3.7 Hydrology and Water Quality

3.7.1 Setting

The Antelope Valley region is a closed topographic basin with no outlet to the ocean. All water that enters the region either infiltrates into the groundwater basin, evaporates, or flows toward the three dry lakes located on Edwards Air Force Base (EAFB); Rosamond Lake, Buckhorn Lake, and Rogers Lake. In general, groundwater flows northeasterly from the mountain ranges to the dry lakes. Due to the relatively impervious nature of the dry lake soil and high evaporation rates, water that collects on the dry lakes eventually evaporates rather than infiltrating into the groundwater (LACSD, 2005).

Surface Water

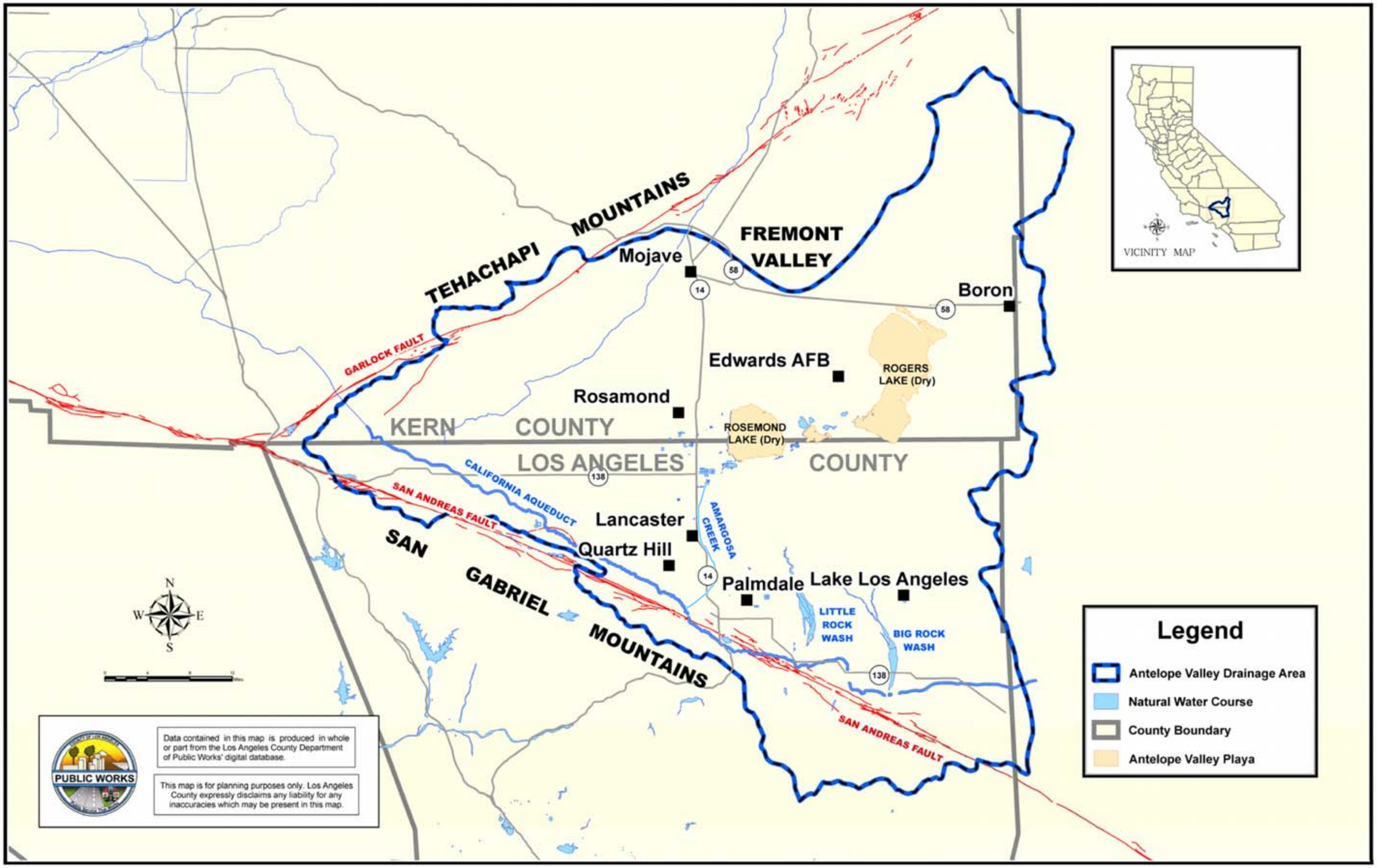
Surface water flows are carried by ephemeral streams. The most significant streams begin in the San Gabriel Mountains on the southwestern edge of the region and include, from east to west, Big Rock Creek, Little Rock Creek and Amargosa Creek, and Oak Creek from the Tehachapi Mountains. Amargosa Creek runs in a south/north direction between State Route 14 and Sierra Highway. **Figure 3.7-1** identifies significant surface water resources in the Antelope Valley.

Little Rock Reservoir

Little Rock Creek is the only developed surface water supply for the region. The Little Rock Reservoir, jointly owned by Palmdale Water District (PWD) and Littlerock Creek Irrigation District (LCID), collects runoff from the San Gabriel Mountains. The reservoir currently has a useable storage capacity of 3,500 af of water (PWD, 2001). Historically, water stored in the Little Rock Reservoir has been used directly for agricultural uses within LCID's service area and for municipal and industrial (M&I) uses within PWD's service area following treatment at PWD's water purification plant.

Dry Lakes and Percolation

Surface water from the surrounding hills and from the region floor flows primarily toward the three dry lakes on EAFB. Except during the largest rainfall events of a season, surface water flows toward the region from the surrounding mountains, quickly percolates into the stream bed, and recharges the groundwater basin. Surface water flows that reach the dry lakes are generally lost to evaporation. It appears that little percolation occurs in the region other than near the base of the surrounding mountains due to impermeable layers of clay overlying the groundwater basin. The United States Geological Survey (USGS) estimates that of the 1.5 million af of precipitation in the Antelope-Fremont Valley each year, approximately 76,000 af percolate to the groundwater reservoirs, while the remaining is lost to evaporation (USGS, 1987).



SOURCE: Los Angeles County Department of Public Works

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Figure 3.7-1
Antelope Valley Surface Waters

Groundwater

The Antelope Valley Groundwater Basin is comprised of two primary aquifers: (1) the upper (principal) aquifer, and (2) the lower (deep) aquifer. The principal aquifer is an unconfined aquifer that historically provided artesian flows due to perched water tables in some areas. These artesian conditions are currently absent due to extensive pumping of groundwater. Separated from the principal aquifer by clay layers, the deep aquifer is generally considered to be confined. In general, the principal aquifer is thickest in the southern portion of the region near the San Gabriel Mountains, while the deep aquifer is thickest in the vicinity of the dry lakes on EAFB. Figure 3.5-5 provides a schematic of the groundwater basin.

Groundwater has been, and continues to be, an important resource within the region. Prior to 1972, groundwater provided more than 90 percent of the total water supply; since 1972, it has provided between 50 and 90 percent (USGS, 2003). Groundwater pumping in the region peaked in the 1950s (USGS, 2000a), and it decreased in the 1960s and 1970s when agricultural pumping declined due to increased pumping costs from greater pumping lifts and higher electric power costs (USGS, 2000a). The rapid increase in urban growth in the 1980s resulted in an increase in the demand for M&I water and an increase in groundwater use. Projected urban growth and limits on the available local and imported water supply are likely to continue to increase the reliance on groundwater.

Groundwater Subunits

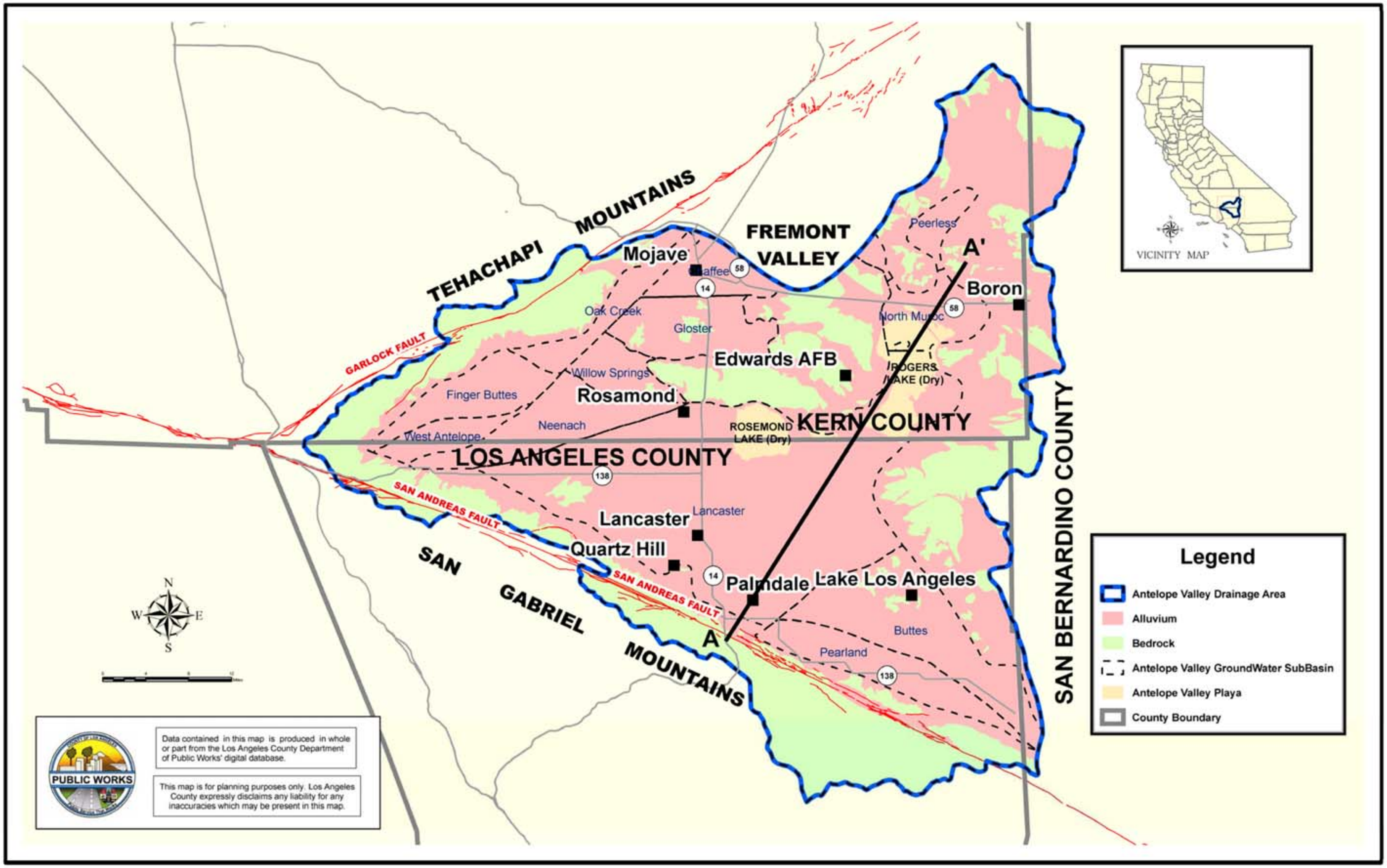
The complex Antelope Valley Groundwater Basin is divided by the USGS into twelve subunits.[1] Groundwater basins are generally divided based upon differential groundflow patterns, recharge characteristics, and geographic location, as well as controlling geologic structures. The Antelope Valley Groundwater Basin's subunits are: Finger Buttes, West Antelope, Neenach, Willow Springs, Gloster, Chaffee, Oak Creek, Pearland, Buttes, Lancaster, North Muroc, and Peerless. **Figure 3.7-2** shows the locations of these basins. According to the USGS, groundwater levels in these subunits have improved in some areas due to the import of State Water Project (SWP) water to the region, and declined in others due to increased groundwater pumping. Each subunit has varying characteristics, and the current conditions in each subunit are briefly summarized below (USGS, 1987).

Subunit Characteristics, listed generally from north to south and west to east (USGS, 1987):

> **Finger Buttes:** A large part of this subunit is in range and forest lands. Flow is generally from southwest to southeast. Depth to water varies, but is commonly more than 300 feet.

> **West Antelope:** Groundwater flows southeasterly to become outflow into the Neenach subunit. Depth to water ranges from 250 to 300 feet.

1 The Antelope Valley Groundwater Basin is currently undergoing an adjudication process. As part of information being complied during the adjudication, the Basin may be divided into different subunits and potentially subbasins in the future.



SOURCE: Los Angeles County Department of Public Works

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Figure 3.7-2
Antelope Valley Groundwater Sub-Basins

Neenach: Groundwater flow is mainly eastward into the principal and deep aquifers of the Lancaster subunit. Depth to water ranges from 150 to 350 feet.

Willow Springs: Groundwater flows southeast and ultimately enters the Lancaster subunit. This subunit receives recharge for intermittent surface flows from the surrounding Tehachapi Mountain area. Depth to water ranges from 100 to 300 feet.

Gloster: Groundwater flows to the east and southeast as outflow to the Chaffee subunit. Depth to water levels for the southeast area of the subunit are 50 and 100 feet; other water level data is sparse.

Chaffee: Groundwater moves into this subunit from Cache Creek, adjacent alluvial fans to the west and, in lesser amounts, from the Gloster subunit. Water moves eastward in the western part of the subunit, and northward in the southern part, generally toward the City of Mojave. Water levels range from 50 to 300 feet.

Oak Creek: This unit is recharged by flows from the Tehachapi Mountains. Groundwater flows are generally to the southeast, with some southward flows toward the Koehn Lake area. Data for depth to water is not available.

Pearland: Substantial recharge to this subunit comes from Littlerock and Big Rock Creeks. Groundwater generally moves from southeast to northwest, with outflow to the Lancaster subunit. Water levels range from 100 to 250 feet.

Buttes: Groundwater generally moves from southeast to northwest, with outflow to the Lancaster subunit. Depth to water ranges from 50 to 250 feet.

Lancaster: This is the largest and most economically important subunit, in both size and water use. Due to the use of this subunit, depths to water levels vary widely, being generally greater in the south and west. Pumping depressions can be observed in various locations. There are two major aquifers in the subunit, the principal and deep aquifers, separated by clay layers. As noted above, groundwater moves into the subunit from the Neenach, West Antelope and Finger Buttes subunits. Groundwater also moves into the principal aquifer from the Buttes and Pearland subunits. The Lancaster subunit underlies Lancaster, Palmdale, Quartz Hill, Rosamond, Antelope Acres and other smaller communities.

North Muroc: This unit underlies part of the Rogers Lake and EAFB area. Groundwater moves north and west, then north again and possibly into the Peerless subunit. Data on depth to groundwater is not available.

Peerless: Little information is available on this subunit, which cannot be clearly delineated, but represents the eastern limit of highly developed water-bearing deposits. As of the date of the USGS report, water levels had declined by as much as 150 feet and flow was toward a pumping depression.

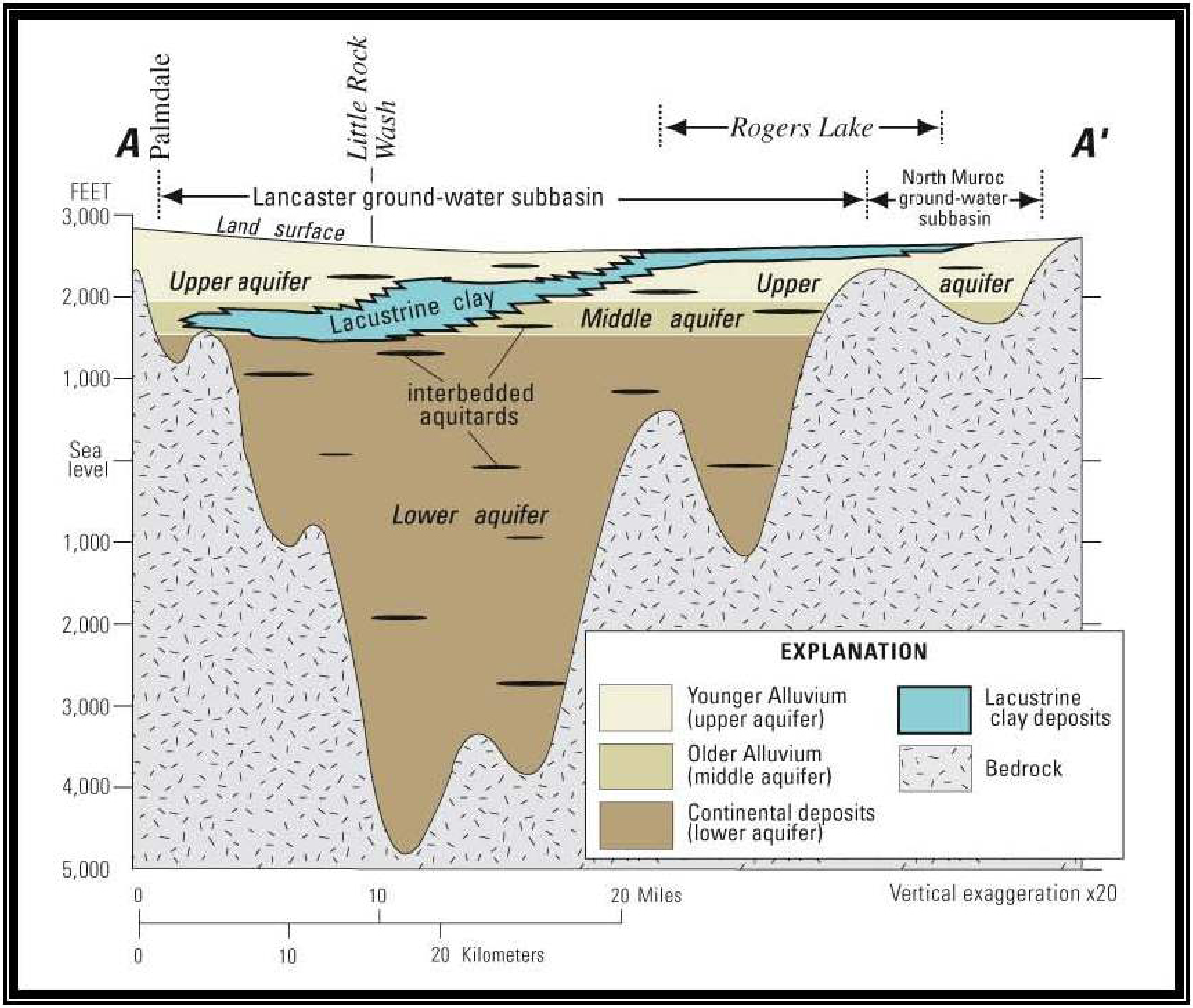
Groundwater Quality

Groundwater quality is excellent within the principal aquifer but degrades toward the northern portion of the dry lake areas. Considered to be generally suitable for domestic, agricultural, and industrial uses, the water in the principal aquifer has a total dissolved solids (TDS) concentration ranging from 200 to 1400 milligrams per liter (mg/L). The deeper aquifers typically have higher TDS levels. Hardness levels range from 50 to 200 mg/L, and high fluoride, boron, and nitrates are problematic in some areas of the basin. Arsenic is an emerging contaminant of concern in the region and has been observed in LACWWD40, PWD, and QHWD wells. Arsenic is a naturally occurring inorganic contaminant often found in groundwater and occasionally in surface water. Anthropogenic sources of arsenic include agricultural, industrial and mining activities. In California, there are 763 sources in 404 water systems in 45 counties that show arsenic levels greater than the new federal drinking water standard of 10 parts per billion (ppb). Arsenic can be toxic in high concentrations and is considered a chronic carcinogen when accounting for lifetime exposures. Research conducted by LACWWD40 and USGS has shown the problem to reside primarily in the deep aquifer, and it is not anticipated that the existing arsenic problem will lead to future loss of groundwater as a water supply resource for the region.

In addition to arsenic issues, there also have been concerns with nitrate levels above current maximum contaminant levels (MCL) of 10 ppm, and high TDS levels in portions of the basin. Groundwater monitoring data from the mid-to-late 1990s indicate nitrate (as N) concentrations periodically exceeding the primary MCL for drinking water of 10 mg/L in two areas in the southern portion of the groundwater basin: one is northeast of the PWRP and the other is near the community of Littlerock slightly east of the upper reach of Littlerock Creek (Geomatrix, 2007). It is estimated both nitrate plumes are similar in size, approximately five to six square miles. Agricultural fertilization practices, septic system disposal, and discharge of treated wastewater have likely contributed to the elevated levels. In the area near the PWRP, actions have already been implemented by LACSD to address the nitrate plume and to minimize any impact from treated wastewater, including treatment upgrades, a change in effluent management practices, the implementation of the proposed project, and performing groundwater remediation activities near the PWRP. In the Littlerock area, Littlerock Creek Irrigation District extracts the nitrate-laden groundwater and blends it with other water sources to meet drinking water quality standards (Geomatrix, 2007). The agricultural facilities that are considered to have contributed to the Littlerock nitrate plume are no longer active.

Groundwater Storage Capacity and Recharge

The total storage capacity of the Antelope Valley Groundwater Basin has been reported at 68 million acre-feet (MAF) (Planert and Williams (1995) as cited in DWR (2004)) to 70 MAF (DWR (1975) as cited in DWR (2004)). The groundwater basin is principally recharged by deep percolation of precipitation and runoff from the surrounding mountains and hills. Estimates of natural groundwater recharge rates range from about 31,200 to 80,400 afy based on a variety of approaches (USGS, 2003; USGS, 1993). Other sources of recharge to the basin include artificial recharge and return flows from agricultural irrigation and urban irrigation. Depending on the thickness and characteristics of the unsaturated zone of the aquifer, these sources may or may not contribute to recharge of the groundwater. Recharge is also affected by clay layers deposited in the hydraulically closed valley as ancient playas. **Figure 3.7-3** provides a schematic cross section of the Antelope Valley.



SOURCE: Kennedy/Jenks Consultants

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Figure 3.7-3
Soil Profile

As previously stated, precipitation in the region is generally less than 10 inches per year and evapotranspiration (ETo) rates (along with soil requirements) are high; therefore, recharge from direct infiltration of precipitation is considered negligible (Snyder, 1955; Durbin (1978) as cited in USGS (2003)). Estimates of the amount of recharge to the basin attributable to the types of recharge (other than mountain-front or precipitation infiltration) are not known.

The basin has historically shown large fluctuations in groundwater levels. Data from 1975 to 1998 show that groundwater level changes over this period ranged from an increase of 84 feet to a decrease of 66 feet (Carlson and Phillips (1998) as cited in DWR (2004)).

In general, data collected by the USGS (2003) indicate that groundwater levels appear to be falling in the southern and eastern areas and rising in the rural western and far northeastern areas of the region. This pattern of falling and rising groundwater levels correlates directly to changes in land use over the past 40 to 50 years. Falling groundwater levels are generally associated with areas that are developed, and rising groundwater levels are generally associated with areas that were historically farmed but have been largely fallowed during the last 40 years. However, recent increases in agricultural production, primarily carrots, in the northeastern and western portions of the region may have reduced rising groundwater trends in these areas (LACSD, 2005).

Groundwater Extraction

According to the USGS (2003), groundwater extractions have exceeded the estimated natural recharge of the basin since the 1920s. This overdraft has caused water levels to decline by more than 200 feet in some areas and by at least 100 feet in most of the region (USGS, 2003). Extractions in excess of the groundwater recharge can cause groundwater levels to drop and associated environmental damage (e.g., land subsidence).

Groundwater extractions are reported to have increased from about 29,000 af in 1919 to about 400,000 af in the 1950’s, when groundwater use in the region was at its highest (USGS, 1995). Use of SWP water has since stabilized groundwater levels in some areas. In recent years, groundwater pumping has resulted in subsidence and earth fissures in the Lancaster and EAFB areas, which has permanently reduced storage by 50,000 af (DWR, 2004). Although an exact

groundwater budget for the basin is not available, data estimates pertaining to groundwater production are available from the early 1900’s through 1995. The most recent estimates from the USGS contend that during the 1991 through 1995 period, groundwater pumpage averaged 81,700 afy (USGS, 2003).

In the Lancaster basin, the groundwater generally moves northeasterly from the San Gabriel and Sierra Pelona Mountains to Rosamond and Rogers dry lakes. Heavy pumping has caused large groundwater depressions that disrupt this movement (USGS, 2003).

Groundwater Adjudication

Although the groundwater basin is not currently adjudicated, an adjudication process has begun and is in the early stages of development. Although there are no existing restrictions on groundwater pumping, pumping may be altered or reduced in the future as part of the adjudication process. The results of the adjudication will provide clarity for groundwater users regarding the management of groundwater resources.

Recycled Water

Currently, the only recycled water in the region that is treated to a tertiary level is a small percentage of the wastewater at the LWRP through the onsite Antelope Valley Tertiary Treatment Plant (AVTTP). This effluent is conveyed to Apollo Parks for use as a recreational impoundment. Approximately 1.0 mgd of tertiary treated recycled water is also produced at the LWRP by a Membrane Bioreactor (MBR). Following the implementation of planned upgrades, disinfected tertiary-treated recycled water will be available from the three treatment plants in the project area: LWRP, PWRP, and RWWTP. See Chapter 1, Introduction, for a description of these treatment facilities and the planned upgrades.

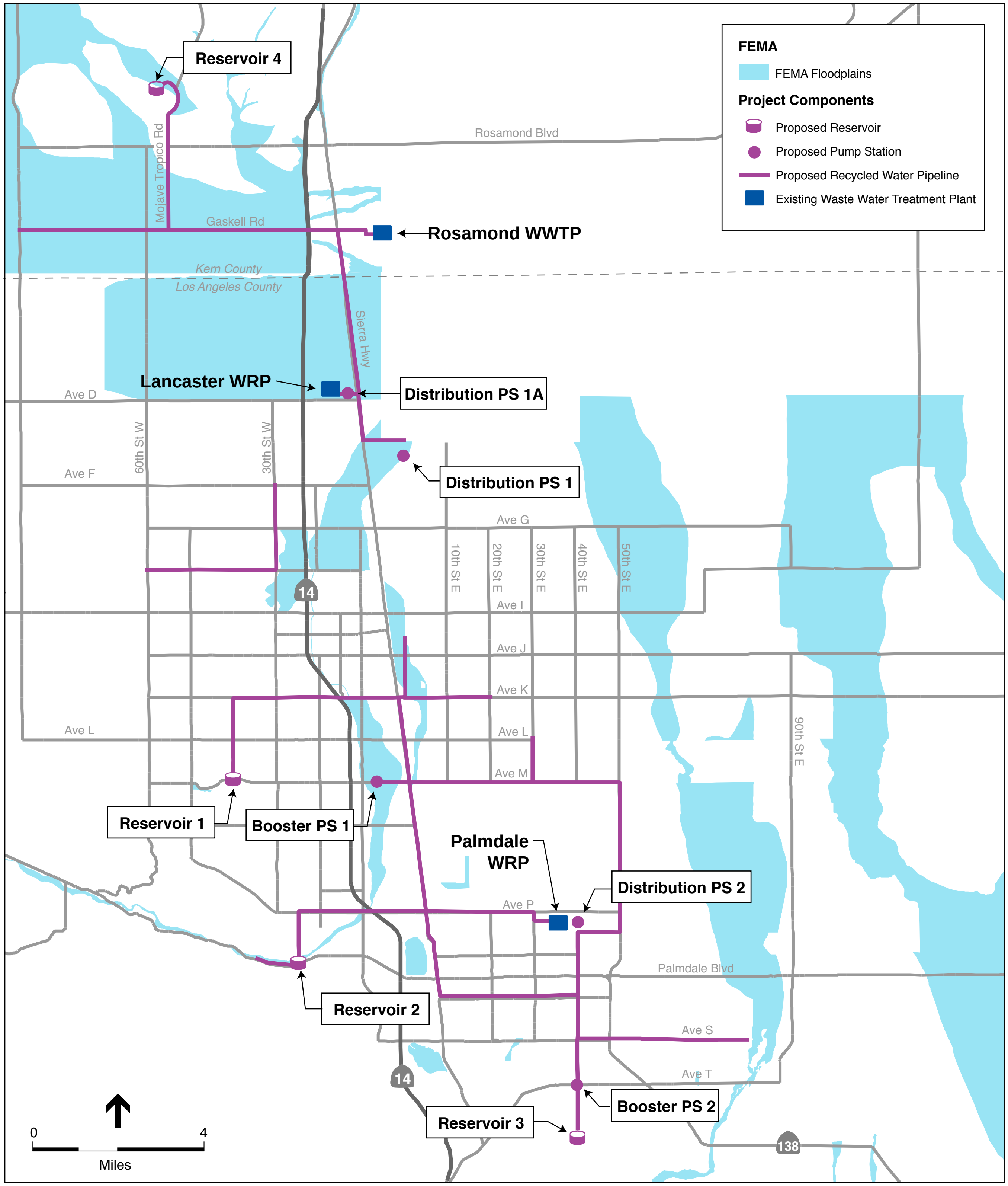
Flooding

Portions of the proposed project are located within the Federal Emergency Management Agency (FEMA) designated 100-year and 500-year flood areas. **Figure 3.7-4** depicts the location of the 100-year flood areas within the project area.

The Antelope Valley Groundwater Basin is a closed basin without a natural outlet for storm water runoff (LADPW, 1987). Numerous streams originating in the mountains surrounding the region carry highly erodible soils onto the region floor, forming large alluvial river washes. Streams then meander across the alluvial fans in ill-defined paths subject to change. Precipitation ranges on average less than 10 inches per year on the region floor, to more than 12 inches in the surrounding mountains (Rantz (1969) as cited in USGS (1995)). Portions of the region floor are subject to flooding due to uncontrolled runoff from these nearby foothills (City of Lancaster, 1997), and this situation is aggravated by lack of proper drainage facilities and defined flood channels in the region. Heavy discharge and flooding is also prevalent along Big Rock Creek, Little Rock Creek, Amargosa Creek, and Anaverde Creek. Heavy rainfall and summer thunderstorms increase the potential for flash floods.

Stormwater runoff that does not percolate into the ground eventually ponds and evaporates in the impermeable dry lake beds at EAFB near the Los Angeles/Kern County line (LADPW, 1987). This 60 square mile playa is generally dry but is likely to be flooded following prolonged precipitation. Fine sediments carried by the storm water inhibit percolation as does the impermeable nature of the playa soils (LADPW, 1987). Surface water can remain on the playa for up to five months, until the water evaporates (LADPW, 2006).

Examples of existing flood control facilities include the engineered channels and retention basins on Amargosa Creek. Storms of a 20-year frequency or greater can, however, overflow these facilities (LACSD, 2005). There is also a flood retention basin along Anaverde Creek; when this basin is overtopped flooding occurs in the vicinity of 20th Street East, 30th Street East, and Amargosa Creek.



SOURCE: California Environmental Resource Evaluation System (CERES)

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Figure 3.7-4
FEMA Flood Areas

Following severe flooding in the Antelope Valley region in 1980, 1983, and 1987, the LADPW prepared the *Antelope Valley Comprehensive Plan of Flood Control and Water Conservation* (LADPW, 1987). This plan proposed flood plain management in the hillside areas, structural improvements in the urbanizing areas, and non-structural management approaches in the rural areas. In the hillside areas the plan recommended restricting development to areas outside of entrenched watercourses. In the project area, much of which is flood-prone, the plan recommended improvements such as open channel conveyance facilities and storm drains through communities, as well as detention and retention basins located at the mouths of the large canyons (LADPW, 1987).

3.7.2 Regulatory Framework

Federal

Clean Water Act

The Federal Water Pollution Control Act (33 U.S.C. 1251 et. sec.) as amended by the Federal Water Pollution Control Act Amendments of 1972, also known as the Clean Water Act (CWA), states that the discharge of pollutants to waters of the United States from any point source is unlawful, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. Amendments (1987) to the CWA added a section which established a framework for regulating M&I storm water discharges under the NPDES program. On November 16, 1990, the United States Environmental Protection Agency (USEPA) published final regulations, under the 1987 CWA Amendments, that establish application requirements for storm water permits. These regulations require that discharges of storm water from construction activity of five acres or more must be regulated as an industrial activity and covered by a NPDES permit.

The USEPA approved the SWRCB and the nine RWQCBs for enforcement of these storm water regulations. The Lahontan RWQCB is responsible for regulating water quality in the project area.

The U.S. Army Corp of Engineers (USACE) has determined that Amargosa Creek is not defined as a water of the United States because it flows to a closed internal dry lake basin (Rosamond Dry Lake), which is wholly within the State of California. For similar reasons, the Lahontan RWQCB has determined that other dry washes in the Antelope Valley (e.g., Big Rock Creek and Little Rock Creek) are not defined as waters of the United States (Lahontan RWQCB, 2004). Therefore, discharges resulting from the proposed project would not be subject to regulation under the NPDES program. However, the Lahontan RWQCB encourages implementation of best management practices (BMPs) similar to those required for NPDES storm water permits to protect the waters of the state (Lahontan RWQCB, 2004).

Safe Drinking Water Act

Federal requirements relevant to the use of recycled water for groundwater recharge are contained in the 1986 amendments to the Safe Drinking Water Act (SDWA) of 1974 (Public Law 93-523). The SDWA focuses on regulation of drinking water and control of public health risks by establishing and enforcing MCLs for various compounds in drinking water. The 1986 amendments also established requirements for protection of groundwater supplies through wellhead protection programs and regulation of underground injection of wastes.

State

California Water Code

The Water Code contains requirements for the production, discharge, and use of recycled water. The Porter-Cologne Water Quality Control Act (Division 7 of the Water Code), which was promulgated in 1969, established the SWRCB as the state agency with the primary responsibility for the coordination and control of water quality, water pollution, and water rights (Division 7, Chapter 1).

Nine RWQCBs were established to represent the SWRCB regionally and carry out the enforcement of water quality and pollution control measures (Division 7, Chapter 4). In addition, each RWQCB was required to formulate and adopt water quality control plans and establish requirements for waste discharge to waters of the state. In 1972, Chapter 5.5 was added to Division 7 to provide the RWQCBs with the authority to carry out the provisions of the federal CWA. As identified previously, the Lahontan RWQCB has jurisdiction over the project area.

Division 7, Chapter 7, Water Reclamation, was included in the Porter-Cologne Water Quality Control Act in 1969. Subsequent amendments required the CDPH (formerly the California Department of Health Services) to establish water reclamation criteria, gave the RWQCB the responsibility of prescribing specific water reclamation requirements for water that is used or proposed to be used as recycled water, provided for the regulation of injection of waste into the ground, and required the use of recycled water, if available, rather than potable water for irrigation of greenbelt areas.

Assembly Bill 1481 (De La Torre, 2007) has established Water Code Section 13552.5, which requires, in part, the SWRCB to develop and adopt a statewide general permit for landscape irrigation uses of recycled water. The Water Code requires SWRCB to adopt the new permit by July 31, 2009. The intent of the new law is to develop uniform interpretations of state standards to ensure the safe, reliable use of recycled water for landscape irrigation that is also consistent with state and federal water quality laws and regulations (SWRCB, 2008c). The new general permit, which is currently under development, would expedite the processing of permit applications for landscape irrigation uses of recycled water.

Title 22 Engineering Report and Permit

In 1975, Title 22 of the CCR was prepared by CDPH in accordance with the requirements of Division 7, Chapter 7 of the Water Code. In 1978, Title 22 was revised to conform with the 1977 amendment to the federal CWA. The requirements of Title 22, as revised in 1978, 1990, and 2001, regulate production and use of recycled water in California.

Title 22 establishes the quality and/or treatment processes required for effluent to be used for a specific non-potable application. The following categories of recycled water are identified:

- Disinfected tertiary recycled water;
- Disinfected secondary-2.2 recycled water;
- Disinfected secondary-23 recycled water;
- Undisinfected secondary recycled water.

In addition to recycled water uses and treatment requirements, Title 22 addresses sampling and analysis requirements at the treatment plant, preparation of an engineering report prior to production or use of recycled water, general treatment design requirements, reliability requirements, and alternative methods of treatment.

A Title 22 Engineering Report would be prepared for the proposed project that incorporates and reflects information from the Master Reclamation Permit (see below). The Lahontan RWQCB would ultimately decide whether the proposed project is covered by the Master Reclamation Permit after reviewing the Title 22 Engineering Report and after CEQA review is complete. If the Lahontan RWQCB decides that the proposed project cannot be covered under the Master Reclamation Permit, a separate application for Water Reclamation Requirements (WRRs) and Waste Discharge Requirements (WDRs) would need to be submitted and a permit secured from the Lahontan RWQCB.

Recycled water produced at the RWWTP, LWRP, and PWRP will be of disinfected tertiary standards making it suitable for all end uses included in Title 22 (see Table 1-2), including M&I and agricultural applications. Disinfected tertiary recycled water is defined in Section 60301.230 of the Title 22, Division 4, Environmental Health, Chapter 3, Water Recycling Criteria as follows:

"The filtered wastewater has been disinfected by either:

- A chlorine disinfection process following filtration that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligrams-minutes per liter at all times with a modal contact times of at least 90 minutes, based on peak dry weather design flow; or

- A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration."

In addition, the median concentration of total coliform bacteria measured in the disinfected effluent can not exceed a Maximum Probable Number (MPN) of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed. Also, the number of total coliform bacteria can not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample may exceed a MPN of 240 total coliform bacteria per 100 milliliters.

Specific requirements outlined for groundwater recharge using recycled water include that the quality must be at a level that fully protects public health (judged on a individual case basis); CDPH will base its recommendations on treatment provided, effluent quality and quantity, spreading area operations, soil characteristics, hydrogeology, residence time, and distance to withdrawal; a public hearing must be held prior to CDPH's determination to discuss the public health aspects of the groundwater recharge project.

Several proposed amendments to Title 22 are being considered at this time but have not yet been approved. These amendments include: general requirements; control of pathogens; control of nitrogen compounds; control of regulated compounds and physical characteristics; diluent water requirements; recycled water contribution requirements; total organic carbon requirements; operation optimization; monitoring between the groundwater recharge project and down gradient drinking water supply wells; and annual and five-year reporting.

Title 22 Waterworks Standards

Minimum requirements for pipeline separation standards are included in CCR Title 22, Division 4, Chapter 16, California Waterworks Standards, Article 4, Materials and Installations of Water Mains and Appurtenances. In accordance with Section 64572, Water Main Separation, there shall be at least a 10 foot horizontal separation and one (1) foot vertical separation between all parallel potable water mains and non-potable water pipelines.

Title 17

CCR Title 17 focuses on the protection of drinking water supplies through control of cross-connections with potential contaminants, including non-potable water supplies such as recycled water. Title 17, Group 4, Article 2, Protection of Water System, Table 1, specifies the minimum backflow protection required on the potable water system for situations in which there is potential for contamination to the potable water supply.

Recycled water is addressed as follows:

- An air-gap separation is required on "Premises where the public water system is used to supplement the recycled water supply."
- A reduced pressure principle backflow prevention device is required on "Premises where recycled water is used … and there is no interconnection with the potable water system."
- A double-check valve assembly may be used for "residences using recycled water for landscape irrigation as part of an approved dual plumed use area established pursuant to Sections 60313 through 60316 unless the recycled water supplier obtains approval for the local public water supplier, or [CDPH] if the water supplier is also the supplier of the recycled water, to utilize an alternative backflow prevention plan that includes an annual inspection and annual shutdown test of the recycled water and potable water systems pursuant to subsection 60316(a)."

California Health and Safety Code

The California Health and Safety Code, Division 104, Part 12, Chapter 5, Article 2, Section 116815, requires all pipes carrying recycled water to be colored purple or wrapped in purple tape. This requirement stems from a concern in cross contamination and potential public health risks similar to those discussed for Title 17. It is also discussed in the California Health Laws Related to Recycled Water (the Purple Book).

California Health Laws Related to Recycled Water (Purple Book)

The Purple Book provides a single source of guidelines and requirements for recycled water usage in California. It is meant to be an aid to staff of the Drinking Water Program within the Department of Public Health's Division of Drinking Water and Environmental Management.

Emerging Contaminants

In addition to the existing water quality and treatment criteria contained in Title 22 regulations, other potential water supply contaminants have been the subject of recent discussions within the water supply industry. Most noteworthy are the unregulated substances of N-nitrosodimethylamine (NDMA), 1,4 Dioxane, and trace pharmaceuticals. Future regulations could govern treatment and reuse of wastewater with respect to these contaminants. WRRs for future groundwater recharge projects could include monitoring and mitigation for emerging contaminants.

N-nitrosodimethylamine (NDMA)

NDMA is a probable carcinogen and has been linked to various forms of liver cancer. It has a history of use as a research chemical, as well as an intermediate compound formed in the production or burning of liquid rocket fuel. Currently, the Department of Public Health has set a very low notification level of 0.01 micrograms per liter for NDMA. In addition to the low notification level, NDMA is also very difficult to measure in low concentrations. NDMA is also a disinfection by-product under certain conditions. To date, research on NDMA and its potential formation is ongoing. As a result, regulations on NDMA are currently in a state of flux and are subject to change as more information becomes available. UV light can be used to reduce NDMA.

1,4 Dioxane

1.4 Dioxane has attracted attention due to it being a known carcinogen and its use in personal care products such as shampoos. It is also a solvent stabilizer and has been found in groundwater remediation efforts involving trichloroethane, a cleaning solvent. 1,4 Dioxane may eventually be regulated out of consumer products. However, until such time, wastewater treatment processes, such as advanced oxidation system could be required.

Trace Pharmaceuticals

Trace pharmaceuticals have been identified in water supplies in Europe and the United States. Trace pharmaceuticals may be transported to water supplies through the wastewater discharge systems resulting from discarded medicines and incompletely metabolized medicines passing as waste. Pharmaceuticals detected in various studies include hormone supplements, antibiotics, anti-depressants, various stimulants, painkillers, etc. Scientists are at odds over the potential health effects of such minute quantities in water supplies. Concerns have also been raised over the potential impact that trace pharmaceuticals could have in the aquatic environment. To date, there are no regulations governing trace pharmaceuticals. Additionally, little information exists on the removal efficiency of wastewater treatment processes. USGS is currently conducting a significant study effort on trace pharmaceuticals as part of its Toxic Substances Hydrology Program. Depending on the outcome of these and other scientific studies, future regulations could govern the treatment and reuse of wastewater as it relates to the removal of trace pharmaceuticals.

Local

RWQCB WDR/WRR and Master Reclamation Permit

Operation of the proposed project would be subject to conditions imposed by the Lahontan RWQCB pursuant to Water Recycling Requirements (WRRs) and Waste Discharge Requirements (WDRs). WRRs are usually issued to the recycled water producer to ensure that the recycled water has received effective treatment for disinfection and to the recycled water user to ensure that recycled water is being applied properly (SWRCB, 2008) WDRs are issued to the recycled water producer to protect the quality of receiving waters, usually the groundwater underlying the irrigation site (SWRCB, 2008a). In lieu of WRRs for recycled water users, the RWQCB can issue a Master Reclamation Permit to the recycled water producer. The permit includes WDRs and rules and regulations for recycled water users.

LACSD Nos. 14 and 20 are currently working towards approval of a Master Reclamation Permit from the Lahontan RWQCB for their proposed treatment process upgrades at LWRP and PWRP and for expansion in capacity at the LWRP (separate projects covered under their own EIRs). It is anticipated that LACSD’s Master Reclamation Permit would cover the proposed project uses of recycled water described in this report. Otherwise, each recycled water retail agency (e.g., LACWWD40, PWD, RCSD, etc.) would be responsible for obtaining WRRs for the intended end uses in their service area. Either the WRRs or Master Reclamation Permit would include requirements for monitoring groundwater quality

RWQCB Storm Water Pollution Prevention Plan

Construction of the proposed project would not be required to comply with the State Water Resources Control Board (SWRCB) NPDES General Construction Permit (GCP). As described above, there are no waters of the U.S. in the project area that are subject to RWQCB storm water pollution prevention requirements. Therefore, LACWWD40 and the implementing agencies for the proposed project would not be required to submit a Notice of Intent to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the GCP. However, during construction of the proposed project, LACWWD40 and/or implementing agencies would be required to protect the water quality objectives and beneficial uses of local surface waters as provided in the RWQCB Basin Plan.

RWQCB Construction Dewatering WDR

Construction of the proposed project may require dewatering activities as a result of excavation or trenching is areas of shallow groundwater. Discharge of the removed water to surface waters requires WDRs from the Lahontan RWQCB since the water could potentially be contaminated with chemicals from the construction activities. Discharge from dewatering activities would be considered a limited-threat discharge if the groundwater does not contain significant quantities of pollutants that could adversely affect beneficial uses of surface waters as designated in the Basin Plan (see below). Limited-threat discharges would be covered under the Lahontan RWQCB General Permit for Limited Threat Discharges to Surface Waters (Board Order No. R6T-2003-0034). Since the project area would not affect waters of the US, the project would not be subject to the general construction dewatering NPDES permit. However, the RWQCB would require that Best Management Practices be implemented to comply with the WDRs.

Basin Plan

The proposed project is subject to the requirements of the Lahontan Region Water Quality Control Plan (Basin Plan) prepared by Lahontan RWQCB in 1995 (RWQCB, 1995). The Basin Plan contains the water quality standards and control measures for surface water and groundwater of the Lahontan region. Additionally, the Basin Plan designates beneficial uses, establishes water quality objectives, and waste discharge prohibitions. The Basin Plan also includes Nondegradation Objectives and any adopted Total Maximum Daily Loads (TMDLs) for the region. The Nondegradation Objective is in accordance with the SWRCB Resolution No 68-16 and the federal anti-degradation policy as required by the federal Clean Water Act (40 CFR 131.12). The Nondegradation Objectives of the Basin Plan apply to both surface water and groundwater. The Nondegradation Objectives require the maintenance of background water quality concentrations, which are concentrations of substances in natural waters unaffected by waste management practices or other sources of contamination. Some degradation may be allowed if it is determined to be in the best interest of the people of California and if the future beneficial uses of waters of the State would not be adversely affected. In addition, whenever existing water quality exceeds that needed to protect beneficial uses, the high quality shall be maintained unless it is determined that a change in water quality would not adversely affect beneficial uses and would maximize the benefit of the people of the State.

LACDPW Flood Control District Easement

Construction activities located within Flood Control District rights-of-way or crossing of a storm drain structure would require obtaining a Flood Permit from the LACDPW Flood Control District. The permit process would include submitting construction plans, hydraulic and hydrologic calculations, certificate of liability insurance, and associated fees.

Grading Permit

Construction in Los Angeles County is subject to Appendix J of the Los Angeles County Building Code (LACBC), which is based on the Uniform Building Code. The LACBC states that a grading permit is required for all construction activities involving 50 cubic yards or more of excavation, more than two feet in depth, or cut slopes greater than five feet. Specific requirements for obtaining a grading permit are contained in the Los Angeles County Grading Guidelines.

3.7.3 Impacts and Mitigation Measures

Significance Criteria

Criteria used to determine the significance of impacts related to hydrology and water quality are based on Appendix G of the *CEQA Guidelines*. The proposed project would result in a significant impact to hydrology or water quality if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
- Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river in a manner that would result in substantial erosion or siltation;
- Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river substantially increasing the rate or amount of surface runoff in a manner that would result in flooding;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding;
- Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow.

A discussion of the impacts and mitigation measures for the proposed project are presented below.

Impacts Discussion

The project site is approximately 45 miles from the Pacific Ocean. Therefore, the proposed project would not expose people or structures to a significant risk of loss, injury, or death due to seiches or tsunamis. Furthermore, the proposed project is located primarily in areas of flat topography except for possible low-lying hillside locations for proposed storage reservoirs. It is anticipated that the proposed project would not expose people or structures to a significant risk of loss, injury or death due to mudflows. Accordingly, no impact statement or mitigation measures are required for this significance criterion.

The proposed project would replace potable water with recycled water for certain end uses, thereby reducing demand for potable water. Therefore, the proposed project would have a beneficial impact on groundwater supplies and aquifer volume. Accordingly, no impact statement or mitigation measures are required for this significance criterion. Furthermore, recharging the groundwater basin would result in a direct net increase in aquifer volume due to the proposed groundwater recharge end use.

The City of Palmdale has determined that it is feasible to use recycled water for cooling water at the planned PHPP (RMC, 2007). Power plants have a large demand for water that meets strict water quality requirements, and also require a known, backup supply in accordance with California Energy Commission requirements. Areas of concern regarding the use of recycled water include scaling, biofouling, and corrosion. Use of recycled water for the power plant cooling tower, a large high-quality water user, would have no adverse impacts on hydrology or water quality as the cooling system would be designed as a closed loop with no need for land application or off-site storage of resulting blowdown. Full discussion of potential impacts resulting from use of recycled water at the proposed PHPP will be provided in upcoming CEQA documentation prepared specifically for development of the PHPP. The potential impacts associated with other end uses for recycled water are discussed below.

Project-level Impacts

Recycled Water Pipelines

Impact 3.7-1: Operation of the proposed recycled water pipelines could result in cross contamination of potable water pipelines, which could result in reduced water quality and potential public health concerns. Less than Significant with Mitigation.

Currently all areas considered for irrigation with recycled water are being irrigated with, or have potable water pipes tied into their irrigation systems. To avoid cross-contamination of potable water with recycled water, backflow prevention devices will be required to be incorporated in accordance with the following mitigation measures. Additionally, the Health and Safety Code, Division 104. Environmental Health Services, Part 12. Drinking Water, Chapter 5. Water Equipment and Control, Article 2. Cross Connection Control by Water Users, Section 116815 states: "All pipes installed above or below ground, on or after June 1, 1993, that are designed to carry recycled water, shall be colored purple or distinctively wrapped with purple tape."

In addition, minimum separation standards for potable and non-potable water pipelines are included in CCR Title 22, Division 4, Chapter 16, California Waterworks Standards, Article 4, Materials and Installations of Water Mains and Appurtenances. In accordance with Section 64572, Water Main Separation, all proposed recycled water pipelines would have at least a 10 foot horizontal separation and one (1) foot vertical separation from any parallel potable water mains.

Mitigation Measures

Mitigation Measure 3.7-1a: Applicable backflow prevention devices, as outlined in Title 17 and the Purple Book, shall be incorporated into pipeline design to avoid potential for cross contamination.

Mitigation Measure 3.7-1b: Applicable minimum pipeline separation standards for potable and non-potable water pipelines, as outlined in Title 22, shall be incorporated into pipeline design to avoid potential for cross contamination.

Mitigation Measure 3.7-1c: All recycled water pipelines shall be painted purple or marked distinctly with purple tape.

Mitigation Measure 3.7-1d: Los Angeles County Department of Public Health (DPH), Cross Connection Control Program for Los Angeles County and the Kern County Department of Public Health in Bakersfield for Kern County shall be advised of each new site where recycled water is to be used prior to placing the site into service.

Mitigation Measure 3.7-1e: All recycled water sites shall be inspected and tested for possible cross connections with the potable water system, in accordance with Sections 60314(3) and 60316(a), Title 22, California Code of Regulations.

Significance after Mitigation: Less than significant.

Impact 3.7-2: Construction of the proposed recycled water pipelines could result in increased soil erosion and transport of subsequent contaminants and sedimentation, with impacts to water quality. Additionally, accidental release of fuels and other hazardous materials during construction could degrade water quality. Less than Significant with Mitigation.

During construction of the proposed recycled water pipelines, excavated soils would have the potential to erode and be transported to down gradient areas, potentially resulting in water quality standard violations. Construction of pipelines would require excavation of trenches or temporary bore and receiving pits, and temporary stockpiling of soils. In the event of heavy rain, erosion of the stockpiles may occur resulting in scouring and sedimentation of local drainages. Additionally, the storm water passing through the construction sites has the potential to pick up any chemicals from the staging site itself (such as fuels or oil from construction equipment), which may pass into the local storm water collection system, impacting water quality. Although the project would not be subject to the General Construction Stormwater NPDES permit, Mitigation Measure 3.7**-2** below would require that LACWWD40 prepare BMPs to be implemented to ensure pipeline construction activities would not degrade surface or groundwater quality. Applicable BMPs are identified in the California Stormwater Quality Association's *California Storm Water Best Management Practices Handbook for Construction* (2003).

Erosion control is a necessary to prevent sediment transport to the storm drain system. Erosion control BMPs bind soil particles to protect the soil surface and may include, but would not be limited to scheduling or limiting activities to certain times of the year and preservation of existing vegetation and ground cover.

Sediment controls complement the erosion control measures to further reduce sediment transport to the storm drain system through physical interception or settlement of the sediment being transported by storm water runoff. Typical BMPs include, but would not be limited to, installation of silt fence or fiber in areas subject to substantial erosion.

Tracking control is necessary to reduce sediment from being transported off the site from construction equipment itself, and onto private/public roads. BMPs for tracking control may include stabilizing entrances to the construction sites and adjacent roadways.

To prevent soil and dust from being transported off site by wind, additional erosion control measures include application of potable water to disturbed soil areas to control dust and maintain optimum moisture levels for compaction, and use of silt fences and plastic covers to prevent wind dispersal from soil stockpiles.

In addition to the storm water control measures mentioned above, non-storm water control measures further reduce potential impacts that include installing specific discharge controls during activities such as paving operations, and vehicle and equipment washing and fueling.

Hazardous materials associated with construction equipment, such as fuels, oils, antifreeze, coolants, and other substances could adversely affect water quality if inadvertently released to surface waters. The BMPs identified in Mitigation Measure 3.7-2 would reduce the release of hazardous materials into water courses through waste management and pollution control. Because implementation of BMPs would reduce the release of hazardous materials into water courses, the proposed project would not violate water quality standards for construction activities.

Inspection of the identified BMPs to be implemented as part of pipeline construction activities would be conducted prior to a forecasted storm event, after a rain event that causes runoff, and at 24-hour intervals for extended rain events for maintenance, inspection, and repair. A checklist for these inspections would be developed, and the inspection reports would be filed with the BMPs. Post-construction BMPs may include revegetation of disturbed areas back to pre-construction conditions.

The BMPs would also includes a sampling and analysis plan for sediment and non-visible pollutants in runoff leaving the construction site to ensure water quality compliance. The sampling and analysis plan will identify sample locations, sampling schedule, sample collection and handling, constituents for analysis, and method for analysis.

Mitigation Measures

Mitigation Measure 3.7-2: The implementing agencies shall develop and implement BMPs to minimize erosion and sedimentation. The implementing agencies shall include in contractor specifications that the contractor is responsible for developing and implementing the BMPs. The BMPs shall be maintained at the site for the entire duration of construction.

The objectives of the BMPs are to identify pollutant sources that may affect the quality of storm water discharge and to implement measures to reduce pollutants in storm water discharges. The BMPs for the proposed project shall include, but not be limited to, the implementation of the following elements:

- Identification of all pollutant sources, including sources of sediment that may affect the quality of storm water discharges associated with construction activity from the construction site;
- Identification of non-storm water discharges;
- Estimate of the construction area and impervious surface area;
- Preparation of a site map and maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs);
- Identification of all applicable erosion and sedimentation control measures, waste management practices, and spill prevention and control measures;
- Maintenance and training practices; and,
- A sampling and analysis strategy and sampling schedule for discharges from construction activities.

Significance after Mitigation: Less than significant.

Impact 3.7-3: Construction activities associated with the recycled water pipelines could result in the dewatering of shallow groundwater resources and contamination of surface water. Less than Significant with Mitigation.

Construction of the recycled water pipelines, including trenching, jack and bore tunneling and horizontal directional drilling techniques, could potentially meet shallow or perched groundwater. Groundwater levels and the depth of excavation vary throughout the proposed project area. If shallow groundwater is met, dewatering would be required. Dewatering operations would include pumping the groundwater and discharging to the local storm drain system. Discharge water could potentially degrade surface water quality with materials used during typical construction activities, such as silt, fuel, grease or other chemicals. This could be a potentially significant impact; however, impacts would be temporary. Implementation of Mitigation Measure 3.7-3 would reduce the impact of construction dewatering to surface water quality to less than significant levels.

Mitigation Measures

> **Mitigation Measure 3.7-3:** The implementing agencies shall obtain and comply with the requirements of dewatering permits issued by the Lahontan RWQCB for dewatering activities. Provisions of the permit may include treatment of flows prior to discharge.

Significance after Mitigation: Less than significant.

Impact 3.7-4: Construction of the recycled water pipelines could temporarily alter drainage patterns at the construction sites, which could cause localized flooding. Less than Significant with Mitigation.

The proposed project is not expected to substantially alter existing drainage patterns within the project area following completion of construction activities. The proposed project would not alter the drainage pattern of any stream or river. Further, the recycled water pipelines would be installed within existing roadway rights-of-way, and after construction is concluded, roadways would be restored to existing conditions. However, Mitigation Measure 3.7-4 would ensure that no new permanent impervious surfaces are created that could alter drainage patterns and potentially result in localized flooding impacts.

Mitigation Measures

> **Mitigation Measure 3.7-4:** The implementing agencies shall include in contractor specifications that all disturbed areas are to be restored back to pre-construction conditions.

Significance after Mitigation: Less than significant.

Recycled Water End Users

Impact 3.7-5: Operation of the pipelines would result in the use of recycled water for municipal and industrial (M&I) applications, which could affect surface and groundwater quality. This could be a potential public health impact. Less than Significant with Mitigation.

Operation of the proposed project would be subject to conditions imposed by the Lahontan RWQCB pursuant to WRRs and WDRs. Recycled water use associated with the proposed project would comply with the CDPH recycled water regulations contained in Title 22 of the CCR. Recycled water provided by the LWRP and PWRP will be treated to disinfected tertiary levels. As such, the product recycled water may be used for all end use categories listed in Table 1-2 in accordance with Title 22 Water Recycling Criteria. These end use categories include, but are not limited to, the following M&I applications.: landscape irrigation of parks, schools, golf courses, sports complexes (e.g., Lancaster National Soccer Center), freeways, greenbelts, cemeteries, and landfills; landscape impoundments; fire suppression; city maintenance and street cleaning operations; culvert jetting; and construction applications, such as dust control.[2] The recycled water end users identified for the proposed project are included in the Title 22 regulations (Table 1-2). To be used as a source supply for these designations, the reclaimed effluent would at all times be adequately oxidized, clarified, filtered, and disinfected effluent.

However, there is the concern for water quality impacts at the recycled water end user sites. Of particular concern is the impact to surface water and groundwater quality that could result due to

2 Municipal and industrial (M&I) end uses do not include residential land uses. This PEIR does not include coverage of residential landscape irrigation.

the higher levels of TDS, nitrogen, and other nutrients in the recycled water relative to potable water. The over-application of recycled water would have the potential to affect surface water quality if this resulted in surface ponding or direct runoff to local creeks or other water bodies.

To address these water quality concerns SWRCB is currently developing a statewide general permit for landscape irrigation uses of recycled water, pursuant to AB 1481. In the interim, SWRCB has stated in its latest draft Recycled Water Policy statement that the discharge of salts and nutrients to groundwater can be reasonably controlled by applying water at agronomic rates for recycled water landscape irrigation projects (SWRCB, 2008b). Irrigation of landscapes at agronomic rates also reduces impacts to surface waters by reducing the potential for ponding or runoff of recycled water to occur. This nutrient management practice would be sufficient to protect beneficial uses and water quality as prescribed in applicable basin plans, water quality control plans, and water quality control policies.

SWRCB also has stated that it is “unreasonable to require groundwater monitoring for landscape irrigation projects using recycled water because these project generally pose a threat to water quality similar to landscape irrigation projects using surface water or groundwater, for which groundwater monitoring is not required” (SWRCB, 2008b).

SWRCB has acknowledged that use of recycled water for irrigation or other water supply augmentation can affect concentrations of salts and nutrients in groundwater basins, in excess of the water quality objectives established in Basin Plans. The regulation of recycled water itself is not adequate to address this issue; rather, SWRCB is drafting a policy that recommends Salt Management Plans (SMPs) for basins and watersheds to manage salts and nutrients from all water sources, including recycled water (SWRCB, 2008d). Currently, the draft policy suggests these SMPs would be basin-wide and would be funded pursuant to Water Code Sections 10750 *et seq*. The SMPs could require monitoring plans and a network of stations to monitor salt concentrations in groundwater for consistency with applicable water quality objectives. In addition, the SMPs could require implementation measures for sustainable management of salt and nutrient loading and an anti-degradation analysis demonstrating compliance with Resolution 68-16 for projects included in the plan. The SWRCB policy would not prevent stakeholders from developing a SMP that is more protective of water quality than the Basin Plan. This policy is still in draft format and may change in the future. Upon adoption of a Recycled Water Policy by SWRCB, the proposed project would be subject to all requirements of the policy, including salt management plans (Mitigation Measure 3.7-5b).

Recycled water contains nitrogen, phosphorus, and potassium. Nutrients in the recycled water applied to landscapes are taken up by vegetation, reducing the need for fertilizer applications. Reduction of fertilizer applications by proposed M&I end users would reduce total nutrient load applied to irrigation sites that potentially could end up in surface runoff or affect underlying groundwater.

Implementation of Mitigation Measure 3.7-5a would reduce potential impacts to surface water quality and groundwater quality to less than significant levels. Mitigation Measure 3.7-5a requires M&I end users to apply water and fertilizer to landscapes at agronomic rates, which is compatible with good farming practices on land. The mechanism for implementing these practices is a Reclaimed Water User Agreement, which would be made between the implementing agency and recycled water end user.

Mitigation Measures

Mitigation Measure 3.7-5a: The implementing agencies shall require the development and implementation of Recycled Water User Agreements with each recycled water end user. The Agreements shall include provisions that prohibit over-application of recycled water and fertilizer, such as requiring irrigation at agronomic rates to reduce the potential for runoff and increased nutrients into the groundwater basin.

Mitigation Measure 3.7-5b: The implementing agencies, in consultation with the Lahontan RWQCB, shall develop and implement a salt management plan, if needed in the future, to reduce the potential for salt and nutrient loading and minimize impacts to water quality in the Antelope Valley groundwater basin.

Significance after Mitigation: Less than significant.

Impact 3.7-6: The use of recycled water for M&I applications could alter drainage patterns or increase local storm water runoff during storm events resulting in localized flooding. Less than Significant with Mitigation.

The use of recycled water by new M&I end users would result in increase runoff during storm events if irrigation activities are not adjusted to prevent saturation of soils onsite. The result would be localized flooding. Implementation of Mitigation Measure 3.7-6 would reduce the potential impact to a less than significant level.

Mitigation Measures

Mitigation Measure 3.7-6: The implementing agencies shall require recycled water end users to cease all irrigation activities during rain events, thereby minimizing off-site runoff.

Significance after Mitigation: Less than significant.

Program-level Impacts

Storage Reservoirs and Pump Stations

Impact 3.7-7: Construction of the proposed storage reservoirs and pump stations could result in increased soil erosion and transport of contaminants, with impacts to water quality. Additionally, release of fuels or other hazardous materials associated with construction activities could degrade water quality. Less than Significant with Mitigation.

Typical activities for reservoir construction would include mobilization of construction equipment, clearing and grubbing of the reservoir area, and construction of appurtenant structures and ancillary facilities such as spillway, inlet/outlet conduits, stormwater routing around the reservoir, access roads, and fencing. This would be followed by site clean up and demobilization.

Construction activities for development of the pump stations would not be expected to involve heavy construction activities, with each site to be graded and prepared to raise a building structure. Construction could involve grading, paving, installation of pumps, construction of pump housing and fencing, and connecting appurtenances in the building. These activities could cause dislodging of soil particles and potential sedimentation.

During construction of the storage reservoirs and pump stations, excavated soils would have the potential to erode and be transported to down gradient areas, potentially resulting in water quality standard violations. Construction of the reservoirs and pump stations would likely include light grading and temporary stockpiling of soils. In the event of heavy rain, erosion of the stockpiles may occur resulting in sedimentation and scouring of local drainages. Additionally, storm water would pick up hazardous materials from construction sites (such as fuels, solvents or oil from construction equipment), which may pass into the local storm water collection system, impacting water quality. LACWWD40 would prepare specific BMPs to be implemented at each of the reservoir and pump station sites to ensure construction activities do not degrade surface or groundwater quality, such as establishment of a sediment basin and erosion control perimeter around active construction and contractor layout areas, silt fencing, jute netting, straw waddles, or other appropriate measures to control sediment from leaving the construction area. Implementation of Mitigation Measure 3.7-2 would reduce impacts to water quality from construction of the reservoirs and pump stations to less than significant levels. No additional mitigation measures are warranted.

Mitigation Measures

Implementation of Mitigation Measure 3.7-2.

Significance after Mitigation: Less than significant.

Impact 3.7-8: Construction and operation of the proposed storage reservoirs and pump stations would increase the amount of impervious surfaces at each site, altering the drainage patterns at each site and resulting in increased local storm water runoff. This could cause localized flooding or contribute to a cumulative flooding impact. Less than Significant with Mitigation.

Construction of the proposed storage reservoirs and pump stations may require excavation and grading to provide a level surface to install the facilities. Excavated soils would likely be replaced on-site, and vegetation or permeable ground cover restored to pre-project conditions. The designs of the pump stations and storage reservoirs have not been determined but may include storm water drainage features to capture and infiltrate stormwater onsite or transport storm water offsite.

Although the exact facility sites are not known, estimated run-on and runoff calculations are summarized in **Table 3.7-1** to demonstrate the potential impacts to drainage patterns. The table demonstrates a low potential for substantial long-term drainage and localized flooding impacts at each reservoir and pump station site; however, implementation of Mitigation Measure 3.7-7 would ensure that adequate design features are incorporated to reduce and capture storm water runoff.

TABLE 3.7-1
SUMMARY OF RUN-ON AND RUN-OFF DISCHARGES FOR PROPOSED STORAGE RESERVOIRS AND PUMP STATIONS

		Existing Conditions		After Proposed Construction		
Facility	Total Site Area[a]	Impervious Site Area	Runoff Coefficient[b]	Impervious Site Area	Runoff Coefficient[b]	Site Area Run-on Discharge[c]
3.0 MG Storage Reservoir	2 acre	0 acres	0.1	0.38 acres	0.26	0.3 cfs
4.4 MG Storage Reservoir	2 acre	0 acres	0.1	0.56 acres	0.34	0.3 cfs
2.1 MG Storage Reservoir	2 acre	0 acres	0.1	0.27 acres	0.22	0.3 cfs
2.0 MG Storage Reservoir.	2 acre	0 acres	0.1	0.26 acres	0.21	0.3 cfs
Distribution Pump Station 1	2 acre	0 acres	0.1	0.06 acres	0.13	0.3 cfs
Distribution Pump Station 2	2 acre	0 acres	0.1	0.06 acres	0.13	0.3 cfs
Booster Pump Station 1	2 acre	0 acres	0.1	0.06 acres	0.13	0.3 cfs
Booster Pump Station 2	2 acre	0 acres	0.1	0.06 acres	0.13	0.3 cfs

[a] Assumed minimum 2 acre site required to develop storage reservoirs and pump stations; however, most parcels being considered are considerably larger.
[b] Assumes impervious site area runoff coefficient of 0.95 and pervious site area coefficient of 0.1. Runoff Coefficient = [(Impervious site area * Impervious runoff coefficient) + (Pervious Site area * pervious runoff coefficient)] /Total Site Area.
[c] Assumes a rainfall intensity of 0.2 inch/hr and a run on coefficient of 0.75. Site area run-on discharge = run-on coefficient * rainfall intensity * drainage area (total site area).

Mitigation Measures

Mitigation Measure 3.7-7: The implementing agencies shall ensure adequately sized and located storm water capture facilities are incorporated into the final design for each storage reservoir and pump station facility.

Significance after Mitigation: Less than significant.

Impact 3.7-9: Placement of storage reservoirs and pump stations within a 100-year flood zone could expose people or property to risks related to flooding. Less than Significant with Mitigation.

The Flood Insurance Rate Maps (FIRMs) produced by the Federal Emergency Management Agency indicate areas prone to flood hazards due to major storm events, including 100-year and 500-year flood zones. According to the FIRMs, the proposed project could place storage reservoirs and pump stations within the 100-year flood zone and potentially portions of the 500-year flood zone (Los Angeles County, 2007). The FIRMs are included for reference in Appendix G.

Distribution Pump Station 2 is located at the PWRP, which is in a designated Flood Zone B. Zone B is a zone between 100-year and 500-year flood zone limits. However, with implementation of Mitigation Measure 3.7-8 and the fact that the pump station will be constructed on an already developed site, flood impacts are expected to be less than significant.

Distribution Pump Station 1, Distribution Pump Station 1A, Booster Pump Station 2, Reservoir 2 and Reservoir 4 are located in or near 100-year flood zone areas (Figure 3.7-4). The pump stations and storage reservoirs would be developed in accordance with the applicable municipal codes[3] regarding construction in flood zones. It is expected that LACWWD 40, or its partner agencies, would be required to obtain a development permit for the above-ground reservoirs prior to construction within any special flood hazard areas. With adherence to the permit requirements, the proposed facilities would not expose people or structures to the risk of loss due to flooding. In addition, implementation of Mitigation Measure 3.7-8 would reduce impacts to people and structures due to flooding to less than significant levels.

Mitigation Measures

> **Mitigation Measure 3.7-8:** The implementing agencies shall require flood diversion facilities to be incorporated into each storage reservoir and pump station site and facility design that would not increase flood risk in other areas.

Significance after Mitigation: Less than significant.

Recycled Water End Users

Impact 3.7-10: Use of recycled water for agricultural irrigation could potentially affect surface and groundwater quality. Less than Significant with Mitigation.

The proposed project provides the physical infrastructure required to convey disinfected tertiary-treated recycled water to agricultural end users. As described above for Impact 3.7-5, this level of

[3] Applicable Municipal Codes include the City of Lancaster's §15.52.010, the City of Palmdale's §110.1.1 and §110.1.2, the 2008 Los Angeles County Building Code (Title 216), and the Kern County Floodplain Management Building Code (Chapter 17.48).

treatment has been identified by CDPH (Title 22) for agricultural irrigation in order to protect public health and water quality.

However, if recycled water is over applied at agricultural reuse sites, then the recycled water could percolate through soil layers, reaching the underlying groundwater aquifer and affecting groundwater quality. Surface water quality also could be affected if over-application of recycled water resulted in surface ponding or direct runoff to local creeks or other water bodies. Localized and regional water quality impacts could result from the higher levels of TDS, nitrogen, and other nutrients in the recycled water applied at potential agricultural irrigation sites when switching from potable water to recycled water.

As described above for Impact 3.7-5, the nutrient content of recycled water exceeds that of potable water. Recycled water contains nitrogen, phosphorus, and potassium. Thus the use of recycled water will offset much of the fertilizer needs for the potential agricultural users. The application of recycled water and fertilizer at agronomic rates would reduce potential impacts to groundwater and surface water quality to less than significant levels. Implementation of Recycled Water User Agreements as required by Mitigation Measure 3.7-5a would ensure minimal impacts to water quality due to the use of recycled water at agricultural reuse sites. Implementation of Mitigation Measure 3.7-5b would ensure minimal impacts to water quality due to the use of recycled water for all end uses, once the SWRCB adopts its Recycled Water Policy requiring implementation of SMPs.

Mitigation Measures

Implementation of Mitigation Measure 3.7-5a and 3.7-5b.

Significance after Mitigation: Less than significant.

Impact 3.7-11: The use of recycled water for groundwater recharge could result in significant water quality impacts if the native groundwater is degraded below existing or acceptable conditions. Less than Significant with Mitigation.

General requirements for GRRPs using surface spreading are contained in the Water Recycling Criteria of Title 22. For GRRPs using surface spreading methods and natural percolation, the regulation states that the water shall “be at all times of a quality that fully protects public health” and further requires a public hearing to discuss the public health aspects of the project. Draft Title 22 regulations suggest that recycled water used for groundwater recharge via surface spreading must be of at least disinfected tertiary quality. The RWQCB would issue WRRs to the recycled water producers and end users that would allow the proposed recharge. CDPH would hold a public hearing and workshop to discuss the public health aspects and technologies available for safe conduct of a GRRP.

The use of recycled water for groundwater recharge may have significant impacts on groundwater quality without adequate mitigation. Although the recycled water will be subject to Title 22 requirements, the impacts to existing groundwater water quality in the underlying basin after recharge has not yet been determined; implementation of a pilot project that includes monitoring would be a necessary first step.

The City of Lancaster is planning to implement a pilot project to test the feasibility of a large-scale GRRP. The Groundwater Recharge Using Recycled Water (GRW-RW) Pilot Project will use a blend of recycled water, stormwater, and imported water. Recharge will occur at a proposed 100-acre stormwater retention basin located in the proximity of Avenue F and 60th Street West in Lancaster. The pilot project has been designed to recharge up to 2,500 acre-feet of water annually at a 4:1 blend ratio, including up to 500 acre-feet of recycled water. The balance will be a combination of imported water and stormwater captured on-site. The 4:1 blend ratio is a design parameter of the pilot set by the CDPH. Recharge water will be monitored to support regulatory compliance. The primary benefit of the Pilot Project will be to better evaluate the feasibility of the full-scale regional GWR-RW project as well as other GWR banking projects in the Antelope Valley by (1) providing a forum for regional collaboration and public involvement, (2) providing water quality and reliability data that will optimize the regional project(s) definition, (3) demonstrating attainment of regulatory requirements, while avoiding basin-wide issues such as salt and nitrogen management, and (4) tackling institutional barriers surrounding the regional projects by starting with a reduced number of participant agencies and at a reduced-level of financial risk. After the initial monitoring phase is complete, recharge water could be pumped to serve either non-potable uses or municipal and industrial users in the Lancaster area. The GRW-RW Pilot Project is considered a foundational project for development of recharge projects in the Antelope Valley. The experience to be gained from the GRW-RW Pilot Project, especially in relation to meeting regulatory requirements, institutional needs and objectives, and building public support for recharge projects of this type is expected to help clarify the steps needs to make any future regional GRRPs in the area successful. The environmental effects of the GRW-RW Pilot Project will be fully evaluated pursuant to CEQA with a separate, subsequent CEQA compliance document.

Mitigation measures to reduce impacts to water quality in the groundwater basin could feasibly include blending requirements or advanced treatment processes. Mitigation requirements would be project specific and additional environmental documentation would be required prior to implementation of a GRRP.

Blending Requirements

Mitigation measures may include a requirement to blend the recycled water with another source of water (such as stormwater or SWP water) to meet water quality requirements prior to recharge. The GWR-RW project described above includes a blend ratio of 4:1 (diluent water to recycled water) required by CDPH to meet water quality requirements. The GRRPs associated with the proposed project may utilize the same source water as the GWR-RW project; thus it is likely that a similar blend ratio would be required for any future GRRP in the region. Any future GRRP would comply with Title 22 blend ratio requirements and blend ratios identified in WRRs or Master Reclamation Permits.

Advanced Treatment

Mitigation measures may include the need for state of the art technology to produce recycled water to meet the highest achievable water quality standards (i.e., near-distilled quality). Orange County Water District is currently implementing a project that utilizes state of the art technology to recharge recycled water into the Orange County groundwater basin. Treatment processes after wastewater treatment include: microfiltration, reverse osmosis, ultraviolet light, and hydrogen peroxide treatment. Additionally, a Water Quality Risk Assessment was conducted for the project to confirm no significant adverse environmental impacts would occur.

Any potential groundwater recharge project using recycled water (GRRP) would be subject to strict regulatory reviews and additional, in-depth environmental assessment and documentation in accordance with CEQA prior to initiation of recharge activities. This PEIR generally describes the impacts associated with a GRRP and does not attempt to describe or evaluate any site-specific or known recharge areas. Accordingly, Mitigation Measures 3.7-9a, 3.7-9b and 3.7-9c identified below are the minimum requirements for future potential GRRPs in the project area.

Mitigation Measures

Mitigation Measure 3.7-9a: The implementing agencies shall operate recharge projects in compliance with CDPH Title 22 regulations as well as in coordination with the RWQCB. The recharge water shall be a blend of recycled water and diluent water at a ratio consistent with Title 22 regulations and CDPH criteria.

Mitigation Measure 3.7-9b: The implementing agencies shall develop and implement a monitoring program of the proposed recharge area in compliance with Title 22 regulations and CDPH criteria. As part of this program, some monitoring wells shall be placed between the proposed recharge area and down gradient drinking water supply wells.

Mitigation Measure 3.7-9c: The implementing agencies shall require recharged recycled water via surface spreading to remain in groundwater storage for the minimum time period stipulated by CDPH Title 22 Water Recycling Criteria prior to extraction.

Significance after Mitigation: Less than significant.
