

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL
BOARD SAN FRANCISCO BAY REGION

STAFF SUMMARY REPORT (Cleet Carlton)
March 9, 2016

ITEM: 6

SUBJECT: **Zone 7 Water Agency, Concurrence with Findings of the Nutrient Management Plan for the Livermore Valley Groundwater Basin**
– Hearing to Consider Adoption of Tentative Resolution

DISCUSSION: The Tentative Resolution (Appendix A) would recognize the merits of the Livermore Valley Nutrient Management Plan (Nutrient Management Plan) and support efforts to increase the use of recycled water while protecting and enhancing groundwater resources in the Livermore Valley groundwater basin. The State Board's Recycled Water Policy, as amended in 2013, calls for local water and wastewater entities, together with local salt and nutrient contributing stakeholders, to develop salt and nutrient management plans for each groundwater basin/sub-basin in California to assess water quality and evaluate strategies for complying with salt and nutrient water quality objectives. The Nutrient Management Plan was prepared as an addendum to a 2004 Salt Management Plan for the Livermore Valley. The Nutrient Management Plan was prepared by the Zone 7 Water Agency (Zone 7) and adopted by its Board of Directors after a public hearing on June 17, 2015. The Nutrient Management Plan's Executive Summary is included as Appendix B.

The Nutrient Management Plan includes an analysis demonstrating that, if recycled water use increases as projected (from the 2013 level of 4,500 acre-feet to 7,300 acre-feet per year by 2050), the high quality groundwater in the Livermore Valley groundwater basin will be maintained and protected. For modeling and analysis purposes, Zone 7 subdivided the Livermore Valley into four sub-basins. Nutrient levels are predicted to decrease (improve) in two sub-basins largely due to the combination of groundwater pumping for municipal supply (which removes nutrients from the basin) and active groundwater recharge with high quality water from the State Water Project. Nutrient levels are projected to increase only slightly in the other sub-basins, mainly due to residential and commercial onsite wastewater treatment systems (OWTS) and agricultural and landscape irrigation/fertilizer application. Nutrient contributions from existing and projected landscape irrigation recycled water use are negligible. The Plan does not include any new implementation measures: it relies on best management practices for fertilizer/manure application, Water Board-issued WDRs for winery and other commercial/industrial waste discharges, and implementation of Alameda County and Zone 7 regulations and policies for OWTS.

Of interest are ten localized areas of concern (AOCs) with elevated nutrient levels (see Appendix B, Figure ES-1), which are believed to be vestiges of past

agricultural land uses and former municipal wastewater and sludge disposal. For these areas, Zone 7 identified the following additional measures:

- Recommended criteria for new and replacement OWTS for inclusion in Alameda County's Local Agency Management Plan, which should be submitted to the Board for consideration in May;
- OWTS monitoring requirements that could include new monitoring wells; and
- Identifying soil and groundwater sampling locations and other data needs to better understand the extent and source(s) of high nitrate concentrations.

Zone 7 is committed to reporting monitoring results in its annual Groundwater Monitoring Program report and collaborating with Board staff on the AOC investigations. We distributed the Tentative Resolution for public comment and received no comments. While we plan a brief presentation on this item, as does Zone 7, we expect this item to remain uncontested.

**RECOMMEN-
DATION:**

Adoption of the Tentative Resolution

Appendices:

- A. Tentative Resolution
- B. Livermore Valley Groundwater Nutrient Management Plan Executive Summary

CIWQS PLACE ID: 813043

APPENDIX A

TENTATIVE RESOLUTION

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

TENTATIVE RESOLUTION No. R2-2016-XXXX

**CONCURRENCE WITH FINDINGS OF THE
NUTRIENT MANAGEMENT PLAN
FOR THE
LIVERMORE VALLEY GROUNDWATER BASIN**

WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), finds that:

1. On May 14, 2009, the State Water Resources Control Board (State Water Board) adopted the “Policy for Water Quality Control for Recycled Water” (Recycled Water Policy; Resolution No. 2009-01 as amended by Resolution No. 2013-03¹). The Recycled Water Policy requires the State and Regional Water Boards to exercise the authority granted to them by the Legislature to the fullest extent possible to encourage the use of recycled water, consistent with State and federal water quality laws.
2. The Recycled Water Policy requires, among other things, that Salt and Nutrient Management Plans (SNMPs) be completed for all groundwater basins in California. It is the intent of the Recycled Water Policy that salts and nutrients from all sources be managed in a manner that ensures attainment of water quality objectives and protection of beneficial uses. The State Water Board found that the appropriate way to address salt and nutrient issues is through the development of regional or sub-regional salt and nutrient management plans rather than through imposing requirements solely on individual recycled water projects. The intent of the Recycled Water Policy is for local water and wastewater entities, together with contributing stakeholders, to develop a SNMP for each groundwater basin/sub-basin to assess water quality and evaluate strategies for complying with salt and nutrient water quality objectives.
3. The Zone 7 Water Agency (Zone 7) has actively managed groundwater in the Livermore Valley Groundwater Basin (California Department of Water Resources [DWR] Basin No. 2-10², herein the Livermore Valley Basin) for over 50 years. The Livermore Valley Basin encompasses an area of approximately 66 square miles in eastern Alameda County, extending 14 miles east to west and three to six miles north to south. The Livermore Valley Basin is divided into four sub-basins³ due to water quality and yield differences: the Main sub-basin, and the Northeast Fringe, North Fringe, and East Fringe sub-basins (Figure 1).
4. The Basin Plan designates the following existing beneficial uses for groundwater in the Livermore Valley Basin: Municipal and Domestic Supply, Industrial Service and Process Supply, and

¹ State Water Resources Control Board. *Recycled Water Policy, Resolution 2009-01*. Amended by Resolution 2013-0003. January 2013.

² DWR (California Department of Water Resources). 2003. California’s Groundwater Bulletin 118 Update 2003. October 2003.

³ The basins are herein referred to as sub-basins even though this is not a formal designation by DWR or within the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan), California Regional Water Quality Control Board, San Francisco Bay Region, amended March 20, 2015.

Agricultural Supply. Table 3-7 in the Basin Plan specifies Water Quality Objectives (WQOs) for nitrate (as NO₃, the primary nutrient of concern for the Livermore Valley Basin) in groundwater at 45 milligrams per liter (mg/L), for at least 90% of each year, in the Main and Fringe sub-basins.

5. Zone 7 developed a Nutrient Management Plan (NMP⁴,) for the Livermore Valley Basin with support and input from the Regional Water Board, the Alameda County Environmental Health Department (ACEH), the Alameda County Community Development Agency (Alameda CDA), Zone 7's Retailers (City of Livermore, City of Pleasanton, Dublin San Ramon Services District [DSRSD], and California Water Service), and other stakeholders. Zone 7 has filed a Notice of Exemption from the California Environmental Quality Act with the Alameda County Clerk-Recorder for the NMP.
6. The NMP was prepared as an addendum to Zone 7's Salt Management Plan (SMP) to address salt loading in the Livermore Valley Basin and to fulfill the requirements of the Regional Water Board's joint Master Water Recycling Permit (Order No. 93-159) and General Water Reuse Order (General Order No. 96-011). The SMP was approved by the Regional Water Board in 2005⁵. The SMP and the NMP are incorporated into Zone 7's Groundwater Management Plan (GMP) for the Livermore Valley Basin, which provides annual updates on the status of salt and nutrient management.
7. The NMP contains the following components in compliance with the Recycled Water Policy:
 - a) The NMP considers and proposes to manage nutrients from all sources, including recycled water projects, on a basin-wide basis in a manner that ensures attainment of WQOs and protects beneficial uses. The NMP finds that in 2013 the average nitrate concentrations in the Main and Fringe sub-basins were about 14 mg/L (compared to the nitrate water quality objective of 45 mg/L). This results in a baseline of 31 mg/L of existing assimilative capacity.
 - b) The NMP finds that recycled water projects in the Livermore Valley Basin are projected to increase from the current 4,500 acre feet per year (AFY) of recycled water applied as landscape irrigation to 7,300 AFY over the next 35 years. All projects will use tertiary-treated recycled water for landscape irrigation; none propose to use recycled water for direct aquifer recharge. Recycled water projects will offset an equivalent amount of potable water use. This offset is about 9 percent of the total potable water demand for the Livermore Valley Basin today and is projected to be 15% by 2050.
 - c) The NMP assesses changes in assimilative capacity related to recycled water projects and other nutrient sources. To predict future water quality conditions, Zone 7 used a mixing model and projected nutrient loading over a 35-year planning period (through 2050). Over that time, the model predicts that average nitrate concentrations will decrease in the Main and Northeast Fringe sub-basins, while increasing only slightly in the North and East Fringe sub-basins (by 3 mg/L, or 9% of assimilative capacity in the North Fringe sub-basin, and by 1 mg/L, or 3% of assimilative capacity in the East Fringe sub-basin). Furthermore, total nutrient loading associated with recycled water projects is less than 1% of the total loading from all other sources combined, including agricultural irrigation and fertilizer application, horse boarding facilities, and discharges from septic systems.

⁴ Nutrient Management Plan, Livermore Valley Groundwater Basin, Zone 7 Water Agency, July 2015.

⁵ San Francisco Bay Regional Water Quality Control Board Basin Plan General Update, Resolution No. R2-2005-0062, November 2005.

- d) The NMP finds that use of tertiary-treated recycled water for landscape irrigation as currently exists, and as projected in the Livermore Valley Basin, will 1) contribute only a minimal increase (<1 mg/L) in groundwater nitrate concentrations at urban build-out, 2) not use more than 20% of the available assimilative capacity, collectively, as specified in the Recycled Water Policy, and 3) not cause groundwater quality to exceed Basin Plan WQOs.
- e) The NMP includes a significant stormwater recharge component. Zone 7 artificially recharges the Livermore Valley Basin using natural stormwater runoff and imported water from the State Water Project, which is stored in and released from Lake Del Valle, to local streams and former gravel quarry pits for percolation to aquifers. Stormwater capture comprises about 15 percent of the total basin artificial recharge. The NMP also encourages continued use of existing low-impact development practices to increase the capture and infiltration of stormwater on a local scale.
- f) The NMP includes a monitoring plan that is adequate to provide a reasonable, cost-effective means of determining if nutrient concentrations are consistent with applicable WQOs. The groundwater quality monitoring program focuses on the Main sub-basin where groundwater is pumped for municipal uses, but monitoring stations are also located to assess conditions in the fringe sub-basins. Zone 7 samples groundwater at least annually from all accessible groundwater wells in the program. Samples are analyzed by Zone 7's laboratory for metals and general minerals including nitrate and phosphate. Monitoring results will be reported in Zone 7's annual GMP reports. At the same time, Zone 7 will continue to compile and review data on the volume and quality of wastewater collected and recycled within the Livermore Valley watershed.
- g) The NMP includes implementation measures to sustainably manage nutrient loading. The largest sources of nutrient loading in the Livermore Valley Basin include agricultural and landscape irrigation/fertilizer application, horse boarding facilities, and onsite wastewater treatment systems (OWTS). The NMP proposes to address the first two sources through the use of "best management practices" (BMPs) such as applying fertilizers at agronomic application. The NMP proposes to address OWTS sources as follows: 1) continued implementation of Zone 7's Wastewater Management Plan (WMP) policies that limit new development served by an OWTS to a minimum of one rural residential equivalence per five acres, 2) Regional Water Board-issued Waste Discharge Requirements (WDRs) for winery and other commercial/industrial waste discharges, 3) Zone 7 support for implementation of Alameda County's OWTS regulations, including scrutiny of any variances, and 4) Zone 7 recommendations to ACEH for special criteria and performance measures for new and replacement OWTS with advanced nitrogen-reducing treatment to be incorporated into Alameda County's Local Agency Management Program (LAMP), which is currently under development. The State Water Board's OWTS Policy sets forth a deadline of May 2016 for local agencies to submit LAMPs for Regional Water Board review and approval. In addition, Zone 7 will continue tracking land use changes to refine potential changes in future salt and nutrient loading estimates.
- h) The NMP is consistent with the goals and requirements of State Water Board Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (State Antidegradation Policy). The use of recycled water will produce minor effects that will not result in a significant reduction of water quality, and, therefore, a complete antidegradation analysis is not required. The State Water Board finds in the Recycled Water Policy that "The

use of recycled water in accordance with this Policy [Recycled Water Policy], that is, which supports the sustainable use of groundwater and/or surface water, which is sufficiently treated so as not to adversely impact public health or the environment and which ideally substitutes for use of potable water, is presumed to have a beneficial impact.” Under this presumption, any change in groundwater quality from increasing the use of recycled water in the Livermore Valley Basin is consistent with providing maximum benefit to the people of the State.

8. The NMP also identifies ten local Areas of Concern (AOCs) within the Livermore Valley Basin (see Figure 1) that exhibit nitrate concentrations above the Basin Plan’s WQO (45 mg/L as NO₃). These ten AOCs are believed to be vestiges of past agricultural land uses and processes and former municipal wastewater and sludge disposal practices; however, five of the areas are outside of municipal Urban Growth Boundaries where sewage disposal continues to be by OWTS. These include Happy Valley, Buena Vista, Mines Road, May School, and Greenville (Figure 1).
9. To address nitrate conditions in these areas, the NMP advocates an adaptive strategy that includes the following:
 - Zone 7 will recommend to ACEH special criteria in the five AOCs that are outside municipal urban growth boundaries to minimize nitrogen loading over time by requiring new or replacement OWTS with advanced nitrogen-reducing treatment when the opportunities arise.
 - Zone 7 will work with ACEH to develop an OWTS monitoring plan that may require that owners and developers install additional monitoring wells.
 - Zone 7 will identify data gaps and suggested locations and depths for new monitoring wells and/or soil borings for expedited groundwater sampling in the AOCs.
 - Zone 7 will continue to monitor groundwater quality and refine nitrate concentration maps to better understand the extent and source(s) of high nitrate concentrations in the AOCs and refine the extent of the special OWTS permitting areas.
10. A Substitute Environmental Document (SED) was prepared by the State Water Board for the Recycled Water Policy in accordance with the State Water Board’s certified regulatory program (Cal. Code Regs., Title 23, §§ 3775-3781). The State Water Board approved the Recycled Water Policy and the SED on May 14, 2009. Because the resolution falls within the scope of the Recycled Water Policy as analyzed by the State Water Board in the SED for the Recycled Water Policy, this resolution does not require further environmental review pursuant to CEQA (Pub. Res. Code § 21166). In addition, Zone 7 has filed a Notice of Exemption for the NMP. This resolution consists of only general descriptions of existing regulations and water quality information from the Livermore Valley NMP and does not include any regulatory changes. It therefore is not a “project” as defined in CEQA. There is no possibility that the activity in question may have a significant effect on the environment (Cal. Code Regs., Title 14, §§ 15378 and 15061, subd. (b)(3) and Cal. Code Regs., Title 23, § 3720).
11. Regional Water Board staff prepared and distributed for public comment this resolution on February 19, 2016. The resolution was distributed to Zone 7 and stakeholders for comment. No comments were received.
12. On March 9, 2016, the Regional Water Board, in a public meeting, heard and considered comments that pertain to the resolution.

NOW, THEREFORE, BE IT RESOLVED THAT, the San Francisco Bay Regional Water Board:

1. Recognizes the imperative for increased recycled water development and use in the San Francisco Bay Region and supports the proposed increase in recycled water use for landscape irrigation in the Livermore Valley Basin from 4,500 AFY today to 7,300 AFY by 2050;
2. Recognizes the benefits of developing and implementing salt and nutrient management plans for the preservation and/or enhancement of the quality of the Region's water resource;
3. Recognizes that Zone 7 has developed the Livermore Valley Basin NMP in a manner consistent with the Recycled Water Policy;
4. Recognizes that on a basin/sub-basin scale, water quality objectives are not exceeded, assimilative capacity for nutrients exists, and the recycled water projects will not use more than 20% of the assimilative capacity, collectively;
5. Recognizes that the NMP, including the identified steps to improve the understanding of water quality in the areas of high nitrate, provides an adequate, reasonable, and cost-effective means of monitoring and evaluating water quality to determine if nutrient concentrations are consistent with applicable water quality objectives;
6. Recognizes that there are ten localized AOCs, including five that are outside of municipal wastewater collection service areas, where shallow groundwater and domestic wells have been affected by high nitrate concentrations; these impacts are believed to be vestiges of past agricultural irrigation and fertilizer use and waste disposal practices and OWTS discharges;
7. Recognizes that the nitrate impacts within the localized AOCs do not appear to threaten the overall water quality of the basin/sub-basins;
8. Recognizes that Regional Water Board staff will work collaboratively with Zone 7 to investigate nitrate impacts within the localized AOCs;
9. Recognizes that the Regional Water Board will continue to permit, as appropriate, individual recycled water projects, regulate commercial/industrial waste discharges, and consistent with the OWTS Policy, regulate OWTS discharges;
10. Determines that at this time, existing implementation measures are adequate to ensure attainment of WQOs and protection of beneficial uses and that an implementation plan, pursuant to the Basin Plan, is not necessary because 1) water quality objectives are not exceeded or threatened to be exceeded on a basin/sub-basin scale, 2) assimilative capacity for nutrients (nitrate) exists, and 3) nutrient loading from all sources, including recycled water projects, is projected to have minimal effects on nitrate concentrations and assimilative capacity basin-wide;
11. Supports triennial review of the NMP, monitoring data, and new information by Regional Water Board staff to determine if an update to the NMP or any additional implementation actions are needed, based on changes in recycled water use, stormwater recharge quantities, or groundwater quality trends, on a basin/sub-basin scale or within the localized AOCs;

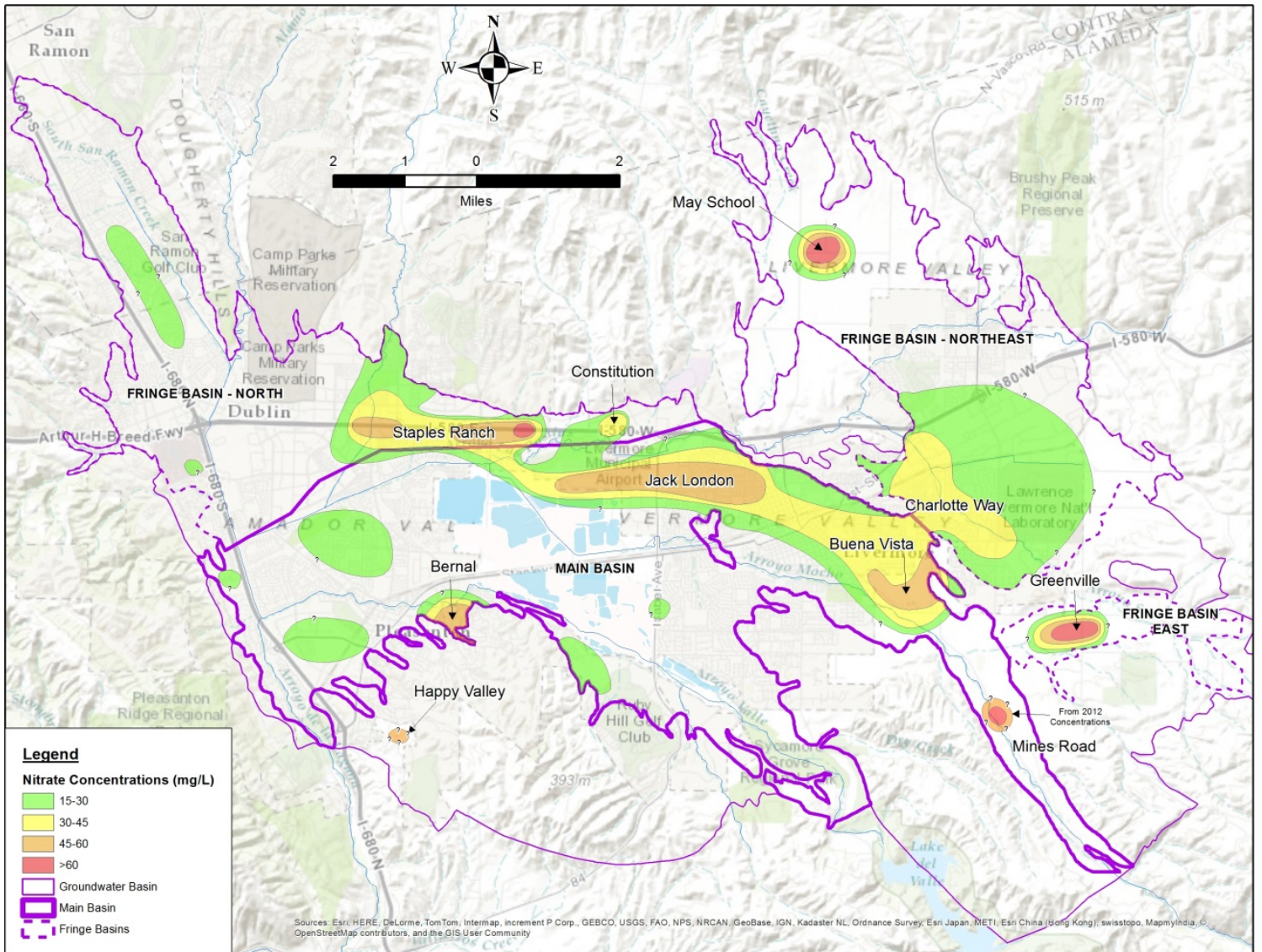
12. Supports the continued efforts of Zone 7's Salt and Nutrient Management Programs to implement its stated goal to "locally manage, protect, and enhance groundwater resources for all beneficial uses in a sustainable, environmentally sound, economical, and equitable manner for generations to come;" and
13. Recognizes that Regional Water Board staff will continue to work collaboratively with Zone 7 and other stakeholders to protect the beneficial uses of groundwater in the Livermore Valley Basin.

I, Bruce H. Wolfe, Executive Officer of the California Regional Water Quality Control Board, San Francisco Bay Region, do hereby certify that the foregoing is a full, true and correct copy of a resolution adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on March 9, 2016.

Bruce H. Wolfe
Executive Officer

Figure 1

Livermore Valley Groundwater Basin Showing Sub-basins and Areas of Concern with Nitrate Concentrations in Upper Aquifer



(July 2015 Nutrient Management Plan, Livermore Valley Groundwater Basin, Zone 7 Water Agency)

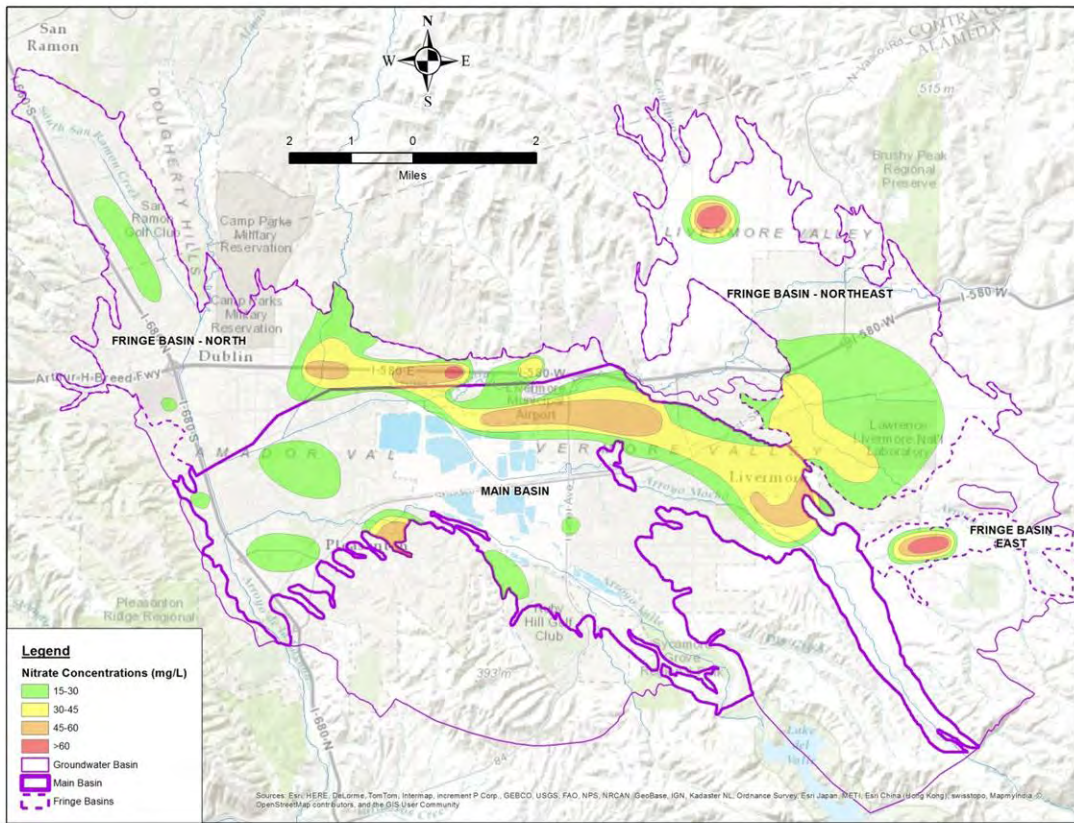
APPENDIX B

**LIVERMORE VALLEY GROUNDWATER NUTRIENT MANAGEMENT PLAN
EXECUTIVE SUMMARY**

NUTRIENT MANAGEMENT PLAN

LIVERMORE VALLEY GROUNDWATER BASIN

July 2015



PREPARED BY:

ZONE 7 WATER AGENCY
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ES Executive Summary

ES 1 Background

This Nutrient Management Plan (NMP) was developed for the Livermore Valley Groundwater Basin (California Department of Water Resources [DWR] Basin No. 2-10) by the Zone 7 Water Agency (Zone 7).

The NMP provides an assessment of the existing and future groundwater nutrient concentrations relative to the current and planned expansion of recycled water projects and future development in the Livermore Valley. The NMP also presents planned actions for addressing positive nutrient loads and high groundwater nitrate concentrations in localized Areas of Concern where the use of onsite wastewater treatment systems (OWTS) (i.e., septic tank systems) is the predominant method for sewage disposal.

The NMP was prepared as an addendum to Zone 7's Salt Management Plan (SMP) which was adopted by the Zone 7 Board of Directors in 2004 to address salt loading in the groundwater basin and to fulfill the requirements of the joint Master Water Recycling Permit (Order No. 93-159) and General Water Reuse Order (General Order No. 96-011). Because the SMP was incorporated into Zone 7's Groundwater Management Plan (GWMP) for the Basin in 2005, the NMP is now also incorporated into Zone 7's GWMP. This NMP is exempt from the California Environmental Quality Act, and a notice of exemption has been filed with the Alameda County Clerk-Recorder.

The State Water Resources Control Board (State Water Board) adopted a Recycled Water Policy in 2009 (State Water Board Resolution No. 2009-0011) and an amendment to the policy in 2013 (State Water Board, Resolution No. 2013-0003) to encourage and facilitate the increased use of recycled water statewide. The policy requires among other things, that Salt/Nutrient Management Plans (SNMP) be completed for all groundwater basins in California. With the addition of this NMP, Zone 7's SMP is akin to the SNMP required by the State's Recycled Water Policy.

The NMP was developed with support and input from the San Francisco Bay Regional Water Quality Control Board (Water Board), Alameda County Environmental Health Department (ACEH), Alameda County Community Development Agency (Alameda CDA), Zone 7's Retailers (City of Livermore, City of Pleasanton, Dublin San Ramon Services District [DSRSD], and California Water Service), and other stakeholders and interested public. For this purpose, several meetings were held with these stakeholders between June 2013 and June 2015.



ES 2 Groundwater Basin Characteristics and Nitrate Concentrations

The Livermore Valley Groundwater Basin is an inland alluvial basin underlying the east-west trending Livermore-Amador Valley (Valley) and Livermore Uplands in northeastern Alameda County. For this NMP, the groundwater basin has been divided into four basin areas:

- Main Basin
- Fringe Basin North
- Fringe Basin Northeast
- Fringe Basin East

The Main Basin has been further divided into an upper and lower aquifer. The Main Basin is a portion of the groundwater basin that contains the highest yielding aquifers and generally the best quality groundwater. It is an important source of drinking water for the communities that overlie it. The fringe basins contain slightly higher salinity water and generally yield low quantities of water to wells. Some groundwater flows from the Fringe Basin North into the Main Basin aquifer where it commingles with Main Basin groundwater, but it is believed that very little of the groundwater in the two eastern fringe basins commingles with Main Basin groundwater. The aquifers beneath the Livermore upland areas south of Livermore and Pleasanton typically only yield small amounts of groundwater to wells, and are not expected to be impacted by existing or planned recycled water projects; therefore, with the exception of the high OWTS use area of unincorporated Happy Valley, the upland portion of the groundwater basin is not addressed in this plan. The locations of the groundwater basin areas and Happy Valley are shown below in Figure ES-1.

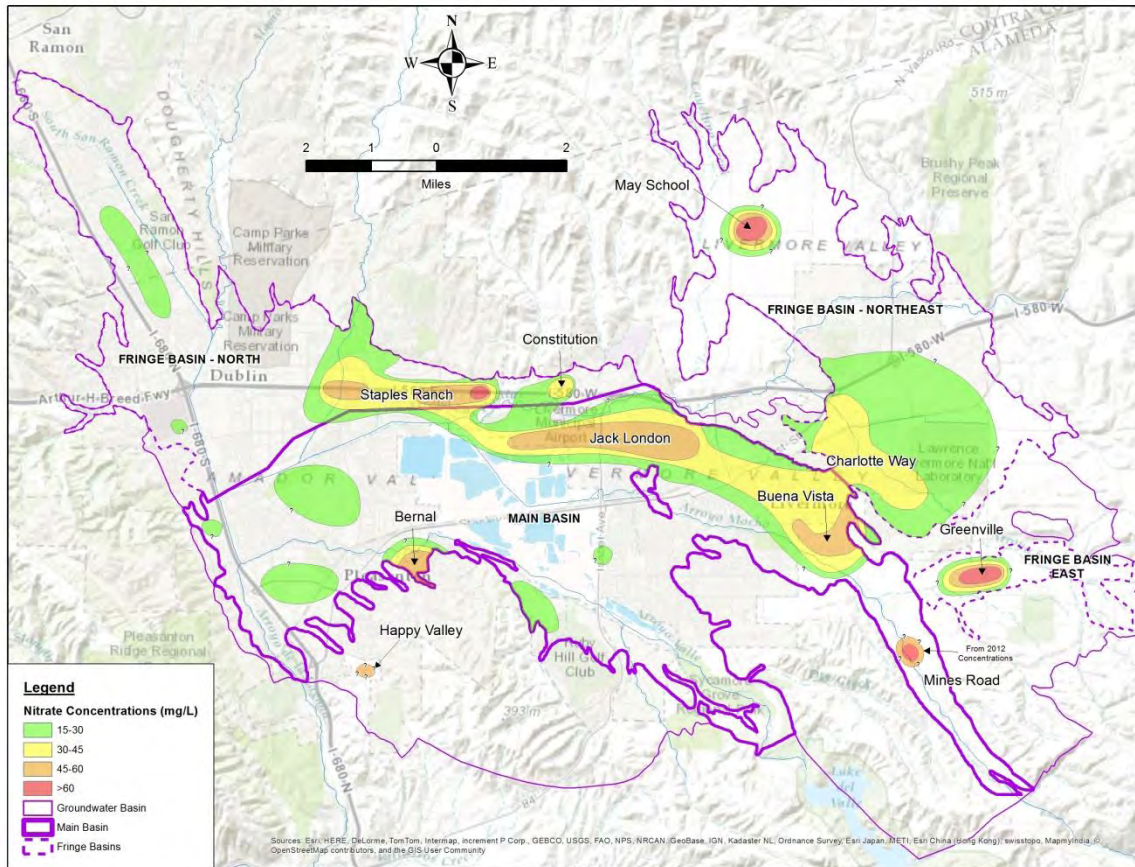
Zone 7's GWMP program monitors groundwater quality throughout the basin areas. Of the two main groundwater quality parameters being monitored as nutrient contamination indicators (nitrate and phosphate), only nitrate has been detected at significant concentrations in the basin areas. The Basin Objective (BO) for nitrate in groundwater is 45 mg/L (measured as NO_3) or less for all of the NMP basin areas (*California State Water Board, 2011*). This is the same value adopted by the California Department of Health as the maximum contamination limit (MCL) for drinking water.

Average nitrate concentrations (as NO_3) in the Main and Fringe Basins range from 11 to 15 mg/L. Assimilative capacity, which represents the capacity of a groundwater basin to absorb pollutants, is calculated by subtracting the average concentration from the BO. The assimilative capacities of the basins range from 30 to 34 mg/L. While average nitrate concentrations in the basin areas are below the BO, and ample assimilative capacity exists in each basin area for nitrate, there are ten localized Areas of Concern within the groundwater basin that have nitrate concentrations above the BO (see *Figure ES-1* below). These ten "hot spots" are believed to be vestiges of past agricultural land uses and processes, and former municipal wastewater and sludge disposal practices; however, five of the areas are outside of municipal Urban Growth Boundaries where sewage disposal continues to be by OWTS. They are:

- Happy Valley
- Buena Vista
- Mines Road
- May School
- Greenville



Figure ES-1: Nitrate Concentrations (Upper Aquifer) and Areas of Concern



ES 3 Nutrient Loading Evaluation

Nitrate contamination in groundwater supplies is typically the result of nitrogen-containing compounds being leached from the surface or soil column and mixing with the ambient groundwater. Nitrogen exists in the environment in many forms and can change forms as it moves through the soil. Sources of nitrogen loading include: fertilizers used on croplands, parks, golf courses, lawns, and gardens; sewage and other wastewaters disposed of onsite; decaying vegetation and other organic materials; animal manure and urine from pastures, animal enclosures, and other livestock boarding facilities; and nitrogen-fixing crops such as alfalfa, clover and vetch.

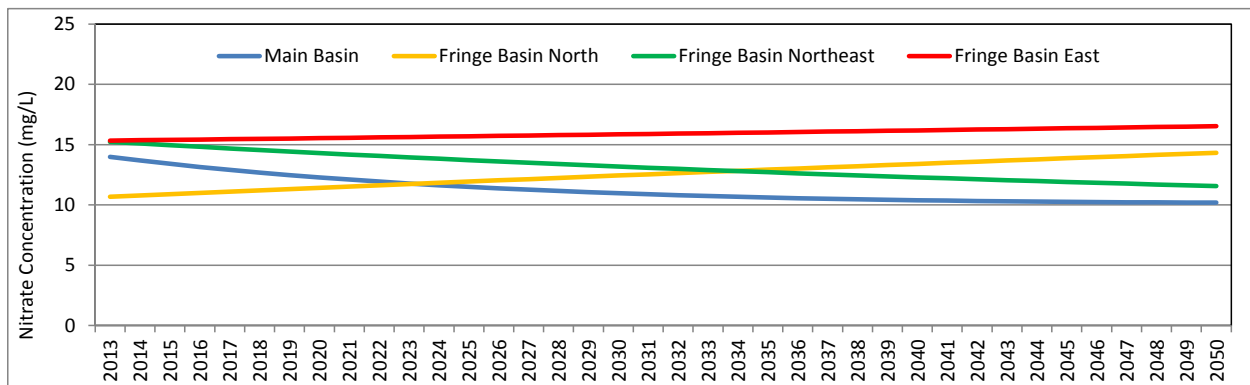


Within the soil zone, nitrogen compounds readily convert to ammonium and nitrate and/or are lost to volatilization, plant uptake and denitrification processes. Because nitrate is highly leachable and readily moves with water through the soil profile, excessive rainfall or over-irrigation will cause nitrate to leach below the plant's root zone and may eventually mix with groundwater.

Groundwater nitrate concentrations are good indicators of nutrient contamination, and graphing concentrations versus time can indicate whether nitrate conditions are changing or stable; however this NMP uses estimates of nitrogen loading from various identified sources to help evaluate whether nitrate concentrations will increase or decrease in the long-term. For this effort, annual nitrogen loading from each known source was estimated and summed spatially using geographic information systems (GIS) software. The results were then applied to a Zone 7-developed spreadsheet model to predict future nitrate concentrations for each basin area, taking into account planned land use changes and expansions of recycled water use.

The model results predict that average nitrate concentrations will decrease over time in the Main and Northeast Fringe basin areas, and will increase only slightly in the North and East fringe basin areas. The incremental increases in predicted nitrate concentrations due to the planned recycled water use expansions (shown on *Figure 3-14* and *Figure 4-1*) in the Main and Northeast Fringe basin areas are less than 1 mg/L over the 37 year model period, or about 3% of the assimilative capacity for these two areas. The future average total nitrate concentrations as predicted by the Zone 7 model are summarized by basin area in *Figure ES-2* below:

Figure ES-2: Projected Nitrate Concentrations by Basin





ES 4 Antidegradation Analysis

The State Water Board’s Recycled Water Policy requires SNMPs to include an antidegradation analysis demonstrating that the recycled water projects included within the plan will collectively satisfy the requirements of State Water Board’s “Antidegradation Policy” (Resolution No. 68-16). The antidegradation analysis for the Livermore Valley Groundwater Basin is summarized below in *Figure ES-3*:

Figure ES-3: Antidegradation Assessment

State Water Board Resolution No. 68-16 Component	Antidegradation Assessment
<i>Water quality changes associated with proposed recycled water project(s) are consistent with the maximum benefit of the people of the State.</i>	The irrigation projects will: <ul style="list-style-type: none"> • contribute only a minimal increase (<1 mg/L) in groundwater nitrate concentrations at urban buildout.
<i>The water quality changes associated with proposed recycled water project(s) will not unreasonably affect present and anticipated beneficial uses.</i>	<ul style="list-style-type: none"> • not use more than 20% of the available Assimilative Capacity
<i>The water quality changes will not result in water quality less than prescribed in the Basin Plan.</i>	<ul style="list-style-type: none"> • not cause groundwater quality to exceed Basin Plan Objectives
<i>The projects are consistent with the use of best practicable treatment or control to avoid pollution or nuisance and maintain the highest water quality consistent with maximum benefit to the people of the State.</i>	Because all planned recycled water projects over the groundwater basin are landscape irrigation projects, most of the nitrogen from these projects will be removed by plant uptake and volatilization (and some by bacterial denitrification under certain conditions). Additional nitrogen loading will be avoided with the continued use of recycled water and fertilizer use best management practices (BMPs) (<i>Section 6.1</i>)
<i>The proposed project(s) is necessary to accommodate important economic or social development.</i>	The recycled water projects are crucial for continued sustainability of the Valley’s water supply and are part of the urban growth plans for Cities of Dublin, Livermore, and Pleasanton.
<i>Implementation measures are being or will be implemented to help achieve Basin Plan Objectives in the future.</i>	Both the SMP and the NMP contain measures that have been or will be implemented to address current and future salt and nutrient loading of the Groundwater Basin.



ES 5 Nutrient Management Goals and Strategies

Although overall basin groundwater quality is not expected to degrade significantly due to ongoing and anticipated future nutrient loading, there is still a need to further assess, reduce or manage, and monitor nutrient loading to make sure that new high nitrate areas are not created by poor waste management practices or over-application of fertilizers and irrigation waters. In general, the NMP's short-term goals are to improve the understanding of current and historical nutrient impacts to the groundwater basin, and to minimize current and future nutrient loading while allowing for a reasonable amount of new loading from rural development and recycled water use increases. The long-term goal is to meet Basin Objectives in all parts of the groundwater basin.

The NMP strategies for achieving these goals include promoting the continued use of “best management practices” (BMPs) requirements aimed at minimizing nutrient loading from certain land uses (i.e., irrigated and fertilized turf and landscapes, confined livestock operations, vineyards and wineries). The NMP also promotes the enforcement of current County OWTS regulations and Zone 7 Wastewater Management policies and the future development and implementation of ACEH's Local Area Management Program (LAMP) to minimize nutrient loading from current and future development in unsewered areas of the basin. In order to address the localized high nitrate conditions in the Areas of Concern, the NMP advocates an adaptive management strategy that begins with:

- 1) Increasing the understanding of the extent and source(s) of the high nitrate concentrations in the Areas of Concern, and adjusting Area of Concern boundaries as appropriate;
- 2) Requiring new development projects within the unsewered Areas of Concern to minimize, or when practical, reduce the overall nutrient loading on the project parcel by installing only new, advanced OWTSs with nitrogen-reducing treatment; and
- 3) Continuing the monitoring of the nitrate concentrations and the success of these actions to reduce them.

Figure ES-4, below, provides a summary of the nutrient loading-specific goals for the active sources and the strategies developed to achieve the specific goals.



**FIGURE ES-4
SUMMARY OF GOALS AND STRATEGIES
NUTRIENT MANAGEMENT PLAN**

Goals	Strategies
Investigate Areas of Concern	
<i>Goal 1: Obtain additional information in shallow aquifer zones of the Areas of Concern</i>	Strategy 1a: Identify and sample additional existing domestic supply wells. Strategy 1b: Encourage additional hydrogeology studies in Areas of Concern as part of new commercial developments.
Fertilizer Application	
<i>Goal 2: Minimize nitrogen loading from fertilizer application using BMPs</i>	Strategy 2a: Promote the use of fertilizer BMPs (<i>Section 6.1.2</i>) to avoid over-application of fertilizers. Using results of soil and irrigation water chemical testing to determine the appropriate amount of additional fertilizer to apply is a good way to lessen excess leachable nitrogen in the soil. Strategy 2b: Limiting irrigation water application to the crop and landscape plants' agronomic rates will reduce the amount of nutrient-rich leachate that migrates below the vegetation root zone and into the underlying aquifer(s).
Recycled Water Irrigation	
<i>Goal 3: Minimize nitrogen loading from recycled water irrigation projects</i>	Strategy 3a: Follow Recycled Water Policy guidance for landscape irrigation projects. Minimize recharge of nitrogen by irrigating landscapes to the prescribed agronomic rates. Account for the nitrogen content of the recycled water when determining how much fertilizer to apply. Strategy 3b: Maintain low levels of nitrogen in the produced recycled water by keeping the nitrogen concentrations in the source water low and/or optimize low nitrogen levels in recycled water production.
Livestock Manure Management	
<i>Goal 4: Minimize nitrogen loading from concentrated livestock facilities such as horse boarding, training, and breeding facilities</i>	Strategy 4: Promote the use of BMPs (<i>Section 6.1.4</i>) such as manure management and controlling site drainage to prevent nutrient contamination of rainfall runoff and irrigation return flows that may percolate to groundwater and/or flow into surface water bodies.
Winery Process Wastewater	
<i>Goal 5: Minimize nitrogen loading from onsite disposal of winery process wastewater</i>	Strategy 5a: Require local wine producers and bottlers to apply for and comply with RWQCB WDRs for the proper treatment and disposal of winery process waste streams. Strategy 5b: Develop guidance document(s) to assist both project proponents and RWQCB staff with Report of Waste Discharge (ROWD) and WDR development and evaluations.
Septic Tanks - Outside Areas of Concern	
<i>Goal 6: Minimize nitrogen loading from new onsite wastewater treatment systems (OWTS), e.g., septic tank systems.</i>	Strategy 6a: Continue applying Zone 7 policies and County Ordinance and Regulation provisions, e.g., 1 Rural Residential Equivalence (RRE)/5 Ac max. Strategy 6b: Continue to work with ACEH to ensure that: 1) they are aware of groundwater nitrate issues in the Livermore Valley Groundwater Basin; 2) variance requests are given the appropriate scrutiny; and 3) their OWTS approvals are consistent with adopted NMP goals and objectives.
Septic Tanks - Inside Areas of Concern	
<i>Goal 7: Reduce nitrogen loading from OWTS in Areas of Concern</i>	Strategy 7a: Increase understanding of existing conditions and causes, and set realistic management goals and apply adaptive management as necessary. Strategy 7b: Require new development projects utilizing OWTS in the Areas of Concern to reduce and/or minimize the overall nitrogen loading to the property. Strategy 7c: On at least an annual basis, assess performance of wastewater treatment systems, estimate area-wide nitrogen loading, and monitor groundwater quality beneath the Areas of Concern.
Enhanced Attenuation	
<i>Goal 8: Increase capture and infiltration of stormwater recharge to dilute and attenuate nitrate concentrations in groundwater</i>	Strategy 8: Promote the use of Low Impact Development (LID) BMPs to capture and infiltrate rainfall runoff and irrigation return flow

ACEH = Alameda County Environmental Health
BMPs = Best Management Practices

RWQCB = Regional Water Quality Control Board



ES 6 Plan Implementation

Zone 7 plans to simultaneously refine the extent of the Areas of Concern and minimize nitrogen loading from existing sources. To further characterize the range and size of nitrate contamination, Zone 7 will work with ACEH and CDA on encouraging or requiring hydrogeologic studies as part of new commercial developments, and with existing well owners to sample existing shallow wells for nitrate, and with permittees planning new wells or soil borings near Areas of Concern to include electronic logs (elogs) and/or groundwater sampling in their construction plans.

To minimize nitrogen loading from existing sources, the NMP encourages continued use of existing BMPs to minimize groundwater impacts from fertilizer and recycled water applications, livestock manure, and winery wastewater. Landscape and agriculture management industries promote careful metering of fertilizers and irrigation water as cost saving measures as well as environmental preservation measures. The State's Recycled Water Policy has built-in prohibitions for over application and runoff of recycled water. Permitted livestock facilities, such as commercial equine boarding facilities, typically have requirements for active manure management conditioned in their County-issued Conditional Use Permits (CUP). Likewise, onsite treatment and disposal (or recycling) of industrial wastewater, such as that generated by winemaking processes, requires a waste discharge permit from the Water Board which often contains provisions for minimizing and monitoring the nutrient loading from the onsite operations. The NMP also encourages continued use of existing Low Impact Development (LID) BMPs to increase the capture and infiltration of stormwater in order to help attenuate nitrate concentrations in groundwater. With continued implementation of these BMPs, future nitrate concentrations are projected to remain below 20% of the assimilative capacities calculated for each of the four Livermore Valley Groundwater Basin areas.

Continued application of these BMPs also helps to minimize nutrient loading in the high nitrate Areas of Concern. In the five Areas of Concern that are within sewerage areas, fertilizer and recycled water use BMPs are important for keeping nitrogen loading low, whereas fertilizer use and manure management BMPs and Waste Discharge Requirements for wineries help prevent nitrate concentrations from worsening in the five Areas of Concern that are in the unincorporated portions of the Valley. However, because there is potential for onsite disposal of residential and commercial sewage to be a significant nitrogen loading component in the five unincorporated Areas of Concern, the NMP recommends implementing additional OWTS performance measures that will, at a minimum, prevent nitrogen loading from OWTS from increasing, and in the long term, should help decrease the loading in these nitrate "hot spots."

The recommended OWTS design criteria for new development in the five Areas of Concern that are outside municipal urban growth boundaries are summarized below in *Figure ES-5*. These criteria are designed to minimize nitrogen loading from new OWTS use and reduce existing loading in the five Areas of Concern over time by replacing conventional OWTS with new treatment systems when the opportunities arise.



The NMP recommends that the special OWTS permit requirements described in *Figure ES-5* be incorporated into the LAMP, which ACEH anticipates completing a draft in 2016, and finalizing it by 2018.

Figure ES-5: Proposed OWTS Requirements Inside Areas of Concern

OWTS Scenario	Parcel Size	New Requirement	Max Nitrogen Loading Rate ²
New, upgraded, or replacement OWTS required by County OWTS Ordinance ¹	≤ 7 acres	Must install/upgrade/replace with code-compliant nitrogen-reducing system(s).	23.8 lbs/year Per Parcel
	> 7 acres	<p>Total nitrogen loading on the parcel must not exceed the Maximum Nitrogen Loading Rate. Commercial uses must also install/upgrade/replace with code-compliant nitrogen-reducing system(s).</p> <p style="text-align: center;">OR</p> <p>Prepare hydrogeologic study that assesses current groundwater nitrate conditions beneath the site and demonstrates that nitrate concentration of total onsite recharge³ does not exceed 36 mg/L (80% of MCL) or the maximum concentration at the site, whichever is lower.</p>	<p>3.4 lbs/year Per Parcel Acre</p> <p>6.8 lbs/year Per Parcel Acre</p>

¹ Does not apply to existing, properly-working, and properly-sized OWTS.
² Loading rates calculated based on 1 RRE = 34 lbs/yr.
³ Assume that 18% of rainfall naturally recharges to groundwater unless study demonstrates otherwise.

Zone 7 has a comprehensive water resources monitoring program in place as part of its GWMP. Monitoring elements include groundwater level monitoring, groundwater quality sampling, and climatological, surface water, land use, and wastewater and recycled water monitoring. Zone 7 will continue to use the data collected as part of these monitoring program elements to refine the nitrate concentration maps, Area of Concern boundaries, and the extent of the special OWTS permitting areas.

Zone 7 will identify data gaps and suggested locations and depths for new monitoring wells and/or soil borings for expedited groundwater sampling in the Areas of Concern. Zone 7 will provide this information to property owners and developers to assist in developing efficient strategies for fully characterizing nitrate concentrations and nitrogen loading for projects inside Areas of Concern. Zone 7 will also work with ACEH to develop an OWTS monitoring plan that may require that owners and developers install additional monitoring wells up-gradient and down-gradient of the high nitrate areas.

NMP-related monitoring results will be reported along with other groundwater sustainability and management information in Zone 7's annual Groundwater Management Program reports. Minor updates to the SMP/NMP will also be reported in the annual reports. As the assigned Groundwater Sustainability Agency for the groundwater basins located within its service areas, Zone 7 plans to incorporate the then



current SMP/NMP into a Sustainable Groundwater Management Plan for the Livermore Valley Groundwater Basin before the due date of January 31, 2022.