Appendix G1

Technical Memorandum: Groundwater Quality

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THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

Pure Water Southern California

Technical Memorandum: Groundwater Quality

March 26, 2025

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Table of Contents

Figures

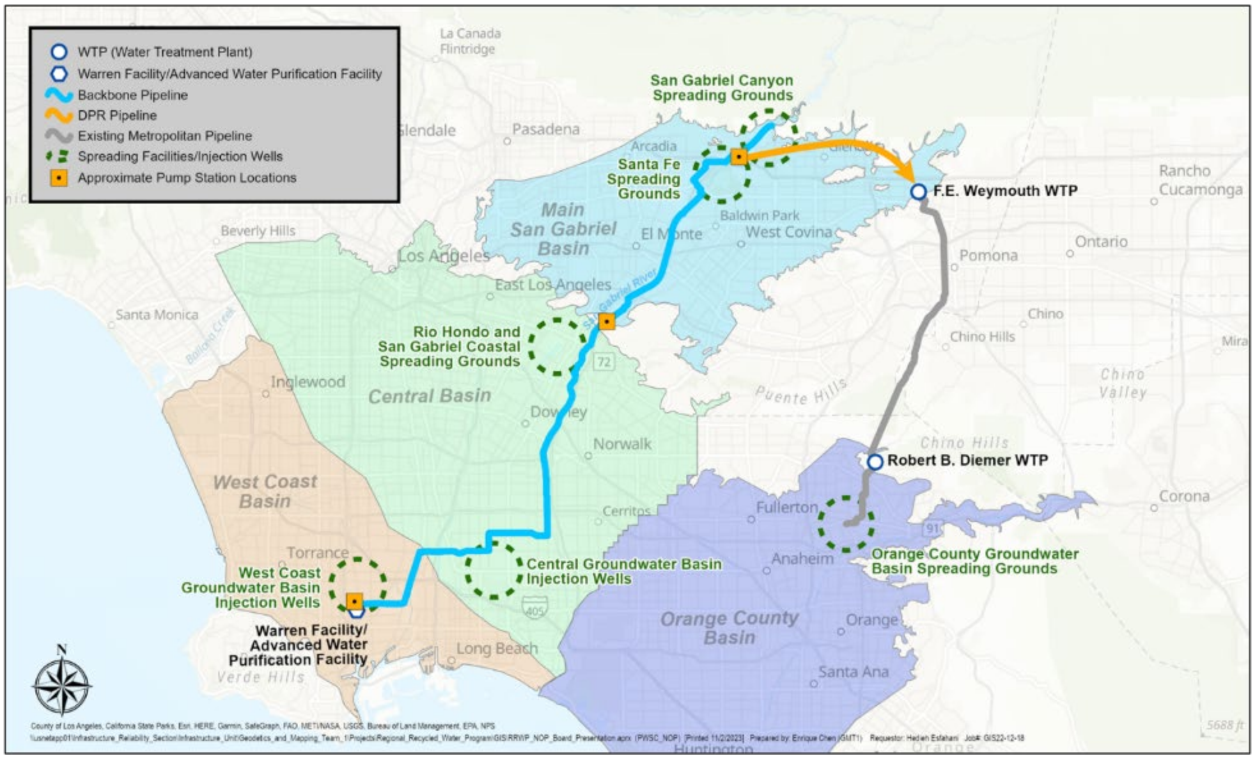
Tables

Section 1: Introduction

Pure Water Southern California (Pure Water) is a partnership between the Metropolitan Water District of Southern California (Metropolitan) and the Los Angeles County Sanitation Districts (Sanitation Districts) to beneficially purify cleaned wastewater that currently is being discharged to the Pacific Ocean to bolster the regional water supply in the greater Los Angeles metropolitan region.

This Groundwater Quality Technical Memorandum (Groundwater Quality Tech Memo) provides an overview of the Pure Water groundwater recharge facilities **(Figure 1)** and hydrologic conditions, as well as an assessment of groundwater quality data collected for the three groundwater basins that could be served by Pure Water. The focus of this Groundwater Quality Tech Memo is Pure Water's potential effect on groundwater water quality; specifically, compliance with standards and whether there is the potential to degrade existing groundwater quality.

Figure 1: Program Overview



1.1 Purpose

The purpose of this Groundwater Quality Tech memo is to:

- Describe the regulatory agencies and requirements for groundwater replenishment.
- Present an overview of the hydrogeologic setting for each of the three groundwater basins of Pure Water.
- Provide a synthesis of groundwater quality conditions at each of the three groundwater basins.
- Summarize groundwater quality data that has been collected to date.
- Describe the groundwater quality constraints of each basin.

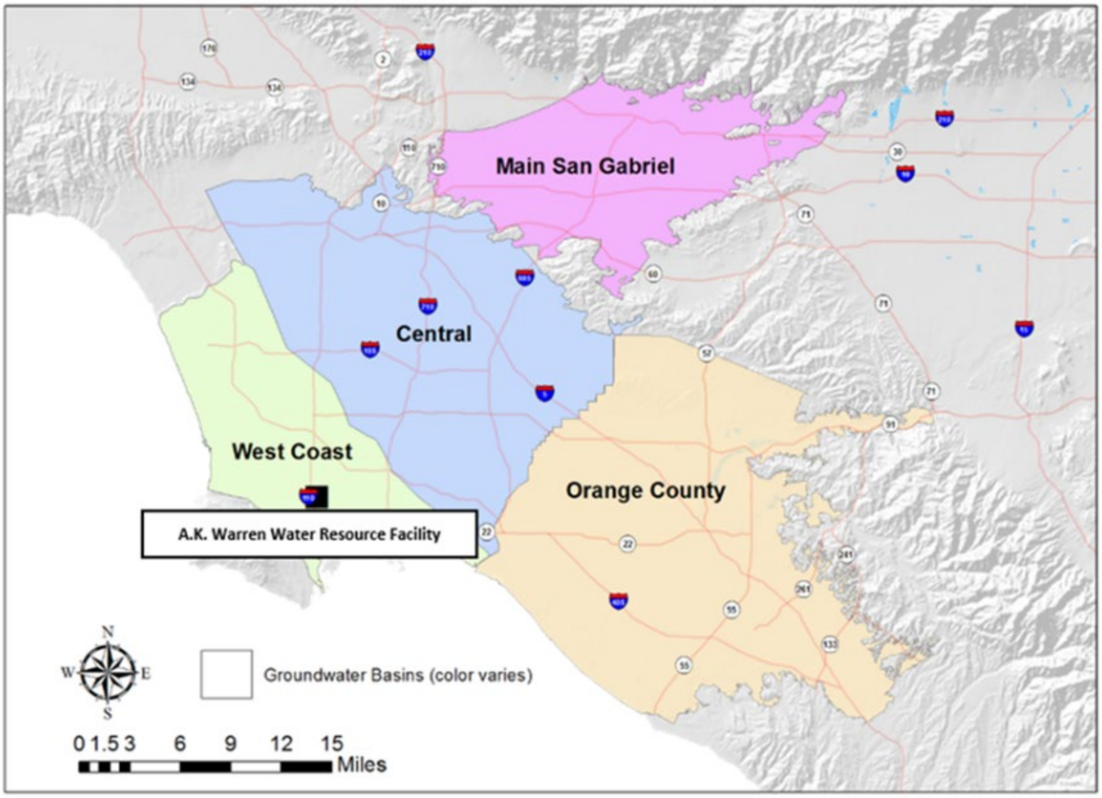
- Assess Pure Water's potential impacts to groundwater quality within the three groundwater basins.

General water quality information regarding current conditions based on groundwater sampling and analysis is provided. Full citations of the references for this technical memorandum are provided in **Appendix A**. This Groundwater Quality Tech Memo will not cover impacts of Pure Water related to groundwater storage or level, or surface water hydrology or quality. These items are discussed in other technical memoranda (Rick Engineering, 2024; Metropolitan, 2024a; Metropolitan 2024b).

1.2 Overview of Pure Water Southern California

Pure Water is a regional-scale indirect and direct potable water reuse project. Cleaned wastewater from the Sanitation Districts' A.K. Warren Water Resource Facility (Warren Facility) in Carson, California, would be conveyed to a new advanced water purification facility (AWP Facility) for purification. The AWP Facility would be constructed on undeveloped property within the Warren Facility's boundaries to produce up to 150 million gallons (about 567,811,500 liters) per day (MGD) of purified water. This purified water would then be transported via new conveyance facilities as far north as the City of Azusa and as far east as the City of La Verne to new or existing water distribution facilities. The purified water could be used to recharge the West Coast, Central, Main San Gabriel, and potentially Orange County groundwater basins through spreading facilities and injection wells **(Figure 2)**.

Figure 2: Groundwater Basins to be Served by Pure Water



Currently, Orange County Basin partners are not expected to purchase water from Pure Water; however, some general information regarding water quality requirements for Orange County Basin is included. Purified water could also be used for raw water augmentation (RWA) at the F.E. Weymouth Water Treatment Plant (Weymouth WTP) and the Robert B. Diemer Water Treatment Plant (Diemer WTP).

1.3 Independent Science Advisory Panel

An independent science advisory panel (ISAP) has been selected to provide an objective review of the technical, scientific, regulatory, and public health aspects of Pure Water. To ensure objectivity, the National Water Research Institute (NWRI), a nonprofit organization with extensive experience in the water reuse industry, selects the panel and manages its activities. NWRI is a nonprofit organization and California Joint Powers Authority founded in 1991 to promote the protection, maintenance, and restoration of water supplies and to protect public health and improve the environment. NWRI specializes in facilitating independent expert advisory panels to provide a credible, objective review of scientific studies and projects in the water industry. The panelists for the ISAP represent industry and academic experts in drinking water treatment, wastewater treatment, advanced water treatment, toxicology, chemistry, microbiology, hydrogeology, pipeline corrosion, and drinking water and recycled water regulations and permitting. To date, the ISAP has convened seven times since the beginning of the program. The ISAP has focused on policies involving groundwater replenishment and potable (indirect and direct) reuse. Specifically, the ISAP has provided peer review of a wide range of scientific and technical areas related to water quality and monitoring, treatment technologies and operations, public health, hydrogeology, water reuse criteria and regulatory requirements, and outreach, among others.

Section 2: Regulatory Requirements for Groundwater Replenishment

The use of recycled water for planned groundwater replenishment projects in California is regulated under the federal Safe Drinking Water Act and State laws, regulations, and policies, with different responsibilities assigned to the State Water Resources Control Board (SWRCB), the SWRCB Division of Drinking Water (DDW), and the nine Regional Water Quality Control Boards (Regional Boards).

2.1 Federal Regulation

The Safe Drinking Water Act (SDWA) (42 U.S.C. Chapter 6A Subchapter XII §300f et seq.) was established in 1974 to protect the quality of drinking water in the U.S. This law authorizes the U.S. Environmental Protection Agency (USEPA) to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards. The SDWA also protects the quality of groundwater drinking water sources through the underground injection control (UIC) program requirements.

2.1.1 SDWA Drinking Water Standards and Advisory Levels

USEPA has established drinking water regulations for more than 90 contaminants in drinking water. In the federal process, the USEPA first establishes maximum contaminant level goals (MCLGs). The MCLG is the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, allowing an adequate margin of safety. Once the MCLG is established, the USEPA sets an enforceable standard. In most cases, the standard is a maximum contaminant level (MCL). The MCL is the maximum level allowed of a contaminant in water that is delivered to any user of a public water system. The SDWA allows the USEPA to promulgate national primary drinking water standards specifying MCLs for contaminants present in a public water system that adversely affects human health, taking into consideration cost and technical feasibility. When there is no reliable method that is economically and technically feasible to measure a contaminant at concentrations to indicate there is not a public health concern, the USEPA sets a “treatment technique” rather than an MCL. A treatment technique is an enforceable procedure or level of technological performance that public water systems must follow to ensure control of a contaminant. If EPA decides not to regulate a contaminant, then it may decide to develop a health advisory. A health advisory is a non-enforceable federal limit. It serves as technical guidance for federal, state, and local officials.

For regulation in California, DDW has established its own set of MCLs based either on the federal MCLs or more stringent MCLs as part of its own regulatory process. For example, California has an MCL for perchlorate, though there is no federal MCL.

2.1.2 SDWA Underground Injection Control

The SDWA establishes requirements and provisions for the UIC program. USEPA establishes minimum standards for state programs to protect underground sources of drinking water from contamination by underground injection of fluids, which is enforced by the SWRCB in California. Any injection project planned in California must meet the State Sources of Drinking Water Policy, which ensures the protection of groundwater quality for drinking water supplies.

2.2 State Regulation

California has been delegated the authority to implement federal SDWA (primacy) by USEPA. The State of California also has an SDWA (Chapter 4 beginning with § 116270 of Part 12 of Division 104 of the Health and Safety Code) that is consistent with the federal SDWA.

The SWRCB is the implementing arm of the federal and state SDWAs. It has regulatory oversight of public water systems throughout the state.

In addition, several agencies within the state have a role in regulating public water systems, including their formation, design, construction, and operations and the rates they can charge customers. They are:

- Office of Environmental Health Hazard Assessment (OEHHA): provides health-based risk assessments for contaminants, which are used to develop primary drinking water standards.
- California Public Utilities Commission (CPUC): shares regulatory responsibility for ensuring the quality of water supplied by investor-owned water utilities.
- County health departments: regulate small public water systems serving fewer than 200 service connections.

2.2.1 California Water Code

The California Water Code (CWC) and Health and Safety Code (H&SC) are the codified California laws that regulate the use of water, recycled water, and the protection of water quality, which are applicable to all groundwater recharge projects that use recycled water. Some of the key statutes that ensure the protection of water quality and public health are described in **Table 1**.

2.2.2 California Title 22, Recycled Water Regulations for Groundwater Replenishment

California water recycling criteria, including those applicable to groundwater replenishment using recycled water, are in Title 22 of the California Code of Regulations (CCR). The overarching principles used by DDW in developing the Groundwater Replenishment Regulations were:

- Groundwater replenishment projects that replenish groundwater basins
- Groundwater replenishment projects include storage in an aquifer and will include some natural treatment.
- Control of pathogenic microorganisms should be based on a low tolerable risk defined as an annual risk of infection from pathogenic microorganisms in drinking water of one in 10,000. This risk level is the same as that used for the federal Surface Water Treatment Rule for drinking water.
- Compliance with drinking water standards for regulated chemicals.
- Controls for unregulated chemicals.
- No degradation of an existing groundwater basin as a drinking water source shall occur.
- Use of multiple barriers to protect water quality and human health are in place.
- Projects should be designed to identify and respond to a treatment failure.

The control mechanisms in the Groundwater Replenishment Regulations that apply to surface and subsurface application (e.g., the use of injection or vadose zone wells) of 100 percent recycled water are summarized in **Table 1**

2.2.3 Division of Drinking Water

The State of California DDW regulates the 7,500 public drinking water systems and enforces both the federal and state SDWAs. Water system oversight includes conducting field inspections, issuing operating permits, reviewing plans for new facilities, taking enforcement actions for non-compliance, reviewing water quality data, and supporting water system security.

The DDW’s Recycled Water Unit establishes criteria and regulations for water recycling, evaluates water recycling projects, and provides recommendations to Regional Boards regarding public health considerations. It also maintains an Alternative Treatment Technology Report for recycled water. A proposed recycled water project must receive approval from DDW for an engineering report prepared in compliance with CCR Title 22, Division 4, Chapter 3 (Uniform Statewide Recycling Criteria) before being permitted by the applicable Regional Board for the production, distribution, or use of recycled water.

Table 1: Key Statutes for Groundwater Recharge of Recycled Water

Statute	Provisions Relative to Groundwater Recharge of Recycled Water
CWC § 13050 (n)	“Recycled water” means water, which, because of the treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource (CWC, 2024a)
CWC §13561 (b)	“Direct potable reuse” means the planned introduction of recycled water either directly into a public water system, as defined in Section 116275 of the Health and Safety Code, or into a raw water supply immediately upstream of a water treatment plan (CWC, 2024b)
CWC §13561 ©	“Indirect potable reuse for groundwater recharge” means the planned use of recycled water for replenishment of a groundwater basin or an aquifer that has been designated as a source of water supply for a public water system, as defined in Section 116275 of the Health and Safety Code (CWC, 2024c)
CWC §13241	Each regional board shall establish such water quality objectives in water quality control plans to ensure the reasonable protection of beneficial uses and for the need to develop and use recycled water (CWC, 2024d)
California Code, Health and Safety Code - HSC § 116271	The DDW Drinking Water Program transferred to the SWRCB, including water reclamation and direct and indirect potable reuse (State Water Resources Control Board, 2024)
CWC § 13523(a)	Each regional board, in consultation with the State Department of Public Health, prescribes water reclamation requirements for water that is used or proposed to be used as recycled water (CWC, 2024e)
CWC § 13562	The Department shall adopt uniform water recycling criteria for indirect potable reuse for groundwater recharge (CWC, 2024f)
CWC § 13540	When a regional board finds that water quality considerations do not preclude controlled recharge of the stratum by direct injection, and when the State Department of Public Health, following a public hearing, finds the proposed recharge will not degrade the quality of water in the receiving aquifer as a source of water supply for domestic purposes, recycled water may be injected by a well into the stratum (CWC, 2024g)
CWC § 60320.212 Regulated Contaminants and Physical Characteristics Control	The recycled water must meet drinking water MCLs and lead and copper action levels. Failure to meet MCLs requires follow-up sampling, notification to DDW and the Regional Board, and/or discontinuation of recycled water use until the problem is corrected (CWC, 2024h)
CWC § 60323. Engineering Report	An Engineering Report, approved by the Department, is required to produce or supply recycled water for reuse. It includes a contingency plan to ensure that no untreated or inadequately treated water will delivered to the use area (CWC, 2024i)
CWC § 60320.230 Alternatives	An alternative to any of the provisions is allowed if it can be adequately demonstrated that the alternative provides the same level of public health protection, the alternative has been approved by the Department, is subject to a public hearing, and an expert panel has reviewed the alternative unless otherwise specified by Department (CWC, 2024j)

2.2.4 State Water Resources Control Board Policies

There are two SWRCB policies directly applicable to the protection of water quality and human health for groundwater replenishment projects. These policies are the anti-degradation policies and the Recycled Water Policy.

2.2.4.1 Anti-degradation Policies

California's anti-degradation policies apply to both surface waters and groundwater (and thus groundwater replenishment projects), protect both existing and potential beneficial uses of surface water and groundwater, and are incorporated into Regional Board Basin Plans. They are binding on all State agencies. The policies are:

- Resolution 68-16, Policy with Respect to Maintaining Higher Quality Waters in California (Anti-degradation Policy). The Anti-degradation Policy requires that existing high water quality be maintained to the maximum extent possible but allows lowering of water quality if the change is "consistent with maximum benefit to the people of the State or will not unreasonably affect present and anticipated beneficial use of such water." The Anti-degradation Policy requires the best practicable treatment or control of discharges to high-quality waters to ensure that pollution or nuisance will not occur and that the highest water quality consistent with maximum benefit to the people of California is maintained. Assimilative capacity is the groundwater capacity to assimilate contaminants without detrimental effects to human health or other beneficial uses. The difference between ambient groundwater quality and a basin's water quality objectives is the available assimilative capacity.
- Resolution 88-63, Sources of Drinking Water. All surface and ground waters of the State are suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards, except for waters whose existing water quantity or quality are not suitable for drinking water. The policy also protects beneficial uses of municipal and domestic water supply wherever they are being attained.

2.2.4.2 Water Quality Control Policy for Recycled Water

The purpose of the Recycled Water Policy is to protect groundwater resources and increase the beneficial use of recycled water from municipal wastewater sources in a manner consistent with State and federal water quality laws and regulations. The SWRCB adopted the Recycled Water Policy (Resolution No. 2009-0011) on February 3, 2009, and amended it in 2013 and 2018 to update statewide water recycling goals and address CEC monitoring for groundwater replenishment projects, among other changes. The critical provisions in the Policy related to groundwater replenishment projects are:

- Salt and Nutrient Management Plans (SNMP) - Managing salts and nutrients on a regional or watershed basis through the development of Salt/Nutrient Management Plans (SNMPs) rather than imposing requirements on individual recycled water projects.
- Regional Board Groundwater Objectives – Allows Regional Boards to include additional or more stringent requirements for groundwater replenishment projects in consultation with DDW and based on the water quality objectives in the applicable Regional Board's Water Quality Control Plan (Basin Plan).

- Assimilative Capacity – Grants Regional Board's discretionary authority to allocate assimilative capacity to groundwater replenishment projects and established assimilative capacity thresholds in the absence of an adopted SNMP. The policy recognizes the importance of recycled water as a critical water supply for California.

The Recycled Water Policy provides direction to the Regional Boards, proponents of recycled water projects, and the public regarding the appropriate criteria to be used by the SWRCB and the Regional Board in issuing permits for recycled water projects.

The policy includes volumetric goals for the use of recycled water and narrative goals to encourage recycled water use in groundwater-overdrafted and coastal areas, and annual reporting requirements statewide for the volume of recycled water produced and used as well as the volume of wastewater treated and discharged.

2.2.4.3 Constituents of Emerging Concern

The Recycled Water Policy groups pharmaceuticals, ingredients in personal care products (such as insecticides and flame retardants), and chemicals that can affect the human endocrine system in terms of growth, reproduction, and sexual behavior. Endocrine-disrupting chemicals are examples of CECs. Many CECs do not have established drinking water standards or advisory levels, so a method to estimate concentrations that can be ingested daily over a lifetime without appreciable risk has been accepted as standard practice for CECs (Nellor, 2015).

California IPR regulations require monitoring for CECs. Specific CECs that require regular monitoring include health-based CECs that have been assigned NLs (e.g., 1,4-dioxane, N-nitrosodimethylamine (NDMA), perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA)), as well as n-nitrosomorpholine (NMOR), which does not have an NL, and performance-based CECs (gemfibrozil, iohexol, sucralose, sulfamethoxazole) (SWRCB, 2018). In close coordination with regulators, comprehensive monitoring of CECs in the purified water from the Grace F. Napolitano Innovation Center (NIC) Demonstration Facility was part of all testing phases. The NIC Demonstration Facility was constructed in 2019 and began water quality testing in 2020. CEC lists are updated for each monitoring effort based on scientific research, priorities, and anticipated water use (e.g., IPR, DPR, discharge to surface water). Monitoring results will be included in the Engineering Report.

Notification levels are health-based advisory levels established by the OEHHA that the SWRCB adopts for chemicals in drinking water that lack MCLs. Monitoring by public water systems for chemicals with NLs is not required, except for compliance with the Unregulated Contaminant Monitoring Rule (UCMR). As a water wholesaler, Metropolitan is not required to comply with the UCMR. However, projects for groundwater replenishment using recycled water will be required to monitor for certain chemicals with notification levels. H&SC § 116456 provides the SWRCB with the authority to establish and revise NLs and RLs for contaminants in drinking water delivered for human consumption before an MCL has been set. When chemicals are found at concentrations greater than their NLs and RLs, certain requirements and recommendations apply. CEC monitoring also includes constituents that do not have NLs (or RLs) and incorporates constituents such as performance indicators, surrogates, and bioanalytical screening tools. The recycled water policy and regulations include provisions for the Regional Board, SWRCB's

Division of Water Quality (DWQ), and DDW to evaluate data and clarify which constituents a project must monitor.

2.2.5 Regional Water Quality Control Boards

The Regional Boards are semi-autonomous and make critical water quality decisions for their region. All duties and responsibilities of the Regional Boards are directed at providing reasonable protection and enhancement of the quality of both surface and groundwater in the region. The Regional Boards develop and enforce water quality objectives and implementation plans that will best protect the beneficial uses of the State's waters, recognizing local differences in climate, topography, geology, and hydrology. Each Regional Board is responsible for water quality decisions for its region, which includes setting standards, issuing waste discharge requirements, determining compliance with those requirements, and taking appropriate enforcement actions.

Pure Water will convey cleaned and purified wastewater via new conveyance facilities to five groundwater replenishment facilities, all of which are located within the Los Angeles Regional Board, Region 4. The five groundwater replenishment facilities and their locations within three groundwater basins are, from west to east:

- West Coast Groundwater Basin Injection Wells, West Coast Basin (California Department of Water Resources [DWR] Basin Number 4-11.03)
- Central Groundwater Basin Injection Wells, Central Basin (DWR Basin Number 4-11.04)
- Rio Hondo and San Gabriel Coastal Spreading Grounds, Central Basin (DWR Basin Number 4-11.04)
- Santa Fe Spreading Grounds, Main San Gabriel Basin (DWR Basin No. 4-13)
- San Gabriel Canyon Spreading Grounds, Main San Gabriel Basin (DWR Basin No. 4-13)

In the future, it may be possible to integrate Pure Water recharge into the Orange County groundwater basin to provide regionwide recycled water distribution and operational flexibility and reliability. Such an integrated system would contribute to regional goals of securing high-quality, climate-resilient, local water supplies for Southern California. However, at this time, recharge into the Orange County groundwater basin is not being proposed for approval as part of the Pure Water, although it could be part of future regional integration. If, in the future, Orange County joins Pure Water, the use of replenishment facilities within the Orange County Basin would be permitted by the Santa Ana Regional Board, Region 8.

2.2.5.1 Regional Board Role

With respect to Pure Water, the role of the Los Angeles Regional Board is to develop and issue permits for facilities in its jurisdictional areas, including a Title 22 Recycled Water Permit. Metropolitan is expected to conduct monitoring to ensure compliance with the permit conditions throughout Pure Water design, construction, and operation.

2.2.5.2 Regional Board Basin Plans

Basin Plans, or Water Quality Control Plans, preserve and enhance water quality and protect the beneficial uses of all regional waters. Basin Plans incorporate (by reference) all applicable State and Regional Board plans and policies, as well as other pertinent water quality policies and regulations.

Specifically, the Basin Plans designate beneficial uses for surface and ground waters; set narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy; and describe implementation programs to protect all waters in the region. Pure Water would be subject to the Basin Plan Objectives (BPOs) set forth in the Water Quality Control Plan: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (2014) and, if reaching Orange County, the Water Quality Control Plan for the Santa Ana River Basin (2019).

2.2.5.2.1 Beneficial Uses

A beneficial use is one of the various ways that water can be used for the benefit of people and/or wildlife. Examples include drinking, recreation, industrial and agricultural water supply, and the support of fresh and saline aquatic habitats. Beneficial uses have been established for regional groundwater basins.

A Basin Plan designates beneficial uses and groundwater quality objectives on a sub-basin basis. In the Los Angeles Regional Board Basin Plan, many groundwater basins are designated Municipal and Domestic Water Supply (MUN), which reflects the importance of groundwater as a source of drinking water and as required by the SWRCB's Sources of Drinking Water Policy. SWRCB Resolution No. 88-63 (Sources of Drinking Water), followed by RWQCB Resolution No. 89-03 (Incorporation of Sources of Drinking Water Policy into the Water Quality Control Plans), states that "All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic waters supply and should be so designated by the Regional Boards ... [with certain exceptions which must be adopted by the Regional Board]." In adherence with these policies, many inland surface and ground waters have been designated as MUN, presuming at least a potential suitability for such a designation. Other beneficial uses for groundwater are generally Industrial Service Supply (IND), Industrial Process Supply (PROC), and Agricultural Supply (AGR). The beneficial uses assigned to the four groundwater basins that could receive Pure Water are shown in **Table 2**. The beneficial uses for groundwater in the Orange County Basin are shown in **Table 2** to illustrate the similarities of beneficial uses between the Orange County Basin and the other three basins.

Table 2: Regional Water Quality Control Board Beneficial Use Designations

Beneficial Use	West Coast Basin[1]	Central Basin[1]	Main San Gabriel Basin[1]	Orange County Basin[2]
Municipal and Domestic Water Supply (MUN)	X	X	X	X
Industrial Service Supply (IND)	X	X	X	X
Industrial Process Supply (PROC)	X	X	X	X
Agricultural Supply (AGR)	X	X	X	X

[1] California Regional Water Quality Control Board, Los Angeles Region, 2014

[2] California Regional Water Quality Control Board, Santa Ana Region, 2019.

2.2.5.2.2 Basin Plan Water Quality Objectives

Groundwater in the four groundwater basins is suitable for AGR, MUN, IND, and PROC use. The Basin Plan has:

- General narrative groundwater objectives that apply to all groundwaters for taste, odor, and radioactivity.
- Groundwater criteria for bacteria and DDW primary and secondary MCLs.
- Objectives to protect soil productivity, irrigation, and livestock watering.

BPOs for groundwater basins are set to ensure that groundwater does not contain concentrations of chemicals in amounts that adversely affect beneficial uses or degrade water quality. Recharge of supplemental water sources introduced into the groundwater basin, including imported water and recycled water, must not cause BPOs to be exceeded. For the groundwater replenishment sub-basins, the Basin Plan establishes specific mineral water quality objectives for total dissolved solids (TDS), chloride, sulfate, and boron (**Table 3**). Because there are specific BPOs for these constituents, a detailed analysis of Pure Water's potential impact on these constituents is included in Section 6.

2.2.5.3 Salt and Nutrient Management Plans

The Recycled Water Policy recognizes the potential for increased salt and nutrient loading to groundwater basins because of increased recycled water use and, therefore, requires the development of regional or sub-regional salt and nutrient management plans (SNMP). In requiring SNMPs, the Policy acknowledges that recycled water may not be the sole cause of high concentrations of salts and nutrients in groundwater basins and, therefore, regulation of recycled water alone will not address such conditions.

Table 3: Basin Plan Objectives

	West Coast Basin [1] (mg/L)	Central Basin [1] (mg/L)	Main San Gabriel Basin Western Area [1] (mg/L)	Main San Gabriel Basin Eastern Area [1] (mg/L)	Orange County Basin [2] (mg/L)
TDS	800	700	450	600	580
Sulfate	250	250	100	100	--
Chloride	250	150	100	100	--
Boron	1.5	1.0	0.5	0.5	--
Nitrate (as N)	10	10	10	10	3.4

[1] California Regional Water Quality Control Board, Los Angeles Region, 2014.

[2] California Regional Water Quality Control Board, Santa Ana Region, 2019.

The intent of the SNMP requirement is for salts and nutrients from all sources to be managed on a basin-wide or watershed-wide basis in a manner that ensures the attainment of water quality objectives and protection of beneficial use. The Recycled Water Policy states:

- Every basin/sub-basin shall have a consistent SNMP.
- SNMPs shall be tailored to address the water quality concerns in each basin.
- SNMPs shall be developed or funded pursuant to the provisions of Water Code sections 10750 et seq. or other appropriate authorities.
- SNMPs shall be completed and proposed to the Regional Board within five years from the adoption date of the Policy.
- SNMPs may address constituents other than salt and nutrients that adversely affect groundwater quality.

A SNMP has been developed for the Central Basin and West Coast Basin (WRD, 2015) and a separate SNMP for the Main San Gabriel Basin (Stetson Engineers, 2016). The Recycled Water Policy includes provisions for managing salts and nutrients on a regional or watershed basis through the development of SNMPs. Unfavorable groundwater salt and nutrient conditions can be caused by natural soils, discharges of waste, irrigation using surface water, groundwater, or recycled water, and water supply augmentation using surface or recycled water. SNMPs are required for every groundwater basin/sub-basin to:

- Identify salt and nutrient sources.
- Estimate basin/sub-basin assimilative capacity and loading estimates.
- Evaluate the fate and transport of salts and nutrients.

The SNMP includes implementation measures to manage salt and nutrient loadings in a basin on a sustainable basis, as well as an anti-degradation analysis, which demonstrates that all recycling projects identified in the plan will collectively protect groundwater quality. The SNMP also includes a monitoring network designed to determine if salts, nutrients, and other constituents of concern (as identified in the SNMPs) are consistent with applicable water quality objectives.

The SNMP analysis indicates that average TDS and chloride concentrations in the Central Basin are below BPOs and that assimilative capacity is available. Due to saline plumes in the West Coast Basin, average TDS and chloride concentrations exceed BPOs, and, as a result, there is no available assimilative capacity. If the saline plume inland of the West Coast Basin barrier is removed from the averaging calculation, average TDS and chloride concentrations in the West Coast Basin are below the BPOs, and there is available assimilative capacity (WRD, 2015).

The Main San Gabriel Basin SNMP found that TDS, nitrate, sulfate, and chloride are the primary constituents of concern (COCs), but it did not include an assessment for boron. As the primary COCs, Pure Water's contribution of these constituents relative to the Basin's assimilative capacity is a key consideration in the approval process. The assimilative capacity of the primary COCs was calculated using the more conservative Main San Gabriel Basin assumptions of the volume available for mixing and the lower BPOs. The analysis also evaluated potential and hypothetical groundwater replenishment projects to determine the loadings and impacts resulting from the projects. Later in this tech memo

(Section 6), an assimilative capacity analysis was performed based on water quality assumed for Pure Water and expected groundwater quality near the proposed recharge areas.

The SNMPs for the Main San Gabriel Basin, the Central Basin, and the West Coast Basin did not explicitly identify Pure Water and did not include targets for potential COCs such as boron; however, potential COCs will be discussed later in this Groundwater Quality Tech Memo. The Regional Board has recently asked that the SNMPs for Central and West Coast Basins be updated.

2.2.5.4 Water Quality Requirements Specified in the Groundwater Replenishment Regulations

The CCR Title 22 Groundwater Replenishment Regulations specify compliance with recycled water quality requirements, including controls for microbial pathogens (virus, *Giardia*, and *Cryptosporidium*), compliance with drinking water standards for regulated chemicals, and controls for nitrogen and unregulated chemicals. More specifically, the recycled water used for surface or subsurface application must comply with the following CCR, Title 22 regulations, as specified in **Table 4**.

Table 4: Title 22 Regulations Applicable to Surface and Subsurface Application of Recycled Water

Subject	Requirements
Pathogenic microorganism treatment requirements	The wastewater must receive treatment that achieves at least 12-log enteric virus reduction, 10-log Giardia cyst reduction, and 10-log Cryptosporidium oocyst reduction using at least three treatment barriers, including residence time underground for virus
Primary MCLs	• inorganic chemicals in Table 64431-A, except for nitrogen compounds • radionuclide chemicals in Tables 64442 and 64443 • organic chemicals in Table 64444-A-A • disinfection by-products in Table 644533-A
Secondary MCLs	• Tables 64449-A and 64449-B (upper limit)
Notification Levels	• NL requirements are more complex than a single exceedance of the numeric NL. The purified water used for replenishment is monitored quarterly for NLs, with accelerated monitoring initiated if the result is greater than an NL. If the running 4-week average is greater than the NL for 16 consecutive weeks, the project sponsor must notify DDW and Los Angeles Regional Board, and the project sponsor must take corrective actions
Lead and Copper Action Levels	• Recycled water cannot exceed the action levels for lead (0.015 mg/L) and copper (1.3 mg/L)
Total Organic Carbon	• TOC concentration in recycled water cannot exceed 0.5 mg/L, based on the 20-week running average of all TOC results and the average of the last four TOC results
Nitrogen	• Total nitrogen cannot exceed a concentration of 10 mg/L

Subject	Requirements
Priority Pollutants	• Priority pollutants in the recycled water and groundwater (from downgradient monitoring wells) must be monitored for priority pollutants (chemicals listed in 40 Code of Federal Regulations (CFR) Section 131.38, "Establishment of numeric criteria for priority toxic pollutants for the State of California") specified by DDW, based on the DDW's review of a project's engineering report

2.3 California Environmental Quality Act

The California Environmental Quality Act (CEQA) is a statute that requires State and local agencies to identify the potentially significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. The CEQA Guidelines are the regulations that explain and interpret the law for both the public agencies required to administer CEQA and for the public generally (CCR, Title 14).

The following thresholds from the CEQA Guidelines are used to determine whether Pure Water will have significant impacts on groundwater resources.

1. *Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*
2. *Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*
3. *Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?*

In addition, the following factors are relevant to determine significant impacts:

- A proposed activity, taking into consideration the effect of groundwater replenishment on ambient groundwater quality, would:
    - Impact groundwater quality so that it no longer meets standards (e.g., Basin Plan beneficial uses and water quality objectives, including drinking water MCLs established to protect public health).
    - Reduce the assimilative capacity of the groundwater basin limiting future uses.
    - Degrade groundwater quality to the extent that the groundwater was no longer suitable for established beneficial uses without additional treatment.
    - Result in noncompliance with the SWRCB Antidegradation Policy and Recycled Water Policy.

Section 3: Water Quality from Pure Water Demonstration Facility

The new AWP Facility would provide the necessary treatment to produce Pure Water purified water. The final design for the AWP Facility is expected to be completed in early 2026. To develop the design and operating criteria of the AWP Facility and demonstrate regulatory compliance to the State Water Resources Control Board's Division of Drinking Water (DDW), Metropolitan and the Sanitation Districts developed the NIC Demonstration Facility (referred hereafter as the Demonstration Facility), a 0.5-MGD advanced water treatment reuse demonstration plant. The Demonstration Facility can treat either primary or non-nitrified secondary effluent from the Warren Facility with three major treatment processes, as shown in **Figure 3** and described below:

- Membrane Bioreactors (MBR)
  - MBRs use biological processes and membrane technology to clean water. Biological removal uses microorganisms to remove organic material and nitrogen compounds. Membranes filter and remove microscopic materials, including microorganisms and other particles.
- Reverse Osmosis (RO)
  - RO purification removes more than 99 percent of all impurities. Water from Stage 1 is forced through membranes that allow water molecules through the membranes' pores while blocking the passage of microscopic materials such as bacteria, pharmaceuticals, and salts.
- Ultraviolet Light/Advanced Oxidation Process (UV/AOP)
  - UV light at specific wavelengths is a powerful disinfectant. UV/AOP uses UV light in its disinfectant wavelength in combination with a strong oxidant, such as chlorine or hydrogen peroxide, to form extremely reactive molecules. These molecules destroy small trace organics that are regulated for water quality.

Since 2019, the NIC has been used to generate data to demonstrate that the treatment train comprised of MBR, RO, and UV/AOP, whether treating primary or secondary effluent, can be used to meet all requirements for an indirect potable reuse project for groundwater recharge. The Demonstration Facility has operated in several different configurations since testing began to evaluate its effectiveness in meeting treatment and water quality goals and optimizing design and operating criteria. Data generated with the two configurations listed below were used to support this technical memorandum and groundwater impacts analysis:

1. tMBR Testing (2020-2021): Nitrifying-only Tertiary MBR (N-only tMBR)+ Split Partial Double Pass RO + UV/AOP, treating secondary effluent
2. sMBR Testing (2022-2023): Nitrifying-Denitrifying Secondary MBR (NDN sMBR) + Single Pass RO + UV/AOP, treating primary effluent.

One of the key criteria the demonstration testing has sought to meet is to produce product water that meets all regulatory requirements in California Title 22 for indirect potable reuse through groundwater recharge. While it is anticipated that the final purified water quality of the future full-scale AWP Facility may vary from that of the Demonstration Facility due to the differences that occur in feedwater, design, process, and operational configurations and conditions, the data generated from the two test conditions are generally anticipated to be within the range of anticipated performance from the future AWP Facility for key constituents, confirming feasibility to meet regulatory requirements. A few examples of these differences are highlighted below:

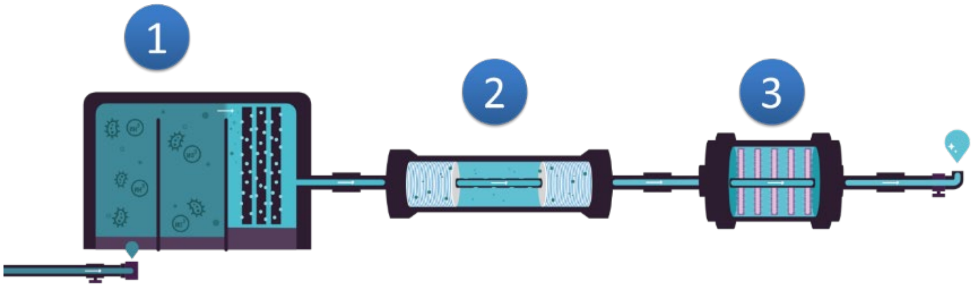
1. While the Demonstration Facility RO system for both tMBR and sMBR testing used a two-stage system, the future full-scale may leverage a three-stage design.

2. While the Demonstration Facility RO system during tMBR testing was operated with a split partial second-pass RO, wherein some of the first-pass permeate was treated with a second pass, the future full-scale AWP Facility may only include a single-pass RO system.
3. While NIC data was generated for both testing phases used different oxidants for UV/AOP, namely sodium hypochlorite or hydrogen peroxide, the future full-scale would be designed with one of the two options evaluated. Nonetheless, both oxidants evaluated demonstrated that key performance and treatment criteria could be met.
4. While the Demonstration Facility operated the MBR in an NdN and N-only mode, the future full-scale will operate first in an N-only mode.

Consistent treatment performance has been demonstrated through robust testing spanning nearly two years, capturing seasonal variation through weekly, monthly, or quarterly monitoring. In addition, while the final design will dictate detailed design criteria for the future AWP Facility, the three major unit processes of MBR, RO, and UV/AOP used to generate the data for this evaluation will be used in the AWP Facility. It should be noted that data used to represent the Demonstration Facility final product water reflect the UV/AOP effluent; however, for the full-scale AWP Facility, additional post-stabilization processes would be used to meet critical targets to address chemical stability, corrosivity, and microbial quality, such as through pH and alkalinity adjustments, and potential disinfectant addition. Therefore, it should be noted that the data from the Demonstration Facility are not completely representative of the final product water that will be used for permit compliance but are deemed appropriate to use for the purposes of this Groundwater Quality Tech Memo.

The water quality data collected over nearly two years from the Demonstration Facility during 2020 through 2023 are summarized in **Appendix B**. Maximum, minimum, and median values for general minerals, metals, volatile organic compounds (VOCs), and other potential COCs are provided. Overall, the quality of the purified water based on the data from the Demonstration Facility meets all primary and secondary MCLs, as well as all notification levels. A comparison to public health goals, which are not regulatory standards, is provided for reference.

Figure 3: Proposed Treatment Process



Membrane Bioreactors
Microorganisms remove ammonia and other nitrogen compounds, while membranes filter tiny particles, smaller than 1/100 of a grain of sand.

Reverse Osmosis
Pressurized membranes further remove microscopic materials, such as bacteria, pharmaceuticals and salts, eliminating more than 99% of all impurities

Ultraviolet/Advanced Oxidation Process:
Ultraviolet light and a powerful oxidant destroy any remaining viruses and trace chemical compounds.

Section 4: Imported Water Sources Currently Used for Groundwater Recharge

Metropolitan imports water from two sources: the State Water Project (SWP) and the Colorado River. Some of the imported water is used to replenish groundwater in the basins and influence the overall basin groundwater quality profile. This section provides an overview of the imported water sources that are currently used for groundwater replenishment.

4.1 State Water Project

The SWP, owned and operated by DWR, conveys water from Northern California watersheds to meet the municipal, agricultural, and industrial needs of the San Joaquin Valley, the San Francisco Bay Area, the Central Coast, and Southern California. Metropolitan receives SWP water, delivered to Castaic Lake via the West Branch and to Silverwood Lake reservoir (**Figure 4**) and Lake Perris via the East Branch. SWP water is treated to drinking water quality standards and delivered to member agencies. SWP water from Silverwood Lake is also used for replenishment at the Sante Fe(via USG-3 from Glendora Tunnel), San Gabriel Canyon (via SGVMWD/USG-3 from Azusa Pipeline/Glendora Tunnel), and Rio Hondo/San Gabriel Coastal Spreading Grounds (via CENB-48 off the Rialto Feeder). Because most of the groundwater basins that will receive purified water from Pure Water currently receive water from the East Branch, water quality from Silverwood Lake is used for comparison. The median concentration of constituents in water from Silverwood Lake is shown in **Appendix B**. SWP water in Silverwood Lake is below the regulatory thresholds (**Appendix B**).

4.2 Colorado River

Colorado River water is delivered to California through the Colorado River Aqueduct (CRA), which is a system of canals, tunnels, and five pumping plants (**Figure 4**).

The CRA terminus, Lake Mathews (**Figure 4**), was selected because it is situated at the upper end of Metropolitan's service area, and its elevation of 1,390 feet allows water to flow by gravity through much of Metropolitan's conveyance system.

The reservoir receives about two-thirds of the CRA supply; the rest is diverted to San Diego and southern Riverside County. No groundwater basins in Los Angeles County currently receive raw CRA supplies for groundwater recharge.

4.3 Weymouth WTP

The Weymouth WTP in La Verne began treating and delivering water in 1941. Today, it has the capacity to treat up to 520 MGD. The plant generally serves eastern Los Angeles County, the San Gabriel Valley, and parts of Orange County.

The Weymouth WTP uses a conventional five-step treatment process:

- **Disinfection/Pre-treatment**: Water entering the plant is disinfected using ozone as the primary disinfectant. Chlorine is used as the backup disinfectant when the ozone system is not available.

- **Coagulation**: Chemical coagulants (either alum or ferric chloride and polymer) are injected into the water and mixed with flash jet mixers.
- **Flocculation**: The water travels into the mixing and settling basins, where large mechanical mixers (flocculators) gently agitate the water. This further mixes the water with the coagulant chemicals and allows sufficient time for the larger suspended particles in the water to bind together and form floc.
- **Filtration**: Settled water from the sedimentation basins is treated with a filter aid polymer and enters the filters, which consist of layers of anthracite coal and sand filter media. The filters remove virtually all of the suspended particles that did not settle during the sedimentation process.

Following the conventional treatment process, chlorine, followed by ammonia, is added to the combined filter effluent to form chloramines, which serve as the secondary disinfectant in the distribution system. Additionally, sodium hydroxide is added to increase the pH of the water, leaving the plant to minimize corrosion in the distribution system. The water produced by the Weymouth water treatment plant meets all drinking water standards (**Appendix B**).

4.4 Diemer WTP

The Diemer WTP started operation in 1963 and has a design capacity of 520 MGD. It is the only WTP that generates electricity through a hydroelectric power plant via the co-located 5.1-megawatt Yorba Linda Hydroelectric Power Plant. The treatment process is the same as at the Weymouth WTP discussed in the previous section (4.3). The water produced by the Diemer WTP meets all drinking water standards (Appendix B). The water from Diemer WTP may be used for groundwater recharge in the seawater intrusion barriers in the Central and West Coast Basins.

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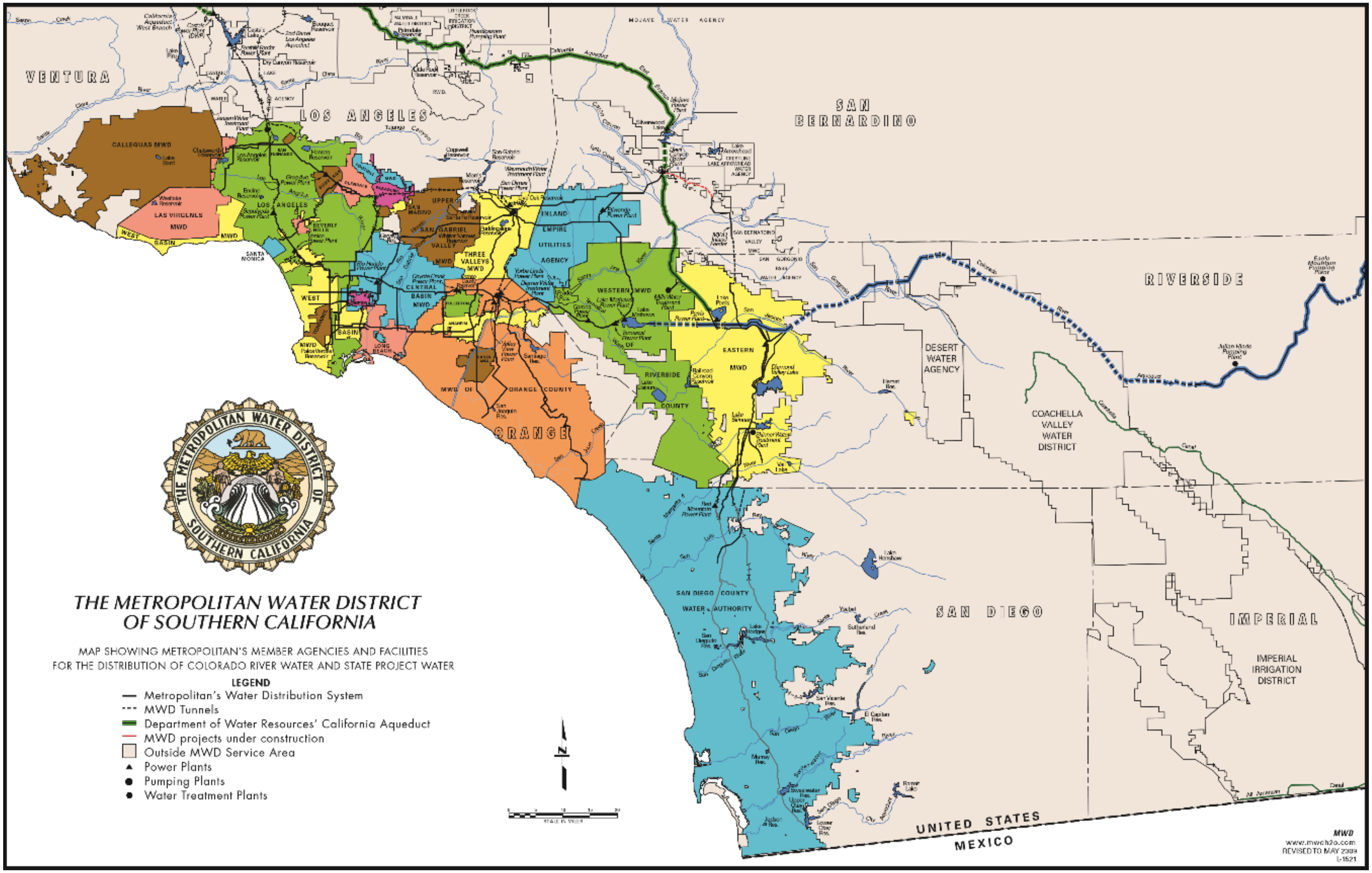
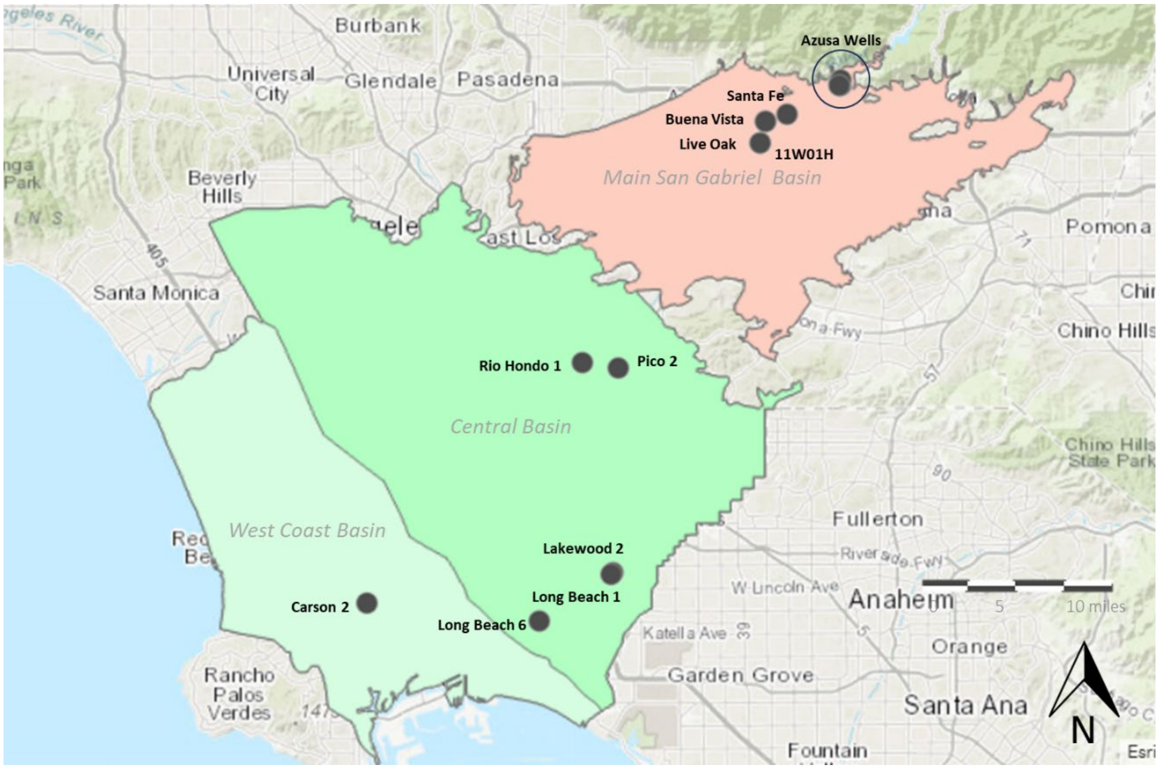
Figure 4: Map of Metropolitan Service Area



Section 5: Background Groundwater Conditions

The background conditions in the groundwater basins are important to characterize and assess the potential effects of adding purified water from Pure Water to these basins. This section summarizing the conditions in the groundwater basins, which are described in more detail in the Pure Water Groundwater Technical Memorandum (PWSC, 2024). Each of the groundwater basins is adjudicated and, therefore, not subject to a Groundwater Sustainability Plan (GSP) under the Sustainable Groundwater Management Act (SGMA). Specific wells have been selected to assess the background water quality at each replenishment area. **Figure 5** identifies the basins, replenishment areas, and wells used in the analysis.

Figure 5: Location of Wells Used in Analysis



5.1 West Coast Basin

The West Coast Basin, shown in green on **Figure 6**, lies along the coast in western Los Angeles County. It is bounded on the south and west by the Pacific Ocean, on the north by the Ballona Escarpment, on the east by the Newport-Inglewood Uplift, and on the south by the Palos Verdes Hills (Metropolitan 2024a). Surrounding groundwater basins are shown for reference.

Increased groundwater production lowered groundwater levels to below sea level throughout much of the West Coast Basin by the 1920s (Land et al., 2004). Seawater began moving inland in aquifers from both Santa Monica Bay and San Pedro Bay. By the 1940s, elevated concentrations of chloride owing to seawater intrusion were present in all coastal areas.

Table 5: Relationship between Basins, Replenishment Areas, and Wells Used in Analysis

Basin	Replenishment Areas	Representative Wells
West Coast	West Coast Groundwater Basin Injection Wells	Carson 2
Central Basin	Central Groundwater Basin Injection Wells	• Long Beach 1 • Long Beach 6 • Lakewood 2
	Rio Hondo and San Gabriel Coastal Spreading Grounds	• Rio Hondo 1 • Pico 2
Main San Gabriel Basin	Santa Fe Spreading Grounds	• Santa Fe • Buena Vista 2 • Buena Vista • Live Oak • MW- 01W11H
	San Gabriel Canyon Spreading Grounds	• Azusa 1 • Azusa 2 • Azusa 4 • Azusa 11 • Azusa 12 • City 8

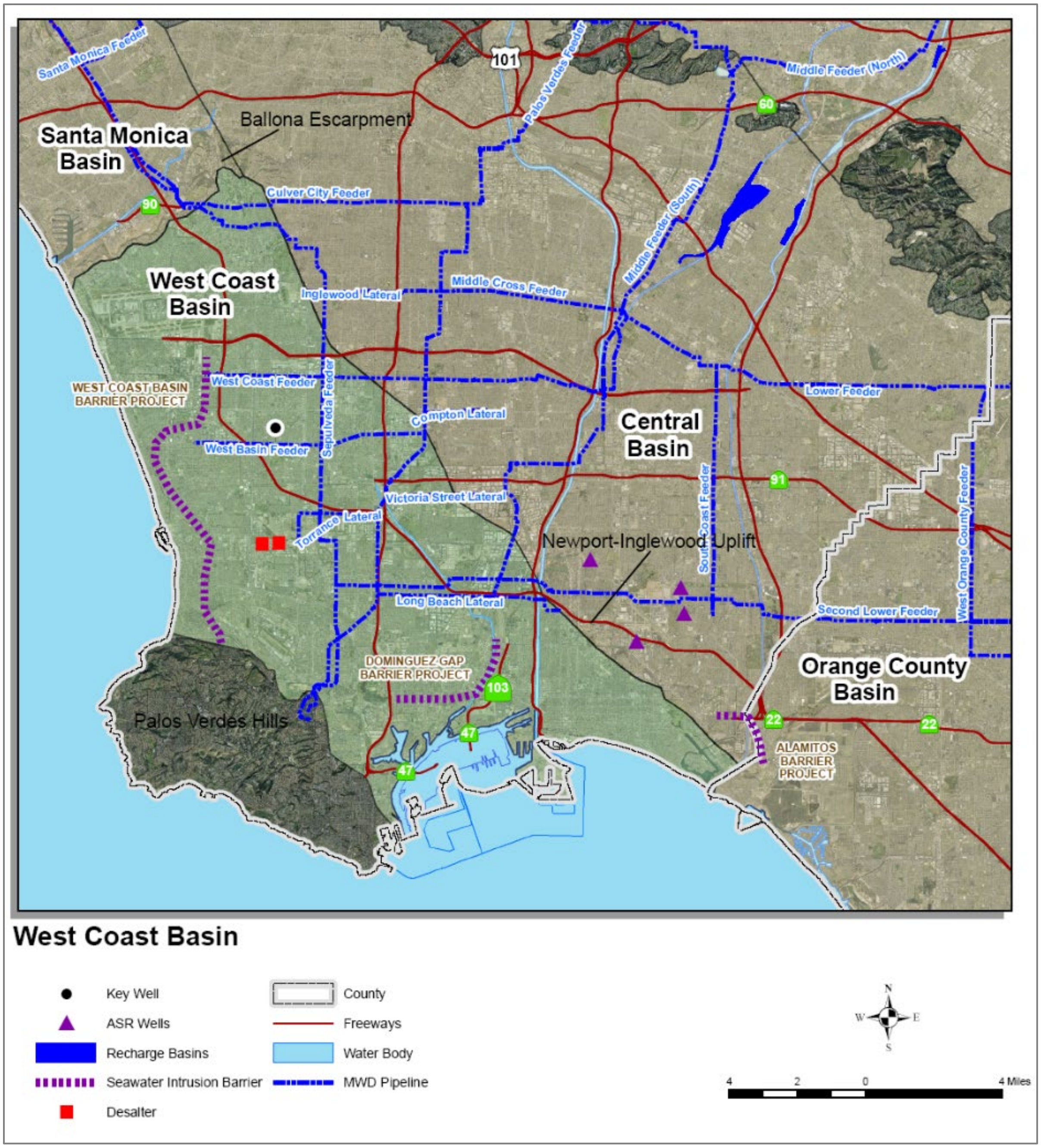
Injection with imported water at what is now the West Coast Basin Barrier Project began in the 1950s. In the late 1990s, the water supply in the West Coast Basin consisted of approximately 66 percent imported water, 24 percent groundwater, and 10 percent recycled water. At the same time, half of basin replenishment was from groundwater inflow from adjacent basins (54 percent), followed by injection (23 percent), precipitation/irrigation (15 percent), and seawater intrusion (8 percent).

The West Coast Basin shares the same geohydrologic framework as the adjacent Central Basin (Land et al., 2004; Reichard et al., 2003). The aquifers were grouped into two hydrogeologic systems. (Land et al., 2004):

- **Upper aquifer system**: Recent aquifer system and Lakewood aquifer system consist of Holocene- to upper Pleistocene-Age sediments, including the Gaspur, Gage (aka 200-foot sand), and Gardena aquifers.

- **Lower aquifer system**: The Upper and Lower San Pedro aquifer systems consist of lower Pleistocene deposits, including the Lynwood (a.k.a. 400-foot gravel) and Silverado aquifers.

Figure 6: Map of West Coast Basin



The underlying Pico unit is considered a low-transmissive zone that underlies the Lower San Pedro aquifer system. The Pico unit is composed primarily of upper Pliocene to lower Pleistocene deposits (Land et al., 2004).

The Silverado aquifer underlying most of the West Coast and Central Basins is the most productive aquifer in the basin. The proposed Pure Water project would inject purified water into the Silverado aquifer. The aquifer ranges from 100 to 500 feet thick and yields 80 to 90 percent of the groundwater extracted annually. The groundwater levels in key well 460 K have varied from about 43 feet below mean sea level to 8 feet above mean sea level over the past 10 years, which represents an increase of more than 50 feet since 1970 (Metropolitan, 2024a). The quality of water from the Silverado aquifer, collected from wells in the West Coast and Central Basins, is used in this Technical Memo to assess background water quality.

Age dating can be a useful tool to identify areas where recent recharge has occurred and identify areas that may not have experienced the influence of imported water, surface water, or seawater intrusion. Age dating information was used to identify the occurrence of relatively recent water. Older water (greater than 40 years) is generally from the Lower aquifer systems. Recent water (younger than 40 years) is present in the Upper and Lower aquifer systems inland from the seawater-barrier projects and locally near replenishment basins (Land et al., 2004). Groundwater age was used by Visser et al. (2016) to trace areas of active groundwater recharge. Data visualization from the Visser et al. (2016) study is provided on the SWRCB website at Groundwater Vulnerability Using Relative Groundwater Age (ca.gov). As shown in **Figure 7**, groundwater in the area near Carson and Lakewood (> 40 years) is older than other areas, such as the Forebay Areas, Irwindale, and Azusa, where imported water is routinely recharged. The areas in West Coast Basin and the Pressure Area of the Central Basin are older and are less influenced by imported water recharge.

Figure 7: Approximate Age Dating of Groundwater in Pure Water Area

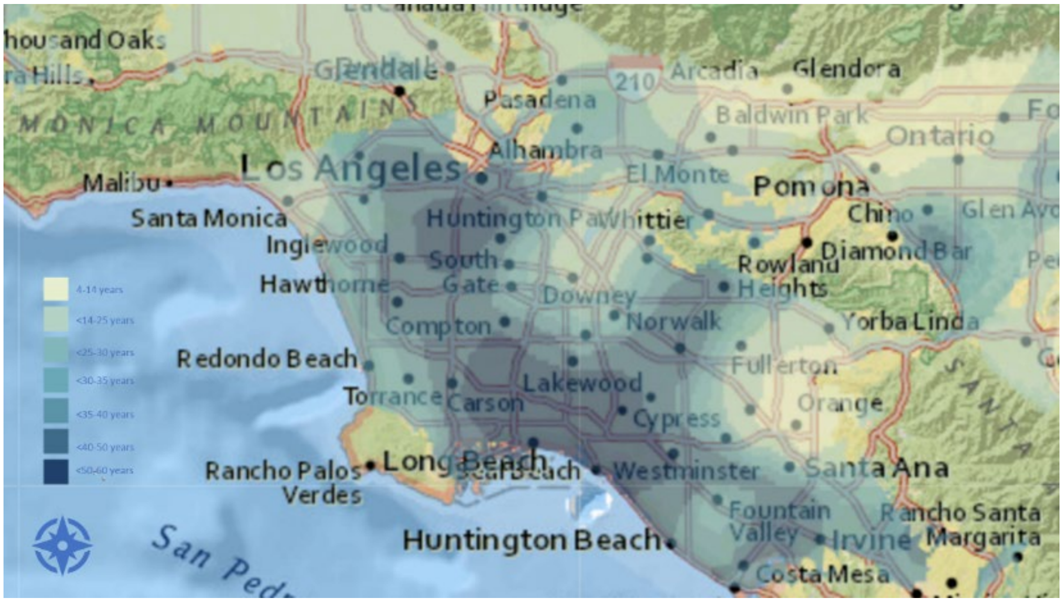
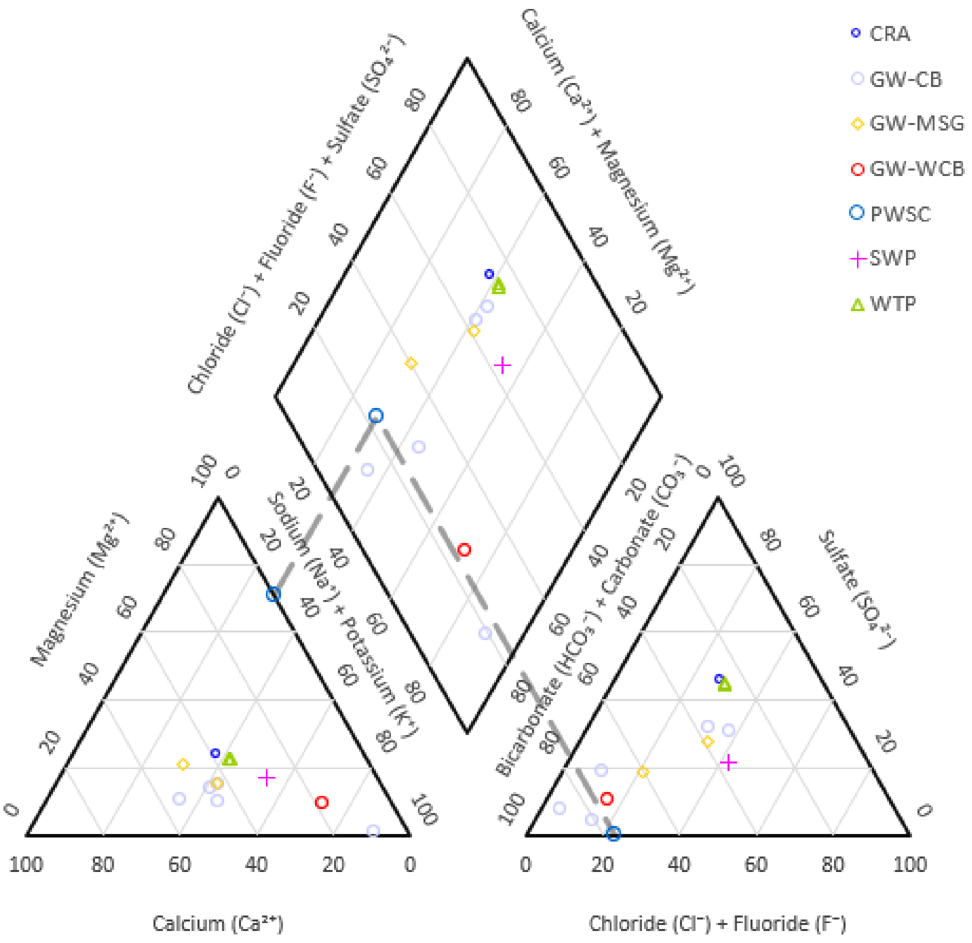


Figure 8 is a Piper diagram of the water from the Silverado aquifer, which confirms the character of the groundwater. A Piper diagram is a graphical representation of water chemistry, specifically for hydrogeochemical analysis. The Piper diagram is divided into two triangles (one for cations and one for

anions) and a central rhombus that integrates both compositions. Each side of the triangle represents one ion of the water from 0 percent to 100 percent. The location of a point on the central diamond indicates the percentage of the different ions in the water. Piper diagrams help to compare and classify water samples from different sources, identify dominant ions, and understand the geochemical processes affecting water chemistry. They are also useful for delineating water types, such as freshwater, brackish water, or saline water, and identifying potential contamination sources. Analytical results of samples from the Silverado aquifer in the lower aquifer group from the Carson 2 well (GW-WCB) are included on the Piper diagram. Carson 2 well water plots as sodium bicarbonate, which reflects the typical condition of a coastal aquifer. Appendix B shows the median concentration of constituents in Carson 2 well, the West Coast Basin background water composition.

Figure 8: Piper Diagram



TDS concentrations in the West Coast Basin range from 150 mg/L to more than 13,000 mg/L. Most water in the West Coast Basin has dissolved solids concentrations of less than 500 mg/L and generally has a sodium-bicarbonate to sodium/calcium-bicarbonate character (Land et al., 2004). Water with a TDS concentration greater than 1,000 mg/L also contains variable amounts of calcium and sodium, but chloride is predominant. Most of the water with high dissolved solids are from the Upper aquifer systems, and several have dissolved chloride values near that of seawater. Elevated chloride concentrations were present in both the Upper and Lower aquifer systems inland from the seawater intrusion barrier projects.

5.2 Central Basin

The Central Basin, shown in green, lies along the coast in western Los Angeles County, between the San Gabriel River on the east and the Rio Hondo and Los Angeles River on the west (**Figure 9**). It is bounded on the south and west by the Pacific Ocean, on the north by the Ballona Escarpment, on the east by the Newport-Inglewood Uplift, and on the south by the Palos Verdes Hills (Metropolitan 2024a). Surrounding groundwater basins are shown for reference.

The same hydrostratigraphy is present in the Central Basin as in the West Coast Basin, the Upper aquifer system (Recent and Lakewood aquifer systems), and the Lower aquifer system (Upper and Lower San Pedro Aquifer systems). The Silverado aquifer is in the Lower aquifer system and produces the most water in the area.

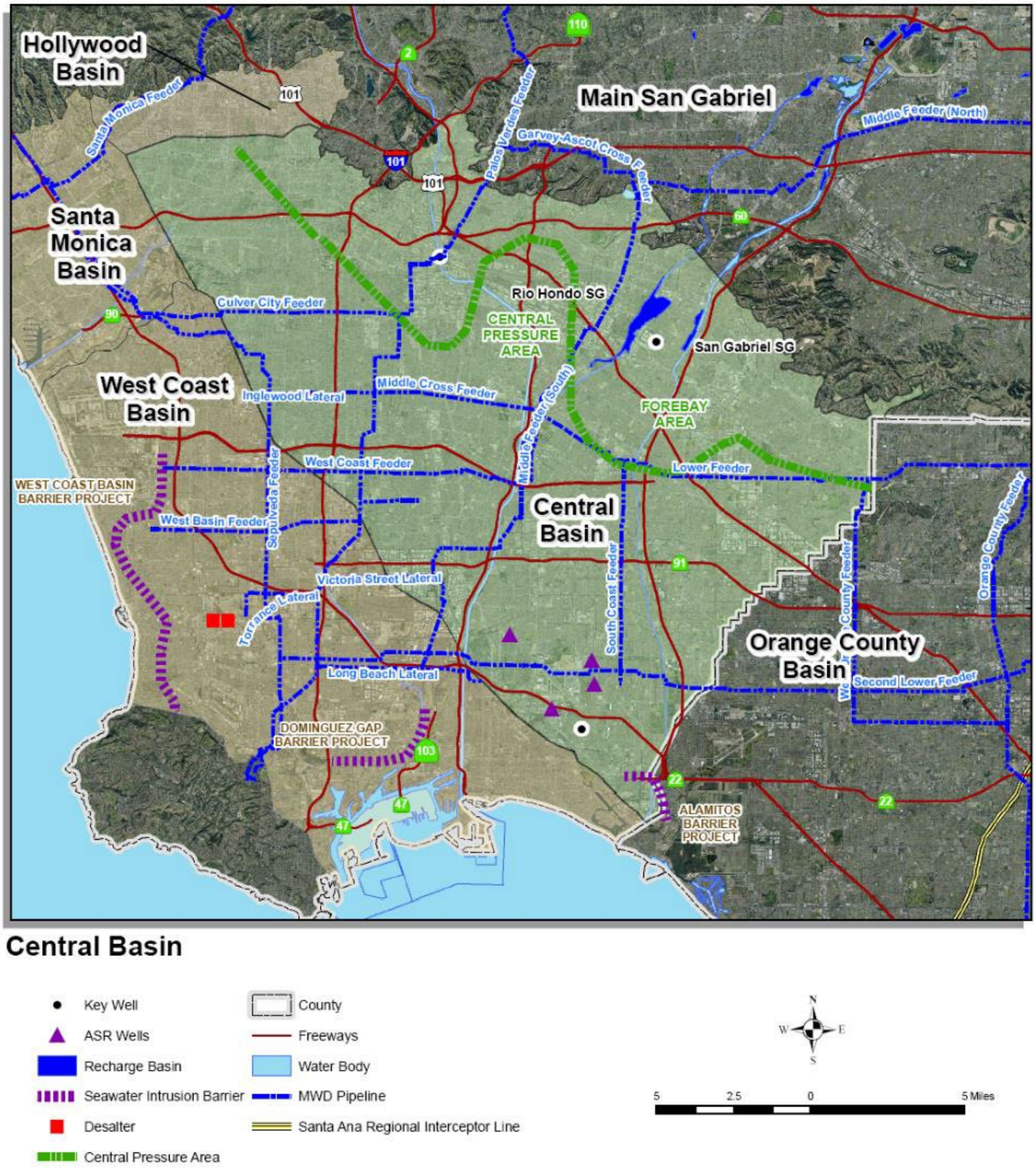
The Central Basin groundwater system is replenished by direct precipitation, irrigation return, stream recharge, runoff from the surrounding uplands, artificial replenishment through spreading grounds, water injection into the seawater barrier wells, and underflow from adjacent basins.

Stream recharge is limited because most of the streams are concrete-lined. Most of the replenishment occurs with spreading basins adjacent to the Rio Hondo and the San Gabriel rivers and within the unlined stream channels (Reichard et al., 2003).

The first water wells in the Central Basin were drilled in the mid-1800s. By the early 1900s, there were more than 4,000 wells. From 1900 to 1930, pumping increased considerably owing to increasing urban demand, lack of surface water supplies, and the development of the deep well turbine (Reichard et al., 2003). In the early 1960s, there were large decreases in pumping and large increases in injection and spreading rates, which reflect the direct use of water imported from the SWP and the Colorado River. Reichard et al. (2003) found that the quality of most water in the Central Basin is suitable for industrial and public supply.

Dissolved solids concentrations are low throughout most of the aquifers, often less than 500 mg/L. Concentrations are lower and less variable in water sampled from wells in the Central Basin compared with the West Coast Basin. Similarly, chloride concentrations are low throughout most of the freshwater aquifers, commonly less than 500 mg/L. In several areas, however, particularly shallow units and coastal regions, dissolved solids concentrations exceed 500 mg/L, and sulfate concentrations exceed 500 mg/L (Reichard et al., 2003). Water is generally under suboxic or slightly reducing conditions. In some portions of the basin, manganese and iron concentrations exceed drinking water standards. Chloride and boron concentrations generally are highest in the youngest groundwater and indicate locations where the percentage of recycled water exceeds 60 percent, generally adjacent to the San Gabriel Coastal Basin Spreading Grounds (Anders and Schoeder, 2003).

Figure 9: Map of Central Basin



Monitoring wells selected to represent the background water quality in the Central Basin are Long Beach 1, Long Beach 6, Lakewood 2, Pico 2, and Rio Hondo 1. The locations of these wells are shown in **Figure 5.** Analytical results from Silverado aquifer water samples are shown as “GW-CB” on the Piper diagram **Figure 4.** The water from Long Beach 6 has a calcium-bicarbonate character and is relatively low in TDS, whereas the water from Rio Hondo 1 and Pico 2 has a sodium-bicarbonate character with double the

TDS concentration of water from Long Beach 6. The average concentration of constituents in Central Basin background water is provided in Appendix B.

5.3 Main San Gabriel Basin

The Main San Gabriel Basin, shown in green on **Figure 10**, is located in eastern Los Angeles County and has a surface area of approximately 167 square miles. It includes the water-bearing sediments underlying most of the San Gabriel Valley (**Figure 10**). This basin is bounded north by the Raymond Fault and consolidated basement rocks of the San Gabriel Mountains (DWR, 2004). The Main San Gabriel Basin is within a series of basins formed as a result of the movement of the San Andreas Fault system in the late Tertiary-Quaternary (Kulongoski and Belitz, 2012). The basins are filled with up to 6,400 feet of marine and terrestrial sediments of the Pleistocene through Holocene ages that overlie crystalline basement. Groundwater movement is generally from the northern parts of the basins south toward the Pacific Ocean.

Recharge to the Main San Gabriel Basin is primarily from infiltration of rainfall on the valley floor and percolation of runoff from the adjacent mountains in spreading basins. The basin also receives imported water and return flow from irrigation. The primary water uses are municipal supply and irrigation.

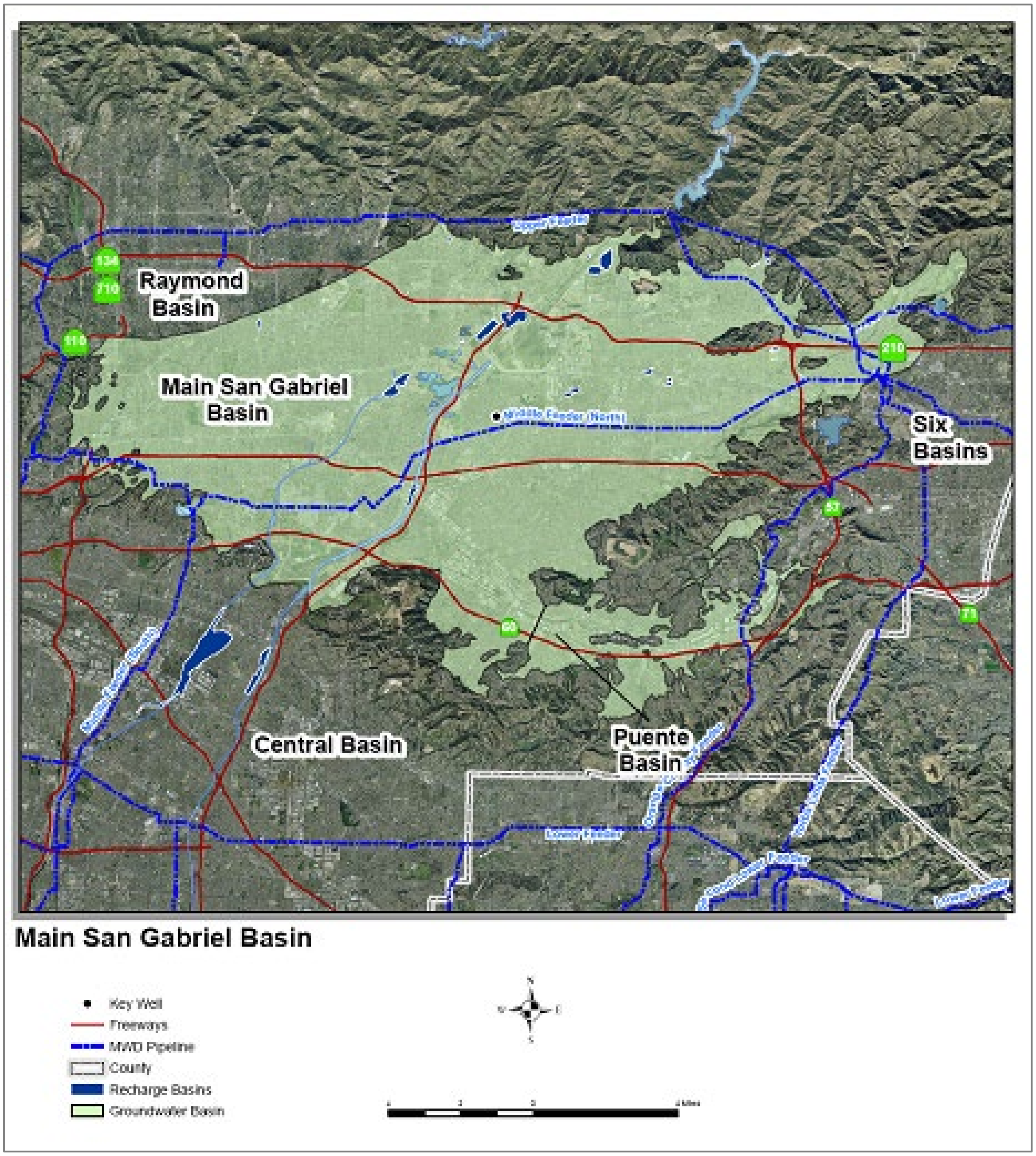
Groundwater levels generally follow a topographic slope, with groundwater flowing from the edges of the basin toward its center, then southwestward to exit through the Whittier Narrows (DWR, 2004), which is a structural and topographic low.

The basin's principal water-bearing formations are unconsolidated and semi-consolidated sediments that range in size from coarse gravel to fine-grained sands in alluvium deposited by streams flowing out of the San Gabriel Mountains (Land et al., 2011). The San Gabriel Basin has no confining layers. The freshwater storage capacity of the basin is estimated to be about 8.6 million acre-feet (Main San Gabriel Watermaster, 2023).

Average groundwater recharge over the past 10 years in the Main San Gabriel Basin is about 47,000 acre-feet per year (AFY) (Main San Gabriel Watermaster, 2022a). Under recent conditions, the natural recharge to the basin has been about half of the historical average, which has resulted in dropping groundwater water levels in key monitoring wells. Increased stormwater flows in 2022/2023 resulted in a notable recovery in water levels.

About 17 spreading basins in the Main San Gabriel Basin cover more than 1,100 acres, which are operated by the Los Angeles County Department of Public Works (LACDPW) and other agencies capable of capturing stormwater runoff from adjacent canyons and/or imported water. The spreading capacity of existing facilities is more than 850 cubic feet per second, or 457 MGD (Metropolitan, 2024b).

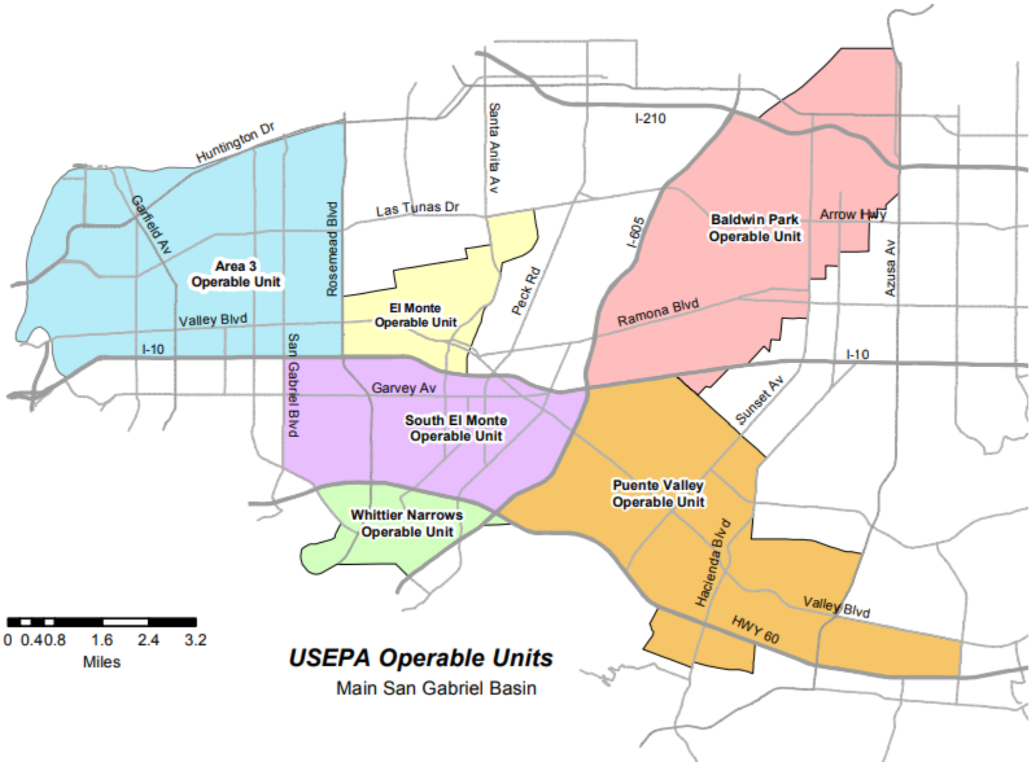
Figure 10: Map of Main San Gabriel Basin



Water within the basin is primarily calcium bicarbonate in character, as shown with symbols GW-MSG on the Piper diagram (**Figure 8**). The average TDS in the Azuza and Irwindale wells was moderate (280 to 301 mg/L) (**Appendix B**). About 18 percent of the water samples from the primary aquifers had moderate TDS concentrations (Kulongoski and Belitz, 2012). The wells used to characterize groundwater quality for the San Gabriel Basin are shown in **Figure 5.**

There are six operable units of Superfund sites in the San Gabriel Valley Groundwater Basin (**Figure 11**).

Figure 11: Map of Operable Units in San Gabriel Valley



Trichloroethylene (TCE), tetrachloroethylene (PCE), and carbon tetrachloride (CTC) contaminate the Whittier Narrows, Puente Basin, Baldwin Park, and El Monte areas (DWR, 2004) (**Figure 12**). Other contaminants such as 1,1-Dichloroethylne (1,1-DCE), 1,1-Dichloroethane (1,1-DCA), 1,2-DCA, cis-, 1, 2-DCE, methyl chloride, hexavalent chromium, and perchlorate are also present in the basin. The groundwater exceeds the MCL in 12 plumes of VOCs and five plumes of nitrate (**Figure 13**).

The Regional Board's and USEPA's management of the plumes has limited the impact to drinking water resources. Basin water quality has also benefited from management practices and implementation of groundwater remediation conducted by the Watermaster in conjunction with local water purveyors (LARWQCB, 2012).

Section 6: Antidegradation Analysis

The following section provides an anti-degradation analysis. Pure Water would be subject to the SNMP and Basin Plans for the Central, West Coast, and Main San Gabriel Basins. The Regional Board has the discretionary authority to allocate assimilative capacity to groundwater replenishment projects. There is a presumed assumption that allowable assimilative capacity allocations greater than the Recycled Water Policy thresholds would not be granted without additional measures or an amendment to the Basin Plan groundwater quality objective unless anti-degradation analysis is performed and accepted by the Regional Board.

Figure 12: Map of Volatile Organic Compounds in Main San Gabriel Basin

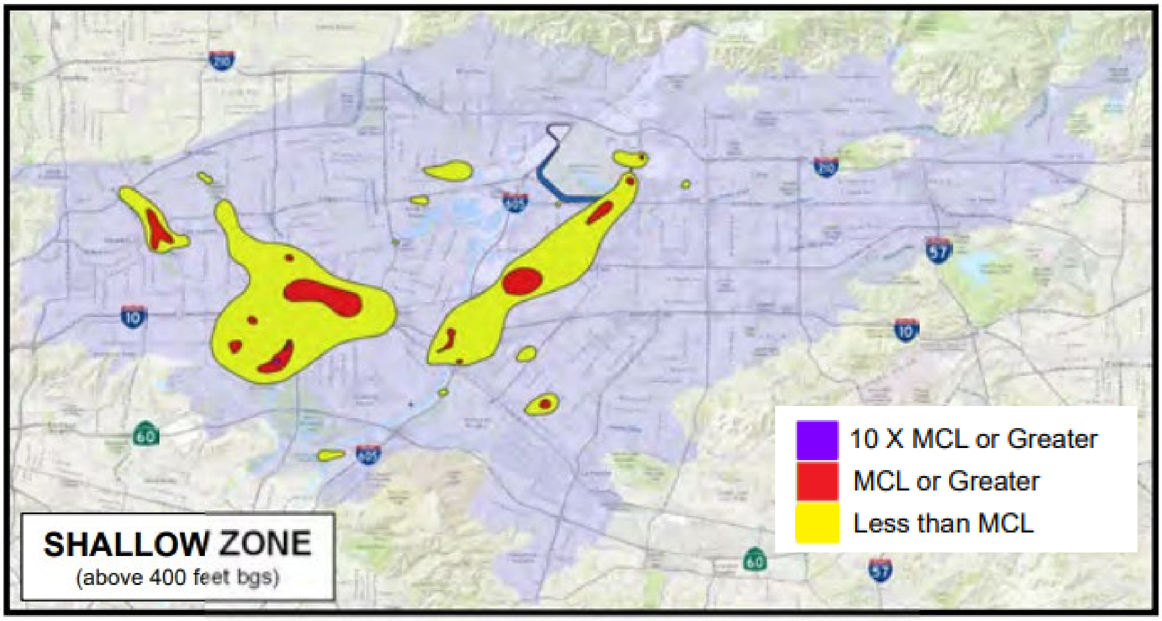
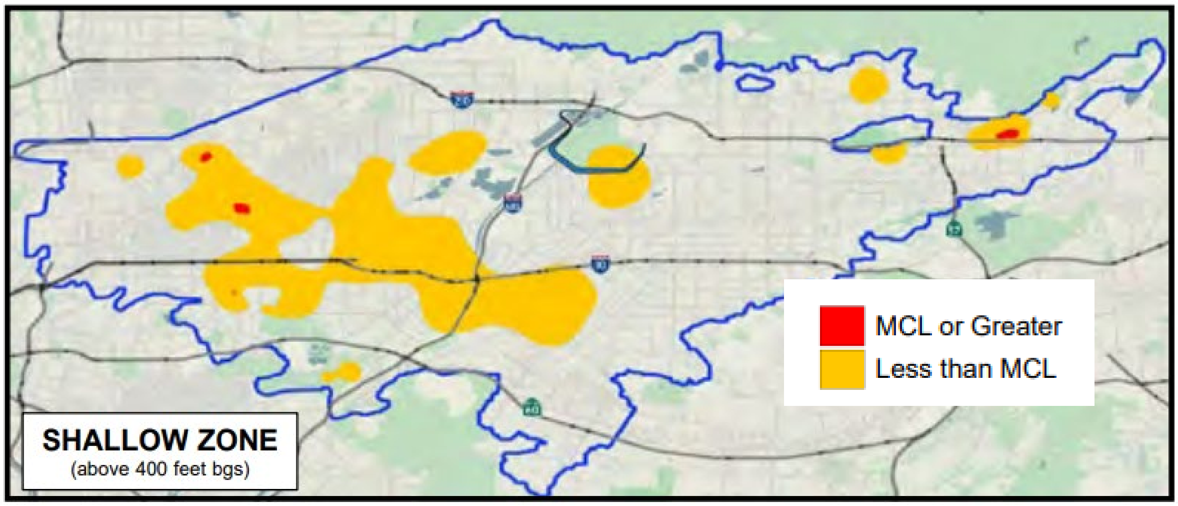


Figure 13: Nitrate Levels in Main San Gabriel Basin



Source: Main San Gabriel Watermaster, 2023.

If the percentage of assimilative capacity used by Pure Water is less than 10 percent for at least 10 years, the impact of any increase in concentration is considered an immaterial impact as defined by the Recycled Water Policy. If the percentage of assimilative capacity used by Pure Water is greater than 10 percent, the project proponent (member agency/watermaster) must conduct a RWQCB-deemed acceptable (and more elaborate) anti-degradation analysis, which would be included in the Engineering Report as required to obtain a Regional Board Title 22 permit. The Regional Board may allow a higher assimilative capacity percentage for a particular constituent if a detailed assimilative capacity analysis is conducted and the project analysis is accepted. Multiple projects in a single basin that use less than 20 percent of the assimilative capacity would be consistent with the Recycled Water Policy. The Anti-degradation Policy allows the lowering of water quality if the change is "consistent with maximum benefit to the people of the State or will not unreasonably affect present and anticipated beneficial use of such water." The water quality changes would be less than significant if:

- The water quality changes will not result in water quality less than prescribed in the Basin Plan.
- The water quality changes will not unreasonably affect present and anticipated beneficial uses.
- The water quality changes are consistent with the maximum benefit to the people of the state.
- The Program is consistent with the use of the 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.

6.1 Ambient Groundwater Conditions

The profile of background water quality constituents was compared to the water quality profile of the water treated at the Demonstration Facility. The purpose of this comparison was to identify the constituents, as represented by data from the Demonstration Facility described in Section 3, that could be greater than the background water quality. Those COCs that could potentially be higher than background water quality are highlighted in yellow in **Appendix B**. Those that exceed a notification level, which is currently not enforceable but could be the basis for future requirements, are highlighted in orange. Those that exceed a primary or secondary MCL are highlighted in red. Below are the COCs that will be used in the anti-degradation analysis:

- TDS
- Sulfate
- Chloride
- Boron
- Nitrate
- 1,4 Dioxane
- Hexavalent chromium (Cr VI)
- Total trihalomethanes (THMs)

The subset of COCs is based upon (1) the salt nutrient management plan goals (TDS, nitrate, sulfate, chloride) and (2) COCs that potentially exceed ambient conditions based on the data from the Demonstration Facility and provided in **Appendix B**.

Median water quality for each basin and recharge area (WRD, 2024; SWRCB, 2025) is provided in **Table 6**. The locations of the wells used for this analysis are shown in **Figure 5**. The general mineral content of the groundwater in the three basins is similar; for example, all three basins have a sodium-bicarbonate to sodium/calcium-bicarbonate character and TDS generally below 500 mg/L(see additional data in **Appendix B**). The TDS, sodium, chloride, and sulfate in the areas where imported water is recharged are slightly higher than in areas where imported water does not occur, but they still do not exceed MCLs. Similarly, better ambient water quality can be found in areas where the groundwater is older (>40 years) (see **Figure 7**). Generally, water quality is better (lower TDS, sulfate, chloride, and metals) in older groundwater. In addition, trace metals are below detection limits in all three basins.

Time series graphs that show the concentration of these constituents in groundwater over a 20-year period, from about 2002 to 2023, are provided in **Appendix C**. As shown by these time series in each basin, constituents of concern are below the applicable regulatory threshold (e.g., MCL, Notification Level). They also show that the concentration of each constituent has remained relatively constant over 20 years, except for nitrate. Although the concentration of nitrate does not exceed the MCL, the concentration varies over time, particularly in the Central Basin (**Appendix C**).

6.2 Assimilative Capacity Comparison

An assimilative capacity comparison was performed for each COC in each zone of the three groundwater basins (West Coast Basin, Central Basin Pressure Area, Central Basin, the Main San Gabriel Basin near the Santa Fe Spreading Grounds in Irwindale, and the Main San Gabriel Basin near the San Gabriel Canyon Spreading Grounds in Azusa. Modeling was performed for a period of 10 years for each COC to estimate changes in concentration for each COC and to determine the utilized assimilative capacity. The results are shown in **Table 6** and summarized below.

6.2.1 West Coast Basin

Up to 20 mgd of purified water will be recharged in the West Coast Basin within the city of Carson as part of Pure Water near monitoring well Carson 2 (shown in **Figure 5**). For the assimilative capacity analysis, ambient water levels are based upon the median concentrations in monitoring well Carson 2 from 2000-2023. For nitrate, chloride, and TDS, ambient data from the SNMP in Central and West Coast Basins are used. Pure Water will result in the same or better water quality (and therefore an assimilative capacity utilization of less than or equal to zero) in the West Coast Basin after the 10-year modeling period for the following constituents, including TDS, sulfate, chloride, 1,4-dioxane, and total THMs. Constituents for which there is an assimilative capacity utilization of greater than zero are described below in more detail.

For nitrate (as N), the ambient groundwater concentration in the West Coast Basin is below the reporting detection limit, or RDL, of 0.1 mg/L. For the calculation of the available assimilative capacity, a value of 0.05 mg/L was used, or 50 percent of the RDL. The BPO for nitrate in the West Coast Basin is 10 mg/L – the available assimilative capacity for nitrate is, therefore, 9.95 mg/L. Median concentrations for nitrate from the Demonstration Plant are 1.7 mg/L. However, nitrate concentrations in the purified water from Pure Water are expected to be up to 4 mg/L under tMBR (N-only) conditions, which would be the initial IPR operational scenario. Therefore, a value of 4 mg/L is used for the assimilative capacity calculations. After 10 years of Pure Water operation, the modeled groundwater concentration in the city of Carson area is projected to be 0.2 mg/L; the utilization of the available assimilative capacity is 1.5 percent. Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

For boron, the ambient groundwater concentration in the city of Carson area is 69 µg/L. The BPO for boron in the West Coast Basin is 1,500 µg/L. Therefore, the available assimilative capacity for boron is 1,476 µg/L. Boron concentrations in the demonstration plant between 2020 and 2024 were 510 µg/L. After 10 years, the modeled groundwater concentration is projected to be 137 µg/L. The utilization of the available assimilative capacity by Pure Water is 0.5 percent.

Table 6: Summary of Constituents of Concern in Groundwater and Assimilative Capacity Analysis (Metropolitan, 2024c)

	Expected Recharge	**Constituent of Concern**	**Boron**	**Nitrate**	**TDS**	**Sulfate**	**Chloride**	**Hexavalent Chromium**	**1,4-Dioxane**	**Total THMs**
Basin	mgd	Units	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L
		PWSC (Median Demo Plant (2020-2024)	510	4	37.5	< 0.5	6.7	0.12	0.18	1.1
West Coast Basin	20	Basin Plan Objective	1,500	10	800	250	250	1	1	80
		Ambient Groundwater Conditions	130	<0.1	747	24	224	<0.1	<1	<0.7
		Assimilative Capacity	1,370	10	53	226	26	1	1	80
		Expected Groundwater Conditions after 10 years with PWSC	144	0.2	721	23	216	0.1	<1	<0.7
		% Change	11%	290.4%	-3.5%	-3.6%	-3.6%	4.6%	0.0%	0.0%
		% of Assimilative Capacity Used by PWSC	**1.0%**	**1.5%**	-49.2%	-0.4%	-30.7%	**0.2%**	0.0%	0.0%
Central Basin (Pressure Area)	4	Basin Plan Objective	1,000	10	700	250	150	1	1	80
		Ambient Groundwater Conditions	117	0.1	233	19.7	13.3	0.3	<1	<0.7
		Assimilative Capacity	884	9.9	467	230	137	0.7	1.0	1,000
		Expected Groundwater Conditions after 10 years with PWSC	119	0.2	232	19.6	13.3	0.3	<1	<0.5
		% Change	2.3%	19.5%	-0.6%	-0.7%	-0.3%	-0.4%	0.0%	0.0%
		% of Assimilative Capacity Used by PWSC	**0.3%**	**0.3%**	-0.3%	-0.1%	0.0%	-0.1%	0.0%	0.0%
Central Basin (Montebello Forebay)	6	Basin Plan Objective	1,500	10	800	250	250	1	1	80
		Ambient Groundwater Conditions	69	2.9	465	98.5	80.5	0.4	<1	0.5
		Assimilative Capacity	1,432	9.5	335	151.5	169.5	1.0	0.95	79.8
		Expected Groundwater Conditions after 10 years with PWSC	97	2.9	448	95	77.6	0.4	<1	0.5
		% Change	25%	2%	-4%	-4%	-4%	-3%	-2%	4%
		% of Assimilative Capacity Used by PWSC	**1.8%**	**0.6%**	-7.1%	-7.4%	-4.1%	-2.4%	-2.5%	0.0%
Main San Gabriel Basin	55	Basin Plan Objective	500	10	450	100	100	1	1	80
		Ambient Groundwater Conditions	117	4.3	372	52	32	0.3	<1	0.5
		Assimilative Capacity	383	5.7	78	48	68	0.7	0.5	79.5
		Expected Groundwater Conditions after 10 years with PWSC	150	4.2	360	46	20	0.25	<1	0.7
		% Change	28%	-1%	-3%	-12%	-37%	-15%	-2%	28.8%
		% of Assimilative Capacity Used by PWSC	**8.6%**	-0.7%	-15.1%	-12.7%	-17.4%	-6.6%	-2.2%	**0.2**%

Notes: For concentrations <RDL, 50% of the RDL was used to calculate expected conditions. If the estimated expected conditions were below the RDL, then the RDL was reported. For nitrate, maximum expected concentrations are used in place of the Demo Plant data.

Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

For hexavalent chromium (also referred to as Cr+6), the ambient groundwater concentration in the city of Carson area is less than the RDL of 0.1 µg/L. As with nitrate, for the calculation of the available assimilative capacity, a value of 0.005 mg/L was used for hexavalent chromium or 50 percent of the RDL. The MCL for hexavalent chromium is 1 µg/L, therefore, the available assimilative capacity for hexavalent chromium is 0.995. After 10 years, the modeled groundwater concentration for hexavalent chromium is projected to be 0.1 µg/L. The utilization of the available assimilative capacity by Pure Water is 0,1 percent. Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

6.2.2 Central Basin Pressure Area

An average of 4 mgd of purified water will be recharged in the Central Pressure Area of the Central Basin by proposed injection wells within the city of Long Beach as part of Pure Water near monitoring wells Long Beach 1, Long Beach 6, and Lakewood 2 (shown in **Figure 5**). For the assimilative capacity analysis, ambient water levels are based upon the median concentrations in monitoring wells Long Beach 1, Long Beach 6, and Lakewood 2 from 2000-2023. Pure Water will result in the same or better water quality (and therefore an assimilative capacity utilization of less than or equal to zero) in the Central Pressure Area after the 10-year modeling period for the following constituents, including TDS, sulfate, chloride, hexavalent chromium, 1,4-dioxane, and total THMs. Constituents for which there is an assimilative capacity utilization of greater than zero are described below in more detail.

For nitrate (as N), the ambient groundwater concentration in the Central Pressure Area in the Basin within the city of Long Beach is 0.1 mg/L. The BPO for nitrate in the Central Pressure Area is 10 mg/L – the available assimilative capacity for nitrate is, therefore, 9.9 mg/L. As discussed previously in this section, median concentrations for nitrate from the Demonstration Plant are 1.7 mg/L, but a higher value of 4 mg/L is used for the assimilative capacity assessment. After 10 years of Pure Water operation, the modeled groundwater concentration in the city of Long Beach area is projected to be 0.2 mg/L; the utilization of the available assimilative capacity is 0.3 percent. Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

For boron, the ambient groundwater concentration in the city of Long Beach area is 117 µg/L. The BPO for boron in the Central Pressure Area is 1,000 µg/L. Therefore, the available assimilative capacity for boron is 883 µg/L. As discussed previously in this section, boron concentrations in the purified water from Pure Water are a median of 510 µg/L. After 10 years, the modeled groundwater concentration is projected to be 119 µg/L. The utilization of the available assimilative capacity by Pure Water is 0.3 percent. Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

6.2.3 Central Basin Forebay Area

An average of 6 mgd of purified water will be recharged in the Central Forebay Area of the Central Basin at the existing San Gabriel Coastal and Rio Hondo Spreading Grounds as part of Pure (shown in **Figure 5**).

For the assimilative capacity analysis, ambient water levels are based upon the median concentrations in monitoring wells Pico 2 and Rio Hondo 1 from 2000-2023. Pure Water will result in the same or better water quality (and therefore an assimilative capacity utilization of less than or equal to zero) in the Central Basin Forebay Area after the 10-year modeling period for the following constituents, including TDS, sulfate, chloride, hexavalent chromium, 1,4-dioxane, and total THMs. Constituents for which there is an assimilative capacity utilization of greater than zero are described below in more detail.

For boron, the ambient groundwater concentration in the Central Basin Forebay Area near the Rio Hondo and San Gabriel Coastal Spreading Grounds is 69 µg/L. The BPO for boron in the Central Basin Forebay Area is 1,500 µg/L. Therefore, the available assimilative capacity for boron is 1,431 µg/L. Boron concentrations in the purified water from Pure Water are a median of 510 µg/L. After 10 years, the modeled groundwater concentration is projected to be 86 µg/L. The utilization of the available assimilative capacity by Pure Water is 1.8 percent. Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

6.2.4 Main San Gabriel Basin

An average of 55 mgd of purified water will be recharged in the Main San Gabriel Basin at the Santa Fe and San Gabriel Canyon Spreading Grounds as part of Pure Water. For the assimilative capacity analysis, ambient water levels are based upon the median concentrations in production wells Santa Fe, Buena Vista, Buena Vista 2, Live Oak, and the Azusa wells and monitoring well 11W01H from 2020-2024 (shown in **Figure 5**). Pure Water will result in the same or better water quality (and therefore an assimilative capacity utilization of less than or equal to zero) in the Central Pressure Area after the 10-year modeling period for the following constituents, including TDS, sulfate, chloride, nitrate, hexavalent chromium, and 1,4-dioxane. Constituents for which there is an assimilative capacity utilization of greater than zero are described below in more detail.

For boron, the ambient groundwater concentration in the Main San Gabriel Basin is 117 µg/L. The BPO for boron in the Main San Gabriel Basin is 500 µg/L. Therefore, the available assimilative capacity for boron is 383 µg/L. As discussed previously, boron concentrations in the purified water from Pure Water are a median of 510 µg/L. After 10 years, the modeled groundwater concentration is projected to be 150 µg/L. The utilization of the available assimilative capacity by Pure Water is 8.6 percent. Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

For total THMs, the ambient groundwater concentration in the Main San Gabriel Basin is 0.5 µg/L. The MCL for boron is 80 µg/L. Therefore, the available assimilative capacity in Main San Gabriel is 79.5 µg/L. Total THMs concentration in Pure Water is a median of 1.1 µg/L. After 10 years, the modeled THMs concentration is expected to be 0.7 µg/L. The utilization of the available assimilative capacity by Pure Water is 0.2 percent. Since the utilization of the availability of assimilative capacity by Pure Water is less than 10 percent, this would not have a substantial impact on groundwater quality.

6.2.5 Summary

As shown in **Table 6**, Pure Water is expected to utilize from negative 37 percent (where Pure Water will improve water quality in constituents such as TDS, chloride, and sulfate) to 8.6 percent (for boron) of the assimilative capacity available. In the West Coast Basin, Central Basin, and Main San Gabriel Basin Pure Water would utilize less than 10 percent of the available assimilative capacity for all COCs over the 10-year modeling horizon. Therefore, the impact on the groundwater quality would be less than significant.

6.3 Maximum Benefit Assessment

It is also proposed that the changes in groundwater quality associated with Pure Water are consistent with the Antidegradation Policy and demonstrate Pure Water's maximum benefit to the state for the following reasons:

- The water quality changes will not result in water quality less than prescribed in the Basin Plan.

  In the West Coast Basin, Central Basin, and Main San Gabriel Basin Pure Water would utilize less than 10 percent of the available assimilative capacity for all COCs over the 10-year modeling horizon. Therefore, the impact on the groundwater quality would be less than significant. Therefore, COC concentrations will not exceed the limits prescribed in the Basin Plan.

- The water quality changes will not unreasonably affect present and anticipated beneficial uses.

  Because Pure Water would use less than 10 percent of the assimilative capacity after 10 years,it is not expected to unreasonably affect present or anticipated beneficial uses.

- The water quality changes are consistent with the maximum benefit to the people of the state.

  Pure Water Southern California plays an important role in Metropolitan's future. Purified recycled water is considered a valuable resource and is suitable for various beneficial uses. Implementation of the Pure Water will increase the water supply available to the Metropolitan Service Area and, therefore, reduce reliance on imported water supplies. The purified water from Pure Water is equal to the supply for over 1.5 million homes. Recycled water is a much-needed sustainable and reliable water supply option for the region. As described in the Addendum to White Paper No. 2 (Metropolitan, 2019), Pure Water will provide the following benefits:

  - **Reduces Chances of a Net Shortage.** Pure Water reduces the risk of net shortages, especially in the SWP-dependent areas, by reducing the chance of a net shortage from 66 percent to 57 percent of the time by 2045. Pure Water also reduces the need for new annual supply from 650,000 AFY to 495,000 AFY.
  - **Improves Chances of Low Regional Storage**. Pure Water reduces the risk of regional storage below 1 million AF. Based on the 2020 IRP analysis, Pure Water would reduce the occurrence of regional storage below 1 million AF by 50 percent.

  - **Improves Groundwater Sustainability**. Pure Water would prevent the potential loss of groundwater production capabilities due to the continuation of declining water levels in the four groundwater basins.
  - **Improves Development of Local Supplies**. Pure Water would increase local supplies by 155,000 AFY, improving the local supply portfolio.

  Pure Water Southern California will help improve the reliability and resilience of Southern California and Metropolitan's integrated system. In addition, Pure Water will assist the state in reaching recycled water development goals. Therefore, Pure Water will provide maximum benefit to the state.

- Pure Water is consistent with the use of the 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.

  Pollution is defined in the California Water Code, § 13050(l), to mean that beneficial uses of water are unreasonably affected. As described above, the implementation of Pure Water will not cause an exceedance of the BPO and, therefore, will not unreasonably affect any beneficial uses. Metropolitan proposes a robust treatment process of MBR, RO, UV, and AOP for groundwater recharge.

6.4 Potential Additional Options to Address Future Changes in Pure Water Quality

The Regional Board and DDW will set targets for Pure Water as part of the Title 22 Engineering Report and Permit. In the event that there are Pure Water concentrations in COCs that may be higher than projected herein or higher than the Regional Board targets, the following addresses additional actions that may be necessary, if the utilization by Pure Water of the assimilative capacity exceeds 10 percent. For example, if boron, which currently utilizes 8.6 percent of the assimilative capacity in Main San Gabriel Basin after 10 years, were to increase from 510 µg/L to 800 µg/L, it would exceed the 10 percent assimilative capacity threshold and may require additional analysis.

- **Increase treatment at the AWP Facility.** If necessary, additional treatment processes could be included at the AWP Facility. For example, if future Pure Water boron levels are higher than modeled, additional treatment may be necessary. For reference, boron removal technologies could include electrocoagulation, ion exchange, RO, adsorption, chemical coagulation, chemical precipitation, and electrodialysis (LACSD, 2019). Additional processes would be evaluated for any potential environmental impacts.

- **Modify the BPO .** It may also be necessary to request a modification of a BPO if the concentrations of a particular COC increase significantly. For example, the low boron BPO is present for potential impacts to citrus agriculture in the San Gabriel Valley, which requires low boron levels, and not for impacts on public health. Changes in boron at the AWP Facility may trigger additional measures. Limits for citrus and other crops range from <500 µg/L for lemons and blackberries to as high as 750 µg/L for oranges, grapefruits, avocados, and peaches (United States Department of Agriculture, 2024). In addition, citrus agriculture is minimal in the San Gabriel Valley. Therefore, an increase in the BPO is likely warranted. Any modifications to the

BPO would be determined by the Regional Board to ensure there would be no impacts to public health.

- **Implement additional source control measures.** If there is an increase in a particular COC at the AWP Facility, additional source control measures may be required. For example, additional source control measures may be required to comply with the Title 22 permit, if there is an observed increase or potential for boron concentrations to increase substantially in the AWP Facility product water. For reference, LACSD has discovered that wastewater discharges from oilfields comprise the largest boron discharge to the Warren Facility, with the top ten oilfield dischargers contributing about 36 percent of the boron detected at the influent of the Warren Facility (LACSD, 2019). Currently, 65 oilfield operators discharge to the sewer system that feeds into the Warren Facility (LACSD, 2019). An analysis based on oilfield wastewater data from 2010-2016 indicated that a 72 percent reduction in boron loading from these oilfields would be needed to meet levels equal to the Main San Gabriel Basin BPO (LACSD, 2019). Oilfield wastewater taken from ten operators indicated that boron concentrations ranged from 1,950 µg/L to 6,210 µg/L (LACSD, 2019). It is anticipated that boron levels will gradually decrease in the future as production from oilfields continue to trend downward. LACSD will continue to monitor industries known to discharge or with the potential to discharge boron. New and existing industrial waste permits will be evaluated to determine impacts on PWSC and, depending on permit requirements, LACSD may impose effluent limitations, self monitoring and reporting requirements, pretreatment requirements or may deny a permit to discharge industrial wastewater. If necessary and feasible, boron discharge limits may be added to new and existing industrial waste permits with a goal to maintain boron concentrations in the influent to the Warren Facility at or below current levels. In such a case, industrial dischargers of boron may be required to implement boron reduction measures before it is introduced into the Warren Facility sewershed.

Metropolitan would coordinate with the Regional Board, DDW, and our member agencies to implement any of the above-described measures to support obtaining the Title 22 permit.

Section 7: Summary and Recommendations

7.1 Summary

Pure Water is a regional-scale indirect and direct potable water reuse project in Los Angeles County, California. Treated wastewater would be purified in a new AWP Facility. The purified water would be used to supply new or existing water distribution facilities, to recharge the West Coast, Central, and Main San Gabriel groundwater basins through spreading facilities and injection wells, and for RWA DPR.

7.1.1 Treatment Processes

There are regulatory requirements for indirect and direct potable reuse at both the federal and state levels. The Safe Drinking Water Act and the underground injection control (UIC) program are federal rules that the state administers. The California Water Code (CWC), Health, Safety Code (H&SC), and Code of Regulations contain California’s statutes and regulations that regulate the use of water, recycled water, and the protection of water quality, which are applicable to all groundwater recharge projects that use recycled water as well as potable reuse.

Pure Water will use the same three major treatment processes (MBR, RO, and UV/AOP) that have been extensively evaluated at the NIC Demonstration Facility. The results of Demonstration Facility testing show that the purified water produced by the three processes, optimized and operating at target conditions to achieve treatment goals, meets and exceeds all requirements of the indirect potable reuse requirements for groundwater recharge and, as such, are anticipated to be of a quality that is generally comparable to or better than the ambient groundwater quality in the basins.

7.1.2 Groundwater

In 2014, the California State Legislature adopted SGMA, which established a statewide framework to help protect groundwater resources by requiring groundwater sustainability agencies (GSAs) to complete a groundwater sustainability plan (GSP) that outlines actions to achieve groundwater sustainability within 20 years. During the SGMA process, DWR assigned each groundwater basin a priority ranking from critical to low. Critical, high, and medium priority basins were required to complete a GSP. Low-priority basins, which included adjudicated basins, were not required to complete a GSP or comply with the SGMA sustainability goals. Each of the groundwater basins included in Pure Water is adjudicated and is, therefore, not subject to a GSP under SGMA.

Groundwater production within the three replenishment basins, West Coast, Central, and Main San Gabriel, started around the turn of the century. By mid-century, the basins were overused, which led to seawater intrusion along the coast and dropping groundwater levels inland. Seawater intrusion barriers were subsequently installed, and groundwater was replenished by infiltration and injection of imported and recycled water.

Ambient groundwater quality in the three replenishment basins was characterized based on water from the Silverado aquifer for the West Coast and Central Basins and from the primary aquifer in the Main San Gabriel Basin. No exceedances of regulatory thresholds were identified in the median concentration of each COC over the period of 2000 – 2023.

7.1.3 CEQA Thresholds

The following thresholds from the CEQA Guidelines have been used to determine whether Pure Water will have significant impacts on groundwater resources.

1. *Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*

   Water recharged from Pure Water is subject to the Basin Plans for each groundwater basin (Central Basin, West Coast Basin, and Main San Gabriel Basin). BPOs for the Central Basin, West Coast Basin, and Main San Gabriel Basin are set forth in the Water Quality Control Plan: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (2014). Recharge from Pure Water would also be subject to SNMP for the Central and West Coast Basins (WRD, 2016) and the Main San Gabriel Basin (Stetson, 2016). Pure Water was not included in the analysis for either SNMP therefore a separate anti-degradation analysis was prepared. In 2024, the Regional Board requested that the

Central and West Coast Basins SNMP be updated – it is expected that Pure Water will be included in the updated SNMP.

Basin-specific BPOs for these basins are set for TDS, nitrate, chloride, sulfate, and boron. In addition, because concentrations of hexavalent chromium, 1,4-dioxane, and total THMs from the Demonstration Facility exceed ambient groundwater levels in some basins, these constituents are also included in the list of COCs of this analysis. Metropolitan completed modeling of the assimilative capacity for each COC for a period of 10 years. In the West Coast Basin, Central Basin, and Main San Gabriel Basin Pure Water would comply with all BPOs and use less than 10 percent of the available assimilative capacity after 10 years for TDS, sulfate, chloride, boron, hexavalent chromium, 1,4-dioxane, and total THMs. Therefore, impacts on groundwater quality would be less than significant.

This Groundwater Quality Tech Memo also shows that changes in concentrations of COCs associated with recharged water from Pure Water is consistent with the Antidegradation Policy and demonstrates Pure Water's maximum benefit to the state because (1) the water quality changes for each COC will not result in water quality less than prescribed in the Basin Plan, (2) the water quality changes will not unreasonably affect present and anticipated beneficial uses,(3) Pure Water is consistent with the maximum benefit to the people of the state because it improves reliability and resilience to Metropolitan and helps the state reach water recycling goals, and (4) Metropolitan proposes a robust treatment process of MBR, RO, UV, and AOP for groundwater recharge.

2. *Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*

   This threshold is addressed in a separate groundwater tech memo (Metropolitan, 2024a).

3. *Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?*

   As discussed earlier, the Central, West Coast, and Main San Gabriel Basins are adjudicated and not subject to a GSP under SGMA. Therefore, there would be no impacts to GSPs.

   Pure Water would be subject to the BPOs for the Central, West Coast, and Main San Gabriel basins. BPOs for the Central Basin, West Coast Basin, and Main San Gabriel Basin are set forth in the Water Quality Control Plan: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (California Regional Water Quality Control Board, 2014). Refer to the response to Question 1 above for response to compliance with the water quality control plan for groundwater.

7.2 Next Steps

The following actions would occur to support obtaining the Title 22 permit:

- Metropolitan and the member agencies will begin coordination with the Regional Board and develop a detailed anti-degradation analysis, which will include additional modeling and mixing scenarios in the required Title 22 Engineering Report, which would then be evaluated by the Regional Board.

- In addition, Metropolitan will continue the monthly sampling frequency for boron at the Demonstration Facility to better understand the diurnal and seasonal variations in boron. If necessary, the treatment process should be fine-tuned to address boron concerns more adequately.

Appendix A
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Appendix B
Water Quality Data

Summary of Water Quality Data

			Samples	Pure Water NIC Demo Facility (2020-2021, 2024 with tMBR; 2022-2023 with sMBR)			West Coast Basin Silverado Aquifer 2000-2023 (Carson 2)^{6} ^	Central Basin Silverado 2000-2023 Lakewood 2^{6} ^	Central Basin Silverado 2000-2023 Long Beach 1^{6} ^	Central Basin Silverado 2000-2023 Long Beach 6^{6} ^	Central Basin Silverado 2000-2023 Pico 2^{6} ^	Central Basin Silverado Aquifer 2000-2023 (Rio Hondo 1)^{6} ^	Main San Gabriel 2000-2024 (Santa Fe Area)^{7,8}	Main San Gabriel 2020-2024 (Azusa)^{7,9}	State Water Project 2005-2023 (Silverwood)	Diemer (2005-2023)	Weymouth (2005-2023)
Consistuents	**Units**	**MCL**	**Number of**	**Min**	**Max**	**Median***	**Median**	**Median**	**Median**	**Median**	**Median**	**Median**	**Median**	**Median**	**Median***	**Median***	**Median***
General Physical Properties																	
Turbidity	NTU	5^{1}	7	< 0.1	0.1	< 0.1	0.1	0.1	0.6	0.4	0.2	0.2	NA	0.08	1.1	0.04	0.05
pH	--	6.5-8.5^{1}	2	5.8	6.3	6.1	8.4	8.1	8.8	8.7	7.7	7.8	7.8	7.77	8.0	8.10	8.10
Color	color units	15	7	< 3	3.0	< 3	5.0	<3	35.0	100.0	<3	<3	ND	ND	10.0	1.16	1.26
Odor	TON	3	7	< 1	4	< 1	2.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	9.0	2.00	2.00
General Mineral																	
Total Dissolved Solids	mg/L	500^{1}, 450-800^{2}	6	26.0	64.0	37.5	270.0	280.0	190.0	230.0	520.0	410.0	200.0	301.0	263.0	552.0	540.0
TOC	mg/L	N/A	66	0.02	0.29	0.07	0.6	<0.3	1.7	4.0	0.6	0.4	NA	NA	3.2	2.4	2.3
Sulfate, Total	mg/L	250^{1}, 100-250^{2}	7	< 0.5	< 0.5	< 0.5	24.0	40.0	14.0	5.1	110.0	87.0	19.0	39.5	35.0	200.0	193.0
Chloride, Total	mg/L	250^{1}, 100-250^{2}	7	2.9	9.8	6.7	22.0	12.0	12.0	16.0	97.0	64.0	13.8	33.2	68.0	91.0	91.0
Fluoride, Total	mg/L	2^{1}, 1^{5}	7	< 0.1	< 0.1	< 0.1	0.3	0.4	0.6	0.6	0.3	0.4	0.3	0.25	0.1	0.77	0.70
Sodium, Total	mg/L	NA	7	3.8	14.0	7.4	57.0	22.0	63.0	79.5	79.0	58.0	20.7	34.0	53.0	88	88.00
Boron, Total	µg/L	500^{2}, 1000^{1}	7	450	650	510	130	69	86	195	240	170	59	121	140	130	130.00
Nitrate as N	mg/L	10^{3}	7	0.3	2.5	1.7	<0.1	0.3	<0.1	<0.1	3.4	2.3	0.6	0.5	0.4	0.26	0.31
Nitrite-Nitrogen as N	mg/L	1^{3}	7	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	0.01	< 0.025	< 0.025
Nitrate+ Nitrite as N	mg/L	10^{3}	7	0.3	2.5	1.7	<0.1	0.3	<0.1	<0.1	3.4	2.3	NA	NA	0.4	0.26	0.27
Alkalinity as CaC03	mg/L	NA	14	6	10	8	180	180	120	150	148	130	123	163	74	112	110
Carbonate	mg/L	NA	0	NA			3.3	<2	5.9	6.1	<20	<20	NA	120	0.0	0.0	0.0
Metals																	
Aluminum	µg/L	1,000^{3}, 200^{1}	7	< 20	< 20	< 20	<100	<40	<100	<250	<40	<40	25.0	<3	33	120	120
Antimony	µg/L	6^{3}	4	< 1	< 1	< 1	<5	<2	<5	<10	<2	<2	3.0	<0.06	< 2	< 2	< 2
Arsenic	µg/L	10^{3},0.004^{5}	4	< 1	< 1	< 1	<5	3.5	<5	<4	2.6	2.6	1.0	3.2	2.5	1.80	1.70
Barium	µg/L	2000^{3}	7	< 1	< 1	< 1	14.0	100.0	<10	7.0	63.0	54.0	50.0	140	32.0	103	98
Beryllium	µg/L	4^{3}	4	< 1	< 1	< 1	<5	<2	<5	<10	<2	<2	0.5	<0.1	< 0.5	< 0.5	< 0.5
Cadmium	µg/L	5^{3}	4	< 0.5	< 0.5	< 0.5	<2.5	<1	<2.5	<5	<1	<1	0.5	<0.03	0.2	< 0.1	< 0.1
Calcium	mg/L	NA	7	< 0.5	< 0.5	< 0.5	28.0	62.0	5.2	6.0	70.0	56.0	39	43	21	59	58
Iron	µg/L	300^{1}	7	< 0.03	< 0.03	< 0.03	<0.1	<0.03	<0.1	0.02	<0.1	<0.1	50	<10	< 50	< 50	< 50
Magnesium	mg/L	NA	7	< 0.5	< 0.5	< 0.5	9.4	9.3	0.3	0.4	15.0	11.0	8.0	13.4	10.0	23	23
Manganese	µg/L	50	7	< 5	< 5	< 5	14.0	<4	2.4	16.0	<4	<4	10.0	<0.4	19.0	< 5	< 5
Mercury	µg/L	2^{3}	8	< 0.2	< 0.2	< 0.2	<0.2	<0.4	<0.2	<1	<0.4	<0.4	0.5	<1	< 0.2	< 0.2	< 0.2
Molybdenum	µg/L	NA	0	NA	NA	NA	NA	NA	4.3	NA	NA	NA	2.0	2.3	< 2	4.0	4.0
Nickel	µg/L	100^{3}, 12^{5}	4	< 5	< 5	< 5	<25	<25	<25	<50	<10	<10	5.0	<0.2	< 2	< 2	< 2
Potassium	mg/L	NA	0	NA	NA	NA	4.3	3.1	<1	<5	4.2	3.6	2.9	3.9	2.5	4.3	4.2
Selenium	µg/L	50^{3}	4	< 5	< 5	< 5	<25	<10	<25	<50	<10	<10	2.5	<0.5	< 5	< 5	< 5
Silver	µg/L	10^{1}	4	< 0.5	< 0.5	< 0.5	<2.5	<0.5	<2.5	<5	<0.5	<0.5	5.0	<0.2	< 5	< 5	< 5
Thallium	µg/L	0.5^{3}	6	< 1	< 1	< 1	<5	<2	<5	<10	<2	<2	0.5	<0.2	< 1	< 1	< 1
Vanadium	µg/L	NA	7	< 0.5	< 0.5	< 0.5	<3	4.0	1.5	1.2	2.8	2.9	1.5	1.2	4.2	2.82	2.88
Copper	µg/L	1,000^{1}, 1,300^{3}	4	< 2	< 2	< 2	<10	<10	<10	<20	<4	<4	25	680	< 10	< 10	< 10
Lead	µg/L	0^{3}, 150^{4}	4	< 0.5	< 0.5	< 0.5	<2.5	<1	<2.5	<5	<1	<1	2.5	ND	< 1	< 1	< 1
Zinc	µg/L	5000^{1}	4	< 20	< 20	< 20	<100	<100	<20	<80	<40	<40	25	<50	< 20	< 20	< 20
Volatile Oraganic Compouds of Concern																	
Tetrachloroethylene (PCE)	µg/L	5^{3}	7	< 0.5	< 0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	< 0.5	< 0.5	< 0.5
Trichloroethylene (TCE)	µg/L	5^{3}	21	< 0.5	< 1	< 1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	< 0.5	< 0.5	< 0.5
1,4-Dioxane	µg/L	1^{4}	20	< 0.07	0.18	< 0.07	<1	<1	<1	<1	<1	<1	0.5	ND	NA	NA	NA
1,1-Dichloroethylene (1,1 - DCE)	µg/L	6^{3}	24	< 0.5	< 1	< 1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.1	ND	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane (1,1 - DCA)	µg/L	5^{3}	24	< 0.5	< 1	< 1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane (1,2 - DCA)	µg/L	5^{3}	24	< 0.5	< 1	< 1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.1	ND	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethylene (cis-1,2-DCE)	µg/L	70^{3}	18	< 0.5	< 0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride (CTC)	µg/L	5^{3}	24	< 0.5	< 1	< 1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ND	< 0.5	< 0.5	< 0.5
Chloromethane (Methyl Chloride)	µg/L	5^{3}	4	< 0.5	< 0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	ND	NA	NA	NA
Other Constituents of Concern																	
1H-Benzotriazole (Benzotriazole)	ng/L		7	< 10	18	< 10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetaminophen	µg/L		4	< 0.005	0.0052	< 0.005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aniline	µg/L		6	< 0.2	1.7	< 0.2	NA	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorate	µg/L		7	< 10	920	590	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium 6+	µg/L	1^{3}, 0.2^{5}	7	0.07	0.35	0.12	<0.1	0.6	0.1	0.04	0.5	0.4	0.5	0.14	0.1	0.06	0.06
Cyanide	µg/L		8	< 5	5.6	< 10	NA	<0.005	NA	NA	NA	NA	50	<5	< 25	< 25	< 25
DEET (N,N-Diethyl-meta-toluamide)	ng/L		11	< 5	17	< 5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diclofenac	ng/L		12	< 5	5.9	< 5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formaldehyde	µg/L		7	< 2	9.1	3.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gemfibrozil	ng/L		12	< 5	7.8	< 5	NA	NA	NA	NA	<5	<5	NA	NA	NA	NA	NA
N-Nitrosodimethylamine	µg/L	0.01^{4}, 0.003^{5}	47	< 0.002	0.0032	< 0.002	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA
Perchlorate^	µg/L	6^{3}	12	< 2	< 4	< 4	<4	0.6	<4	<20	<4	0.4	2.0	1.0	< 2	< 2	< 2
PFOA	ng/L	5.1^{4}, 4^{3}	8	< 0.002	< 0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	13.0	13.3	0.9	<1.7	< 2.0	< 2.0	< 2.0
PFOS	ng/L	6.5^{4}, 4^{3}	8	< 0.002	< 0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	17.7	22.0	<1.7	<1.7	< 2.0	< 2.0	< 2.0
Radium-226	pCi/L	1^{3}, 0.05^{5}	7	-0.246	0.578	0.0954	NA	NA	NA	NA	NA	NA	0.5	<1	< 1	< 1	< 1
Radium-226+228	pCi/L	5^{3}	7	-0.1779	0.73	0.347	NA	NA	NA	NA	NA	NA	1.0	<1	< 1	< 1	< 1
Radium-228	pCi/L	5^{3},0.19^{5}	7	-0.108	0.594	0.113	NA	NA	NA	NA	NA	NA	0.5	<1	< 1	< 1	< 1
Sulfamethoxazole	ng/L		14	< 5	7.6	< 5	NA	NA	NA	NA	100	57	NA	NA	NA	NA	NA
THMs, Total	µg/L	80^{3}, 0.083^{5}	5	0.8	1.5	1.1	<0.5	<0.5	<10	<0.5	0.8	<0.5	0.4	<0.3	NA	34.00	35.00
Tris(chloropropyl) phosphate (TCPP)	ng/L		12	< 200	230	< 200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tritium	µg/L		4	12.6	196.0	43.7	NA	NA	NA	NA	NA	NA	NA	15.9	< 200	< 1000	< 1000
Uranium	pCi/L	20^{3}	24	< 0.5	< 1	< 1	<0.7	2.6	<0.7	<0.7	0.9	0.7	0.50	1.5	1.7	1.9	1.7

Notes

* For averaging, ND = 0

^The report detection limit (RDL) varies over time. The highest RDL is used in this table.

[1] Secondary MCL

[2] Basin Plan Objective

[3] Primary MCL

[4] Notification Level

[5] Public Health Goal

[6] WRD, Regional Groundwater Monitoring Report 2022-2023, 2024

[7] Main San Gabriel Basin Watermaster, Five-Year
Water Quality and Supply Plan, 2023-24-2027-28, 2024

[8] Valley County Water District, Consumer Confidence Report, 2023

[9] Azusa Light and Water, Consumer Confidence Report, 2023

ND = Non-detect (reporting limit unknown)

NA = Data not available

🟥 Exceeds Primary, Secondary MCL, Basin Plan Objective, or Notification Level

🟧 Exceeds Public Health Goal

🟨 Potential Degradation of Groundwater

▨ Provisional data. Actual levels are expected to vary following post-treatment.

Appendix C
Water Quality Time Series

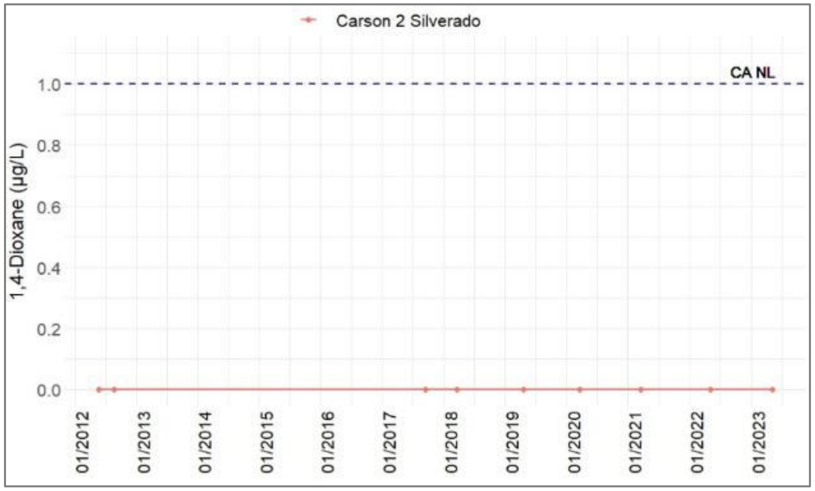

Figure: Area 1_1,4-Dioxane

Figure: Area 1_Boron

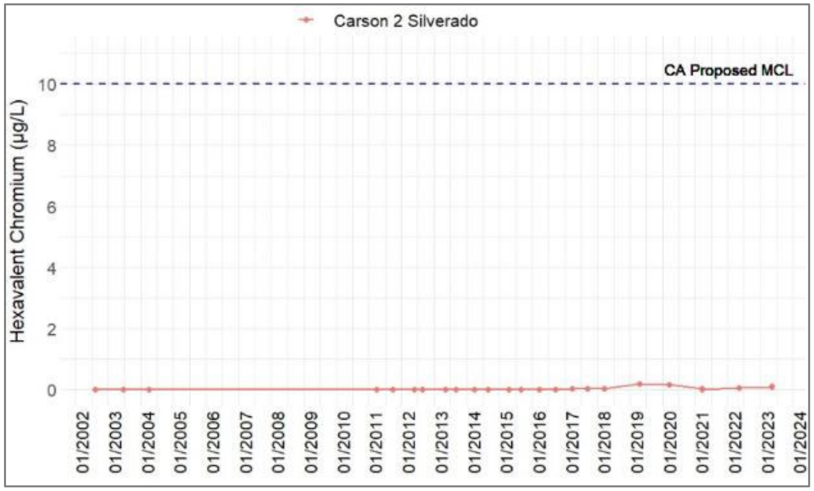

Figure: Area 1_HexCR

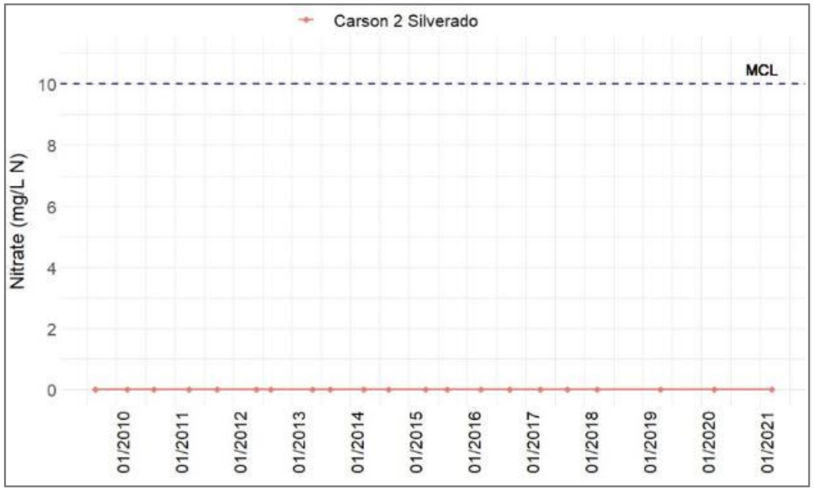

Figure: Area 1_Nitrate

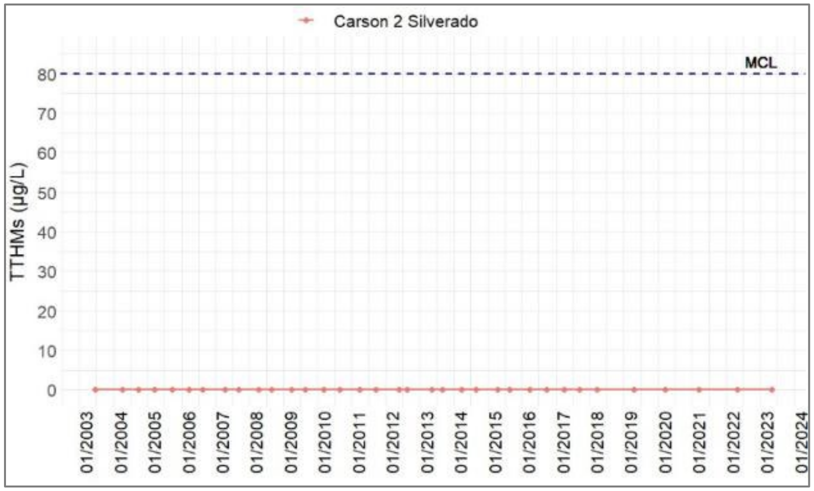

Figure: Area 1_TTHM

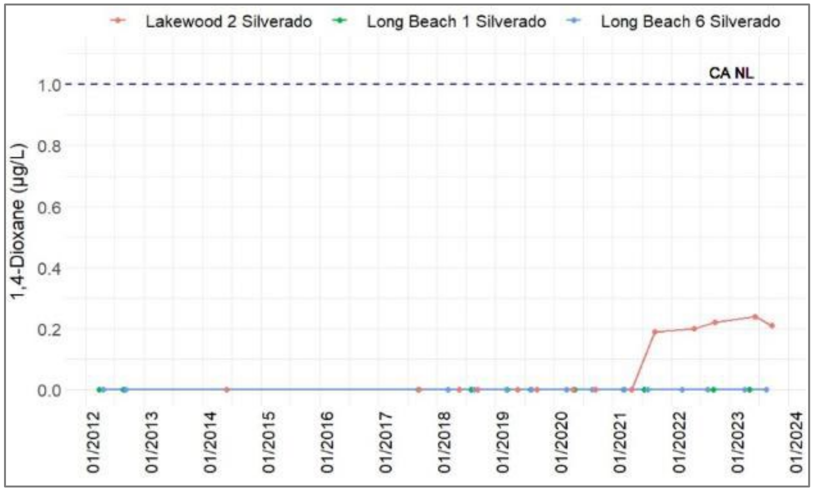

Figure: Area 2_1,4 Dioxane

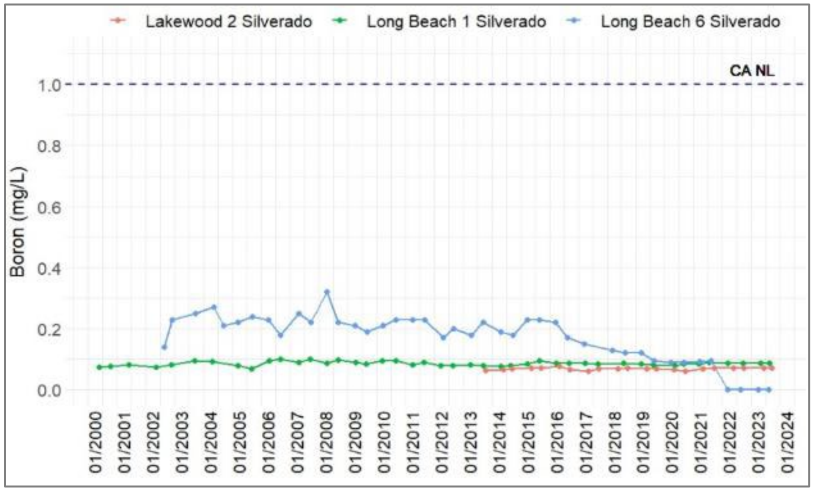

Figure: Area 2_Boron

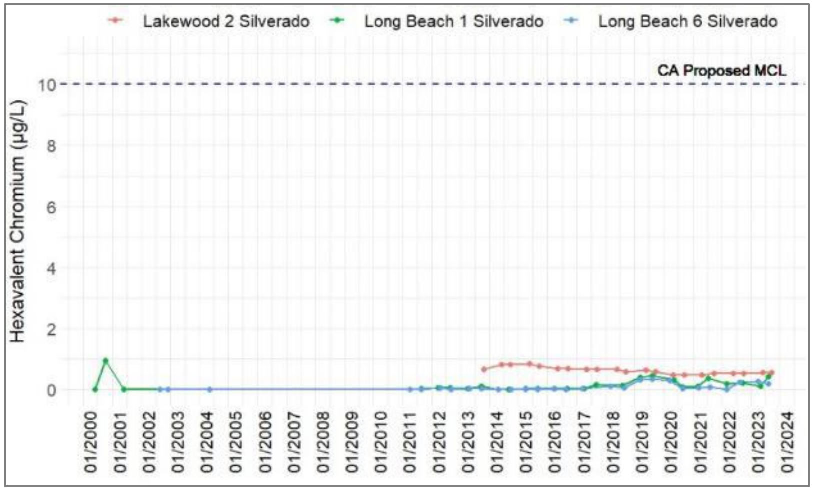

Figure: Area 2_HexCr

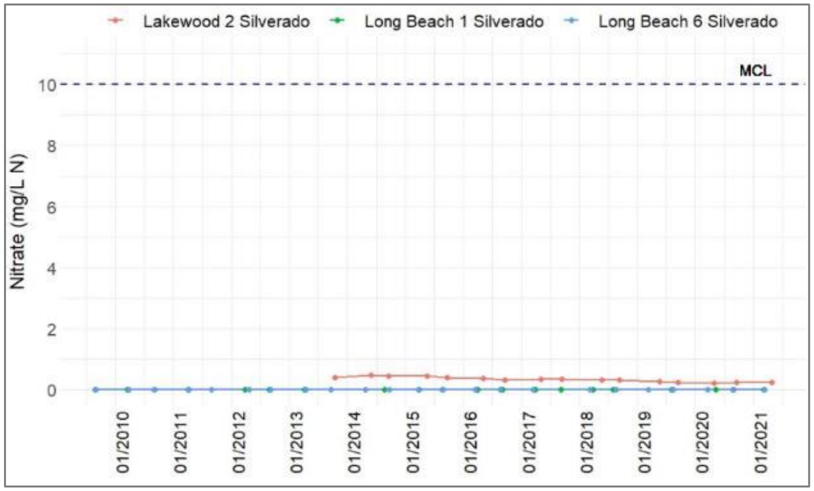

Figure: Area 2_Nitrate

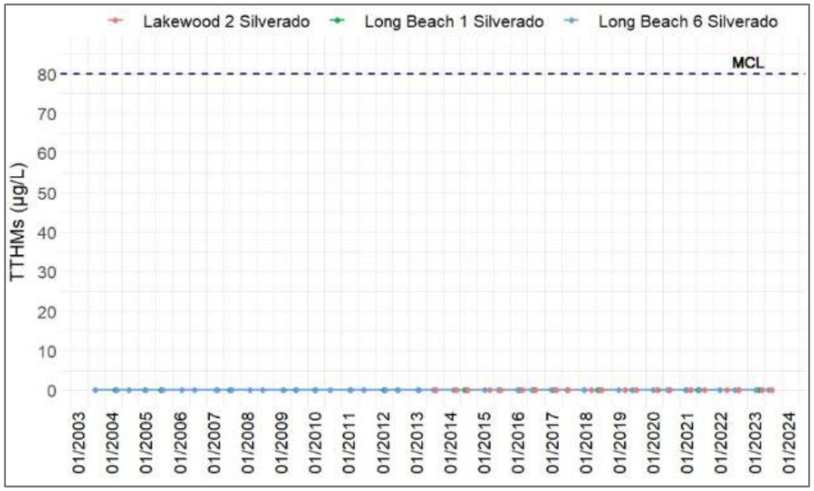

Figure: Area 2_TTHM

Figure: Area 3_Boron

Figure: Area 3_Dioxane

Figure: Area 3_HexCr

Figure: Area 3_Nitrate

Figure: Area 3_TTHM

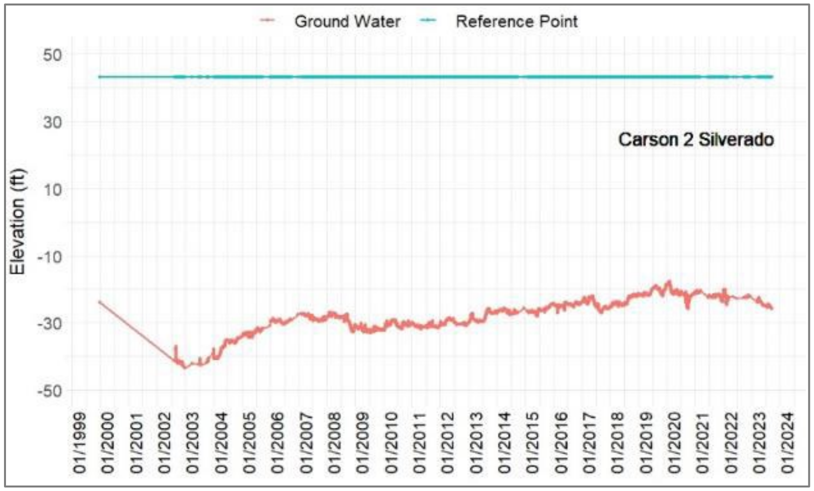

Figure: GWElev_Carson2

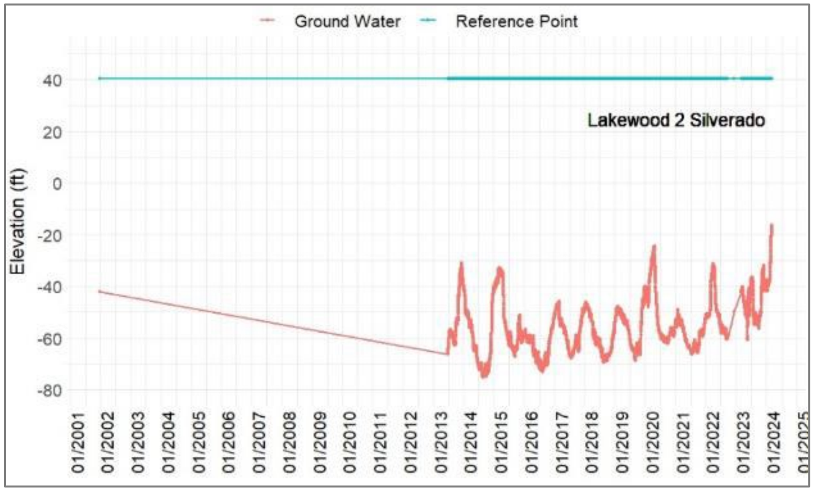

Figure: GWElev_Lakewood2

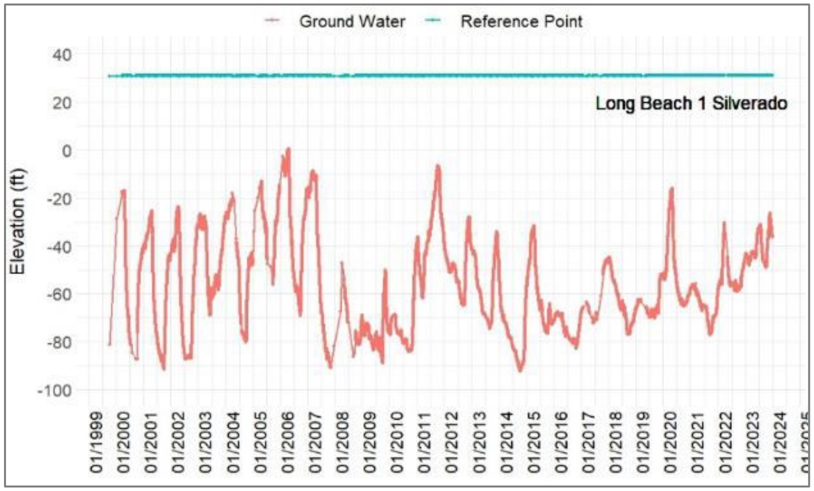

Figure: GWElev_Long Beach 1 Silverado

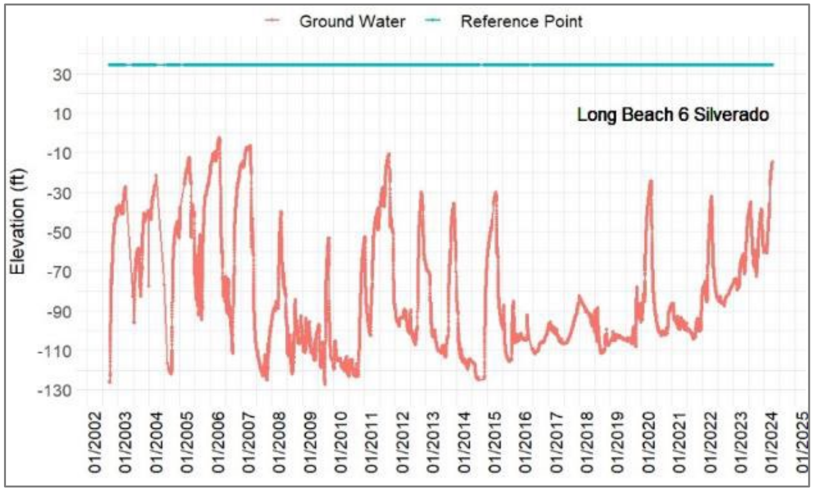

Figure: GWElev_Long Beach 6 Silverado

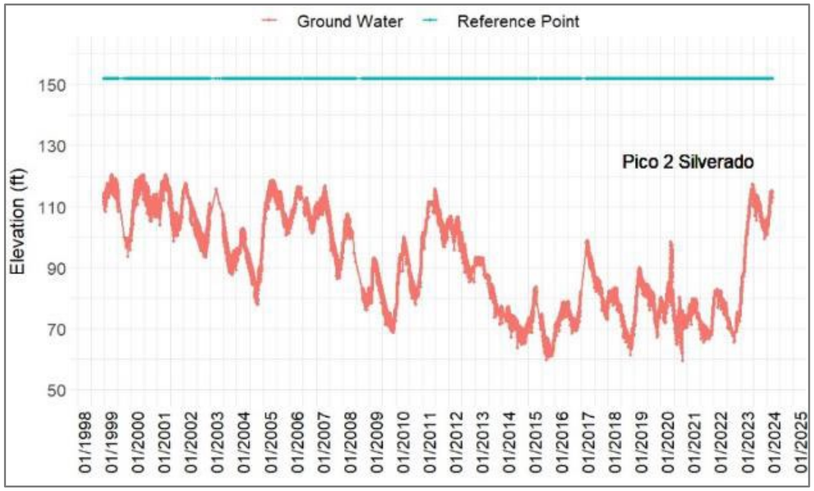

Figure: GWElev_Pico 2 Silverado

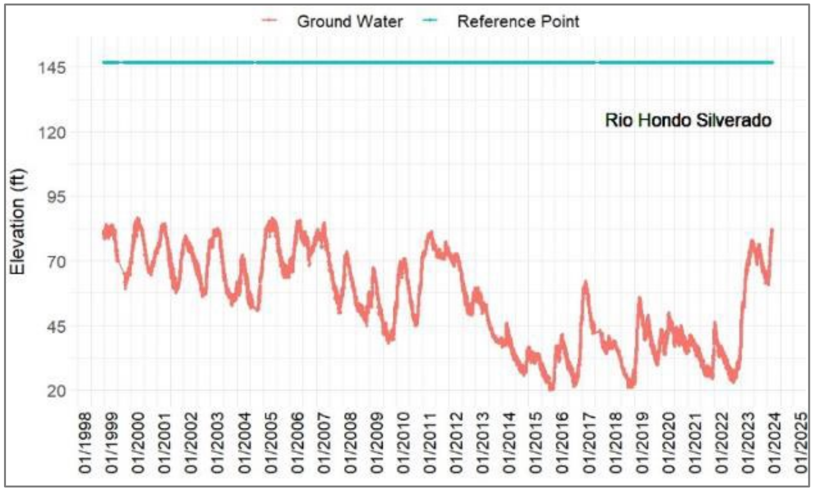

Figure: GWElev_Rio Hondo Silverado

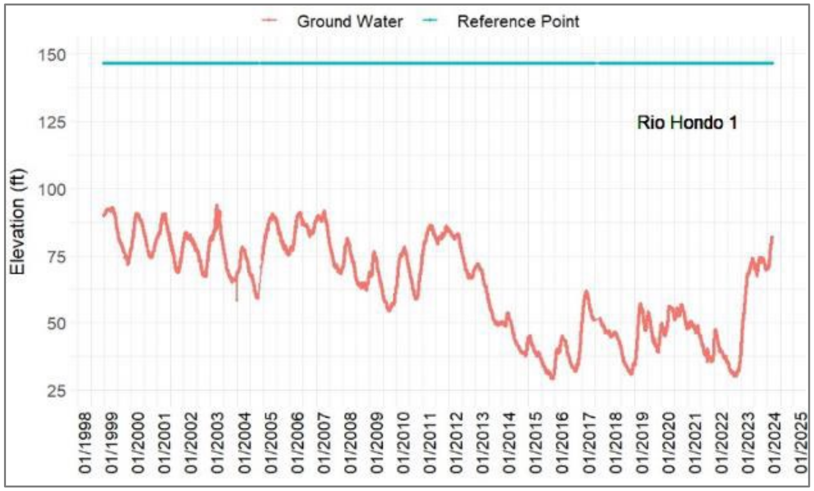

Figure: GWElev_Rio Hondo1