

**CA Wastewater Needs Assessment
Groundwater Impacts Assessment
Executive Summary for April 2025 Advisory Group Meeting**

Groundwater Impact Assessment (GIA) Methodology

Overview

The Wastewater Needs Assessment (WWNA) calls for developing a method to identify inadequate and at-risk wastewater systems. At previous Advisory Group (AG) meetings, the WWNA team presented the types of facilities that would be included in the assessment, as well as the inadequacy and at-risk methodologies. In general, the WWNA team will perform the inadequacy and at-risk assessments on domestic wastewater facilities with National Pollutant Discharge Elimination System (NPDES), Waste Discharge Requirements (WDRs), and Sanitary Sewer Order (SSO) permits. However, there is also an interest in assessing statewide where Onsite Wastewater Treatment Systems (OWTS)¹ might be impacting groundwater quality. The WWNA team is therefore developing methodology¹ to conduct a Groundwater Impacts Assessment (GIA), which will evaluate the potential for OWTS to contribute to nitrate contamination based on existing well data and modeled potential contamination loading from OWTS, as well as other site attributes that might influence contamination.

Nitrate contamination is important to study in California because many communities rely on groundwater as their primary source of drinking water. Elevated nitrate levels can pose serious health risks, particularly in disadvantaged, rural communities. It should be noted that other sources of nitrate contamination could be contributing to elevated nitrate levels in groundwater (e.g., agriculture) but the GIA is only to determine the likelihood of OWTS contributing to such contamination. If the State Water Resources Control Board and regional water quality control boards (collectively, Water Boards) staff determine that multiple sources may be contributing to elevated nitrate detections in groundwater, multiple actions may be considered.

Ultimately, the GIA will classify areas statewide based on contamination likelihood, and the results could be used to make decisions on where OWTS conversion projects (to existing sewer or to a community cluster) might be focused.

Methodology

The GIA Framework consists of three methodological components: (1) Assessment Applicability; (2) Key Factor Selection; and (3) Likelihood Assessment and Classification. The Assessment Applicability component will define which type of wastewater systems the GIA is applied to. The Key Factor Selection component will identify factors used to assess the likelihood of OWTS contributing to nitrate contamination in groundwater. Finally, The Likelihood Assessment will determine how likely each system is to contribute to the groundwater contamination.

Assessment Applicability

The GIA will be applied only to OWTS-dependent unsewered areas, as approximated by a model being developed by the University of Massachusetts (UMass). Until the UMass model is completed (estimated

¹ OWTS refers to non-sewered domestic wastewater systems, such as septic tanks, within the context of this analysis.

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for December 2025), proxy datasets will be used to approximate unsewered parcels served by OWTS, with a focus on rural areas and regions beyond California drinking water system area boundaries.

Key Factor Selection

The project team is developing key factors influencing the likelihood of groundwater contamination from OWTS. The factors consider both environmental and human influences, and are based on scientific judgment, programmatic needs, and data constraints. The Key Factors currently being considered include: (1) Measured Nitrate Concentration; (2) Modeled Nitrate Loading; and (3) Other Site Attributes. The Key Factors and associated variables that influence their ranking are tabulated below, followed by descriptions of each.

Key Factors	Variable (s)
Measured Groundwater Nitrate Concentration	• Groundwater Nitrate Concentration Measurements
Modeled Nitrate Loading from OWTS	• Population • Per Capita Nitrogen Contribution • Parcel Area • Annual Precipitation
Site Attributes	• Depth to Groundwater • Soil Drainage

Measured Nitrate Concentrations: Several drinking water wells are monitored for nitrate throughout the state, and the data is available through the Water Board’s Groundwater Ambient Monitoring and Assessment (GAMA) Program. If a parcel is served by OWTS and has a well with nitrate concentrations exceeding a certain threshold (e.g., Primary MCL of 10 mg/L), the high nitrate levels may be due to OWTS discharges.

Modeled Nitrate Loading: Where measured nitrate data is not available, potential nitrate contamination from OWTS can be estimated based on assumptions of the number of people per parcel dwelling and assumed nitrogen loading per person per day. The estimate also depends on the volume of annual rainfall on the parcel, as heavier rainfall can dilute nitrate concentrations. Annual rainfall volumes can be calculated from annual rainfall depths and parcel acreage. Resulting modeled nitrate loadings that exceed a certain threshold (e.g., Primary MCL of 10 mg/L), may be due to OWTS, although the confidence is less so than actual in-situ measurements.

Other Site Attributes

Other site attributes that may indicate nitrate contamination from OWTS include depth to groundwater and soil drainage. Discharges from OWTS on parcels with shallow groundwater tables and well-draining soils will have less filtration and attenuation potential than those on parcels with deeper groundwater and slower drainage.

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Assessment Applicability

The Key Factors can be used to assign unsewered, OWTS parcels a relative likelihood that OWTS are contributing to elevated nitrate concentrations. The Likelihood Classifications are tabulated below.

Likelihood Classification	Description
Very High	Measured nitrate concentrations exceed Primary MCL of 10 mg/L.
High	Modeled nitrate loading exceeds Primary MCL of 10 mg/L.
Moderate	Other site attributes indicate low potential for filtration and attenuation.
Low	Does not meet any of the above criteria.

Conclusion & Next Steps

The GIA results are intended to help inform where nitrate contamination from OWTS may be occurring. The results of the GIA may be used in deciding where OWTS-dependent households can be converted or connected to a public wastewater system may take place, due to the likelihood of existing OWTS impacting groundwater quality. The GIA is being developed to align with the State Water Board's OWTS policy and relevant, regional assessments –such as that ongoing in the Central Valley Regional Water Quality Control Board jurisdiction— without overriding them. As a statewide assessment, the results of the GIA may be most useful for regions without planned or ongoing similar assessments. The WWNA team will be comparing the GIA results with any relevant, similar regional assessments to evaluate usefulness.

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