facilities. CUPs may be required in order for reclamation plants to comply with local zoning or land use designations.

Wellhead Treatment

Wellhead treatment projects would include minimal development of new structures or facilities near existing extraction wells. Some additional chemical storage may be required for some treatment processes. Chemical storage may conflict with local sensitive land uses.

Treatment Plant

Construction of treatment plants involves substantial ground disturbance and would result in new land uses. These treatment plants and/or water blending facilities may not be compatible with sensitive land uses such as schools and health care facilities. CUPs may be required in order for treatment plants to comply with local zoning or land use designations.

Mitigation Measures

- M3.4-1** **Implementing agencies shall conduct siting studies to determine the most suitable locations to place facilities. Siting studies shall consider existing and planned land uses in the vicinity of the project. Projects should be located in areas with suitable neighboring land uses wherever possible.**
- M3.4-2** **If sensitive land uses cannot be avoided, buffer zones, access controls, and visual screens could be implemented to minimize impacts. Some implementing agencies may need to obtain encroachment permits, easements or other permits such as Conditional Use Permits (CUPs) from the jurisdictional agency prior to construction activities as needed to obtain local approval.**

Significance After Mitigation

Less than significant.

Impact 3.4-2: Project facilities could be located on important farmland or Williamson Act lands.

Projects may be located on important farmland or on lands set aside by the Williamson Act. Development in these areas would reduce the amount of farmland in the region. However, as shown on Figure 3.4-5, few projects would be located in areas where farmland would be directly affected. Implementing agencies should be able to site facilities to avoid these lands.

Mitigation Measures

M3.4-3 Implementing agencies shall avoid siting project facilities in areas designated as important farmland whenever possible.

Significance After Mitigation

Less than significant.

Impact 3.4-3: Projects may be located on lands designated by Bureau of Land Management (BLM) for other uses including potential conservation areas for sensitive species.

Projects may be located on or traverse BLM lands. BLM has designated conservation land uses for large areas of the MWA service area. Land uses vary from intense use to limited access wilderness areas. The West Mojave Plan further identifies potential regional conservation areas for sensitive habitats. Placing project facilities in conservation areas, wilderness areas, or high intensity recreation areas may pose compatibility conflicts. However, as shown on Figure 3.3-4, few projects would be located near conservation areas proposed in the West Mojave Plan. Nonetheless, project siting efforts could attempt to avoid these areas wherever possible.

Mitigation Measures

M3.4-4 Implementing agencies shall avoid siting project facilities in areas designated as potential conservation areas wherever possible.

Significance After Mitigation

Less than significant.

Intentionally left blank.

3.5 PUBLIC SERVICES AND UTILITIES

This section evaluates the public services and utilities in the MWA service area that may be affected by the proposed projects. The potential impacts of the projects on the public resources including police protection services, fire protection services, wastewater treatment, water supply, and solid waste disposal are identified. The analysis specifically addresses whether the project would affect current levels of public services and suggests mitigation measures to reduce the impacts to their least significant level.

SETTING

The environmental setting describes the public services and utilities that may be affected by the proposed projects. The assessment below provides information on the availability of public services and utilities for each major city within the service areas.

POLICE PROTECTION SERVICES

Individual County Sheriff Departments are responsible for providing police protection within the unincorporated areas of the County as well as those incorporated cities and towns that contract with the County Sheriff to protect their city. Typically, the County Sheriffs assist newly incorporated municipalities to serve their citizens by offering an established police force to protect the jurisdiction as it grows. City police departments are found mostly in the older and larger cities. Police protection services in the MWA service areas are primarily served by City police departments.

The California Highway Patrol (CHP) service area is along the state route and Interstate highway system that dissects the Mojave desert region. The CHP collaborates with both County and City Police Departments when the need arises. The San Bernardino County Sheriff's Department provides law enforcement service to unincorporated areas and under contract to the cities of Hesperia, Apple Valley, Victorville and Adelanto. Apple Valley, Victorville, Hesperia, Adelanto, and Yucca Valley all contract with the Sheriff.

City of Barstow

Police protection services to the City are provided by the Barstow Police Department, the San Bernardino County Sheriff's Department, and the CHP. The Department operates its main station at 220 East Mountain View Avenue. Additional sub-station operations are located at outlet malls and are only staffed on a part-time basis. Emergency response time average approximately 5 minutes, while non-emergency response times average 10 minutes.

City of Hesperia

Police protection for the City of Hesperia is provided by the San Bernardino County Sheriff's Department. The Department has adopted the standard officer to civilian ratio of 1/1000. The Department maintains an average of three to four cars on patrol and one to two cars on traffic duty

at any one given time. There are currently no jails or holding facilities within the City of Hesperia. The Department uses the facilities located in the adjacent City of Victorville for both holding facilities and courts. The Department also calls on the CHP for assistance. The CHP provides public safety and law enforcement services on federal and state highways within the area. In addition to the Highway Patrol, the Department can also call upon officers from the Apple Valley, Victorville, and Victor Valley Sheriff's Stations for assistance.

City of Victorville

The Victorville Police Department is staffed by officers under contract with the San Bernardino County Sheriff. The department primarily operates from one police station but has a satellite station at the Mall of Victor Valley and a mobile police station.

FIRE AND EMERGENCY MEDICAL SERVICES

The County Fire Department provides fire prevention/suppression and emergency services to the unincorporated areas of the county as well as those municipalities that contract with the County for fire protection. As with police services, city fire departments are more prevalent among older and larger municipalities.

San Bernardino County

The desert region of San Bernardino County covers 18,414 square miles and has a population of approximately 171,100. This area is protected by numerous fire stations. Estimated overall response time in the county is from 5 to 20 minutes. However, 90% of the desert area is beyond a 30-minute response time.

City of Barstow

Fire protection including fire prevention, fire safety and paramedic services in the City of Barstow is provided by the Barstow Fire Protection District. The District encompasses fifty-five square miles of and includes all of the City of Barstow, and the unincorporated areas of Lenwood, Grandview, North Barstow, and Barstow Heights. The District operates four stations: Stations 361, 362, 363, and 364. The District operates five engine companies, one truck company and a paramedic/reserve squad.

City of Hesperia

Fire Protection for the City of Hesperia is provided by the Hesperia Fire Protection District. Fire Protection is also provided by the California Department of Forestry and the Regional Fire Protection Authority (RFPA). The RFPA is comprised of the communities of Barstow, Victorville, Apple Valley, Lucerne Valley, Wrightwood, Adelanto and Hinkley. The Hesperia Fire District has two full-time stations and one paid-call station. The District fire department operates paramedic units as well as fire engines. The standard response time is no longer than 5-6 minutes after dispatch has been made.

City of Victorville

The City of Victorville Fire Department provides fire protection, emergency medical service, and hazardous materials service for the City. The City participates in a RFPA, which provides mutual aid agreements. The City also participates in the California Disaster and Civil Defense Master Mutual Aid Agreement which is designed to ensure that adequate resources, facilities, and other support are provided whenever a jurisdiction's own resources prove to be inadequate to cope with a given situation.

Town of Yucca Valley

Fire protection and life safety services are provided to the Town of Yucca Valley by the SBCFD and the California State Department of Forestry. The Department of Forestry provides protection to areas primarily outside of the community for vegetation/wildland fires. The SBCFD has two stations serving the Town of Yucca Valley. The Yucca Valley Fire Protection District encompasses sixty-one (61) square miles.

WASTEWATER TREATMENT

Victorville Area

Wastewater disposal facilities in the desert region of San Bernardino County range from septic tanks to wastewater treatment plants. Many of the population centers in the Victor Valley area receive wastewater service from the VVWRA. The VVWRA treatment plant has a 9.5 mgd capacity. Wastewater flows in 2000 were 8.69 mgd. The VVWRA projects this to increase to 18.62 by 2020. Member agencies include the City of Victorville, County Sanitation Agencies 42 and 64, Apple Valley, and Hesperia. The VVWRA plant discharges to the Mojave River and to percolation ponds located adjacent to the river within the floodplain. The plant provides tertiary treatment including flocculation, filtration, and disinfection.

City of Barstow

The City of Barstow wastewater treatment facilities have a combined secondary treatment capacity of 7.5 mgd. The existing treatment facilities include aeration basins, secondary clarifiers, a chlorine contact chamber and a chlorine contact lagoon. After treatment, effluent is discharged to the Mojave River adjacent to the treatment facilities. Sewage generation, associated with commercial and industrial growth in the City of Barstow will be increased by nearly 1.7 million gallons per day (gpd) from approximately 66,000 gpd to over 1.75 gpd¹. New sewage transmission and treatment facilities will be required to accommodate growth.

¹ City of Barstow, *City of Barstow General Plan (Part B)*, dated April 18, 1997.

Town of Yucca Valley

The Town of Yucca Valley is not served by a sewage collection system or by a wastewater treatment facility. On-site septic systems are utilized by residents and commercial and industrial operations throughout the Town. The HDWD is exploring the feasibility of constructing a wastewater collection and treatment facility to serve Yucca Valley and other parts of the District service area.

WATER SUPPLY

MWA is a SWP contractor, accepting deliveries of SWP to be percolated into the local groundwater basins. Several water retailers convey water to residential, commercial, and industrial customers within the service area. Major water retailers in the region include the SCWC, the City of Hesperia, the Victor VVWD, the City of Adelanto, the Baldy Mesa Water District, Apple Valley Ranchos Water Company, HDWD, JBWD, and County Service Areas. These organizations supply groundwater exclusively.

Southern California Water Company

Water for the City of Barstow, Lucerne Valley, and Apple Valley is provided by the SCWC Company. SCWC operates groundwater extraction well fields and conveyance systems to meet demand in these areas. The MWA Mojave River Pipeline and the Morongo Pipeline convey SWP water to areas served by SCWC.

City of Hesperia

Water is supplied to the City of Hesperia by the Hesperia Water Department. The Hesperia Water Department is the City's municipal water department which covers approximately 57 square miles. The department has 14 wells, of which 10 are currently in production. The production capacity of the Hesperia Water Department is 25.8 mgd. The water is transported throughout the City by more than 435 miles of pipeline.

High Desert Water District

Water services to the Town of Yucca Valley are provided by the HDWD, which lies within the MWA service boundaries. HDWD derives water resources primarily from the Warren Valley Groundwater Basin underlying the Town of Yucca Valley. The HDWD service area includes portions of the unincorporated areas outside the Town boundaries and is supplied by fifteen (15) wells. The Basin also gets SWP water from the Morongo Basin Pipeline.

Joshua Basin Water District

The JBWD includes 96 square miles in southwestern San Bernardino County. The water system presently consists of approximately 220 miles of mainlines, four wells and 15 reservoirs and serves approximately 4,000 customers⁶.

Victor Valley Water District

The VVWD currently gets all of its water from the Upper Basin area, known as the Alto Subarea, of the underground aquifer that provides water to the High Desert. The water system has 25 active production wells and delivers more than 15 mgd to a population of more than 55,000 within the boundaries of the City of Victorville.⁷

SOLID WASTE

City of Barstow

The Barstow Sanitary Landfill, located three miles southeast of the City, and the Lenwood/Hinkley Landfill, located ten miles west of Barstow are both Class III facilities that accept nonhazardous solid and inert waste. The wastes originate from residential, commercial, agricultural and construction sources. By 1996, over 20% of Barstow Landfill's 621,229 ton capacity has been used, while over 4% of the Lenwood/Hinkley Landfill's 1,451,656 ton capacity has been used. The life expectancy of the Barstow Landfill is 16 years, while that of the Lenwood/Hinkley Landfill is 240 years.

City of Hesperia

The majority of solid waste generated by the City of Hesperia is municipal solid waste, defined as residential and commercial garbage, rubbish, yard wastes or materials which are collected and transported by municipal or private haulers to conventional public or private sanitary landfills. The average solid waste generation rate for the Desert Region is estimated at 1.88 tons per person per year⁸.

City of Victorville

The City of Victorville process non-hazardous solid waste at the materials recovery facility (MRF) built in 1995. Burrtec Waste Industries, Inc., developed the MFR with the Mojave Desert and Mountain Solid Waste Joint Powers Authority, to serve the City of Victorville and the Town of Apple Valley. There are no hazardous waste facilities in the City of Victorville. Hazardous

⁶ Joshua Basin Water District, Website: <http://www.joshuatreevillage.com/552/552.htm>.

⁷ Victor Valley Water District, Website: <http://www.vvwater.org/wq-annual.cfm>.

⁸ City of Hesperia, *City of Hesperia General Plan*, dated May 16, 1991.

wastes are collected and transported to facilities outside San Bernardino County and even the State⁹.

Town of Yucca Valley

Solid waste in the Town of Yucca Valley is primarily handled by Hi-Desert Disposal, which offers both residential and commercial services. Hi-Desert Disposal offers special services for customers that produce large levels of wastes. All trash collected in the Town is distributed between the Landers and Morongo Valley Landfills¹⁰.

UTILITY CORRIDORS

Major power transmission lines and pipelines traverse the MWA service areas. **Figure 3.5-1** identifies major overhead power-line utility corridors that traverse the region. Oil and gas pipelines are operated by Four Corners Pipeline Company, California-Nevada Pipeline Company, Pacific Gas and Electric, Southern Pacific Pipelines, Fontana Pipelines, and the All American Pipeline.

The CDCA Plan Amendment established a network of sixteen utility planning corridors across the Mojave and Colorado Deserts. All new linear utilities exceeding the following thresholds must be located within a utility corridor¹¹:

- New electrical transmission towers and cables of 16 kV (kilovolts) or above;
- All pipelines with diameters greater than 12 inches;
- Coaxial cables for interstate communications; and,
- Major aqueducts or canals for interbasin transfer of water.

REGULATIONS

The regulatory setting describes the federal, state, and local agencies that have jurisdiction over public services and utilities. The regulations pertinent to public services and utilities that each of these agencies enforce are also described.

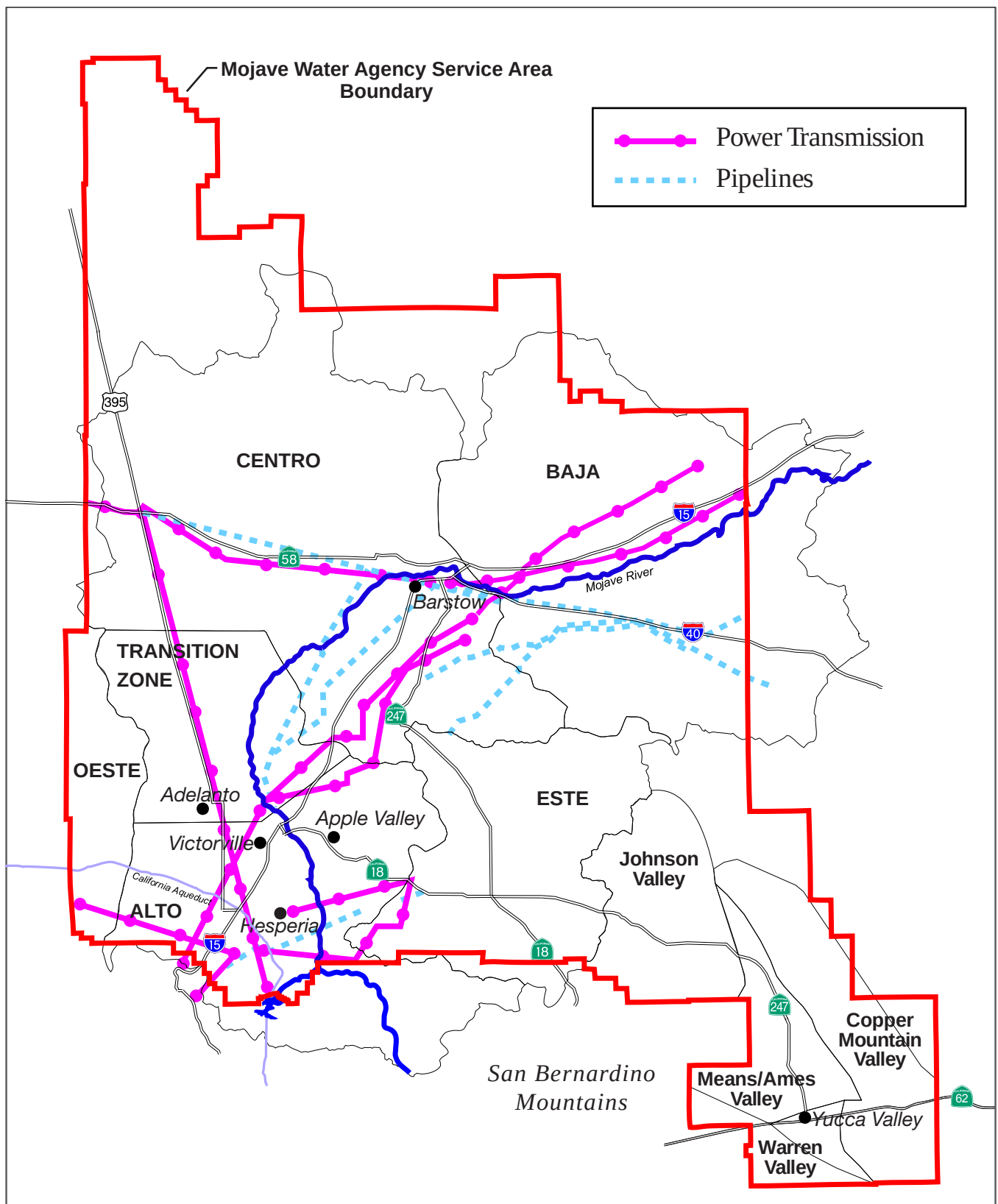
FEDERAL AGENCIES

40 CFR, Part 258 Subtitle D of the Resource Conservation and Recovery Act (RCRA) establishes minimum location standards for siting municipal solid waste landfills. Because California laws and regulations governing the approval of solid waste landfills meet the requirements of Subtitle D, the U.S. EPA has delegated the enforcement responsibility to the State of California. California laws and regulations governing these facilities are summarized below.

⁹ City of Victorville, *City of Victorville General Plan*, dated July 15, 1997.

¹⁰ Town of Yucca Valley, 1995a, *Town of Yucca Valley General Plan*, dated December 14, 1995.

¹¹ Draft Environmental Impact Report and Statement for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment, Volume 1.



SOURCE: BLM Special Edition 1997, Desert Access Guides
(Victorville, San Bernardino, Big Bear Lake, Newberry Springs)

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Figure 3.5-1
Utility Corridors

STATE AGENCIES

California Code of Regulations (CCR)

Pursuant to CCR Title 23, Division 3, Article 2 (Waste Classification and Management) and Article 3 (Waste Unit Classification and Siting), Class III (municipal solid waste) landfills are sited in accordance with criteria that are similar to those found in Subtitle D of RCRA. CCR Title 27 includes various regulations pertaining to siting, design, construction and operation of solid waste landfills.

California Integrated Waste Management Board (CIWMB)

The CIWMB has numerous responsibilities in implementing the federal and state regulations summarized above. The CIWMB is the state agency responsible for permitting, enforcing and monitoring solid waste landfills, transfer stations, MRFs, and composting facilities within California. Permitted facilities are issued Solid Waste Facility Permits (SWFPs) by the CIWMB. The CIWMB also certifies and appoints Local Enforcement Agencies (LEAs), county or city agencies which monitor and enforce compliance with the provisions of SWFPs. The CIWMB is also responsible for monitoring implementation of AB 939 by the cities and counties.

IMPACT ASSESSMENT MITIGATION MEASURES

Implementation of the proposed projects could affect public services and utilities. Impacts could possibly include demand for additional wastewater treatment, water supplies and solid waste services. Both short-term construction related impacts and long-term or permanent impacts from new facilities potentially would result from implementation of the proposed projects. It should be noted that project specific impacts may vary and appropriate mitigation measures would need to be developed on a project-by-project basis.

All mitigation measures shall be included in project-level analysis as appropriate. The implementing agencies for each individual project shall be responsible for ensuring adherence to the mitigation measures prior to construction.

SIGNIFICANCE THRESHOLDS

CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions within the area affected by the project. Generally, a project may be considered to have significant public services-related impacts if it:

- Requires or results in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Would be served by a landfill without sufficient permitted capacity to accommodate the project's solid waste disposal needs.
- Complies with federal, state, and local statutes and regulations related to solid waste.

- Results in major reduction or interruption of utility services to consumers.
- Creates a substantial need within the region for construction of additional public facilities, such as fire and police stations, schools or other public facilities; or
- Uncovers and potentially severs underground utility lines; or
- Generates a substantial increase in the amount of solid waste that exceeds the region's available landfills' capacity to handle and dispose of the waste.

Impact 3.5-1: Construction activities could affect emergency service access.

Fire protection, emergency medical services, and police services within the Mojave Desert region are provided by numerous agencies within multiple jurisdictions. Depending upon the timing, location, and duration of construction activities, several of the proposed projects could delay emergency vehicle response times or otherwise disrupt delivery of emergency services. By closing off one or more lanes of a roadway, emergency routes would be impaired. The closure of these lanes could potentially cause traffic delays and ultimately prevent access to calls for service. While these impacts would be brief in nature, they could be potentially significant. Implementing agencies would be required to obtain encroachment permits analyzing the potential affect to emergency services. Traffic management plans prepared for compliance with encroachment permits would identify detour routes and notification requirements to minimize this impact.

Mitigation Measure

M3.5-1 Implementing agencies shall evaluate impacts to emergency access routes during construction activities, provide detours if necessary, and notify emergency service providers.

Significance After Mitigation

Less than significant.

Impact 3.5-2: Construction could generate significant amounts of solid waste.

Several of the projects within the MWA have the potential to generate a significant amount of solid waste during construction, such as the construction of recharge basins, injection/extraction wells, pipelines and treatment plants through grading and excavation activities. Construction debris would be recycled or transported to the nearest landfill site and disposed of appropriately. The amount of debris generated during project construction would need to be evaluated prior to construction on a project by project basis. The mitigation measures described below would help to reduce the impact to less than significant.

Mitigation Measures

M3.5-2 Implementing agencies shall coordinate with the solid waste landfill operators to ensure adequate capacity is available prior to construction.

Significance After Mitigation

Less than significant.

3.6 RECREATION

This section addresses the impacts of the proposed project on recreational resources and facilities in the project area. This analysis was prepared using information from city and county general plans and resource agency plans.

SETTING

The MWA service area contains a multitude of recreation opportunities, including hiking, camping, fishing, swimming, water skiing, sightseeing, picnicking, and off-road vehicle (ORV) use. Recreation providers operate federal, state, and local open space lands and facilities in the service area and surrounding areas to support these opportunities. **Figure 3.6-1** shows the locations of recreation areas within the MWA service area.

BUREAU OF LAND MANAGEMENT – CALIFORNIA DESERT CONSERVATION AREA

BLM manages about half of the land in the MWA service area for recreation and other uses under the CDCA Plan. Recreation on BLM lands consists of camping, hiking, sightseeing, hunting, rock-climbing, land sailing, and ORV use. The CDCA Plan is used for managing four wilderness areas within or near the RWMP area: Golden Valley, Newberry Mountains, Rodman Mountains, and Bighorn Mountains. Wilderness areas provide backpacking, hiking, educational, and scenic opportunities for local and regional populations. Additionally, the CDCA Plan manages three ORV areas within the MWA service area, the El Mirage ORV Area, the Stoddard Valley ORV Area and the Johnson Valley ORV Area.

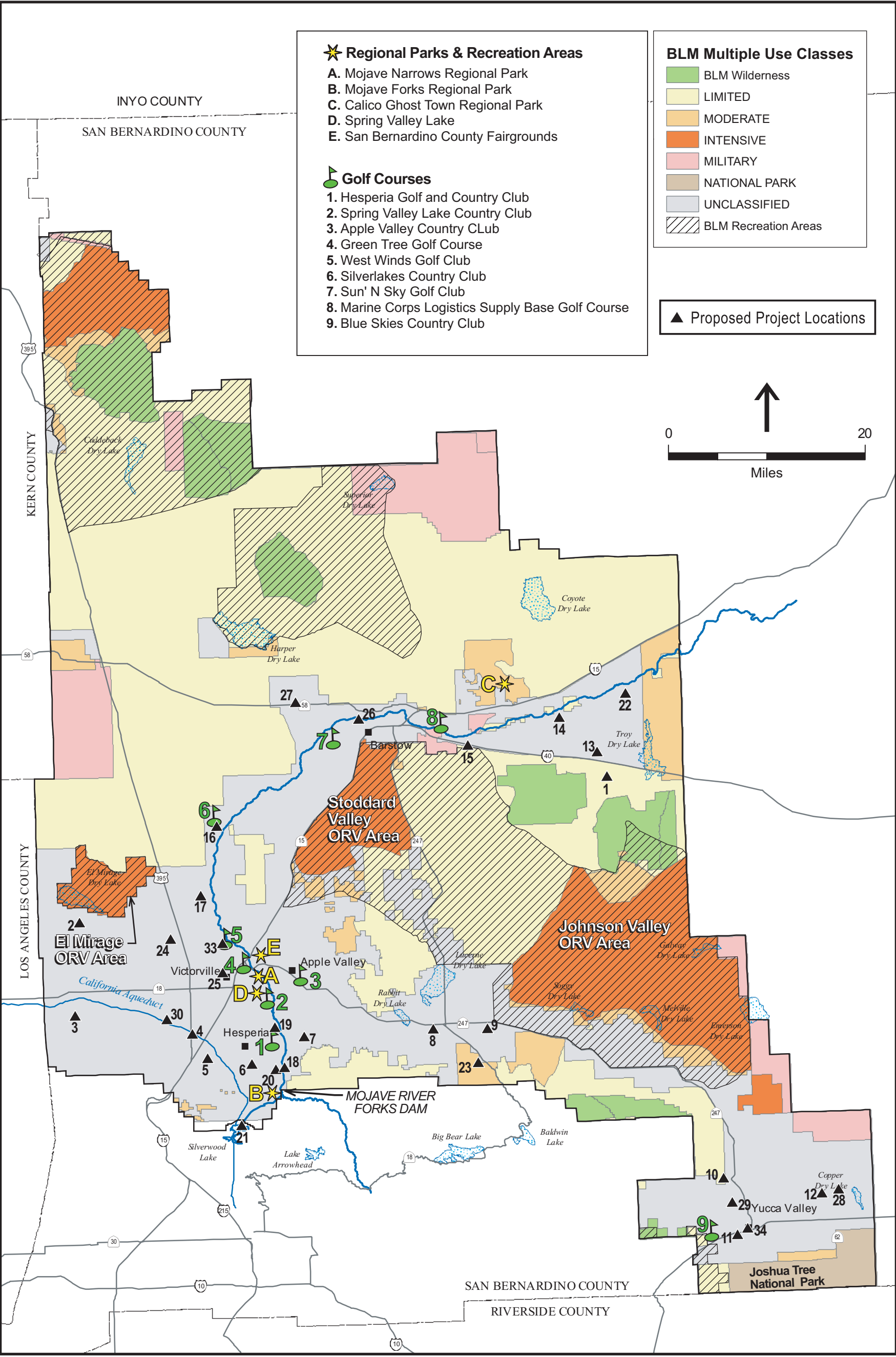
U.S. FOREST SERVICE – SAN BERNARDINO NATIONAL FOREST

The San Bernardino National Forest is located immediately south of the MWA service area in the San Bernardino and San Gabriel Mountains. The USFS manages the forest, which comprises meadows, rolling hills, mountain peaks, cliffs, lakes, chaparral slopes, and evergreen and oak forests.

Recreation activities in San Bernardino National Forest include hiking, backpacking, camping, hunting, horseback riding, rock climbing, picnicking, sightseeing, fishing, and downhill and cross-country skiing. ORV use is also allowed in designated areas. These activities are generally concentrated in wilderness areas including Cucamonga, San Gorgonio, and San Jacinto.

NATIONAL PARK SERVICE – JOSHUA TREE NATIONAL MONUMENT

The Joshua Tree National Monument, located southeast of the MWA service area, provides camping areas, day use areas, trail facilities, education centers, and sightseeing facilities on 550,000 acres. Use of these lands is more strictly controlled than on adjacent BLM or state desert lands.



SOURCE: Bureau of Land Management 2004

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Figure 3.6-1
Recreational Land Use Area Map

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION – SILVERWOOD LAKE STATE RECREATION AREA

The Silverwood Lake State Recreation Area is located immediately south of the RWMP area in the San Bernardino National Forest. Silverwood Lake was formed by the construction of the Cedar Springs Dam across the West Fork of the Mojave River in 1972. The 2,400-acre recreation area provides camping, picnicking, hiking, biking, boating, fishing, water skiing, and swimming opportunities. The lake is stocked with rainbow trout and channel catfish for freshwater fishing.

COUNTY OF SAN BERNARDINO – REGIONAL PARKS

The San Bernardino County Regional Parks Department manages the three regional parks within the MWA service area: the Mojave Narrows Regional Park bordering Victorville along the Mojave River; the Mojave River Forks Regional Park southeast of Hesperia; and the Calico Ghost Town Regional Park just north of Yermo. The regional parks are described below.

Mojave Narrows Regional Park

The Mojave Narrows Regional Park offers fishing, swimming, boat rides, picnic facilities for day trips, and a 112-unit campground for overnight guests. The Mojave Narrows Regional Park provides hiking and equestrian trails and wheelchair-accommodating nature trails. Other facilities at this 840-acre regional park include an equestrian center with horse rentals, an archery range, a petting zoo, and turf areas for baseball and other games.

Mojave River Forks Regional Park

The Mojave River Forks Regional Park is located southeast of Hesperia along the west fork of the Mojave River near the Mojave River Forks Dam. Recreation opportunities at this 1,100-acre regional park include camping, picnicking, hiking, mountain biking, equestrian riding, and OHV use.

Calico Ghost Town Regional Park

The Calico Ghost Town Regional Park is a theme park north of Yermo that was built to resemble a mining town from the 1880s. The park has camping and picnicking facilities and hiking trails. Recreation at the 480-acre park is focused on daily tours and annual events on Mother's Day, Columbus Day, and Palm Sunday.

CITY OF VICTORVILLE

The Victorville Parks and Recreation District manages the neighborhood, community, and citywide parks within the city's sphere of influence. Recreation facilities include 14 parks, two golf courses, two swimming pools and four community centers. Other recreation areas in

Victorville include the San Bernardino County fairground, Spring Valley Lake at Victor Valley Community College, and Mojave Narrows Regional Park¹.

CITY OF ADELANTO

The City of Adelanto General Plan designates more than 5,400 acres of open space lands within the City². Although not all open space lands can be used for recreation, the general plan open space policies encourage recreation uses when compatible. The general plan map for Adelanto indicates that five neighborhood or community parks comprise approximately 110 acres of the open space lands. Facilities include game fields and picnic areas. Maverick Stadium, built in 1991, is home to Adelanto's minor league baseball team.

CITY OF HESPERIA

The Hesperia Recreation and Park District, established in 1957, maintains a system of community and neighborhood parks. The District currently maintains six parks, with one under construction and one open space area. Hesperia Lake Park, one of the larger city parks, provides fishing and camping opportunities.

The City also has established standards for new developments to provide neighborhood parks. Private recreation resources in the City include the Hesperia Country Club and Golf Course. Hesperia residents also use regional recreation facilities, including the Mojave Narrows Regional Park, north of Hesperia along the Mojave River; the Mojave Forks Regional Park, in Summit Valley; and the San Bernardino County fairground located in Victorville.

TOWN OF APPLE VALLEY

The Apple Valley Park and Recreation Department is responsible for designing, operating and maintaining public facilities that include a community center, gymnasium, 13 parks and playgrounds, an equestrian center and ball fields. The Apple Valley Country Club and Jess Ranch Golf Club, privately owned recreation facilities, provide golf and other recreational opportunities within the Town limits. Recreation opportunities in the area also focus on the Mojave Narrows Regional Park, located adjacent to the Town boundary, and BLM Desert Conservation Area lands to the east and immediately south of the Town.

CITY OF BARSTOW

The Barstow Parks and Recreation District maintains 102 acres of recreational open space within the incorporated City of Barstow and the Barstow Heights, Lenwood, Hodge, Grandview, Skyline North, Skyline East, and Fort Irwin Estates communities. The Barstow Parks and Recreation District plans and maintains neighborhood and community parks and special facilities, including golf courses, swimming pools, and a community center and museum³. The City of Barstow

¹ City of Victorville 1988.

² City of Adelanto 1985.

³ City of Barstow, *Draft General Plan Environmental Impact Report*, August 1987.

contains 11 designated park areas as well as one nine-hole public golf course and one nine-hole privately owned golf course. Nearby Stoddard Valley ORV Area and BLM Desert Conservation Area land also provide recreation opportunities near Barstow.

TOWN OF YUCCA VALLEY

According to the General Plan, the Town of Yucca Valley park and recreation facilities consist of five useable, existing parks that are developed or partially developed and under the management of the Town. Two additional parks exist but are not managed by the Town. The Blue Skies golf Course, an 18-hole course, also serves the Town. Residents of Yucca Valley also use the nearby recreational areas of Joshua Tree National Park and the Big Morongo Canyon Wildlife Preserve.

RECREATION LAKES IN THE MOJAVE RIVER AREA

Many small artificially created lakes exist in the Mojave River area for recreational use. Recreation on the lakes includes water skiing, boating, and picnicking. Water for these lakes is provided by extracting groundwater from underlying aquifers.

REGULATIONS

The local city General Plans identify recreational areas contain Open Space Plan in the Resource Element. Two major goals of the plans are to utilize the Mojave River corridor for recreational trails and to preserve its significant, natural areas and the natural resources.

TOWN OF APPLE VALLEY

The Apple Valley Park and Recreation Department has established a standard of three acres of recreation space per 1,000 residents⁴. The Apple Valley General Plan (1991) designates over 3,000 acres of land for open space. Although not all of this land will support active recreation uses, these areas will provide additional recreation opportunities for residents.

TOWN OF YUCCA VALLEY

The Town of Yucca Valley General Plan contains a Parks, Recreation, and Trails Element that identifies the following major goals:

- **Goal 1:** A multi-use, quality system of parks, and recreational areas that support a broad range of activities, as well as cultural, and a passive open space enjoyment opportunities for current and future residents.
- **Goal 2:** An enhanced and expanded park and recreational system designed to provide opportunities for healthful active, passive, and cultural enjoyment throughout the Town and to all segments of the population.

⁴ Town of Apple Valley, *General Program Hearing Draft Environmental Impact Report*, May 24, 1991.

IMPACT ASSESSMENT AND MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

The CEQA Guidelines establish that a project would normally have a significant effect on existing land uses if it would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would be accelerated;
- Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

These impacts established by CEQA generally result directly from population growth. The potential for growth inducement and a discussion of growth-related impacts are included in Chapter 4.0.

This section considers impacts of the proposed project on recreation based on whether the proposed project would:

- Interfere with existing recreational area activities during construction or operation of the proposed project;
- Displace existing or planned recreational areas due to implementation of the proposed project.

Impact 3.6-1: The proposed projects could adversely affect parks or recreational facilities.

Projects

Recharge Basins

Recharge basins could be constructed near recreational areas that could be considered sensitive land uses. Recharge basins may be located on or in the vicinity of recreational areas in the Alto subarea. River flows in the Mojave River could affect the Mojave River Forks Regional Park and the Mojave Narrows Regional Park. In order to minimize the impacts of recharge projects on recreational facilities, MWA or the implementing agency would coordinate with the applicable recreation or park agency to identify ways to minimize impacts of the project on recreational activities. Where a recharge basin would be located directly on recreational land, MWA would coordinate with the applicable park or recreation agency to gain approval of the project. Siting of RWMP projects within recreational areas of intensive uses, such as ORV uses (at El Mirage, Stoddard, and Johnson ORV Areas), could restrict recreational access, including temporary closure of trails or park areas.

Some recharge projects may require work within the Mojave River in the vicinity of recreational river uses, particularly in the vicinity of Mojave Narrows Regional Park and Mojave Forks

Regional Park which are located directly on the Mojave River. Implementation of these projects may alter river flows. This could interfere with recreational activities associated with these parks.

Pipelines

The proposed pipelines may be located on lands used for recreational purposes. Pipelines would be below grade and would not be visible from above the ground surface. Therefore, operation of pipeline projects would not impact recreational land uses. However, during construction of pipelines on or near recreational areas, recreational uses may be temporarily disrupted.

Injection / Extraction Wells

Injection wells and extraction wells would involve minimal structures and would not generally impact recreational land uses depending on their location. Construction of injection and extraction wells on or near recreational areas may result in temporary disruptions to recreation land uses.

Management Actions

Reclamation

Recycled water could be used on parks and golf courses in the MWA service area. Recycled water is approved for use in recreational facilities by DHS.

Wellhead Treatment

Wellhead treatment would involve minor modifications to existing wellheads in the MWA service area. Development of related structures would be minimal. As a result, impacts to recreational land uses are anticipated to be minimal.

Treatment Plant

Construction of treatment plants on or near recreational areas may result in temporary disruptions to recreation land uses. Construction of treatment plants may also result in temporary impacts to recreational facilities, involving temporary closure of trails or park areas.

Mitigation Measures

M3.6-1 Implementing agencies shall identify locations for recharge basins, injection and extraction wells, and reclamation and treatment plants that will minimize impacts to recreational facilities. Favorable sites would:

- **Require minimal alteration of existing recreational facilities, including trails;**
- **Require minimal development of new access roads;**

- Minimize visual impacts to existing trails and scenic lookouts; and,
- Minimize impacts to biological and geological resources of existing parks and recreational facilities.

M3.6-2 For projects located in recreational areas, implementing agencies shall coordinate with the applicable recreation or park agency to identify ways to minimize impacts of the project on recreational activities. Measures may include but are not limited to:

- Use of vegetation to screen proposed facilities from view of adjacent recreational land uses;
- Security fencing shall be utilized to enclose facilities, as necessary.
- Posting of signage indicating dates during which use of recreational areas would be restricted due to construction;
- Placement of fencing to isolate construction areas and allow continued use of other areas of recreational parks and facilities;
- Timing of construction activities to avoid peak recreational use seasons.

M3.6-3 In the event that water transfers would result in increased frequency of water releases into Mojave River, MWA shall consult with the park and recreation agencies to ensure that recreational trails and other facilities would not be affected by the proposed actions.

Significance After Mitigation

Less than significant.

3.7 AESTHETICS

This section identifies key visual resources in the MWA service area and evaluate potential impacts of the RWMP.

SETTING

The MWA service area lies in the Mojave Desert. The service area is located on the northeastern flank of the San Bernardino and San Gabriel Mountains, which separate the High Desert from the coastal basins and inland valleys of the greater Los Angeles area. These mountains, which reach elevations of over 10,000 feet asl, were uplifted along the San Andreas Fault. The High Desert Area is characterized overall as an alluvial plain providing long range views with few interruptions. The Mojave River, which originates in the San Bernardino Mountains, is a major landscape feature in this region.

A mixture of Mojavean creosote bush scrub and western Mojave desert saltbrush scrub dominates the desert landscape. Joshua trees, which occasionally occur as dense woodland, add visual variety to the desert landscape in certain areas. Riparian and wetland vegetation is sparse in this region, occurring in scattered stretches along the Mojave River.

The project areas encompass the desert communities of Adelanto, Victorville, Apple Valley, Hesperia, Yucca Valley, and Barstow. Scenic areas include Joshua Tree National Park, the restored ghost town of Calico, and much of the open desert itself. The overall general aesthetic and visual character of this area consists of an expansive desert horizon and sparsely inhabited landscape with views of the surrounding San Bernardino Mountain and San Gabriel Mountain ranges in the distance.

The Morongo Basin Subregion is referred to as the South Desert and includes the unincorporated communities of Morongo Valley, Yucca Valley, and Joshua Tree. The Town of Yucca Valley is located between the intersection of the little San Bernardino Mountains and the Sawtooth Mountains. There is a distinct contrast of a snow-capped mountain scenery and vast expanses of desert that all contribute to the Town's scenic beauty.

REGIONAL AESTHETIC RESOURCES

Aesthetically significant features range in character from more urban centers to rural agricultural lands to a natural desert landscape. The range of visual features in the region are affected by climate, topography, and flora and fauna in the natural environment, as well as the diversity of lifestyle, composition, and distribution of the built environment. Natural features include land and water resources such as open space and recreation areas, wilderness areas (mountains and deserts), and natural water sources. Other natural features may contain visual significance such as rivers, streams, creeks, lakes, and reservoirs located within the region. The greatest scenic resource for the MWA service areas are the panoramic views of the Mojave Desert, the San Bernardino and San Gabriel Mountains, the Mojave River and the Joshua tree habitats.

Undeveloped open space represents the largest land use in San Bernardino County. The County of San Bernardino GPU estimates open space resources totaling nearly 9.9 million acres, with the U.S. BLM managing over 7 million acres. There are approximately 1.5 million acres of scenic areas within the East Mojave National Scenic Areas.¹

MOJAVE RIVER

The Mojave River begins flowing northerly, largely underground flow near Hesperia at the boundary of the San Bernardino National Forest and terminating in the Mojave National Preserve. It is the focal hydrologic system of the central portion of the West Mojave Desert area. The two primary forks of the upper watershed, Deep Creek and the West Fork of the Mojave River, converge at the Mojave Forks Dam to form the mainstream of the Mojave River. There is a 2.9 mile segment of the Mojave River near Afton Canyon that is under consideration for the National Wild and Scenic Rivers System. The segment identified contains Outstanding Remarkable Scenic Values, i.e., Class “A” scenic quality, according to the BLM Manual guidelines. A segment of Deep Creek is also under consideration as a National Wild and Scenic River.

Vegetation in the 2.9 mile segment consists of riparian plant communities, including Cottonwood-Willow Riparian Forest, Willow Scrub, Mesquite Bosque, as well as alkaline meadow, and other emergent plant communities. Wildlife supported by these plant communities includes a high percentage of neotropical migrant birds and local or regional disjuncts such as yellow warbler, vermilion flycatcher, summer tanager and yellow-breasted chat. The flowing water in this segment has served to attract humans for thousands of years. In terms of its geologic features, this segment presents a spectacular landscape of badlands with an exposed multicolored stratigraphy. It also offers an important historic and recreation feature attracting a high number of users. Public lands in this segment have been designated as an Area of Critical Environmental Concern in part because of the spectacular scenery.

DESIGNATED SCENIC HIGHWAYS AND VISTA POINTS

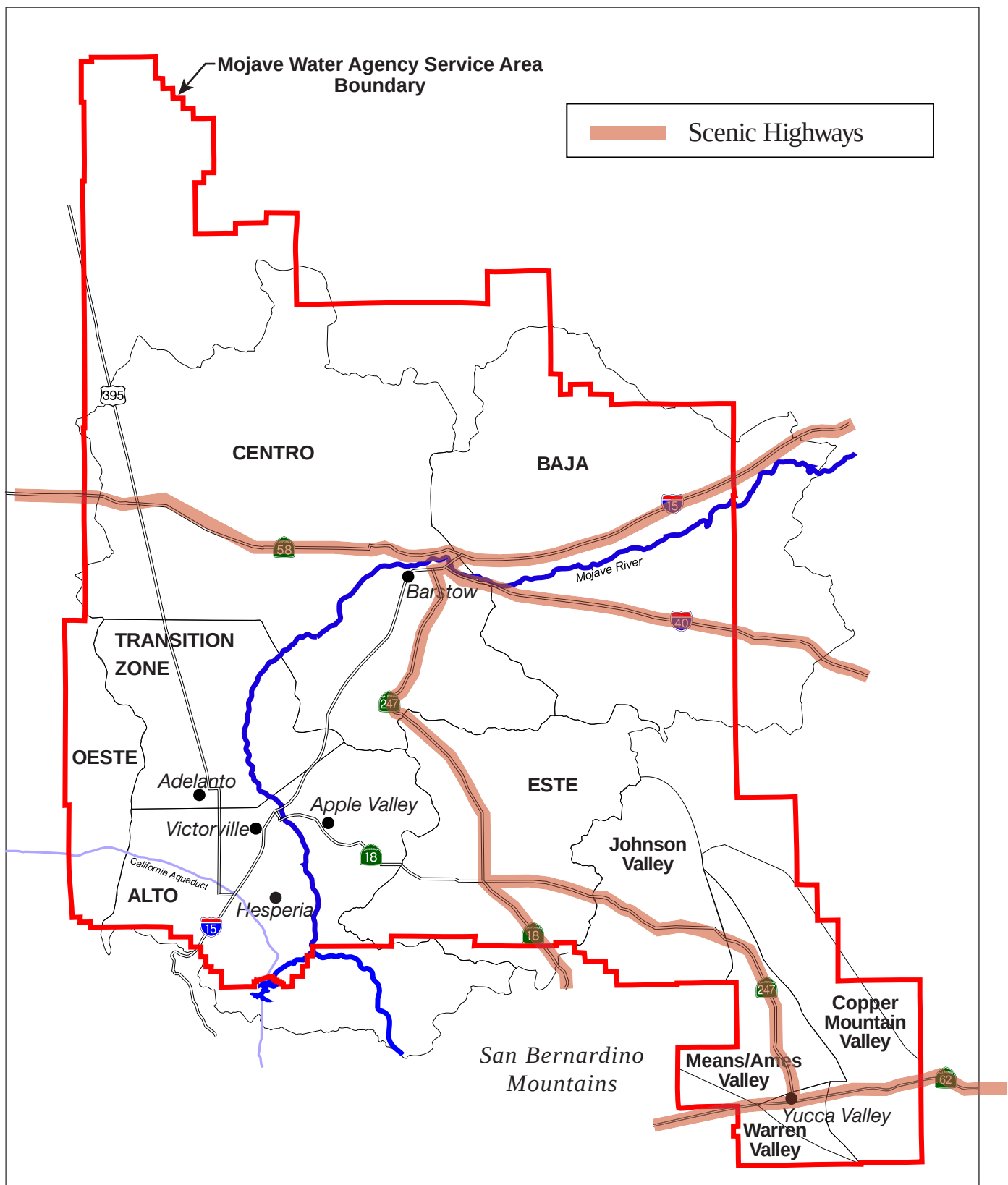
No scenic highways have been officially designated by Caltrans within the MWA service areas. However, there are roadways in the service area that are eligible to be designated as State Scenic Highways. They are shown in **Figure 3.7-1** and also listed below in **Table 3.7-1**.

REGULATORY SETTING

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) – CALIFORNIA SCENIC HIGHWAYS PROGRAM

The California Scenic Highways Program was created by the state legislature in 1963 to preserve and protect scenic highway corridors from change that would reduce the aesthetic value of lands

¹ County of San Bernardino General Plan, 1991.



SOURCE: BLM Special Edition 1997, Desert Access Guides
(Victorville, San Bernardino, Big Bear Lake, Newberry Springs)

MWA RWMP / 203148 ■

Figure 3.7-1
Eligible Scenic Highways in the Mojave Water Agency Area

TABLE 3.7-1
RWMP ROADWAYS ELIGIBLE FOR STATE SCENIC HIGHWAY DESIGNATION

Route	County	Location	Miles
I-15	San Bernardino	From Route 58 near Barstow to Route 127 near Baker.	59.7
SR-18	San Bernardino	From Route 138 near Mt. Anderson to Route 247 near Lucerne Valley.	56.1
SR-40	San Bernardino	Barstow/Needles	154.6
SR-58	Kern / San Bernardino	From SR-14 near Mojave/ I-15 near Barstow	107.5
SR-62	Riverside / San Bernardino	From Route 10 near Whitewater to Arizona state line near Earp via Morongo Valley, the vicinity of Yucca Valley, Twentynine Palms, Rice, and Vidal Junction. Entire Route.	142.7
SR-127	San Bernardino / Inyo	From Route 15 near Baker to the Nevada state line via the vicinity of Death Valley Junction.	49.4
SR-247	San Bernardino	From Route 62 near Yucca Valley to Route 18 near Lucerne Valley to Route 15 in Barstow. Entire route.	78

Source: California Department of Transportation. (n.d.). Officially designated state scenic highways. Retrieved July 7, 2004, from <http://www.dot.ca.gov/hq/LandArch/scenic/schwy1.html> and <http://www.cahighways.org>.

adjacent to highways. To be included in the state program, the highways proposed for designation must meet Caltrans' eligibility requirements and have visual merit. County highways and roads that meet the Caltrans Scenic Highways Program standards may also be officially designated.

Caltrans requires that a roadway proposed for inclusion in this program be included in a local scenic corridor protection program that applies to the area of land within the scenic corridor.

LOCAL AGENCIES AND REGULATIONS

The San Bernardino County General Plan cites the following as a determination of scenic value for a feature or vista:

- Provides a vista of undisturbed natural areas.
- Includes a unique or unusual feature which comprises an important or dominant portion of the viewshed.
- Offers a distant vista which provides relief from less attractive views of nearby features (such as views of mountain backdrops from urban areas).

Scenic Corridors

Scenic corridors connect many of the visually attractive areas in San Bernardino County. The system is designed to enhance the opportunities for recreational driving and to protect views from the road. The scenic corridor is the visible land areas outside the highway right-of-way.

IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

The recommended project would pose a significant impact, if it:

- Blocks scenic views (e.g., mountains, ocean, rivers, or significant man-made structures).
- Alters the appearance of designated scenic resources along or near a state-designated or county-designated scenic highway or vista point.
- Creates significant contrasts with the scale, form, line, color, and/or overall visual character of the existing landscape setting.
- Is inconsistent with applicable local guidelines or regulations.
- Conflicts with adopted visual resource policies.
- Have substantial, demonstrable negative effect.
- Substantially reduces the vividness, intactness, or unity of high-quality views.
- Substantially changes the quality of scenic corridors or views from scenic roadways.

Impact 3.7-1: The projects and management actions could degrade the existing character or quality of the sites and their surroundings.

The projects proposed primarily consist of constructing recharge basins, pipelines, and injection/extraction wells. Many of the management actions proposed would not involve construction activities. Impacts to scenic resources resulting from these proposed projects would depend on several factors such as the type of project proposed for the given area, scenic resources in the given area, and duration of the proposed construction activities. Construction of recharge basins, wells, and treatment plants could add visual elements of urban character to an existing natural, rural and open space. The RWMP region contains approximately 4,900 square miles, many of which are in their natural state or are primarily rural. Construction projects outside of the urban core would add visual elements of urban character to these regions.

Recharge/Detention Basins

Groundwater recharge basins are above-ground developments composed primarily of natural earth as much as 10 to 15 feet in height. The berms may be located within low-lying drainages or may block views of the surrounding areas from local streets and land uses. However, impacts to long range views from areas beyond the immediate vicinity of the basins would not be anticipated.

Recharge basins would add a developed character to existing natural, rural and open space areas. Implementation of mitigation measures would minimize the impact to regional scenic resources.

Pipelines

Distribution pipelines would be constructed below grade primarily within existing public roadway rights-of-way. Once constructed, the projects would not have adverse effects on scenic resources.

Injection/Extraction Wells

Installing extraction or injection wells would involve constructing a well pad area within a 5,000 to 10,000 square foot area. The new facilities would add a developed character to existing natural, rural or open space areas. Implementation of mitigation measures would minimize the impact to regional scenic resources.

Management Actions

Reclamation

Increased use of reclaimed water would not adversely affect scenic resources.

Treatment Plants/Blending

Construction of treatment plants could affect local scenic resources depending on their location. Treatment plants could require significant amounts of land in otherwise undeveloped areas. Implementation of mitigation measures would minimize the impact to regional scenic resources.

Mitigation Measures

M3.7-1 Implementing agencies shall implement design guidelines consistent with local policies and programs to protect scenic values and to avoid visual intrusions.

M3.7-2 Implementing agencies shall incorporate landscaping plans into final designs of large projects such as recharge basins and treatment plants to mask views of new structures.

Significance After Mitigation

Less than significant.

3.8 AIR QUALITY

The setting section below provides region-specific information related to climate and topography, followed by an overview of the regulatory context (plans, policies, and regulations), and finally, existing air quality conditions. The air pollutants of concern in the Mojave Desert Air Basin are primarily ozone and particulate matter. The analysis of air quality impacts focuses on construction and operational emissions associated with the individual categories of 2004 RWMP projects and management actions.

SETTING

CLIMATE AND TOPOGRAPHY

The Mojave Desert Air Basin is characterized by a dry, hot desert climate. The intervening mountain ranges block cool, moist coastal air and create hot (average daily highs above 100 degrees Fahrenheit) and dry summers and cooler winters. On average, 20 to 30 frontal systems move into the Air Basin each winter only a few of which produce measurable precipitation (approximately 5 inches per year). In summer, the area is primarily influenced by a Pacific subtropical high-pressure system that sits off the coast blocking cloud formation and encouraging daytime solar heating.

The inversion conditions in the Air Basin are much less favorable for the build-up of high ozone concentrations than in the coastal areas of Southern California. When subsidence inversions occur, they are generally 6,000 to 8,000 feet above the desert surface, allowing much greater vertical mixing than along the coast where the inversion base is much lower. As a result, meteorology in the Mojave Desert Air Basin is less favorable for the chemical mixing characteristic of typical ozone formation.

The Mojave Desert Air Basin experiences high prevailing winds primarily from the southwest and west¹. The exchange of lower and upper air tends to accelerate surface winds during the warm part of the day when convection is at a minimum. During the winter, the rapid cooling of the surface layers at night retards this exchange of momentum, which often results in calm conditions.

EXISTING AIR QUALITY CONDITIONS

The MDAQMD and California Air Resources Board (CARB) operate a regional air quality-monitoring network in the Mojave Desert Air Basin consisting of 14 monitoring stations that provides information on ambient concentrations of criteria air pollutants. Monitored ambient air pollutant concentrations reflect the number and strength of emissions sources and the influence of topographical and meteorological factors. **Table 3.8-1** shows a summary of regional monitoring data collected over the past five years for those pollutants for which the Mojave Desert Air Basin is designated “nonattainment.”

¹ California Air Resources Board, *California Surface Wind Climatology*, June 1984.

**TABLE 3.8-1
SUMMARY OF BASINWIDE MONITORING DATA FOR THE
MOJAVE DESERT AIR BASIN, 1999-2003**

Pollutant	State Std.	National Std.	Pollutant Concentration by Year ^a				
			1999	2000	2001	2002	2003
<i>Ozone</i>							
Highest 1-hour average, ppm ^b	0.09	0.12	0.137	0.163	0.146	0.157	0.163
Days over State Standard			83	86	72	75	93
Days over National Standard			4	11	6	16	13
Highest 8-hour average, ppm ^b	NA	0.08	0.122	0.132	0.117	0.123	0.130
Days over National Standard			73	72	65	66	74
<i>Respirable Particulate Matter (PM₁₀)</i>							
Highest 24-hour average (State/National), µg/m ³ ^{b,c}	50	150	40/109	90/90	112/115	194/208	158/162
Estimated Days over State Standard			0	6	6	12	12
Estimated Days over National Standard			0	0	0	6	2
Highest annual arithmetic mean (State/National), µg/m ³ ^{b,c}	20	50	18/32	20/34	20/30	24/34	22/23

Source: California Air Resources Board, Air Quality Data Statistics 1999-2003; <http://www.arb.ca.gov/adam>.

Note: **Bold** values are in excess of applicable standard. NA = Not Applicable or Not Available.

^a For regional pollutants, ozone and PM₁₀, this table summarizes the data from all of the monitoring stations within the Mojave Desert Air Basin.

^b ppm, parts per million; µg/m³, micrograms per cubic meter.

^c State and national statistics may differ for the following reasons: 1) State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods; 2) State statistics are based on local conditions, whereas national statistics are based on standard conditions; and 3) State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

As shown in Table 3.8-1, the regional monitoring network has recorded exceedances of the state ozone standard on average of approximately 82 days per year over the past five years. Exceedances of the national one-hour and eight-hour standards occur less frequently, on approximately 10 and 70 days, respectively.

The Mojave Desert Air Basin is downwind of the Los Angeles Air Basin, and to a lesser extent, is downwind of the San Joaquin Valley. CARB has recognized that prevailing winds transport ozone and ozone precursor emissions from both regions into and through the Mojave Desert Air Basin during the summer ozone season. Local MDAQMD emissions contribute to exceedances of both the national and state standards for ozone, but the Mojave Desert Air Basin would be in

attainment of both standards without the influence of this transported air pollution from upwind regions².

With respect to PM₁₀, the regional monitoring network recorded exceedances of the state 24-hour standard at one or more of the stations in the Mojave Desert Air Basin in four of the past five years. The state annual arithmetic mean standard has been exceeded in the past two years. The number of actual exceedances is likely to be much higher, since PM₁₀ is measured every sixth day rather than daily as is the case for ozone.

REGULATIONS

Regulation of air pollution is achieved through both national and state ambient air quality standards and emissions limits for individual sources of air pollutants. The federal Clean Air Act (CAA) requires the U.S. EPA to identify National Ambient Air Quality Standards (national standards) to protect public health and welfare. National standards have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. These pollutants are called “criteria” air pollutants because standards have been established for each of them to meet specific public health and welfare criteria. California has adopted more stringent ambient air quality standards for most of the criteria air pollutants (referred to as State Ambient Air Quality Standards or State standards). **Table 3.8-2** presents both sets of ambient air quality standards (i.e., national and state) and provides a brief discussion of the related health effects and principal sources for each pollutant.

Under amendments to the federal CAA, the U.S. EPA has classified air basins, or portions thereof, as either “attainment” or “nonattainment” for each criteria air pollutant, based on whether or not the national standards have been achieved. Under the federal CAA Amendments of 1990, ozone nonattainment areas are further classified as marginal, moderate, serious, severe, or extreme, depending upon the severity of peak ozone concentrations in the area. In 1988, the State Legislature passed the California CAA, which is patterned after the federal CAA to the extent that areas are required to be designated as “attainment” or “nonattainment;” however, area designations that have been made under the California CAA correspond to the state standards, rather than the national standards. Thus, areas in California have two sets of attainment / nonattainment designations: one set with respect to the national standards and another set with respect to the state standards.

The federal CAA also requires nonattainment areas to prepare air quality plans that include strategies for achieving attainment. Air quality plans developed to meet federal requirements are referred to as State Implementation Plans (SIPs). The state California CAA also requires plans for nonattainment areas with respect to the state standards. Thus, just as areas in California have two

² Mojave Desert Air Quality Management District, *Revised Draft MDAQMD 2004 Ozone Attainment Plan (State and Federal)*, March 2004.

TABLE 3.8-2
STATE AND NATIONAL CRITERIA AIR POLLUTANT
STANDARDS, EFFECTS, AND SOURCES

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 hour 8 hours	0.09 ppm ---	0.12 ppm 0.08 ppm	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when reactive organic gases (ROG) and nitrogen oxides (NO _x) react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial / industrial mobile equipment.
Carbon Monoxide	1 hour 8 hours	20 ppm 9.0 ppm	35 ppm 9 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
Nitrogen Dioxide	1 hour Annual Avg.	0.25 ppm ---	--- 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
Sulfur Dioxide	1 hour 3 hours 24 hours Annual Avg.	0.25 ppm --- 0.04 ppm ---	--- 0.5 ppm 0.14 ppm 0.03 ppm	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
Respirable Particulate Matter (PM₁₀)	24 hours Annual Avg.	50 µg/m ³ 20 µg/m ³	150 µg/m ³ 50 µg/m ³	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g. wind-raised dust and ocean sprays).
Fine Particulate Matter (PM_{2.5})	24 hours Annual Avg.	--- 12 µg/m ³	65 µg/m ³ 15 µg/m ³	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; Also, formed from photochemical reactions of other pollutants, including NO _x , sulfur oxides, and organics.
Lead	Monthly Ave. Quarterly	1.5 µg/m ³ ---	--- 1.5 µg/m ³	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurologic dysfunction.	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.

Source: California Air Resources Board, available at <http://www.arb.ca.gov/aqs/aaqs2.pdf>, June 12, 2003.

Note: ppm = parts per million, µg/m³ = micrograms per cubic meter.

sets of designations, many also have two sets of air quality plans: one to meet federal requirements relative to the national standards and another to meet state requirements relative to the state standards.

Regulatory Agencies

U.S. EPA is responsible for implementing the myriad of programs established under the federal CAA, such as establishing and reviewing the national standards and judging the adequacy of State Implementation Plans, but has delegated the authority to implement many of the federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented.

The CARB, the State air quality management agency, is responsible for establishing and reviewing the state ambient air quality standards, compiling the California SIP and securing approval of that plan from U.S. EPA. CARB also regulates mobile emissions sources in California, such as construction equipment, trucks, and automobiles, and oversees the activities of air quality management districts, which are organized at the county or regional level. The county or regional air quality management districts are primarily responsible for regulating stationary emissions sources at industrial and commercial facilities within their jurisdiction and for preparing the air quality plans that are required under the federal CAA and state California CAA.

The MWA service area is located entirely within the Mojave Desert Air Basin, which stretches out over 20,000 square miles of California's desert area. The Mojave Desert Air Basin includes desert portions of Kern, Los Angeles, San Bernardino and Riverside counties. The regional agency primarily responsible for regulating air quality in the Air Basin is the MDAQMD. The MDAQMD has primary responsibility for regulating stationary sources of air pollution situated within its jurisdictional boundaries. To this end, the District implements air quality programs required by State and Federal mandates, enforces rules and regulations based on air pollution laws, and educates businesses and residents about their role in protecting air quality.

Air Quality Plans, Policies and Regulations

Plans and Policies

The Mojave Desert Air Basin is currently designated as nonattainment for state ozone and PM₁₀ standards³. In addition, a subarea within the Mojave Desert Air Basin (in the northwestern corner of San Bernardino County near Trona) is designated as nonattainment for hydrogen sulfide and sulfates; the proposed 2003 designations redesignate this small area as attainment for sulfates and only the Searles Valley Planning Areas would remain nonattainment for hydrogen sulfide. The Air Basin is designated as attainment or unclassified with respect to the state standards for the remaining criteria air pollutants, including NO_x, CO, SO₂, lead and visibility reducing particles.

In addition, a subregion (referred to as the Southeast Desert Modified Air Quality Management Area) within the Air Basin is designated a "severe" nonattainment area with respect to the national one-hour ozone standard; this subregion includes all or portions of Kern, Los Angeles, Riverside, and San Bernardino counties located within the Air Basin. The Mojave Desert Air Basin is also designated as a nonattainment for the national PM₁₀ standard in most areas. The Air Basin is

³ California Air Resources Board, available at: <http://www.arb.ca.gov/aqs/aqs2.pdf>, June 12, 2003.

designated as attainment or unclassified with respect to the national standards for the remaining criteria air pollutants, including NO_x, CO, and SO₂.

As noted above, the federal CAA and the state California CAA require plans to be developed for areas designated as nonattainment (with the exception of areas designated as nonattainment for the state PM₁₀ standard). Plans are also required under federal law for areas designated as “maintenance” (i.e., formerly nonattainment) for national standards. Air quality plans developed to meet federal requirements are included in the overall SIP program.

The MDAQMD has adopted state and federal attainment plans for the region within its jurisdiction. The most recent ozone plan that was approved by the U.S. EPA to address nonattainment of the national standard is the *Attainment Demonstration Plan* adopted in 1994, whereas the most recently adopted state ozone plan is the *1996 Triennial Revision to the 1991 Air Quality Attainment Plan*. The current plan that addresses both state and national ozone nonattainment is the *Draft MDAQMD 2004 Ozone Attainment Plan*. This plan demonstrates that the Mojave Desert Air Basin will be in attainment of the national ozone standard by the required year, 2007, and that the Air Basin will show significant progress towards attainment of the state standards for ozone within that timeframe. This planning document includes the latest planning assumptions regarding population, vehicle activity and industrial activity. The document also addresses all existing and forecast ozone precursor-producing activities within the Air Basin through 2007 (MDAQMD, 2004).

The *Federal Particulate Matter (PM₁₀) Attainment Plan* proposes a reduction in the geographic extent of the federal PM₁₀ nonattainment area and refers to this smaller area as the Mojave Desert Planning Area. The federal PM₁₀ Plan recognizes that the nonattainment of PM₁₀ in the planning area is caused by both fugitive dust sources operating within the area as well as region-wide wind-blown dust during moderate to high wind episodes (MDAQMD, 1995). The Plan identifies that local sources will be controlled with a strategy that focuses on unpaved road travel, construction, and local disturbed areas in the populated areas, and certain stationary sources operating in Lucerne Valley and recognizes that it is not feasible to implement control measures to reduce dust from regional wind events. The Plan includes a construction and demolition control measure intended to reduce emissions from construction and demolition activities. The control measures requires that construction projects that would disturb one-half acre or more of land implement dust control measures, and includes enhanced measures and requirements for construction sites greater than 100 acres (MDAQMD, 1995).

Rules and Regulations

The MDAQMD is the agency primarily responsible for regulating stationary emissions sources at industrial and commercial facilities within the Mojave Desert Air Basin. The MDAQMD regulates air quality through its permit authority over most types of stationary emissions sources and through its planning and review activities. MDAQMD exercises its permit authority through its own *Rules and Regulations*. The types of emissions sources that would be associated with the project, including mobile equipment and trucks related to construction are generally not subject to the permitting requirements of the MDAQMD. However, certain rules apply to all projects, such

as nuisance rules and restrictions on use of cutback and emulsified paving materials (Rule 1103, Cutback and Emulsified Asphalt) and architectural coatings (Rule 1111, Architectural Coatings), which are intended to limit emissions of VOCs. Also, the MDAQMD currently has three rules which specifically address PM₁₀ emissions, especially fugitive dust. These rules include: Rule 401 - Visible Emissions; Rule 402 - Nuisance; and Rule 403 - Fugitive Dust, which are enforced by the MDAQMD compliance personnel across the entire nonattainment area (MDAQMD, 1995). Rule 403.2 requires that a Dust Control Plan (DCP) be completed and submitted to the MDAQMD for review for all projects that would disturb 100 acres or more during project construction. The MDAQMD also has Rule 1160, Internal Combustion Engines, that limits emissions associated with internal combustion engines rated at 500 brake horsepower (bhp) or more, including emergency generators, portable, standby, or stationary internal combustion engines.

IMPACT ASSESSMENT AND MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

According to Appendix G of the *CEQA Guidelines* (Governor's Office of Planning and Research, 2004), a project would generally have a significant effect on the environment if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any nonattainment pollutant;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

CEQA Guidelines Section 15125(d) further states that an EIR shall discuss “any inconsistencies between a proposed project and applicable general plans and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan (or SIP)”.

The MDAQMD has published a set of recommendations that provide specific guidance on evaluating projects under CEQA relative to the above general criteria. Specifically, the MDAQMD established daily and annual threshold levels to attain and prevent exceedances of state and national standards. The following significance thresholds are used to assess construction and operational air pollutant impacts, including mobile, point, and area sources:

**MDAQMD SIGNIFICANCE THRESHOLDS FOR CONSTRUCTION
AND OPERATIONAL EMISSIONS**

<u>Pollutant</u>	<u>Annual Threshold (tons/year)</u>	<u>Daily Threshold (lbs/day)</u>
Carbon Monoxide (CO)	100	548
Oxides of Nitrogen (NO _x)	25	137
Volatile Organic Compounds (VOCs)	25	137
Oxides of Sulfur (SO _x)	25	137
Particulate Matter (PM ₁₀)	15	82

Source: MDAQMD and AVAQMD, *California Environmental Quality Act (CEQA) and Federal Conformity Guidelines*, March 2002.

CONSTRUCTION IMPACTS

Impact 3.8-1: Construction activities associated with individual RWMP projects and management actions involving the development of new facilities and/or disturbance of land would generate substantial amounts of dust, which would result in potential health and nuisance impacts in the immediate vicinity of construction sites. Project construction would also generate other criteria pollutant emissions.

Construction of individual RWMP projects and management actions involving development of new facilities and/or disturbance of land would generate substantial amounts of dust (including PM₁₀) primarily from “fugitive” sources (i.e., emissions released through means other than through a stack or tailpipe) and lesser amounts of criteria air pollutants primarily from operation of heavy equipment construction machinery (mostly diesel operated) and construction worker commute trips. Construction activities would also generate evaporative emissions of Reactive Organic Gases (ROG) from asphalt paving and the use of architectural coatings on structures.

A large portion of the total construction dust emissions would result from grading activities and heavy equipment travel over temporary unpaved roads at the construction sites. Dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and the weather. In the absence of mitigation, construction activities may result in significant quantities of dust, and as a result, local visibility and PM₁₀ concentrations may be adversely affected. In addition, the fugitive dust generated by construction would include not only PM₁₀, but also larger particles, which would fall out of the atmosphere within several hundred feet of the site and could result in nuisance-type impacts. Exhaust emission levels for construction activities would vary depending on the number and type of equipment, duration of use, operating schedules, and the number of construction workers. Criteria pollutant emissions of ROG and NO_x from these emission sources would incrementally add to the regional atmospheric loading of ozone precursors during project construction.

Construction of the individual RWMP projects and management actions being contemplated could occur at any point over the 20-year planning period. The phasing and duration of individual construction projects is unknown. Construction of multiple projects and management actions could also occur simultaneously. Individual RWMP projects and management actions are subject to subsequent project-level environmental review at which time a more detailed analysis of construction-related emissions would be undertaken to evaluate the need for additional mitigation,

such as mitigation that would reduce ROG and NO_x emissions. Such measures could include: restricting hours of use of construction equipment, minimizing idling, use of fuel additives or alternative fuels in construction equipment.

Estimates of construction-related exhaust emissions from construction equipment and worker trips are shown in **Table 3.8-3** below for several of the projects and management actions. Since construction details are unknown at this time, the information presented in Table 3.8-3 is intended to reflect the types of exhaust emissions that might be expected at a single construction site on a typical earth moving day.

TABLE 3.8-3
ESTIMATED CONSTRUCTION EXHAUST AND ON-ROAD PM₁₀ EMISSIONS FOR
VARIOUS RWMP PROJECTS AND MANAGEMENT ACTIONS

Pollutant	Emissions (lbs/day) ^a				
	Recharge Basins ^b	Pipeline Open Trench – 1 crew ^b	Injection/ Extraction Wells ^b	Treatment Plant/ Blending Facilities ^b	MDAQMD Daily Significance Thresholds
Carbon Monoxide (CO)	133	106	93	120	548
Oxides of Nitrogen (NO _x)	110	78	68	94	137
Reactive Organic Gases (ROG)	15	12	10	13	137
Particulate Matter	19	18	12	19	82

Source: EMFAC 2002, Environmental Science Associates, 2004.

Note: **Bold** values are in excess of the applicable MDAQMD significance threshold.

- a. Emissions estimates reflect estimated exhaust emissions and brake wear, tire wear, and entrained road dust from on-road vehicle travel. Estimates do not include fugitive dust emissions at the site, or evaporative emissions associated with asphalt paving and architectural coatings use. Calculation sheets are included in Appendix F.
- b. The construction scenarios used to estimate emissions assume construction would occur in 2004 and would include 1 haul truck making five 20-mile trips to and from the site on a given day, and 15 construction worker commute trips of 30 miles to and from the site. The emissions estimates also assume the operation of the following equipment 8 hours per day:

Recharge Basins – 1 crusher, 1 loader, 1 scraper, 1 excavator, 1 water truck, 1 backhoe, and 1 trencher
 Pipeline Open Trench 1 Crew – 1 forklift, 1 loader, 1 excavator, 1 compactor, 1 water truck, and 1 trencher
 Injection/Extraction Wells – 1 bore/drill rig, 1 paver, 1 excavator, and 1 water truck
 Treatment Plant/Blending Facilities – 1 crusher, 1 loader, 1 excavator, 1 grader, 1 water truck, 1 backhoe, and 1 trencher.

Emission rates are projected to decrease into the future due to cleaner burning fuels, improved combustion technologies, and fleet turnover. For the same reasons, background concentrations are expected to continue to decrease as they have into the future. As such, the emissions associated with projects constructed in future years at the same level of activity could be incrementally lower than levels presented in Table 3.8-3.

The emissions estimates in Table 3.8-3 do not include fugitive dust emissions because the lack of information regarding specific construction site activities renders the estimation of emissions essentially meaningless. Instead, for the purposes of this analysis, it is assumed that fugitive dust

emissions would be potentially significant for any construction site larger than one-half acre in size, the trigger level for MDAQMD requiring implementation of dust control measures.

The emissions estimates in Table 3.8-3 also do not include estimates of evaporative emissions of ROG from asphalt paving activities and the use of architectural coatings. Compliance with MDAQMD Rule 1103 and Rule 1111 would ensure that ROG emissions from project-related asphalt paving and use of architectural coatings would be minimized.

Potential construction-related air quality impacts associated with each general category of projects and management actions are discussed below.

Estimates of construction-related exhaust emissions from construction equipment and worker trips that might be expected at a single construction site on a typical earth moving day are shown in Table 3.8-3. Table 3.8-3 identifies the types of equipment that were assumed for the construction scenario and other assumptions used. Under this construction scenario, exhaust emissions would be below MDAQMD daily significance thresholds. If a project involved a scenario that entailed construction activities more intensive than that shown in Table 3.8-3, the emissions could exceed the MDAQMD significance thresholds (particularly for NO_x and PM₁₀) and be considered significant. In this case, subsequent project-level environmental review will determine the need for mitigation measures to reduce construction emissions.

Projects

Recharge Ponds

The RWMP could include the construction of over 20 new recharge ponds in the MWA's RWMP service area. New recharge ponds would be relatively small, generally less than 20 acres. Each of the new ponds would require the installation of either a new or extended pipeline to supply water to the recharge points. Construction of the recharge ponds would require substantial surface disturbances including site clearing, excavation, trenching, sediment removal and possibly selective channel clearing. Development of these facilities would concentrate construction activities in a single area for a period of time that would depend on the design capacity of the facility.

Pipelines

As described above, each of the new recharge ponds would require the installation of either a new pipeline or the extension of an existing one to supply water to the recharge points. This would account for the majority of new or expanded pipeline construction. The new or expanded pipeline segments would be relatively short in length (up to about 2 miles), but could generate substantial amounts of dust and other criteria air pollutants from vehicle exhaust along the pipeline alignments for the duration of pipeline installation. The anticipated rate of pipeline installation along segments where open trench construction methods are used would be about 100 feet per day, which is typical for this type of construction in public roadway rights-of-way.

Injection/Extraction Wells

Construction of the injection and extraction wells would include developing a roughly 5,000- to 10,000-square foot concrete pad that would likely require the use of backhoes, loaders, dump trucks, concrete mixers, pavers and delivery trucks. Construction activities that could generate substantial amount of dust and other criteria air pollutants from vehicle exhaust during construction of the wells would include site preparation, paving, construction of a small building or enclosure to house the electric-powered pumps, and locating back-up generators on-site (if required). Construction of the well sites would also require the use of a drill rig to drill the wells.

Management Actions***Reclamation***

The construction-related air quality impacts associated with pipelines required for reclaimed water distribution in the Alto subarea area are included in the general discussion of pipeline construction impacts above. It is assumed that any reclaimed water treatment would occur at a treatment plant/blending facility prior to distribution. The construction-related air quality impacts associated with new treatment plant/blending facilities are discussed separately below. Other than these potential treatment and distribution facility impacts, it is expected that there would be minimal construction disturbances for reclamation projects. Therefore, this impact would be considered less than significant.

Wellhead Treatment

Construction related to the installation of wellhead treatment devices with a standard granular activated carbon system would require minimal construction. It is assumed that the installation of wellhead treatment devices (e.g., a chemical tank) would occur at existing or planned extraction/production well sites or at locations along existing or planned pipeline segments. The construction-related air quality impacts associated with new or extended pipelines and new extraction wells are discussed separately above. Because the amount of construction and disturbances of land related to installing wellhead treatment devices is expected to be minimal, this impact would be less than significant.

Treatment Plant/Blending Facilities

The proposed RWMP could include the construction of regional and local water treatment plants, local blending facilities and several local wastewater treatment plants. Construction of treatment plants/blending facilities would involve substantial surface disturbances including site clearing, excavation, trenching, paving, and earth moving activities. While construction of treatment plants/blending facilities would be similar to the impacts discussed above for recharge pond sites and injection and extraction well sites, treatment plant/blending facility sites would be larger in size and would generally include a prolonged construction period relative to other RWMP projects and management actions.

Mitigation Measures

M3.8-1 **Implementing agencies shall establish best management practices for the reduction of air emissions for construction projects for inclusion in contractor specifications. Such measures may include restricting hours of use of construction equipment, minimizing idling, use of fuel additives or alternatives in construction equipment, implementing dust control plans that are consistent with MWA guidelines, etc.**

M3.8-2 **MWA shall develop a standard set of dust control plan guidelines for construction activities consistent with the Mojave Desert Air Quality Management District (MDAQMD) Rule 403.2. In accordance with these guidelines, Implementing agencies shall establish best management practices for construction dust control for each project for inclusion in contractor specification. The guidelines may include the following:**

- a. Use periodic watering for short-term stabilization of disturbed surface areas to minimize visible fugitive dust emissions.**
- b. Ensure that loaded vehicles will not exceed 25 miles per hour on public and private earthen or gravel roads.**
- c. Take actions sufficient to prevent project-related trackout onto paved surfaces.**
- d. Cover loaded haul vehicles while operating on publicly maintained paved surfaces.**
- e. Stabilize graded site surfaces upon completion when subsequent development is delayed or expected to be delayed more than 30 days.**
- f. Reduce non-essential earth-moving activities under high wind conditions.**

Significance After Mitigation

For most projects, construction emissions would be considered less than significant. However, some larger projects may exceed emissions thresholds. Prior to approval, emissions estimates would determine significance of individual projects.

OPERATIONAL IMPACTS

Impact 3.8-2: Operation of the RWMP projects and management actions would result in operational emissions of criteria air pollutants.

Following installation, the majority of the projects and management actions would not result in long-term operational emissions. Potential emission sources resulting from operation of the RWMP projects and management actions would include air emissions from powering of project facilities, the testing and potential use of emergency generators, the operation of stationary source equipment associated with project facilities, and from increased employee trips. Emissions from generators and stationary source equipment operation would be local in nature, while emissions from motor vehicles would be regional. The 2004 RWMP projects and management actions include elements that require few employees. Related vehicle emissions would be negligible. Additional trips associated with occasional deliveries and visitors would also be minimal. All stationary source equipment would be subject to MDAQMD permitting. Collectively, the operation of RWMP projects and management actions would not be expected to significantly affect air quality over the long-term.

Operational air quality impacts associated with each of the projects and management actions are discussed below.

Projects

Recharge Ponds

Recharge pond operations, which are limited to water storage and percolation, would not generate air quality emissions. Inspection and periodic maintenance operations would generate only a few worker vehicle trips per year and would not generate emissions that would substantially contribute to project emissions that would trigger an exceedance of the MDAQMD significance thresholds. The operation of these project facilities would be a less than significant impact.

Pipelines

All pipelines would be located below grade. Operational activities would be limited to periodic inspections of the pipeline alignments to check for signs of leaks. The vehicle trips associated with these maintenance inspections would not generate emissions that would substantially contribute to project emissions that would trigger an exceedance of the MDAQMD significance thresholds. This would be a less than significant impact.

Injection/Extraction Wells

The operational impacts associated with the injection and extraction wells would be limited to those associated with operation of electric-powered pumps and back-up emergency generators (if required). Emergency generators of a certain size (>50hp) would require emissions permits from MDAQMD. Other operational activities would be limited to periodic inspections of the well sites. The vehicle trips associated with these maintenance inspections would not generate emissions that would substantially contribute to project emissions that would trigger an exceedance of the MDAQMD significance thresholds. This would be a less than significant impact.

Management Actions

Reclamation

This management action, which includes the use of reclaimed water in nonpotable applications, does not involve the operation of new facilities or new stationary sources of air pollutants in the RWMP area. Any treatment of reclaimed water would occur at existing or planned treatment plants/blending facilities; air quality impacts associated with planned facilities are discussed below. The application of reclaimed water would not generate significant air quality emissions. This would be a less than significant impact.

Wellhead Treatment

Vehicle trips associated with maintenance inspections would not generate emissions that would substantially contribute to project emissions that would trigger an exceedance of the MDAQMD significance thresholds. This would be a less than significant impact.

Treatment Plant/Blending Facilities

Any new stationary sources would be subject to review by the MDAQMD and could require MDAQMD permitting before construction could occur. The permit review process would ensure that all air emissions associated with the facility comply with applicable federal and state standards.

Treatment Plant/Blending Facilities would be subject to subsequent project-level environmental review when they are more fully defined. At a program level, it does not appear that operation of treatment plants/blending facilities would cause a significant air quality impact.

Mitigation Measures

None required.

Significance After Mitigation

Less than significant.

3.9 CULTURAL RESOURCES

This chapter analyzes the effect of the MWA RWMP on important cultural resources. This section provides information on the cultural resources setting of the plan area, assesses potential impacts on cultural resources, and provides program-level mitigation measures.

SETTING

Cultural resources include the prehistoric and historic archaeological resources, historic buildings and structures, and sites of importance to Native Americans in the plan area. The descriptions of the paleoenvironment, Native American prehistory, ethnographic use of the Plan area, and historical use of the Plan area are presented below to provide a context in which cultural resources can be understood and evaluated.

PALEOENVIRONMENTS

The environment of the deserts of southeastern California are marked by a fluctuating climatic sequence from the moist Pleistocene (2 MYA¹ to 10,000 Y.B.P.²) to the more arid Holocene (10,000 Y.B.P. to present) that represents the present-day environment and climate. Fifteen thousand years ago, pluvial lakes and marshes dominated the California deserts, as well as much of California's interior. During the Pleistocene, pluvial lakes were created by heavy rain periods (pluvials) and snow runoff—a climatic phenomenon caused by the advancing and retreating continental ice-sheets³. The areas close to pluvial lakes and streams were an abundant source of food for the earliest inhabitants of California, often grouped into what is known as the “Western Pluvial Lakes Tradition”. However, with rising temperatures after 6500 B.C. (early Holocene), evaporation rates increased, causing the inland lakes to dry up and winter rainfall to decline. This long dry period is known as the Altithermal⁴. With the dryer, harsher conditions, local peoples were forced to adapt technology to exploit a wider base of resources, namely the increased use of seed processing tools. These conditions also lead to a subsistence and settlement pattern of seasonal movement from place to place resulting in the use of large areas by relatively small populations, and left the remains that are now archaeological sites widely scattered over the landscape.

Prehistoric Context

Although the California Desert has been inhabited for at least 8,000 to 12,000 years and perhaps longer, there is a paucity of material evidence linked to these early populations. As mentioned, the archaic settlements were clearly focused along the pluvial lakes, which are now the dry playas so characteristic of the Mojave Desert and Great Basin. Sites from this early period, sometimes referred to as the Lake Mojave Period, were recorded at Lake Manix and Calico Hills⁵. These

¹ Million Years Ago.

² Years Before Present.

³ Dincauze, D.F. *Environmental Archaeology*. Cambridge University Press: Cambridge, U.K. 2000.

⁴ Antevs, E. *Climatic Changes and Pre-White Man*. University of Utah Bulletin 38(20), 1948.

⁵ Simpson, R.D. 1958. *The Manix Lake Archaeological Survey*. The Masterkey 32(1):4-10; Leakey, L.S.B., R.D. Simpson, and T. Clements 1969. *Man in America: The Calico Mountains Excavations*. Encyclopedia Britannica Yearbook of Science and the Future, 64-75, 77-79.

sites yielded crude lithic tools that included percussion-flaked choppers, scrapers, bifaces, cores, and waste flakes. Although the artifacts are clearly of great antiquity, the exact dates related to these sites is still uncertain given the difficulties in obtaining an accurate carbon-14 date from the fossil lakeshore.

Around 6,000 years ago, with the Altithermal warming cycle expanding, adaptations to food gathering techniques and land use patterns began to appear that continued into the historic period. For instance, the use of a greater variety of habitats and plant and animal resources was evident in the archaeological record and grinding implements such as manos and metates became more common.

The Mojave River Valley, which includes a large portion of the MWA, exhibited a large degree of prehistoric use, especially along the Mojave River itself. Simpson's (1965) survey of the Troy Lake Basin, about 25 miles east of Barstow, resulted in the recordation of some 20 sites. Excavations yielded a great variety of projectile point types of the larger and older phases (e.g. Pinto, Elko, and Gypsum points) discovered in the Northern Mojave (~2000-3000 Y.B.P). Also of note is Newberry Cave, near the south end of Troy Lake Basin, which was initially excavated by Smith (1963). The cave contained a myriad of occupational debris, such as Gypsum Cave and Elko Eared dart points, scrapers, choppers, a mano, and a hearth.

In general, at about 2,000 years ago a shift in projectile point types from larger forms (e.g. Elko and Gypsum points) to smaller forms (e.g. Rose Spring and Eastgate Points) may indicate the introduction of the bow and arrow to replace spears and atlatls. This later development was identified partly from the excavations at Oro Grande near Victorville. The Oro Grande site yielded a smaller projectile point industry as well as shell beads, suggesting trade with southern California coastal groups around 500-1500 A.D. Further, it has been posited that the Mojave Sink region was the seat of the "cultural climax", with complex trade routes established between coastal groups and inland cultures like the Anasazi—with the Mojave sink region in the middle⁶ (Rogers 1945).

Synthesized California Desert Cultural Sequences

The effort to synthesize the whole of the disparate archaeological phenomenon in the California Deserts has resulted in a confusing plethora of named and renamed "cultures", "industries", "phases", and "periods". However, in most cases, each period is marked by a distinctive projectile-point type that is widely dispersed throughout the California deserts during a particular temporal unit. **Table 3.9-1** shows two of the more commonly used chronologies for the California deserts prehistory and their time period concordance. **Table 3.9-2** summarizes archaeological sequences identified in the Mojave River valley.

In general, the sequences demonstrate a co-evolving subsistence strategy with tool innovations to accommodate changing climatic factors and resource availability and abundance. In addition,

⁶ Rogers, M.J. 1945. *An Outline of Yuman Prehistory*. Southwestern Journal of Anthropology 1(2): 167-198.

**TABLE 3.9-1
CONCORDANT CULTURAL CHRONOLOGIES FOR THE MOJAVE DESERT AREA**

Bettinger and Taylor (1974)	Warren and Crabtree (1972)
Marana – A.D. 1300	Period V: Shoshonean – A.D. 1000
Haiwee – A.D. 600	Period IV: Saratoga Springs – A.D. 500
Newberry – 1200 B.C.	Period III: Gypsum – 2000 B.C.
Little Lake – 4000 B.C.	Period II: Pinto – 5000 B.C.
Mojave – Uncertain	Period I: Lake Mojave – 8000 B.C.

Source: Moratto (1984).

**TABLE 3.9-2
ARCHAEOLOGICAL SEQUENCES BY SITE IN THE MOJAVE RIVER VALLEY**

Periods	Dates	Mojave River Valley Regional Sites
Proto-Historic	A.D. 1500	Mojave River pottery sites
Saratoga-Springs	A.D. 500 – A.D. 1000	Oro Grande
Gypsum Period	1000 B.C. – A.D. 1	Newberry Cave
Pinto Period	4000 B.C. – 3000 B.C.	No sites known

Source: Moratto (1984).

greater socio-political complexity is evinced by the increasing trade between southwest peoples and the coastal groups seen in the record as the proto-historic period began.

ETHNOGRAPHIC SETTING

The project area lies within the ethnographic boundaries of the Serrano, and within the Cahuilla to the South, which may have encompassed Yucca Valley. The Cahuilla and Serrano are culturally more similar to southern coastal groups than to neighboring desert peoples, particularly in terms of the common Takic language (of the Uto-Aztecan stock) spoken by these groups. The territories of these peoples spanned both higher and lower elevations, with their camps situated in locations with adequate fresh water sources.

Serrano

Most researchers place the traditional territory of the Serrano in the San Bernardino Mountains east of the Cajon Pass, at the base and north of the mountains in the desert near Victorville, eastward as far as Twenty-nine Palms, and south into the Yucaipa Valley.

The Serrano were gatherers and hunters. Women conducted most of the gathering while the men performed all of the hunting. Food preferences varied from locality to locality. Acorns and pinon nuts were the staple foods for those living in the foothills and yucca roots, mesquite and cacti fruits were the principal foods of those living in and near the desert.

The location of Serrano settlements were determined primarily by accessibility to fresh water. Nuclear families lived in circular, domed structures built of willow frames covered with tule thatching. In addition to the family dwellings, each village had a large ceremonial house where the lineage leader lived. Other structures included storage and sweathouses.

Because the Serrano were located inland, European influence was not significant until after 1819 when a mission was established at present day Redlands. Between 1819 and 1834, most of the Western Serrano were forced into the mission system. Serrano traditions survived in locations more distant from Spanish influence, northeast of the San Geronimo Pass. Population estimates for the Serrano range between 1,500 and 2,500 at the time of first contact with the Spanish⁷.

Cahuilla

The Cahuilla occupied most of the region from the summit of the San Bernardino Mountains in the north to Borrego Springs and the Chocolate Mountains in the south, as well as a portion of the Colorado Desert west of Orocopia Mountain, then to the eastern San Jacinto Plain near Riverside and the eastern slopes of Palomar Mountain to the west. Natural boundaries such as the Colorado Desert separated the Cahuilla from the Mohave, Ipai, Tipai, and Halchidhoma, while the mountains and plains separated them from the neighboring Gabrielino, Serrano, and Luiseno.

As with most other Southern California groups, the Cahuilla were a hunter/gatherer society. The diversity of habitats included an extensive variety of natural resources from which to choose. The most important resources were acorns, screw beans, pinion nuts and cactus bulbs. Because of their inland location, there was limited contact by the Cahuilla with Spanish explorers during the 18th Century. Only a few Cahuilla baptisms are registered at Missions San Gabriel and San Luis Rey. In 1819, additional Spanish outposts were established near this tribe at San Bernardino, Pala and Santa Ysabel. Cahuilla villages were located in canyons or on alluvial fans near resources. The area immediately surrounding a village was communally owned. Networks of trails were used for hunting, trading and visiting interconnected villages. Sacred sites were marked with pictographs and petroglyphs. Domiciles were dome shaped and constructed of brush and reeds. These structures varied in size depending on a family's needs. Population estimates for this tribe range between 3,600 and 10,000 in the late 18th Century. Today, ten reservations remain in former Cahuilla territory. These include Agua Caliente, Augustine, Cabazon, Cahuilla, Los Coyotes, Morongo, Ramona, Santa Rosa, Soboba, and Torres-Martinez.

HISTORIC SETTING

The earliest known historic contact in the project area occurred when Native American villages along the upper Mojave River and in Summit Valley were visited in 1776 by Spanish missionary Father Francisco Garcés. The area was visited 30 years later by Father Jose Maria Zalvidea⁸. In 1819, a Spanish punitive expedition against the Mojave Native American tribe led by Lieutenant Gabriel Moraga passed through the area on its way to the desert.

The town of San Bernardino was established by the Mormons in 1851 which created an immediate need for building materials. During this same period American settlers saw advantages of the mountain meadows for stock raising. During the 1860s, tensions between Native Americans of

⁷ Bean, L.J., and C.R. Smith. *Serrano: In Handbook of North American Indians*, Vol. 8: California. Ed by R.F. Heizer. Smithsonian Institution: Washington, D.C., 1978.

⁸ Beattie, G.W. *Diario de una expedicion a la tierra adentro, del P.Jose M'A. In Preliminary Report of the Archaeological Survey of the Deep Creek Site on the Upper Mojave River. San Bernardino County Museum Association Quarterly 2(2)*, 1955.

the region and settlers increased. In January 1867, Native Americans in this area raided a lumber camp in the San Bernardino Mountains, looting and burning cabins and a sawmill. A retaliatory posse gathered at Las Flores Ranch then searched for and found the Native Americans with their families hiding at a butte called Chimney Rock at the north edge of Rabbit Dry Lake in Lucerne Valley where a battle ensued. This site is now a State Registered Landmark (SRL 737) described as the site of the last Native American conflict in Southern California⁹. The remaining native inhabitants of the region were congregated on reservations in San Bernardino with the subsequent demise of the Serrano aboriginal lifeways.

During the 1860s, gold mining activities began in the eastern San Bernardino Mountains. The Holcomb Valley, which is a State Registered Landmark (SRL 619), was the site of Southern California's richest goldfield. It derives its name from William Francis "Bill" Holcomb, who made the first strikes there in 1860¹⁰. The Holcomb Valley gold rush was short lived, yet it brought many new settlers into the county. Another contemporary gold rush occurred in the Lytle Creek-Glenn Ranch area far to the west.

Cattle ranching continued for the remainder of the 19th and early 20th centuries. There were a few early homesteaders in the project area during the late 1800s, but historic settlement was primarily a 20th century phenomenon in the area¹¹.

Joshua Tree National Monument was established in 1936, with most of its 870 square miles within Riverside County, but with the headquarters and visitors center at Twentynine Palms in San Bernadino County. At Barstow, a hotel that had been built by Fred Harvey for the Santa Fe Railroad is commemorated (SRL 892) on the building "Casa del Desierto", which was erected on the site of the original structure that burned in 1911. Some 75 Harvey houses were built along the lines of the Santa Fe Railroad in the late 19th century.

REGULATIONS

STATE

Procedures for the evaluation and treatment of archaeological and historical resources are outlined in the CEQA Statutes and Guidelines issued by the Governor's Office of Planning and Research. CEQA is the prevailing State authority protecting these resources by ensuring their consideration in discretionary activities. CEQA requires that public or private projects financed or approved by public agencies must assess the effects of the project on historical resources. Historical resources are defined as buildings, sites, structures, objects or districts, each of which may have historical, architectural, archaeological, cultural, or scientific significance. CEQA requires that if a project results in an effect that may cause a substantial adverse change in the significance of an historical resource, then alternative plans or mitigation measures must be considered; however, only significant historical resources need to be addressed. Therefore, prior to the assessment of effects

⁹ Hoover, R. *Historic Spots in California*. Stanford University Press. Stanford, CA. 1990.

¹⁰ *Ibid.*

¹¹ Leakey, L.S.B., R.D. Simpson, and T. Clements 1969. *Man in America: The Calico Mountains Excavations*. Encyclopedia Britannica Yearbook of Science and the Future, 64-75, 77-79.

or the development of mitigation measures, the significance of cultural resources must first be determined. The steps that are normally taken in a cultural resources investigation for CEQA compliance are as follows:

- Identify potential historical resources
- Evaluate the eligibility of historical resources
- Evaluate the effects of a project on all eligible historical resources

The California Health and Safety Code (Sec. 7052) prohibits disturbance of human remains except under certain conditions, and specifies procedures to be followed in the event that Native American graves are found.

FEDERAL

Section 106 of the National Historic Preservation Act

Projects that are on federal land or are funded, permitted, or approved by a federal agency are subject to the requirements of Section 106 of the National Historic Preservation Act (NHPA). Section 106 requires federal agencies, or those they fund or permit, to consider the effects of their actions on the properties that may be eligible for listing or are listed in the National Register of Historic Places (NRHP). To determine whether an undertaking could affect NRHP-eligible properties, cultural resources (including archaeological, historical, architectural properties, and traditional cultural properties) must be inventoried and evaluated for listing in the NRHP. Although compliance with Section 106 is the responsibility of the lead federal agency, the work necessary to comply can be undertaken by others. The Section 106 review process normally involves a four-step procedure described in detail in the Section 106 Regulations (36 CFR Part 800):

- Define the Area of Potential Effects (APE) and identify and evaluate cultural resources in consultation with the State Historic Preservation Officer (SHPO) and interested parties,
- assess the effects of the undertaking on properties that are eligible for inclusion in the NRHP,
- consult with the SHPO, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation,
- proceed with the project according to the conditions of the agreement.

National Environmental Policy Act

Specific projects that are subject to the National Environmental Policy Act (NEPA) must also comply with NEPA requirements for the consideration of cultural resources. Compliance with NEPA requirements concerning cultural resources may be addressed through compliance with Section 106 of the NHPA. Reports, agreements documents, and correspondence documenting compliance with Section 106 of the NHPA are provided to the lead NEPA agency for a specific proposed action that is subject to NEPA.

IMPACT ASSESSMENT AND MITIGATION MEASURES

METHOD OF ANALYSIS

This impact analysis is a preliminary, program-level assessment of potential impacts on important cultural resources that could occur as a result of implementation of potential projects and management actions under the 2004 RWMP. Because this is a program-level analysis, impacts on specific cultural resources that could result from individual projects or management actions are not addressed in this document, but may need to be assessed through additional analysis as projects and management actions are developed and further defined.

The impacts and mitigation measures identified in this section address types of activities that could significantly impact cultural resources including archaeological sites, historic buildings and structures, and locations of importance to Native Americans. Projects and management actions that include these types of activities would be required to implement the identified mitigation measures in an effort to reduce any impacts to a less-than-significant level.

The identification of specific impacts and mitigation measures that are appropriate for a specific project or management action will depend on both the nature of the cultural resources that are present and on the nature of the project or management action. In some instances, mitigation measures must be developed in consultation with multiple agencies and other interested parties.

CRITERIA FOR DETERMINING SIGNIFICANCE

The criteria used to determine if a cultural resource would be significantly impacted by a project or by a management action are those described in the CEQA Guidelines (see below). In addition to the CEQA criteria for determining the significance of an impact, other criteria may also need to be considered, depending on the full regulatory requirements of a project or a management action. Projects that are approved or permitted by a federal agency, are on federal land, or that are funded in whole or in part by federal sources, for example, would need to consider the significance of impacts as determined through compliance with Section 106 of the NHPA (see below).

CALIFORNIA ENVIRONMENTAL QUALITY ACT

According to the CEQA, a project with an effect that may cause a substantial adverse change in the significance of a cultural resource is a project that may have a significant effect on the environment (CEQA rev. 1998 Section 15064.5(b)). CEQA further states that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a cultural resource would be materially impaired. Actions that would materially impair the significance of a cultural resource are any actions that would demolish or adversely alter those physical characteristics of a resource that convey its historical significance and qualifies it for inclusion in the California Register of Historical Resources or in a local register or survey that meet the requirements of sections 5020.1(k) and 5024.1(g) of the Public Resources Code.

NATIONAL HISTORIC PRESERVATION ACT

Regulations implementing Section 106 of the NHPA define an effect on a historic property as an action that could alter the characteristics of the property that may qualify the property for inclusion in the NRHP including alteration of location, setting, or use. An undertaking may be considered to have an adverse effect on a historic property when the effect may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to,

- physical destruction or alteration of all or part of the property
- isolation of the property from or alteration of the property's setting when that character contributes to the property's qualifications for listing in the NRHP
- introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting
- neglect of a property resulting in its deterioration or destruction; or
- transfer, lease, or sale of the property. (36 CFR 800.9)

The following potential impacts on cultural resources have been identified that could result from implementation of projects and management actions.

Impact 3.9-1: Construction of new facilities which involve ground-disturbing activities has the potential to adversely affect significant prehistoric and historic archaeological resources and/or buried human remains through damage or destruction of those remains.

Archaeological remains and human remains could be inadvertently unearthed during ground-disturbing activities such as grading, trenching, or use of staging areas. Demolition or substantial damage to significant archaeological resources or human burials is a significant impact. Implementing agencies for each individual project would be required to conduct records searches to determine whether known resources would be disturbed.

State laws relating to the disposition of Native American burials fall within the jurisdiction of the Native American Heritage Commission (NAHC) (Pub. Res. Code Sec. 5097). In the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery, the following steps should be taken as required under CEQA Guidelines 15064.5 (e)(1):

- (1) There shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:
 - (A) The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required, and
 - (B) If the coroner determines the remains to be Native American:
 1. The coroner shall contact the NAHC within 24 hours.
 2. The NAHC shall identify the person or persons it believes to be the most likely descended from the deceased Native American.

3. The most likely descendant may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98, or
- (2) Where the following conditions occur, the landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance.
 - (A) The NAHC is unable to identify a most likely descendent or the most likely descendent failed to make a recommendation within 24 hours after being notified by the commission.
 - (B) The descendant identified fails to make a recommendation; or
 - (C) The landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the NAHC fails to provide measures acceptable to the landowner.

If human remains of Native American origin are discovered on federal land during project construction, the affected federal agency will be required to comply with the Native American Graves Protection and Repatriation Act (NAGPRA) regulations relating to the discovery of human remains of Native American origin on federal land. NAGPRA specifies the procedures that agencies must follow when burials of Native American origin are found on federal land (43 CFR Part 10). The regulations implementing the requirements of NAGPRA relating to the inadvertent discovery of human remains of Native American origin are described in 43 CFR Part 10, Subpart B, Section 10.4. These regulations include the following provisions which will be implemented immediately following notification of the county coroner or county sheriff if human remains are discovered during project implementation:

- Notify in writing the responsible federal agency and
- Cease activity in the area of the discovery and protect the human remains

Upon notification that human remains have been discovered on federal land, the responsible federal agency will:

- Certify receipt of the notification.
- Take steps to secure and protect the human remains.
- Notify the Native American Tribe or Tribes likely to be culturally affiliated with the discovered human remains within one working day.
- Initiate consultation with the Native American Tribe or Tribes in accordance with regulations described in 43 CFR Part 10, Subpart B Section 10.5.

Identified cultural resources that may be impacted by a proposed project or management action would be evaluated for eligibility for listing on the California Register of Historical Resources (CRHR). Cultural resources that are eligible for the CRHR are considered to be significant cultural resources. Cultural resources that are identified within project areas subject to federal

approval, permits, or funding would also be evaluated for eligibility for listing on the NRHP. Cultural resources determined to be eligible for listing on the NRHP are automatically eligible for listing on the CRHR and are considered to be significant cultural resources.

Implementation of the following mitigation measures would minimize effects to cultural resources. Individual projects would undergo additional review by implementing agencies prior to construction.

Mitigation Measures

- M3.9-1** **Implementing agencies shall conduct a cultural resources inventory designed to identify potentially significant resources within the area of potential effect for all projects and management actions that have the potential to impact cultural resources. The cultural resources inventory would consist of a cultural resources records search to be conducted at the Information Center of the San Bernardino County Museum; consultation with the Native American Heritage Commission (NAHC) and with interested Native Americans identified by the NAHC; a field survey where appropriate (if one has not previously been conducted); and recordation of all identified archaeological sites and historic buildings and structures on California Department of Parks and Recreation 523 Site Record forms.**
- M3.9-2** **Implementing agencies shall avoid impacts if feasible on identified cultural resources including prehistoric and historic archaeological sites, locations of importance to Native Americans, human remains, and historical buildings and structures. Methods of avoidance may include, but not be limited to, project re-route or re-design, project cancellation, or identification of protection measures such as capping or fencing.**
- M3.9-3** **Implementing agencies shall retain archaeological monitors during construction for ground-disturbing activities that have the potential to impact significant archaeological remains as determined by a qualified archaeologist.**

Significance After Mitigation

Less than significant.

Impact 3.9-2: Construction of new facilities has the potential to adversely affect historic architectural resources through demolition or significant changes to the historical setting

Construction of new facilities could result in impacts on significant historic architectural resources. Historic architectural resources may be impacted both directly by demolition or relocation of buildings or indirectly through significant changes in the historical setting of buildings. Demolition of historically significant buildings is considered to be a significant impact.

Mitigation Measure

M3.9-4 **Implementing agencies shall identify and evaluate potentially affected historic resources prior to alterations, including relocation.**

Significance After Mitigation

Less than significant.

Intentionally left blank.

3.10 GEOLOGY AND SOILS

This section describes the geologic and seismic setting in the MWA service area. Potential geologic and seismic hazards that may affect the proposed projects and actions are then outlined, as well as pertinent regulatory information.

SETTING

TOPOGRAPHY

The MWA service area is located in a region known as the California High Desert, a portion of the Mojave Desert in southeastern California. The San Bernardino and San Gabriel Mountains, located southwest of the High Desert, physiographically separate the High Desert region from the coastal basin and inland valleys of the Los Angeles vicinity and reach elevations of over 10,000 feet above mean sea level (amsl). Elevations within the MWA service area range from 5500 feet amsl in the San Bernardino Mountains, near the southern boundary of the service area to 1500 feet amsl near Afton Canyon, towards the eastern portion of the service area (Saracino-Kirby-Snow, 2002).

GEOLOGY

The High Desert area can be generally characterized as a large alluvial plain, consisting of valleys and isolated basins.¹ This alluvial plain primarily consists of water-bearing unconsolidated sediments, while hills and low mountains within the plain consist of consolidated igneous (volcanic), sedimentary, and metamorphic bedrock from which the sediments are derived (Saracino-Kirby-Snow, 2002). The alluvial plain includes a large number of northwest-trending faults, all of which are part of a fault region known as the Eastern California Shear Zone (ECSZ). These faults are relatively closely spaced, and undergo up to 13-14 millimeters per year of shear (Jagiello *et al.*, 1992; Miller *et al.*, 2001). Movement on these faults results in regional and local deformation of the geology and natural barriers to groundwater flow (Saracino-Kirby-Snow, 2002). Prominent fault zones include the Helendale fault zone, the Lenwood fault zone, the Johnson Valley fault zone, the North Frontal fault zone, the Camp Rock fault zone, and the Homestead Valley fault zone (Jennings, 1994).

The Centro and Baja regions, which encompass roughly the northern half of the service area, have geology illustrative of the entire High Desert. Hills and mountainous areas are composed mainly of sedimentary, igneous (volcanic), and metamorphic basement complex, surrounded by undifferentiated alluvium deposits, all Quaternary in age.² These Quaternary deposits are composed chiefly of clay, silt, sand, and gravel. Some of these alluvium deposits are related to recent and ancestral activity on the Mojave River. Terminal dry lakes (or playas) are scattered throughout the Centro and Baja regions, and include Troy Lake, Harper Lake, Coyote Lake, Superior Lake, and Cuddeback Lake. These lakes have no outlet, collect water which quickly

¹ Alluvial and alluvium refers to deposits of clay, silt, sand, and gravel deposited by a stream or running water.

² Quaternary refers to a period of geologic time from 1.6 million years ago to the present.

evaporates, and tend to contain fine-grained surficial deposits such as clays, sands, and silts (Saracino-Kirby-Snow, 2002).

The Este, Oeste, and Morongo Basin/Johnson Valley regions of the service area contain roughly the same geology as the rest of the High Desert. The Este region is chiefly defined by the Lucerne Valley, a large valley bisected by the northwest-trending Helendale fault zone. Playas in the Lucerne Valley include both Rabbit Lake and Lucerne Lake. The Morongo Basin/Johnson Valley region is chiefly defined by the Johnson and Upper Johnson Valleys, both of which contain playas such as Emerson Lake, Melville Lake, Means Lake, and Galway Lake. El Mirage Lake is the major playa within the Oeste region. All three regions also contain igneous and metamorphic basement complex which comprise the San Bernardino Mountains to the south and the San Gabriel Mountains and San Andreas fault zone to the southwest (Saracino-Kirby-Snow, 2002; Morton and Miller, 2003).

The Alto and Alto Transition Zone regions of the service area contain the southern portion of the Mojave River where it collects drainage at the base of the San Bernardino Mountains (Saracino-Kirby-Snow, 2002; Morton and Miller, 2003). A U.S. Army Corps of Engineers water control structure at the southern end of the Alto region joins the two forks of the Mojave River and marks the beginning of the river's northward flow through 14 miles of alluvial deposits. Within this 14-mile distance, the river bed drops 450 feet in elevation. Flow then reaches a granitic ridge named the Upper Narrows, through which the river has cut a 200-foot wide opening. In the vicinity of the Upper Narrows, a unique vertically stacked aquifer system exists, with aquifers separated by impervious clay layers. Until 1999, wells in the Upper Narrows vicinity were artesian, meaning that water reached the surface entirely by hydrostatic pressure from the surrounding environment. Artesian pressure has since been lost, but some leakage onto the near-surface from deeper aquifers is present in the Upper Narrows. The Mojave River continues to flow through 4 miles of the confined channel of the Upper Narrows, and exits at the Lower Narrows (California Department of Fish and Game, 2004). The Lower Narrows of the Mojave River separate the Alto region and the Alto Transition Zone region (Saracino-Kirby-Snow, 2002; Morton and Miller, 2003).

SOILS

There are 21 soil associations present within the MWA service area:

- Adelanto-Hesperia
- Adelanto-Mojave
- Anthony-Cajon
- Arizo-Daggett
- Cajon
- Calvista-Hi Vista
- Casa Grande-Barstow
- dune land
- Greenfield-Ramona
- Hanford-Greenfield
- Hesperia-Rosamond
- lava flows
- Mojave-Adelanto variants
- Mojave variant-Sunrise
- playas
- Ramona
- riverwash
- rock land
- Rosamond-Oban
- Sunrise
- Tujunga

Figure 3.10-1 shows the approximate locations of these soils within the MWA service area and corresponding physical properties which could present a constraint to development. **Table 3.10-1** indicates the soil association location on **Figure 3.10-1**, and describes physical properties such as depth, erosion potential, and shrink-swell potential. Physical properties, such as erosion potential and shrink-swell potential, are discussed further in the **Geologic Hazards** section, below.

SEISMICITY

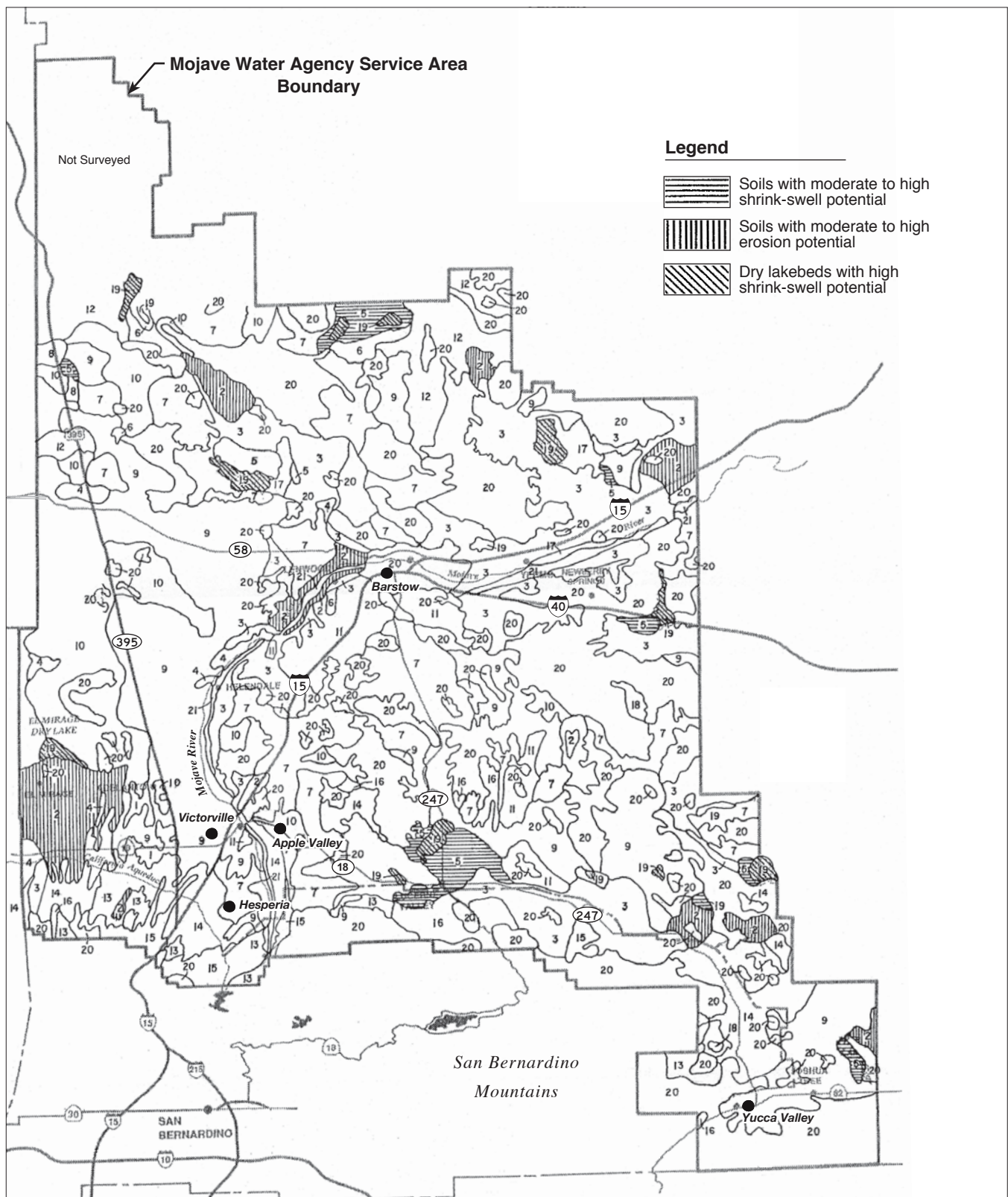
The High Desert region contains both active and potentially active faults, and is considered a region of high seismic activity and earthquakes are common on many of the major active faults in the region.³ The service area is designated as either seismic zone 3 or 4, as determined by the 1997 Uniform Building Code (UBC) (see **Figure 3.10-2**). Cities located within seismic zone 3 designated areas include Barstow, Yermo, Daggett, and Hinkley, while cities within seismic zone 4 designated areas include Victorville, Hesperia, Apple Valley, and Adelanto (County of San Bernardino, 1997). Although areas designated as seismic zones 3 and 4 are susceptible to earthquake ground motion and seismic design criteria as required under the UBC, minimum requirements for design in seismic zone 4 designated areas are typically more rigorous those required under seismic zone 3. In southern California, the last earthquake exceeding moment magnitude 8.0 was the 1857 Fort Tejon earthquake.⁴ Other notable earthquakes include the 1971 San Fernando earthquake (moment magnitude 6.6), the 1994 Northridge earthquake (moment magnitude 6.7), the 1992 Landers earthquake (moment magnitude 7.3), and the 1999 Hector Mine earthquake (moment magnitude 7.1). These earthquakes caused extensive damage throughout southern California (SCEDC, 2004).

Regional Faults

The San Andreas Fault, located to the south of the service area, is a major structural feature of the ECSZ, and forms a boundary between the North American and Pacific tectonic plates. The San Gabriel Mountains roughly denote the trace of the San Andreas Fault in the region. Active faults within the service area include the Helendale fault zone, the Lenwood fault zone, the Johnson Valley fault zone, the North Frontal fault zone, the Camp Rock fault zone, and the Homestead Valley fault zone (Jennings, 1994). **Figure 3.10-3** depicts active faults in the vicinity of and within the service area. **Table 3.10-2** lists the date of the most recent major historic earthquake and the estimated maximum moment magnitude of a characteristic event on these faults.

³ An “active” fault is defined by the State of California as a fault that has had surface displacement within the Holocene time (approximately the last 10,000 years). A “potentially active” fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not mean that faults lacking evidence of surface displacement are necessarily inactive. “Sufficiently active” is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

⁴ Moment magnitude is related to the physical size of a fault rupture and movement across a fault. The Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CGS, 1997).



SOURCE: Environmental Science Associates, MWA (1994)

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Figure 3.10-1
Soil Associations in the
RWMP Update Study Area

TABLE 3.10-1
SOIL ASSOCIATIONS WITHIN THE MWA SERVICE AREA

Figure 3.10-1 Number	Soil Association	Composition	Depth (inches)	Erosion Potential	Shrink-Swell Potential
1	Anthony-Cajon	Fine sandy loam and gray sand	40	Slight-moderate	Low
2	Cajon	Sand	40	Moderate-high	Low
3	Arizo-Daggett	Gravelly sand	42	Slight-moderate	Low
4	Hesperia-Rosamond	Sandy loam	48	Slight-moderate	Low-moderate
5	Rosamond-Oban	Silty clay loam	35	Slight-moderate	Moderate-high
6	Casa Grande-Barstow	Sandy loam	27	Slight	Low-moderate
7	Adelanto-Mojave	Sandy loam	32	Slight-moderate	Low-moderate
8	Adelanto-Hesperia	Sandy loam	na	Moderate	Low-moderate
9	Mojave-Adelanto variants	Sandy loam	32	Slight-moderate	Low-moderate
10	Mojave variant-Sunrise	Sandy loam	30	Slight-moderate	Moderate
11	Sunrise	Sandy loam	21	Slight-moderate	Moderate
12	Calvista-Hi Vista	Sandy loam	16	Moderate	Low-moderate
13	Greenfield-Ramona	Sandy loam	30	Slight-moderate	Low-moderate
14	Hanford-Greenfield	Sandy loam	42	Slight-moderate	Low
15	Ramona	Sandy loam	22	Moderate	Moderate
16	Tujunga	Gravelly sand	15	Slight-moderate	Low
17	Dune land	Sandy loam	na	na	Low
18	Lava flows	Lava bedrock	na	na	na
19	Playas	Clay loam and silty clay	na	na	High
20	Rock land	Rocky sandy loam	na	na	na
21	Riverwash	Sandy alluvium	na	na	Low

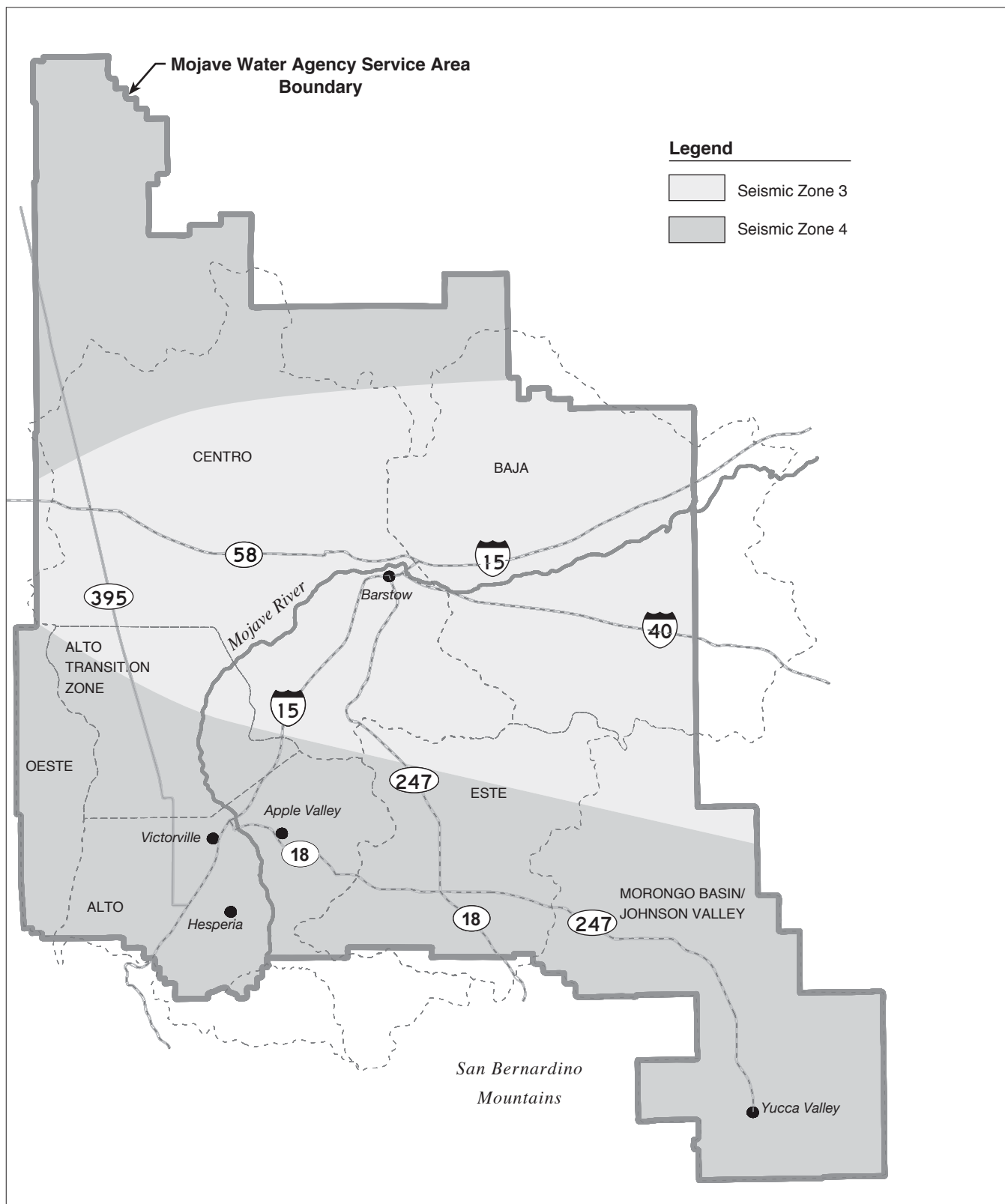
Source: MWA, 1994

na = Not applicable and/or not available.

Shaking Intensity

While the moment and Richter magnitudes are a measure of the energy released in an earthquake, intensity is a measure of the earthquake ground shaking effects at a particular location. Intensity will vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material underlying an area. The Modified Mercalli Intensity (MMI) scale (Table 3.10-3) is commonly used to measure earthquake effects due to ground shaking because it expresses ground shaking relative to actual observed effects and therefore provides a useful tool for comparison. MMI values range from I (earthquake not felt) to XII (damage nearly total). Earthquakes on the various active and potentially active fault systems in the service area can produce a wide range of ground shaking intensities within the service area.

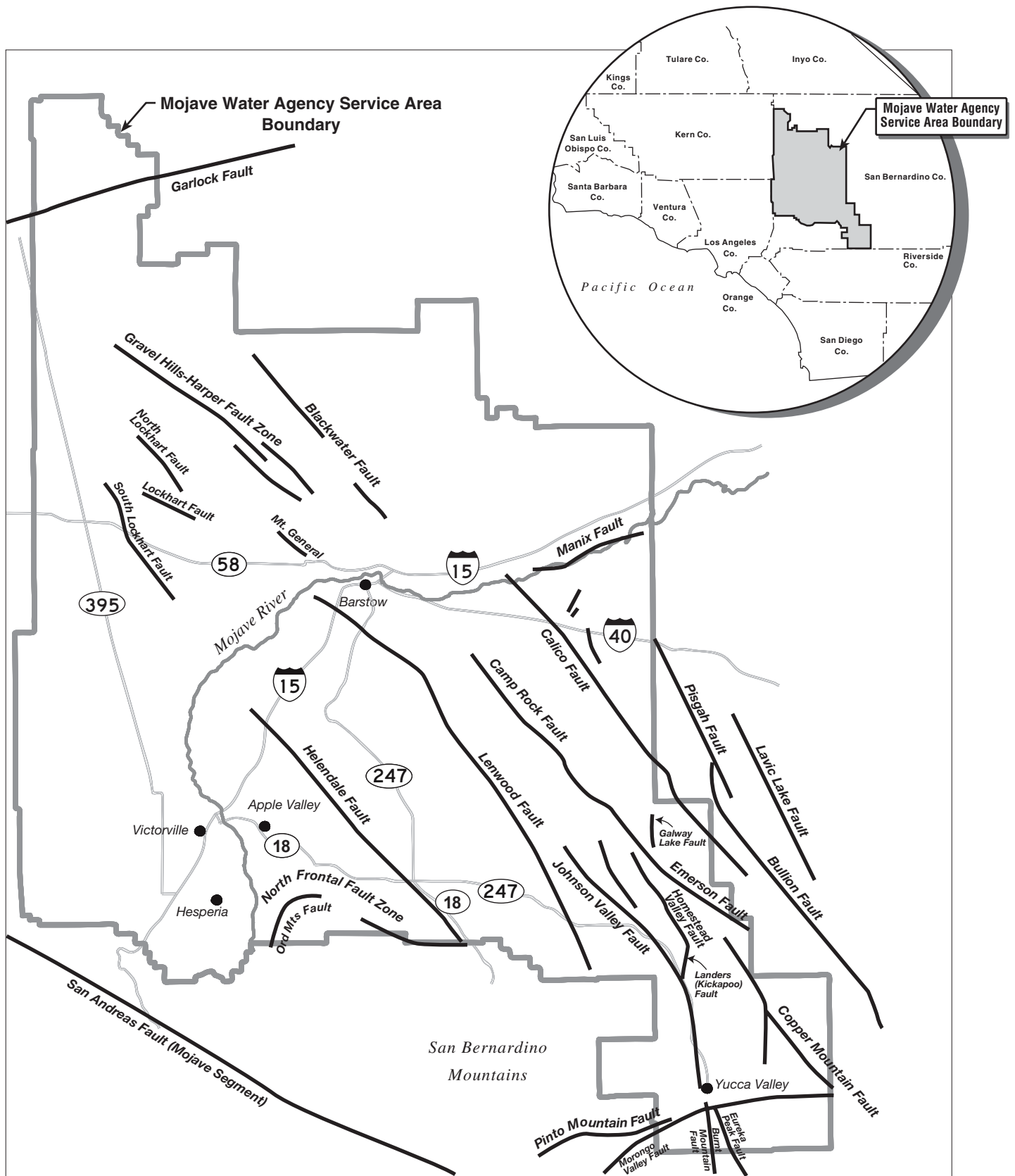
According to the California Geological Survey (CGS) Probabilistic Seismic Hazard Assessment, peak ground acceleration in the MWA service area could reach or exceed a range of 0.2 to 0.6 g (CGS, 2003). A probabilistic seismic hazard map is a map that shows the hazard from



SOURCE: Environmental Science Associates, County of San Bernardino (1997)

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Figure 3.10-2
UBC Seismic Zones within the
RWMP Update Study Area



SOURCE: Environmental Science Associates, Jennings (1994), Town of Yucca Valley (1995)

MWA RWMP / 203148 ■

Figure 3.10-3
Regional Fault Map

TABLE 3.10-2
ACTIVE AND POTENTIALLY ACTIVE REGIONAL FAULTS
WITHIN AND IN THE VICINITY OF THE MWA SERVICE AREA

Fault Zone	Location Relative to Service Area^a	Recency of Faulting^b	Historical Seismicity	Maximum Moment Magnitude^c
Mount General	4.7 miles northwest	Holocene	na	na
Gravel Hills-Harper	21 miles northwest	Holocene	na	M _w 6.5-7.2
Blackwater	24 miles northwest	Holocene	na	M _w 6.5-7.1
Lockhart (includes North Lockhart and South Lockhart)	25 miles northwest	Holocene	na	M _w 6.5-7.4
Helendale	25 miles south	Holocene	na	M _w 6.5-7.3
Lenwood	26 miles southeast	Historic, Holocene	M _w 7.3, 1992	M _w 6.5-7.4
Camp Rock	26 miles southeast	Historic, Holocene	M _w 7.3, 1992	M _w 6.0-7.5
Manix	28 miles east	Historic, Holocene	M _w 6.5, 1947	M _w 6.0-7.0
Pisgah	39 miles southeast (<i>outside service area</i>)	Historic, Holocene	M _w 7.3, 1992	M _w 6.0-7.0
Calico	39 miles southeast	Historic, Holocene	M _w 7.3, 1992; M 5.3, 1997	M _w 6.5-7.1
North Frontal (includes Ord Mountains)	39 miles south	Holocene	na	M _w 6.0-7.1
Galway Lake	40 miles southeast	Historic, Holocene	M 5.0, 1975; M _w 7.3, 1992	M 5.0-6.0
Emerson	44 miles southeast	Historic, Holocene	M _w 7.3, 1992	M _w 6.5-7.3
Lavic Lake	47 miles southeast (<i>outside service area</i>)	Historic, Holocene	M _w 7.3, 1992; M _w 7.1, 1999	na
Garlock	47 miles northwest	Historic, Holocene	M 5.7, 1992	M _w 6.8-7.6
Homestead Valley	47 miles southeast	Historic, Holocene	M 5.3, 1979; M _w 7.3, 1992	M _w 6.0-7.0
San Andreas (Mojave segment)	50 miles southwest (<i>outside service area</i>)	Historic, Holocene	M _w 8.0, 1857	M _w 6.8-8.0
Bullion	50 miles southeast (<i>outside service area</i>)	Historic, Holocene	M _w 7.1, 1999	M _w 6.5-7.1
Johnson Valley	50 miles southeast	Historic, Holocene	M _w 7.3, 1992	M _w 6.5-7.3
Landers (Kickapoo)	51 miles southeast	Historic	M _w 7.3, 1992	M 4.8-5.3
Pinto Mountain	62 miles southeast	Historic, Holocene	M _w 7.3, 1992	M _w 6.5-7.5
Eureka Peak	62 miles southeast	Historic, Holocene	M _w 7.3, 1992	M _w 5.5-6.8
Burnt Mountain	62 miles southeast	Historic, Holocene	M _w 7.3, 1992	M _w 6.0-6.5
Copper Mountain	62 miles southeast	Holocene	na	M 6.0-6.5
Morongo Valley	63 miles southeast	Holocene	na	M _w 6.0-6.8

Sources: Jennings, 1994; Hart, 1997; SCEDC, 2004; and Peterson et al., 1996.

^a Distance to a specified fault was measured from central Barstow. This distance is meant to give an indication of how faults are distributed within and in the vicinity of the service area. Note that some faults are located outside of the service area.

^b Historic: displacement during historic time (within last 200 years), including areas of known fault creep; Holocene: evidence of displacement during the last 10,000 years.

^c Maximum moment magnitude is the maximum earthquake moment magnitude which could occur within the specified fault zone.

na = Not applicable and/or not available.

**TABLE 3.10-3
MMI SCALE (Abridged)**

Intensity Value	Intensity Description	Average Peak Acceleration^a
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	< 0.014 g
III	Felt quite noticeably indoors; especially on upper floors of buildings, but many people do not recognize it as an earthquake.	< 0.014 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound.	0.014–0.039 g
V	Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned.	0.039–0.092 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; minor fallen plaster or damaged chimneys. Damage slight.	0.092–0.18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken.	0.18–0.34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls.	0.34–0.65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse.	0.65–1.24 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 1.24 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

Source: Bolt, 1988; CGS, 2003.

^a g is gravity = 980 centimeters per second squared. Acceleration is scaled against acceleration due to gravity or the acceleration with which a ball falls if released at rest in a vacuum (1.0 g). Acceleration of 1.0 g is equivalent to a car traveling 100 meters (328 feet) from rest in 4.5 seconds.

earthquakes that geologists and seismologists agree could occur. It is “probabilistic” in the sense that the analysis takes into consideration the uncertainties in the size and location of earthquakes

and the resulting ground motions that can affect a particular site.⁵ As a comparison, during the moment magnitude 7.1 Hector Mine earthquake in 1999, maximum ground accelerations recorded at Hector Mine (approximately 14 miles north of the epicenter) were approximately 0.33 g. However, ground motions near Barstow were approximately 0.13 g (California Integrated Seismic Network (CISN), 2003). Structures on alluvium or artificial fill are generally more susceptible to damage than structures on bedrock.⁶ Peak ground accelerations experienced within the service area would vary depending on individual location (see **Figure 3.10-4**).

In addition to the peak ground accelerations which could occur in the service area, the California Integrated Seismic Network has predicted the MMIs which would be experienced within the service area were a Richter magnitude 7.8 earthquake to occur on the segment of the San Andreas fault ruptured in the 1857 Fort Tejon earthquake. MMIs that could be experienced include VI-VIII (strong to severe) around Victorville, VI (strong) around Barstow, decreasing to V (moderate) in areas east of Barstow (CISN, 2004).

Faults considered potentially active faults are typically not zoned under the Alquist-Priolo Earthquake Fault Zoning Act (Hart, 1997).⁷ However, since active faults are abundant within the service area, many Earthquake Fault Hazard Rupture Zones have been defined by the Alquist-Priolo Earthquake Zoning Act within the service area (see **Figure 3.10-5**).

GEOLOGIC HAZARDS

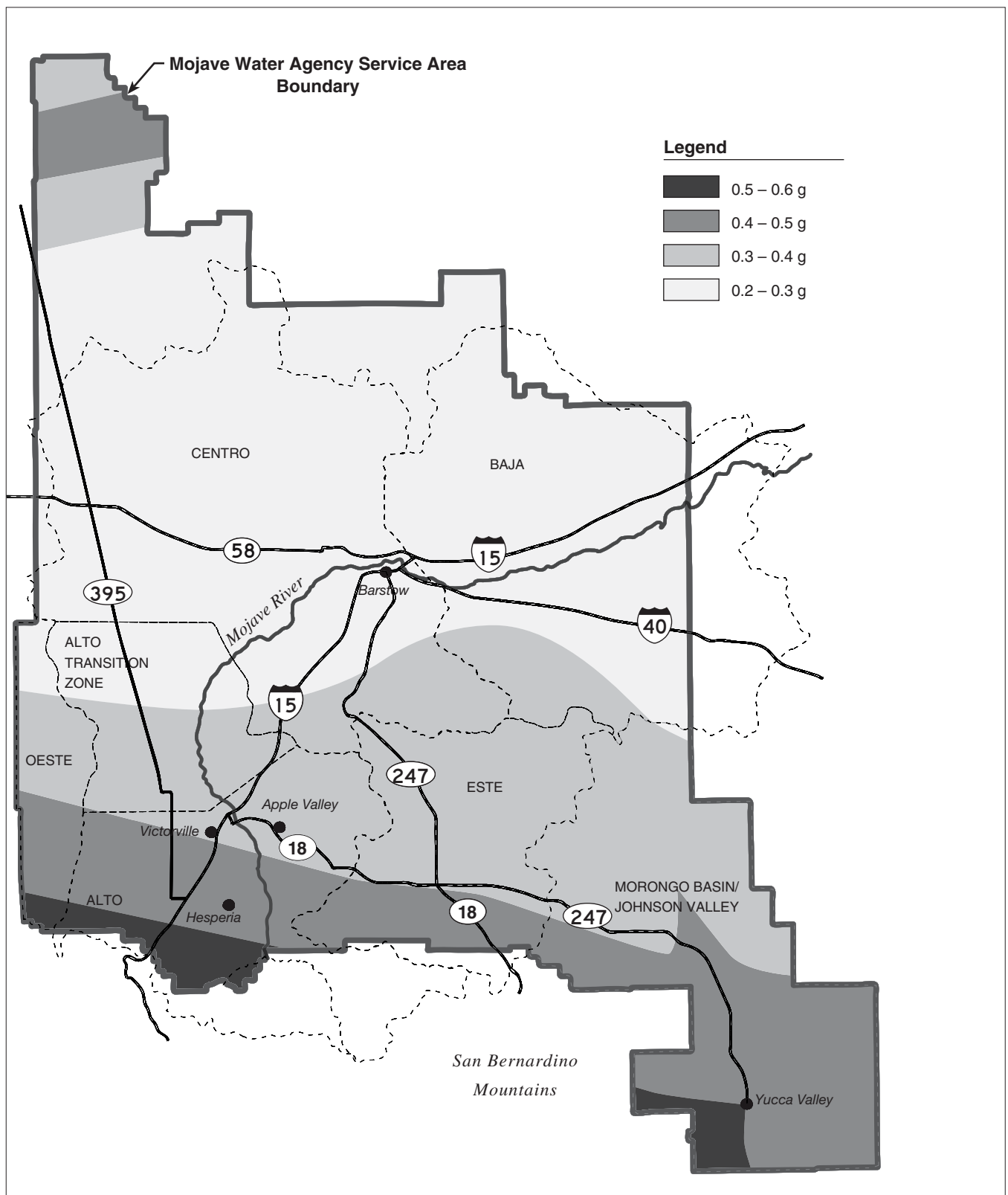
Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the down-slope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Exposed rock slopes undergo rock falls, rockslides, or rock

⁵ The maps are typically expressed in terms of probability of exceeding a certain ground motion. For example, the 10 percent probability of exceedance in 50 years maps depict an annual probability of 1 in 475 of being exceeded each year. This level of ground shaking has been used for designing buildings in high seismic areas. The maps for 10 percent probability of exceedance in 50 years show ground motions that geologists and seismologists do not think will be exceeded in the next 50 years. In fact, there is a 90 percent chance that these ground motions will not be exceeded. This probability level allows engineers to design buildings for larger ground motions than geologists and seismologists think will occur during a 50-year interval, which makes buildings safer than if they were only designed for the ground motions that are expected to occur in the next 50 years. Seismic shaking maps are prepared using consensus information on historical earthquakes and faults. These levels of ground shaking are used primarily for formulating building codes and for designing buildings. The maps can also be used for estimating potential economic losses and preparing for emergency response (Peterson et al., 1999).

⁶ The damage level represents the estimated overall level of damage that will occur for various MMI levels. The damage, however, will not be uniform. Some buildings will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all buildings perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a building all affect its performance (ABAG, 1998).

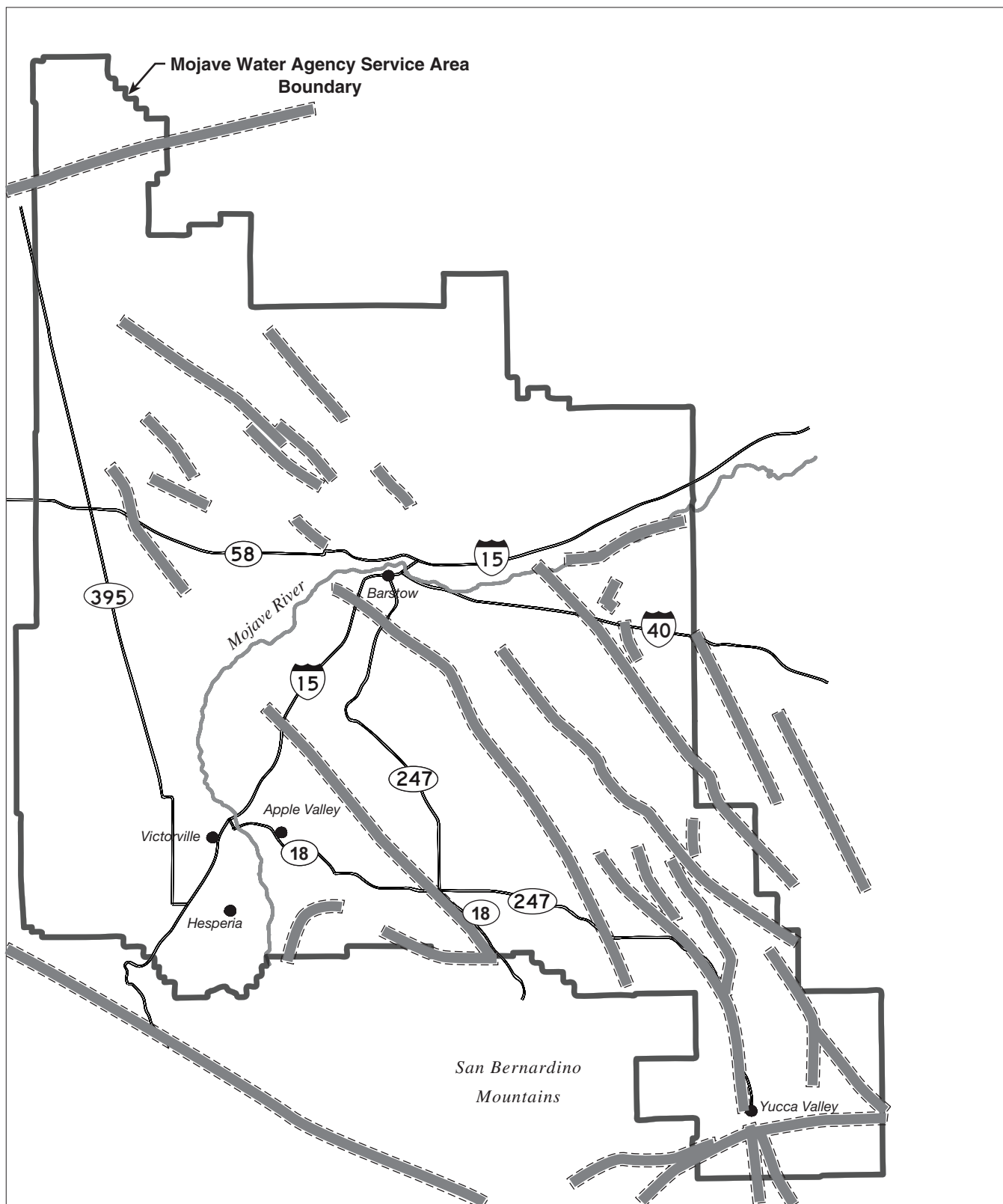
⁷ The Alquist-Priolo Earthquake Fault Zoning Act, signed into law in December of 1972, requires the delineation of zones along active, potentially active, and well-defined faults. The purpose of the Alquist-Priolo Act is to regulate development on or near active fault traces to reduce the hazard of fault rupture.



SOURCE: Environmental Science Associates, CGS (2003)

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Figure 3.10-4
Probabilistic Seismic Hazard Map
for the RWMP Service Area



SOURCE: Environmental Science Associates, Jennings (1994), Hart (1997)

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Figure 3.10-5
Approximate Alquist-Priolo Zones
in the MWA Service Area

avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. Steep slopes along Highway 138 and Interstate 15 through Cajon Pass in the southwestern corner of the service area near Hesperia are identified as areas prone to earthquake-induced landslides. Steep slopes along Highway 18 through Crestline leading down to San Bernardino near the southern border of the service area have also been identified as slopes prone to earthquake-induced landslides. No major landslides have been identified in the Hesperia sphere of influence. However, undercutting by drainage channels and arroyos has caused minor slumps during heavy storms. Soil slippage, creep, landslides, and excessive erosion are more common in areas with gullied, unconsolidated alluvial soils such as northeast and southeast Hesperia, the Summit Valley foothills southwest of Hesperia, and areas adjacent to active washes and natural drainages (City of Hesperia, 1991). The California Division of Mines and Geology (CDMG; now called the CGS) characterized the majority of the MWA service area as having a very low landslide severity rating in 1973. Isolated areas exhibiting moderate landslide potential are located in the hills of the southwestern portion of the MWA service area, near the County's border with Los Angeles County (MWA, 1994). Landslide potential has been characterized as low in the city of Barstow's sphere of influence, meaning that the level of risk of landsliding is so low that little or no specific action is deemed necessary and that the occurrence of a landslide is unlikely (City of Barstow, 1997).

Expansive Soils

Expansive soils possess a "shrink-swell" behavior. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments (such as montmorillonite, a common mineral in the service area) from the process of wetting and drying. Structural damage may result over a long period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. Typically, soils that exhibit expansive characteristics comprise the upper five feet of the surface. The effects of expansive soils could damage foundations of above-ground structures, paved roads and streets, and concrete slabs. Expansion and contraction of soils, depending on the season and the amount of surface water infiltration, could exert enough pressure on structures to result in cracking, settlement, and uplift. The soils in the MWA service area have a range of shrink-swell potentials; see Table 3.10-1 for a summary of these characteristics. Specifically, soil associations which exhibit moderate to high shrink-swell potential within the service area include the Casa Grande-Barstow, Mojave variant-Sunrise, playas, Ramona, Rosamond-Oban, and Sunrise associations (MWA, 1994).

Settlement

If not properly engineered, loose, soft soil material comprised of sand, silt and clay has the potential to settle after a building or structure is placed on the surface. Settlement of loose soils generally occurs slowly but over time can amount to more than most structures can tolerate. Building settlement could lead to structural damage such as cracked foundations, and misaligned or cracked walls and windows. Minor foundation settlement is expected to occur following the completion of large structures, and is considered in foundation and building design.

Soil and Wind Erosion

Soil erosion is the process whereby soil materials are worn away and transported to another area either by wind or water. Erosion rates can vary depending on the soil material and structure, placement, and human activity. Soil containing high amounts of silt can be easily erodible while sandy soils are less susceptible. Excessive soil erosion can eventually lead to damage of building foundations, roadways and/or other structures. Erosion is most likely on sloped areas with exposed soil, especially where unnatural slopes are created by cut and fill activities. Consequently, soil erosion rates can be higher during the construction phase of projects and are typically reduced once the soil is graded and covered with properly designed concrete, structures, asphalt, or vegetation. Specifically, soil associations which exhibit moderate to high erosion potential within the service area include the Adelanto-Hesperia, Adelanto-Mojave, Cajon, Calvista-Hi Vista, Mojave-Adelanto variants, Mojave variant-Sunrise, Ramona, Sunrise, and Tujunga associations (MWA, 1994).

Wind erosion is greatest in arid regions where sandy or loamy sediments are exposed to severe wind conditions. Human activities that disturb soils increase the wind erosion potential of susceptible soils. Many of the desert areas in the MWA service area are also susceptible to blowsand, which is a severe form of wind erosion that damages property and causes sand to accumulate on roadways (MWA, 1994).

SEISMIC HAZARDS

Ground Shaking

Strong ground shaking from earthquakes generated by active faults is a hazard within the service area and it is likely that at least one moderate to severe earthquake will cause strong ground shaking within the service area over the next 50 years. The severity of ground shaking in the service area resulting from a specific earthquake will depend on the characteristics of the generating fault, distance to the energy source, the magnitude of the event, and the site-specific geologic conditions. In general, bedrock areas will experience ground shaking of higher frequency, shorter period, and lower amplitude. Structural damage resulting from shaking tends to be worse for structures located on unconsolidated deposits.

Liquefaction

Liquefaction is the sudden temporary loss of shear strength in saturated, loose to medium dense, granular sediments subjected to ground shaking. It generally occurs when seismically-induced ground shaking causes pore water pressure to increase to a point equal to the overburden pressure. Liquefaction can cause foundation failure of buildings and other facilities due to the reduction of foundation bearing strength. Under existing conditions, the service area has a range of geologic environments which could or could not be favorable to liquefaction. Shallow groundwater is present in Horsethief Canyon and Summit Valley within the City of Hesperia's sphere of influence and liquefaction may occur in these areas (City of Hesperia, 1991). Downstream of the Mojave Forks Dam, within the Hesperia sphere of influence, liquefaction potential decreases as depth to

groundwater increases. The Mojave River channel, in the vicinity of Barstow, has also been identified as an area likely to experience liquefaction (City of Barstow, 1997). In general, alluvial valleys are particularly susceptible to liquefaction. Unconsolidated alluvial deposits in desert regions are rarely saturated because of the depth to the water table and are less susceptible to liquefaction than unconsolidated alluvium adjacent to streams and rivers. As a result, the vast alluvial deposits in the desert regions of the MWA service area generally exhibit low liquefaction potential. Localized areas in the southwestern portion of the service area along the Mojave River and around the perimeter of dry lake beds exhibit moderate to high liquefaction potential (MWA, 1994).

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e., adjoining areas settling at different rates).

REGULATIONS

ALQUIST-PRIOLO EARTHQUAKE FAULT ZONING ACT

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act), signed into law in December of 1972, requires the delineation of zones along active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near active fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces.⁸ Cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture is not necessarily restricted to the area within an Alquist-Priolo Zone. Since active faults are abundant within the service area, many Earthquake Fault Hazard Rupture Zones have been defined by the Alquist-Priolo Earthquake Zoning Act within the service area (see Figure 3.10-5).

SEISMIC HAZARDS MAPPING ACT

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic

⁸ A “structure for human occupancy” is defined by the Alquist-Priolo Act as any structure used or intended for supporting or sheltering any use or occupancy that has an occupancy rate of more than 2,000 person-hours per year.

hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. The CGS has not completed seismic hazard mapping of the quadrangles in which the service area is located.

CALIFORNIA BUILDING CODE (CBC)

The CBC is another name for the body of regulations known as the California Code of Regulations, Title 24, Part 2. Title 24 is assigned to the California Building Standards Commission which, by law, is responsible for administering, adopting, approving, publishing, and implementing all building standards in the state of California. Under state law, all building standards must be centralized in Title 24 or they are not enforceable (Bolt, 1988).

The Uniform Building Code (UBC) is a widely adopted model building code in the United States, and was most recently published in 1997 by the International Conference of Building Officials (ICBO). The CBC incorporates the 1997 UBC by reference and includes necessary California amendments. These amendments include criteria for seismic design, and approximately one-third of the text within the CBC has been tailored to California earthquake conditions. The 1997 UBC requires extensive geotechnical analysis and engineering for grading, foundations, retaining walls, and structures within zones of seismic activity. The project site is located within Seismic Zone 4, which is the seismic zone expected to experience the greatest effects from earthquake ground shaking. Thus, this seismic zone has the most rigorous requirements for seismic design. In January 2003, the ICBO merged with the Building Officials and Code Administrators International and the Southern Building Code Congress International, and all three organizations have become collectively known as the International Code Council (ICC). Revisions to the 1997 UBC by the ICC are expected by 2005 or later.

LOCAL PLANS

The County of San Bernardino General Plan contains a Natural Hazards Planning Issues section, which identifies and assesses known conditions and seismic hazards. The section identifies planning goals, and outlines corresponding policies and programs to support the various goals.

Individual General Plans for the cities and towns in the MWA contain Safety Elements, which address seismic hazards. General plans identify safety goals and outline corresponding policies, implementation measures, and programs to support the various goals.

IMPACT ASSESSMENT MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

CEQA defines a significant effect on the environment as a substantial, or potentially substantial, adverse change in the physical conditions within the area affected by the project. A geologic, soils-related, or seismic hazard impact would be considered significant if it would result in any of the following, which are adapted from the *CEQA Guidelines*, Appendix G:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death 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;
 - Strong seismic ground shaking;
 - Seismic-related ground failure, including liquefaction; or
 - 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; or
- Be located on expansive soil, as defined in Table 18-1-B of the 1994 UBC, creating substantial risks to life or property.

Impact 3.10-1: Strong ground motion generated during an earthquake within or in the vicinity of the service area could result in damage to facilities. Damage could occur through surface rupture, ground shaking, liquefaction, and/or landslides.

Projects

The MWA service area is seismically active and the proposed projects and actions included in the 2004 RWMP would likely experience at least one major earthquake during their individual operational lifetimes. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the moment magnitude, and the duration of shaking. MMI levels expected for an event could range between MMI VII and MMI VIII, with equivalent ground peak accelerations of 0.2 to 0.6 g. Earthquakes could occur on one or more of the prominent fault zones in the service area, such as the San Andreas (Mojave segment), Helendale, Johnson Valley, Lenwood, Emerson, and/or Camp Rock faults, among others. All of these fault zones would be capable of generating an earthquake with significant shaking intensities, which the service area would likely experience. Secondary effects of an earthquake, including surface rupture, liquefaction, and/or landslides, could also be sustained by proposed facilities and/or earthen structures.

Although some structural damage is typically not avoidable during an earthquake, building codes and construction ordinances have been established to prevent building collapse and major injury during a seismic event. The design and construction of facilities and/or structures (including buried utilities) in accordance with applicable requirements of the UBC, the CBC, and recommendations of geotechnical investigations for an individual site (if applicable) would ensure that the level of risk from earthquake ground shaking and secondary effects is less than significant for implementation of a project and/or action proposed in the 2004 RWMP.

Building codes and construction ordinances have been established to prevent building collapse and major injury during a seismic event. The design and construction of proposed reclamation plants and/or structures (including buried utilities) in accordance with applicable requirements of the UBC, the CBC, and city/agency jurisdictions would minimize the level of risk related to seismic hazards. In addition, to further reduce this potential impact, a site-specific, design-level geotechnical investigation would be prepared during the design phase to ensure structures are in accordance with applicable requirements of the UBC, the CBC, and agency/city jurisdictions. Compliance with **Mitigation Measure 3.10-1** would ensure that the level of risk related to seismic hazards is less than significant.

Recharge Basins

Groundwater recharge basin projects proposed in the 2004 RWMP would consist of above-ground developments composed primarily of natural earth materials. The effect of an earthquake on a recharge basin would depend on the seismic hazards of the site and on the type of structure, its materials, and construction quality. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the moment magnitude, and the duration of shaking. Damage to a recharge basin could include localized leaks and damage to surface conveyance and control structures. Liquefaction could result in loss of bearing pressure or other ground failure in unimproved foundation soils resulting in foundation and equipment damage. Ground failure could result in localized leaks, or pipes to crack, rupture, and/or alter their alignment.

Construction and operation of proposed recharge basin projects would be designed to prevent failure in the event an earthquake were to occur, thus protecting adjacent land uses. If a specific recharge/detention basin is over 25 feet high and impounds over 15 acre-feet (af) of water, or over 6 feet high and impounds over 50 af of water, the California Department of Water Resources, Division of Safety of Dams (DSOD) would oversee its construction. The majority of recharge basin projects are proposed within existing drainages where catastrophic dam failure would be less likely to impact residential and/or commercial developments. Recharge basins would be designed in accordance with specific design criteria (as adopted by the applicable City or Town), as determined appropriate, to prevent damage during a seismic event.

Pipelines

Pipeline projects included in the 2004 RWMP would consist of below-ground structures. Compared to above-ground structures, underground pipelines are less susceptible to damage from strong ground shaking because they are bedded in compacted backfill and can tolerate more seismic wave motion. Pipelines that cross faults can be severed during fault movement. The design and construction of pipelines would be in accordance with applicable requirements of the UBC and the CBC to minimize the potential damage. In addition, recommendations of geotechnical investigations for an individual site (if applicable) would ensure that the level of risk from earthquake ground shaking and secondary effects is less than significant.

Injection/Extraction Wells

Similar to the other facilities, well shafts and surface equipment could be damaged in an earthquake. Facilities would be constructed to CBC standards to minimize the effect. Since the well pads are generally small, high risk areas such as directly over or across active faults can be avoided during the facility siting process. Compliance with design standards would ensure that the level of risk from earthquake ground shaking and secondary effects is less than significant.

Management Actions

Reclamation

Similar to other facilities, treatment plants and distribution systems would be subject to seismic hazards. The design and construction of new facilities and/or structures (including buried utilities) in accordance with applicable requirements of the UBC, the CBC, and city/agency jurisdictions would minimize the level of risk related to seismic hazards. In addition, to further reduce this potential impact to less than significant, a site-specific, design-level geotechnical investigation would be prepared during the design phase of a new facility to ensure structures are in accordance with applicable requirements of the UBC, the CBC, and agency/city jurisdictions. Compliance with **Mitigation Measure 3.10-1** would ensure that the level of risk related to seismic hazards is less than significant.

Wellhead Treatment

Wellhead treatment actions proposed in the 2004 RWMP would consist of small modifications to existing wellheads in the service area; therefore, facility development would be minimal. However, in the event that new structures are deemed necessary, these new structures could be subjected to seismic hazards.

Treatment Plant/Blending

Treatment plant/blending facility actions proposed in the 2004 RWMP would consist of construction of new treatment plants or blending facilities in the service area, which could be subjected to seismic hazards. The design and construction of new facilities and/or structures (including buried utilities) in accordance with applicable requirements of the UBC, the CBC, and city/agency jurisdictions would minimize the level of risk related to seismic hazards. In addition, to further reduce this potential impact to less than significant, a site-specific, design-level geotechnical investigation would be prepared during the design phase of a new facility to ensure structures are in accordance with applicable requirements of the UBC, the CBC, and agency/city jurisdictions. Compliance with **Mitigation Measure 3.10-1** would ensure that the level of risk related to seismic hazards is less than significant.

Mitigation Measure

M3.10-1 **Implementing agencies shall prepare site-specific, design-level geotechnical investigations for each site prior to the commencement of construction. Each investigation shall include an analysis of expected geologic hazards at the site. The analyses shall be in accordance with applicable City or Town ordinances and policies, and shall be consistent with the 1997 Uniform Building Code (UBC) (or any more recent version of the UBC adopted by the applicable City or Town). Recommendations made in the geotechnical report shall be incorporated into the project.**

Significance After Mitigation

Less than significant.

Impact 3.10-2: Facilities included in the projects and actions proposed in the 2004 RWMP could be subjected to hazards related to expansive soils and settlement.

Projects

Soil associations which exhibit moderate to high shrink-swell potential within the service area include the Casa Grande-Barstow, Mojave variant-Sunrise, playas, Ramona, Rosamond-Oban, and Sunrise associations.⁹ Facilities developed on such soils could experience settlement over time as a result of increased foundation loads from the overlying structures being placed on loose and soft (semi-unconsolidated) geologic materials. Potentially half of the settlement could occur during construction or shortly thereafter. Differential settlement could occur between column or floor slabs due to variability of underlying soil conditions. Total and differential settlement of site soils could damage foundations, structures, and utility lines. Surface structures with foundations constructed in expansive soils would experience expansion and contraction, depending on the season and the amount of surface water infiltration, and enough pressure could be exerted to result in cracking, settlement, and uplift.

Geotechnical reports include the requirement that design and construction of a project strictly follow engineering recommendations needed to improve and/or eliminate settlement and expansive soils conditions. The design and construction of a proposed facility in accordance with project-specific requirements would ensure that the level of risk from settlement and expansive soils is less than significant.

Recharge Basins

Depending on the locations of the recharge basins proposed in the 2004 RWMP, individual basins could be subjected to expansive soils, which could cause damage to earthen structures, including localized leaks and damage to surface conveyance and control structures. As noted above, the

⁹ MWA, 1994.

majority of recharge basin projects proposed in the 2004 RWMP would be located at the outer edges of the municipalities, where they would be less likely to impact residential and/or commercial developments, should a basin fail or otherwise become damaged. In addition, recharge/detention basins would be designed in accordance with design criteria required by the UBC, the CBC, and other specific design criteria (as adopted by the applicable City or Town), as determined appropriate, to avoid damage due to expansive soils. Thus, this impact would be less than significant.

Pipelines

Pipeline projects proposed in the 2004 RWMP would be located below the ground surface and, compared to above-ground structures, would be less susceptible to damage from expansive soils and settlement because they would be bedded in compacted backfill. Nonetheless, improperly installed pipelines could be subjected to shear forces caused by expansive soils and settlement. The pipelines would be designed in accordance with the CBC to avoid damage due to expansive soils. Thus, this impact would be less than significant.

Injection/Extraction Wells

Due to limited extent of a typical injection or extraction well, it is unlikely that possible expansive soils would have a significant impact on well projects proposed in the 2004 RWMP. Due to limited extent of this type of well, it is unlikely that seismic shaking or related secondary failures would have a significant impact on injection well projects proposed in the 2004 RWMP. Thus, this impact would be less than significant.

Management Actions

Reclamation

Similar to other facilities, treatment plants and distribution systems would be subject to expansive soil and settlement hazards. The design and construction of new facilities and/or structures in accordance with applicable requirements of the CBC would minimize the level of risk related to geologic hazards. In addition, a site-specific, design-level geotechnical investigation would be prepared during the design phase of a new facility to ensure structures are in accordance with applicable requirements of the CBC. Compliance with **Mitigation Measure 3.10-1** would ensure that the level of risk related to geologic hazards is less than significant.

Wellhead Treatment

Wellhead treatment actions proposed in the 2004 RWMP would include minimal facility development. However, in the event that new structures are deemed necessary, these new structures could be subjected to expansive soils. The design and construction of new facilities and/or structures (including buried utilities) in accordance with applicable requirements of the UBC, the CBC, and city/agency jurisdictions would minimize the level of risk related to possible

expansive soils. In addition, to further reduce this potential impact, a site-specific, design-level geotechnical investigation would be conducted during the design phase of a new facility and/or structure to ensure structures are in accordance with applicable requirements of the UBC, the CBC, and agency/city jurisdictions. Implementation of **Mitigation Measure 3.10-1** would ensure that the level of risk from expansive soils is less than significant.

Treatment Plant/Blending

Depending on the location of a treatment plant or blending facility proposed in the 2004 RWMP, an individual project could be subjected to expansive soils. The design and construction of proposed treatment plants and/or structures (including buried utilities) in accordance with applicable requirements of the UBC, the CBC, and city/agency jurisdictions would minimize the level of risk related to possible expansive soils. In addition, to further reduce this potential impact, a site-specific, design-level geotechnical investigation would be conducted during the design phase of a facility to ensure structures are in accordance with applicable requirements of the UBC, the CBC, and agency/city jurisdictions. Implementation of **Mitigation Measure 3.10-1** would ensure that the level of risk from expansive soils is less than significant.

Mitigation Measures

See Mitigation Measure M3.10-1.

Significance After Mitigation

Less than significant.

Impact 3.10-3: Construction related to the projects and actions proposed in the 2004 RWMP could result in soil erosion during excavation, grading, and other construction activities.

Projects

Construction activities associated with projects and/or actions proposed in the 2004 RWMP would require backfilling, earthmoving, grading, and compaction, which would expose areas of soil that could have previously been covered with vegetation or consolidated materials. Exposed bare soil could be subjected to erosion by wind and storm water runoff. The extent of erosion would depend on soil type, vegetation/cover, and weather conditions. Generally, sandy soils are less prone to erosion than silty soils, however cleaner sands that contain little or no fine-grained sediments can be highly susceptible to wind-blown erosion.

Concentrated water and wind erosion, if not managed or controlled, could eventually result in significant soil loss and/or discharging of sediment into installed utilities and/or adjacent areas. Sediment from project-induced onsite erosion could also accumulate in downstream drainage facilities, interfere with flow, and aggravate downstream flooding conditions.

A National Pollutant Discharge Elimination System General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Permit) would be required for projects and/or actions proposed in the 2004 RWMP. The permit process includes preparation of a Storm Water Pollution Prevention Plan (SWPPP) for all construction phases of a project, as required by the Regional Water Quality Control Board (RWQCB). The objectives of the SWPPP are to identify pollutant sources (such as sediment) that may affect the quality of storm water discharge and to implement Best Management Practices (BMPs) to reduce pollutants in storm water discharges. BMPs are individual or combined measures that can be implemented in a practical and effective manner on the project site which, when applied, prevent or minimize the potential release of contaminants into surface waters and groundwater. BMPs have been established by the RWQCB in the California Storm Water BMP Handbook for Construction (CASQA, 2003), and are recognized as effective in reducing degradation of surface waters.

Since BMPs have been recognized as methods to effectively prevent or minimize the potential release of contaminants into surface waters and groundwater, compliance with the SWPPP and the prescribed BMPs would reduce potential erosion impacts during project construction to less than significant. (See Mitigation Measure 3.2-8)

Recharge Basins

During construction of the recharge basins proposed in the 2004 RWMP, compliance with the SWPPP and the prescribed BMPs would reduce potential erosion impacts during project construction. Potential soil erosion associated with implementation of recharge basin projects proposed in the 2004 RWMP would be less than significant.

Pipelines

During construction of the pipeline projects proposed in the 2004 RWMP, compliance with the SWPPP and the prescribed BMPs would reduce potential erosion impacts to less than significant. Following construction of pipeline projects, the ground surface would be returned to its original configuration, minimizing the soil erosion potential. Therefore, this impact is considered less than significant.

Injection/Extraction Wells

During construction of an injection or extraction well project proposed in the 2004 RWMP, compliance with the SWPPP and the prescribed BMPs would reduce potential erosion impacts to less than significant. Well projects would not include substantial modification of the site topography; therefore, operation of the wells would not result in substantial soil erosion. Potential soil erosion associated with implementation of well projects proposed in the 2004 RWMP would be less than significant.

Management Actions

Reclamation

Application of recycled water would be regulated by Water Recycling Requirements limiting runoff that could promote erosion. Therefore, this impact is considered less than significant.

Wellhead Treatment

Wellhead treatment actions proposed in the 2004 RWMP would include minimal construction activities and would not require substantial movement of earth. Wellhead actions would not include substantial modification of the site topography; therefore, operation of these facilities would not result in substantial soil erosion. Therefore, this impact is considered less than significant.

Treatment Plant/Blending

During construction associated with a treatment plant/blending facility action proposed in the 2004 RWMP, compliance with the SWPPP and the prescribed BMPs would reduce potential erosion impacts to less than significant.

Mitigation Measure

See **Mitigation Measure M3.2-8.**

Significance After Mitigation

Less than significant.

3.11 HAZARDS & HAZARDOUS MATERIALS

SETTING

Hazardous substances include chemicals regulated by both the United States Department of Transportation's (DOT) "hazardous materials" regulations and the EPA "hazardous waste" regulations. Hazardous materials are substances that have the capacity of causing a health hazard during exposure. Hazardous wastes require special handling and disposal because of their potential to damage public health and the environment. Hazardous wastes can occur in soils and in building materials. Past uses can contaminate soils, groundwater, and surface water through the improper disposal of wastes. Industrial uses can be sources of solvents, petroleum products, and metals. Agricultural uses can result in contamination from pesticides, herbicides, pathogens, and high levels of nitrates from fertilizers and animal waste. In rural areas of the county, residential septic systems have affected groundwater with elevated levels of nitrates.

Potential subsurface contamination consists of pesticides and herbicides from past agriculture, leaking underground storage tanks (USTs), and contamination from improper disposal of chemicals and wastes from industrial, military land uses, and rural residential uses.

REGULATORY ENVIRONMENT

The principal federal regulatory agency for hazardous wastes is the U.S. EPA. The key federal regulations pertaining to hazardous wastes are the:

- Resource Conservation and Recovery Act (RCRA);
- Superfund Amendment Reauthorization Act (SARA) Title III; and
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In addition, a number of federal regulations exist regarding the use, removal, and disposal of asbestos containing materials. Applicable federal regulations are primarily contained in Titles 29, 40, and 49 of the CFR. In California, Title 22 and Title 23 of the CCR address hazardous materials and wastes. Title 22 defines, categorizes, and lists hazardous materials and wastes. Title 23 addresses public health and safety issues related to hazardous materials and wastes and specifies disposal options.

The Hazardous Waste Control Law (HWCL) is the State law similar to the federal RCRA program. HWCL is implemented by regulations contained in Title 26 of the CCR, which describes the requirements for the proper management of hazardous wastes, including:

- Criteria for identification and classification of hazardous wastes;
- Generation and transportation of hazardous wastes;
- Design and permitting of facilities that recycle, treat, store, and dispose of hazardous wastes;
- Treatment standards;

- Operation of facilities and staff training; and
- Closure of facilities and liability requirements.

Title 26 regulations include over 800 materials that may be hazardous and the criteria for identifying, packaging, and disposing of wastes identified as being hazardous. Title 26 also establishes permit requirements for facilities that recycle, treat, store, or dispose of hazardous wastes. Under HWCL and Title 26, the generator of a hazardous waste must complete a manifest that accompanies the waste from the generator to the transporter to the ultimate disposal location. Copies of the manifest must be filed with the Department of Toxic Substances Control (DTSC). The DTSC and the RWQCB share management of underground storage tanks and hazardous waste site remediation.

SIGNIFICANCE CRITERIA

The criteria used to determine the significance of an impact are based on the initial study checklist in Appendix G of the State CEQA Guidelines.

The proposed project may result in a significant impact if it would:

- create a significant hazard to the public or environment through the routine transport, storage, use, or disposal of hazardous materials;
- create a significant hazard to the public 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;
- be located on a site that is known to contain hazardous materials or is listed on a site compiled pursuant to Government Code Section 65962.5, and as a result could create a significant hazard to the public or the environment;
- result in a safety hazard for people residing or working in the project area for a project located within an airport land use plan, within two miles of a public airport or within the vicinity of a private airstrip;
- impair or interfere with the implementation of an adopted emergency response plan or emergency evacuation plan; or,
- expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

IMPACTS AND MITIGATION MEASURES

Impact 3.11-1: Project construction could encounter soil during excavation that has been exposed to contamination.

Construction of recharge basins, pipelines, wells, and treatment plants would involve site clearing and excavation activities throughout the service area. Past uses on selected project locations and

on adjacent properties may have contaminated soils. Contamination could include petroleum hydrocarbons from storage tanks or from surface spills, poly-chlorinated biphenols (PCBs) used as a fire retardant in transformer oil, pesticides from past storage or agricultural operations, nitrates from septic systems or past agricultural activity, or metals or other listed contaminant from commercial, industrial, and military land uses. If contaminated soils are excavated, state and federal regulations require proper characterization and disposal. If concentrations of contaminants exceed standards for hazardous wastes, the contaminated soils would be disposed of at hazardous waste disposal facilities in accordance with applicable regulations.

Mitigation Measures

- M3.11-1** **Prior to identifying recommended project locations, implementing agencies shall conduct Phase I Site Assessments to identify past uses that may have resulted in soil contamination.**
- M3.11-2** **If the Site Assessment identifies the potential for contaminated soils on proposed recharge basin sites, the implementing agency shall either conduct further analysis, redesign the project to avoid this area, or remediate the contamination pursuant to RWQCB standards prior to implementation of the project.**
- M3.11-3** **Excavated materials containing hazardous waste shall be disposed of in accordance with applicable hazardous waste transportation and disposal regulations by the implementing agency within 90 days of excavation.**

Significance after Mitigation

Less than significant.

Impact 3.11-2: Projects could involve storing hazardous materials on site that could pose a spill hazard to neighboring land uses.

Wellhead treatment facilities pump stations, and treatment plants may involve on-site storage of hazardous materials including fuel and water treatment chemicals such as chlorine. In the event of a catastrophic spill, neighboring land uses could be exposed to hazardous vapors. To prevent potential hazards, storage of these materials would be subject to hazardous materials storage regulations contained in CCR Title 22. Facility operator would be required to notify local fire departments of the type and quantity of hazardous materials stored on site. In addition, treatment processes may produce byproducts such as concentrated brine. Disposal of treatment byproducts would be subject to waste disposal regulations regulated by the RWQCB, DHS, and DTSC. Compliance with these regulations would minimize potential hazards from hazardous materials and treatment wastes to less than significant levels.

Mitigation Measure

None required.

Significance after Mitigation

Less than significant.

3.12 NOISE

This section describes generally the existing noise environment in the MWA service area, applicable noise regulations, and potential noise impacts from construction and operation of the RWMP project and management actions. This analysis uses typical construction equipment noise levels to discuss the potential corresponding noise levels at noise-sensitive receptor locations. Long-term operation-phase impacts are based on estimates of noise increases from similar noise sources.

SETTING

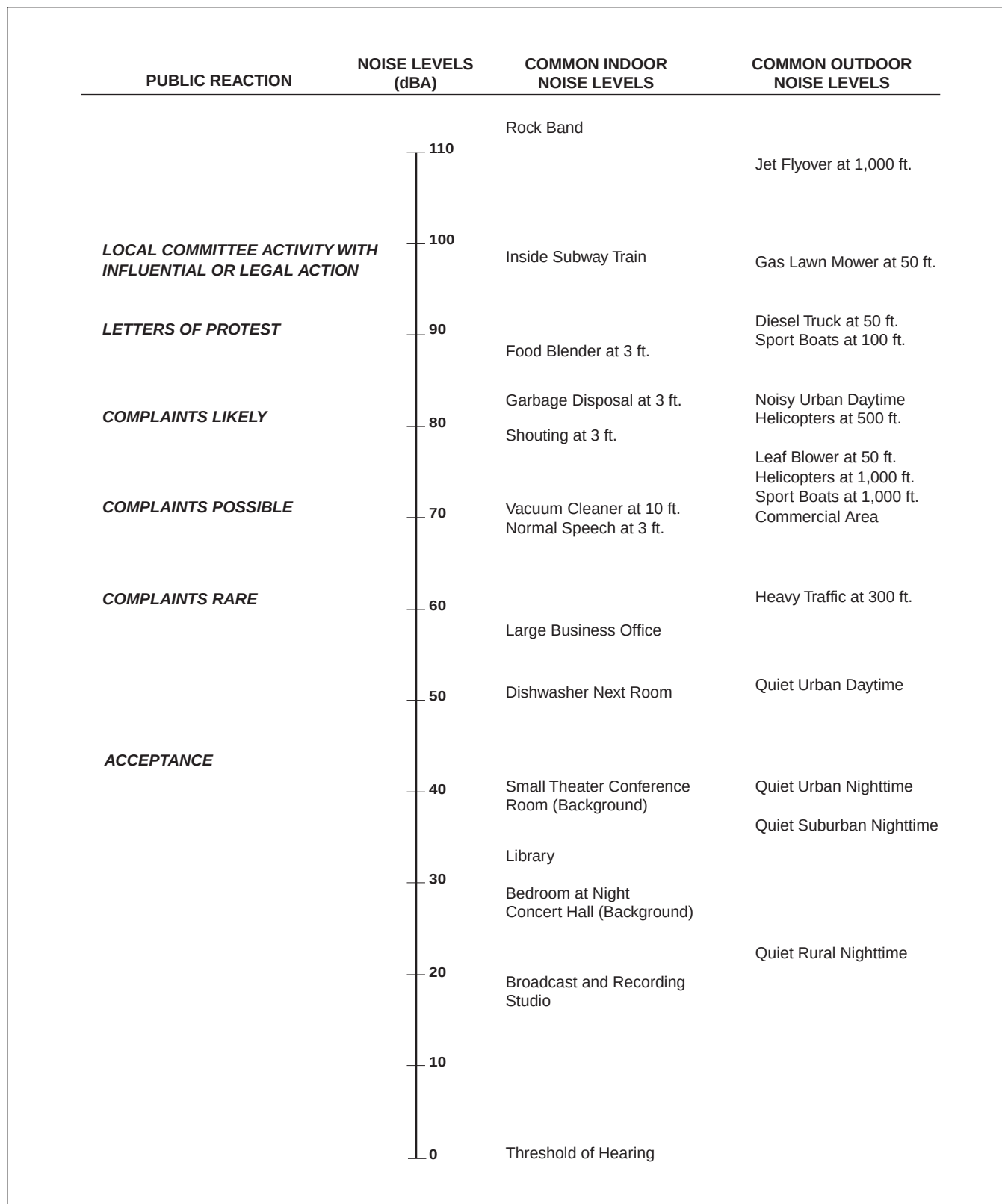
NOISE DESCRIPTORS AND PRINCIPLES

Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound. Human response to noise is subjective and can vary greatly from person to person. Factors that can influence individual response include intensity, frequency, and time pattern of the noise; the amount of background noise present prior to the intruding noise; and the nature of work or human activity that is exposed to the noise. The adverse effects of noise include interference with concentration, communication, and sleep. At the highest levels, noise can induce hearing damage.

Environmental noise is usually measured in A-weighted decibels (dBA).¹ Environmental noise typically fluctuates over time, and different types of noise descriptors are used to account for this variability. Typical noise descriptors include maximum noise level ($L_{\max}$), the energy-equivalent noise level (L_{eq}), the day-night average noise level (DNL), and the community noise equivalent level (CNEL).² Both the DNL and CNEL noise descriptors are commonly used in establishing noise exposure guidelines for specific land uses. Some representative noise sources, their associated dBA noise levels, and corresponding effects are shown in **Figure 3.12-1**.

¹ A dB is a unit of sound energy intensity. Sound waves, traveling outward from a source, exert a sound pressure level (commonly called “sound level”) measured in dB. An dBA is a decibel corrected for the variation in frequency response to the typical human ear at commonly encountered noise levels.

² The $L_{\max}$ refers to the highest instantaneous noise level observed in a given period. L_{eq} , the energy-equivalent noise level (or “average” noise level), is the equivalent steady-state continuous noise level which, in a stated period of time, contains the same acoustic energy as the time-varying sound level that actually occurs during the same period. DNL, the day-night average noise level, is a weighted 24-hour noise level. With the DNL descriptor, average noise levels (in terms of L_{eq}) between 10:00 p.m. and 7:00 a.m. are adjusted upward by 10 dBA to take into account the greater annoyance of nighttime noise as compared to daytime noise. CNEL, the community noise equivalent level, is similar to DNL, but an additional 5-dBA “penalty” is added to evening noise (7:00 p.m. to 10:00 p.m.). DNL and CNEL are considered equivalent for most planning purposes. All $L_{\max}$, L_{eq} , DNL, and CNEL values reported herein reflect A-weighted decibels unless stated otherwise.



SOURCE: Caltrans Noise Manual California State Department of Transportation, March 1980.

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Figure 3.12-1
Common Noise Levels and Public Reactions

Noise levels are measured on a logarithmic scale, instead of a linear scale. On a logarithmic scale, the sum of two noise sources of equal loudness is 3 dBA greater than the noise generated by just one of the noise sources (e.g., a noise source of 60 dBA plus another noise source of 60 dBA generate a composite noise level of 63 dBA).

The noise level experienced at a receptor depends on the distance between the source and the receptor, presence or absence of noise barriers and other shielding features, and the amount of noise attenuation (lessening) provided by the intervening terrain. For line sources, such as motor or vehicular traffic, noise decreases by about 3.0 to 4.5 dBA for every doubling of the distance from the roadway. For point or stationary noise sources, such as electric motors or construction equipment, a noise reduction of 6.0 to 7.5 dBA is experienced for each doubling of the distance from the source.

EXISTING NOISE SOURCES IN THE RWMP AREA

Major noise sources in the RWMP area include transportation sources, such as automobiles, trucks, trains, and aircraft. Throughout the RWMP area the noise environment is dominated by traffic on Interstates 15 and 40, State Routes 18, 58, 62 and 247, U.S. Highway 395, and local traffic. Union Pacific, Southern Pacific, and Atchison & Topeka Santa Fe railroads all operate heavily traveled rail lines through portions of the RWMP area. There are several public use airports in the RWMP area that affect the noise environment in their immediate vicinity, including the Apple Valley Airport, the Yucca Valley Airport, the Daggett Airport, the Hesperia Airport, and the Southern California Logistics Airport (formerly George Air Force Base). Military aircraft related to the Twenty-Nine Palms Air Ground Combat Center also contribute to the noise environment. In certain areas of the RWMP, industrial operations, including mining operations, play a major role in the community noise environment.

SENSITIVE RECEPTORS

Some land uses are considered more sensitive to noise levels than others due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. For instance, residential areas, schools, and hospitals generally are more sensitive to noise than are commercial and industrial land uses. Many different types of land uses are located in the communities throughout the RWMP area, including noise-sensitive uses such as residences. Because the specific locations of RWMP projects and management actions are unknown at this time, the proximity to sensitive receptors is also unknown. For the purposes of this EIR, it is assumed that sensitive receptors could be located in close proximity to each of the project components and management actions.

REGULATIONS

As a general matter, federal and state agencies regulate mobile noise sources, and local agencies regulate stationary noise sources and activities. Federal and state agencies regulate noise from mobile sources by establishing and enforcing noise standards on vehicle manufacturers. Local agencies regulate noise through three principal means: enforcement of local noise ordinances;

implementation of noise-related policies contained in the local general plan, such as noise / land use compatibility guidelines; and enforcement of noise-related conditions on permit approvals.

After construction, the project could involve operation of stationary sources of noise at project facilities that would be located in the City of Adelanto, the Town of Apple Valley, the City of Barstow, the City of Hesperia, the City of Victorville, the Town of Yucca Valley, and unincorporated areas of San Bernardino County. On-going operation of the RWMP projects and management actions would generate very few daily trips for on-going maintenance and operation of project facilities, and as such, the project would not raise long-term traffic or transportation-related noise concerns. Stationary sources of noise could include electrical pumps that would be required to pump water to at least some of the individual recharge ponds/ detention basins (those where gravity flow is not feasible) and also at some injection and production well sites. Treatment plants/blending facilities and wellhead treatment facilities would also include stationary sources of noise. In addition, if diesel- or natural gas-powered back-up generators were required at any of the above sites, this would also introduce a new temporary and intermittent source of noise. Noise from stationary sources raises long-term issues that are addressed by noise ordinance standards or general plan policies.

The relevant standards and policies for those jurisdictions that could be affected by project-related construction and/or operational noise are provided below.

CITY OF ADELANTO

The City of Adelanto regulates noise through its general plan. The general plan specifies the following exterior noise levels: 1) for single and multiple family residential uses, group homes, hospitals, schools and other learning institutions, parks and open spaces, where quiet is a basis for use, exterior noise levels should not exceed 65 CNEL, 2) for commercial and industrial areas, noise levels shall not exceed 75 dBA at any time, 3) for schools to be located where exterior noise exposures do not exceed 65 CNEL and interior peak noise levels do not exceed 60 DBA, 4) for library facilities to be located where interior noise levels do not exceed 65 CNEL and average interior noise levels during business hours do not exceed 40 dB, 5) for interior noise levels for hospital and convalescent homes to not exceed 55 CNEL in interior living areas and 45 CNEL in interior sleeping areas, and 6) for recreational areas intended for quiet to not exceed 70 dB.

With respect to noise / land use compatibility, the general plan guidelines assign 60 to 70 dB as the maximum normally acceptable level and 70 as the conditionally acceptable level for noise sensitive receptors such as residences, transient lodging, churches, and schools. The land use guidelines present 60 dB as the acceptable external noise level for residential uses and 65 dB if noise reduction is incorporated and the interior level is below 45 dB. The noise insulation standards detail specific requirements for multi-family structures such as hotels, motels, apartments, condos, and other attached dwellings located within 60 CNEL contour adjacent to roads, railroads, rapid transit lines, airports or industrial areas. An exception is made for railroads where there are no nighttime (10 p.m. to 7 a.m.) operations and where daytime (7 a.m. to 10 p.m.) operations do not exceed four per day. The standards also show that these multi-family units have been designated to limit interior noise levels with doors and windows closed to 45 CNEL. For

residential areas the exterior noise level should be such that interior noise levels will not exceed 45 CNEL³.

TOWN OF APPLE VALLEY

The Town of Apple Valley regulates construction hours and sets construction equipment limits through its noise ordinance. With respect to noise / land use compatibility, the maximum noise level considered to be normally acceptable for single- and multi-family residential development is 65 CNEL⁴. The Town has also established specific noise / land use compatibility standards for new industrial and commercial sources. In addition, the noise ordinance specifies the following exterior noise levels that are not to be exceeded more than 30 minutes in any hour: 1) for single-family residential areas, during the daytime (7:00 a.m. to 10:00 p.m.) and at night (10:00 p.m. to 7:00 a.m.) noise levels shall not exceed 45 and 40 dBA, respectively; 2) for multi-family residential and public space areas, during the daytime and at night noise levels shall not exceed 50 and 45 dBA, respectively; 3) for limited commercial and office uses, during the daytime and at night noise levels shall not exceed 60 and 55 dBA, respectively; 4) for general commercial uses, during the daytime and at night noise levels shall not exceed 65 and 60 dBA, respectively; and, 5) for light industrial and heavy industrial uses, noise levels shall not exceed respective noise levels of 70 and 75 dBA at any time.

CITY OF BARSTOW

The City of Barstow regulates noise through its general plan. The general plan noise element specifies base ambient noise limits for specific zones as follows: 1) for multi-family residential areas, noise levels shall not exceed 60 CNEL; 2) for commercial and industrial zones, noise levels shall not exceed 70 dBA at any time; and, 3) for institutional facilities such as hospitals, schools, churches and libraries, exterior noise levels shall not exceed 65 CNEL and interior noise levels shall not exceed 45 CNEL at any time. With respect to noise / land use compatibility, the maximum exterior noise standard not to be exceeded for residential, hotel, motel, and transient lodging facilities, hospitals, schools, and open space areas is 65 CNEL. The standards also stipulate that for residential areas the exterior noise level should be such that interior noise levels will not exceed 45 CNEL. According to the General Plan, the noise ordinance uses these standards as a guide for determining noise violations⁵.

CITY OF HESPERIA

The City of Hesperia regulates noise through its noise ordinance and general plan. The noise ordinance specifies the following exterior noise levels that are not to be exceeded more than 30 minutes in any hour: 1) for residential areas, during the daytime (7:00 a.m. to 10:00 p.m.) and at night (10:00 p.m. to 7:00 a.m.) noise levels should not exceed 60 and 55 dBA, respectively; 2) for commercial zones, noise levels shall not exceed 65 dBA at any time; and, 3) for industrial

³ City of Adelanto, *General Plan Update Final Program Environmental Impact Report*, May 1995.

⁴ Town of Apple Valley, 1998, *Town of Apple Valley General Plan (update)*, October 27, 1998.

⁵ City of Barstow, *City of Barstow General Plan (Part B)*, dated April 18, 1997.

zones, noise levels shall not exceed 70 dBA at any time. The noise ordinance exempts construction activities occurring during specific time periods (see **Table 3.12-1** for the allowable construction hours and days) and emergency equipment (e.g., back-up generators) from these noise standards. With respect to noise / land use compatibility, the maximum exterior noise standard not to be exceeded for residential, hotel, motel, and transient lodging facilities, hospitals, schools, and open space areas is 65 CNEL. The standards also stipulate that for residential areas the exterior noise level should be such that interior noise levels will not exceed 45 CNEL⁶.

**TABLE 3.12-1
TYPICAL CONSTRUCTION NOISE LEVELS**

Construction Phase	Noise Level at 50 feet (Leq) ^a	Approximate Distance (in feet) to Reduce Noise to Given Level (Leq) ^b		
		60	65	70
Ground Clearing	84	790	450	250
Excavation	89	1,400	800	450
Foundations	78	400	220	130
Erection	87	1,120	630	200
Finishing	89	1,400	800	450

Source: U.S. Environmental Protection Agency, *Noise from Construction Equipment and Building Operations, Building Equipment, and Home Appliances*, December 1971.

- a. Average noise levels 50 feet from the noisiest source and 200 feet from the rest of the equipment associated with a given construction phase. Noise levels correspond to office building, hotel, hospital, school, and public works construction.
- b. Calculations assume a 6-dBA reduction for each doubling of distance from the noise source and do not take into account other noise attenuating features such as topography, intervening barriers, and ground surfaces.

CITY OF VICTORVILLE

The City of Victorville regulates noise through its noise ordinance. The noise ordinance specifies base ambient noise limits for specific zones and times as follows: 1) for residential areas, during the daytime (7:00 a.m. to 10:00 p.m.) and at night (10:00 p.m. to 7:00 a.m.) noise levels shall not exceed 65 and 55 dBA, respectively; 2) for commercial zones, noise levels shall not exceed 70 dBA at any time; and, 3) for industrial zones, noise levels shall not exceed 75 dBA at any time. If the ambient noise level exceeds these limits, then the ambient noise level shall be the standard. Construction related to public works projects or essential public works services and facilities are exempt from these noise level standards, but are not limited to any specific hours. With respect to noise / land use compatibility, the maximum exterior noise level considered to be normally acceptable for single-family and multi-family residential development, and other noise-sensitive uses (including hotels/motels, schools, libraries, churches and medical facilities) is 65 DNL⁷.

TOWN OF YUCCA VALLEY

The Town of Yucca Valley regulates construction hours through enforcement of ordinance standards. Stationary noise sources in Yucca Valley are regulated through conditions of approval

⁶ City of Hesperia, *City of Hesperia General Plan*, dated May 16, 1991.

⁷ City of Victorville, *City of Victorville General Plan*, July 15, 1997.

for local permits. With respect to noise / land use compatibility, the Town recognizes 60, 65, 67.5, and 70 DNL as the maximum level of noise that is normally acceptable for the most sensitive uses (residences, churches, libraries, schools, medical facilities), transient lodging (motels and hotels), commercial office/professional businesses, and industrial and park uses, respectively⁸.

SAN BERNARDINO COUNTY

San Bernardino County regulates stationary source noise from commercial and industrial land uses through its noise ordinance. With respect to stationary equipment, such as pumps or other mechanical equipment, the County's noise ordinance limits noise from such equipment to 55 L_{eq} during the daytime (7:00 a.m. and 10:00 p.m.) at the property line for both residential and professional businesses, and at night (10:00 p.m. to 7:00 a.m.) to 45 and 55 L_{eq} for these same land uses, respectively. These standards are consistent with those contained in the County's Noise Element of the General Plan⁹. Noise levels at other commercial land uses and industrial properties are limited to 60 and 70 L_{eq} at all hours of the day, respectively. The above noise standards are not to be exceeded for a cumulative period of 30 minutes or more in an hour. The noise ordinance exempts construction activities occurring during specific time periods and emergency equipment (e.g., back-up generators) from these noise standards. With respect to noise / land use compatibility, the County recognizes 45 and 60 DNL as the maximum level of interior and exterior noise, respectively, that is normally acceptable for residential and hotel, motel and transient lodging uses; the corresponding interior and exterior exposure levels for other commercial uses, institutional/public uses, and open space uses is 45 and 65 DNL, respectively (except for commercial, retail, banks, and restaurants where an interior level of 50 DNL is acceptable)¹⁰.

IMPACT ASSESSMENT AND MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

Appendix G of the State CEQA Guidelines provides guidance that can be used in the development of significance criteria. Based on this guidance a project would normally result in a significant noise 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;
- Expose persons to or generate excessive groundborne vibration or groundborne noise;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

⁸ Town of Yucca Valley, 1995a, *Town of Yucca Valley General Plan*, December 14, 1995.

⁹ San Bernardino County, 1989.

¹⁰ *Ibid.*

- For a project located within an airport land use plan area or within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels; or
- For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

With regard to increases in A-weighted noise level, it is widely accepted that the average person can barely perceive noise level changes of 3 dBA, while a change in noise levels of 5 dBA is a readily perceptible increase in noise levels and the minimum required increase for a change in community reaction¹¹. With respect to temporary construction noise impacts, identification of “substantial increases” depends upon the duration of the impact, the temporal daily nature of the impact, as well as the absolute change in dBA levels and the time of day in which the noise occurs.

With respect to project operations, this EIR also considers changes in ambient noise levels from sources directly attributed to the proposed project. A sliding scale is commonly used for this purpose, allowing greater increases at lower absolute sound levels than at higher levels. The significance criteria for changes in noise from project operations are as follows:

- If the noise level resulting from project operations would exceed the “normally acceptable” range for a given land use where the existing noise level exceeds the normally acceptable range, a 3 dBA or greater increase due to the project is considered significant.
- If the noise level resulting from project operations would exceed the “normally acceptable” range for a given land use where the existing noise level is within the normally acceptable range, a 5 dBA or greater increase due to the project is considered significant.
- If the noise level resulting from project operations would be within the “normally acceptable” range for a given land use, a 10 dBA or greater increase due to the project is considered significant.

Project operations would also be deemed significant if they would cause noise levels to exceed the property line noise standards established in local general plans or noise ordinances.

While there are several airports within the RWMP area and most likely within two miles of specific RWMP projects and management actions, the project itself does not include the development or introduction of noise sensitive land uses within the vicinity of an airport, and for this reason, would not be expected to expose persons to excessive aircraft or airport noise levels.

METHODOLOGY

The evaluation of potential impacts to the noise environment during construction of components of the RWMP is based on a qualitative assessment of general impacts associated with those components that would generate some construction-related noise that could affect sensitive

¹¹ California Department of Transportation (Caltrans). *Traffic Noise Analysis Protocol for New Highway Construction and Highway Reconstruction Projects*, 1998.

receptors. A qualitative, rather than a quantitative, analysis for construction noise impacts is warranted due to the brief period during which construction noise would be expected to affect most sensitive land uses and given that the location of individual project elements and their proximity to sensitive receptors is unknown. For operational phase impacts, this analysis includes a qualitative discussion of potential noise impacts and establishes noise performance standards for potential operational noise impacts that are identified.

CONSTRUCTION IMPACTS

Impact 3.12-1: Construction activities associated with individual projects and management actions involving the development of new facilities would intermittently and temporarily generate noise levels above existing ambient levels in the vicinity of those project elements.

The project would result in temporary and intermittent noise increases due to construction. Construction-related noise levels throughout the MWA service area would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment associated with individual projects and management actions. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate percussive noises (such as pile driving), which can be particularly annoying. The effect of construction noise would depend upon how much noise would be generated by the equipment, the distance between construction activities and the nearest noise-sensitive uses, the existing noise levels at those uses, and the time of day in which construction activities would occur.

Table 3.12-1 shows typical noise levels during different construction stages for public works type projects. **Table 3.12-2** shows typical noise levels produced by various types of construction equipment.

**TABLE 3.12-2
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS**

Equipment	Noise Level at 50 feet (L_{eq})
Backhoes ^a	71-95
Dozers	74-93
Trucks	70-96
Pumps	69-80
Generators	69-82
Compressors	68-95
Pile Drivers	95-101

Source: *Handbook of Noise Control*, Cyril M. Harns, 1979; *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*, U.S. Environmental Protection Agency, 1971.

a. Backhoes are a common type of excavator.

Standard demolition activities, if required, employ equipment similar to that used for construction activities and would have similar, but likely shorter duration, noise impacts. The distances

required to achieve noise levels of 60, 65, and 70 dBA during various construction stages are presented in Table 3.12-1.

Potential construction-related noise impacts associated with each general category of projects and management actions are discussed below.

Projects

Recharge Ponds/Detention Basins

The RWMP could include the construction of over 20 new recharge ponds/detention basins in the MWA's service area. Each of the new ponds would require the installation of either a new or extended pipeline to supply water to the recharge points. Construction of the recharge ponds/detention basins would require substantial surface disturbances including site clearing, excavation, trenching, sediment removal and possibly selective channel clearing. Development of these facilities would concentrate construction activities in a single area for a period of time that would depend on the design capacity of the facility.

During peak earthmoving activities, a number of pieces of earthmoving equipment may be operated simultaneously to excavate the recharge ponds/detention basins and to create the perimeter berms or embankments. Tables 3.12-1 and 3.12-2 show typical noise levels during various construction phases and generated by different types of construction equipment, respectively. The types of construction equipment that could be used for the proposed recharge ponds/detention basins construction include bulldozers, backhoes, loaders, scrapers, excavators, trenchers and water trucks. The types of construction phases associated with basin/pond construction would primarily include ground clearing and excavation. Construction-related noise could exceed the construction equipment noise standards and hourly limits in at least some of the jurisdictions where construction would occur. The location of the recharge ponds/detention basins relative to existing sensitive receptors is unknown, but it is expected that given the number of ponds/basins that are to be constructed that construction-related noise associated with these projects would be substantially greater than ambient noise levels when sensitive receptors are present.

Pipelines

As described above, each of the new recharge ponds/detention basins would require the installation of either a new pipeline or the extension of an existing one to supply water to the recharge points. The new or expanded pipeline segments would be relatively short in length (up to about 2 miles), but could affect noise levels at sensitive receptor locations along the pipeline alignments for the duration of pipeline installation. The anticipated rate of pipeline installation along segments where open trench construction methods are used would be about 100 feet per day, which is typical for this type of construction in public roadway rights-of-way. At any one location along the pipeline segments, the duration of noise impacts would be relatively brief, approximately three to five days, from the commencement of trenching to the completion of backfilling and paving, if necessary.

Table 3.12-2 shows typical noise levels generated by different types of construction equipment. The types of construction equipment that would be used for pipeline installation could generally include bulldozers, backhoes, forklifts, loaders, compactors, rollers, delivery trucks, scrapers, pavers, excavators, trenchers and water trucks. As shown in Table 3.12-2, the noisiest non-percussive construction equipment would generate approximately 68 to 96 L_{eq} at 50 feet, assuming no noise mitigation features. Construction-related noise could exceed the construction equipment noise standards and hourly limits in at least some of the jurisdictions where construction would occur. The location of the pipeline segments relative to existing sensitive receptors is unknown, but it is expected that construction related to pipeline installation would generate noise that would be substantially greater than ambient noise levels even in those areas where sensitive receptors are present.

For the crossing of major roadways, creeks, or at other locations, pipeline installation could involve bore and jack construction techniques or micro-tunneling rather than open trench installation. Bore and jack pit locations may also require installation of sheetpiles to shore jack-pit excavations. The need for and location of potential jack-and-bore locations is unknown. Construction at jack-and-bore locations generally concentrates construction activities in a single location for up to several weeks.

Injection/Extraction Wells

The installation of injection and extraction wells would include developing a roughly 5,000- to 10,000-square foot area and would likely require the use of backhoes, loaders, dump trucks, concrete mixers, pavers and delivery trucks. Construction noise levels generated by construction of the wells would include site preparation, paving, construction of a small building or enclosure to house the electric-powered pumps, and locating back-up generators on-site (if required). Construction of the well sites would also likely require the use of a drill rig to drill the wells. Tables 3.12-1 and 3.12-2 show typical noise levels during various construction phases and generated by different types of construction equipment, respectively. As shown in Table 3.12-2, the noisiest non-percussive construction equipment would generate approximately 68 to 96 L_{eq} at 50 feet, assuming no noise mitigation features. Construction-related noise could exceed the construction equipment noise standards and hours in at least some of the jurisdictions where construction would occur. While it is likely that construction of the well pads and structures would occur during daytime hours, the drill rig(s) could be in operation 24 hours a day. The location of the wells is unknown, but it is expected that construction related to pad construction would generate noise that would be substantially greater than ambient noise levels if sensitive receptors were located in close proximity.

Management Actions

Reclamation

Use of reclaimed water in nonpotable applications is being evaluated for implementation in the Alto subarea. The construction-related noise impacts associated with pipelines required for reclaimed water distribution in this area are included in the general discussion of pipeline

construction impacts above. It is assumed that any reclaimed water treatment would occur at a treatment plant/blending facility prior to distribution. The construction-related noise impacts associated with new treatment plant/blending facilities are discussed separately below. Other than these potential treatment and distribution facility impacts, it is expected that there will be minimal construction disturbances for reclamation projects. Therefore, this impact would be considered less than significant.

Wellhead Treatment

The amount of construction related to installing wellhead treatment devices is expected to be minimal and of short duration.

Treatment Plant/Blending Facilities

Construction of treatment plants and blending facilities would involve substantial surface disturbances including site clearing, excavation, trenching, paving, and earth moving activities. While construction of treatment plants/blending facilities would be similar to the impacts discussed above for recharge pond/detention basin sites and injection and extraction well sites, treatment plant/blending facility sites would be larger in size and would generally include a prolonged construction period of several months. Construction of these facilities may also require pile driving, depending on the local geology at treatment plant/blending facility locations. Tables 3.12-1 and 3.12-2 show typical noise levels during various construction phases and generated by different types of construction equipment, respectively. As shown in Table 3.12-2, the noisiest non-percussive construction equipment would generate approximately 68 to 96 L_{eq} at 50 feet, assuming no noise mitigation features. Construction-related noise could exceed the construction equipment noise standards and hourly limits in at least some of the jurisdictions where construction would occur. The location of the treatment plants/blending facilities is unknown, but it is expected that construction related to site development would generate noise that would be substantially greater than ambient noise levels if sensitive receptors were located in close proximity.

Mitigation Measures

M3.12-1a **Implementing agencies shall implement procedures to reduce noise generation from project construction activities. Typical noise control procedures include the following:**

- a. Require construction contractors to comply with the construction hours and days limitations established in local noise ordinances. Night-time construction would require approval from local jurisdictions.**
- b. Require all construction contractors to locate fixed construction equipment (e.g., compressors and generators) as far as possible from noise-sensitive receptors.**

- c. **Equipment used in the construction of individual projects and management actions shall be muffled and maintained in good operating condition. Internal combustion engine-driven equipment shall be fitted with intake and exhaust mufflers that are in good condition.**
- d. **If pile driving is required for facility construction or sheetpiling the contract specifications for those projects shall incorporate the following requirements:**
 - **Wherever possible, sonic or vibratory pile drivers will be used lieu of impact pile drivers.**
 - **Wherever feasible, pile holes will be pre-drilled to reduce potential noise and vibration impacts.**
- e. **Additional noise attenuating measures include changing the location of stationary construction equipment and/or staging areas; notifying adjacent residences and nearby sensitive receptors in advance of construction work; shutting off idling equipment; rescheduling construction activities; requiring on-going construction noise monitoring to assure adherence to City/County construction equipment standards; and/or installing temporary barriers around stationary construction noise sources.**

M3.12-1b **Implementing agencies shall distribute information to residents and noise-sensitive receptors in the affected areas several weeks in advance of operations that would generate noise in excess of local standards. The information distributed should include a brief description of the operations, including the duration of the project.**

Significance After Mitigation

Less than significant.

OPERATIONAL IMPACTS

Impact 3.12-2: The operation of some of the RWMP projects and management actions could result in substantial noise increases in the vicinity of project facilities.

Operation of the proposed projects would result in long-term noise increases, as implementation of the project would result in the addition of mechanical and electrical equipment at some of the project facilities. The degree of impact would vary with each project component, and would depend on the number, size, and type of equipment, proximity to sensitive receptors, topography and intervening structures, and extent in which noise attenuating features are incorporated into the project design. Operational noise associated with each of the projects and management actions are discussed below.

Projects

Recharge Ponds

Recharge pond operations, which are limited to water storage and percolation, would not be anticipated to generate substantial noise. Routine inspections would also not generate appreciable noise on-site or at off-site sensitive receptor locations. The basins could require periodic maintenance operations that would involve heavy equipment clearing the bottoms of the basins or repairing the side berms. During these periods noise would be generated at the site, but would be temporary and occur infrequently.

Pipelines

All pipelines would be located below grade. Operational activities would be limited to periodic inspections of the pipeline alignments to check for signs of leaks. The vehicle trips associated with these maintenance inspections would not generate significant noise.

Injection/Extraction Wells

The operational impacts associated with the injection and extraction wells would be limited to those associated with operation of electric-powered pumps and back-up emergency generators (if required). The operation of pumps associated with extraction well sites would be a potentially significant impact

Extraction Wells

The operational impacts associated with the extraction wells would be limited to those associated with operation of electric-powered pumps and back-up generators (if required). The noise impacts would be similar to those described above for any pump stations that are required in connection with the recharge ponds/detention basins. The exact location of and need for extraction wells in the RWMP area is unknown. The operation of pumps associated with extraction well sites would be a potentially significant impact.

Management Actions

Reclamation

This management action, which includes the use of reclaimed water in nonpotable applications, does not involve the operation of new facilities or new noise sources in the RWMP area. The application of reclaimed water would not generate significant operational noise.

Wellhead Treatment

Operational noise associated with wellhead treatment sites would be limited to periodic inspections and maintenance of the sites, and possibly chemical or material truck deliveries. The vehicle trips associated with these activities would not generate significant noise.

Treatment Plants/Blending Facilities

Potential operational noise impacts associated with regional and local water treatment plants, blending facilities, and local wastewater treatment plants would primarily be from the operation of fixed stationary equipment. The impacts associated with the operation of these facilities are discussed at a program level here, since the specific location, equipment, processes and overall characteristics of these facilities are unknown. Treatment plants and blending facilities would be subject to subsequent project-specific environmental review.

Noise-generating equipment at the treatment plants and blending facilities could include blowers, pumps, process motors, transformers, back-up generators, and heavy trucks to deliver chemical supplies and materials, among other equipment. Some of the treatment/blending processes would occur in enclosed buildings that would shield noise from off-site receptors.

The level of noise generated by pumps and other stationary equipment depends on four major variables:

- 1) characteristics of the noise source (e.g., the technology type, rated horsepower, revolutions per minute (rpm), presence or absence of pure tones, directional characteristics of the noise source, presence or absence of acoustical design features);
- 2) number of noise sources clustered together;
- 3) type and effectiveness of building enclosure; and
- 4) operational characteristics (e.g., continuous 24-hour operation, intermittent operation, variable settings at different times).

Noise associated with pump and stationary equipment operation could result in a potentially significant operational noise impact. For example, as a general category, pumps are rated at a noise level of 76 dBA at a distance of 50 feet without controls or enclosures¹². This rating is generally consistent with field data collected by ESA at pump station sites throughout California. Simultaneous operation of multiple pumps would incrementally and logarithmically add to this noise level. A doubling of pumps would increase the noise level by 3 dBA. For example, the operation of two pumps operating at 76 dBA would generate a composite noise level of 79 dBA. The type of building enclosures and noise attenuation effectiveness of the enclosure are unknown. Any pumps that would be located below grade would be relatively easy to shield and should not affect nearby sensitive receptors.

Back-up generators have been identified as generating noise of 85 dBA at 50 feet without acoustical enclosures. Since back-up generators would operate infrequently (only for routine testing and maintenance or during an actual interruption in power from the utility grid), they would not contribute substantially to the overall average noise exposure outside the project property boundary.

¹² U.S. Environmental Protection Agency, *Noise from Construction Equipment and Building Operations, Building Equipment, and Home Appliances*, December 1971.

Depending on the location of these facilities, operation of pumps and other stationary equipment could generate noise levels in excess of standards established in local general plans or noise ordinances, or applicable standards of other agencies. In addition, pump station operation could cause noise levels at sensitive receptor locations to increase by 3 DNL or more in areas where noise levels already exceed the normally acceptable range, 5 DNL where the noise level from project operations would exceed the normally acceptable range for a given land use, or 10 DNL where the project would be within the normally acceptable range. Therefore, potential noise impacts from treatment plant/blending facility related noise increases could be mitigated through provision of adequate building setbacks, effective building enclosures, and consideration of the appropriate vent locations.

Mitigation Measures

M3.12-2 Implementing agencies shall comply with local noise ordinances. In areas where pump and/or stationary equipment operation would cause noise levels to exceed the normally acceptable range for a given land use, the operation of such equipment shall not cause noise levels to increase by 5 Day-night Average Noise Level (DNL) or more. In areas where noise levels already exceed the normally acceptable range for a given land use, the operation of such equipment shall not cause noise levels to increase by 3 DNL or more. To accomplish these performance standards, the implementing agency should consider the following:

- a. **Maximize the buffer area or setback distance between pump facilities and treatment plant/blending facility sites and noise-sensitive land uses.**
- b. **Design stationary equipment and pump enclosures such that building exhaust fans and louvers are oriented away from noise-sensitive uses. To the extent feasible, configure the facility layout such that noise-generating equipment is setback from noise-sensitive land uses.**
- c. **Incorporate equipment enclosures, fan silencers, mufflers, acoustical treatments at vent openings, acoustical panels, etc.**
- d. **Construct a perimeter wall at the site such that the line of site between the building openings (exhaust fans and louvers) at the pump facilities, and at treatment plant/blending facility sites, and nearby sensitive receptors is effectively blocked. Effective shielding can significantly reduce noise.**

Significance After Mitigation

Less than significant.

3.13 TRANSPORTATION / TRAFFIC

This chapter evaluates the projected traffic impacts associated with the proposed RWMP.

SETTING

EXISTING REGIONAL TRANSPORTATION SYSTEM

The main highways in the area are: I-15, which provides access to the southern portion of the Mojave Basin area from Riverside County and the Los Angeles metropolitan area and runs northeast through Las Vegas, Nevada and I-40, which originates at Barstow and runs east through Arizona; U.S. Route 395 (US 395) State Route 18, 58, 62 and 247 (SR 18, SR 58, SR 62, SR 138, and 247) also provide access to the MWA service areas, with a system of local roads linking areas within the MWA service areas. **Figure 3.13-1** shows the MWA service area roadway network.

There are approximately 3,620 miles of County maintained roads in County unincorporated areas, of which approximately 2,930 are paved. The main roadways connecting urban areas across the County are all designated Major Highways, except for I-15 and I-40, which are designated Desert Freeways.

The average daily traffic volumes on the main roads across the San Bernardino County are listed in the following table (**Table 3.13-1**):

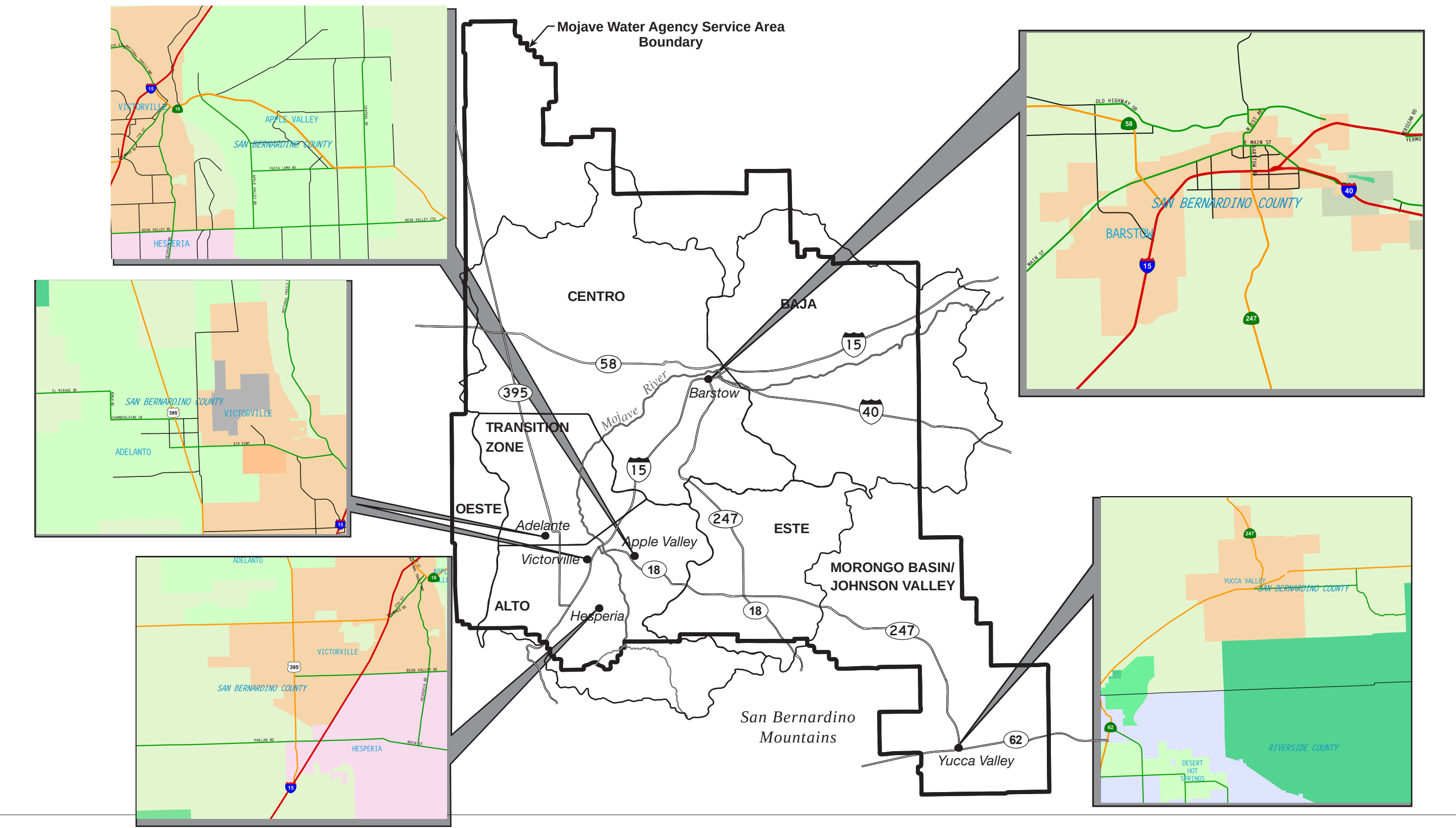
**TABLE 3.13-1
AVERAGE DAILY TRAFFIC (ADT) ON HIGHWAYS IN THE MWA SERVICE AREA**

Route	Type of Highway	ADT
I-15	Interstate	38,000 to 110,000
I-40	Interstate	11,900 to 17,300
SR-18	State Route	3,000 to 45,000
SR-58	State Route	10,400 to 10,700
SR-62	State Route	10,300 to 16,400
SR-138	State Route	1,700 to 16,000
SR-247	State Route	1,700 to 14,300
US-395	Route	10,200 to 25,000

Source: California Highways Statistics, <http://www.dot.ca.gov>, 2003.

City of Adelanto

The City of Adelanto is located amid a vast regional/national highway network. U.S. Highway 395 bisects the City of Adelanto and is considered the primary access into the City. It is a two lane State Highway that runs north-south and carries a significant volume of traffic through Adelanto. I-15 is located five miles east of the City's southeastern edge. Highway 18 (Palmdale Road) forms Adelanto's southern boundary. Highway 18 provides access to Adelanto from the west and the east. It is also the primary connection between the cities of Palmdale and Victorville. Highway 58 traverses from the Northwest and connects Kern County with I-40 and I-15 at



SOURCE: Carde Ten Architects, December 2003

Figure 3.13-1
MWA Service Area Roadway Network

Barstow. Estimates of through traffic volumes from existing daily segment counts and from peak hour turning movement counts take at key intersections in the City are summarized below¹:

<u>Segment</u>	<u>Average Daily Traffic (ADT)</u>
US Hwy 395 at Air Base Road	5,400/day
Air Base Road east of Hwy 395	1,200/day
El Mirage Road west of US Hwy 395	1,500/day
SR 18 at US Hwy 395	4,200/day

It is the goal of the City to improve a circulation system that accommodates the projected growth of the City and provides adequate capacity of roadways to handle buildout. Part of Adelanto's long range plans is to build a multi-modal transportation system including a major airport and a high speed rail link to other regions in Southern California.

City of Barstow

State Highway SR 247, known as Barstow Road, is considered to be one of the key arterial streets in the Barstow area. It is the key north-south arterial through central Barstow and provides access to the downtown area and connects Barstow with Lucerne Valley. Main Street (old U.S. Highway 66), which runs east-west through the City, has interchanges with the I-15 and I-40 freeways and provides access to the Helendale/Oro Grande areas. This roadway also serves as an alternative route for the I-15 Freeway south to Victorville.

The following is an outline of existing traffic volumes on key City of Barstow roadways:

- The I-15 Freeway carries approximately 44,000 vehicles per day through Barstow.
- The I-40 Freeway carries 18,300 vehicles per day east through the City.
- Main Street carries 17,800 per day between Barstow Road and First Avenue.
- Barstow Road carries 18,400 vehicles per day north of the I-15 Freeway and 11,000 south of the I-15 Freeway.
- First Avenue carries 10,700 vehicles per day north of Main Street.²

Based on the existing daily traffic volumes, all of the streets within the City are operating within their respective capacities.

The City of Barstow is a principal rail distribution point for southern California. The AT&SF/ Burlington Northern and Union Pacific Railroad mainlines pass through Barstow. The rail classification yards, located between Main Street and the Mojave River represent a major circulation barrier for vehicles traveling to and from north Barstow. Regional and interstate passenger rail service is provided by AMTRAK and bus service is provided by Greyhound Lines.

¹ City of Adelanto, *General Plan Update Final Program Environmental Impact Report*, May 1995.

² City of Barstow, *City of Barstow General Plan (Part B)*, April 18, 1997.

City of Hesperia

The major highways are I-15, U.S. Highway 395, State Highway 138 and 173. I-15, the Barstow Freeway provides 6-8 travel lanes north of the Highway 395 intersection. State Highway 138 is a major access route to Summit Valley and Crestline and State Highway 173 extends eastward to the Lake Arrowhead area from its intersection with State Highway 138.

There are two railroad companies with routes transecting the City of Hesperia. The Santa Fe Railroad tracks enter Hesperia in Summit Valley through the Cajon Pass, extending in a northeasterly direction through the center of the City and exiting to the north. This line serves both passenger and freight trains. The Southern Pacific Railroad is actively used by freight trains running between Colton and Palmdale.

The Hesperia Airport is located west of Santa Fe Avenue near the southern City limits. It is an uncontrolled privately-owned airport which accommodates only light, privately-owned aircraft. Approximately 200 landings and take-offs occur at Hesperia Airport per week.

City of Victorville

The City of Victorville is a member of the Victor Valley Transit Authority (VVTA). The VVTA is a joint powers agency comprised of the cities of Adelanto, Hesperia, and Victorville, the Town of Apple Valley, and the County of San Bernardino. The VVTA provides multiple occupancy vehicle service to the City and surrounding community. Approximately 166 miles of roads are covered by the VVTA fixed-route network, of which approximately sixty-seven miles are located within the City.

The City of Victorville is also a member of the San Bernardino Associated Governments (SANBAG), which serves the County transportation commission. SANBAG has adopted a county-wide Congestion Management Program (CMP). There are approximately 1,500 miles of county-wide roads which are part of the CMP network of which 176 miles are located in Victor Valley and forty miles in Victorville. The CMP network includes state highways and principal arterials, roadways of multi-jurisdictional or regional significance. The CMP network roadways located within the Victorville area include I-15, Highway 18, Highway 395, and Bear Valley Road.

Town of Apple Valley

Apple Valley is served by the Interstate Highway System via I-15 and the Regional Highway System via SR 18. I-15 runs along the Town's northwest border while SR 18 runs through the Town's center from northwest to southeast. Apple Valley is also served by a system of arterials which are primarily established on a one-mile grid pattern. Major north-south arterials include Apple Valley Road, Dale Evans Parkway (Boulder/Bell Mountain Road), Aztec Road, Central Road, Joshua Road, and Stoddard Wells Road. East-west arterials include Bear Valley Road, Yucca Loma Road, Happy Trails Highway (Highway 18), Corwin Road, and Waalew Road. The travelway of these arterials varies from 17 to 76 feet and two to six lanes.

Town of Yucca Valley

State Highway 62 provides the primary linkage between the east and west portions of the Town of Yucca Valley. State Highway 247 enters the town from the north and connects the town to the Lucerne and Victor Valleys. Alternative routes such as Sunnyslope Drive and Paxton Road north of State Highway 62, and Yucca Trail, Onaga Trail and Joshua Drive to the south help to relieve traffic on the State Highway and delay the need for midblock and intersection improvements. The Morongo Basin Transit Authority (MBTA) is the provider of public transit service within the Town of Yucca Valley.

The Yucca Valley Airport is a privately-operated airstrip, situated on 35 acres near Yucca Valley's central business district.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

According to CEQA Guidelines, a project would have a significant effect on the environment if it:

- Causes an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system.
- Causes circulation patterns associated with the project to create unsafe traffic operation.
- Causes potential traffic safety hazards to pedestrian and bicyclists.
- Generates a demand for parking that would not be accommodated by the proposed on site supply of parking spaces.
- Exceed a level of service standard established by the county congestion management agency for designated roads or highways.
- Substantially increase hazards due to design features (e.g., sharp curves) or incompatible use (e.g., farm equipment).
- Result in inadequate emergency access.
- Result in inadequate parking capacity.
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks or lanes).

The term Level of Service (LOS) is used to define the quality of traffic flow over specific street or road segments or through individual intersections. LOS expresses relationships between the volumes of present or anticipated traffic and the ability of road networks to carry them. A description of the six standard levels of service for road segments is shown in **Table 3.13-2** along with the roadway capacities for each level of service.

Impact 3.13-1: Construction activity would temporarily increase traffic volumes on roadways in the project vicinity.

**TABLE 3.13-2
LEVEL OF SERVICE (LOS) DESCRIPTIONS AND ROADWAY CAPACITIES**

Level of Service (LOS)	Description of Travel Conditions	Daily Roadway Capacities		
		2 Lanes	4 Lanes	6 Lanes
A	No physical restriction on operation speeds.	7,000	15,000	25,000
B	Stable flow with few restrictions on operating speed.	8,000	18,000	28,000
C	Stable flow with more restrictions on speed and lane changing.	10,000	22,000	32,000
D	Approaching unstable flow, little freedom to maneuver and short periods of heavy restrictions on flow.	12,000	26,000	35,000
E	Unstable flow, low operating speeds and some momentary stoppages.	14,000	28,000	38,000
F	Forced flow operations at low speeds where the highway acts as a storage area and there are many stoppages.	14,000	28,000	38,000

Source: Highway Capacity Manual; VVCE, Inc.

Construction of recharge basins, pipelines, wells and treatment plants would result in temporary transportation impacts resulting from truck movements to and from the project site during activities associated with project construction. Construction-related traffic would cause a temporary and intermittent lessening of the capacities of the access streets and haul routes because of the slower movements and turning radii of construction trucks compared to personal occupancy vehicles. Construction activities are anticipated to create an increase in trips per day on local and regional roadways due to construction worker trips and the delivery and removal of construction materials to and from the project site. Road blockage during times of peak traffic flow would have a greater potential to create conflicts than during non-peak hours due to increased commuter traffic on the affected roadways.

Temporary transportation impacts would also result from project construction adjacent to public roadways. The main roadways connecting urban areas across the County (State Routes 18, 38, 58, 62, 127, 138, 178 and 247, and U.S. Route 95 and 395) will also be affected. The primary construction activities to occur within transportation easements would be jack-and-boring under State Highways and railroad tracks, and trenching for pipeline installations within County roads. These activities would require encroachment permits from Caltrans or the County DOT. Encroachment permits would require preparation of traffic management plans to mitigate temporary congestion. The pipeline installation in County roads may require lane closures or potentially temporary road closures.

Mitigation Measures

M3.13-1 Implementing agencies shall minimize heavy-duty truck traffic associated with soil hauling and deliveries during peak traffic periods.

M3.13-2 Implementing agencies shall obtain encroachment permits from local jurisdictions and Caltrans prior to construction when construction would result in work within roadway easements or would require lane closures.

Significance After Mitigation

Less than significant.

Intentionally left blank.

CHAPTER 4

GROWTH INDUCEMENT POTENTIAL AND SECONDARY EFFECTS OF GROWTH

4.1 INTRODUCTION

The CEQA Guidelines (Section 15126(d)) require that an EIR evaluate the growth inducing impacts of a proposed project. The CEQA Guidelines provide the following guidance for the discussion and consideration of growth-inducing impacts:

“Discuss the ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas). Increase in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significant effects the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.”

A project can have direct and/or indirect growth inducement potential. Direct growth would result if a project involved construction of new housing. An indirect growth inducement effect would occur if a project would establish substantial new permanent employment opportunities (e.g., commercial, industrial or governmental enterprises) or even if it would involve a substantial construction effort with substantial short-term employment opportunities and indirectly stimulate the need for additional housing and services to support the new employment demand. Similarly, a project would have an indirect growth inducement effect if it would remove an obstacle to additional growth and development, such as removing a constraint on a required public service.

Water supply service is one of the chief public services needed to support development. Implementation of the RWMP would help provide the facilities and management actions to increase supply to meet future demand associated with planned growth as well as balance the groundwater basins and prevent further overdraft. As such, implementation of the RWMP would help remove water supply availability as one obstacle to further development and population growth in western San Bernardino County. In accordance with the CEQA definition, implementation of the RWMP would have indirect growth inducement potential.

As indicated in the CEQA definition above, growth inducement itself is not necessarily an adverse impact. It is the potential consequences of growth, the secondary effects of growth, that may have an environmental impact. Potential secondary effects of growth include: increased demand on

other community and public services and infrastructure, increased traffic and noise, and adverse environmental impacts such as degradation of air and water quality, degradation or loss of plant and animal habitats, and conversion of agricultural and open space land to developed uses.

This section first analyzes the nature and extent of growth inducement potential for the RWMP, both within the MWA service area and outside its service area. For the MWA service area, this analysis includes an assessment of existing and projected population levels, and existing and projected water supply and demand, as well as a discussion of conformance with regional and local general plans. The secondary effects of growth are then assessed along with a discussion of responsible agencies and mitigation policies and measures in place to reduce these impacts.

4.2 GROWTH INDUCEMENT POTENTIAL

WITHIN THE MWA SERVICE AREA

Implementation of the RWMP would not have a direct growth inducement effect: the plan does not involve development of new housing to attract additional population. Further, implementation of the RWMP would not result in substantial permanent or even short-term construction employment that could indirectly induce population growth by establishing new employment opportunities.

Implementation of the RWMP has indirect growth inducement potential because it would help remove water supply availability as one potential obstacle to growth in the region. Among several objectives, the RWMP is intended to help increase water supply in the MWA service area to meet the projected needs of future planned growth through the year 2020. The RWMP assesses means to meet 2020 water demand levels and eliminate the water balance deficit in the MWA service area and identifies a recommended program of projects and actions to accomplish these goals. The recommended program succeeds in meeting projected water demand for 2020 in all subareas within the MWA service area. As such, the RWMP provides the means to accommodate the projected growth, while maintaining compliance with the court judgments. The Alto subarea has the greatest growth potential; it encompasses four of the six cities within the MWA service area and is and will continue to be the main population center in the MWA service area. The Centro subarea (including Barstow), and the Warren Valley subbasin (including the Town of Yucca Valley) are secondary population growth centers within the MWA service area.

The future demand estimates that were used to develop supply targets for the RWMP were carefully and specifically tied to the land use plans and growth projections of the local and regional land use jurisdictions: San Bernardino County and the cities within the MWA service area. The RWMP does not seek to develop more water than is needed to meet planned growth for the service area. As the water wholesaler for the region, MWA's objective is to be prepared to respond and serve planned growth in the future, not to drive or stimulate that growth and conversely, not to be unable to accommodate local community plans for growth and development. Implementation of the RWMP would help provide adequate water supply to the service area over time to meet the needs of planned growth. The increase in water supply to the service area would

occur incrementally, in phases, as actual growth and appropriate financing for the RWMP projects occurs.

The following section summarizes how the future water demand projections were developed for the 2004 RWMP and demonstrates that they are consistent with the local, adopted land use plans for the service area.

MWA SERVICE AREA POPULATION PROJECTIONS

Regional Overview

The MWA service area is located in the western portion of San Bernardino County in the Desert subregion. This region has experienced rapid growth and development since 1975. According to the population growth figures of the State Department of Finance, the cities that comprise the San Bernardino Desert subregion (which include Adelanto, Apple Valley, Barstow, Hesperia, Needles, Twentynine Palms, and Victorville) experienced a population increase of 31 percent between 1990 and 1999, an increase notably higher than the 17 percent increase for the County as a whole.

The MWA service area includes the incorporated cities of Victorville, Adelanto, Hesperia and Barstow, and the towns of Apple Valley and Yucca Valley. The locations of these municipalities are shown in Figure 3.4-1 of Section 3.4, Land Use. Among these cities, the fastest growing are generally located within the Alto subarea. These cities serve as “bedroom communities” for workers commuting to jobs in the San Bernardino and Los Angeles basins. **Table 4-1** presents the most recent population information for the County and cities within the MWA service area from SCAG¹. As shown in this table, in the year 2000 the cities within the MWA service area had a total population of approximately 238,430. By the year 2020 the population in these same cities is projected by SCAG to increase by just over 175,000 people to approximately 413,763. Following is a review of the population projections used in the 2004 RWMP process to develop future water demand estimates and a comparison of those with the most recent 2004 SCAG population projections.

2004 RWMP

In the 2004 RWMP, population was determined for each of the MWA subareas, as shown in **Table 4-2**. These population estimates were determined using SCAG data, by overlaying geo-referenced spatial data for each census block with geo-referenced spatial data for subarea and MWA boundaries. The year 2000 population estimate is based on the 2000 census data but the projections from 2000 to 2020 provided by SCAG were based on 1990 population tract data because projections based on year 2000 data were not yet available at the time of the RWMP. SCAG develops population, housing and employment projections for Southern California

¹ Southern California Association of Governments, 2004 RTP Growth Forecast, City Projections, website <http://www.scag.ca.gov/forecast/rtpgf2004.htm>, accessed July 12, 2004.

TABLE 4-1
SCAG 2004 POPULATION PROJECTIONS FOR
INCORPORATED TOWNS AND CITIES IN THE MWA SERVICE AREA

	Population			
	2000	2005	2020	Average Annual Change (2000 - 2020)
San Bernardino County Total		1,919,215	2,397,709	1.5 % ¹
Alto Region Municipalities				
Adelanto	18,167	21,888	35,351	3.4 %
Apple Valley	54,585	63,453	83,707	2.2 %
Hesperia	62,835	78,494	139,049	4.1 %
Victorville	64,871	75,952	103,353	2.4 %
Centro Region Municipality				
Barstow	21,133	23,902	32,215	2.1 %
Morongo Basin/Johnson Valley Municipality				
Yucca Valley	16,839	18,339	20,088	0.9 %

Source: Southern California Association of Governments, 2004 RTP Growth Forecast, City Projections, website <http://www.scag.ca.gov/forecast/rtpgf2004.htm>, accessed July 12, 2004.

¹ Annual percent increase based on projections for 2005 through 2020 (15 years) for this entry only.

TABLE 4-2
CURRENT AND PROJECTED POPULATION ESTIMATES
USED IN THE 2004 RWMP

	2000	2005	2010	2015	2020	Annual Percent Change 2000-2020
Mojave Basin Area						
Alto	236,600	266,700	303,700	348,900	407,700	2.8%
Baja	5,100	5,300	5,600	5,900	6,200	1.0%
Centro	33,700	36,100	41,500	47,100	54,100	2.4%
Este	6,000	6,800	8,100	9,400	11,300	3.2%
Oeste	7,400	8,300	9,400	11,300	13,600	3.1%
Subtotal Mojave	288,800	323,200	368,300	422,600	492,900	2.7%
MB/JV Area (1)						
Copper Mtn. Valley	9,600	10,300	11,000	11,800	12,700	1.4%
Johnson Valley	400	400	500	500	600	2.0%
Means/Ames Valley	7,500	8,300	9,300	10,400	11,700	2.2%
Warren Valley	14,700	16,600	18,600	21,000	23,600	2.4%
Subtotal MB/JV	32,200	35,600	39,400	43,700	48,600	2.1%
TOTAL	321,000	358,800	407,700	466,300	541,500	2.6%

Source: 2004 RWMP, SWS 2004

(1) Morongo Basin/Johnson Valley Area subbasin populations represent the population served by each subbasin, not the population that overlies the subbasin. This assumption is consistent with the 1994 RWMP.

communities based on an assessment of the local and regional land use plans and policies along with economic factors.

SCAG 2004

Because SCAG projections based on the 2000 census data are now available, updated projections through the year 2020 were developed to determine if there were any significant changes between these updated projections and those developed in the RWMP Update Phase 1 Report to support the future demand targets used in the 2004 RWMP. Using a similar methodology with geo-referenced spatial data, current population and population projection estimates for subareas were produced using SCAG 2004 forecasts based on 2000 census data, as shown in **Table 4-3**. A comparison of values for population projections used for the 2004 RWMP and more current population projections based on 2000 census data indicates that overall, within the MWA service area, population projections through the year 2020 are quite similar.

TABLE 4-3
CURRENT AND PROJECTED POPULATION ESTIMATES FROM 2000 CENSUS DATA

	2000	2005	2010	2015	2020	Annual Percent Change 2000-2020
Mojave Basin Area						
Alto	219,926	256,206	292,039	336,483	380,341	2.8%
Baja	4,178	4,735	4,897	5,249	5,598	1.5%
Centro	38,833	43,499	45,736	50,870	55,934	1.8%
Este	8,463	11,441	12,478	13,548	14,606	2.8%
Oeste	17,265	19,919	21,991	24,936	27,843	2.4%
Subtotal Mojave	288,665	335,800	377,141	431,086	484,322	2.6%
Subtotal MB/JV (1)	34,878	37,272	38,667	41,052	43,398	1.1%
Total	323,543	373,072	415,808	472,138	527,720	2.5%

Source: 2000 U.S. Census data and SCAG 2004 projections information adjusted by ESA to address subareas within the MWA service area.

- (1) Unlike the data from the previous table, the Morongo Basin/Johnson Valley Area subbasin populations in Table 4-3 represent the population that overlies the subbasin, not the population served by each subbasin. This difference in assumptions can account for some minor differences between the two tables.

The total population projection in the year 2020 for both the Mojave Basin and the Morongo/Johnson Valley Basin are slightly lower now than those previously developed in the 2004 RWMP process (less than 2 percent lower for the Mojave Basin and about 10 percent lower for the Morongo/Johnson Valley Basin). The difference in the total MWA service area population projection for 2020 is 13,780, a decrease of 2.5 percent. Thus, the population projections used to develop the 2004 RWMP future supply targets remain appropriate and in-line with SCAG's more current 2004 projections. The 2004 RWMP proposes to develop a water supply that is consistent with SCAG's regional growth projections that are based on the adopted plans and policies for land use and growth of the local land use jurisdictions.

The General Plans for land use jurisdictions within the MWA service area, most of which were adopted in the 1990s, generally refer to SCAG data and projections as the basis for their planning. The exceptions include the City of Victorville and the City of Barstow General Plans, which use SCAG projections, but point out that, historically, projected SCAG annual percentage growth rates are higher than actual growth. The City of Victorville General Plan indicates that actual annual

growth rates in Victorville from 1990-1995 were 2-3 percent compared to the 3.5 percent projected by SCAG before the 2000 census data was available. As shown above in Table 4-1, SCAG now estimates an average annual growth rate for Victorville of 2.4 percent – reflecting the City’s actual growth experience in recent years.

The City of Barstow General Plan Housing Element (2000) states that although SCAG projections set forth an annual growth rate of 3 percent for Barstow, the General Plan projected annual growth rate is 2 percent. Based on the updated 2000 census information, SCAG’s 2004 projections for the City of Barstow are based on a revised average annual growth rate of 2.1 percent, closer to the City’s own estimates.

As shown in this review of the population growth projections used to assess the future water supply needs for the 2004 RWMP, the 2004 RWMP plan for future water supply is solidly based on the adopted local land use plans of the County areas and cities within the MWA service area and conforms with the SCAG regional projections for this area.

MWA SERVICE AREA WATER DEMAND PROJECTIONS

The 2004 RWMP estimates 2020 consumptive water use, using the population projections shown in Table 4-2 as a foundation. Consumptive use estimates, are broken down based on subarea (Alto, Baja, Centro, Este, Oeste, Morongo Basin/Johnson Valley) and on type of water use (Industrial, Municipal, Golf Course, Recreation, Agriculture). **Table 4-4** presents the 2020 consumptive use estimates used to develop the recommended plan. Total urban consumptive use, which includes all water uses except agricultural use, is projected to be 111,600 afy in 2020. This estimate assumes that per capita water usage rates for urban water use would be similar to existing conditions.

Agricultural consumptive use was estimated under two possible scenarios, intended to provide a maximum and a minimum estimate of future agricultural water demand. Scenario 1 assumes that agricultural consumptive use does not change from the year 2000 estimates through 2020. Scenario 2 assumes that rampdown under the Mojave Basin Area Judgment (1996) resumes in 2002 at 5% per year until balance is achieved between production rights and available water supply as required by the Judgment. Under Scenario 1, total agricultural water use is projected to be 34,900 afy. Under Scenario 2, total agricultural water use is projected to be 12,500 afy. The RWMP assumes that Scenario 2 will be implemented, reflecting compliance with the Judgment, which represents the minimum agricultural water demand scenario for the future. The minimum 2020 water balance deficit across the MWA service area is 58,600 afy (Agriculture Scenario 2).

GROWTH INDUCEMENT POTENTIAL OUTSIDE THE MWA SERVICE AREA ASSOCIATED WITH WATER BANKING

The recommended program for the RWMP includes actions whereby MWA would enter into agreements with other water supply agencies to implement water banking and/or water exchange programs that benefit both agencies. Two examples of these types of actions include the current

TABLE 4-4
YEAR 2020 AVERAGE ANNUAL WATER BALANCE
UNDER AGRICULTURE SCENARIO 2 (AFY)

	Net Average Annual Water Supply (1)	Consumptive Water Use			Surplus/ Deficit
		Agricultural	Urban (2)	Total	
Mojave Basin Area					
Alto	34,700	1,300	78,500	79,800	-45,100
Baja	5,600	600	11,100	11,700	-6,100
Centro	18,500	8,900	12,300	21,200	-2,700
Este	3,500	1,400	2,600	4,000	-500
Oeste	1,100	300	3,500	3,800	-2,700
Subtotal Mojave	63,400	12,500	107,600	120,100	-56,700
MB/JV Area					
Copper Mtn. Valley	600	0	1,000	1,000	-400
Johnson Valley	2,300	0	50	50	+2,250
Means/Ames Valley	600	0	900	900	-300
Warren Valley	900*	0	2,100	2,100	-1,200
Subtotal MB/JV (3)	2,100	0	4,000	4,000	-1,900
Total	65,500	12,500	111,600	124,100	-58,600

Source: 2004 RWMP, SWS, 2004.

(1) Net average annual water supply data as shown in Tables 4-2 and 4-5 of Chapter 4, 2004 RWMP.

(2) Urban uses include municipal, industrial, golf course, and recreational water uses.

(3) Johnson Valley is not included in the Morongo Basin/Johnson Valley totals because the supply is not included as noted in Chapter 4, Phase 1 Report.

* Hi-Desert Water District reports unpublished USGS estimates of 200 acre-feet-year net average annual supply in Warren Valley.

agreement MWA has with the Solano County Water Agency (SCWA) for exchange of SWP water, and the demonstration project that MWA has underway with the Metropolitan Water District of Southern California (Metropolitan) for a water banking program. Under these types of activities, both MWA and the other water agency generally both achieve some type of water supply benefit. Potential water supply benefits to the participating agency include dry-year reliability benefits. Implementing these types of actions under the RWMP, therefore, could have some water supply benefit, and in turn, some indirect growth inducement potential outside of the MWA service area, in the service area of the other participating water agency.

It is speculative what other agencies MWA might enter into agreements for water banking or exchanges with in the future. Therefore, it is not possible to assess the growth inducement potential for other specific agencies. Growth inducement potential associated with such actions will have to be evaluated in the future, in a project-level CEQA analysis, at such time a specific agreement is proposed with another water agency.

The one exception is a potential water banking agreement between MWA and Metropolitan. It is reasonably foreseeable that, upon completion of the current pilot project for groundwater banking between MWA and Metropolitan, if successful, both agencies will pursue a longer-term agreement for such banking. As appropriate, MWA and Metropolitan will process project-level CEQA review for a longer-term water banking agreement. For purposes of this Program EIR analysis of

the RWMP, the following section provides an overview of Metropolitan, its service area, water supply plans and that agency's assessments of its water needs in relation to the existing and planned growth within its service area.

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Metropolitan is a regional water wholesaler delivering water to many public and private water retailers that, in turn, provide water to individual customers. Metropolitan serves 26 agencies in Southern California encompassing 5,200 square miles with a population of approximately 17 million people. As a wholesale water distributor, Metropolitan is responsible for assessing and obtaining adequate water supplies for its member agencies and, subsequently, the member agencies' customers. As part of this effort, Metropolitan has undertaken several regional water planning endeavors including 1) the Integrated Resources Plan (IRP) and 2) the Regional Urban Water Management Plan (RUWMP) for the Metropolitan Water District of Southern California (MWD). The following information about Metropolitan is summarized from Metropolitan's *Report on Metropolitan's Water Supplies* (2003).² This report provides Metropolitan's member public agencies, retail water utilities, cities and counties within the service area with information may assist in their compliance with two recently enacted laws that require demonstration of adequate availability of water supplies before new development can be approved, Senate Bill (SB) 221 (Kuehl) and SB 610 (Costa).

The IRP, which was first adopted in January of 1996 by Metropolitan's Board of Directors with an updated adopted in July 2003, guides Metropolitan's future operations. The primary objective of the IRP is as follows:

Through the implementation of the IRP, Metropolitan and its member agencies will have the full capacity to meet full-service demands at the retail level at all times

Prior to approval of the IRP, all water plans and/or investments were made by individual water purveyors (wholesale and retail), independently of each other, thereby risking potential overspending on Southern California's water supply and infrastructure. However, through the IRP process, Metropolitan was able to establish policy guidelines for water conservation, water recycling, desalination, Colorado River deliveries, SWP deliveries, water transfers, and storage in groundwater basins and surface reservoirs.

Metropolitan's current RUWMP, which was last adopted in December 2000 in compliance with California's Urban Water Management Planning Act (California Water Code Sections 10610 and 10656) and is to be updated in 2005, furthers the water supply/use planning efforts made in the 1995 RUWMP. The 2000 RUWMP details revised plans for reasonable and practical water-efficient uses and drought contingencies. As part of the RUWMP, Metropolitan designates several stages for surplus and shortage conditions and the appropriate actions to be taken during each stage.

² Metropolitan Water District of Southern California, *Report on Metropolitan's Water Supplies*, March 25, 2003.

To guard against the potential for shortage conditions to occur, Metropolitan analyzes regional demand for potable water supplies. Water demand in the Metropolitan service area has experienced several discernable trends in the last five years. Most notably, since the recession experienced in the mid-1990s, the development of long-term water conservation programs and increases in pricing have succeeded in suppressing growth in per capita water demands across the region. Further, Metropolitan conjectures that water demand in the Metropolitan service area will continue along this trend and accounts for this trend in its demand projections.

When analyzing regional water demand throughout the Metropolitan service area, Metropolitan uses the MWD-MAIN Water Use Forecasting System, which is a model adapted to Southern California. The statistical portion of the model incorporates projections of demographic and economic variables from regional planning agencies (SCAG and the San Diego Association of Governments (SANDAG)) to generate the regional projected water demand. The models also factor in conservation estimates by adding additional information on water use, such as the requirements of the Memorandum of Understanding Regarding Urban Water Conservation in California (signed by Metropolitan in 1991). **Table 4-5** provides a tabular breakdown of Metropolitan's most-recent demand forecast model results. As shown in this table, Metropolitan is planning on developing additional supplies from the State Water Project system—referred to as the California Aqueduct in the table that increase from 20,000 afy in 2005 to 390,000 afy by 2015. Groundwater banking programs, such as that being testing in the pilot study with MWA, are one way Metropolitan will develop this additional supply from the state system.

TABLE 4-5
METROPOLITAN SUPPLY CAPABILITY AND
POTENTIAL RESERVE OR REPLENISHMENT¹ (AFY)

	2005	2010	2015	2020	2025
Current Supplies					
Colorado River ²	721,330	833,292	833,292	833,292	833,292
California Aqueduct	1,290,300	1,376,100	1,146,100	1,120,300	1,120,300
In-Basin Storage	455,300	531,700	530,400	513,000	499,200
Supplies Under Development					
Colorado River ²	167,300	416,708	416,708	416,708	416,708
California Aqueduct	20,000	195,000	390,000	390,000	390,000
In-Basin Storage	-	89,000	200,000	200,000	200,000
Maximum Supply Capability¹	2,654,200	3,441,800	3,516,500	3,473,300	3,459,500
Total Demands on Metropolitan³ (Firm & Replenishment)	2,245,200	2,175,600	2,320,900	2,534,100	2,688,500
Potential Reserve & System Replenishment Supply	409,000	1,266,200	1,195,600	939,200	771,000

Source: Metropolitan Water District of Southern California. *Report on Metropolitan's Water Supplies*, March 25, 2003.

1 Represents expected supply capability for resource programs.

2 Total Colorado River Aqueduct Deliveries limited to 1,250,000 acre-feet per year.

3 Based on SCAG 98 RTP, SANDAG 1998 forecasts and member agency projections of local supplies.

Metropolitan's assessment of future water supply needs is based on the SCAG and SANDAG population projection forecasts that reflect local land use plans and policies within the service area. Metropolitan pursues adequate water supplies to support planned growth as approved by the

land use jurisdictions within its service area. SCAG and SANDAG have projected residential growth and employment growth in all geographic areas of Metropolitan's service area. Much of this growth is projected to occur in inland areas. As the wholesale water supplier, Metropolitan responds to supply requests from its member water retailing agencies. It does not have a role in developing the infrastructure to deliver water directly to new customers and thus it does not affect the location of approved development growth. Local agencies determine where and when water delivery infrastructure will be installed in response to planned and approved growth.

In summary, future water banking agreements with MWA are identified in the most recent IRP prepared by Metropolitan. The MWA banking agreement—and others like it with other SWP contractors—are mutually beneficial arrangements that assist Metropolitan in meeting its future dry-year demand. Metropolitan supports growth planned by its member agencies. Local member agency General Plans identify local growth trends and policies and evaluate the secondary effects of growth within their jurisdictions.

4.3 SECONDARY EFFECTS OF GROWTH

The local jurisdictions that govern land use and development in the MWA service area include San Bernardino County, the cities of Adelanto, Barstow, Hesperia, and Victorville, and the towns of Apple Valley and Yucca Valley. Each land use jurisdiction within the MWA service area has adopted a General Plan to guide the type, location and level of land use and development and each jurisdiction implements its own development approval process that determines the timing and specific nature, intensity and location of development and other land use.

Each municipality and the County have assessed the growth-related impacts associated with the planned land use and growth allowed under their General Plans and the CEQA EIRs they have prepared on those plans. It is these growth-related impacts associated with land use and growth planned and approved by the local land use jurisdictions that constitute the secondary effects of growth associated with the RWMP. **Table 4-6** summarizes the secondary effects of growth within the MWA service area that have been identified by each land use jurisdiction in their general plan EIRs.

As shown in Table 4-6, the EIRs on the General Plans within the MWA service area identify significant and unavoidable impacts associated with planned growth in several areas: aesthetics, air quality, biological resources, geology and soils, hydrology and water quality, land use, agricultural resources, noise, and traffic. The sections that follow briefly summarize these growth-related impacts and provides an overview of the applicable regulations and mitigation measures set forth by agencies with jurisdiction in the MWA service area.

Impact 4-1: Implementation of projects and management actions under the 2004 RWMP would accommodate planned growth in the MWA service area. Planned growth would result in secondary environmental effects. The effects of planned growth have been identified and addressed in the EIRs on Regional Plans and General Plans for municipalities within the service area. Local land use jurisdictions have identified several significant and unavoidable impacts associated with planned growth including impacts to air quality,

TABLE 4-6
SUMMARY OF RWMP AREA GENERAL PLAN AND EIR CONCLUSIONS

Issue Area	San Bernardino County	City of Adelanto	Town of Apple Valley	City of Barstow	City of Hesperia	City of Victorville	Town of Yucca Valley
Aesthetics	NA	NA	LTSM	LTSM	SU	B	LTSM
Agricultural Resources	NA	NA	LTSM	NA	NA	SU	NA
Air Quality	LTSM	SU	SU	LTSM	SU	SU	LTSM
Biological Resources	SU	SU	LTSM	LTSM	SU	LTSM	SU
Cultural Resources	LTSM	LTSM	LTS	LTSM	LTS	LTSM	LTSM
Geology and Soils	SU	SU	LTSM	LTSM	LTSM	LTSM	LTSM
Hydrology and Water Quality	SU	SU	SU	LTSM	SU	SU	SU
Hazards	LTSM	LTSM	LTSM	LTSM	NA	SU	NA
Land Use	LTSM	LTSM	SU	LTSM	SU	LTS	LTSM
Mineral Resources	SU	NA	LTSM	LTSM	NA	SU	NA
Noise	SU	LTSM	LTSM	LTSM	SU	SU	LTSM
Population and Housing	LTSM	SU	SU	LTSM	B	SU	LTSM
Public Services and Utilities	NA	SU	LTS	LTSM	LTSM	LTSM	LTSM
Recreation or Open Space	LTSM	SU	LTS	LTSM	NA	NA	NA
Transportation and Traffic	SU	SU	SU	NA	LTSM	LTSM	SU
Utilities and Service Systems	LTSM	SU	LTS	NA	LTSM	LTSM	LTSM

Sources: City of Adelanto General Plan Update, Final Program Environmental Impact Report May 1994, City of Barstow, Draft General Plan Environmental Impact Report, August 1997, City of Hesperia, Draft Program Environmental Impact Report for Hesperia General Plan: Land Use and Circulation Elements, June 1990, City of Victorville, Final Program Environmental Impact Report for the City of Victorville Comprehensive General Plan Update, July 15, 1997, San Bernardino County Final Environmental Impact Report, May 1989, Town of Yucca Valley, Draft Environmental Impact Report for the Yucca Valley Comprehensive General Plan, September 1995, Town of Apple Valley, General Program Hearing Draft Environmental Impact Report, May 24, 1991.

SU = Significant Unavoidable

LTSM = Less Than Significant With Mitigation

LTS = Less Than Significant

B = Beneficial

NA= Not Addressed

biological resources, geology, hydrology and water quality, land use, aesthetics, agricultural resources, noise, and traffic.

Mitigation Measures

MWA does not have the authority to make land use and development decisions to halt or alter growth and development patterns or approvals. Nor does it have the authority or jurisdiction to address many of the identified significant, secondary effects of planned growth. Authority to implement such measures lies with the County and cities, which enforce the mitigations they adopted as part of their General Plan EIR certifications as well as local, state, and federal regulations through the permit process. Other agencies with authority to require mitigation or with responsibility to implement measures to mitigate the effects of planned growth include regional and state agencies such as, but not limited to the MDAQMD, RWQCB, CDFG, DHS, Caltrans, and federal agencies including USFWS, U.S. EPA, and U.S. Army Corps of Engineers.

MWA does have the authority to take actions and implement projects to help mitigate the secondary effects of planned growth on water resources and water supply services within the service area. Implementation of the 2004 RWMP is, in effect, mitigation for the effects of planned growth on groundwater resources and water supply services.

M4-1 San Bernardino County and the local city land use jurisdictions within the MWA service area should implement the General Plan policies and mitigation measures they have adopted as part of their General Plan approval process and as part of the development and land use approval process to address the growth-related impacts of their planned growth.

M4-2 MWA should implement the RWMP to address the effects of planned growth on groundwater resources and water supply services within the service area.

Significance After Mitigation

Significant and Unavoidable.

DISCUSSION OF SECONDARY EFFECTS OF GROWTH AND MITIGATION

Following is a discussion of the key environmental areas where secondary effects of growth are expected to occur. As described above, these impacts have been addressed in detail in the CEQA EIRs prepared on each community's General Plan and the reader is referred to those General Plan EIRs for further information. This discussion of issues also highlights the chief planning and regulatory agencies that are responsible for regulation and/or mitigation of specific environmental resources. **Table 4-7** lists agencies in the MWA service area that have the authority to implement major mitigation measures for growth-related impacts. This discussion begins with a description of the SCAG, one regional agency that endeavors to coordinate regional growth and development, as described below.

TABLE 4-7
AGENCIES WITH AUTHORITY TO IMPLEMENT MAJOR
MITIGATION MEASURES FOR GROWTH-RELATED IMPACTS

Agency	Authority
Southern California Association of Governments	Formed to provide more effective regional planning in southern California. Charged with providing a framework for orderly regional growth and development; a clearinghouse for federal grant applications. Responsible for developing regional plans, including: Regional Comprehensive Plan and Guidelines, Regional Transportation Plan, Regional Housing Needs, and Employment Assessment.
County of San Bernardino	Responsible for planning, land use, and environmental protection of unincorporated areas. Of particular importance are development of presently undeveloped lands, provision of regional solid waste management facilities, and regional transportation, air quality and flood control improvement programs.
Local cities (within the MWA service area)	Responsible for adoption of local general plans and various planning elements and local land use regulations. Responsible for local water supplies. Adopt and implement local ordinances for control of noise and other environmental concerns. Participate in regional air quality maintenance planning through adoption of local programs to control emissions via transportation improvements. Responsible for enforcing adopted energy efficiency standards in new construction.
Local Agency Formation Commission	Empowered to approve or disapprove all proposals to incorporate cities, to form special districts or to annex territories to cities or special districts. Also empowered to guide growth of governmental service responsibilities.
Regional Water Quality Control Board, Lahontan Region # 6 and Colorado River Basin Region # 7	Share responsibility with SWRCB to coordinate and control water quality. Formulate and adopt water quality control plans for the District's service area. Implement portions of the Clean Water Act when EPA and SWRCB delegate authority, as is the case with issuance of NPDES permits for waste discharge.
State Department of Health	Responsible for the purity and potability of domestic water supplies for the state. Assists SWRCB and RWQCBs in setting quality standards of wastewater discharge.
Metropolitan Water District	Responsible for the development, storage, transportation and wholesaling of water to member agencies for domestic and municipal purposes in their service area. Obtains water from California State Water Project and Colorado River Aqueduct.
San Bernardino County Flood Control District	Responsible for providing regional flood control facilities within San Bernardino County. Plan storm drainage and flood control facilities on a countywide, regional basis.
California Air Resources Board	Responsible for adopting and enforcing standards, rules, and regulations for the control of air pollution from mobile sources throughout the state.
Mojave Desert Air Quality Management District	Adopts and enforces local regulations governing stationary sources of air pollutants. Issues Authority to Construct Permits and Permits to Operate. Provides compliance inspections of facilities and monitors regional air quality. Developed the Air Quality Management Plan (AQMP).

Source: compiled by ESA

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS - PLANS

SCAG is the regional authority charged with providing a framework for coordination of orderly regional growth and development. The SCAG Regional Comprehensive Plan and Guide (RCPG), completed in 1996, combines regional planning efforts into a single focused document. The RCPG addresses growth management as well as several core elements including transportation, air quality, water quality, and hazardous waste management. These elements provide a basis for regional conformity review for state regulations (as outlined in SCAG's Guidance for Implementation of the 1989 AQMP Conformity Procedures) and federal regulations (as promulgated in 40 CFR, Part 51, Subpart W). The RCPG also addresses as ancillary or advisory guidance the following elements: economic issues, housing, human resources, public finance, open space and conservation, water resources, energy resources, and integrated solid waste management. The principal objectives of the RCPG are to coordinate regional and local decisions with respect to future growth and development and to minimize future environmental impacts.

SCAG has also more recently prepared a Regional Transportation Program (RTP) and an associated EIR (December 2003). The RTP acts as a long-term planning and management plan for the regional transportation system, providing mitigation measures to off-set the impacts of growth projected in the RCPG. The RTP EIR identifies significant unavoidable impacts in a number of issue areas (including but not limited to land use, population and housing, and noise), but offers management plans perceived to be beneficial to air and transportation resources.

AIR QUALITY

Population growth in the MWA service area would result in continued intermittent construction activities for new development scattered throughout the region. These construction activities would result in emission of air pollutants. Increased development in the region would also result in an increase in operational emissions of industrial developments. Additionally, increases in regional population would also increase traffic in the region, resulting in increased emissions from vehicles. With these factors contributing to air quality degradation, growth is generally considered to have a significant unavoidable impact on air quality.

Air quality is primarily regulated at the state and regional levels. The California Air Resources Board (CARB), the State air quality management agency, is responsible for establishing and reviewing the state ambient air quality standards, compiling the California State Implementation Plan (SIP) and securing approval of that plan from U.S. EPA. The regional agency primarily responsible for regulating air quality in the Mojave District Air Basin is the MDAQMD. The MDAQMD has primary responsibility for regulating stationary sources of air pollution situated within its jurisdictional boundaries. To this end, the District implements air quality programs required by State and Federal mandates, enforces rules and regulations based on air pollution laws, and educates businesses and residents about their role in protecting air quality.

The MDAQMD has adopted a variety of attainment plans for a variety of nonattainment pollutants. **Table 4-8** summarizes the attainment plans prepared by the MDAQMD applicable to

TABLE 4-8
AIR QUALITY ATTAINMENT PLANS IN THE MOJAVE AIR BASIN

Name of Plan	Date of Adoption	Applicable Area	Pollutant(s) Targeted	Attainment Date
1991 Air Quality Attainment Plan	26-Aug-91	San Bernardino County portion	NO _x and VOC	1994*
Mojave Desert Planning Area Federal Particulate Matter Attainment Plan	31-Jul-95	Mojave Desert Planning Area	PM ₁₀	2000*
Triennial Revision to the 1991 Air Quality Attainment Plan	22-Jan-96	Entire District	NO _x and VOC	2005

Source: Mojave Desert Air Quality Management District, CEQA Guidelines, 2002.

*Note: A historical attainment date given in an attainment plan does not necessarily mean that the affected area has been re-designated to attainment; please refer to Table 1 in the MDAQMD 2002 CEQA Guidelines.

the MWA service area. These plans provide measures to reduce pollutant loads in the local air basins by a certain date to comply with federal air quality standards.

The County and municipalities generally support efforts to minimize air quality degradation with policies that:

- Pledge cooperation between local, regional, and state agencies to establish comparable air quality elements and implementation programs;
- Support and expand public transit to reduce emissions from vehicle trips;
- Provide incentives to reduce work-related vehicle trips (including HOV lanes); and,
- Support legislation to promote cleaner fuels.

Although implementation of these policies and mitigation measures would reduce growth-related impacts on air quality, impacts may remain significant.

BIOLOGICAL RESOURCES

Development associated with growth would remove vegetation and result in the loss of habitat for some biological species. Growth would result in the conversion of open spaces to developed uses, potentially resulting in fragmentation of existing wildlife corridors. Additionally, increased development may result in a loss of riparian and wetland habitats. Existing biological communities in the MWA service area that may be affected are described in more detail in Section 3.3, Biological Resources.

Local jurisdictions, including the municipalities and the County, have developed policies and mitigation measures through their general plans and the associated EIRs that help identify and preserve biological communities. Policies include:

- Requiring biological surveys of land prior to approval of development;
- Protecting sensitive resources during construction activities; and,

- Requiring adequate mitigation for developments that would adversely affect listed rare, threatened, or endangered species.

Additionally, federal and state agencies, including the USFWS and the CDFG, require permitting and otherwise restrict construction or development activities within areas containing sensitive biological species. The federal Endangered Species Act requires permits for actions that could result in the direct loss of listed species including the desert tortoise.

The West Mojave Plan is being jointly prepared by agencies having administrative responsibility or regulatory authority over species of concern within the West Mojave Desert. The federal lead agency is the BLM. Local lead agencies include the City of Barstow and San Bernardino County. The West Mojave Plan will define a regional strategy for conserving plant and animal species and their habitats and will develop an efficient, equitable, and cost-effective process for complying with threatened and endangered species laws. The plan will enable the USFWS and CDFG to issue programmatic biological opinions and incidental take permits more efficiently. The plan area extends from Olancho in Inyo County on the north to the San Gabriel and San Bernardino Mountains on the south, and from the Antelope Valley on the west to the Mojave National Preserve on the east. The MWA service area is entirely within the boundaries of the West Mojave Plan. At the time of this publication, the West Mojave Plan is under review by BLM.

Although implementation of these policies and mitigation measures would reduce growth-related impacts on biological resources, impacts may remain significant.

GEOLOGY AND SOILS

Geological impacts that could result from population growth include the construction of developments on land that is susceptible to geological hazards such as seismic ground-shaking, fault rupture, liquefaction, landslide, erosion, subsidence, settlement, and expansive soils. The MWA service area encompasses a seismically active region susceptible to considerable seismic hazards. The risks from many geologic hazards can be successfully mitigated through a combination of land use and developmental standards, engineering, and construction. The municipalities in the MWA service area and the County, therefore, have developed policies and mitigation measures including but not limited to:

- Improving the knowledge of sites of geologic hazards (including seismic and non-seismic hazards) and incorporating newly acquired data into mapping and local policies;
- Requiring all facilities to meet appropriate codes; and,
- Requiring geologic reports for certain proposed development projects, establishing standard guidelines for geologic reports, and developing standard mitigation measures.

The California Geological Survey also provides data concerning mapping of geologic hazards. Additionally, the California Uniform Building Code of the California Code of Regulations provides standards for the construction of all new facilities to ensure safety during seismic hazards.

Although implementation of these policies and mitigation measures would reduce growth-related impacts on geology and soil, impacts may remain significant.

HYDROLOGY, WATER SUPPLY AND WATER QUALITY

Population growth in the region would result in increased water demand and wastewater production, which would require improvement and enlargement of utilities in order to meet demand levels and wastewater treatment requirements. Additionally, an increase in development resulting from population growth would result in increased areas of impermeable surfaces. This may contribute to increases in storm water runoff and water quality degradation. Municipalities and the County address these issues with policies aimed towards:

- Cooperating with federal, state, and local agencies responsible for water basin management to compile water quality and water demand data;
- Limiting development to areas where utilities infrastructure is already in place and where adequate water supply is shown to be available;
- Encouraging the development of water reclamation systems and the use of reclaimed wastewater, where feasible; and,
- Encouraging water conservation.

Water quality issues are also regulated at the regional level by RWQCB. The RWQCB enforces implementation of the NPDES to address both storm water/non-point source pollution and point sources. With respect to water supply for consumptive use, the requirements of California State Senate Bills 610 and 221 recently enacted in the State of California require that new developments of certain size obtain verification of the availability of water to supply the development prior to approval. MWA coordinates with local municipalities to assess that adequate water supplies are available for existing and planned development.

Although implementation of these policies and mitigation measures would reduce growth-related impacts on hydrology and water quality, impacts may remain significant.

LAND USE

Population growth would result in the conversion of existing open space and/or agricultural land uses to developed municipal land uses. The conversion of open space is partially addressed by policies related to biological resources. In particular, the BLM West Mojave Desert Plan (described above under biological resources) aims to ensure that open space containing unique biological resources is preserved. In addition, local municipalities and the County set forth policies to support the preservation of open space and agricultural land. These agencies can establish zoning and land use designations to encourage the preservation of open space, for example by requiring large lot sizes, clustering developments, designating areas of unique resources (sand dunes, hot springs, etc.). Municipal and County general plans also set forth goals of acquiring and purchasing open space areas for preservation and establishing local and regional trail networks.

NOISE

Population growth may result in increased noise levels in developed areas. Construction activities for development projects would contribute to increases in noise levels. Where development results in a higher density of municipal or urban land uses, noise levels could also be expected to increase. Additionally, increased traffic would result in increased noise levels. The municipalities and the County reduce these impacts of noise through policies that:

- Establish interior and exterior noise standards for different land uses and ensure that construction and operation of new developments do not exceed those standards;
- Establish land use compatibility standards to ensure that noise sensitive developments are not impacted by nearby noise-generating land uses; and,
- Require the inclusion of noise buffering measures in the design of new roadways and transportation corridors.

Although implementation of these policies and mitigation measures would reduce growth-related impacts on noise levels, impacts may remain significant.

TRAFFIC

As population in the region grows, the number of vehicles on roadways throughout the region would increase. Accommodating increased traffic volumes would generally require increasing the transportation infrastructure in the region. SCAG's RTP offers long-term planning and management guidelines for the regional transportation system. The RTP EIR provides mitigation measures to off-set the impacts of growth projected in the region. Additionally, municipalities and the County set forth general plan policies to:

- Improve and maintain roadways to accommodate existing and projected traffic volumes;
- Ensure that the roadway system is safe and efficient; and,
- Provide diverse and effective public transit to reduce traffic volumes.

Although implementation of these policies and mitigation measures would reduce growth-related impacts on traffic, impacts may remain significant.

CHAPTER 5.0

CUMULATIVE IMPACTS

5.1 INTRODUCTION

Under CEQA, an EIR is required to assess the “cumulative impact” of a project when the project’s incremental effect is cumulatively considerable. (14 CCR §15130) 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 closely related past, present and reasonably foreseeable future probable projects causing related impacts.” (14 CCR §§15130, 15355). “Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.” (14 CCR §15355(c)).

Section 15130(b)(1) of the CEQA Guidelines describes elements necessary for an adequate discussion of cumulative impacts:

(1) 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. Any such planning document shall be referenced and made available to the public at a location specified by the lead agency.

Table 5-1 summarizes the cumulative analysis conducted by local jurisdictions for their General Plans. Most jurisdictions conclude that implementation of their plans will result in cumulatively significant impacts to numerous resources including air quality, biological resources, traffic, water quality, and public services and utilities.

Since the 2004 RWMP is a regional resource plan, analysis contained in Chapter 3 of this EIR is similar to a cumulative analysis. The setting encompasses a broad area, and regional resources affected are scattered throughout the service area. The cumulative baseline includes the effects associated with implementing local General Plans in addition to the effects of the 2004 RWMP.

**TABLE 5-1
SUMMARY OF CUMULATIVE IMPACT ANALYSIS FROM LOCAL JURISDICTION GENERAL PLANS**

Issue Area	San Bernardino County	City of Adelanto	Town of Apple Valley	City of Barstow	City of Hesperia	City of Victorville	Town of Yucca Valley
Air Quality	LTSM	SU	SU	LTSM	SU	SU	LTS
Biological Resources	SU	SU	LTS	LTSM	LTS	SU	LTS
Cultural Resources	LTSM	LTSM	LTS	LTSM	LTS	LTSM	LTS
Geology and Soils	SU	SU	LTS	LTSM	LTS	LTS	LTS
Hydrology and Water Quality	SU	SU	SU	LTSM	SU	SU	LTSM
Hazards	LTSM	LTS	LTS	LTSM	LTS	SU	NA
Land Use	LTSM	LTSM	LTS	LTSM	LTS	LTS	LTS
Mineral Resources	SU	SU	LTS	LTSM	LTS	LTS	NA
Noise	SU	LTSM	LTS	LTSM	LTS	SU	LTS
Population and Housing	LTSM	LTSM	LTS	LTSM	B	SU	LTS
Public Services and Utilities	LTSM	SU	SU	NA	SU	SU	SU
Recreation or Open Space	LTSM	SU	LTS	LTSM	LTS	LTS	LTS
Transportation and Traffic	SU	SU	SU	NA	SU	SU	LTS

Sources: City of Adelanto, City of Adelanto General Plan Update Final Program Environmental Impact Report, May 1994; City of Barstow, City of Barstow General Plan Environmental Impact Report, August 1987; City of Hesperia, Draft Program Environmental Impact Report for Hesperia General Plan: Land Use and Circulation Elements, June 1990; City of Victorville, Final Program Environmental Impact Report for the City of Victorville Comprehensive General Plan Update, July 15, 1997; County of San Bernardino, County of San Bernardino General Plan Final Environmental Impact Report, April 12, 1989; Town of Apple Valley, Town of Apple Valley General Plan Program Hearing Draft Environment Impact Report, May 24, 1991; Town of Yucca Valley, Town of Yucca Valley Draft Environmental Impact Report for the Yucca Valley Comprehensive General Plan September 15, 1995.

SU = Significant Unavoidable

LTSM = Less Than Significant With Mitigation

LTS = Less Than Significant

NA = Not Assessed

B = Beneficial

Construction activities would temporarily contribute significantly to the already degraded air quality in the Mojave Desert Air Basin. This contribution to the cumulative baseline would be considered a significant cumulative impact. The project would not contribute significantly to the cumulative baseline in any of the other resource areas evaluated. The following sections evaluate the cumulative baseline condition and compare it to cumulative effects identified in local General Plan EIRs.

5.2 WATER RESOURCES

Most of the local General Plan EIRs find that local water demand contributes significantly to the cumulative water demand in the region (see Table 5-1). A primary objective of the 2004 RWMP is to accommodate projected future water demand. Through implementation of the 2004 RWMP, MWA acts as a regional resource manager with responsibilities to mitigate the significant cumulative impacts to water supplies identified individually by local cities within the MWA service area.

The 2004 RWMP identifies a group of projects and management actions that would achieve a regional water balance. As such, the analysis of the project itself provides a cumulative assessment of the regional groundwater resource. In addition to this regional assessment, the cumulative baseline condition may include projects implemented independently by local jurisdictions that could affect local groundwater basins. The following discussions evaluate the cumulative impacts for water resources.

GROUNDWATER QUALITY

As discussed in Section 3.2, implementation of the 2004 RWMP could affect groundwater quality due to recharge water quality and surface contamination. Groundwater quality is also affected locally by contamination sites and faulty septic tanks and leach fields. Naturally occurring minerals contribute to the cumulative condition. Since the recharge projects proposed in the 2004 RWMP would be located throughout the MWA service area, they would contribute considerably to the cumulative baseline. As noted in Section 3.2, impacts to water quality would be less than significant with mitigation. Implementation of the 2004 RWMP would assist in maintaining groundwater quality to avoid a significantly degraded regional condition resulting from cumulative effects.

GROUNDWATER OVERDRAFT

The cumulative effect of groundwater extraction in the region has resulted in a regional overdraft condition. The Judgment has instituted a physical solution to rectify the adverse condition. As discussed in Section 3.2, the 2004 RWMP supports the Mojave Basin Area Judgment by establishing mechanisms to equitably maintain regional water balance. As such, the 2004 RWMP supports the Judgment in providing a plan to achieve regional water balance.

SURFACE WATER QUALITY

Surface water quality is affected by contaminated runoff from urban and industrial land uses and by construction activities. However, no surface waters in the region are listed as impaired water bodies by the SWRCB (303(d) list). As noted in Section 3.2, the 2004 RWMP would contribute to the regional condition during construction of facilities. Implementation of mitigation measures would reduce the contribution of the projects identified in the 2004 RWMP to less than significant levels. The 2004 RWMP would not contribute significantly to the cumulative baseline.

SUMMARY

The existing cumulative baseline for water resources includes an overdraft condition, areas of groundwater contamination, and impacted surface runoff. The Mojave Basin Area Judgment mandates that the overdraft condition be eliminated. The 2004 RWMP addresses a regional condition, and as such the analysis in Section 3.2 Water Resources is similar to a cumulative analysis. The 2004 RWMP supports the Judgment and with mitigation measures identified in Section 3.2 would not contribute significantly to groundwater contamination or surface water quality degradation. The Plan would have beneficial effects on the groundwater overdraft cumulative baseline.

5.3 BIOLOGICAL RESOURCES

CONSTRUCTION EFFECTS

Local General Plans (See Table 5-1) identify impacts to biological resources from planned growth as being significant and unavoidable. Since the 2004 RWMP is a regional resource plan, the analysis in Section 3.3 provides a program-level, regional analysis. The projects identified in the 2004 RWMP could result in clearing multiple acres of open space that may support biological resources. The total acreage needed for recharge basins in the region could reach 600 acres. As such, the projects would contribute to the cumulatively significant loss of habitat in the region.

Section 3.3 evaluates the effects of the 2004 RWMP on biological resources, concluding that impacts to biological resources from the individual projects could be reduced to less than significant levels with implementation of mitigation measures. None of the projects would be located in critical habitat areas as designated by the USFWS or BLM. Prior to construction, the implementing agencies would comply with permitting requirements if sensitive habitats or species were destroyed. Permits could require providing replacement habitats in areas more critical to the species' survival. Mitigation measures outlined in Section 3.3 would assist in maintaining the regional viability of species and habitats impacted by individual projects.

The amount of land needed for the 2004 RWMP projects is small compared with the total urban development envisioned in local General Plans. Nonetheless, the 2004 RWMP would contribute to the regional reduction of open space, and the amount of land required for all the proposed facilities combined could be considered a significant contribution to the cumulative condition of diminishing open space in the region.

RIPARIAN HABITAT

The Mojave Basin Area Judgment mandates a physical solution that includes conserving riparian areas within the Mojave River. The 2004 RWMP supports the Judgment. Recharge projects in the Floodplain Aquifer would assist in meeting the goals of the Judgment and CDFG on a regional scale. Separate from the 2004 RWMP process, MWA is involved as Judgment Watermaster with CDFG to develop ways to maintain the riparian habitat. Implementation of the 2004 RWMP would not contribute to the drop in water levels that cumulatively threaten riparian habitat in the region.

5.4 LAND USE

The proposed projects do not involve large-scale development that would significantly change the characteristics of the areas in which they are located. 2004 RWMP projects are generally scattered throughout the more developed areas of the MWA service area including Victor Valley, the Barstow area, and the Morongo Basin, with only a few projects in the less developed areas. The projects would be compatible with local General Plans policies to manage groundwater basins to support planned growth. No cumulative impacts to land use would result from the proposed project.

Agricultural operations and lands designated for agricultural uses are dispersed throughout the MWA service area, primarily over the Mojave River Floodplain Aquifer. The Mojave Basin Area Judgment mandates a ramp-down of Free Production Allowances that could result in reduced agriculture in the region. MWA does not have the authority to cause or prevent agricultural uses in the future. The 2004 RWMP assumes that future agriculture uses will decline. However, the 2004 RWMP does not contribute to this regional condition.

5.5 RECREATION

The 2004 RWMP identifies projects that could be constructed near recreational areas. Construction of these projects would not contribute adversely to regional recreational facilities. Recharge projects in the Mojave River could augment recreational aspects of the river. Furthermore, reclamation projects would provide landscape irrigation that cumulatively would add to the “greening” of the local recreational facilities.

5.6 AESTHETICS

As urban areas grow and convert a large amount of existing open and vacant space into residential, commercial and industrial land uses, visual resources within the area may be impacted. Section 3.7 assesses potential impacts to regionally significant aesthetic resources. The projects identified in the 2004 RWMP would not contribute significantly to the regional character.

5.7 AIR QUALITY

The 2004 RWMP is generally considered to conform with the applicable attainment plans in the MDAQMD because the individual projects and management actions would comply with all applicable District Rules and Regulations and with applicable control measures from the applicable plans. Further, the 2004 RWMP projects and management actions are consistent with local growth projections that serve as the basis for applicable air quality plans.

Project-related construction emissions of PM-10 and possibly ROG and NO_x could exceed MDAQMD significance thresholds even with mitigation, depending on the phasing of construction and intensity of construction activities. While construction impacts are generally temporary, the RWMP could include 55 development projects and associated construction emissions. Given the amount of construction allowed for under the project, and when viewed in combination with other construction projects that could occur within the RWMP area concurrently with the project over the 20-year planning period, the project would be expected to have a cumulatively considerable effect on local and regional air quality. Projects meeting these criteria are considered to have an incremental effect on the region's ability to attain quality air. This would be a significant impact of the project.

The mitigation measures provided in Section 3.8 would reduce PM-10 emissions substantially, but given the overall amount of construction activities and associated emissions, temporary construction activities are assumed to result in a potentially significant and unavoidable cumulative air quality impact.

5.8 GEOLOGY AND MINERAL RESOURCES

Geologic hazards affect the entire region. Section 3.10 describes the regional setting that serves as the cumulative baseline. Individual projects may encounter specific geologic hazards such as surface rupture and unstable soils. However, the 2004 RWMP would not contribute significantly to hazards associated with local geology.

Several local cities have identified reduced access to mineral resources as a cumulatively significant impact of development. Siting of facilities may affect future access to mineral resources. However, facilities may be sited to avoid mineral resources if necessary. Therefore, the 2004 RWMP would not contribute substantially to the cumulative effect on mineral resources.

5.9 NOISE

Concurrent construction of 2004 RWMP projects and other foreseeable development projects would intermittently and temporarily generate noise levels above existing ambient levels in the project vicinity. Where sensitive receptors are present, they could be impacted by concurrent construction. Simultaneous construction of projects and other locally-approved projects could also raise ambient noise levels along roadways providing access to and from construction sites. Implementation of project-specific mitigation measures identified in Section 3.12, and the implementation of similar measures for other projects, would be expected to reduce cumulative construction-related noise effects to a less-than-significant level.

Operational noise impacts associated with RWMP implementation would be highly localized. Implementation of project-specific mitigation measures identified in Section 3.12 and implementation of similar measures for the other projects, would be expected to reduce cumulative operational noise effects to a less-than-significant level.

5.10 TRAFFIC

Construction of the 2004 RWMP projects would temporarily add construction traffic to local roadways. Section 3.13 describes the regional roadway network. Most of the local General Plans conclude that cumulative development will result in cumulatively significant impacts to traffic. Implementation of the 2004 RWMP would not directly result in substantial permanent increases in traffic. The additional traffic associated with the construction activities would be temporary and would not add significantly to the cumulative baseline.

5.11 PUBLIC SERVICES AND UTILITIES

Most cities identify significant cumulative impacts to public services and utilities associated with their future plans (see Table 5-1). The future plans require additional fire services, police services, and other community services such as schools and hospitals. Local utility infrastructure is also required. The 2004 RWMP would not contribute to the need for additional services. The projects identified in the 2004 RWMP provide some of the infrastructure needed to mitigate impacts associated with local water and wastewater services needs. Therefore, the 2004 RWMP acts to mitigate cumulative effects to water supply infrastructure.

5.12 SUMMARY OF CUMULATIVE IMPACTS

The following impacts summarize the conclusions presented in the discussions above.

Impact 5-1: Implementation of the 2004 RWMP would contribute significantly to the adverse baseline condition for air quality and biological resources.

Local cities have concluded that implementation of their General Plans would result in cumulatively significant adverse effects to air quality, biological resources, geology, mineral resources, hydrology, noise, public services, and transportation. Regional resource managers including MDAQMD, BLM, CDFG, USFWS, and the Corps provide mechanisms to minimize impacts to air quality and biological resources. The 2004 RWMP would contribute considerably to regional air emissions during construction. Development of recharge basins would destroy biological resources that would be mitigated to less than significant levels for each individual project, but that would contribute to the cumulative loss of biological resources in the region.

Mitigation Measures

M-5-1 Implementing agencies shall comply with existing regulations regarding air emissions controls and biological resources permitting.

Significance After Mitigation

Significant, unavoidable.

Impact 5-2: The 2004 RWMP's contribution to the cumulative condition for water quality, geology, mineral resources, noise and transportation would be considered less than significant.

As discussed above, the 2004 RWMP would have less than significant effects on groundwater quality, surface water quality, geology, mineral resources, noise and transportation.

Mitigation Measures

None required

Significance After Mitigation

Less than significant

Impact 5-3: The 2004 RWMP's contribution to the cumulative condition for groundwater overdraft and public services infrastructure would be considered beneficial.

As discussed above, the 2004 RWMP would have beneficial effects on groundwater overdraft conditions and water supply infrastructure. Several local cities have identified these issues as significantly affected by cumulative development. The 2004 RWMP would assist in mitigating these adverse cumulative effects.

Mitigation Measures

None required

Significance After Mitigation

Beneficial

CHAPTER 6

ALTERNATIVES

6.1 INTRODUCTION

CEQA (Section 15126.6) requires an assessment of a range of reasonable alternatives to a project that would meet most of the project objectives and could avoid or substantially lessen any significant environmental impacts associated with the proposed project. CEQA also requires that an EIR assess the No Project Alternative, providing an assessment of what would reasonably be expected to occur if the project were not implemented. CEQA (Section 15126.6(e)(A)) defines the No Project Alternative as follows:

When the project is the revision of an existing land use or regulatory plan, policy or ongoing operation, the “no project” alternative will be the continuation of the existing plan, policy or operation into the future....

MWA’s proposed 2004 RWMP is described in detail in Chapter 2 of this document. Chapter 3 assesses potential impacts of the proposed 2004 RWMP. The impact analysis identifies potential regional impacts associated with implementation of the 2004 RWMP as well as potential facility siting and facility construction impacts. This section evaluates alternatives to the 2004 RWMP and the No Project Alternative. The 2004 RWMP does not specify locations for proposed projects. Future siting efforts and project-level CEQA will evaluate site alternative options for these projects.

6.2 2004 RWMP PROJECT SUMMARY

PROJECT OBJECTIVES

As stated earlier in Chapter 2.0, the objectives established for the RWMP through 2020 are to:

- A) Balance future water demands with available supplies recognizing the need to:
- stabilize the groundwater basin storage balance over long-term hydrologic cycles,
 - protect and restore riparian habitat areas as identified in Exhibit H of the Mojave Basin Area Judgment and the CDFG management plan required by Exhibit H,
 - limit the potential for well dewatering, land subsidence, and migration of poor quality water,
 - maintain a sustainable water supply through extended drought periods, and
 - select projects with the highest likelihood of being implemented.

B) Maximize the overall beneficial use of water throughout MWA by:

- supplying water in quantity and of quality suitable to the various beneficial uses,
- addressing issues throughout the MWA service area recognizing the interconnection and interaction between different areas,
- distributing benefits that can be provided by MWA in an equitable and fair manner,
- ensuring that costs incurred to meet beneficial uses provide the greatest potential return to beneficiaries of the project(s),
- avoiding redirected impacts, and
- identifying sustainable funding sources including consideration of affordability.

Balancing future water demands with available supplies will increase water supply reliability by preventing continued overdraft of the groundwater. With groundwater storage stabilized, there will be groundwater available during surface water supply shortages and delivery interruptions. With a balanced basin, groundwater elevations will be relatively stable and be kept at higher average levels than the No Project Alternative. This will reduce the potential for land subsidence and associated aquifer compaction. By limiting migration of poor water quality, available supplies will be of sufficient quality to meet drinking water objectives, thereby increasing long-term water supply reliability.

SUMMARY OF POTENTIALLY SIGNIFICANT IMPACTS

Chapter 3.0 provides analysis of potentially significant impacts that could result from implementation of the 2004 RWMP. As summarized in Table ES-1, potentially significant impacts could result from construction of facilities, facility siting, and operations. Operational impacts are primarily associated with groundwater levels and quality. Construction air emissions could exceed regional thresholds of significance for individual projects. However, it is expected that all other project construction and facility siting impacts could be reduced to less than significant levels with identified mitigation measures incorporated into proposed projects. Implementation of the 2004 RWMP could result in significant unavoidable impacts associated with the secondary effects of growth. These include potential impacts to air quality, traffic, noise, land use, hydrology, geology, public services and utilities, and biological resources. In addition, implementation of the individual projects could contribute considerably to cumulatively significant impacts to air quality in the region.

6.3 COMPARISON OF ALTERNATIVES TO THE 2004 RWMP

OVERVIEW

As noted above, Section 15126.6 of the CEQA Guidelines requires that an EIR evaluate a range of reasonable alternatives to the project that could avoid or substantially lessen any of the significant effects of the project. MWA evaluated several alternative variations that incorporated various supply and demand assumptions. The variations were evaluated with respect to their ability to

maintain groundwater balances throughout the MWA service area. The proposed projects and management actions identified in the 2004 RWMP were recommended based on this initial screening of alternative variations.

Section 15126.6(e) of the CEQA Guidelines requires an EIR to include a No Project evaluation in the Alternatives analysis. The No Project Alternative is evaluated in the following sections. The No Project Alternative assumes that the 1994 RWMP would remain in place and that certain projects that have not yet been implemented would be completed. This scenario is consistent with the No Project Alternative described in Section 15126.6(e)(3)(A). The No Project Alternative also assumes that the Judgment would be fully implemented, resulting in ramped-down production allowances throughout the service area. A limited number of recharge facilities could be constructed in certain areas in the floodplain aquifer, as well as the Alto, Este, and Centro subareas as proposed in the 1994 RWMP. **Table 6-1** summarizes the comparison of potential impacts resulting from the alternatives considered.

**TABLE 6-1
COMPARISON OF ALTERNATIVES TO THE RECOMMENDED 2004 RWMP**

	Variations to the 2004 RWMP	No Project Full Judgment, 1994 RWMP
Operational Impacts (groundwater balance and quality)	Greater impact	Greater impact
Construction Impacts	Similar impact	Reduces impact
Facility Siting Impacts	Similar impact	Reduces impact
Growth Impacts	Similar impact	Similar impact

VARIATIONS TO THE 2004 RWMP

MWA conducted a preliminary alternative screening of over 18 alternative variations to balance water supplies and demand in the region. The alternatives differ in their water supply assumptions and performance expectations. An initial set of alternative variations was developed and evaluated, followed by a refined list of final alternatives. Of these final alternatives, two alternatives were recommended for inclusion in the 2004 RWMP. The following sections describe the alternative screening process provided in Chapter 9 of the 2004 RWMP.

INITIAL ALTERNATIVE VARIATIONS

The initial alternatives developed by MWA include A0, A1, A2, B0, B1, B2, B3, and B4. **Table 6-2** shows the principal characteristics that define each alternative. All of these alternatives assume full implementation of the Judgment by 2020, with consumptive use set to equal natural supply plus imports. Agricultural Scenario 1 assumes that existing (year 2000) levels of extraction for agriculture would continue. Agricultural Scenario 2 assumes a reduction from current agricultural extraction of 34,900 afy to 12,500 afy by 2020.

Alternatives A0 and B0 are No Action alternatives, which do not utilize any projects or management actions other than those in current use. Alternatives A1 and B1 attempt to meet each

TABLE 6-2
INITIAL ALTERNATIVE ASSUMPTIONS AND RESULTS

Alternative	A			B				
	A0	A1	A2	B0	B1	B2	B3	B4
Judgment Implementation	Full			Full				
Ag Demand Scenario	Ag Scenario 1			Ag Scenario 2				
Municipal Conservation	0%					5%		
Regional WTP			56K			56K		
Alto Reclamation		5.7K	11.0K		9.3K	11.0K	9.3K	
Rock Springs Release		40K			40K		40K	40K
Demands Met (Kafy)								
Total	113	207	209	110	206	202	205	204
Percent Total	45%	82%	83%	51%	95%	93%	96%	98%
Agricultural	33	52	38	20	20	20	20	20
Municipal	68	129	154	70	153	162	152	152

K 1,000

Kafy thousand acre-feet per year

subarea's demands with SWP imports, including a large Rock Springs release. Alternatives A2 and B2 include a 56,000 AF/year capacity treatment plant in Alto. Alternatives B3 and B4 are similar to Alternative B1 except that they include 5 percent municipal conservation as well. All of the alternatives other than B4 assume that 9,700 acre-feet of VVWRA's discharge is released to the Mojave River, with the remaining being allocated to reclamation to golf course and municipal users. Alternative B4 assumes that all VVWRA discharge is released to the Mojave River.

Alternatives A0 and B0 are No Action alternatives, which do not utilize any projects or management actions other than those in current use. Alternatives A1 and B1 attempt to meet each subarea's demands with SWP imports, including a large Rock Springs release. Alternatives A2 and B2 include a 56,000 AF/year capacity treatment plant in Alto. Alternatives B3 and B4 are similar to Alternative B1 except that they include 5 percent municipal conservation as well. All of the alternatives other than B4 assume that 9,700 acre-feet of VVWRA's discharge is released to the Mojave River, with the remaining being allocated to reclamation to golf course and municipal users. Alternative B4 assumes that all VVWRA discharge is released to the Mojave River.

Table 6-2 shows the demands met under each alternative. Alternative A0 meets only 45 percent and Alternative B0 meets only 51 percent of the total MWA demand. In each of these No Action Alternatives, the Alto Baja, and Oeste subareas have less than 40 percent of their demands met.

Alternatives A1 and A2 show significant shortfalls in meeting full municipal and agricultural demands under Agricultural Scenario 1. Alternative A1 meets only 82 percent of total MWA demand, while Alternative A2 meets only 83 percent. These results indicate that it is impossible to meet full 2020 demands under Agricultural Scenario 1 with no conservation even while importing MWA's entire SWP supply. Conservation of almost 30 percent of municipal consumptive use would be required to avoid significant shortages under this scenario.

Alternatives B1, B2, B3, and B4 all meet at least 93 percent of total MWA demands. However, because SWP deliveries to the treatment plant in Alto are given priority, Alternative B2 has significant shortages in Baja, Oeste, and Este. Alternatives B3 and B4 have fewer shortages because they assume 5 percent municipal conservation.

The initial alternatives are formulated to balance supply and demand at the subarea level, but no attempt was made to select recharge projects that would balance each individual aquifer unit. As a result, although each subarea is in balance as a whole, many aquifer units show significant declines. In addition, the Transition Zone floodplain region shows unreasonable increases in elevation because no cap was placed on its available storage in the initial alternatives. This limitation in aquifer unit elevation has been resolved in the revised and final alternatives.

FINAL ALTERNATIVE VARIATIONS

Following the initial evaluation of alternatives, MWA developed a set of final alternatives: C0, C3, D0, D2, D3, D5, D6, and D7. **Table 6-3** shows the principal characteristics that define these alternatives. All of these alternatives except for C3 assume full implementation of the Judgment by 2020, with consumptive use set to equal natural supply plus imports. Alternative C3 assumes that the ramp-down of agricultural producers will remain at 80 percent in 2020. In Alternative C3, agricultural production is permitted to continue at the ramp-down level even if it results in draw-downs in the groundwater aquifers.

TABLE 6-3
REVISED AND FINAL ALTERNATIVE ASSUMPTIONS AND RESULTS

Alternative	C		D							
	C0	C3	D0	D2	D3	D5	D5r	D6	D6r	D7
Judgment Implementation	Full	80% Ag	Full							
Ag Demand Scenario	Ag Scenario 1		Ag Scenario 2							
Municipal Conservation	0%		0%	5%		20%*	10%*	20%*	10%*	20%*
Regional WTP				46K		26K	12K			
Alto Reclamation		6.3K		9.9K	8.7K	6.8K	8.7K	6.8K	8.7K	6.8K
Rock Springs Release		10K			10K	10K	10K	10K	10K	10K
Demands Met (Kafy)										
Total	102	216	101	198	200	182	199	185	198	185
Percent Total	40%	85%	47%	95%	96%	98%	99%	100%	98%	100%
Agricultural	30	56	20	20	20	20	20	20	20	20
Municipal	59	138	63	153	148	131	146	131	145	131

* Municipal conservation in the Morongo Basin/Johnson Valley Area is 5% in these alternatives.

The final alternatives build off of the initial ‘A’ and ‘B’ alternatives. In these alternatives, the problem of unreasonably high elevation increases in the Transition Zone has been resolved by limiting the amount of recharge into the aquifer from the Mojave River such that the aquifer elevation could not exceed 2,510 feet. In addition, an attempt has been made in each alternative to

select a combination of recharge projects for SWP water that would result in reasonable balance in each of the aquifers units.

Alternative D2 is a revised version of B2, with a 46,000 afy regional water treatment plant in Alto and with 5 percent municipal conservation. Alternative D3 also has 5 percent municipal conservation but does not include a regional treatment plant. Alternatives D5, D6, and D7 include 20 percent municipal conservation in the Mojave River Basin. Alternative D5 includes a smaller 26,000 afy regional treatment plant. Alternative D7 is the only new alternative with a large Rock Springs release.

After presentation of the results of these alternatives at the TAC meeting, it was decided to create two final alternatives that would be revisions of the D5 and D6 alternatives. D5r is similar to D5 except that it includes only 10 percent municipal conservation in the Mojave River Basin and the size of the Regional Treatment Plant has been reduced to 12,000 acre-feet/year capacity. D6r is similar to D6 except that the amount of municipal conservation is reduced to 10 percent. The following sections briefly describe each alternative's performance under different performance measures.

Demands Met

Table 6-3 shows the demands met under each revised and final alternative. Alternative C0 meets only 40 percent and Alternative D0 meets only 47 percent of the total MWA demand. In each of these No Action Alternatives, Alto, Baja, and Oeste have 50 percent or less of their demands met. The results of Alternative C3 demonstrate that it is not possible to meet 2020 demand levels (Agricultural Scenario 1) while keeping free production allowance at 80 percent ramp-down levels. In this alternative, only 85 percent of total MWA demands are met, and significant overdraft of the Baja subarea occurs.

Alternatives D2, D3, D5, D5r, D6, D6r, and D7 all meet at least 95 percent of total MWA demand. However, Alternative D2 has significant shortages in Baja and Oeste due to the lack of flexibility offered by the inclusion of a large treatment plant in Alto. With 20 percent municipal conservation, Alternatives D5, D6, and D7 are able to meet very close to 100 percent of total MWA demand. At the intermediate level of 10 percent municipal conservation, Alternatives D5r and D6r are each able to meet at least 98 percent of total MWA demand, with no significant shortage in any subarea.

All "Action" Alternatives meet significantly more demand than do the "non-Action" Alternatives (C0 and D0). Alternative C3 supplies the most total demand because it is not constrained to achieve balance in the groundwater aquifers. Alternatives D2 and D3 meet more total demand than the other 'D' alternatives because they include less municipal conservation, while Alternatives D5, D6, and D7 meet the least demand of all the "Action" Alternatives because they include the greatest municipal conservation.

Summary

Alternatives D5r and D6r were identified as the recommended alternatives to be included in the 2004 RWMP. The two alternatives are essentially identical except that Alternative D5r would include a 12,000 Afy regional surface water treatment plant in the Alto subarea. These alternatives have many common features, including:

- 10 percent Municipal conservation in the Mojave River Basin, 5 percent in the Morongo Basin/Johnson Valley area
- Agricultural Scenario 2
- Reclamation of VVWRA discharge above 9,700 acre-feet/year
- Recharge of SWP water into the Alto Mid-Regional, East Regional, and Floodplain aquifers, and into the Baja Regional, Este Regional, Oeste Regional, Warren Valley, Copper Mountain Valley, and Means/Ames Valley aquifers
- Baja and Cushenberry Canyon stormflow retention or equivalent pond recharge projects
- Water supply augmentation for Hinkley and Pioneertown
- Alto wellhead treatment

The two recommended alternatives provide the following benefits:

- 99 percent of total MWA demand is met with no significant shortage in any subarea or demand sector
- Include an attainable level of 10 percent municipal conservation
- Provide water quality improvements over existing conditions
- All groundwater aquifer units are in balance
- Each alternative provides benefits to all subareas without negatively impacting other areas

ABILITY TO MEET PROJECT OBJECTIVES

The following sections summarize the results of the groundwater modeling effort conducted for each of the final alternatives.

Groundwater Storage

Table 6-4 shows the average annual change in groundwater storage in each subarea under each alternative. The Centro subarea shows a surplus in all alternatives. In Alternative C3 there is a significant reduction in groundwater storage in Baja because there is not enough supply available to meet the agricultural production at 80 percent ramp-down levels. Alternative D7 includes a large Rock Springs release, which is not effective in overcoming deficits in the Alto Regional aquifer and causes greater surpluses in Centro and Baja due to increased Mojave River flow downstream.

TABLE 6-4
AVERAGE ANNUAL CHANGE IN GROUNDWATER STORAGE

	Average Annual Change in Groundwater Storage (acre-feet per year)							Rank
	Morongo	Este	Oeste	Alto	Centro	Baja	Total	
No-Action Alternative C0	0	0	0	0	7,200	0	7,200	7
No-Action Alternative D0	0	100	0	0	6,600	0	6,700	9
C3	0	0	400	2,500	5,800	(10,900)	(2,200)	10
D2	0	100	500	1,100	5,400	(300)	6,800	8
D3	0	0	500	1,500	5,400	100	7,500	6
D5	1,000	600	500	2,600	10,000	1,100	15,800	1
D5r	1,000	100	500	1,300	7,400	200	10,500	3
D6	1,000	200	600	2,400	8,600	700	13,500	2
D6r	1,000	0	500	500	6,700	100	8,800	5
D7	1,000	(200)	400	(10,900)	12,800	6,400	9,500	4

Alternatives D5 and D6 perform the best under this measure, with total net increases of 15,800 and 13,500 afy, respectively and no deficits in any subarea. This occurs because the high 20 percent municipal conservation reduces the consumptive demand for SWP supply.

Groundwater Levels

For C and D alternatives, recharge projects were identified in locations that would achieve relative balance in all subareas in the aquifer. This has been achieved in all alternatives except for Alternatives C3, D2 and D7.

In Alternative C3, the floodplain and regional aquifers in Baja are significantly depleted because agricultural production is allowed to remain at levels that cannot be supported by the available supply. **Figure 6-1** shows modeled groundwater levels in the Baja Regional aquifer under each alternative assuming the historic record of inflow from 1930 to 2000 as a baseline. In Alternative C3, the groundwater elevations drop 24 feet, compared to 8 feet or less in each of the other alternatives.

In Alternative D2, there is not enough flexibility to balance all of the aquifers because such a large portion of the SWP supply is allocated to an Alto Treatment Plant. **Figure 6-2** shows the groundwater levels in the Alto Floodplain Aquifer under each alternative. The groundwater levels in Alternative D2 drop 18 feet over the course of the model period compared to a decline of less than 8 feet for every alternative other than D7.

In Alternative D7, the Alto West Regional, Mid-Regional, East Regional, and Floodplain aquifers are significantly depleted. This occurs because of the heavy reliance in this alternative on a Rock Springs release into the Mojave River to meet Alto's supply needs. In Alternative D7, the Alto Floodplain aquifer drops 47 feet in elevation over the course of the modeled period.

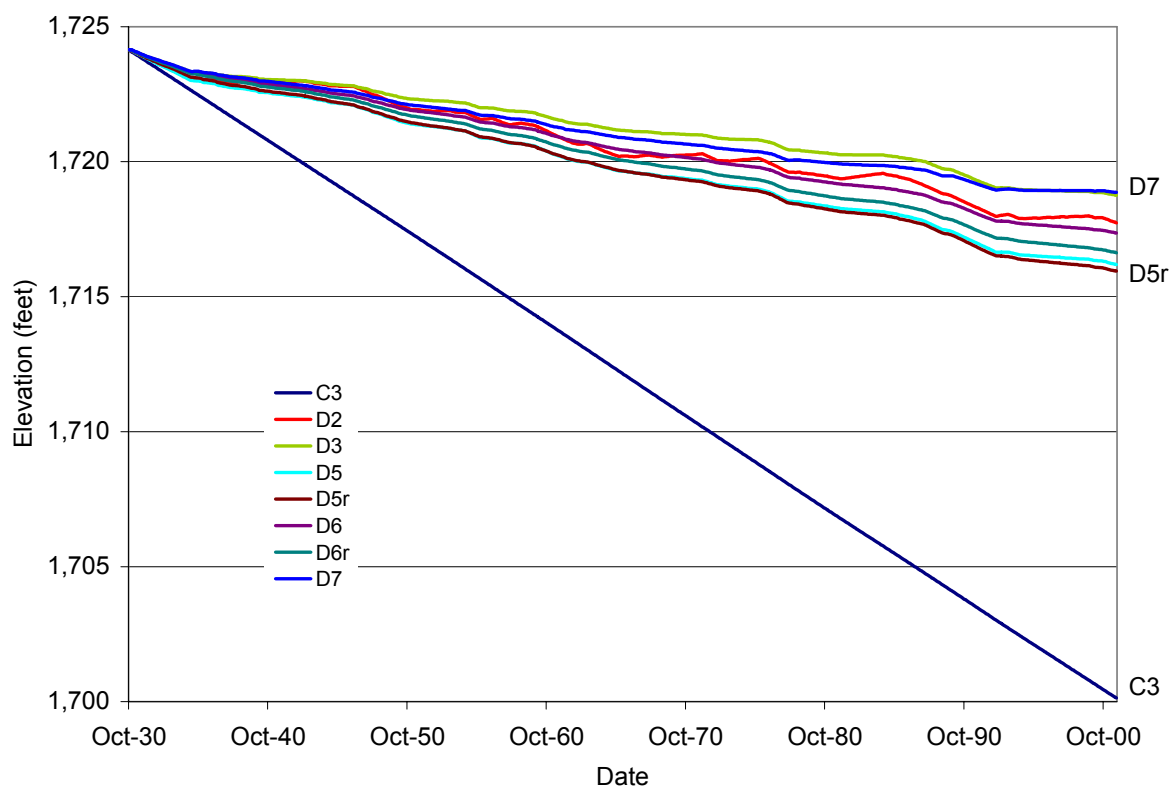


Figure 6-1: Modeled Time Series of Elevations in the Baja Regional Aquifer

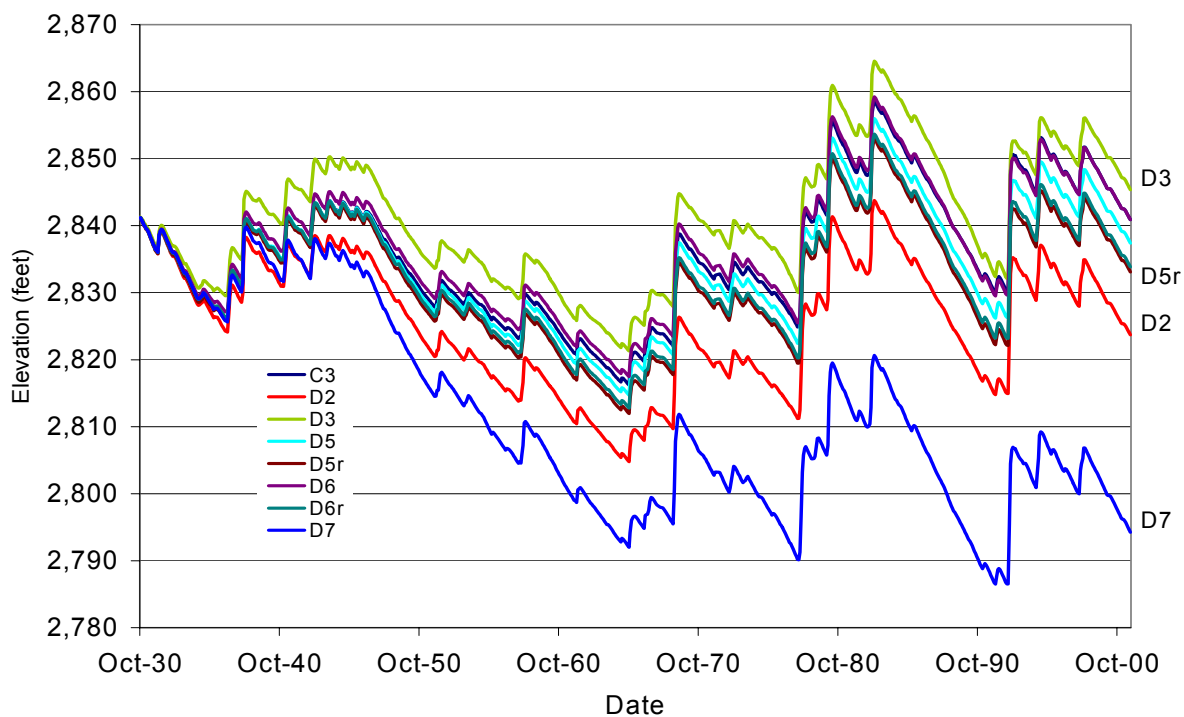


Figure 6-2: Modeled Time Series of Elevations in the Alto Floodplain Aquifer

Subarea Interaction

Subarea interaction is measured by the amount of Mojave River flow and groundwater flow that passes from one subarea to another. **Figure 6-3** shows the average annual Mojave River flows in each alternative. Alternative D7 has significantly higher river flows in all river reaches compared to the other alternatives because a large Rock Springs release has been included in the alternative. Several thousand acre-feet of additional outflow from the basin through Afton Canyon would occur annually due to this operation. All of the other alternatives have similar magnitude Mojave River flows on average.

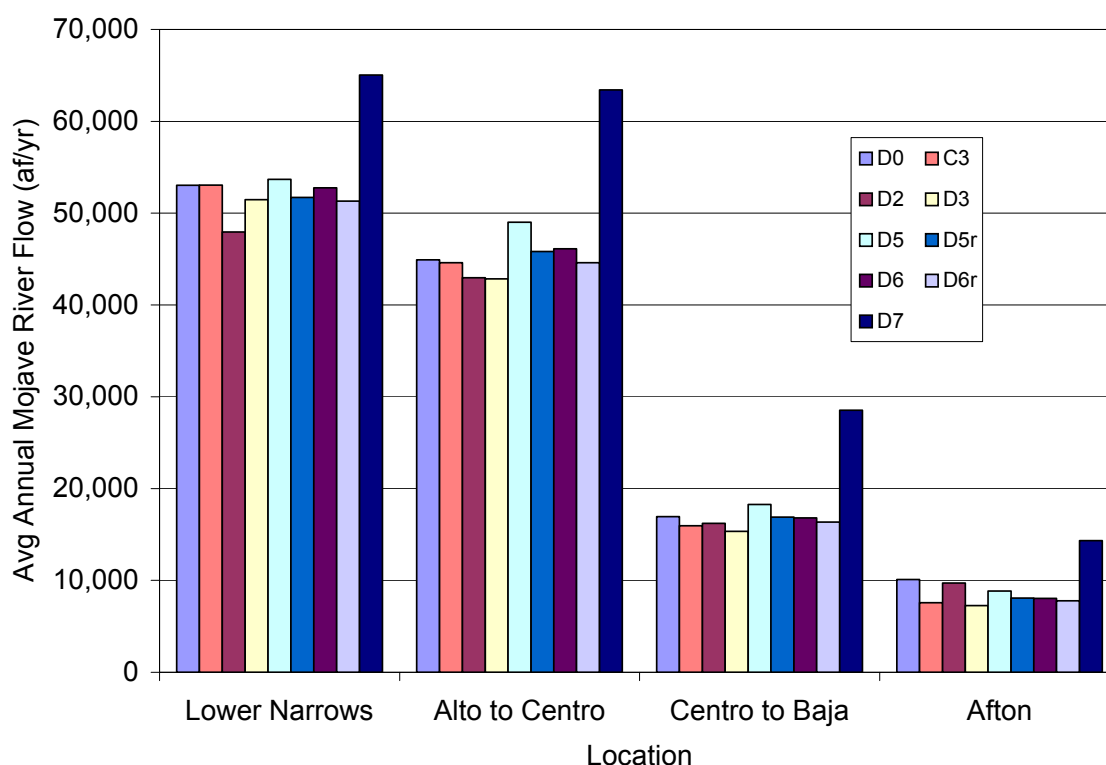


Figure 6-3: Average Annual Mojave River Flows

Figure 6-4 shows the average annual groundwater flows between subareas in each alternative. In Alternative D7 there is additional groundwater flow from Este and Oeste into Alto because the Alto regional aquifer has been depleted due to insufficient SWP recharge. Alternative C3 has the highest groundwater flows from Centro to Baja because Baja's aquifers are depleted. The other alternatives have similar magnitude groundwater flows.

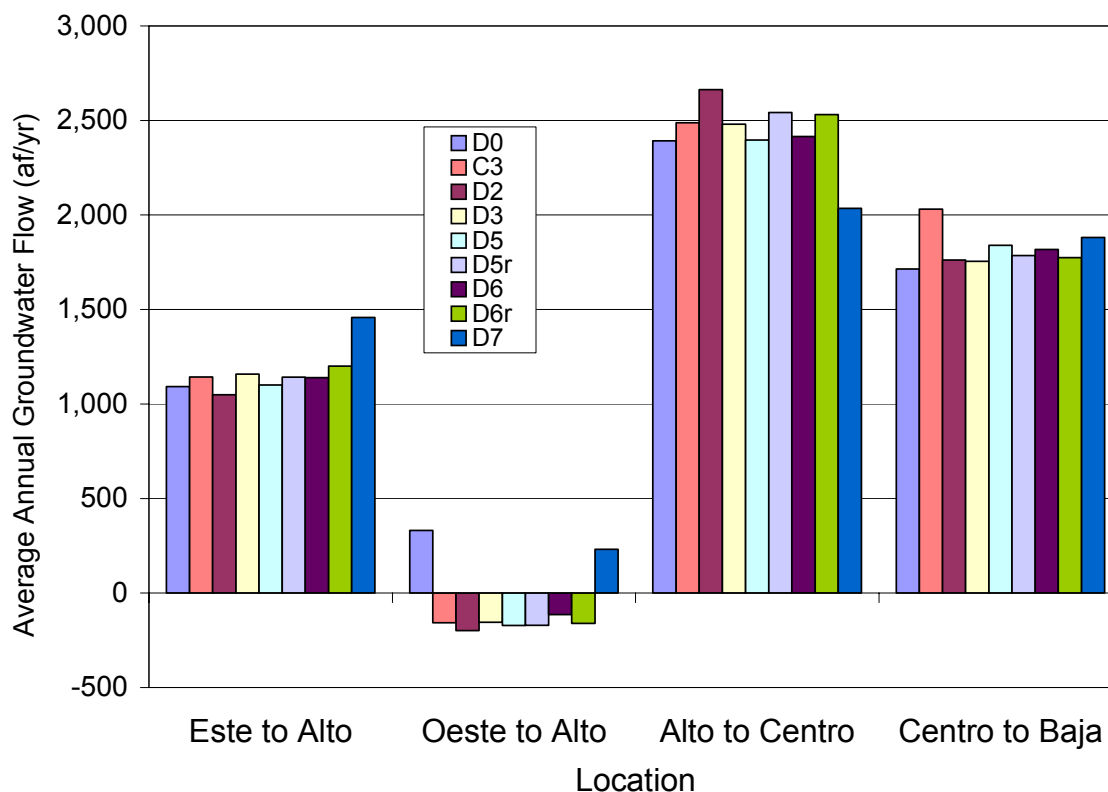


Figure 6-4: Average Annual Groundwater Flows

SUMMARY OF ENVIRONMENTAL IMPACTS OF 2004 RWMP ALTERNATIVE VARIATIONS

Operational Impacts

Operational impacts include effects to the groundwater basin resulting from implementation of the 2004 RWMP alternative variations. As discussed above, Alternatives D5 and D6 would result in the greatest volume of storage in the groundwater basins. The groundwater basins would achieve relative balance in all subareas in the aquifer except under Alternatives C3, D2 and D7.

Facility Siting and Construction Impacts

Environmental impacts for facility siting and construction would be similar under each of the final alternatives (Alternatives C3, D2, D3, D5, D5r, D6, D6r, and D7). Each of these alternatives assumes that individual projects would be constructed throughout the region to achieve groundwater balance. Some alternatives (Alternatives D2, D5, and D5r) would include constructing treatment plants that would be larger scale projects. Alternative D7 would include constructing fewer recharge basins. Facilities may be implemented by MWA or by other local jurisdictions. The precise locations for proposed facilities remains flexible.

Secondary Effects of Growth

Since the alternatives evaluated would accommodate most of the projected demand in the region, they would support growth in the region similar to the recommended project. As such, secondary effects of growth would be similarly significant and unavoidable.

INCREASED CONSERVATION (>10 PERCENT)

The 2004 RWMP (Alternatives D5r and D6r) assumes that a goal of at least 10 percent conservation of consumptive demand in the Mojave River Basin and 5 percent in the Morongo Basin would be achieved by 2020. Other Alternatives evaluated in the preliminary alternatives screening process (Alternatives D5, D6, and D7) assume that a more aggressive 20 percent could be achieved by 2020.

Although the 2004 RWMP does not limit the amount of conservation possible, the more conservative 10 percent is assumed to provide a reasonably achievable goal. Additional conservation beyond 10 percent is encouraged through the 2004 RWMP's Management Actions. MWA is now involved with the AWAC. AWAC was formed in August 2003 and is composed of 24 local cities, resource agencies, water suppliers, and institutions. AWAC's goals are to educate local communities, provide tools to reduce per capita consumption, and ultimately to reduce regional water consumption by 10 percent per capita by 2010 and 15 percent by 2015. AWAC serves as a clearinghouse for assessing the effectiveness of on-going water conservation measures.

NO PROJECT ALTERNATIVE

The No Project Alternative assumes implementation of the 1994 RWMP without update. MWA would continue to operate the existing recharge and distribution facilities and would implement the additional recharge and monitoring facilities that were proposed in the 1994 RWMP but have not yet been constructed. These include recharge facilities in the Alto, Este, and Centro subareas. The No Project Alternative assumes that the Judgment would be fully implemented resulting in free production allowance ramp-downs of five percent annually until supply and annual balance are archived.

The components of the 1994 RWMP include the following:

- Diversions from the SWP
- Water transfers and exchanges
- Groundwater recharge in the Mojave River channel without improvements
- Water conservation
- Groundwater recharge in the Alto subarea
- Groundwater recharge in the Este subarea
- Groundwater recharge at Dry Lakebeds
- Morongo Basin pipeline extension and recharge facilities

- Mojave River pipeline and adjacent recharge basins in Centro and Baja subareas
- El Mirage aqueduct and recharge basins in the Oeste subarea.

The 1994 RWMP was divided into three phases of implementation for structural improvements and administrative actions. Phase 1 projects were proposed for development over the ensuing five years. Phase 2 projects were anticipated during the following 5 to 10 years, as financing would allow. Phase 3 projects were considered long-term goals scheduled for completion by the year 2015. Several components of the 1994 RWMP have not yet been implemented. **Table 6-5** summarizes the status of structural and administrative goals of the 1994 RWMP. The No Project Alternative assumes that the incomplete projects would be completed.

ABILITY TO MEET PROJECT OBJECTIVES

Implementation of the No Project Alternative would partially meet project objectives with facilities identified in the 1994 RWMP. The 1994 RWMP would help reduce overdraft and meet future demands but would not balance supply and demand on a subarea basis or for smaller aquifer units.

SUMMARY OF ENVIRONMENTAL IMPACTS OF NO PROJECT ALTERNATIVE

Operational Impacts

Operational impacts include effects to the groundwater basin resulting from implementation of the RWMP. The 1994 RWMP EIR notes that the RWMP would assist in recharging SWP water to meet regional demand. Groundwater levels would not necessarily be affected since the additional water supplied to the groundwater basins would be replacement water replenishing the difference between overlying producers' free production allowance and actual extraction amounts. However, the 2004 RWMP provides a refined analysis of recharge requirements to meet demand equitably throughout the MWA service area. The 2004 RWMP proposes numerous projects and management actions to convey recharge water where it is needed and to monitor the groundwater basins. Although the No Project Alternative would assist in maintaining a regional water balance, the more refined 2004 RWMP management actions and recharge projects would provide greater assurance that impacts to groundwater resources would be minimized, while meeting regional demand equitably.

The 1994 RWMP EIR identified a mitigation measure committing MWA to monitor groundwater to assess affects of recharge water on groundwater quality and modify treatment of extracted water to meet drinking water standards as necessary.

Facility Siting and Construction Impacts

Environmental impacts for facility siting and construction of facilities would be cumulatively less under the No Project Alternative since fewer projects would be constructed. However, each

**TABLE 6-5
STATUS OF 1994 RWMP COMPONENTS**

Phase 1 (Structural)	Status
Drilling wells for monitoring program	Status: incomplete; more wells are needed away from Mojave River and deeper beneath the River and within the TZ
Rock Springs recharge facility & turnout	Status: completed
Increase recharge of natural supplies	Status: no action
Groundwater recharge in the Centro and Baja subareas from Mojave River Pipeline	Status: Centro has two recharge basins (Hodge & Lenwood) and has one at Daggett and Baja is underway with construction of pipeline to second at Newberry Springs
Groundwater recharge in Este (Lucerne) from Morongo Basin Pipeline	Status: incomplete; no recharge, purchased land in Lucerne Valley, prepared preliminary design and performed environmental review
Groundwater recharge in Oeste (El Mirage)	Status: no action, except for USGS feasibility of recharge in Sheep Creek
Recharge in Morongo Basin with Morongo Basin Pipeline Extension	Status: recharge taking place in Warren Valley Basin at 2 sites, a third is under development
Phase 1 (Non-structural)	
Release to Mojave River from Lake Silverwood	Status: releases generally discontinued since the completion of the Rock Springs Turnout, used during demonstration project with MWD
Water monitoring programs	Status: completed, but expanding
Purchase of State Water Project (SWP) Water	Status: ongoing; however not all available water has been purchased due to financial constraints
Legislative changes to MWA Act	Status: Act amended to allow MWA to implement well programs in furtherance of the Judgment
Water Quality Protection Programs	Status: water quality monitoring for recharge programs at Rock Springs Outlet, Hodge, Lenwood and Warren Basin; MWA wells used to support water quality monitoring for Mojave Watershed program with State Board.
Water conservation program to reduce consumptive use	Status: ongoing through education programs and demonstration gardens and AWAC
Investigation of Additional Water Importation Projects	Status: ongoing; purchased 25,000 acre-feet/yr of SWP Table A from Berrenda-Mesa Water District; executed water exchange agreement with Solano County Water Agency; recharge pilot program with MWDSC
Zones of Benefit to collect benefit assessments	Status: no action
Improvement districts to finance facilities	Status: no action
Phase 2 (Structural)	
Groundwater extraction & delivery to Mojave River Pipeline	Status: no action
Phase 2 (Non-Structural)	
Zones of Benefit to collect benefit assessments	Status: no action
Improvement districts to finance facilities	Status: no action
Contracts with purveyors	Status: ongoing
Phase 3 (Structural)	
Delivery of imported water and groundwater to water users	Status: Ordinance 9 water sale approved for City of Victorville from Mojave River Pipeline, ongoing deliveries to Hi-Desert Water District, Makeup and Replacement Water deliveries under the Judgment
Meeting peaking requirements and constructing water treatment facilities	Status: no action
Phase 3 (Non-Structural)	
Contracts with purveyors	Status: ongoing
Water allocation policies	Status: hierarchy of water delivery priorities during shortages identified through Ordinance 9; implementation if the MBA Judgment: ongoing

individual project would potentially result in impacts similar to those described in the 2004 RWMP.

Secondary Effects of Growth

Since the No Project Alternative would accommodate most of the projected demand in the region, it would support growth in the region similar to the recommended project. As such, secondary effects of growth would be similarly significant and unavoidable.

NO ACTION ALTERNATIVES

Although CEQA does not require analysis of a “no action,” “do nothing” scenario, MWA evaluated a potential future water balance in the region under a No Action scenario. Two versions of the No Action scenario were modeled using the Stella groundwater model: one version assumed that the Judgment would be fully implemented and one assumed that the Judgment would be only partially implemented. The modeling results concluded that the Alto and Baja subareas and the Means/Ames subbasin would remain in deficit under the No Action Alternative assuming full implementation of the Judgment. Under the Partial Judgment scenario, the Este and Oeste subareas would also be in deficit in 2020. Under the No Action Full Judgment scenario only 48 percent of the projected demand in the region would be met. The No Action Partial Judgment scenario would meet much of the demand but would result in overdraft conditions. The results of groundwater modeling for hypothetical No Action scenarios highlight the need for implementing the RWMP.

FACILITY ALTERNATIVES

SURFACE STORAGE PROJECT

The 2004 RWMP does not recommend any surface storage reservoir projects. Surface storage reservoirs could provide additional storage in areas where groundwater basins either do not have adequate storage capacity, or are constrained by water quality concerns. Then 2004 RWMP determined that these potential problems with conjunctive use could be resolved through regional water storage without requiring construction of expensive surface reservoirs. MWA considered surface reservoirs to be less desirable than groundwater conjunctive use for the following reasons:

- **Land Requirements.** A new surface reservoir would require substantially more land than a recharge basin. Acquiring the necessary land would likely result in conversion of multiple land uses. The chosen location would be constrained by suitable topography and underlying geology.
- **Environmental Impacts.** Construction of surface water reservoirs results in significant environmental impacts to local biological resources, significantly alters local drainage, and typically requires a significant construction effort resulting in air emissions, noise, and construction traffic. In addition, dam safety continues to be an important consideration when locating reservoirs up-stream of sensitive land uses (residential and agricultural).

- **Water Quality.** Providing open air reservoirs poses water quality concerns. Reservoirs may need a circulation system depending on the turnover period. A surface treatment plant would be required.
- **Evaporation.** The evaporation rates in the Mojave Desert present considerable constraint to the use of surface storage reservoirs. Large quantities of water delivered from Northern California via the California Aqueduct would be lost to evaporation unnecessarily. Conjunctive use mitigates this significant flaw.
- **Limited Storage Capacity.** Surface storage reservoirs have limited capacity. The groundwater basins underlying the MWA service area have considerable storage capacities. Areas with limited underground capacity could benefit from the use of regional capacity through cooperative planning provided by the 2004 RWMP to ensure adequate supply without the need for surface reservoirs.
- **Lack of Suitable Locations.** Suitable locations for surface reservoirs in the MWA service area are limited due to the underlying geologic conditions. No suitable sites have been identified or are under investigation. Substantial geological investigations would be required to ensure the integrity of the reservoir.
- **Costs.** Construction of surface reservoirs would be substantially more costly than groundwater recharge projects providing the similar water storage benefit.

Although surface reservoir projects could be developed by local jurisdictions in the future for local supplies, for the reasons summarized above, no surface reservoir projects are under consideration for development in the 2004 RWMP.

TREATMENT PLANT IN MORONGO BASIN

The 2004 RWMP Alternatives D2, D5, and D5r include the construction of a surface water treatment plant. This treatment plant would be located in the Alto subarea. The 2004 RWMP provides no provisions for constructing a surface water treatment plant in the Morongo Basin. The 2004 RWMP provides for wellhead treatment to be installed near individual wells to address localized water quality issues. The groundwater basins in the Morongo Basin area have suitable capacity to accommodate projected demand under the recommended project alternatives. No need for an additional treatment plant was identified in this area.

FACILITY SITING OPTIONS

The 2004 RWMP identifies projects that could meet the overall program objectives of providing water supplies to meet projected demand in each subarea. Most of the projects have been developed on a conceptual level by local jurisdictions or by MWA, and some projects are more fully developed than others. The list of projects is not exclusive, but represents a possible means of achieving the overall objectives. In the future, additional projects may be added as monitoring information is compiled. Since some of the projects have similar goals, redundant projects could be removed from the list as more information is compiled. In addition, as siting studies are conducted for each project, precise project locations will change depending on local constraints.

In summary, there remains a great deal of uncertainty as to which projects will be implemented and where exactly they will be located. This 2004 RWMP EIR provides a program-level assessment of a wide array of potential projects located generally within subareas. Subsequent project-level analysis is required prior to constructing each project. As impacts are identified for each project in subsequent CEQA analysis, project location alternatives will be evaluated to avoid or lessen potential impacts.

Priority Projects

The 2004 RWMP prioritizes projects that are necessary in the short-term using the following criteria:

- Whether it is an existing project or is already being pursued by MWA or other entities
- The level of current overdraft that the project attempts to mitigate
- Expected growth in the subarea where the project will be applied

The projects that have the highest priority include implementing 10 percent municipal conservation, VVWRA wastewater reclamation, Alto wellhead treatment, a new water supply for Pioneertown, and the recharge of SWP water into the Warren Valley and into the Floodplain, West Regional, and Mid-Regional aquifers in Alto recharge in Baja at Newberry Springs. Municipal conservation is considered to have the highest priority because measures will need to be initiated immediately in order to achieve 10 percent conservation by 2020. Recharge of SWP water into the Alto Flood (land purchased, pipeline basin designed) plain, West Regional, and Mid-Regional aquifers will require feasibility studies to determine the optimal locations for building the necessary recharge facilities. Many such projects have been proposed, including projects at Oro Grande Wash, Antelope Valley, and Cedar Street in the West and Mid-Regional aquifers, and an Upper Mojave Wellfield Distribution System utilizing Rock Springs or Hesperia Lakes or other additional recharge facilities South of Rock Springs in the Floodplain aquifer.

6.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires that an EIR identify the environmentally superior alternative of a project. The recommended 2004 RWMP (D5r and D6r) would constitute the environmentally superior project since it would avoid localized groundwater overdraft conditions for each subarea throughout the MWA service area, while providing for continued regional management and oversight of the groundwater resource.

The No Project Alternative would avoid the significant impacts to air quality from construction and the cumulatively significant impacts to air quality and biological resources. Significant and unavoidable impacts associated with the secondary effects of growth would likely result under any of the proposed alternatives, including the No Project Alternative. Full implementation of the Judgment would require that groundwater overdraft conditions were alleviated. As a result, the No Project Alternative would be required to maintain regional water balance. However,

groundwater modeling results indicate that certain subareas within the service area could experience localized overdraft under the No Project Alternative.

CHAPTER 7

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CHAPTER 8

LIST OF ACRONYMS AND ABBREVIATIONS

AB	California Assembly Bill
ADT	Average Daily Traffic
afy	Acre-feet per Year
amsl	Above Mean Sea Level
APE	Area of Potential Effects
AQMP	Air Quality Management Plan
asl	Above Sea Level
AVAQMD	Antelope Valley Air Quality Management District
AVEK	Antelope Valley-East Kern Water Agency
AWAC	Alliance for Water Awareness and Conservation
bgs	Below Ground Surface
BHDVWA	Big Horn-Desert View Water Agency
BLM	Bureau of Land Management
BMPs	Best Management Practices
BMWD	Baldy Mesa Water District
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCR	California Code of Regulations
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

CFR	Code of Federal Regulations
CGS	California Geological Survey
CHP	California Highway Patrol
CIWMB	California Integrated Waste Management Board
CMP	Congestion Management Plan
CNDDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	Carbon Monoxide
Conservation Plan	Habitat Water Supply Management Plan, CDFG, 2004
Corps	United States Army Corps of Engineers
County	San Bernardino County
CSLC	California State Lands Commission
CSWQA	California Storm Water Quality Association
CUP	Conditional Use Permit
CUWCC	California Urban Water Conservation Council
CWA	Clean Water Act
dB	Decibel
dBA	A weighted decibels; an unit of measure used with a frequency weighting method designated to simulate the response of the human ear to various frequencies of sound
DCP	Dust Control Plan
DHS	California Department of Health Services
DNL	Day-night Average Noise Level
DOC	Dissolved Organic Carbon
DOT	Department of Transportation
DSOD	Division of Safety of Dams
DTSC	Department of Toxic Substances Control

DWR	California Department of Water Resources
ECSZ	Eastern California Shear Zone
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
FPA	Free Production Allowance
gpd	Gallons per Day
GPU	General Plan Update
HCP	Habitat Conservation Plan
HDWD	Hi-Desert Water District
HWCL	Hazardous Waste Control Law
I40	Interstate 40
I5	Interstate 5
ICBO	International Conference of Building Officials
ICC	International Code Council
IRP	Integrated Resources Plan
JBWD	Joshua Basin Water District
Kafy	Thousands Acre-feet per Year
kV	Kilovolt
lbs	Pounds
LEAs	Local Enforcement Agencies
L_{eq}	Energy equivalent noise level (or average noise level), is the equivalent steadystate continuous noise level which, in a stated period of time, contains the same acoustic energy as the time varying sound level that actually occurs during the same period.
L_{max}	Instantaneous maximum noise level for specified time period.

LOS	Level of Service
LTS	Less than Significant
LTSM	Less than significant with Mitigation
MBTA	Morongo Basin Transit Authority
MDAQMD	Mojave Desert Air Quality Management District
MDRCD	Mojave Desert Resource Conservation District
mg/l	Milligrams per Liter
mgd	Million Gallons per Day
MGS	Mohave Ground Squirrel
MMI	Modified Mercalli Intensity
MOU	Memorandum of Understanding
MRF	Materials Recovery Facility
MWA	Mojave Water Agency
MWD	Metropolitan Water District of Southern California
MWDSC	Metropolitan Water District of Southern California
MWMA	Mojave Weed Management Area
MYA	Million Years Ago
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOP	Notice of Preparation
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	United States Department of Agriculture Natural Resources Conservation Service
NRHP	National Register of Historic Places

O₃	Ozone
ORV	Off road Vehicle
PCBs	Polychlorinated Biphenols
PEIR	Program Environmental Impact Report
Plan	Regional Water Management Plan
PM₁₀	Particulate Matter less than 10 Microns in Diameter
ppb	Parts per Billion
ppm	Parts per Million
RCPG	Regional Comprehensive Plan and Guide
RCRA	Resource Conservation and Recovery Act
RFPA	Regional Fire Protection Authority
ROG	Reactive Organic Gases
RTP	Regional Transportation Program
RUWMP	Regional Urban Water Management Plan
RWMP	Regional Water Management Plan
RWQCB	Regional Water Quality Control Board
SANBAG	San Bernardino Associated Government
SANDAG	San Diego Association of Governments
SARA	Superfund Amendment Reauthorization Act
SBCFCD	San Bernardino County Flood Control District
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCWA	Solano County Water Agency
SCWC	Southern California Water Company
SHPO	State Historic Preservation Office
SIPs	State Implementation Plans
SO₂	Sulfur Dioxide

SRL	State Registered Landmark
SU	Significant Unavoidable
SWFPs	Solid Waste Facility Permits
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
THM	Trihalomethane
TMDLs	Total Maximum Daily Loads
TPH	Total Petroleum Hydrocarbons
UBC	Uniform Building Code
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USTs	Underground Storage Tanks
VOCs	Volatile Organic Compounds
VVTA	Victor Valley Transit Authority
VVWD	Victor Valley Water District
VVWRA	Victor Valley Wastewater Reclamation Authority
WDRs	Water Discharge Requirements
Williamson Act	California Land Conservation Act of 1965
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

CHAPTER 9

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