State of California
California Regional Water Quality Control Board
Santa Ana Region

May 3, 2019

Staff Report

ITEM: 11

SUBJECT: Update on Amending the Septic Tank Prohibition in Quail Valley, City of Menifee, Riverside County

1 Introduction

Quail Valley is a community within the City of Menifee in Riverside County and is upgradient of Canyon Lake, a recreational and drinking water reservoir. Residential subsurface disposal systems (septic systems) in the area have failed during heavy rainstorms, resulting in sewage backing up into residences and sewage or grey water at the ground surface level. These systems were generally failing due to high groundwater, poor soil conditions, shallow impermeable strata, and poor design and maintenance.

During the winter of 2004/2005, a series of prolonged rain events caused a number of septic system failures. The resulting flows and pooling of sewage and/or grey water in Quail Valley caused the Santa Ana Regional Water Quality Control Board (Regional Water Board) to take regulatory action. On October 3, 2006, the Regional Water Board adopted Resolution No. R8-2006-0024 that amended the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan[1]) to establish a prohibition on waste discharges from new septic systems in Quail Valley. The Quail Valley Prohibition became effective on August 20, 2007 after it was approved by the State Water Resources Control Board (State Water Board) and the California Office of Administrative Law. Pursuant to the Prohibition, discharges from new septic systems could only be considered after the local sewering agency made progress on providing sewer service to the areas of high density lots, specifically subareas 4 and 9 of Quail Valley.

Various agencies, including Regional Water Board staff, Eastern Municipal Water District (EMWD), the County of Riverside, and the City of Menifee, have been working to address the sewering requirements of the prohibition. The major challenge was funding projects. In 11 years, EMWD secured $8 million from the State Water Board, $1.93 million from the Santa Ana Watershed Project Authority, and $455,814 in Supplemental Environmental Project funds from the Regional Water Board. These funds allowed EMWD to extend the main sewer line to Quail Valley, providing sewer connections to 216 parcels in Subarea 9. Additional projects will be completed as additional funding becomes available.

On April 22, 2016, Regional Water Board staff provided an update on the status of the Quail Valley Prohibition, including efforts by EMWD, to provide sewer service to portions of the

[1] Abbreviations, Acronyms, and Descriptions are provided at the end of the Staff Report.

community. The Regional Water Board directed staff to consider preparing exemption criteria to the Prohibition and to consider the following elements:

A. Allow for exemptions to the prohibition of discharges from new septic systems in seven of the nine subareas of Quail Valley, specifically excluding the high-density subareas 4 and 9.

B. Require increased maintenance protocols for existing septic systems in subareas 4 and 9.

At the September 7, 2018 Regional Water Board meeting, staff provided an update on the status of revising the Prohibition. The recommendations discussed in 2018 were based on requiring minimum lot sizes. Part of the basis for the lot sizes was the 0.5-acre minimum lot size that the Regional Water Board adopted on October 13, 1989 under Resolution No. 89-157. This requirement was based on protecting underlying groundwater from excessive nitrate nitrogen levels in septic system effluent. An equation for nitrate-nitrogen based on site-specific and literature input values was used to determine that a minimum lot size of 0.5 acre would protect groundwater nitrate-nitrogen water quality.

In 2012, the State Water Board adopted a statewide Onsite Wastewater Treatment System (OWTS) Policy (Resolution No. 2012-0032). The OWTS Policy allows local permitting agencies to develop Local Agency Management Programs (LAMPs) that establish requirements for new and replacement systems. Where approved LAMPs are in place, the OWTS Policy required the Regional Water Board to rescind the minimum lot size requirements from the Basin Plan. This rescission was done in 2014 (Resolution No. R8-2014-0005). As a result of the rescission of these lot size requirements and further investigations on scientific evidence, the basis of the initial proposal of exemptions based on lot sizes needed to be reconsidered.

This report provides an overview of water quality problems discussed in the 2006 Quail Valley Prohibition, explains the rationale for a revised Prohibition exception focused around nitrogen and groundwater impacts, and describes options to address water quality issues while expanding exceptions to allow discharges from new septic systems.

2 2006 Prohibition

The 2006 Quail Valley Prohibition staff report identifies several water quality issues that resulted from septic system failures to support the need for the Quail Valley Prohibition. These water quality problems are summarized in Table 1. Since the adoption of the Prohibition, local agency actions, as well as the adoption of the statewide OWTS Policy, address many of these issues. Nitrogen loading, however, is not being addressed. Nevertheless, other options, such as minimum lot size requirements and advanced treatment systems can reduce this type of loading into the groundwater.

Table 1. Water quality issues associated with failing septic systems in Quail Valley, as identified in Resolution No. R8-2006-0024, and the entities that will address the issues for new discharges from septic systems.

Stated Reasons for Prohibition	City of Menifee[1]	County of Riverside[2]	Regional Water Board[3]
Septic system failure due to poor soil conditions	Ordinance 650, sewage discharge	Local Agency Management Program (LAMP)*	Onsite Wastewater Treatment System Policy (OWTS Policy)
Septic system failure due to high groundwater levels	• Ordinance 650	• LAMP*	• OWTS Policy
Septic system failure due to hydraulic overload (undersized systems)	• Ordinance 650	• LAMP*	• OWTS Policy
Bacterial problems in surface and ground waters in Quail Valley	• Ordinance 650	• LAMP*	• OWTS Policy • Waste Discharge Requirements (WDR) • National Pollutant Discharge Elimination System (NPDES) Phase I MS4 Permit
Bacterial problems in Canyon Lake	• Ordinance 650	• LAMP*	• OWTS Policy • WDR • MS4 Permit
Nitrogen loading to ground and surface waters as the result of septic system use in Quail Valley	--	--	• MLSR / ATU* • TMDL • WDR • NPDES

* Denotes the primary program addressing the problem.

[1] The City of Menifee has an agreement with the County of Riverside for the County to provide Plan Check, Planning review, and OWTS install services for septic systems within the City.

[2] The City of Menifee has an agreement with the County of Riverside to permit septic systems. The City is ultimately the responsible party for all the County of Riverside's roles.

[3] The Regional Water Board's regulatory tools include National Pollutant Discharge Elimination System permits, Waste Discharge Requirements, Water Reclamation Requirements, Water Quality Certifications, and Waste Discharge Prohibitions.

2.1 General Siting and Design Issues

General siting and design issues exacerbated three problems identified in the 2006 Prohibition: soil conditions unsuitable to support septic system function, high groundwater levels in certain areas of Quail Valley, and undersized systems.

2.1.1 Resolution No. R8-2006-0024 Problem Statements Regarding Unsuitable Soil Conditions, High Groundwater Levels, and Hydraulic Overloads

- **Unsuitable Soil Conditions**

  Some soils are less suited to support septic system functions. The lack of fine soil results in fast percolation and poor filtration, while too much fine soil prevents wastewater from percolating and may cause surfacing of that wastewater. Shallow bedrock or other impermeable strata may also cause surfacing of wastewater.

- **High Groundwater Levels**

  Prior to the adoption of the statewide OWTS Policy and the County of Riverside's LAMP, the Regional Water Board's Guidelines for Septic Systems (1979) required a 10-foot separation between the ground surface and anticipated high groundwater and a 5-foot separation between the bottom of the disposal facilities and anticipated high groundwater.

  During inspections of the Quail Valley area by County Health and Regional Water Board staff from March 2004 to June 2005, it was noted that there were several locations with natural springs and surfacing groundwater. At a few locations, septic tank effluent surfaced, and grey-water discharges occurred (during a one-day survey on March 15, 2005 by County Health staff, at least 37 sites had domestic wastewater discharges to the ground surface).

- **Septic System- Failure Due to Hydraulic Overload (Undersized Systems)**

  Hydraulic overload to septic systems in Quail Valley was caused by both the high density of septic systems (particularly in subareas 4 and 9) and the number of residents in these subareas: Septic systems on small lots and more people in a household than can be accommodated by the septic system design capacity can exacerbate the septic system failure rates.

2.1.2 Septic System Siting and Design

- **City of Menifee**
  - <u>Agreement with County of Riverside</u>

    The City of Menifee has an agreement with the County of Riverside's Department of Environmental Health for the County to provide plan check, installation oversight, and planning review for septic systems located within the City of Menifee.

- **County of Riverside – LAMP**

  - Unsuitable Soil Conditions

    The County of Riverside's LAMP addresses minimum siting and design requirements in Chapter 2, Onsite Wastewater Treatment System Report for Single Lots, and Chapter 5, Design Requirements for Conventional Onsite Wastewater Treatment Systems (OWTS). The requirements will restrict the placement of septic system in a location with unsuitable soil conditions.

  - High Groundwater Level

    Avoiding the placement of new septic systems in areas with high groundwater is addressed by the County of Riverside's LAMP, which specifies requirements in Chapter 4, Special Testing for High Groundwater or Perched Water Areas, and Chapter 5, Design Requirements for Conventional Onsite Wastewater Treatment Systems (OWTS).

  - Septic System Failure Due to Hydraulic Overloads (Undersized Systems)

    The LAMP contains minimum requirements in Chapter 5, Design Requirements for Conventional Onsite Wastewater Treatment Systems (OWTS) that establishes the requirement for adequately sized systems.

- **State Water Board**

  - Onsite Wastewater Treatment Policy

    The statewide OWTS Policy establishes minimum design requirements should a LAMP not be in effect.

2.1.3 Ongoing Oversight of Septic Systems

- **City of Menifee**

  The City of Menifee incorporated County of Riverside ordinances into their City ordinances.

  - Conventional Treatment Systems

    There are no minimum maintenance or permitting requirements for conventional septic systems.

  - Advanced Treatment Systems

    Ordinance No. 650, Section 5, Advanced Treatment Units (ATU): All new or repaired Alternative OWTS must have an annual operating permit; quarterly evaluations, direct visual inspections every six months, and annual maintenance by a qualified service provider; and be cleaned/maintained at least every five years. During the annual renewal of the operating permit, the property owner must supply proof of a

maintenance agreement and any evaluation/inspection reports. The ATU is subject to annual inspections by the City of Menifee.

2.1.4 Response to Septic System Failures

- **City of Menifee**
  - Ordinance No. 650 (Sewage Discharge), Section 7 (OWTS Failure)

    In the event of an OWTS failure, the City will require the property owner to abate the failure or the City will perform the action and collect the costs from the property owner, as identified in Ordinance No. 725.

  - Ordinance No. 725 (Procedures and Penalties for Violations)

    The City may issue a Notice of Violation or abate the septic system failures with cost recovery from the property owner.

  - Order No. R8-2010-0033, Phase I MS4 NPDES Permit: Section X

    "Sewage Spills, Infiltration Into the MS4 Systems from Leaking Sanitary Sewer Lines, Septic System Failures, and Portable Toilet Discharges," of the "National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the Incorporated Cities of Riverside County Within the Santa Ana Region" requires the City of Menifee to maintain an inventory of all septic systems since the City's incorporation in 2008 and to swiftly respond to failing septic systems.

  - Statewide Onsite Wastewater Treatment Policy

    Tier 4 of the OWTS Policy establishes requirements for OWTS that require corrective action.

2.2 Bacterial Issues in Quail Valley and Canyon Lake

Bacterial quality has been a concern in both Quail Valley and Canyon Lake. In Quail Valley, discharge from failed septic systems has surfaced, resulting in elevated bacterial levels in ponded water. When the prohibition was adopted in 2006, Canyon Lake was included on the Clean Water Act section 303(d) List of Impaired Waters due, in part, to elevated levels of bacteria, so there was a concern about surface flows with elevated bacterial levels reaching Canyon Lake.

The following two tables are sample results from surface water samples collected in February 2019 from ephemeral streams in Quail Valley by Regional Water Board staff and surface water samples collected from Canyon Lake by EWMWD staff. The results showed that the indicator bacteria, *E. coli*, was elevated in Quail Valley. The use of surfactants (methylene blue active substances [MBAS]) is an analysis tool to detect foaming agents, like detergents, which indicate the influence of household discharges on the sample results.

Table 2. Sample results from surface water samples collected by Regional Water Board staff on February 6, 2019, following multiple rain events.

Constituent	Units	Basin Plan Inland Surface Waters – Water Quality Objectives	Sampling Location Names					
			North to South – Quail Valley Subarea 4 "grid" area to City of Canyon Lake					Eastern Quail Valley
			5	4	3	6	2	1
***E. coli* – single sample maximum, Tier D**	MPN/100 mg/L	409	540	920	170	920	49	170
Surfactants (MBAS)	mg/L	0.05	0.078	0.107	0.154	0.092	0.089	0.078

EVMWD collects periodic surface water samples to analyze for *E. coli* from seven locations around Canyon Lake. The following table represents where influence from Quail Valley surface flows would be the greatest. The majority of Quail Valley, including the drainage that passes through the "grid" of Subarea 4, enters Canyon Lake at Sierra Park. A portion of southeastern Quail Valley flows to Fairweather Drive.

Table 3. Sample results from Canyon Lake surface water samples collected by Elsinore Valley Municipal Water District.

Sampling Location	Constituent	Units	Basin Plan Inland Surface Waters – Water Quality Objective	1/22/2019	3/13/2019	4/1/2019
Sierra Park	E. coli – single sample maximum, Tier A	MPN/ 100 mg/L	235	22	25	3
Fairweather Drive				20	4	225

2.2.1 Resolution No. R8-2006-0024 Problem Statements Regarding Bacterial Problems in Surface and Ground Waters in Quail Valley

- **Quail Valley**

  Subarea 4 (the high-density "grid" Area of Quail Valley) does not have storm drain systems. Therefore, surface runoff from the area either ponds in land depressions or flows into ephemeral streams in the area and ultimately into Canyon Lake. Surface and groundwater samples collected from the Quail Valley area by County Health and Regional Water Board staff indicated high bacteria levels in the surface runoff and in groundwater.

- **Canyon Lake**

  Canyon Lake was posted to prohibit body contact during the 2004-2005 rainy season for 145 days due to high bacteria levels. These postings were due to bacteria from diverse sources, including bacteria from septic system failures in Quail Valley. City of Canyon Lake and Regional Water Board staff conducted a surveillance of the bacteria laden surface runoff from Quail Valley downhill and discharging into Canyon Lake.

In March 2004, staff walked along these discharges from their discharge point into Gold Cove area of Canyon Lake to their origination point in Quail Valley and noted the discharges into these streams came from failing septic systems in Quail Valley. On January 4, 2005, County Health staff collected samples from these streams in Quail Valley area and confirmed high bacteria levels in these streams. These investigations determined that the runoff in drainage channels from Quail Valley to Canyon Lake contained high levels of Enterococcus bacteria. Other sources of bacteria into Canyon Lake include runoff into the Lake from San Jacinto River and Salt Creek.

EVMWD and the City of Canyon Lake routinely monitor water quality in Canyon Lake. These monitoring results indicated that the bacteria levels in the Lake have exceeded the DHS guidelines for body contact recreation a number of times. Some of these exceedances were traced back to runoff resulting from septic system failures in the Quail Valley area. However, while the causes of all the exceedances could not be fully established, a number of them have been directly linked to septic system failures in Quail Valley.

- Delisting from the Clean Water Act section 303(d) List of Impaired Waters

  Canyon Lake was listed on the 303(d) List as being impaired by pathogens in 1998. The category name was changed from “pathogens” to “indicator bacteria” for the 2014/2016 Integrated Report, when Canyon Lake was also delisted from the 303(d) list for elevated bacteria levels.

  The delisting of Canyon Lake for Indicator Bacteria in the 2014-2016 Integrated Report was approved by the Regional Water Board under Resolution No. R8-2017-0013 on April 28, 2017, approved by the State Water Board under Resolution No. 2017-0059 on October 3, 2017, and was approved by the U.S. Environmental Protection Agency on April 6, 2018.

2.2.2 Septic System Siting and Design

- **City of Menifee**
  - Agreement with County of Riverside

    The City of Menifee has an agreement with the County of Riverside’s Department of Environmental Health for the County to provide plan check, installation oversight, and planning review for septic systems located within the City of Menifee.

- **County of Riverside**
  - LAMP

    The County of Riverside’s Local Agency Management Program addresses minimum site conditions and system sizing requirements, which cumulatively address the components of wastewater treatment for bacteria.

2.2.3 Ongoing Oversight of Septic Systems

- **City of Menifee**

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  - Conventional Treatment Systems

    There are no minimum maintenance or permitting requirements for conventional septic systems.

  - Advanced Treatment Systems

    Ordinance No. 650, Section 5, Advanced Treatment Units: All new or repaired Alternative OWTS must have an annual operating permit; quarterly evaluations, direct visual inspections every six months, and annual maintenance by a qualified service provider; and be cleaned/maintained at least every five years. During the annual renewal of the operating permit, the property owner must supply proof of a maintenance agreement and any evaluation/inspection reports. The ATU is subject to annual inspections by the City of Menifee.

2.2.4 Response to Septic System Failures

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  - Order No. R8-2010-0033, Phase I MS4 NPDES Permit: Section X

    "Sewage Spills, Infiltration Into the MS4 Systems from Leaking Sanitary Sewer Lines, Septic System Failures, and Portable Toilet Discharges," of the "National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the Incorporated Cities of Riverside County Within the Santa Ana Region" requires the City of Menifee to maintain an inventory of all septic systems since the City's incorporation in 2008 and to swiftly respond to failing septic systems.

  - Statewide Onsite Wastewater Treatment Policy

    Tier 4 of the OWTS Policy establishes requirements for OWTS that require corrective action.

2.3 Nutrient Loading to Ground and Surface Waters as the Result of Septic System Use in Quail Valley

Upon the discharge of waste from a treatment system to the soil, the biological processes in the soil continue to treat the effluent. Bacteria have a greater residency time in the soil. Some nutrients, such as nitrogen, tend to move through the area of biological activity at a faster rate and aren't acted upon to the same extent as bacteria. This may lead to elevated concentrations of various forms of nitrogen in surfacing effluent and in groundwater.

2.3.1 Resolution No. R8-2006-0024 Problem Statement Regarding Nutrient Problems in Surface and Ground Waters in Quail Valley

Total nitrogen in septic system effluent typically ranges from 40 to 60 mg/l. Taking the average of 50 mg/l N, and the calculated average wastewater flow rate of 239.4 gpd/residence, the annual nitrogen loading from the existing residences in Quail Valley is estimated at over 52,000 pounds. Groundwater in the Quail Valley area is tributary to the Elsinore Groundwater Management Zone, which lacks assimilative capacity for nitrate-nitrogen inputs (i.e., the established nitrate-nitrogen objective for this Management Zone is being exceeded). Groundwater also surfaces in the Quail Valley area and contributes to surface water flows that are tributary to Canyon Lake. Septic system failures also result in surface water discharges of wastewater that affect Canyon Lake. When the prohibition was adopted, Canyon Lake was on the Clean Water Act section 303(d) list of Impaired Waters for both nutrients and bacteria. A Nutrient Total Maximum Daily Load (Nutrient TMDL) was established for Canyon Lake under Regional Board Resolution No. R8-2004-0037, which identified septic systems as a source of nitrogen to the lake and, accordingly, includes load allocations for septic systems that require reductions in nutrient inputs.

2.3.2 Nutrient Loading to Surface Waters

The following are February 2019 sample results from surface water samples collected in Quail Valley by Regional Water Board staff. Sample collection sites 2-5 were collected from an ephemeral stream that flows through the "grid" area of Subarea 4 to Sierra Park in the City of Canyon Lake. Sample collection site 1 represents flow from the south eastern portion of Quail Valley.

Table 4. Sample results from surface water samples collected by Regional Water Board staff on February 6, 2019, following multiple rain events.

Constituent	Units	Water Quality Objectives and TMDL Numeric Targets	Sampling Location Names					
			North to South – Quail Valley Subarea 4 "grid" area to City of Canyon Lake					Eastern Quail Valley
			5	4	3	6	2	1
Nitrate as Nitrogen	mg/L	10[1]	4.29	5.77	4.51	5.91	6.30	3.10
Total Nitrogen	mg/L	0.75[2]	5.34	6.96	5.57	7.18	7.35	4.07
Total Phosphorus	mg/L	0.1[2]	0.305	0.381	0.334	0.367	0.282	0.142
Surfactants (MBAS)	mg/L	0.05[1]	0.078	0.107	0.154	0.092	0.089	0.078

[1] Water Quality Control Plan for the Santa Ana River Basin (Region 8), Chapter 4 – Water Quality Objectives for Inland Surface Waters

[2] Resolution No. R8-2004-0037, Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient Total Maximum Daily Loads (TMDLs) for Lake Elsinore and Canyon Lake, Numeric Targets

2.3.3 Nutrient Loading to Groundwater

The basis for the 2006 prohibition also identifies potential impacts to the Elsinore Groundwater Management Zone, which is downgradient to Quail Valley. Quail Valley, itself, is not within a groundwater management zone.

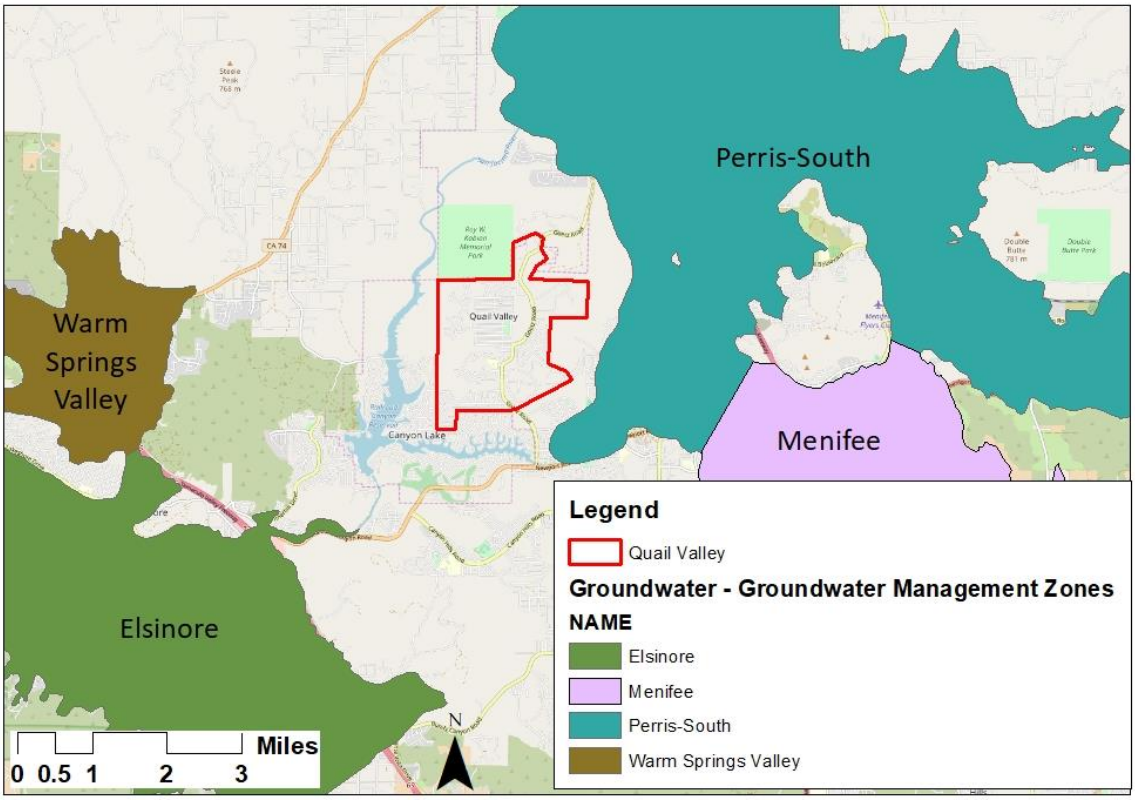

Figure 1. Quail Valley in relation to Groundwater Management Zones.

2.3.4 Nutrient Control Requirements

- **City of Menifee**

  - Order No. R8-2010-0033, NPDES Phase I MS4 Permit, Section VI, Effluent Limitations, Discharge Specifications and Other TMDL Related Requirements

    In general, non-point source discharges are covered under the Non-Point Source (NPS) program. However, Section VI(D)(2), Lake Elsinore/Canyon Lake (San Jacinto Watershed) Nutrient TMDLs, requires MS4 permittees to implement a Comprehensive Nutrient Reduction Plan (CNRP) to reduce urban sources of water quality objective exceedances. Section VII, Receiving Water Limitations, requires urban runoff to meet Water Quality Standards.

    It is important to note that Quail Valley's septic system nutrient impacts to groundwater are not addressed by the Canyon Lake Nutrient TMDLs, the MS4 Stormwater permit, the County of Riverside's LAMP or the City of Menifee's Ordinance.

3 Potential Alternatives to Protect Water Quality from Discharges from New Septic Systems in Quail Valley

There are various approaches to establishing a basis to balance protecting water quality with discharges from new septic systems. The final approach may be one of the following or a combination.

3.1 Minimum Lot Size Requirements

3.1.1 Description

As discussed previously, at the September 7, 2018 Board meeting, Board staff presented proposed amendment language that would be applied to Quail Valley as a whole, rather than distinguishing subareas. The initial proposed amendment language was the following:

- **All Households**
  All households must connect to the sewer, if available.

  Basis: This is a continuation of the existing language

- **New Septic Systems**
  - < 0.5-acre parcel: discharges from new septic systems are prohibited

    Basis of 0.5-acre Threshold: Half-acre minimum lot size requirement established in Regional Board Resolution No. 89-157.

- ≥ 0.5-acre & < 1.0-acre parcel: exempted from prohibition upon Regional Board approval

  Basis of 0.5-acre Threshold: Half-acre minimum lot size requirement established in Regional Board Resolution No. 89-157.

  Basis of 1.0-acre Threshold: Areas with septic system failures within the Santa Ana Region have a 1.0-acre minimum lot size requirement. This is a consistent continuation of that requirement.

- ≥ 1-acre parcel: exempted from prohibition

  Basis: Areas with septic system failures within the Santa Ana Region have a 1.0-acre minimum lot size requirement. This is a consistent continuation of that requirement.

- **New Subdivisions & Mergers**:

  2.5-acre minimum lot size requirement

  Basis: The statewide OWTS Policy bases minimum lot size requirements on rainfall totals, by whichthe minimum lot size requirement for Quail Valley's mean rainfall is 2.5 acres. This statewide policy is superseded by the County of Riverside's LAMP, which established a 0.5-acre minimum lot size requirement.

  Based on the inches of rain per year in Quail Valley, 0.5 acre lots are not assured to be protective of groundwater, so the statewide minimum of 2.5-acre lots are recommended for Quail Valley.

3.2 Monitoring and Oversight

3.2.1 Performance-Based Monitoring and Oversight

Required annual maintenance contract by property owner that includes sampling, lab analysis, and electronic reporting from the lab to the Regional Water Board via email.

3.2.2 Prescriptive Monitoring and Oversight

Periodic Regional Water Board sampling and subsequent coordination with City of Menifee if exceedances are observed.

3.3 Discharge Limitations

3.3.1 Critical Development Density

The critical development density is the density at which residential, conventional leach field septic systems may operate without exceeding the nitrate-nitrogen Water Quality Objective of 10 mg/L in groundwater. The following equation was used to establish the septic system density of 1 septic system per each 0.5-acre lot in 2009.

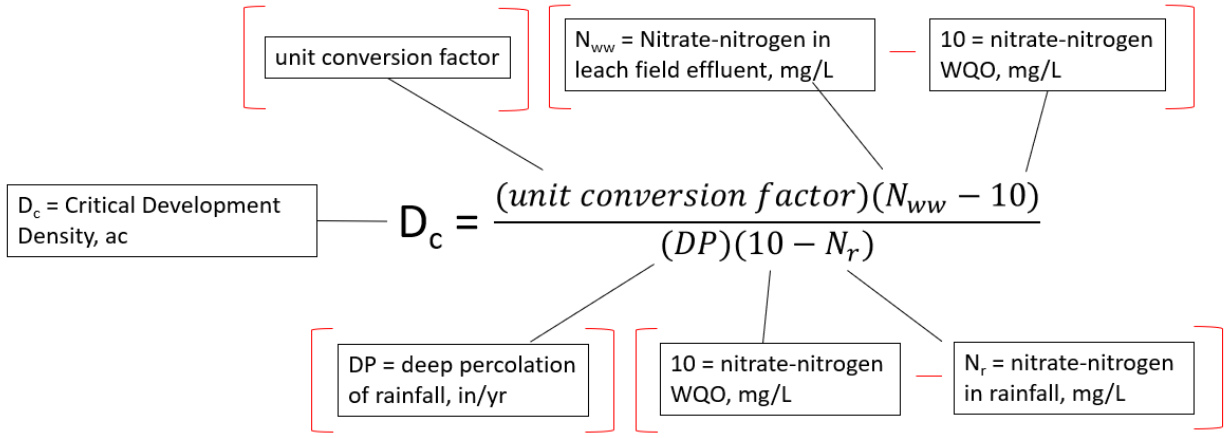

Figure 2. Critical Development Density equation.

This equation may be used to find the maximum nitrate-nitrogen effluent in septic system discharge by parcel size to approximate the critical development density for a conventional septic system. The critical development density is for gross area, including roadways, and the equation as used addresses net parcels, so it is conservative.

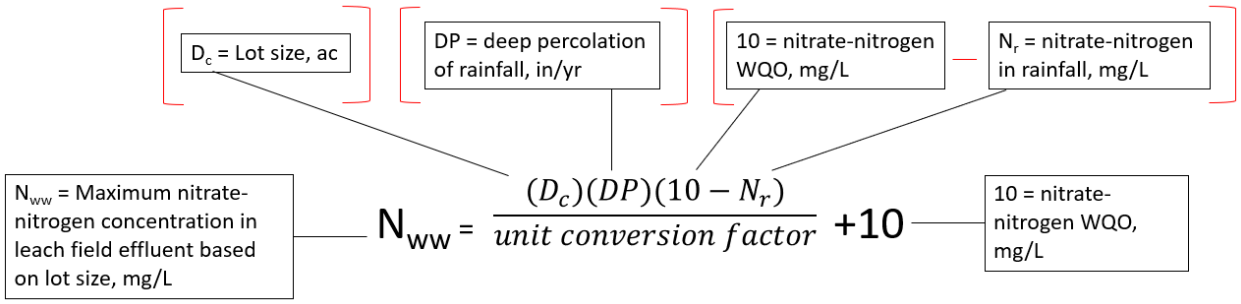

Figure 3. Critical Development Density equation used to determine maximum nitrate-nitrogen effluent limitations from residential lots smaller than the critical development density threshold.

- **Deep Percolation of Precipitation (DP in equations above)**

  Deep percolation is affected by the amount of precipitation losses due to evaporation and evapotranspiration and runoff from impervious areas. In a high-density development, the construction of roads, drive-ways, patios, sidewalks, etc., substantially reduces the area available for rainfall percolation, and the runoff from the area increases. The deep percolate is available for diluting the wastewater discharges from the septic systems.

  The deep percolation data for the inches per year of precipitation that reaches groundwater was referenced from the following two reports:

- Water Resources Engineers, Inc., (November 1970), Watershed Climate, Geohydrology and Water Quality; a Final Report on Task III-3 to the Santa Ana Watershed Planning Authority.

- Water Resources Engineers, Inc., (November 24, 1971), Percolation of Precipitation, Model Input Data Submitted to Santa Ana Watershed Planning Authority.

It appears that the deep percolation data was collected for a single project and not repeated. The 1970 and 1971 reports remain the most recent data.

There isn't data to determine a site-specific value for deep percolation in Quail Valley because the geology of the area doesn't lend itself to be a groundwater resource and the area isn't in a groundwater management zone. Review of Nitrate Problems in Ground Waters of the Santa Ana Region identified a mean deep percolation of 3.25 inches/year. The Resolution No. 89-157 staff report identified 3.72 inches/year, but the report doesn't discuss the discrepancy from the Nitrate report released the year before.

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TABLE 15[1]

Historical Relationship Between Precipitation and Deep Percolation
Santa Ana Region

Water Year	Precipitation MAF	Precipitation Inches[2]	Percolation MAF	Percolation Inches[3]
1950-51	0.305	8.8	0.0141	0.47
52	0.886	25.6	0.2893	9.70
53	0.421	12.1	0.0401	1.34
54	0.534	15.4	0.1322	4.43
55	0.443	12.8	0.0431	1.44
56	0.461	13.3	0.0960	3.22
57	0.431	12.4	0.0534	1.79
58	0.912	26.3	0.2516	8.45
59	0.229	6.6	0.0184	0.62
60	0.359	10.4	0.0265	0.89
Average		14.4		3.25

[1] Data from References 27, 28
[2] Water Bearing Area = 416,100 acres
[3] Area of Nodal Pattern = 356,000 acres
MAF = Million Acre-Feet

Figure 4. Table of data from A Review of Nitrate Problems in Ground Waters of the Santa Ana Region establishing a mean deep percolation rate for the Santa Ana RWQCB.

- **Groundwater Nitrate-Nitrogen Water Quality Objective**

  The Basin Plan Water Quality Objective in Groundwaters for nitrate-nitrogen is 10 mg/L.

- **Nitrate-Nitrogen in Precipitation (N_r in the equations above)**

  Generally, rain water contains O to 1 mg/L of nitrate-nitrogen. The 1989 A Review of Nitrate Problems in Ground Waters of the Santa Ana Region used 1 mg/l when calculating the critical development density to protect groundwater from septic system nitrate-nitrogen pollution. The Staff Report for Resolution No. 89-157, which established a Region-wide Minimum Lot Size Requirement, used 0.5 mg/L. A literature review suggests 0.5 mg/L is more accurate.

- **Discharge Rate**

Table 5. Updated waste discharge rate in OWTS Policy.

Source	Waste Discharge Rate
1989 Resolution No. 89-157	150 gallons/day/dwelling unit
2012 OWTS Policy[1]	250 gallons/day/dwelling unit

[1] **"Single-family dwelling unit"** means a structure that is usually occupied by just one household or family and for the purposes of this Policy is expected to generate an average of 250 gallons per day of wastewater (OWTS 2012).

- **Summary**

Table 6. Summary of values used in critical development density equation.

Category	Value	Source
Nitrate-nitrogen in wastewater treatment system effluent	40 mg/L	Resolution No. 89-157 Staff Report & literature review (1989)
Deep Percolation of Precipitation	3.25 inches/year	A Review of Nitrate Problems in Ground Waters of the Santa Ana Region (1989)
Groundwater nitrate-nitrogen Water Quality Objective	10 milligrams/liter	Basin Plan
Nitrate-nitrogen in precipitation	0.5 milligrams/liter	Resolution No. 89-157 Staff Report & literature review (1989)
Discharge Rate	250 gallons/day/dwelling unit Conversion factor: 3.3604	SWRCB's OWTS Policy (2012)

- **Minimum Lot Size for Convention Septic System**

  Using the equation in Figure 2 and data in Table 6, the critical density for septic systems is 3.2652 acres per dwelling unit.

Table 7. The proportional maximum nitrate-nitrogen effluent from lots less than 4.0 acres.

Lot Size (ac)	Proportional Nitrate-Nitrogen Discharge Maximum (mg/L)
0.0	10.00
0.1	10.92
0.2	11.84
0.3	12.76
0.4	13.68
0.5	14.59
0.6	15.51
0.7	16.43
0.8	17.35
0.9	18.27
1.0	19.19
1.1	20.11
1.2	21.03
1.3	21.94
1.4	22.86
1.5	23.78
1.6	24.70
1.7	25.62
1.8	26.54
1.9	27.46
2.0	28.38
2.1	29.29
2.2	30.21
2.3	31.13
2.4	32.05
2.5	32.97
2.6	33.89
2.7	34.81
2.8	35.73
2.9	36.64
3.0	37.56
3.1	38.48
3.2	39.40
3.2652	**40.00**
3.3	40.32

3.4	41.24
3.5	42.16
3.6	43.08
3.7	44.00
3.8	44.91
3.9	45.83
4.0	46.75

Table 8 indicates how a critical density of 3.2652 acres per dwelling unit affects the development potential of property owners in Quail Valley. Less than 2% of the undeveloped lots meet the critical development threshold.

Table 8. Percent of undeveloped lots in Quail Valley per 10th acre.

Acreage	Count	Count Below Threshold	Percent Below Threshold	Count Above Threshold	Percent Above Threshold
> 0.0 to 0.1	36	36	1.8%	2022	98.3%
> 0.1 to 0.2	1191	1227	60.7%	831	40.4%
> 0.2 to 0.3	435	1662	82.2%	396	19.2%
> 0.3 to 0.4	92	1754	86.7%	304	14.8%
> 0.4 to 0.5	41	1795	88.8%	263	12.8%
> 0.5 to 0.6	27	1822	90.1%	236	11.5%
> 0.6 to 0.7	16	1838	89.3%	220	10.7%
> 0.7 to 0.8	8	1846	89.7%	212	10.3%
> 0.8 to 0.9	47	1893	92.0%	165	8.0%
> 0.9 to 1.0	4	1897	92.2%	161	7.8%
> 1.0 to 1.1	14	1911	92.9%	147	7.1%
> 1.1 to 1.2	16	1927	93.6%	131	6.4%
> 1.2 to 1.3	15	1942	94.4%	116	5.6%
> 1.3 to 1.4	14	1956	95.0%	102	5.0%
> 1.4 to 1.5	8	1964	95.4%	94	4.6%
> 1.5 to 1.6	7	1971	95.8%	87	4.2%
> 1.6 to 1.7	2	1973	95.9%	85	4.1%
> 1.7 to 1.8	5	1978	96.1%	80	3.9%
> 1.8 to 1.9	1	1979	96.2%	79	3.8%
> 1.9 to 2.0	7	1986	96.5%	72	3.5%
> 2.0 to 2.1	4	1990	96.7%	68	3.3%
> 2.1 to 2.2	4	1994	96.9%	64	3.1%
> 2.2 to 2.3	2	1996	97.0%	62	3.0%
> 2.3 to 2.4	9	2005	97.4%	53	2.6%
> 2.4 to 2.5	5	2010	97.7%	48	2.3%
> 2.5 to 2.6	3	2013	97.8%	45	2.2%

> 2.6 to 2.7	1	2014	97.9%	44	2.1%
> 2.7 to 2.8	2	2016	98.0%	42	2.0%
> 2.8 to 2.9	0	2016	98.0%	42	2.0%
> 2.9 to 3.0	2	2018	98.1%	40	1.9%
> 3.0 to 3.1	4	2022	98.3%	36	1.7%
> 3.1 to 3.2	0	2022	98.3%	36	1.7%
> 3.2 to 3.3	**1**	**2023**	**98.3%**	**35**	**1.7%**
> 3.3 to 3.4	1	2024	98.3%	34	1.7%
> 3.4 to 3.5	3	2027	98.5%	31	1.5%
> 3.5 to 3.6	0	2027	98.5%	31	1.5%
> 3.6 to 3.7	0	2027	98.5%	31	1.5%
> 3.7 to 3.8	2	2029	98.6%	29	1.4%

4 Advanced Treatment Units

To allow as many property owners as possible to safely develop their land, advanced treatment systems could be allowed to reduce potential pollutant concentrations from septic system effluent. Discharges from advanced treatment units are less than 10 mg/L nitrate-nitrogen, so meeting the scaled threshold for smaller parcels is assumed for all advanced treatment units. The following are the costs associated with different waste treatment options.

4.1 Costs

The cost of the installation, annual permit fees, and service contracts for Advanced Treatment Units exceeds the typical cost of a sanitary sewer connection or convention septic system.

Table 9. Costs of wastewater disposal methods.

	Sanitary Sewer	Septic, Leach Field	Septic, Advanced (ATU)
Design Fee	$0	$600	$1,500
Testing Costs	$0	$1,800	$1,800
Permitting Costs	$0	$1,000	$1,300
Unit Cost	$2,500[1]	$2,000	$15,000 - $25,000
Connection/Installation	$8,930[2]	$5,000	$10,000
Service/Maintenance	$425/year	$100/year	$500/year
Annual Permit Fee	$0	$0	$200

[1] Material and installation cost of line from dwelling unit to sanitary sewer
[2] EMWD connection fee

5 Staff Recommendation

Because many of the historical reasons for the Quail Valley Prohibition are currently being addressed through other programs (e.g., the County of Riverside's LAMP or the City of Menifee ordinance), Staff recommends that revisions to the Quail Valley Waste Discharge Prohibition focus on the protection of the downgradient groundwater management zone from potential nutrient discharges from septic systems in Quail Valley. Staff's proposed approach would be to implement a minimum lot size requirements for any new septic systems within Quail Valley. For those lots that don't meet the minimum lot size requirement, Board staff would recommend that Advanced Treatment Units be required.

This is an information item and an opportunity for the Regional Board to provide input on Staff's proposed approach for revising the Quail Valley Prohibition. Board staff to prepare the necessary Basin Plan amendment documents based on Board feedback. There will be workshops, opportunities for public comment and a public hearing during the next 6-12 months.

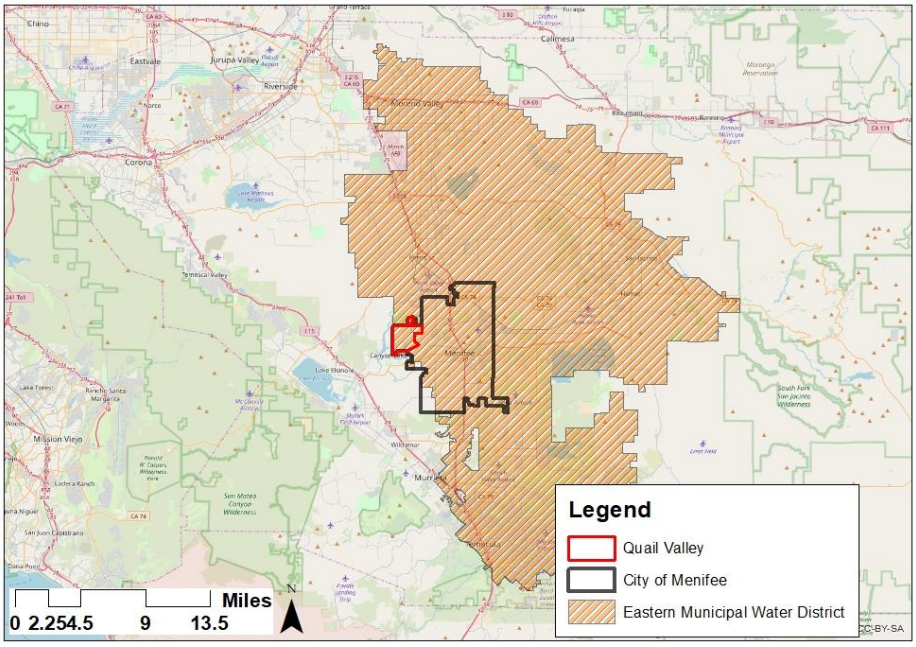
Abbreviations, Acronyms, and Descriptions

303(d) List The State's **Impaired Water Body** List

Basin Plan "Basin Plan" means the same as "water quality control plan" as defined in Division 7 (commencing with Section 13000) of the Water Code. Basin Plans are adopted by each Regional Water Quality Control Board, approved by the State Water Resources Control Board and the Office of Administrative Law, and identify surface water and groundwater bodies within each Region's boundaries and establish, for each, its respective beneficial uses and water quality objectives.

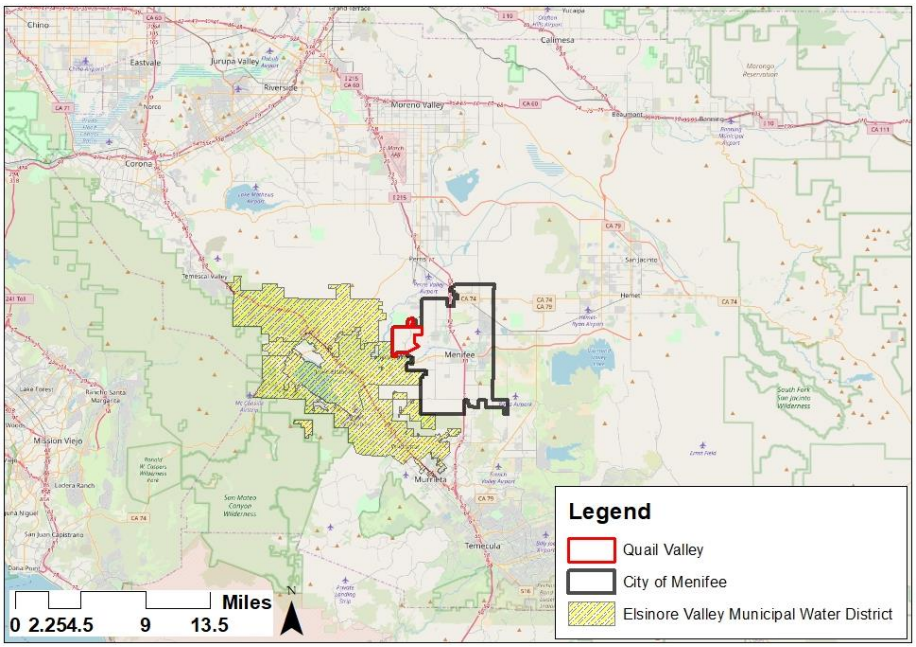
EMWD **Eastern Municipal Water District**

Eastern Municipal Water District (EMWD) provides water, recycled water, and wastewater services to approximately 825,000 people living and working within a 555-square mile service area in western Riverside County.



EVMWD **Elsinore Valley Municipal Water District**

Elsinore Valley Municipal Water District (EVMWD) provides water, water recycling, and wastewater services to approximately 45,000 water, wastewater and agricultural service connections.



Groundwater Water below the land surface that is at or above atmospheric pressure.

Groundwater Management Zones Groundwater Management Zones are distinguished by (1) separation by impervious rock formations or other groundwater barriers, such as geologic faults; (2) distinct flow systems defined by consistent hydraulic gradients that prevent widespread intermixing, even without a physical barrier; and (3) distinct differences in water quality. Groundwater flow, whether or not determined by a physical barrier. Water quality data were used to support understanding of the flow regime and to assure that unusually high- or poor-quality waters were distinguished for regulatory purposes.

Impaired Water Body Surface water bodies or segments thereof that are identified on a list approved first by the State Water Board and then approved by U.S. Environmental Protection Agency pursuant to Section 303(d) of the federal Clean Water Act.

LAMP	**Local Agency Management Program** To accommodate variations in geological and climatic conditions in California, the statewide Onsite Wastewater Treatment System (OWTS) Policy allows local agencies to submit management programs ("Local Agency Management Programs") for approval by Regional Water Quality Control Boards. Local agencies may use their approved LAMPs to manage the installation of new and replacement OWTS under that program.
Local Agency	Any subdivision of state government that has responsibility for permitting the installation of and regulating OWTS within its jurisdictional boundaries; typically, a county, city, or special district.
OWTS	**Onsite Wastewater Treatment System** Onsite wastewater treatment systems are individual disposal systems, community collection and disposal systems, and alternative collection and disposal systems that use subsurface disposal. A septic system is a type of OWTS.
OWTS, New	An OWTS permitted after May 13, 2013.
OWTS, Policy	On June 19, 2012, the State Water Board Resolution No. 2012-0032, adopting the Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (OWTS Policy). This Policy establishes a statewide, risk-based, tiered approach for the regulation and management of OWTS installations and replacements and sets the level of performance and protection expected from OWTS.
Regional Water Board	Santa Ana Regional Water Quality Control Board
Septic Tank	a watertight, covered receptacle designed for primary treatment of wastewater and constructed to: 1. Receive wastewater discharged from a building; 2. Separate settleable and floating solids from the liquid; 3. Digest organic matter by anaerobic bacterial action; 4. Store digested solids; and 5. Clarify wastewater for further treatment with final subsurface discharge.
State Water Board	State Water Resources Control Board

TMDL	**Total Maximum Daily Load** Section 303(d)(1) of the Clean Water Act requires each state to establish a TMDL for each impaired water body to address the pollutant(s) causing the impairment. In California, TMDLs are usually adopted as Basin Plan amendments and contain implementation plans detailing how water quality standards will be attained.
WDR	**Waste Discharge Requirements** An operation and discharge permit issued for the discharge of waste pursuant to Section 13260 of the California Water Code.