CHAPTER 14

HYDROLOGY AND WATER QUALITY

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This chapter presents an analysis of the potential hydrologic and water quality impacts associated with the PWRP 2025 Plan and EIR.

ENVIRONMENTAL SETTING

The Antelope Valley is a large, closed basin in the western part of the Mojave Desert. The climate is generally dry, experiencing an annual average precipitation of less than 10 inches on the valley floor and greater than 12 inches in the local mountains. Runoff water from the San Gabriel Mountains flows in Big Rock and Little Rock Washes and other creeks toward Rogers, Rosamond, and Buckhorn Dry Lakes. Over 80 percent of the mean annual precipitation occurs during the winter months. During the summer months, a relatively minor amount of rainfall occurs with infrequent and localized thunderstorms.

Because the Antelope Valley is a closed basin with no outlet to the ocean, all water that enters the valley either infiltrates into the groundwater basin, or flows toward the three playa lakes located near the center of the valley (Rosamond, Rogers, and Buckhorn Dry Lakes). In general, groundwater flows northeasterly from the mountain ranges to the playa lakes. Due to the relatively impervious nature of the playa lake soil, water that collects on the playa lakes eventually evaporates rather than infiltrating into the groundwater.

Surface Water

A number of creeks and washes carry surface water to the playa lakes. As a result of the arid climate, these creeks and washes typically flow only during periods of heavy rainfall or as a result of melting snowpack from the local mountains. Many areas in the Antelope Valley experience sheet flow during particularly heavy rainstorms, but tend to remain dry with moderate and low-intensity storms. Major water bodies in the area are described below and shown on Figure 14-1.

Rogers Dry Lake, Rosamond Dry Lake, and Buckhorn Dry Lake

Rosamond Dry Lake covers approximately 21 square miles. Buckhorn Dry Lake, located between Rogers and Rosamond Dry Lake, encompasses approximately three square miles. Rogers Dry Lake, located further east, encompasses approximately 35 square miles and is used by EAFB as a runway and emergency landing area. All three dry lakes are located entirely within EAFB. The lakebeds are usually dry flat playas, only becoming covered in water following large winter storms. Collected storm water evaporates from the surface with little water infiltrating to the groundwater due to the impermeable nature of the playa soils.

Amargosa Creek

Amargosa Creek collects runoff from the Sierra Pelona Mountain Range, initially flowing eastwards and then draining northerly through Palmdale and Lancaster. The change in flow direction occurs near SR-14. The creek eventually terminates at Rosamond Dry Lake.

Anaverde Creek

Anaverde Creek collects runoff from the Sierra Pelona Mountain Range and drains easterly through Anaverde Valley. The creek then flows along the western edge of Palmdale and northerly along Sierra Highway, where the flow is collected and held in a retention basin. Water that overflows the retention basin flows north and merges with Amargosa Creek.

Little Rock Wash

Little Rock Wash is an ephemeral wash that flows west of Littlerock through the east side of Palmdale and PMD to Rosamond Dry Lake. The waterway originates as Little Rock Creek conveying runoff from the San Gabriel Mountains through Little Rock Canyon. North of the Little Rock Reservoir, the wash is characterized by a poorly defined channel for most of its length, spreading out as sheet flow north of Avenue H. Some small segments of the wash north of the LAWA property exhibit a well-defined channel, but for the most part, storm water sheet flows across a wide area within the LAWA property.

Little Rock Reservoir and Lake Palmdale

Little Rock Reservoir provides a primary water supply for the PWD and the Littlerock Creek Irrigation District. Little Rock Dam was first constructed in 1924 and has undergone numerous upgrades over the years. The reservoir is fed by Little Rock Creek and supplies water to Lake Palmdale and Little Rock Wash. Lake Palmdale is located on the southern edge of the City of Palmdale and is used for drinking water storage.

California Aqueduct

The DWR operates the SWP that transports water from the Sacramento Delta to Southern California via the California Aqueduct. The East Branch of the California Aqueduct traverses eastward along the southern edge of the Antelope Valley, passing just south of the City of Palmdale. The aqueduct continues eastward to Silverwood Reservoir where water is conveyed southward.

Lake Los Angeles

Lake Los Angeles was a man-made lake located approximately 15 miles east of the PWRP near the unincorporated community of Lake Los Angeles. The lake was fed by pumped groundwater but has been dry for several years.

Big Rock Wash

Big Rock Wash, which collects runoff from the San Gabriel Mountain's Pallett and Big Rock Creeks, flows northerly from Holcomb Ridge through the unincorporated area of Pearblossom. In its northern reaches, Big Rock Wash is divided by Alpine, Lovejoy, and Piute Buttes. Water flowing in Big Rock Wash enters EAFB and flows onto Rosamond, Buckhorn, and Rogers Dry Lakes.

Flooding

FEMA is responsible for identifying flood hazard zones. FEMA estimates the level of inundation under various conditions and relates the information on Flood Insurance Rate Maps. According to the Flood Insurance Rate Maps for the region,[1] sections along Little Rock Wash are identified as areas determined to be within the 100-year flood plain. The remainder of the project area is located outside the 100-year flood plain. Figure 14-2 identifies 100-year flood zones within the project area.

Groundwater

The Antelope Valley groundwater basin encompasses 1,580 square miles within an extensive alluvial valley. The basin is bound on the northwest by the Garlock fault zone at the base of the Tehachapi Mountains; on the southwest by the San Andreas fault zone at the base of the San Gabriel Mountains; on the east by ridges, buttes, and low hills that form a surface and groundwater drainage divide; and on the north by Fremont Valley Groundwater Basin at a groundwater divide approximated by a southeastward-trending line from the mouth of Oak Creek through Middle Butte to exposed bedrock near Gem Hill, and by the Rand Mountains further to the east.[2]

The Antelope Valley aquifers are bounded by the consolidated rocks of the San Gabriel and Tehachapi Mountains and the bedrock floor. Within the confines of these barriers, unconsolidated deposits of alluvium, sand, gravel, and silt are the primary water-bearing formations that create the aquifers. In general, groundwater in the Antelope Valley is divided vertically into three aquifers, a shallow, unconfined, upper aquifer that is not highly productive; a thicker, deeper, confined middle aquifer that produces the most groundwater; and a thin, lower aquifer that is deepest and also produces

[1] *County, 065043-0275B, 065043-0245C, 065043-0255B; and City of Palmdale, 060144-0045, 060144-0035D, 060144-0030D.*

[2] *DWR, 2004.*

little groundwater.[3] Horizontally, the Antelope Valley basin is divided into twelve subbasins,[4] including the Lancaster, Pearland, and Buttes subbasins, which are near or under the PWRP.[5] The Lancaster subbasin, which is the largest and most developed, has all three aquifer zones. The Pearland and Buttes subbasins are single unconfined aquifers that feed the larger adjacent Lancaster subbasin. Figure 14-3 shows the general locations of the Antelope Valley groundwater basin subbasins.

The principal sources of natural recharge to the Antelope Valley aquifers are storm water runoff and snow pack melt from the San Gabriel Mountains. At the base of the mountains, alluvial deposits of coarse sands and gravels accept and transmit water to the aquifer below. At these locations, the principal and deep aquifers are connected, and surface water percolation directly recharges both confined and unconfined aquifers. Eighty percent of natural recharge comes from mountain runoff, of which over 50 percent is attributed to Big Rock and Little Rock Washes.[6] Recent studies estimate natural recharge to range from 31,000 to 59,100 afy.[7] There are no estimates of other sources of recharge such as excessive irrigation, leaking water lines, or incidental recharge.

Groundwater Levels

Extensive groundwater pumping has played a significant role in the lowering of groundwater levels and the development of more than six feet of land subsidence in areas of the Antelope Valley. Since the 1970s, the reduction of irrigated agriculture has paralleled dramatic increases in population and land use. Although groundwater pumping has declined sharply since the mid-1900s, annual groundwater extraction still exceeds the estimated mean natural recharge to the valley by nearly two-fold. Near the municipal extraction wells serving the City of Palmdale, groundwater depths are over 300 feet bgs.[8] Perched water occurs in some areas at depths less than 50 feet bgs after heavy rains or in areas that are heavily irrigated at depths less than 25 feet bgs.

The total storage capacity of the groundwater basin has been reported at approximately 68,000,000 af [9] and 70,000,000 af.[10] Current estimates indicate that regional subsidence has permanently reduced aquifer system storage by about 50,000 af.[11]

Groundwater Quality

TDS content in the basin averages 300 milligrams per liter (mg/L) and ranges from 200 to 800 mg/L.[12] The groundwater mineral content ranges from calcium bicarbonate in character to sodium bicarbonate or sodium sulfate in character.[13]

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 wells located north and down-gradient of the existing land application areas (Figure 14-4). Samples collected on May 1, 2003, from monitoring wells in the vicinity of the PWRP EMS areas indicate maximum nitrate values of 14.6 mg/L.

In response to these reported exceedances for nitrates, the RWQCB-LR adopted a CAO and a CDO requiring the submittal of a Nitrate Delineation Report and a CRP to investigate and mitigate a condition of degraded groundwater and to evaluate the potential for future degradation and pollution.

District No. 20 submitted a Nitrate Delineation Report to the RWQCB-LR on August 13, 2004. An Addendum to the report was submitted on

[3] *USGS, 2003.*
[4] *Thayer, 1946.*
[5] *Bloyd, 1967.*
[6] *KJC, 1995.*
[7] *USGS, 1993a.*
[8] *Galloway et al., 1995.*
[9] *Planert and Williams, 1995.*
[10] *DWR, 1975.*
[11] *Sneed and Galloway, 2000.*
[12] *Kennedy/Jenks Consultants, 1995.*
[13] *Duell, 1987.*

December 29, 2004. The report summarized the results of soil boring and groundwater monitoring actions undertaken by District No. 20 under a scope of work developed in consultation with the RWQCB-LR to delineate the extent of the nitrate contamination in the vicinity of the PWRP EMS. The report included a figure showing an interpreted distribution of nitrate concentrations within the upper 50 feet of the groundwater table in the area.[14] This figure is reproduced in Figure 14-4. Figure 14-5 identifies groundwater elevations in the area. As shown in the figure, elevated concentrations of nitrates in groundwater appear to be confined to the area underlying historic agricultural and land-application operations north of the PWRP.

District No. 20 submitted a CRP to the RWQCB-LR on September 15, 2004. The CRP proposes additional delineation of the aerial and vertical extent of the degraded and polluted groundwater plume at the EMS. The CRP also proposes additional groundwater monitoring in the vicinity of the two northern monitoring wells and included a conceptual proposal for groundwater quality restoration.

The CRP proposes several actions to correct and prevent future degradation of groundwater quality. These include developing methods for extracting groundwater with elevated nitrate concentrations to mitigate past degradation. The CRP assumes that the PWRP would be upgraded to include activated sludge treatment with nitrification/denitrification unit processes with maximization of agriculture using recycled water to cultivate grasses and grains.

Recycled Water

The PWRP currently treats an average flow of 9.4 mgd of municipal and industrial wastewater. Currently, recycled water is utilized to irrigate 1,220 acres of fodder crops (including alfalfa, barley, oats, and Sudan grass), 23 acres of pistachio trees, and 28 acres of evergreen trees in accordance with regulations promulgated by DHS in Title 22 of the CCR. Since the PWRP has no seasonal storage capacity, much of the recycled water has been discharged to an agricultural area at above agronomic rates during the winter months when crop irrigation demands are lowest.

REGULATORY BACKGROUND

See Chapter 3, Laws and Regulations, of the PWRP 2025 Plan for information on regulatory framework for hydrologic resources. A summary of pertinent regulations is provided below.

The federal CWA, as amended by the Water Quality Act of 1987, regulates water quality. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation’s waters. The PCA (Division 7 of the California Water Code) provides the basis for water quality regulation within California. The SWRCB administers water rights, water pollution control, and water quality functions throughout the state, while the RWQCBs conduct planning, permitting, and enforcement activities.

The RWQCB-LR has prepared a Basin Plan identifying beneficial uses and water quality objectives for surface water bodies and for groundwater in the Antelope Valley. Table 14-1 summarizes the beneficial uses designated for Little Rock Wash, Big Rock Wash, and local groundwater. The Basin Plan also establishes water quality objectives for all water bodies in the region.

The RWQCB-LR is also authorized to issue master reclamation permits that establish six different types of procedural and substantive requirements intended to assure protection of the environment, including compliance with uniform statewide reclamation criteria. The issuance of a master reclamation permit is an approach taken in the past for oversight of municipal, non-potable reuse projects that do not represent a significant impact to groundwater quality.

[14] *Antelope Valley Water Group, 1995.*

EPA Water Reuse Guidelines

In 1992, the EPA prepared a Manual for Water Reuse that describes water reuse applications and recommended water quality. Appendix R includes tables summarizing recommended water quality parameters for recycled water use.

Table 14-1
Antelope Hydrologic Unit (HU 626.00)
Select List of Beneficial Uses

DRAINAGE FEATURE	MUN	AGR	IND	GWR	FRSH	REC-1	REC-2	COMM	COLD	WILD	SPWN
LRC	X			X		X	X	X	X	X	
BRC	X	X	X	X		X	X	X	X	X	X
GW	X	X			X						

Source: Water Quality Control Plan for the Lahontan Region, SRWCB, 1994.
Drainage Key: LRC = Little Rock Creek; BRC = Big Rock Creek; GW = Groundwater
Beneficial Uses Key: MUN = Municipal Water Supply; AGR = Agricultural Supply; IND = Industrial Service Supply; GWR = Ground Water Recharge; FRSH = Freshwater Replenishment; REC-1 = Water Contact Recreation; REC-2 = Non-contact Water Recreation; COMM = Commercial and Sportfishing; COLD = Cold Freshwater Habitat; WILD = Wildlife Habitat; SPWN = Spawning, Reproduction, and Development

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Thresholds of Significance

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 hydrology or water quality impact would be considered significant if it would result in any of the following, which are adapted from the CEQA Guidelines, Appendix G.

- Violate any water quality standards or WDRs or otherwise substantially degrade surface or groundwater water quality;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would decline to a level that 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 that would result in substantial erosion or siltation on or off site or provide substantial additional sources of polluted runoff;
- Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site, or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems; or
- Place structures within a 100-year flood hazard area, which would impede or redirect flood flows.

The following impacts and mitigation measures are presented in the general order of the significance criteria listed above.

Impact 14-1: Project construction activities could induce soil erosion and transport contaminants to downstream dry washes and playas.

Construction of storage reservoirs and conversion of agriculture lands would involve vegetation removal, grading, and excavation that would expose soils to erosion and may result in the transportation of sediment into local drainages. Pipeline construction would require excavation of trenches and temporary stockpiling of soils. Construction at the PWRP would involve basic earthwork activities to level a portion of the site and prepare building foundations.

Heavy rainfall could cause erosion of stockpiles and subsequent sedimentation of local drainages. Although the amount of erosion from stormwater is anticipated to be low due to the generally level topography, excessive erosion during a heavy rainfall event during construction could result in scouring and sedimentation of downstream areas. In addition, fuels, solvents and/or other chemicals used in construction activities could be spilled, dumped, or discarded into local drainages. To minimize erosion, District No. 20 would prepare a SWPPP to obtain coverage under the state wide general construction storm water NPDES permit. Implementation of best management practices outlined in Mitigation Measure 14-1 would ensure that construction does not adversely affect surface or groundwater quality.

Mitigation Measure

Mitigation Measure 14-1: District No. 20 shall prepare, or have a contractor prepare, an SWPPP for all construction phases of the proposed project. The objectives of the SWPPP are to identify pollutant sources that may affect the quality of storm water discharge and to implement BMPs to reduce pollutants in storm water discharges.

BMPs may include, but would not be limited to:

- If excavation occurs during the rainy season, storm runoff from the construction area shall be regulated through a storm water management/erosion control plan that shall include temporary on site silt traps and/or basins with multiple discharge points to natural drainages and energy dissipaters. Stockpiles of loose material shall be covered and runoff diverted away from exposed soil material. If work stops due to rain, a positive grading away from slopes and stockpiles shall be provided to carry the surface runoff to areas where flow can be controlled and directed to the appropriate runoff structures, such as the temporary silt basins. Sediment basins/traps shall be located and operated to minimize the amount of off site sediment transport.

- Temporary erosion control measures shall be provided until perennial revegetation or landscaping is established and can minimize discharge of sediment into nearby waterways.

- BMPs selected and implemented for the project shall be in place and operational prior to the onset of major earthwork on the site. Effective mechanical and structural BMPs that could be implemented at the project site include the following:

  – Mechanical storm water filtration measures.

  – Vegetative strips and high infiltration substrates can be used where feasible to reduce runoff and provide initial storm water treatment.

  – Permanent energy dissipaters can be included for drainage outlets.

  – Water quality detention basins.

- Hazardous materials such as fuels and solvents used on the construction sites shall be stored in covered containers and protected from rainfall, runoff, vandalism, and accidental release to the environment. All stored fuels and solvents will be contained in an area of impervious surface with containment capacity equal to the volume of the materials stored. A stockpile of spill cleanup materials shall be readily available at all construction sites. Employees shall be trained in spill prevention and cleanup, and individuals shall be designated as responsible for prevention and cleanup activities.

- Equipment shall be properly maintained in designated areas with runoff and erosion control measures to minimize accidental release of pollutants.

Significance After Mitigation

Less than significant.

Impact 14-2: Effluent water infiltrating into the groundwater from the proposed storage reservoirs could degrade water quality.

The proposed project would involve the construction of storage reservoirs to accommodate effluent outflows during winter months when crop water demands are low. With the construction of storage reservoirs comes the potential for effluent to infiltrate into the groundwater. Current estimates indicate that groundwater levels within the vicinity of the three proposed reservoir sites range between 200 to 300 feet bgs. Over time, infiltrating water could cause elevated levels of nitrates and TDS in the groundwater. As documented in the setting discussion, groundwater extracted from monitoring wells north of the PWRP, at times, exceeds the primary MCL for nitrate in some locations. Other constituents of concern from wastewater according to the RWQCB-LR include boron, pathogens, and toxics. Although the PWRP effluent will be disinfected and generally exhibits low levels of these contaminants, the RWQCB-LR Basin Plan states that all waters in the region are subject to the anti-degradation policy. Therefore, increased concentrations of contaminants caused by infiltration from the reservoirs would be considered a significant effect of the project.

The PWRP 2025 Plan and EIR has been prepared to minimize the potential for groundwater degradation in response to the CAO issued by the RWQCB-LR. District No. 20 is proposing treatment plant improvements to reduce total nitrogen in the treated wastewater, and increasing the land area available for agronomic irrigation with recycled water. However, with a constant head pressure provided by a storage reservoir, if water penetrates the floor of the reservoir, it could come into contact with groundwater over time, as the underlying geology is generally very permeable. This could facilitate the transport of highly soluble contaminants, such as nitrate, into the vadose zone.

The RWQCB-LR has not established standard permeability requirements for wastewater impoundments, but determines WDRs and liner impoundment requirements on a case-by-case basis. Preliminary assessment of soils data for the Palmdale area indicates that native soil materials are likely too coarse (e.g., sandy) for use as liner material. Without a sufficient quantity of fine clay materials available locally, District No. 20 will need to utilize a synthetic liner to restrict permeability at the surface. Implementation of the following mitigation measure would ensure that the groundwater quality would not be adversely impacted by operation of the proposed storage reservoirs.

Mitigation Measure

Mitigation Measure 14-2: District No. 20 shall line all proposed storage reservoirs (bottoms and sides) with synthetic materials to minimize infiltration of treated effluent into the subsurface.

Significance After Mitigation

Less than significant.

Impact 14-3: Effluent water infiltrating into the groundwater from agricultural or municipal reuse operations could degrade groundwater quality.

On average, depth to groundwater in the vicinity of the proposed agricultural reuse area is greater than 200 feet bgs. However, in locations near seasonal waterways (e.g., Little Rock Wash), groundwater may be less than 100 feet bgs. After storm events, groundwater may be encountered at shallower depths. The project would involve expanded agricultural reuse on up to 5,140 acres. This land acreage would allow for continued agricultural reuse, while limiting water applications to agronomic rates. Nonetheless, irrigation with recycled water could introduce contaminants that could degrade groundwater quality if irrigation water infiltrates to the groundwater. Principal contaminants of concern in recycled effluent include TDS and nitrates, and other potential contaminants include boron, sodium, organic compounds, and pathogens. In addition, infiltrating water can dissolve minerals from shallow geologic layers and transport them into the groundwater. The RWQCB-LR has adopted an anti-degradation policy that discourages actions that could degrade water quality. Violation of the RWQCB-LR Basin Plan's Anti-Degradation Policy would constitute a significant impact of the project.

Furthermore, as part of the conveyance system, retention basins may be needed to store water pumped from the PWRP to the agricultural areas prior to irrigation, and on site catch and/or pump basins may be needed to provide surface drainage. Ponding in these retention basins could increase infiltration of the water due to the constant hydraulic pressure. As a common soils management practice, salt build-up in the root zone may be periodically flushed through over-application of irrigation water for a short period. This practice tends to transport the salts as well as nitrogen deeper into the ground beyond the root zone. With excessive irrigation and flushing, these salts and nitrates can be transported into the sub-surface, thereby adversely affecting groundwater quality.

Total Dissolved Solids

Table 14-2 summarizes recent PWRP effluent quality and EPA-recommended water quality parameters. Effluent TDS concentrations averaged 520 mg/L in 2004. This is well below the upper limit secondary MCL for drinking water of 1,000 mg/L and within EPA's acceptable range for recycled effluent as shown in Table 14-2. TDS concentrations in the groundwater basin vary, but near Palmdale and the PWRP, TDS concentration ranges from 110-665 mg/L as reported from all monitoring wells during 2003. In comparing these TDS concentrations, the use of effluent for irrigation would not be dissimilar to using groundwater in terms of the amounts of salts applied.

Metals

Metal concentrations in the PWRP effluent are well below their respective drinking water MCLs. In addition, metals are removed from water in soils through a complex process of adsorption, precipitation, and ion exchange.

Pathogens

Bacteria, including coliforms, are removed by filtration through the soil. In general, there is greater filtration of bacteria in fine-grained material than in coarse-grained material. Studies of wastewater application indicate that coliforms are normally removed after five feet of infiltration through the soil. The PWRP effluent will be disinfected, substantially reducing or eliminating pathogen loading onto agricultural lands.

Nitrate

PWRP effluent nitrate concentrations averaged 0.79 mg-N/L in 2003 with a maximum 6.39 mg-N/L. However, nitrogen in other forms (ammonia and Kjeldahl organic nitrogen) tends to convert to nitrate when applied to soils, increasing overall nitrate loading. Existing groundwater concentrations in areas north of the PWRP have been documented to exceed the primary MCL of 10 mg/L for nitrate (as nitrogen). These concentrations of nitrate are attributed to residual background levels, past agriculture fertilizer applications, and the application of secondary-treated effluent.

Nitrate is absorbed by plants (e.g., alfalfa) and is readily immobilized in the unsaturated zone through absorption to soils. However, once in groundwater, nitrate is relatively stable and mobile. Typically, the levels of nitrate present in PWRP's proposed recycled water would be less than the nitrate requirement of crops, and it is expected that nitrates will be readily absorbed. Additionally, processes such as denitrification and ammonia volatilization will contribute to additional decreases in nitrate concentrations.

Table 14-2
Palmdale Water Reclamation Plant Effluent Water Quality and EPA Recommended Limits

PARAMETER	2004 PWRP EFFLUENT ANNUAL AVERAGE (MG/L)*	2004 PWRP EFFLUENT ANNUAL MAXIMUM (MG/L)*	2004 PWRP EFFLUENT ANNUAL MINIMUM (MG/L)*	MCLS (MG/L)**	EPA GUIDELINES RECOMMENDED LIMITS*** (MG/L) LONG-TERM	EPA GUIDELINES RECOMMENDED LIMITS*** (MG/L) SHORT-TERM	WITHIN EPA RECOMMENDED LIMITS?
TDS	520	562	489	500-1,000[†]	500 – 2,000	500 – 2,000	Yes
Suspended Solids	84	176	50				
Nitrate + Nitrite	0.79 mg-N/L	6.39 mg-N/L	0.11 mg-N/L	10	NR	NR	--
Ammonia	22.0 mg-N/L	28.6 mg-N/L	19.5 mg-N/L	NA	NR	NR	--
pH	8.2	9.0	7.5	NA	6.0 (lower limit)	6.0 (lower limit)	Yes
Arsenic (A)	<0.001	0.002	<0.001	0.05	0.10	2.0	Yes
Lead (A)	<0.002	<0.002	<0.002	NA	5.0	10.0	Yes
Cadmium (A)	<0.004	<0.004	<0.004	0.005	0.01	0.05	Yes
Total chromium (A)	<0.01	<0.01	<0.01	0.05	0.1	1.0	Yes
Nickel (A)	<0.02	<0.02	<0.02	0.1	0.2	2.0	Yes

Sources:
* *PWRP – Annual Monitoring Report, 20043*
** *Title 22 Sections 64431-64449*
*** *EPA, Manual, Guidelines for Water Reuse, EPA/625/R-92/004, September 1992.*

Notes:
† *Secondary MCL (consumer acceptance levels)*
N/A = data not available
NA = no adopted MCL
NR = no recommended limits
ND = not detected
(A) – Parameters sampled once annually; no averages available.
(B) – Quarterly Composite Samples

Efforts by District No. 20 to estimate denitrification in the vadose zone below the crop root zone are ongoing. Additionally, District No. 20 is in the process of developing a study to verify the assumptions for nitrogen loss to the atmosphere through ammonia volatilization. The study will include testing during different times of the year to develop seasonal estimates. Maintaining nitrogen content of the loading applied in effluent to match the agronomic rate required by the crop and minimizing application offertilizer would further minimize the potential for groundwater contamination.

Municipal Reuse

Municipal reuse is a component of the proposed project. District No. 20 intends to obtain a master reclamation permit from the RWQCB-LR. This permit would allow recycled water users to operate under a master reclamation permit for the PWRP, thus facilitating the permitting process for appropriate municipal reuse projects. Listed in Table 3-3 are uses approved by DHS for disinfected tertiary recycled water that are widely accepted and implemented with minimal or no impacts to receiving waters. Prior to approving a project under its master reclamation permit, District No. 20 would have to ensure that the reuse project falls under the list of approved projects and would not promote excessive infiltration that could affect groundwater quality. The master reclamation permit would exclude projects that may have potential impacts on the groundwater quality. These projects would include large-scale agricultural operations and large unlined impoundments. As a result, no impacts to groundwater quality would occur from the overall municipal reuse program.

Summary of Impacts

Properly managed farm operations and municipal reuse operations can effectively minimize infiltration of effluent reaching the groundwater over the planning period (through 2025) by balancing sufficient irrigation acreage and available storage. Although applying irrigation water at agronomic rates should prevent exceedances of groundwater quality objectives, incidental infiltration of irrigation water could transport some nitrates and other contaminants to the groundwater.

Furthermore, implementation of the FMP will minimize infiltration and downward migration of treated effluent by requiring construction of sufficient storage capacity, expansion of the agricultural reuse area, crop rotation, and fallowing. Increasing the application area will serve to minimize infiltration rates when effluent is applied above agronomic rates.

As part of the project, District No. 20 will apply to the RWQCB-LR to amend its current WDRs and WRRs prior to using effluent for irrigation in the proposed reuse areas. The WDRs will require District No. 20 to implement measures to protect groundwater quality pursuant to the RWQCB-LR's Basin Plan policies. Compliance with the WDRs, implementation of the project, and integration of the following mitigation measures would minimize impacts to groundwater quality and reduce the impact to a less-than-significant level.

Mitigation Measures

Mitigation Measure 14-3: District No. 20 shall implement an FMP outlining procedures for ensuring that effluent is applied at agronomic rates to minimize the potential for infiltration. The FMP may include, but not be limited to, the following elements:

- Farm Operations Management Structure
  – Crop selection process
  – Irrigation system selection process
- Site/Soil Preparation
- Irrigation Scheduling
- Monitoring/Reporting
  – Effluent water quality
  – Groundwater quality
  – Soil quality
  – Crop production
- Best Management Practices
  – Farming procedures
  – Site control/security
  – Good neighbor practices

Mitigation Measure 14-4: District No. 20 shall provide liners to retention basins to prevent substantial infiltration of applied water or, with RWQCB-LR approval, manage these basins to minimize infiltration to ensure protection of groundwater.

Significance After Mitigation

Less than significant.

Impact 14-4: Recycled effluent could run off the site if over-applied or applied during storm events.

The proposed project will irrigate large areas with reclaimed water. With these practices comes the potential for over-application, allowing reclaimed water to travel off site and into local drainages or roadside flood control ditches. The DHS prohibits runoff of land-applied recycled water from the use area, unless the runoff does not pose a public health threat and is authorized by the regulatory agency. Prior to implementation of the project, the RWQCB-LR would issue WDRs likely restricting unauthorized runoff. As part of the project, the agricultural operations would be required to comply with the WDRs, including prevention of runoff.

During storm events, the proposed storage reservoirs would be utilized to accommodate the total effluent flow. This would ensure that storm water runoff from the fields does not include large volumes of applied effluent. Incidental runoff of applied effluent during large storm events would be minimized through implementation of BMPs prepared for the FMP. Compliance with the amended WDRs and integration of the following mitigation would reduce this impact to a less than significant level.

Mitigation Measure

Mitigation Measure 14-5: District No. 20 shall construct a combination of earthen berms, modify existing site grades, and/or construct catch or pump basins at points around the proposed agricultural areas to prevent unauthorized runoff. The improvements would be designed to allow peak flood waters to inundate fields without modifying the floodplain by providing flood access culverts or other design features. The location and description of the improvements will be provided in the FMP. In addition, District No. 20 will cease all irrigation during storm events.

Significance After Mitigation

Less than significant.

Impact 14-5: Improperly abandoned wells could transport recycled water used for irrigation directly to the groundwater aquifer.

Numerous functioning and abandoned water wells exist in the project area, reflecting the history of agricultural and residential land uses in the Antelope Valley. There is a possibility that previously unidentified wells may also exist in the project area. These old wells may be improperly abandoned and could act as conduits for recycled water to enter the groundwater. This could cause a significant impact to groundwater quality since much of the water consumed by residential uses and used by agriculture in the region is pumped from the underground aquifer.

The number of unrecorded wells in the project area is unknown. Implementation of the following mitigation measures would reduce the risk of potential groundwater contamination via existing well shafts.

Mitigation Measures

Mitigation Measure 14-6: District No. 20 shall identify and properly abandon groundwater wells in the proximity of the proposed project operations in conformance with Title 22 Article 4 and any local requirements in coordination with the RWQCB-LR.

Mitigation Measure 14-7: Title 22 requirements shall be used to determine the appropriate distance between agricultural irrigation activities and separating water wells.

Significance After Mitigation

Less than significant.

Impact 14-6: Project facilities located in a floodplain could redirect floodwaters and cause localized flooding.

FEMA's 100-year flood hazard zones are depicted in Figure 14-2. Storage reservoirs constructed within a 100-year floodplain could displace or redirect flood waters onto areas not currently within the floodplain. Floodwaters could potentially inundate roadways. As part of the project, each of the storage reservoirs would be designed with flood diversion features capable of directing flood waters around the berms and back into the flood way. Velocity dissipation features would be required to minimize scouring caused by channelizing floodwaters.

The storage reservoir levees would be designed to minimize the potential for failure in compliance with the California Building Code and Title 23, Chapter 15, Article 4. If storage reservoirs are constructed within the FEMA-designated flood plain, District No. 20 would be required to submit a Letter of Map Revision to FEMA to update the 100-year flood plain base flood elevation in the affected areas. Implementation of the following mitigation measure would ensure that the storage reservoirs are constructed to minimize flooding and scouring.

Much of the proposed agricultural lands are within the FEMA-designated 100-year floodplain. The agricultural operations would not alter the floodplain. During large flood events the fields could be inundated with sheet flow, as is currently the case. The agricultural fields would not adversely affect the floodplain or increase flood hazards in the region.

<u>Mitigation Measures</u>

Mitigation Measure 14-8: District No. 20 shall incorporate engineering considerations in reservoir design to accommodate floodwaters to prevent road inundation and minimize scouring.

Significance After Mitigation

Less than significant.

Impact 14-7: Construction of treatment facilities would increase the impervious surface area at the PWRP, increasing storm water runoff volumes.

Construction of new treatment facilities would increase impervious surfaces on the treatment plant property, which would result in greater volumes of storm water runoff generated from the site. However, the site is currently mostly paved or developed. Storm water drains off site and to culverts following roadways. No storm drain system exists in the area around the PWRP. The project would increase runoff only slightly and would not overwhelm the existing culverts and sheet flow drainages.

<u>Mitigation Measure</u>

No mitigation measures are required.

Significance of Impact

Less than significant.

Impact 14-8: Eliminating application of treated effluent above the agronomic rate will reduce the amount of water recharged into the ground. This could adversely affect groundwater levels and local water supplies.

Past and current effluent management practices at the PWRP include agriculture above agronomic rates during periods when effluent volumes exceeded the water demands of agricultural sites. The land application method promotes infiltration through the relatively coarse alluvial formations to the groundwater beneath the EMS at approximately 300 feet bgs. While the exact amount of water reaching the groundwater basin is difficult to quantify, groundwater elevation surveys (see Figure 14-5) show elevated groundwater levels under the EMS, indicating that measurable recharge is occurring. After taking into account evaporative losses, approximately 800 af of effluent applied to agricultural areas above agronomic rates is projected to infiltrate into the ground in 2005.[15]

Groundwater in the region has been documented as being in an overdraft condition. Reducing a recharge source would be considered a significant impact. However, the PWRP 2025 Plan and EIR would provide recycled water for agricultural and municipal reuse to offset future demands on the Antelope Valley's limited groundwater supplies. Therefore, reducing the incidental infiltration would not adversely affect the regional water balance.

Farming in the region is expanding, relying extensively on groundwater pumping. The PWRP 2025 Plan and EIR would provide recycled water to offset a portion of the future farming and municipal irrigation demand. The recycled water will be used in place of groundwater. Therefore, the PWRP 2025 Plan and EIR

[15] *Derived from land application estimates in the District No. 20 2005 Annual Cropping Plan.*

would provide an in lieu use that would more than offset the elimination of the incidental recharge that has been occurring.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Less than significant.