Development of Statewide Risk Assessment for California Wastewater Systems

EXECUTIVE SUMMARY

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The Risk Assessment is the second quantitative step of the broader Wastewater Needs Assessment (WWNA). The assessment includes systems with National Pollutant Discharge Elimination System (NPDES), Waste Discharge Requirement (WDR), and Sanitation Sewer Overflow (SSO) permits that meet the WWNA inclusion criteria[[1]](#footnote-1).

The purpose of the Risk Assessment is to identify wastewater treatment and collection systems “at-risk” of inadequately treating and disposing of wastewater. The identification of At-Risk wastewater systems will ideally allow the State Water Resources Control Board and the Regional Water Quality Control Boards (the Water Boards) to proactively target technical assistance and funding toward communities to prevent systems from becoming inadequate. These assessments are crucial for Regional Boards in implementing SB 1215 (septic-to-sewer projects) and assessing the condition of Wastewater Systems and Facilities in municipalities, districts, and cities. The Risk Assessment analysis will also greatly benefit the State Water Board, when wastewater projects (e.g., Capital Improvement or Wastewater Consolidation) are submitted through the Financial Assistance Application Submittal Tool (FAAST) or the Technical Assistance Program.

This Executive Summary introduces the risk variables proposed to be included in the Risk Assessment and justifies their inclusion.

The Risk Assessment will not evaluate risk for Onsite Wastewater Treatment Systems (OWTS) or unsewered systems more broadly. However, another assessment focused on areas primarily served by OWTS will be included in the WWNA and will be discussed in a future Advisory Group meeting.

**Methods**

The Risk Assessment will be conducted for roughly 260 NPDES, 1,000 WDR, and 1,000 SSO systems included in the WWNA. It will evaluate their performance across risk indicators within the following four categories: socioeconomic, operational, environmental, and public health. Facilities within each permit type – NPDES, WDR, SSO – require slightly different Risk Criteria to capture their diverse characteristics accurately.

We selected category names and variables to be included in different categories of the Risk Assessment based on reviews of previously published literature, conversations with experts from our project team, and consultation with Water Boards staff working on compliance and enforcement aspects of facilities with NPDES, WDR, and SSO permits. Our project team evaluated thirty-seven potential risk variables for inclusion: 8 socioeconomic, 17 operational, 8 environmental, and 6 public health. We propose including twenty-three in the Risk Assessment: 5 socioeconomic, 12 operational, 7 environmental, and 1 public health. We will publish a full report outlining the inclusion and exclusion process later in 2025. Details on the individual risk variables included in each risk category can be found in **Table 1** below.

**Table 1:** Proposed Risk Assessment Variables.

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| Risk Category | Variable | Description |
| **Socioeconomic** | Household Socioeconomic Burden*(NPDES, WDR, SSO)* | Measures poverty prevalence and housing burden using a composite score. Communities with high levels of poverty and high housing costs may struggle to pay for the necessary upgrades, maintenance, and operation of Wastewater Systems and Facilities. |
| Incomplete Plumbing*(NPDES, WDR, SSO)* | Identifies the number of occupied housing units lacking complete plumbing. Lack of complete plumbing can indicate substandard housing quality and challenges upholding the human right to sanitation. |
| Disadvantaged Community Status (DAC)*(NPDES, WDR, SSO)* | Identifies when a community's median household income is at or below 80 percent of the statewide MHI (80% of Statewide MHI = $73,524 based on 2022 ACS). |
| Severely Disadvantaged Community Status (SDAC)*(NPDES, WDR, SSO)* | Identifies when a community's median household income is at or below 60 percent of the statewide MHI (60% of Statewide MHI = $55,143 based on 2022 ACS). |
| Race/Ethnicity*(NPDES, WDR, SSO)* | The racial and ethnic makeup of the community served by a Wastewater System and Facility. Historically marginalized people and communities are disproportionately likely to be without access to safe water and sanitation. |
| **Operational** | Relative Annual Capital Expenditures*(SSO)* | Funds spent on acquiring, upgrading, or maintaining physical assets and infrastructure such as building, expanding, or upgrading Wastewater Systems and Facilities relative to the size of the system. |
| Relative Operation & Maintenance Budget*(SSO)* | Budgets that cover the costs associated with operating, maintaining, and managing Wastewater Systems and Facilities relative to the size of the system. |
| <15% of system being cleaned annually*(SSO)* | Indicated inadequate system maintenance, risking system inefficiency or failure.  |
| <10% of system being inspected with closed-circuit television (CCTV) annually*(SSO)* | Indicated inadequate inspection practices, increasing the likelihood of undetected issues and reducing system reliability.  |
| Relative System Capacity*(SSO)* | The designed flow capacity of a system relative to the total number of people served by the system.  |
| >40% of system older than 1950*(SSO)* | System may be more likely to experience structural failures, capacity issues, and increased maintenance.  |
| System Governance*(NPDES, WDR, SSO)* | The entity that oversees the operation and maintenance of a Wastewater System and Facility. |
| Operator Certification*(NPDES, WDR, SSO)* | Measures if a certified operator is present at a wastewater treatment facility and, if so, if the certification is sufficient for the Wastewater System and Facility. |
| Future Permit Limit Additions*(NPDES)* | NPDES-permitted Wastewater Systems and Facilities typically follow secondary treatment standards. However, facilities discharging into impaired or effluent-dominated waterbodies with beneficial uses must meet tertiary treatment standards and may face stricter limits in the future. |
| Design Flow vs. Actual Flow*(NPDES, WDR, SSO)* | Measures the peak flow volume that a Wastewater System and Facility is designed to process compared to the amount the system is truly processing. Identifies overburdened systems.  |
| Depopulation*(NPDES, WDR, SSO)* | Measures the population decline of areas served by a Wastewater System and Facility. A decreased customer-base can lead to difficulties covering fixed-costs to maintenance and updates. |
| Population Growth*(NPDES, WDR, SSO)* | The increase in the population served by a Wastewater System and Facility. Rapid population growth can lead to hydraulic overloading and operational constraints. |
| **Environmental** | Increasing Instances of Near-Discharge Exceedance(NPDES) | Trends of Wastewater Systems and Facilities that may be nearing their limits for priority items like permitted flow, BOD and nutrient loading, and any local contaminants of concern. |
| Discharge to impaired water bodies*(NPDES, WDR, SSO)* | Identifies systems which may have additional discharge requirements.  |
| Drought *(NPDES, WDR, SSO)* | Shows the location and intensity of drought across California. Declining water flows can pose risk to Wastewater Systems and Facilities.  |
| Flooding*(NPDES, WDR, SSO)* | Measures flood risk of Wastewater Systems and Facilities. Flooding can lead to infrastructure damage and forced treatment bypass. |
| Sea Level Rise*(NPDES, WDR, SSO)* | Measures projected sea level rise. For coastal Wastewater Systems and Facilities, sea level rise can cause flooding or block system outflows, among other negative system impacts.  |
| Extreme Heat*(NPDES, WDR, SSO)* | Identifies regions with frequent extreme heat days. Extreme heat events can impact Wastewater Systems and Facilities’ ability to effectively and efficiently remove contaminants. |
| Wildfire*(NPDES, WDR, SSO)* | Measures the fire hazard severity of an area where a Wastewater System and Facility is located. Wildfires can damage wastewater infrastructure and change flow levels. |
| Public Health  | Constituents of Emerging Concern (CEC)*(NPDES, WDR, SSO)* | Substances or matter in aquatic ecosystems for which there are not currently published enforceable health standards, the standard is being evaluated, or the toxicology is not well understood. |

**Table 1 Legend:**

NPDES = Risk variable relevant for NPDES-permitted facilities

SSO = Risk variable relevant for SSO-permitted facilities

WDR = Risk variable relevant for WDR-permitted facilities

1. System types included in the WWNA: Public treatment plants – cities and special districts; Private treatment plants serving rural residential settlements, mobile home parks, etc.; Migrant labor camps; RV Parks; Hotels; Prisons and Work/Conservation Camps; Schools and Hospitals. [↑](#footnote-ref-1)