Livermore Valley Groundwater Basin

Sustainable Groundwater Management Annual Report

2023 Water Year (October 2022 – September 2023)

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Abbreviations

ACEH	Alameda County Environmental Health
AF	acre-feet
AFY	acre-feet per year
CCR	California Code of Regulations
CIP	Capital Improvement Program
COC	Constituents of Concern
COL	Chain of Lakes
CWS	California Water Service
CY	Calendar Year
DDW	Division of Drinking Water
DSRSD	Dublin San Ramon Service District
DWR	Department of Water Resources
EIR	Environmental Impact Report
ft	feet
ft bgs	feet below ground surface
ft msl	feet above mean sea level
GPQ	Groundwater Pumping Quota
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWE	Groundwater Elevation
HCM	Hydrogeologic Conceptual Model
HI	Hydrologic Inventory
ICSW	Interconnected Surface Water
LAVWMA	Livermore-Amador Valley Water Management Agency
mg/L	milligrams per liter
MGDP	Mocho Groundwater Demineralization Plant
MO	Measurable Objective
MT	Minimum Threshold
ng/L	nanograms per Liter
NMP	Nutrient Management Plan
OWTS	Onsite wastewater treatment system
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane Sulfonic acid
PFHxS	Perfluorohexane Sulfonate
RMS	Representative Monitoring Site
SBA	South Bay Aqueduct
SFPUC	San Francisco Public Utilities Commission
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SMP	Salt Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TDS	Total Dissolved Solids
UR	Undesirable Result
WL	Water Level
WMP	Well Master Plan
WQ	Water Quality
WY	Water Year

1. Executive Summary

The Livermore Valley Groundwater Basin (also referred to herein as "the Basin"), California Department of Water Resources (DWR) Basin No. 2-010, is classified as a "medium priority" basin (DWR, 2019) and therefore is subject to the Sustainable Groundwater Management Act (SGMA). Alameda County Flood Control and Water Conservation District, Zone 7 (Zone 7 Water Agency or Zone 7) is the exclusive Groundwater Sustainability Agency (GSA) for the Basin and has managed local surface and groundwater resources for beneficial uses and users for more than 50 years.

To address the long-term sustainability of groundwater in the Basin and to comply with SGMA, Zone 7 submitted an Alternative Groundwater Sustainability Plan (Alternative GSP) for the Basin in December 2016. Subsequently, DWR reviewed and approved the Alternative GSP in July 2019. Zone 7 submitted the first Periodic Evaluation to the Alternative GSP (2021 Alternative GSP; Zone 7 GSA, 2021, also referenced as the 2022 Alternative GSP in other reports) in December 2021, which is currently under review.

This 2023 Water Year (WY) Annual Report for the Basin has been prepared in compliance with California Code of Regulations (CCR) Title 23 § 356.2 and is consistent with the DWR's October 2023 *GSP Implementation: A guide to Annual Reports, Periodic Evaluations, & Plan Amendments*[1]. The 2023 WY includes the period from 1 October 2022 through 30 September 2023. **Appendix A** provides a summary of the required information and corresponding location(s) in the report. **Appendix B** provides supplemental data/information including additional water quality, land subsidence, and water budget data.

General information about the Basin is provided in **Section 2**. The Basin encompasses approximately 69,600 acres (109 square miles) in Alameda and Contra Costa counties, and includes three Management Areas, defined by varying geologic, hydrogeologic, and groundwater conditions: the Main Basin Management Area (Main Basin), the Fringe Management Area (Fringe Area), and the Upland Management Area (Upland Area), as shown in **Figure 1**. Principal Aquifer units include the Upper Aquifer and Lower Aquifer within the Main Basin, the Fringe Aquifer within the Fringe Area, and the Upland Aquifer within the Upland Area.

Recent groundwater elevation trends within the Basin are detailed in **Section 3**. Groundwater elevation contours are shown for Spring 2023 (seasonal high) and Fall 2023 (seasonal low) groundwater conditions by Principal Aquifer unit on **Figure 2** through **Figure 5**. Groundwater elevations rebounded significantly within the Basin during the 2023 WY owing to above-average groundwater recharge (from rainfall and stream sources) and below-average municipal pumping. As further described in **Section 3**, water levels increased by as much as 35 feet (ft) in the Upper Aquifer and 145 ft in the Lower Aquifer within portions of the Main Basin from Fall 2022 to Fall 2023. In general, groundwater elevations in the Main Basin remained well above historic lows

[1] Groundwater Sustainability Plan Implementation: A Guide to Annual Reports, Periodic Evaluations, & Plan Amendments (ca.gov)

(up to about 150 ft) except in the central and southern portion of the Amador Subarea where two mining excavations have extended down into the Lower Aquifer. As indicated by the contours, groundwater flow directions and magnitudes did not vary greatly between the seasonal high to seasonal low periods in 2023 WY.

The 2021 Alternative GSP established 12 Representative Monitoring Sites for Chronic Lowering of Groundwater Levels (RMS-WL) and 14 Representative Monitoring Sites for Depletions of Interconnected Surface Water (RMS-ICSW). **Table 1** and **Table 2** summarize groundwater elevations measured at each RMS-WL and RMS-ICSW during the seasonal high (Spring) and seasonal low (Fall) 2023 WY SGMA monitoring events relative to their respective Minimum Thresholds (MTs) and Measurable Objectives (MOs) defined in the 2021 Alternative GSP. Hydrographs comparing recent groundwater elevations to the MTs and MOs defined at each RMS-WL and RMS-ICSW location are shown on **Figure 6** and **Figure 7**, respectively.

Groundwater and surface water supplies and uses within the Basin during the 2023 WY are detailed in **Sections 4, 5,** and **6**. Basin-wide groundwater extractions totaled approximately 9,796 acre-feet (AF) during the 2023 WY, 89% (8,694 AF) of which was used for municipal supplies. Zone 7 extracted 51% (5,005 AF, including 645 AF for Dublin San Ramon Service District [DSRSD]) of the total extraction (**Table 3** and **Table 4**). General locations of groundwater extractions are shown on **Figure 8**.

In addition to groundwater extraction, Zone 7 imported a total of 42,400 AF of surface water supplies to the Basin in 2023 WY (**Table 5**). Total water use within the Basin for the 2023 WY consisted of 20% groundwater, 67% imported water, and 13% recycled water (**Table 6**, **Figure 9** and **Figure 10**). Zone 7 was also able to artificially recharge 6,734 AF of surplus imported supplies in the 2023 WY, thereby more than fully offsetting its groundwater pumping for the water year. Since 1974, Zone 7 has artificially recharged 28,669 AF more than it has pumped.

Changes in groundwater storage over the 2023 WY were estimated using both the Groundwater Elevation (GWE) method and the Hydrologic Inventory (HI) method, as further described in **Section 7**. Taking an average of the two methods, the total groundwater in storage at the end of 2023 WY was calculated to be 245.1 thousand acre-feet (TAF), which is about 28.4 TAF more than the 2022 WY average total storage value (**Table 7**). **Figure 11** shows the change in storage from Fall 2022 to Fall 2023 for each Main Basin node. **Figure 12** shows the annual change in groundwater storage and cumulative change in groundwater storage for the Basin along with the water year type from the 1974 WY through 2023 WY. Using the Water Year Type methodology developed by DWR (DWR, 2021), the 2023 WY is considered a Wet (W) water year, and the annual change in groundwater storage for the Basin over 2023 WY (+28.4 TAF) is the highest on record since Zone 7 began calculating groundwater storage estimates in the 1974 WY.

Section 8 presents a summary of Alternative GSP implementation during 2023 WY. **Section 8.1** summarizes SGMA Monitoring Activities performed throughout the water year, while **Section 8.2** and **Table 8** summarize the Sustainable Management Criteria (SMCs) and current conditions as of 2023 WY for each Sustainability Indicator defined for the Basin. As further detailed in **Table 8**,

no Undesirable Results (URs) occurred during the 2023 WY for any of the five Sustainability Indicators with SMCs defined in the 2021 Alternative GSP. A brief description of current conditions for each Sustainability Indicator is provided below; supplemental data and information including the measurements collected from each SGMA Representative Monitoring Site throughout the 2023 WY can be found in **Appendix B.**

- **Chronic Lowering of Groundwater Levels**. As shown in **Table 1**, groundwater elevations in all RMS-WL wells either increased or remained stable relative to 2022 WY conditions and were measured above their respective Minimum Thresholds (MTs) and Measurable Objectives (MOs) during both the seasonal high (Spring) and seasonal low (Fall) 2023 WY monitoring events. Therefore, no URs were observed within the Basin during the 2023 WY.

- **Reduction in Groundwater Storage**. Water Level SMCs are used as proxy for evaluating Reduction in Groundwater Storage. Therefore, no URs were observed within the Basin during the 2023 WY.

- **Degraded Water Quality.** No Constituents of Concern (COCs) for which SMCs are defined in the 2021 Alternative GSP (i.e., Total Dissolved Solids [TDS], Nitrate, Boron, and Chromium) were detected above their corresponding MTs at any of the 12 Representative Monitoring Sites for Water Quality (RMS-WQs) sampled during the 2023 WY. Therefore, no URs were observed within the Basin during the 2023 WY.

- **Land Subsidence.** Water levels at all applicable proxy RMS-WL sites for Land Subsidence remained above their respective MTs and MOs throughout the 2023 WY. Furthermore, vertical displacement data obtained from DWR's Interferometric Synthetic Aperture Radar (InSAR) monitoring program indicates ground surface elevations fluctuated by -0.05 ft to +0.2 ft across the Basin throughout the 2023 WY. Therefore, no URs were observed within the Basin during the 2023 WY.

- **Depletion of Interconnected Surface Water.** As shown in **Table 2**, groundwater levels rebounded in all RMS-ICSW wells from the 2022 drought and were measured above their MTs during both the seasonal high (Spring) and seasonal low (Fall) 2023 WY monitoring events. Therefore, no URs were observed within the Basin during the 2023 WY.

The 2021 Alternative GSP outlined potential Projects and Management Actions (P/MAs) currently being implemented or otherwise proposed for future implementation. The P/MAs identified in the 2021 Alternative GSP generally fall into the following four categories: (1) water supply augmentation, (2) water demand reduction, (3) improvement of groundwater quality, and (4) data gap-filling activities. A brief description of the status of each P/MA through the 2023 WY is listed in **Section 8.3**. A summary of other information on Alternative GSP implementation progress, including ongoing stakeholder outreach and engagement efforts, recent public comments received, additional information and accomplishments relevant to SGMA throughout

the water year, and anticipated implementation activities for the upcoming water year are provided in **Section 8.5**.

To avoid duplication, material included in the 2021 Alternative GSP has not been repeated here, but specific sections are referenced when more background detail may be desired.

2. General Information

☑ *§ 356.2 (a)*

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(a) General information, including an executive summary and a location map depicting the basin covered by the report.

On 16 September 2014, the California legislature enacted the Sustainable Groundwater Management Act (SGMA), the primary purpose of which is to achieve and/or maintain sustainability within the state's high and medium priority groundwater basins. The Livermore Valley Groundwater Basin (also referred to herein as "the Basin"), California Department of Water Resources (DWR) Basin No. 2-010, is classified as a "medium priority" basin (DWR, 2019) and is not subject to the critical conditions of overdraft. Under its authority as the Exclusive Groundwater Sustainability Agency (GSA) of the Basin, Alameda County Flood Control and Water Conservation District, Zone 7 (Zone 7 Water Agency or Zone 7) submitted an Alternative Groundwater Sustainability Plan (GSP) for the Basin in December 2016, which was approved by DWR in July 2019, and the first Periodic Evaluation to the Alternative GSP in December 2021 (i.e., the 2021 Alternative GSP), which is currently under review.

This 2023 Water Year (WY) Annual Report for the Basin has been prepared in compliance with CCR 23 § 356.2 and is consistent with the DWR's October 2023 *GSP Implementation: A guide to Annual Reports, Periodic Evaluations, & Plan Amendments*[1]. The 2023 WY includes the period from October 1, 2022 through September 30, 2023. This report also contains available and appropriate historical information back to Calendar Year (CY) 2015, as required by CCR 23 §356.2 (b), to provide information and data related to Basin conditions through the current reporting year. All the data included in this report are conveyed based on the 2023 WY; however, due to other reporting obligations, some information in this report (e.g., retailer groundwater pumping quota and surface water supply volumes) is compiled and reported on a CY basis (i.e., January 1 through December 31, 2023).

Zone 7 provides water management in the Basin as part of its mission to deliver safe, reliable, efficient, and sustainable water services, and more specifically addresses Strategic Plan initiatives *#7 – Manage as the GSA and implement the groundwater management plan* and *#8 – Study and refine knowledge of the groundwater basins*. Zone 7 has managed local surface and groundwater resources for beneficial uses for more than 50 years.

The Zone 7 service area is located about 40 miles southeast of San Francisco and encompasses an area of approximately 425 square miles of the eastern portion of Alameda County, including the Livermore-Amador Valley, Sunol Valley, and portions of the Diablo Range (**Figure 1**). Zone 7 also serves a portion of Contra Costa County (Dougherty Valley in San Ramon) through an out-of-service-area agreement with Dublin San Ramon Services District (DSRSD).

As shown on **Figure 1**, the Basin encompasses approximately 69,600 acres (109 square miles) in Alameda and Contra Costa counties, and includes three Management Areas based on varying geologic, hydrogeologic, and groundwater conditions: the Main Basin, Fringe Area, and Upland Area. The Basin is boarded on the northwest by the San Ramon Valley Basin (Basin No. 2-07), a very-low priority basin that extends to the northwest in Contra Costa County, and on the southwest by the Sunol Valley Basin (Basin No. 2-11), which is also a very-low priority basin.

Available hydrogeologic information indicates that the Basin is bounded by the Calaveras Fault on the west, the Greenville Fault on the east, and bedrock deposits of the Plio-Pleistocene Tassajara and Livermore Formations to the north and south, respectively. Principal Aquifer units include the Upper Aquifer and Lower Aquifer within the Main Basin, the Fringe Aquifer within the Fringe Area, and the Upland Aquifer within the Upland Area. The Upper Aquifer consists of recent (Holocene) alluvial fill materials and extends continually across the Main Basin at depths up to 190 feet below ground surface (ft bgs), containing groundwater typically under unconfined conditions. The Lower Aquifer exists below a confining aquitard with thicknesses ranging from less than 5.0 feet (ft) up to 50 ft in the central and eastern parts of the Main Basin. The Lower Aquifer consists of Quaternary alluvial fill materials and the productive upper portion of the Livermore Formation, extending to depths of up to 800 ft bgs in the central Main Basin. A large majority of groundwater production occurs within the Lower Aquifer of the Main Basin. The Fringe Aquifer and Upland Aquifer are demonstrated to be of lower productivity and quality than the aquifers of the Main Basin, and groundwater production is limited to domestic and agricultural uses in these areas.

Sources of recharge to the Basin include rainfall recharge, applied water recharge, stream recharge, subsurface groundwater inflow, and pipe leakage. Groundwater outflows from the Basin include municipal pumping, agricultural pumping, mining use, and subsurface groundwater outflow. A historical water budget period (1974-2020 WYs) presented in the 2021 Alternative GSP shows that long-term sustainability has been maintained in the Basin for at least 45 years, as groundwater storage conditions have remained generally stable to increasing and have shown resilience following dry periods.

Detailed information regarding the Plan Area, Hydrogeologic Conceptual Model, and historical and recent Groundwater Conditions are provided in the 2021 Alternative GSP.

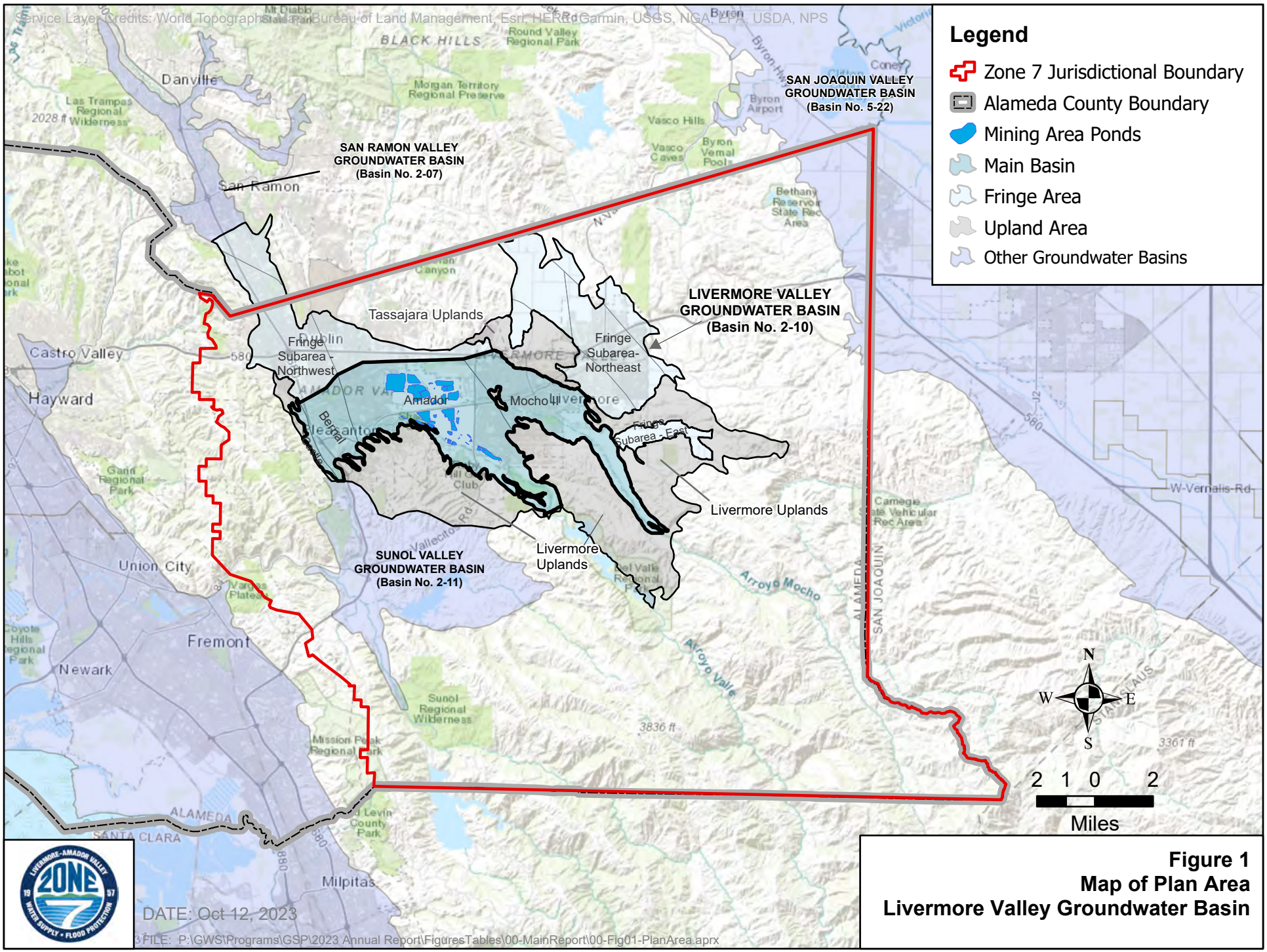

Figure 1
Map of Plan Area
Livermore Valley Groundwater Basin

3. Groundwater Elevation Data

3.1. Description

☑ *§ 356.2 (b) (1)*

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:

(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:

(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.

(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.

Zone 7 has conducted an extensive program of groundwater level monitoring throughout the Basin since the mid-1970s. Background information regarding the Groundwater Elevation Monitoring Program (Program) is provided in *Section 14.2.1 Monitoring Network for Chronic Lowering of Groundwater Levels* of the 2021 Alternative GSP. The Program includes the measurement of groundwater levels in monitoring and production wells to confirm that management objectives are met, to assess groundwater supplies, and to define any new management objectives needed to maintain sustainability. The Program focuses on the Main Basin, where groundwater is pumped for municipal uses; however, water levels are also measured in the Fringe and Upland Areas.

Approximately 252 wells were included in Zone 7's Groundwater Elevation Monitoring Program during the 2023 WY. Groundwater elevations in most of these wells were measured at least two times throughout the water year, during both seasonal high (Spring) and seasonal low (Fall) groundwater conditions. Seasonal high (Spring) and seasonal low (Fall) 2023 WY groundwater elevation contour maps are presented in **Section 3.3** for each Principal Aquifer[2] in the Basin using water level measurements from the wells in the Program.

3.2. Representative Monitoring Sites

The Basin currently has 12 Representative Monitoring Sites for Chronic Lowering of Groundwater Levels (RMS-WL) and 14 Representative Monitoring Sites for Depletions of Interconnected Surface Water (RMS-ICSW) which represent a subset of the Groundwater Elevation Monitoring Program. Updated hydrographs of groundwater elevations are presented in **Section 3.4** for each of the wells included in the RMS-WL and RMS-ICSW monitoring networks. Seasonal high and

[2] Insufficient monitoring wells currently exist in the Upland Area to prepare contour maps for the Upland Aquifer.

seasonal low water levels at the RMS-WL and RMS-ICSW sites are compared to their corresponding Sustainable Management Criteria (SMCs) in **Table 1** and **Table 2**.

Table 1 compares water level measurements from the seasonal high (Spring) and seasonal low (Fall) 2023 WY monitoring events to the Minimum Thresholds (MTs) and Measurable Objectives (MOs) defined at each RMS-WL in the 2021 Alternative GSP. The table also shows the change in elevation from the previous year's seasonal low to this year's seasonal low. Groundwater elevations in all Main Basin RMS-WL wells rose significantly relative to 2022 WY conditions, especially in the Lower Aquifer (e.g., by as much as 87.6 ft at RMS-WL 3S1E12K003 in the Amador East Subarea). Water levels were measured above their respective MTs and MOs at all RMS-WL wells during the most recent, seasonal low (Fall) 2023 WY monitoring event.

On September 2, 2022, the water level in RMS-WL 3S1E12K003 was about 25 ft below the MO. Zone 7 closely monitored the decreasing water level in this RMS-WL well as it approached and exceeded the MO. In response, Zone 7 performed several management actions as further described in **Appendix B** (Section 11.3). As a result of these management actions (and assisted by rainfall later in the month), the water level in this RMS-WL rose about 100 ft to end the 2023 WY at 75 ft above the MO.

In the Fringe Aquifer, water elevations in the RMS-WL wells stayed relatively constant throughout the 2023 WY, generally varying by less than 2.5 ft compared to groundwater levels in the RMS-WL wells in the 2022 WY.

Table 2 compares water level measurements from the seasonal high and seasonal low 2023 WY monitoring events to the MTs and MOs defined at RMS-ICSW wells in the 2021 Alternative GSP. The table also shows the change in elevation from the previous year's seasonal low to this year's seasonal low. Groundwater levels rebounded in all wells from last year's drought and ended the year above MOs with the exception of RMS-ICSW Well 3S2E33C001 [33C1] which was measured at 1.37 ft below the MO during the seasonal low (Fall) 2023 WY monitoring event. Water levels remained above the MT at 33C1 during the seasonal low (Fall) monitoring event and all RMS-ICSW wells were measured above their MTs and MOs during the seasonal high (Spring) monitoring event. The MO exceedance observed at 33C1 does not constitute an UR per the definition provided in *Section 13.6.1 Undesirable Results for Depletions of Interconnected Surface Water* of the 2021 Alternative GSP.

3.3. Groundwater Elevation Contour Maps

3.3.1. Upper Aquifer and Fringe Aquifer

Figure 2 and **Figure 3** show the 2023 WY groundwater elevation contours in the Upper Aquifer and Fringe Aquifer during the seasonal high (Spring) and seasonal low (Fall) conditions, respectively. Similar groundwater gradient maps that include groundwater elevations at each of the wells are included in **Appendix B** (Figures 5-4 and 5-5, respectively). The groundwater gradient in the Upper Aquifer was generally from east to west and ranged from 0.005 to 0.025 ft/ft.

Groundwater elevations in the Upper Aquifer rebounded significantly during the 2023 WY (e.g., by as much as 35 ft in the western portion of the Amador Subarea) owing to above-average groundwater recharge (from rainfall and stream sources) and below-average municipal pumping.

Quarry dewatering (mining) operations in the Amador Subarea create groundwater depressions in pits where water is pumped and groundwater mounds in pits that are not clay-lined and where excess water is stored. The water from the dewatering of MA-P042 and MA-P046 (future Lakes B and J, respectively) was discharged into other adjacent clay-lined mining pits. The water from pit MA-R028 (future Lake D) was discharged into MA-R024, where it likely recharged back into the Basin. Most of the groundwater elevation head change (the steepest groundwater gradient) occurs in the central area of the Basin, where the mining pits are being excavated, and did not appear to vary significantly between the seasonal low and seasonal high periods of the 2023 WY.

Water levels in wells in the southwestern portion of the Basin near the Arroyo de la Laguna (as indicated primarily by the RMS-WL for the Bernal Subarea Upper Aquifer 3S1E20C007 [20C7] and nearby well 3S1E29M004 [29M4]) were below the upper threshold groundwater elevation at which Basin overflow occurs (i.e., about 295 feet above mean sea level [ft msl]). Consequently, no water overflowed from the Upper Aquifer into the Arroyo de la Laguna and exited the Basin during the 2023 WY.

In the Fringe Aquifer, water elevations stayed relatively constant throughout the 2023 WY, generally varying by less than 5.0 ft compared to groundwater levels in the 2022 WY (shown in **Appendix B** Figure 5-6). For more information regarding historical groundwater elevations and trends observed for the Fringe Area, refer to *Section 8.3 Current and Historical Groundwater Conditions* of the 2021 Alternative GSP.

3.3.2. Lower Aquifer

Figure 4 and **Figure 5** show the 2023 WY groundwater elevation contours in the Lower Aquifer during seasonal high (Spring) and seasonal low (Fall) conditions, respectively. Similar groundwater gradient maps that include groundwater elevations at each of the wells are included in **Appendix B** (Figures 5-8 and 5-9, respectively). Flow directions and magnitudes indicated by the groundwater elevation contours did not vary greatly between the seasonal low and seasonal high conditions during the 2023 WY. In general, the groundwater gradient is toward the center of the Basin where there are piezometric depressions created around several municipal wellfields and two mining pits (MA-P042 [Lake B] and MA-R028 [Lake D]) that appear to extend into the Lower Aquifer. The lowest groundwater elevation in the Lower Aquifer was observed near the MA-R028 (Lake D) mining excavation pond (173.5 ft msl).

Groundwater elevations in the Lower Aquifer rebounded significantly (e.g., by as much as 145 ft in the eastern portion of the Amador Subarea) from the previous year owing to above-average groundwater recharge (from rainfall and stream sources) and below-average municipal pumping. In general, groundwater elevations in the Main Basin remained well above historic lows (up to about 150 ft) except in the central and southern portion of the Amador Subarea where two mining excavations have extended down into the Lower Aquifer (see **Appendix B** Section 5.2.4).

For more information on general groundwater gradient and water level trends, see *Section 8 Current and Historical Groundwater Conditions* of the 2021 Alternative GSP and **Appendix B** (Section 5).

3.4. Groundwater Elevation Hydrographs

Groundwater levels for the 2023 WY followed a typical seasonal pattern observed from the historical data, rising in the beginning of the year with natural (i.e. rainfall) and artificial (i.e., managed streamflow) recharge and minimal pumping occurring, levelling off in late spring, and then dropping during the second half of the water year as rainfall ceased and pumping demands increased. Groundwater elevations increased significantly at all RMS-WL wells in the Main Basin compared to water levels during the 2022 WY. For reference, Zone 7 identified the 2023 WY as a Wet WY based on the methodology developed by DWR (DWR, 2021). Historical water year types are provided in **Figure 12**.

Figure 6 and **Figure 7** show hydrographs of historical and recent groundwater elevations at all RMS-WL and RMS-ICSW wells, respectively. These hydrographs further demonstrate the seasonal trends observed in both the Upper/Fringe Aquifers and the Lower Aquifer. The seasonal fluctuations are greater in the Lower Aquifer where more pumping occurs to meet seasonal demands in the warmer months, and when surface water treatment plant outages occur.

Groundwater elevations will continue to be monitored at all RMS-WL and RMS-ICSW wells per the monitoring plans described in *Section 14 Monitoring Network* of the 2021 Alternative GSP.

TABLE 1
GROUNDWATER ELEVATIONS AT REPRESENTATIVE MONITORING SITES
FOR CHRONIC LOWERING OF GROUNDWATER ELEVATIONS
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

RMS Well		*Management Area/Unit*			*2023 Water Year (in ft)*					*SMCs for GWE (ft above Mean Sea Level)*				
Well Name	*Map*	*Area*	*Subarea*	*Aquifer*	*Season High GWE*	*Season Low GWE*	*Change from 2022**	*Height above MT*	*Height above MO*	*MT*	*IM-5*	*IM-10*	*IM-15*	*MO*
3S1E20C007	20C7	Main	Bernal	Upper	335.8	278.3	+21.0	133.5	98.8	144.8	153.4	162.1	170.8	179.5
3S1E20C008	20C8	Main	Bernal	Lower	336.6	277.3	+43.7	132.5	97.8	144.8	153.4	162.1	170.8	179.5
3S1E09P005	9P5	Main	Amador West	Upper	349.0	286.9	+18.4	107.2	80.2	179.8	186.5	193.2	199.9	206.7
3S1E09P010	9P10	Main	Amador West	Lower	349.6	288.3	+47.2	108.6	81.7	179.8	186.5	193.2	199.9	206.7
3S1E11G001	11G1	Main	Amador East	Upper	369.9	317.3	+31.4	136.4	97.5	181.0	190.7	200.4	210.2	219.9
3S1E12K003	12K3	Main	Amador East	Lower	406.7	294.9	+87.6	113.9	75.0	181.0	190.7	200.4	210.2	219.9
3S2E08K002	8K2	Main	Mocho II	Upper	464.4	434.7	+19.9	179.5	141.5	255.1	264.6	274.1	283.6	293.1
3S2E08H003	8H3	Main	Mocho II	Lower	475.1	426.1	+19.3	171.0	133.0	255.1	264.6	274.1	283.6	293.1
3S1E06F003	6F3	Fringe	Northwest	Upper	333.8	324.2	+0.7	19.2	9.6	305.0	307.4	309.8	312.2	314.6
2S2E34E001	34E1	Fringe	Northeast	Upper	500.0	494.0	+0.3	5.7	2.8	488.2	489.0	489.7	490.5	491.2
3S2E24A001	24A1	Fringe	East	Upper	718.5	699.3	+2.5	23.8	21.0	675.5	676.2	676.9	677.6	678.3
3S2E21K009	21K9	Upland	Upland	Upper	NA	476.4	-0.3	6.3	6.3	470.1	470.1	470.1	470.1	470.1

RMS = Representative Monitoring Site
GWE = Groundwater Elevation (in ft above Mean Sea Level)
SMC = Sustainable Management Criteria
IM = Interim Milestone
MO = Measurable Objective
MT = Minimum Threshold
NA = Not Available (no access to well in Spring)
* = 2023 Seasonal Low minus 2022 Seasonal Low

Main
Fringe
Upland

TABLE 2
GROUNDWATER ELEVATIONS AT REPRESENTATIVE MONITORING SITES
FOR INTERCONNECTED SURFACE WATER
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

RMS Well		*Management Area/Unit*			*2023 Water Year (in ft)*					*SMCs for ICSW (ft above MSL)*				
Well Name	*Map*	*Area*	*Subarea*	*Aquifer*	*Season High GWE*	*Season Low GWE*	*Change from 2022**	*Height above MT*	*Height above MO*	*MT*	*IM-5*	*IM-10*	*IM-15*	*MO*
3S2E30D002	30D2	Main	Amador	Upper	410.66	408.72	4.92	7.72	2.22	401	403.8	404.7	405.6	406.5
3S1E16P005	16P5	Main	Amador	Upper	324.27	321.38	14.27	36.18	36.18	285.2	285.2	285.2	285.2	285.2
3S2E33G001	33G1	Main	Amador	Upper	503.22	502.73	0.57	1.73	1.43	501	501.1	501.2	501.2	501.3
3S2E29F004	29F4	Main	Amador	Upper	448.78	448.75	4.2	10.95	4.15	437.8	441.2	442.3	443.5	444.6
3S2E33C001	33C1	Main	Amador	Upper	489.81	484.83	-0.43	2.73	-1.37	482.1	484.2	484.8	485.5	486.2
3S1E02N006	2N6	Main	Camp	Upper	343.09	338.49	1.55	6.99	4.59	331.5	333.9	333.9	333.9	333.9
3S2E16E004	16E4	Main	Mocho II	Upper	491.76	490.29	23.37	23.39	23.29	466.9	466.9	466.9	466.9	467
3S2E23E001	23E1	Main	Mocho II	Upper	599.25	597.27	2.9	1.87	1.87	595.4	595.4	595.4	595.4	595.4
4S2E01A001	1A1	Main	Mocho II	Upper	800.34	797.97	4.91	16.77	16.77	781.2	781.2	781.2	781.2	781.2
2S2E27P002	27P2	Fringe	Spring	Upper	504.81	502.61	1.04	1.61	1.61	501	501	501	501	501
2S2E34E001	34E1	Fringe	May	Upper	497.21	493.99	0.29	2.79	0.99	491.2	492.1	492.4	492.7	493
3S1E05K006	5K6	Fringe	Camp	Upper	333.6	331.34	2.4	5.34	3.14	326	328.2	328.2	328.2	328.2
3S1E02R001	2R1	Fringe	Camp	Upper	367.29	362.29	5.4	16.99	8.69	345.3	349.4	350.8	352.2	353.6
3S2E32E007	32E7	Upland	Upland	Upper	593.75	592.99	0.85	1.59	1.59	591.4	591.4	591.4	591.4	591.4

RMS = Representative Monitoring Site
GWE = Groundwater Elevation (in ft above Mean Sea Level)
SMC = Sustainable Management Criteria
ICSW = Interconnected Surface Water
MSL = Mean Sea Level
IM = Interim Milestone
MO = Measurable Objective
MT = Minimum Threshold
* = 2023 Seasonal Low minus 2022 Seasonal Low

Main
Fringe
Upland

LEGEND

Gradient Contours

- Contours (Interval = 10')
- Hatch pattern towards lower elevation

Wells - Upper Spring 2023

- Supply
- Monitor
- Nested
- Ponds
- SGMA Representative Well

Mining Pond Areas 2023

- In Flux
- Pumped From
- Pumped Into
- Static
- Not In Contact With Groundwater

Stream Recharge Rates (cfs)

- < 0
- 0
- 0 to 1
- 1 to 3
- 3 to 5
- > 5

- Township-Range
- Main Basin
- Fringe Area
- Upland Area

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Miles

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Figure 2
Groundwater Gradient Map
Upper Aquifer, Seasonal High, Spring 2023
Livermore Valley Groundwater Basin

LEGEND

Gradient Contours

- Contours (Interval = 10')
- Hatch pattern towards lower elevation

Wells - Upper Fall 2023

- Supply
- Monitor
- Nested
- Ponds
- SGMA Representative Well

Mining Pond Areas 2023

- In Flux
- Pumped From
- Pumped Into
- Static
- Not In Contact With Groundwater

Stream Recharge Rates (cfs)

- < 0
- 0
- 0 to 1
- 1 to 3
- 3 to 5
- > 5

- Township-Range
- Main Basin
- Fringe Area
- Upland Area

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Figure 3
Groundwater Gradient Map
Upper Aquifer; Seasonal Low, Fall 2023
Livermore Valley Groundwater Basin

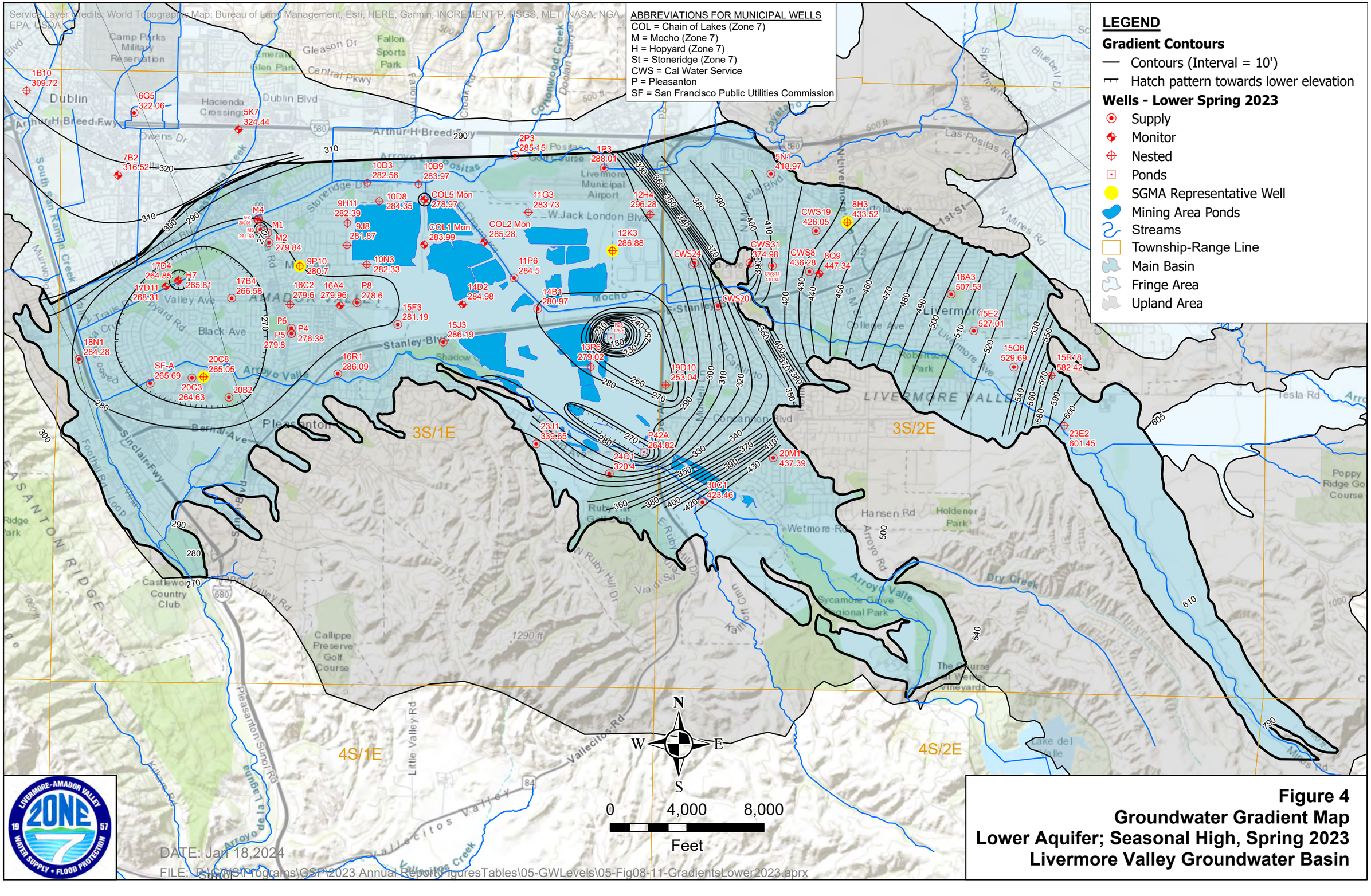

Figure 4
Groundwater Gradient Map
Lower Aquifer; Seasonal High, Spring 2023
Livermore Valley Groundwater Basin

ABBREVIATIONS FOR MUNICIPAL WELLS
COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
St = Stoneridge (Zone 7)
CWS = Cal Water Service
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND

Gradient Contours
- Contours (Interval = 10')
- Hatch pattern towards lower elevation

Wells - Lower Fall 2023
- Supply
- Monitor
- Nested
- Ponds
- SGMA Representative Well
- Mining Area Ponds
- Streams
- Township-Range Line
- Main Basin
- Fringe Area
- Upland Area
- Active Muni Well (no water level)

N
W E
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0 4,000 8,000
Feet

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Figure 5
Groundwater Gradient Map
Lower Aquifer; Seasonal Low, Fall 2023
Livermore Valley Groundwater Basin

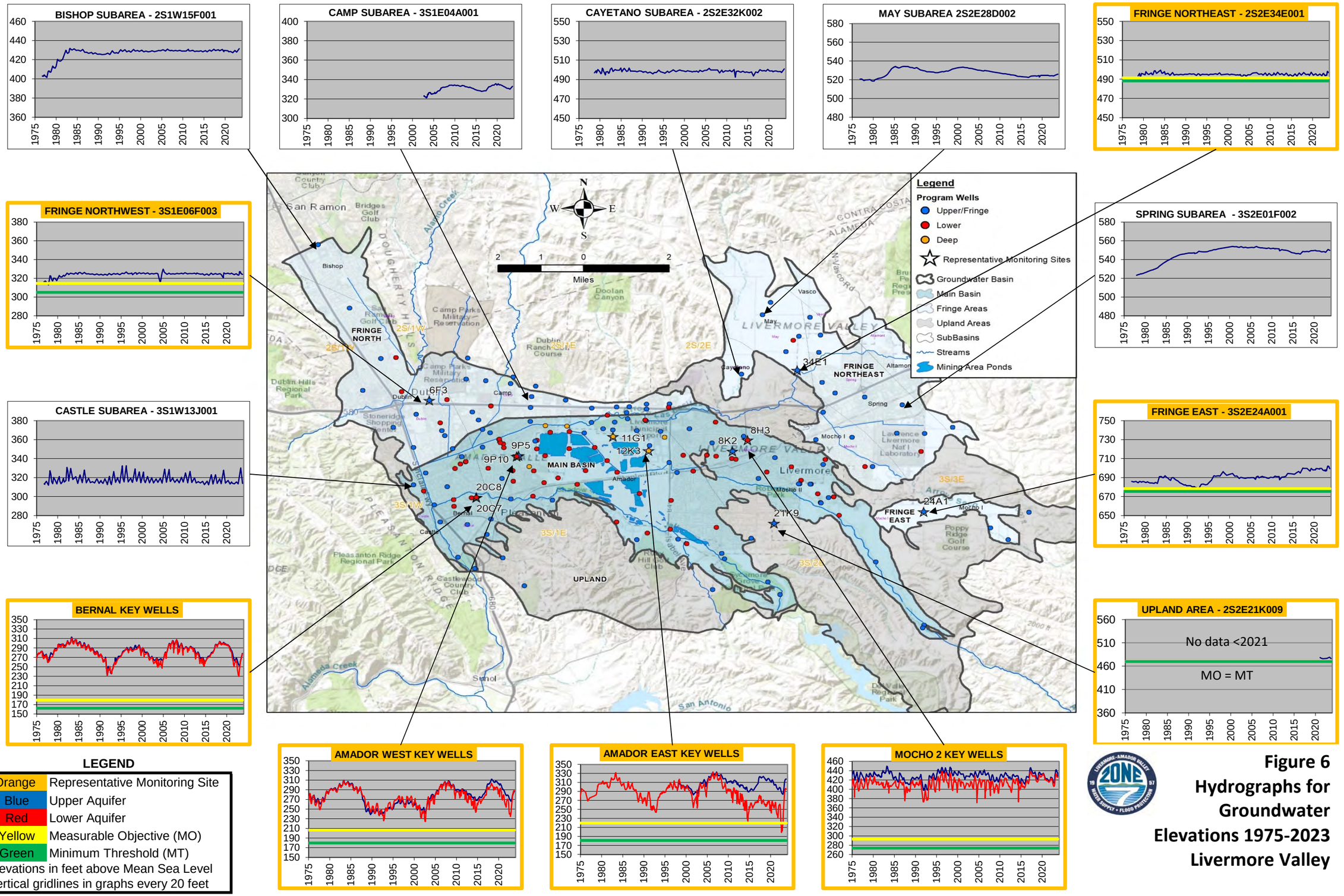
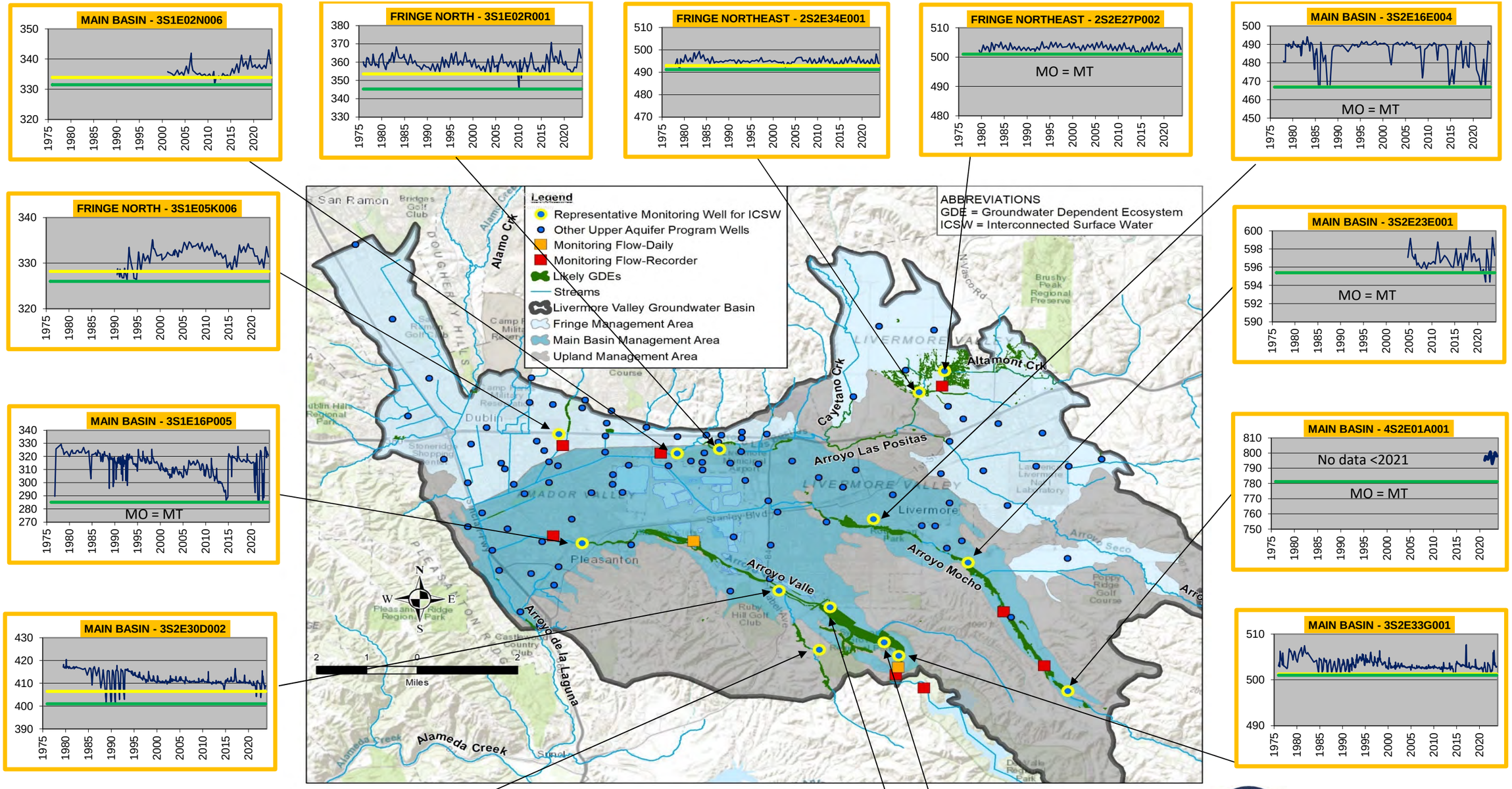


Figure 6
Hydrographs for Groundwater Elevations 1975-2023
Livermore Valley



LEGEND

Orange	Representative Monitoring Site
Blue	Upper Aquifer
Yellow	Measurable Objective
Green	Minimum Threshold

Elevations in feet above Mean Sea Level
Vertical gridlines in graphs every 10 feet

Figure 7
Hydrographs for Interconnected Surface Water 1975-2023
Livermore Valley Groundwater Basin

4. Groundwater Extraction Data

☑ *§ 356.2 (b) (2)*

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:

(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.

Since the 1960s, Zone 7 has actively embraced a "conjunctive use" approach to Basin management by integrating local and imported surface water supplies with the local conveyance, storage, and groundwater recharge features. Zone 7's annual groundwater production and artificial recharge operations vary with the availability of surface water, treatment plant capacity, and the available groundwater storage space.

After two years of unprecedented pumping due to the recent drought (i.e., 15,795 acre-feet [AF] in the 2021 WY and 14,641 AF in the 2022 WY), Zone 7 pumped only 4,578 AF in the 2023 WY, of which 4,387 AF was delivered to Zone 7's retailers[3] (i.e., the City of Pleasanton, City of Livermore, California Water Service [CWS], and DSRSD). These totals do not include the water Zone 7 pumps for DSRSD (usually 645 acre-feet per year [AFY]), which is considered part of the "natural" demand (i.e., basin outflow allocated to natural recharge) as further described in *Section 9 Water Budget Information* of the 2021 Alternative GSP. Within the same timeframe, Zone 7 was able to artificially recharge 6,734 AF of surplus imported water supplies, thereby more than fully offsetting its groundwater pumping for the 2023 WY. Since 1974, Zone 7 has artificially recharged 28,669 AF more than it has pumped.

Table 3 below shows the Basin-wide, 2023 WY groundwater extraction data by water use sector and measurement method; reported units are in AF. Groundwater extractions within the Basin totaled approximately 9,796 AF during the 2023 WY, of which 89% was for the municipal sector.

[3] The remaining 191 AF of Zone 7's gross groundwater pumping during 2023 WY is accounted for in system losses and exported brine from Zone 7's Mocho Groundwater Demineralization Plant (MGDP), and thus is not included in Table 3.

Table 3. Summary of Groundwater Extractions by Source and Sector

Water Use Sector / Entity	2023 WY Groundwater Extractions (AF)	Measurement Method	Estimated Accuracy (AF)
Total Municipal Pumping	**8,694**	**See below**	**See below**
Zone 7 Production (i.e., excluding DSRSD, waste, brine)	4,387	Metered by Zone 7	10
Zone 7 Pumping for DSRSD	645	Metered by Zone 7	1
City of Pleasanton	270	Metered by Pleasanton	10
California Water Service – Livermore (CWS)	2,653	Metered by CWS	10
San Francisco Public Utilities Commission (SFPUC)	449	Metered by SFPUC	10
Fairgrounds	290	Metered by Fairgrounds	10
Domestic Pumping	**69**	**Estimated**	**50**
Pumping for Ag/Golf	**1,033**	**Estimated**	**100**
Total	***9,796***	**-**	**-**

AF = acre-feet
Ag = Irrigated Agriculture

Approximately 41% of the municipal pumping during the 2023 WY came from groundwater pumped by Zone 7's retailers (i.e., the City of Pleasanton, City of Livermore, CWS, and DSRSD). The retailers are permitted by contract to pump a Groundwater Pumping Quota (GPQ) (accounted for on a CY basis) without having to pay a replenishment fee to Zone 7. They can carry forward any unpumped GPQ (up to 20% of their GPQ). The retailer's GPQ and total pumping for the 2023 CY (in AF) are shown in **Table 4**. None of the retailers pumped more than their respective GPQ in the 2023 CY.

Table 4. Retailer Groundwater Extractions vs. Groundwater Pumping Quota (GPQ)*

Retailer	GPQ (AF)	Carryover from 2022 CY (AF)	Pumped in 2023 CY (AF)	Carryover to 2024*** (AF)
City of Pleasanton	3,500	700	0	700
Cal Water Service	3,069	614	2,624	614
DSRSD (pumped by Zone 7)	645	0	645	0
City of Livermore (not used)**	31	-	0	-
Total	**7,214**	**1,314**	**3,269**	**1,314**

* = All values accounted for and reported on a Calendar Year (CY) basis
** = Livermore no longer pumps groundwater, GPQ not included in totals or carryover.
*** = Maximum of 20% of GPQ can be carried over
AF = acre-feet

Figure 8 shows the general location and volume of groundwater extractions occurring throughout the Basin in the 2023 WY. A large majority of groundwater production is municipal pumping and occurs within the Lower Aquifer of the Main Basin. There are no municipal supply wells within the Fringe and Upland Areas. There are domestic wells within the Basin, but the pumping volumes from these domestic wells are de minimis (i.e., less than 2.0 AFY per well). Agricultural pumping is estimated by the Areal Recharge Model, which is discussed in detail in *Section 9 Water Budget Information* of the 2021 Alternative GSP.

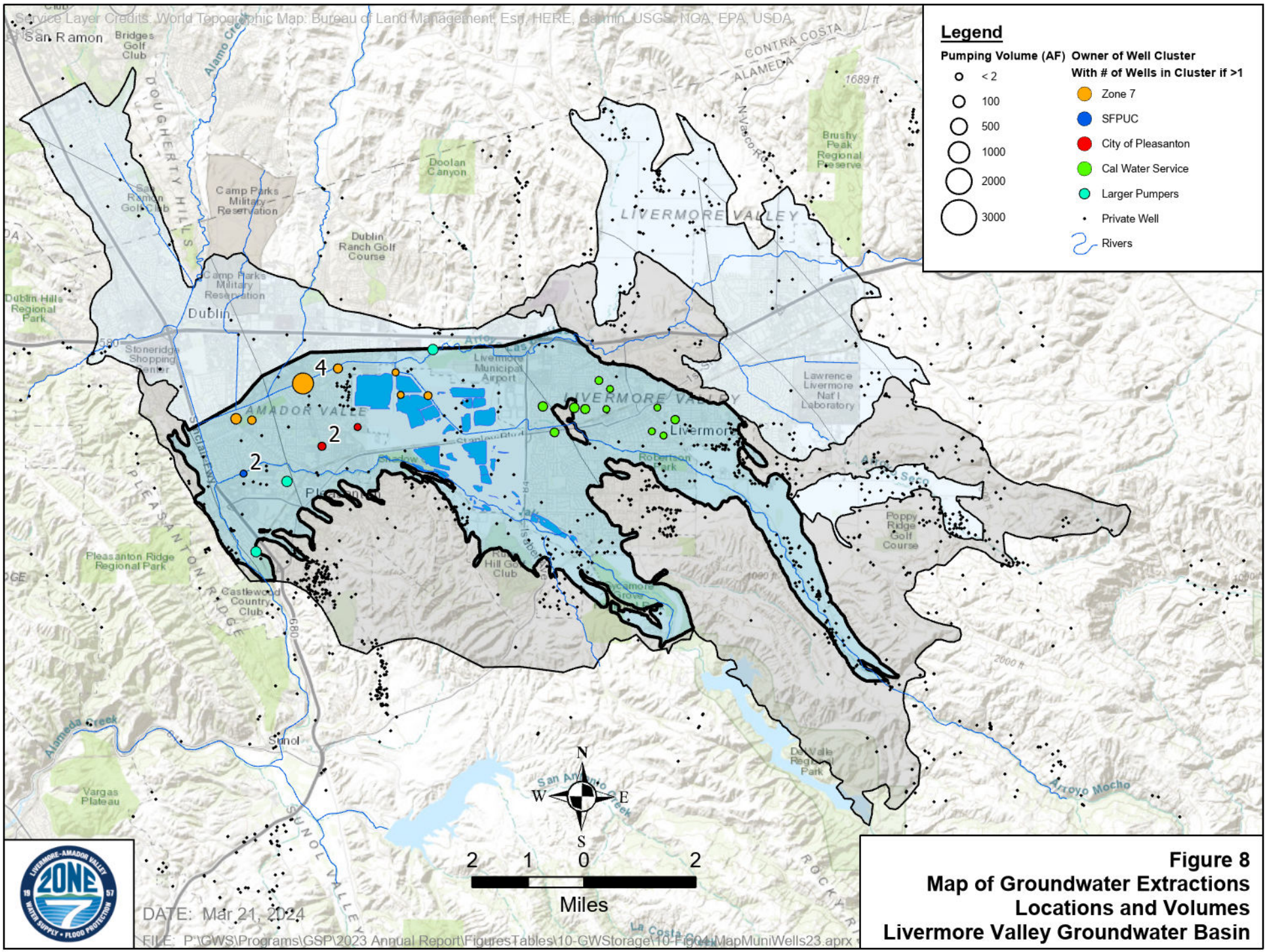


Figure 8
Map of Groundwater Extractions Locations and Volumes
Livermore Valley Groundwater Basin

5. Surface Water Supply

☑ *§ 356.2 (b) (3)*

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:

(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.

Zone 7 ensures that local water supplies (e.g., groundwater) are not depleted by importing an average of approximately 80% of the Basin's water supply from the State Water Project (SWP) and other surface water sources (**Table 5)**. These imported water supplies are delivered to Zone 7's retailers and agricultural customers and used to recharge the Main Basin when surplus supplies are available ("artificial recharge"). Details regarding Zone 7's surface water supply sources and contract amounts are provided in *Section 7.7.6 Source and Point of Delivery for Imported Water Supplies* of the 2021 Alternative GSP.

In accordance with DWR's accounting time-interval of SWP water, the allocation totals are accounted for by Calendar Year. The SWP allocation for the 2023 CY was 100% of Zone 7's maximum allocation (80,619 AF). **Table 5** shows Zone 7's imported water supplies for the 2023 CY and the amounts being carried over to the 2024 CY. All deliveries of imported surface water are measured with electromagnetic flow meters and are accurate to within 1%.

Table 5. Imported and Local Surface Water Supplies by Source and Sector (AF)*

Source	Available at end of 2022	Added in 2023	Imported in 2023	Transferred in 2023	Carryover to 2024
State Water Project	**10,200**	**83,019**	**42,400**	**10,000**	**32,219**
Table A (100% Allocation)	0	80,619	38,400	10,000	32,219
Article 56	10,200	0	1,600	0	0**
Article 21	0	2,400	2,400	0	0
Kern Groundwater Basin	**86,600**	**9,000**	**0**	**0**	**95,600**
Semitropic	65,900	9,000	0	0	74,900
Cawelo	20,700	0	0	0	20,700
Other Imported	**0**	**0**	**0**	**0**	**0**
Yuba/Dry Year Transfer	0	0	0	0	0
Mojave Water Agency	0	0	0	0	0
TOTAL IMPORTED	**96,800**	**92,019**	**42,400**	**10,000**	**127,819**
TOTAL LOCAL: Lake Del Valle (AV Water Rights)	**2,300**	**6,900**	**4,200**	**0**	**5,000**
TOTAL IMPORTED & LOCAL	**99,100**	**98,919**	**46,600**	**10,000**	**132,819**

* = All values accounted for and reported on a Calendar Year (CY) basis

** = excess Article 56 water cannot be carried over

AF = acre-feet

AV = Arroyo Valle

6. Total Water Use

☑ *§ 356.2 (b) (4)*

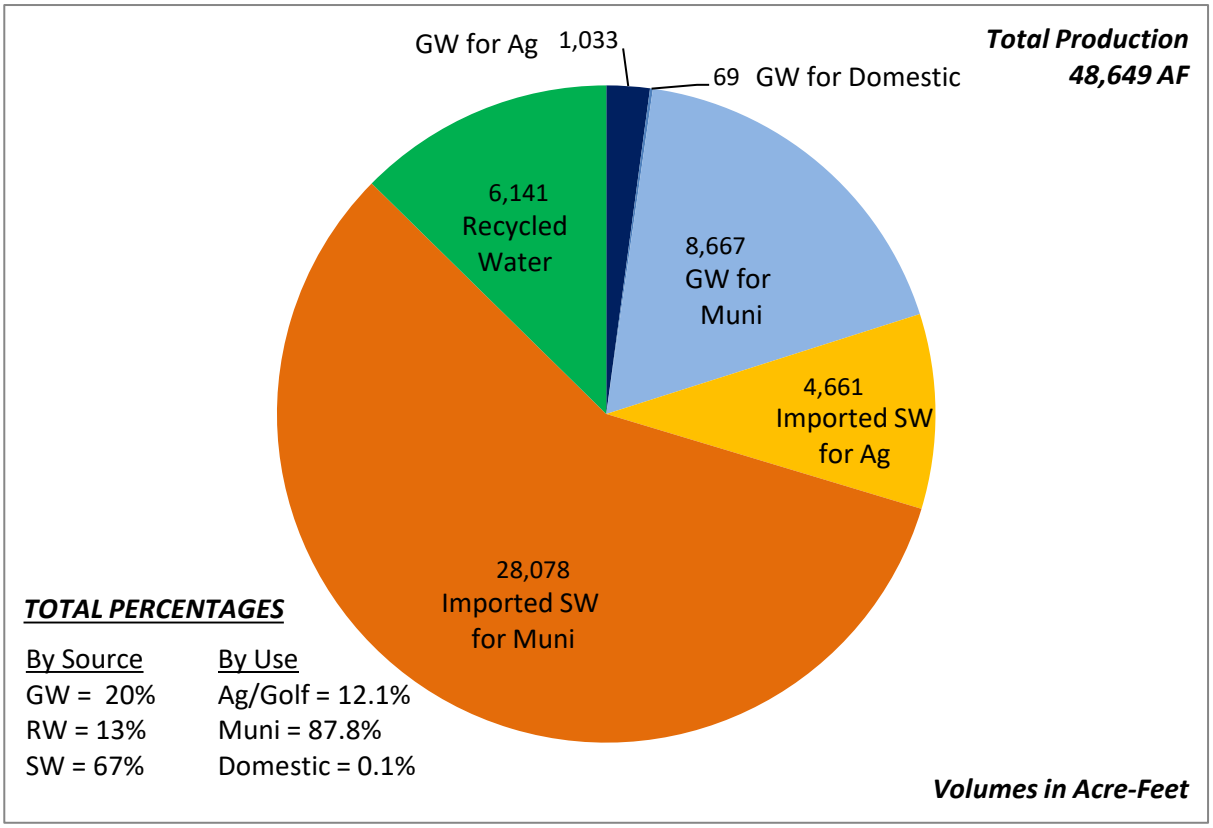
Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:

(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.

The volume of water produced and used in the Basin over the 2023 WY is shown by water source type and by water use sector in **Figure 9** and **Table 6** below.

Figure 9: Pie-Chart Summary of Total Water Use by Source and Sector



Ag = Agriculture; Muni = Municipal; GW= Groundwater; RW = Recycled Water; SW = Surface Water

Total groundwater production in the Basin (including by Zone 7, retailers, agriculture, domestic, etc.) supplied about 20% of the total Basin-wide water demand in the 2023 WY. Total surface water used in the Basin supplied about 67% of the total Basin-wide water demand, which allowed

32,712 AF of groundwater to be conserved instead of being pumped to meet this demand. The final 13% of water demands were satisfied by recycled water supplies, 100% of which were used for urban irrigation.

Of the total water use within the Basin during the 2023 WY (including groundwater, surface water, and recycled water), about 87.8% was used by the municipal sector, 12.1% was used by the agricultural sector (including golf courses), and 0.1% was used by the domestic sector. A more detailed breakdown of water supply and uses by source and sector within the Basin is provided in **Figure 10**.

Table 6. Summary of Total Water Use by Source and Sector

Water Use Sector	Water Source	2023 WY Water Use (AF)
Municipal	Groundwater	8,694
	Imported Surface Water	28,051
	Recycled Water	5,960
Agriculture/Golf	Groundwater	1,033
	Imported Surface Water	4,661
	Recycled Water	181
Domestic	Groundwater	69
Total		**48,649**

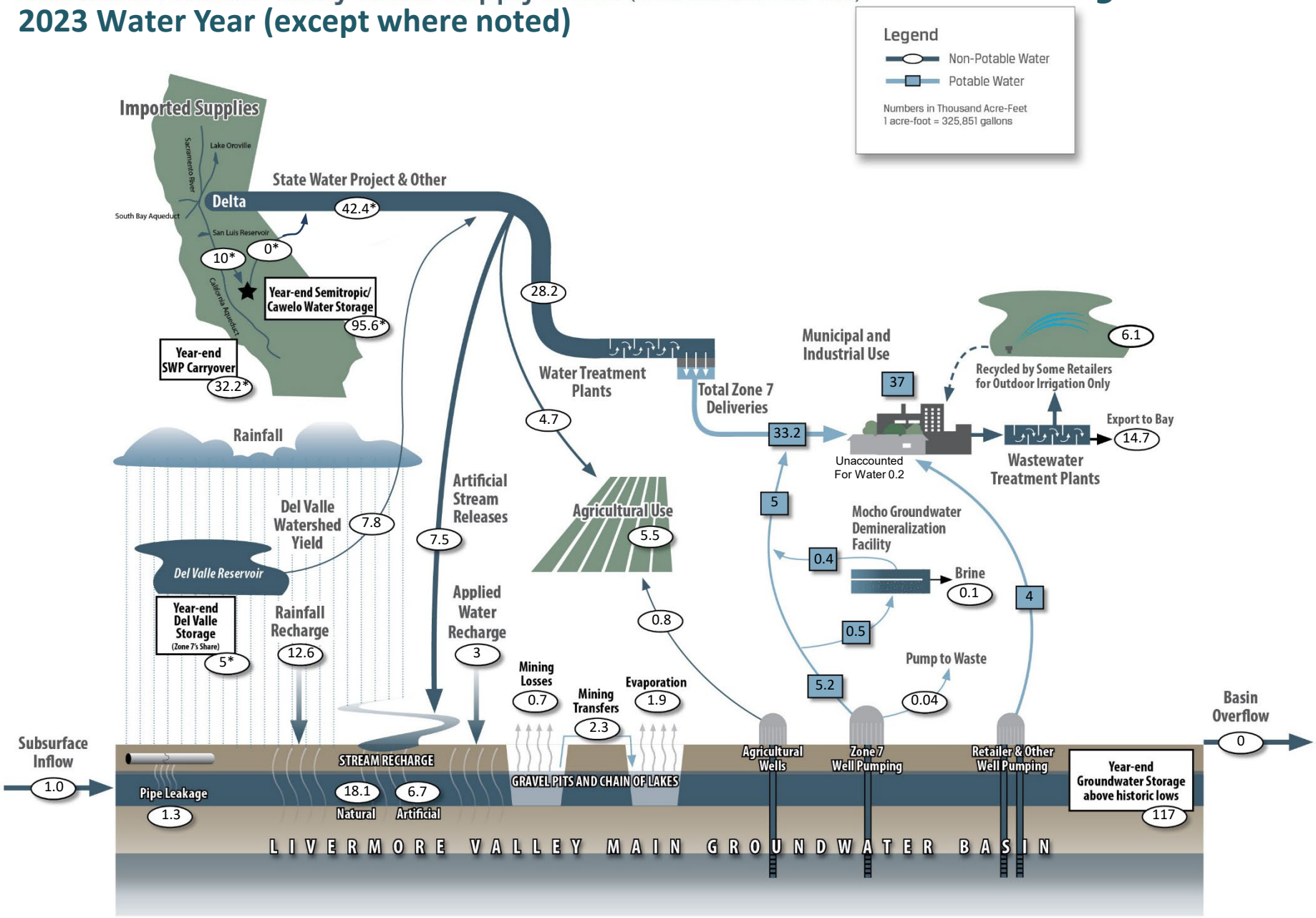
AF = acre=feet

Methods of measurement and accuracy of measurements for groundwater extraction and surface water data are summarized in **Section 4** and **Section 5**, respectively.

Livermore-Amador Valley Water Supply & Use (in Thousands of Acre-Feet)

2023 Water Year (except where noted)

Figure 10



* 2023 Calendar Year

7. Change in Groundwater Storage

☑ *§ 356.2 (b) (4)*

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:

(4) Change in groundwater in storage shall include the following:

(A) Change in groundwater in storage maps for each principal aquifer in the basin.

(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.

To avoid significant depletion of groundwater storage, Zone 7 operates the Basin such that groundwater storage remains between a full Basin volume (254 thousand acre-feet [TAF]) and the historic low storage volume (128 TAF), or about one half of total storage volume. This 126 TAF (254 TAF – 128 TAF) is considered the "Operational Storage". Groundwater below this historic low storage volume is regarded as "Reserve Storage" that is unavailable during nonemergency conditions. Most of the groundwater storage is contained in the Main Basin, which is characterized by the largest saturated thickness of aquifer materials.

Zone 7 uses two methods for calculating groundwater storage in the Basin: The Groundwater Elevation (GWE) method and the Hydrologic Inventory (HI) method. The GWE method uses groundwater level data and storage coefficients for "nodes" (originally developed by DWR in 1974) to estimate the total volume of water in the Basin (see *Section 8.4 Groundwater Storage* of the 2021 Alternative GSP). The HI method, also known as the Water Budget, involves an accounting of all inflows and outflows and derivation of the change in storage as the residual of the water budget equation (see *Section 8.4 Groundwater Storage* of the 2021 Alternative GSP). Storage volumes from the two methods are averaged to quantify the total storage of the Basin. Both methods were improved and/or adjusted in the 2023 WY (the most significant change was to the HI method as described below) so the previous year's totals presented herein may be different than those presented in the 2022 WY Annual Report.

The GWE method yielded a total storage of 245.0 TAF at the end of the 2023 WY, which is 26.4 TAF more than the GWE value calculated for the 2022 WY. **Figure 11** shows the change in storage from Fall 2022 to Fall 2023 for each Main Basin node.

The HI method produced a total storage value of 245.2 TAF at the end of the 2023 WY, which is 30.3 TAF more than value calculated for the 2022 WY. **Figure 12** shows the annual change in groundwater storage and cumulative change in groundwater storage for the Basin along with the water year type from the 1974 WY to the 2023 WY.

The total groundwater storage for the Basin is computed by averaging the storage estimates from the GWE and HI methods. As shown in **Table 7** below, the average total groundwater in storage at the end of the 2023 WY was calculated to be 245.1 TAF, which is about 28.4 TAF more than the 2022 WY average total storage value of 216.7 TAF. This equates to approximately 117 TAF of groundwater available as Operational Storage, which is about 93% of the total Operational Storage capacity of 126 TAF.

Table 7: Groundwater Storage Summary, 2023 WY (in TAF)*

Storage Calculation Method	End of 2022 WY	End of 2023 WY	Change in Storage
GWE Method	218.6	245.0	26.4
HI Method	214.9	245.2	30.3
TOTAL STORAGE (Average of GWE and HI Methods)	**216.7**	**245.1**	**28.4**
Operational Storage*	**88.7**	**117.1**	**28.4**

*Numbers rounded to nearest tenth TAF
** Operational Storage = Total Storage - Reserve Storage (i.e., 128 TAF)
GWE = Groundwater Elevation
HI = Hydrologic Inventory
TAF = Thousand acre-feet

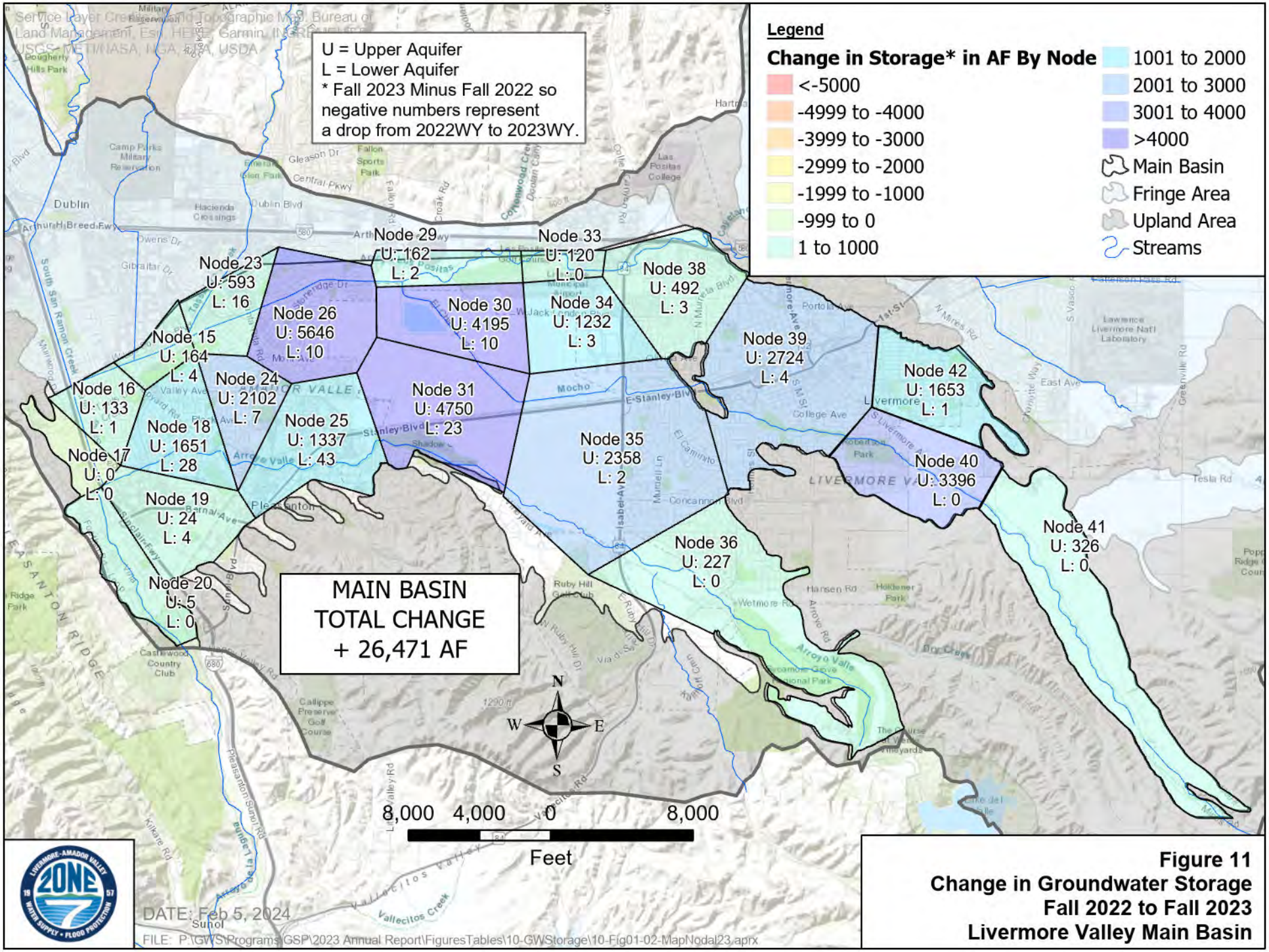


Figure 11
Change in Groundwater Storage
Fall 2022 to Fall 2023
Livermore Valley Main Basin

FIGURE 12
GRAPH OF GROUNDWATER STORAGE 1974 - 2023 WATER YEARS
LIVERMORE VALLEY GROUNDWATER BASIN

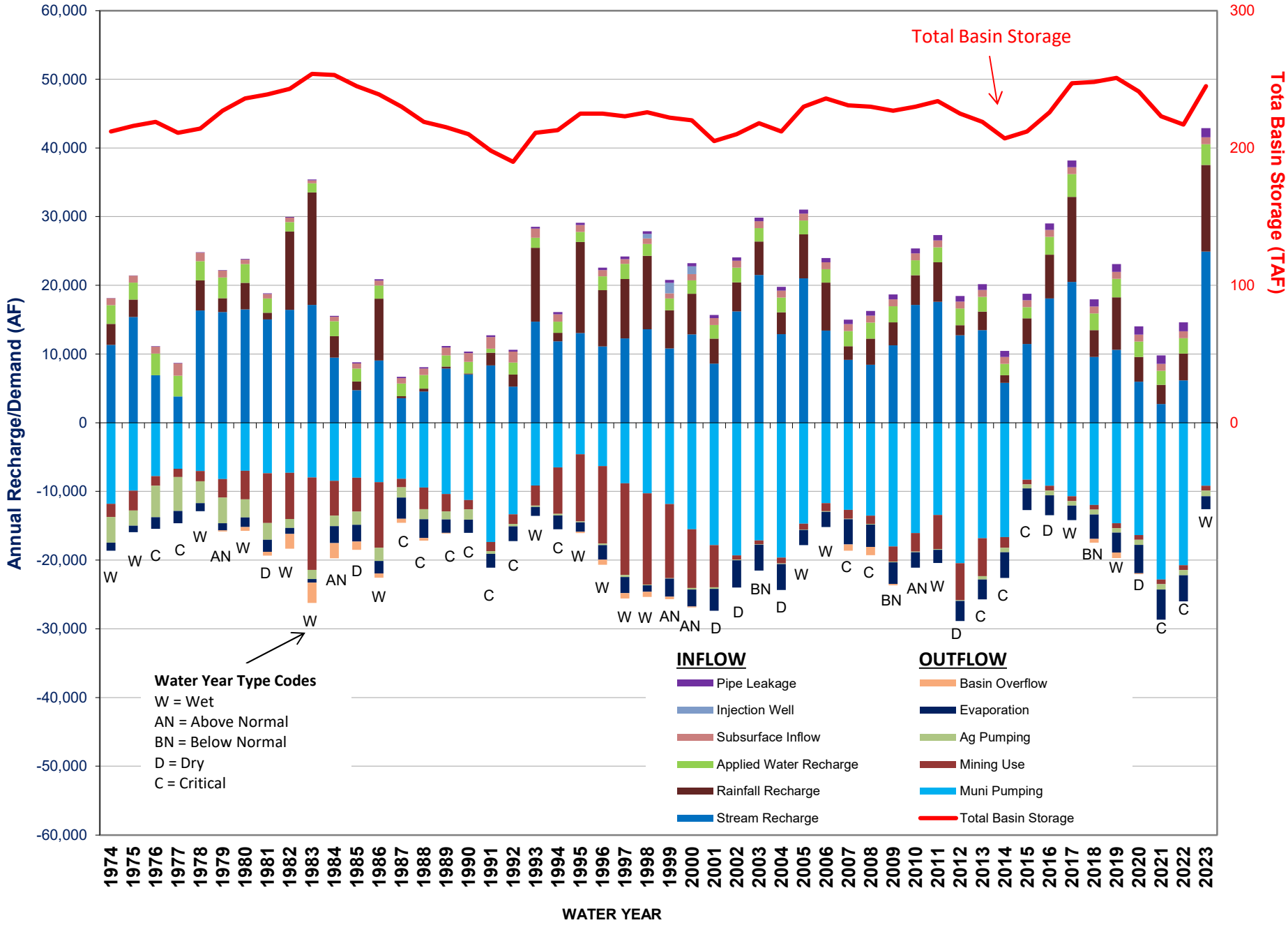


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Figure 12

8. Plan Implementation

☑ *§ 356.2 (b) (4)*

Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:

(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

8.1. SGMA Monitoring Activities

Semi-annual groundwater elevation data were collected during seasonal high (Spring) and seasonal low (Fall) conditions at all 12 RMS-WLs during the 2023 WY in accordance with the protocols for water level data collection outlined in the 2021 Alternative GSP.

Annual water quality samples were collected at all 12 Representative Monitoring Sites for Water Quality (RMS-WQs) for each constituent of concern (COC) during the 2023 WY in accordance with the protocols for water quality data collection outlined in the 2021 Alternative GSP.

Semi-annual groundwater elevation and streamflow gauging data were collected at all 14 RMS-ICSW-Well and 10 RMS-ICSW-Gauge sites, respectively, during the 2023 WY in accordance with the protocols for water level and streamflow data collection outlined in the 2021 Alternative GSP.

Land subsidence data was obtained from DWR's monthly TRE Altamira Interferometric Synthetic Aperture Radar (InSAR) monitoring program and supplemented with proxy water level monitoring data from 11 RMS-WLs during the 2023 WY in accordance with the protocols for land subsidence monitoring outlined in the 2021 Alternative GSP.

8.2. Current Conditions – Sustainability Indicators

8.2.1. Description

Table 8 summarizes the five Sustainability Indicators for which SMCs are defined within the Basin[4], their associated Undesirable Results (URs), and MTs as presented in the 2021 Alternative GSP. The table also includes the 2023 WY status for each indicator and any action taken in the 2023 WY or planned for the upcoming water year. As summarized in **Table 8** and further described below, no URs occurred during the 2023 WY for any of the five Sustainability Indicators with SMCs defined in the 2021 Alternative GSP.

8.2.2. Chronic Lowering of Groundwater Levels

As described in **Section 3** and shown in **Table 1**, water levels at all RMS-WL wells rose significantly relative to 2022 WY conditions, especially in the Lower Aquifer (up to 87.6 ft). Water levels at all

[4] Seawater intrusion is not occurring in the Basin and thus no SMCs have been defined for this Sustainability Indicator.

RMS-WL wells were measured above their respective MTs and MOs during both the seasonal high (Spring) and seasonal low (Fall) 2023 WY monitoring events.

On September 2, 2022, the water level in RMS-WL 3S1E12K003 was about 25 ft below the MO. Zone 7 closely monitored the decreasing water level in this RMS-WL well as it approached and exceeded the MO threshold. In response, Zone 7 performed several management actions including:

- Increased the measurement interval in the 3S1E12K003 RMS-WL well from monthly to weekly from June to December 2022;
- Installed InSitu VuLink devices in seven wells (including five RMS-WL wells) with water level readings occurring every 15 minutes;
- Reduced pumping in Zone 7's nearby Chain of Lakes and Stoneridge wells; and
- Communicated with Cal Water Services regarding their two municipal wells (CWS 20 and CWS 24) in the Basin to the east of the RMS-WL.

As a result of these management actions (and assisted by rainfall later in the month), the water level in this RMS-WL rose about 100 ft and was measured at 75 ft above the MO during the seasonal low (Fall) 2023 WY monitoring event. Therefore, no URs were observed within the Basin during the 2023 WY.

8.2.3. Depletion of Groundwater Storage

As described in *Section 13.2 Reduction of Groundwater Storage* of the 2021 Alternative GSP, the wells and criteria used to define URs for Depletion of Groundwater Storage are consistent with those used to define URs for Chronic Lowering of Groundwater Levels. As described in **Section 8.2.2** above, water levels at all RMS-WL wells remained above their respective MTs and MOs during both the seasonal high (Spring) and seasonal low (Fall) 2023 WY monitoring events. Therefore, no URs were observed within the Basin during the 2023 WY.

8.2.4. Seawater Intrusion

Because significant and unreasonable effects from seawater intrusion are not present in the Basin and are not likely to occur, SMCs were not set for the Seawater Intrusion Sustainability Indicator. The Seawater Intrusion Sustainability Indicator is therefore not discussed herein.

8.2.5. Degraded Water Quality

As further described in **Appendix B** (Section 6), no Constituents of Concern (COCs) for which SMCs are defined in the 2021 Alternative GSP (i.e., Total Dissolved Solids [TDS], Nitrate, Boron, and Chromium) were detected above their corresponding MTs at any of the 12 RMS-WQs sampled during the 2023 WY. TDS concentrations were detected above the MOs at five RMS-WQ during the annual sampling event (3S1E11G001 [11G1], 3S2E08K002 [8K2], 3S1E20C008 [20C8] and 3S1E08H003 [8H3], and 3S2E24A001 [24A1]), Nitrate concentrations were detected above the MOs at two RMS-WQ (3S2E08H003 [8H3] and 3S2E24A001 [24A1]), Boron concentrations were detected above the MOs at two RMS-WQ (3S1E06F003 [6F3] and 2S2E34E001 [34E1]), and

Chromium concentrations remained below the MOs at all RMS-WQ. The MOs exceedances observed at these wells does not currently constitute an UR per the definition provided in *Section 13.4.1 Undesirable Results for Degraded Water Quality* of the 2021 Alternative GSP. Therefore, no URs were observed within the Basin during the 2023 WY.

SMCs for per- and polyfluoroalkyl substances (PFAS) have not currently been established, as Maximum Contaminant Levels (MCLs) are not yet established. However, Zone 7 is complying with State Water Resources Control Board (SWRCB) orders concerning PFAS compounds and meeting Response Levels established by the SWRCB's Division of Drinking Water (DDW). In addition, as further described in **Section 8.3.4.5**, Zone 7 has developed a PFAS management strategy consisting of PFAS monitoring, blending and treating, managing water quality, and diversifying groundwater resources. Zone 7 will continue to sample for PFAS compounds, identify possible sources, and perform PFAS mobilization modeling. The SMCs for PFAS will be addressed in the next Periodic Review once additional data have been collected and regulatory criteria established.

Furthermore, Zone 7 will continue to monitor the other COCs within the Basin and implement its Salt Management Plan (SMP, Zone 7, 2004) and Nutrient Management Plan (NMP, Zone 7, 2015).

8.2.6. Land Subsidence

Land subsidence has not historically been observed in the Basin. As described in **Section 8.2.2** above, water levels at all applicable proxy RMS-WL sites remained above their respective MTs and MOs during both the seasonal high (Spring) and seasonal low (Fall) 2023 WY monitoring events. Furthermore, as further described in **Appendix B** (Section 7), DWR InSAR data indicates ground surface elevations generally rose slightly (i.e., by less than 0.2 ft) and in some areas dropped slightly (i.e., within 0.05 ft) throughout the 2023 WY. These elevation changes are within the range Zone 7 considers to be "elastic deformation" (i.e., rebounds to the original elevation when groundwater levels return to previous levels). Therefore, no URs were observed within the Basin during the 2023 WY.

8.2.7. Depletion of Interconnected Surface Waters

As described in **Section 3** and shown in **Table 2**, groundwater levels rebounded in all wells from the 2022 drought and ended the year above MOs with the exception of RMS-ICSW Well 3S2E33C001 [33C1] which was measured at 1.37 ft below the MO during the seasonal low (Fall) 2023 WY monitoring event. Water levels remained above the MT at 33C1 during the seasonal low (Fall) monitoring event, and all RMS-ICSW wells were measured above their MTs and MOs during the seasonal high (i.e., spring) monitoring event. The MO exceedance observed at 33C1 does not currently constitute an UR per the definition provided in *Section 13.6.1 Undesirable Results for Depletions of Interconnected Surface Water* of the 2021 Alternative GSP. Therefore, no URs were observed within the Basin during the 2023 WY.

Table 8: Sustainable Management Criteria Status, 2023 WY

Sustainability Indicator	Undesirable Results Criteria	Minimum Threshold	2023 WY Status	Action Taken
Chronic Lowering of Groundwater Levels	Water levels in greater than 25% of the RMS-WLs decline below their respective MTs for two consecutive years.	Historic low minus maximum annual rate of groundwater level change, or historic low if maximum annual rate of groundwater level change is not available.	MOs and MTs were not exceeded at any RMS-WLs, see **Figure 6**.	Continue to monitor.
Depletion of Groundwater Storage	Water levels in greater than 25% of the RMS-WLs decline below their respective MTs for two consecutive years. Not applicable to Upland Management Area.	Water Level SMCs used as proxy.	MOs and MTs were not exceeded at any RMS-WLs, see **Figure 6**.	Continue to monitor.
Degradation of Groundwater Quality	If MTs are exceeded for any of the identified constituents of concern in greater than 25% of the RMS-WQs at least two (2) consecutive years as a result of SGMA-related groundwater management activities such that they cannot be managed to provide drinking water supply (i.e., that treatment or blending is not possible or practicable).	TDS > 1,000 milligrams per liter (mg/L) or 2015 Baseline concentration plus maximum deviation, whichever is greater.	TDS was not detected above the MT in any RMS-WQs; however, TDS was detected above the MO in five RMS-WQs. No URs have been triggered within the Basin.	Continue to monitor and increase municipal supply pumping, implement SMP, increase operation of Mocho Groundwater Demineralization Plant (MGDP), and conduct artificial groundwater recharge with low TDS water.
		Nitrate (as N) > 10 mg/L or 2015 Baseline concentration plus maximum deviation, whichever is greater.	Nitrate was not detected above the MT in any RMS-WQs; however, nitrate was detected above the MO in two RMS-WQs. No URs have been triggered within the Basin.	Continue to monitor and implement NMP.
		Boron > 1.4 mg/L, or 2015 Baseline concentration plus maximum deviation, whichever is greater.	Boron was not detected above the MT in any RMS-WQs however, boron was detected above the MO in two RMS-WQs. No URs have been triggered within the Basin.	Continue to monitor.

Sustainability Indicator	Undesirable Results Criteria	Minimum Threshold	2023 WY Status	Action Taken
Degradation of Groundwater Quality (continued)		Total Chromium > 0.050 mg/L, or 2015 Baseline concentration plus maximum deviation, whichever is greater.	Chromium was not detected above the MT or MO in any RMS-WQs. No URs have been triggered within the Basin.	Continue to monitor.
		SMCs for PFAS in development	Zone 7 continued to sample for PFAS compounds, worked to implement PFAS management strategy, adjusted pumping to meet new regulations, investigated treatment options, and performed PFAS groundwater modeling.	Continue to monitor
Land Subsidence	Water Level SMCs used as proxy for Main Basin and Fringe Management Area, and no more than 0.4 ft of irreversible land surface elevation decrease in one year. Not applicable to Upland Management Area.	Water Level SMCs used as proxy and irreversible land surface elevation decrease of 0.4 ft.	MTs were not exceeded at any applicable RMS-WLs and elastic fluctuations were detected at rates of approximately 0.2 ft throughout the 2023 WY.	Continue to monitor
Depletion of Interconnected Surface Waters	If groundwater levels decline below their MTs in greater than 40% of the RMS-ICSWs for more than two consecutive years.	Historic low water levels or to be determined if historical water levels are not available.	One MO exceedance was recorded in RMS-ICSW 3S2E33C001 during the seasonal low (Fall) 2023 WY monitoring event; however, no URs have been triggered within the Basin.	Continue to monitor

8.3. Implementation of Projects and Management Actions

8.3.1. Overview

This section provides an update on the P/MAs described in *Section 15 Projects and Management Actions* of the 2021 Alternative GSP. As demonstrated in the 2021 Alternative GSP and in this Annual Report, Zone 7 continues to sustainably manage the Basin through numerous interrelated programs to assess, manage, monitor, and protect groundwater supplies. Using the data collected from its robust monitoring programs, Zone 7 adaptively manages its groundwater supplies by considering current hydrologic conditions, water demands, water quality conditions, and future water supply/demand forecasts. In addition to continuing the monitoring programs that are critical to Zone 7's sustainable groundwater management, Zone 7 is also working to implement its PFAS management strategy as well as its SMP and NMP, improve long-term surface water supply reliability, maximize conjunctive use opportunities, provide watershed protection, and support water recycling operations.

8.3.2. Water Supply Augmentation Projects

8.3.2.1. Existing Imported Water Supplies

Imported surface water supplies secured by Zone 7 for the 2023 WY are shown in **Table 5** and **Figure 10** and are summarized below include:

- The SWP Table A allocation for the 2023 CY was 100% of Zone 7's maximum allocation (80,619 AF). Approximately 38,400 AF of this was imported via the South Bay Aqueduct (SBA) for the 2023 CY, 10,000 AF was transferred, and the remaining 32,219 AF was carried over for the 2024 CY. Zone 7 also imported 1,600 AF of water from its Article 56 allocation (previous year's carryover) and 2,400 AF of water that was banked at San Luis Reservoir (Article 21) via the SBA.
- Zone 7 did not import any water from its water banks in the Kern County Groundwater Basin (i.e., in Semitropic Water Storage District and Cawelo Water District) but did add an additional 9,000 AF to its water bank storage accounts. Zone 7 had a total of 95,600 AF stored in the Kern County Groundwater Basin at the end of the 2023 CY.
- Zone 7 did not import any water from the Lover River Yuba Accord (Yuba) or the Mojave Water Agency.
- Total imported surface water supplies in the 2023 CY (42,400 AF) made up 67% of Basin water demands.
- Total groundwater production in the Basin (including by Zone 7, retailers, agriculture, domestic, etc.) supplied about 20% of the total Basin-wide water demand in the 2023 WY.
- Of the 5,223 AF of groundwater pumped by Zone 7 (including that pumped for DSRSD) during the 2023 WY, about 5,032 AF was delivered to Zone 7's retailers; the remainder of

which is accounted for in pumping losses and exported brine from the groundwater demineralization process.

- Zone 7's total produced groundwater was about 15% of the total treated water production that Zone 7 delivered to its retailers during the 2023 WY (on average, groundwater makes up about 16% of Zone 7's annual treated water deliveries).

8.3.2.2. Future Water Supply Projects

Zone 7 continued its strategy of securing the long-term reliability of the water supply system to meet the needs of both existing and future customers as summarized below:

- In 2023, Zone 7 continued its petition to extend Zone 7's water rights permit for diverting surface water captured in Lake Del Valle from the upper Arroyo Valle. Under the existing permit, Zone 7's average annual yield from the upper Arroyo Valle is about 7,300 AFY. A diversion structure from Arroyo Valle into Lake A, and a pipeline connecting Lake A to other lakes in the Chain of Lakes (COLs), are included in Zone 7's Capital Improvement Plan (CIP, 2018-2028). Once constructed, these projects will facilitate the capture and storage of additional water from the Del Valle Watershed.

- Zone 7 continues to support the Delta Conveyance Project, the State of California's proposed project to upgrade the SWP system infrastructure and operations and improve its long-term reliability while protecting the Sacramento-San Joaquin Delta (Delta) ecosystem. At this time, while the project's design is still being re-evaluated, Zone 7 is assuming that some form of the Delta Conveyance Project would be in-service by 2040.

- Zone 7 is also continuing to evaluate alternative water supply and storage options such as the Bay Area Regional Desalination Project, potable reuse, Los Vaqueros Expansion, Sites Reservoir, and water transfers. Ultimately, Zone 7 may choose to implement one or several of these options depending on the results of the studies and planning efforts, the amounts and timing of development and conservation, and the determination of costs and benefits to the Basin.

- Zone 7 continues to evaluate the feasibility of an intertie with another major water agency (e.g., East Bay Municipal Utilities District or San Francisco Public Utilities Commission [SFPUC]). An outage of the SBA, or major disruptions in the Delta, would prevent Zone 7 access to most of its water supplies, leaving only groundwater, water in the COL, and water in Lake Del Valle available to meet its demands. An intertie with another agency could provide an additional source of water during an emergency or drought and could also facilitate water transfers.

- Finally, Zone 7 continues to invest in planning and modeling tools to improve its long-term water supply reliability in the face of future hydrologic and water supply uncertainties. For example, Zone 7 recently completed its 2022 Water Supply Evaluation Update (Zone 7, 2023) which included the development of a new water supply risk model using the RiverWare modeling platform, providing an enhanced capability to evaluate and

plan for the impacts of water supply shortages in real time. The RiverWare model was further applied to identify and prioritize a suite of potential future water supply portfolios that would meet Zone 7's Water Supply Reliability Policy under varying future hydrologic and water shortage scenarios.

8.3.2.3. Conjunctive Use

Zone 7 implements conjunctive use practices within the Basin to the greatest extent possible given hydrologic conditions and imported water supply availability. During the 2023 WY, Zone 7 released 7,526 AF from the SBA into the Arroyos Valle and Mocho for artificial recharge and water rights, of which 6,734 AF was recharged into the Basin.

8.3.2.4. Well Master Plan (WMP, Zone 7, 2003)

During the 2023 WY, Zone 7 staff continued the process of reevaluating Zone 7's supply well needs. Site specific evaluation and future well construction will depend on the outcome of water supply needs, PFAS investigations, and future regulatory requirements. Once the evaluation is complete, staff plans to begin an update to its Well Master Plan in the upcoming fiscal year.

8.3.2.5. Chain of Lakes Recharge Projects

During the 2023 WY, Zone 7 continued to work with Hanson Aggregates (former quarry operator for Lakes H, I, and Cope) while they continue to finalize reclamation on Lake H.

One of the conditions of approval in CEMEX's 2021 amendment to Surface Mining Permit 23 is to install up to three new monitoring wells (or one nested well with up to three casings) with guidance from Zone 7 on location and screened intervals. Zone 7 and CEMEX are working together on these wells which should be installed in the 2024 WY.

8.3.3. Water Demand Reduction Management Actions

8.3.3.1. Existing and Future Non-Potable Recycled Water Use

Both the City of Livermore and DSRSD plan to expand the use of recycled water for turf and landscape irrigation projects over the next few years. The City of Pleasanton purchases recycled water from DSRSD and/or Livermore for irrigation of city parks and landscapes located within the Main Basin. In the 2023 WY, Livermore and DSRSD recycled about 6,141 AF, approximately 13% of the total water use for the Basin.

Zone 7 continues to collaborate with Livermore, DSRSD, and Pleasanton to mitigate any additional potential impacts to groundwater quality from the future planned recycled water use.

8.3.3.2. Water Conservation

Throughout the 2023 WY, Zone 7 continued its regional coordination of conservation programs, including community workshops and other education/training events, school education programs, and rebates and water-saving giveaway programs.

8.3.3.3. Groundwater Pumping Quota Program

The retailers are permitted by contract to pump a GPQ (accounted for on a CY basis) without having to pay a replenishment fee to Zone 7. They can carry forward any un-pumped GPQ (up to 20% of their GPQ). The retailer's GPQ, along with their groundwater pumping volumes for the 2023 CY, are shown in **Table 4**. None of the retailers pumped more than their respective GPQ in the 2023 CY.

8.3.4. Projects to Improve Drinking Water Quality in Zone 7 Service Area

8.3.4.1. Well Ordinance Program

During the 2023 WY, Zone 7 issued 125 drilling permits, 11 permits less than in the 2022 WY. **Table 9** details the breakdown of the types of permits issued during the 2023 WY and their quantities.

Table 9: Well Ordinance Permits Issued in the 2023 WY

Permit Type	Quantity
Geotechnical Investigations	69
Well Destructions	13
Contamination Investigations/Remediation	18
Water Supply Wells	8
Groundwater Monitoring	11
Cathodic Protection Wells	6
Total	***125***

- Eight water supply well permits were issued in the 2023 WY. The pre-drought average was 25 per year.
- About 61% of the permitted well work was physically inspected by Zone 7 permit compliance staff; the remaining 39% proceeded with self-monitoring and reporting efforts when a licensed professional was supervising the project.

8.3.4.2. Toxic Site Surveillance Program

In the 2023 WY, Zone 7 tracked the progress of 46 active sites where contamination has been detected in groundwater or is threatening groundwater. Four of these active sites have a contaminant plume that is within 2,000 ft of a water supply well or a surface water source and are therefore classified as "High Priority" cases due to their impact or threat of impact on potable groundwater supplies. Zone 7's database also contains 278 other contamination cases that have been either "Closed" or classified as "No Action Required" because they have been sufficiently cleaned up and/or pose minimal threat to drinking water supplies.

8.3.4.3. Salt Management and Groundwater Demineralization

Zone 7's long-term salt management strategy includes monitoring and increasing municipal supply pumping, increasing operation of the Mocho Groundwater Demineralization Plant (MGDP), and conducting artificial groundwater recharge with low TDS water. **Table 10** below shows the salt loading summary for the 2023 WY.

Table 10: Salt Loading Summary for 2023 WY

Category	Volume (AF)	Salt Mass (Tons)	TDS Concentration (mg/L)	Change in Concentration from 2022 WY (mg/L)
Inflow	42,648	22,108	382	-126
Outflow	12,587	7,250	424	-45
Net (In – Out)	30,060	14,858		
Basin Total	**245,164**	**241,880**	**726**	**-51**

AF = acre-feet
mg/L = milligrams per Liter

- In the 2023 WY, the total salt mass added to the Main Basin by all the inflow (Supply) components was approximately 22,108 tons, whereas the total mass of salts removed from the Basin by all the outflow (Demand) components is estimated at 7,250 tons; a net increase of 14,858 tons.
- The salt load increase was accompanied by groundwater storage increase of 30,060 AF during the 2023 WY, which caused the end-of-water-year theoretical average TDS concentration for the Main Basin to decrease by 51 mg/L from the WY.

After operating sparingly throughout the 2022 WY to conserve water during the drought, the MGDP resumed normal operations in the 2023 WY:

- During the 2023 WY, the MGDP produced 155 AF of brine (compared to 2.0 AF in the 2022 WY) that resulted in the export of about 510 tons of salt from the Main Basin through the Livermore-Amador Valley Water Management Agency (LAVWMA) pipeline (compared to 7.0 tons in the 2022 WY).
- Since its inception, the MGDP has exported over 19,596 tons of salt from the Basin.

8.3.4.4. Nutrient Management

During the 2023 WY, Zone 7 continued working with Alameda County Environmental Health (ACEH) to implement the NMP measures. One of these measures is that Zone 7 regulates commercial onsite wastewater treatment systems (OWTS, a.k.a., septic systems) to manage nitrate loading in the groundwater. In the 2023 WY, Zone 7 received seven applications for nonresidential OWTS: one application was approved by Zone 7 staff, two were approved by

Zone 7's Board of Directors (see **Section 8.5.1**), and Zone 7 is working with ACEH to process the remaining applications.

8.3.4.5. Per- and Polyfluoroalkyl Substances (PFAS)

The SMCs for PFAS have not been established, as MCLs are not yet available. However, Zone 7 is complying with SWRCB orders concerning PFAS compounds and meeting Response Levels established by the SWRCB DDW. In 2022, the SWRCB DDW established Reporting and Notification Limits for Perfluorohexane Sulfonate (PFHxS) of 20 nanograms per Liter (ng/L) and 3 ng/L, respectively. In 2023, The Environmental Protection Agency (EPA) released proposed MCLs of 4 ng/L for both Perfluorooctane Sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA).

Several municipal wells, primarily in the western portion of the Main Basin, have been impacted by PFAS compounds over the last few years. For example, elevated PFAS concentrations have been detected at the City of Pleasanton's three active municipal wells. As a result, Pleasanton has ceased pumping from all three of their wells and is studying options to acquire water from Zone 7 and/or drill additional municipal wells elsewhere in the Basin. At least seven of Zone 7's ten municipal wells have also been detected with elevated PFAS concentrations. To meet the latest regulatory limits, Zone 7 has implemented the following management activities:

- Ceased pumping from the Mocho 1 Well in 2020;
- Diverted pumped groundwater from the Mocho 2 and 3 Wells through the existing MGDP and/or blended with low-PFAS groundwater pumped from the Mocho 4 Well;
- Ceased pumping from the COL wells in 2022 and is currently installing a PFAS treatment system that is scheduled to be operational in late 2024; and
- Installed a new ion-exchange PFAS treatment facility at the Stoneridge Well.

In 2023 Zone 7 was awarded $16M in grant funding from DWR (Proposition 68, Round 2 Sustainable Groundwater Management Implementation) for the Stoneridge Well ion-exchange PFAS Treatment Facility. The facility was completed in September 2023 and a special board meeting/ribbon cutting ceremony was held at the facility on September 13, 2023. The facility is currently operational.

8.3.5. Data Gap-Filling and Other Alternative GSP Implementation Projects

In 2023 Zone 7 conducted the following data gap filling activities and/or projects:

- **Livermore Valley Hydrogeologic Investigations and Groundwater Model Update:** In December 2022 Zone 7 submitted a DWR Proposition 68 SGM Implementation Grant application for a project that includes geophysical investigations, pumping tests, updating the Hydrogeologic Conceptual Model (HCM) of the Basin, and using the new HCM to upgrade its groundwater model. The HCM will also incorporate data collected from DWR's Airborne Electromagnetic [AEM] Survey (Survey Area Six), available online at https://data.cnra.ca.gov/dataset/aem.

- **Groundwater Contaminant Mobilization Study:** Starting in 2021 and continuing into 2022, Zone 7 used its existing groundwater model to develop water quality fate and transport simulations to evaluate existing and future groundwater operations and the impact of constituents (including PFAS) that pose existing and/or anticipated challenges. The results from the first phase of this study, which focuses on PFAS mobilization, were presented at a meeting with Zone 7's retailers and at a Zone 7 Special Board Meeting on August 2022. Both the presentation and the technical memorandum are available online at https://www.zone7water.com/pfas. As mentioned above, in December 2022 Zone 7 submitted a DWR Proposition 68 SGM Implementation grant application for a project that included conducting additional PFAS fate and transport modeling to further enhance its ongoing PFAS management and mitigation strategies and capabilities.

  In 2023, Zone 7 completed the second phase of the study, which focused on potential groundwater quality impacts from groundwater recharge of purified water. The study involved simulating the fate and transport of existing constituents such as nitrate, chloride, boron, arsenic, and hexavalent chromium. The results were presented at a Zone 7 Water Resources Committee meeting in January 2024 and at a Zone 7 Board meeting in February 2024.

- **Well Metering and Pumping Record**: Zone 7 assessed the need for well metering and groundwater pumping data collection. Based on this assessment, Zone 7 now requires well metering and reporting to Zone 7 for all new well permits.

- **Water Supply Risk Model:** As mentioned in **Section 8.3.2**, Zone 7 recently completed an update to its Water Supply Evaluation which included development of a new robust water supply risk model using the RiverWare software (Zone 7, 2023). This model runs on a monthly timestep and can simulate the seasonal availability of supplies including local runoff, imported surface water, recovered water from groundwater banks and local groundwater in an integrated manner. Additionally, the RiverWare model is planned to be used in conjunction with Zone 7's update groundwater model once completed to further analyze the impacts of variable conjunctive use operations on groundwater conditions and SGMA compliance within the Basin.

8.4. Progress Made on Addressing Recommended Corrective Actions in the Department's GSP Determination

Zone 7 submitted the first Periodic Evaluation to the Alternative GSP (2021 Alternative GSP; Zone 7 GSA, 2021, also referenced as 2022 Alternative GSP in other reports) in December 2021. As part of that submittal, Zone 7 addressed all recommended corrective actions from DWR on the original (2016) Alternative GSP (see 2021 Alternative GSP *Section 1.2 – Summary of Major Plan Updates*). The 2021 Alternative GSP is currently under review by DWR, and therefore no additional recommended corrective actions have been provided on the 2021 Alternative GSP as of the date of this publication.

8.5. Other Information on Implementation Progress

8.5.1. Stakeholder Outreach and Engagement

During the 2023 WY, Zone 7 continued to conduct outreach to various stakeholder on a variety of platforms as summarized below.

- **Livermore Valley Groundwater Basin Sustainable Groundwater Management Annual Report for Water Year 2022**
    - Submittal to Zone 7 Board of Directors, April 19, 2023
        - Agenda Item 20f: https://portal.laserfiche.com/Portal/DocView.aspx?id=30576&repo=r-35dfdee4&searchid=c52c8547-68de-426c-8525-37b31ba5bb7f
        - Minutes of Meeting (staff report approved with no comments): https://portal.laserfiche.com/Portal/DocView.aspx?id=30813&repo=r-35dfdee4
    - Presentation to Zone 7 Water Resources Committee of Directors, Summary of Livermore Valley Groundwater Basin Sustainable Groundwater Management Annual Report, May 3, 2023
        - Minutes of Meeting (with comments): https://portal.laserfiche.com/Portal/DocView.aspx?id=31451&repo=r-35dfdee4

- **Livermore Valley Hydrogeologic Investigations and Groundwater Model Update**
    - Award of Contract to EKI Environment & Water, Inc. for the Livermore Valley Hydrogeologic Investigations and Groundwater Model Update. Presentation to Zone 7 Board of Directors, September 20, 2023:
        - Agenda Item 11: https://portal.laserfiche.com/Portal/DocView.aspx?id=31412&repo=r-35dfdee4&searchid=e09a7b18-0a87-4ed7-a365-ec015c9ecc8d
        - Agenda Item 11, Supplemental Materials: https://portal.laserfiche.com/Portal/DocView.aspx?id=31523&repo=r-35dfdee4&searchid=e09a7b18-0a87-4ed7-a365-ec015c9ecc8d
        - Minutes of Meeting (see Pages 3 and 4 for comments): https://portal.laserfiche.com/Portal/DocView.aspx?id=32441&repo=r-35dfdee4

- **Desktop Groundwater Contaminant Study**
    - Staff presented the finding of Desktop Groundwater Contaminant Mobilization Study to the Zone 7's Water Resources Committee on January 23, 2024, and the Board of Directors on February 21, 2024.
        - Water Resources Committee January 23, 2024:

        - Agenda Item #3: https://portal.laserfiche.com/Portal/DocView.aspx?id=32909&repo=r-35dfdee4
        - Supplemental Material Item #3: https://portal.laserfiche.com/Portal/DocView.aspx?id=32954&repo=r-35dfdee4
        - Minutes of Meeting Not Yet Posted
    - Board Meeting, February 21, 2024:
  - Agenda Item #9: https://portal.laserfiche.com/Portal/DocView.aspx?id=33034&repo=r-35dfdee4
    - Minutes of Meeting (see Pages 2 to 4 for comments): https://portal.laserfiche.com/Portal/DocView.aspx?id=33194&repo=r-35dfdee4

- **Stoneridge PFAS Treatment Facility**
  - Special board meeting on September 13, 2023, to inaugurate the ion-exchange PFAS treatment facility constructed with the funding from SGMA implementation grant.
    - Minutes of Meeting: https://portal.laserfiche.com/Portal/DocView.aspx?id=32440&page=1&repo=r-35dfdee4&searchid=2d972fab-ea26-4668-a2ba-f97a484f85cb

- **Non-Residential Onsite Wastewater Treatment Systems**
  - Commercial Use of Septic System at Del Valle Winery, 4948 Tesla Road
    - Presentation to Zone 7 Water Resources Committee of Directors, May 3, 2023:
      - Minutes of Meeting (with comments): https://portal.laserfiche.com/Portal/DocView.aspx?id=31451&repo=r-35dfdee4
    - Presentation to Board of Directors, May 17, 2023:
      - Agenda, Item #13 https://portal.laserfiche.com/Portal/DocView.aspx?id=30730&repo=r-35dfdee4
      - Minutes of Meeting (see Pages 3 to 4 for comments): https://portal.laserfiche.com/Portal/DocView.aspx?id=31440&repo=r-35dfdee4
  - Septic Tank Application for Non-Residential Use at 1114 Greenville Road, Board Meeting September 20, 2023:
    - Agenda, Consent Item #8d https://portal.laserfiche.com/Portal/DocView.aspx?id=31404&repo=r-35dfdee4

- Minutes of Meeting. (Consent Item approved with no comments): https://portal.laserfiche.com/Portal/DocView.aspx?id=32441&repo=r-35dfdee4

8.5.2. Public Comments Received

During the 2023 WY, public comments were received by Zone 7 in the following forms: letters, emails, and verbal comments at the monthly Zone 7 Board of Directors meeting. **Section 8.5.1** above includes links to the minutes of the board meetings where public comments were solicited and/or received.

8.5.3. Additional Information or Accomplishments

The following describes additional information and/or accomplishments Zone 7 has made related to implementation efforts that are being used to achieve the Basin's Sustainability Goal.

- Optimized groundwater production operations to ensure consistent compliance with SMCs. For example, during the recent 2020 WY – 2022 WY drought, Zone 7 shut down groundwater pumping when groundwater levels at nearby RMS-WL wells temporarily dropped below MTs;
- Continued to implement Executive Orders for well permitting and SGMA compliance;
- Continued studying contaminant mobilization to protect Basin water quality objectives;
- Reviewed and commented on various project California Environmental Quality Act (CEQA) documents with respect to potential impacts on the Basin's ability to meet SGMA compliance; and
- Reviewed and commented on various project development documents to ensure project proponents comply with requirements specified in the Basin's 2021 Alternative GSP.

8.5.4. Anticipated WY 2024 Implementation Activities

The following describes planned and/or anticipated implementation activities to be undertaken by Zone 7 and associated Basin stakeholders for WY 2024.

- **Installation of Nested Well Set (3S1E08K002 and 3S1E08K003) Between Mocho and Hopyard Wellfields** (completed as of January 2024) - These wells will act as sentinel wells to detect if PFAS compounds have migrated southwest of the Mocho Wellfield towards the Hopyard Wellfield.
- **Livermore Valley Groundwater Basin Sustainable Groundwater Management Annual Report, 2023 Water Year** - Submittal to DWR by 1 April 2024 deadline; accompanying appendices to be reviewed for approval at the April 17, 2024 Zone 7 Board of Directors meeting.

- **Livermore Valley Hydrogeologic Investigations and Groundwater Model Update** (ongoing) - Presentation of Phase 1 results (Hydrogeologic Investigations) to Zone 7 Water Resources Committee currently scheduled for April 24, 2024.
- **Desktop Groundwater Contaminant Mobilization Study** (ongoing) - Future presentation(s) to Zone 7 Board and/or Board Committees planned for the 2024 WY.

9. References and Technical Studies

DWR, 2019, Sustainable Groundwater Management Act 2019, Basin Prioritization Process and Results. April 2019, 64 pp.

DWR, 2021, Sustainable Groundwater Management Act Water Year Type Data Set Development Report, January 2021, 17pp. https://data.cnra.ca.gov/dataset/sgma-water-year-type-dataset/resource/79c7b9c1-1203-4203-b956-844554fcec79

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APPENDICES

Appendix A. Annual Report Submittal Checklist
Appendix B. Supplemental Information

Appendix A

Annual Report Submittal Checklist

Groundwater Sustainability Plan Annual Report Elements Guide

Basin Name	Livermore Valley Groundwater Basin (DWR No. 2-010)		
GSP Local ID			
California Code of Regulations - GSP Regulation Sections	***Groundwater Sustainability Plan Elements***	**Document *page number(s) that address the applicable GSP element.***	***Notes: Briefly describe the GSP element does not apply.***
Article 5	**Plan Contents**		
Subarticle 4	***Monitoring Networks***		
§ 354.40	**Reporting Monitoring Data to the Department**		
	Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.	17:18	
	Note: Authority cited: Section 10733.2, Water Code. Reference: Sections 10728, 10728.2, 10733.2 and 10733.8, Water Code.		
Article 7	**Annual Reports and Periodic Evaluations by the Agency**		
§ 356.2	**Annual Reports**		
	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:		
	(a) General information, including an executive summary and a location map depicting the basin covered by the report.	6:12	
	(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:		
	(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:		
	(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.	19:22	
	(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.	23:24	
	(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.	25:28	
	(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.	29:30	
	(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.	31:33	

Groundwater Sustainability Plan Annual Report Elements Guide

Basin Name	Livermore Valley Groundwater Basin (DWR No. 2-010)		
GSP Local ID			
California Code of Regulations - GSP Regulation Sections	***Groundwater Sustainability Plan Elements***	**Document *page number(s) that address the applicable GSP element.***	***Notes: Briefly describe the GSP element does not apply.***
	(5) Change in groundwater in storage shall include the following:		
	(A) Change in groundwater in storage maps for each principal aquifer in the basin.	34:36	
	(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.	37	
	(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.	38:53	

Appendix B

Supplemental Information

APPENDIX B: Supplemental Information

Livermore Valley Groundwater Basin

Sustainable Groundwater Management Annual Report

Water Year 2023 (October 2022 – September 2023)

Submitted by:

Zone 7 Water Agency
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PREPARED BY:

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List of Figures and Tables

Attached

Acronyms and Abbreviations

Abbrev	Description	Abbrev	Description
µg/L	Micrograms per Liter	HRL	Health reference level
ACCDA	Alameda County Community Development Agency	InSAR	Interferometric Synthetic Aperture Radar
ACDEH	Alameda County Department of Environmental Health	ISCO	In-situ chemical oxidation
ACNP	Alamo Canal near Pleasanton	LAMP	Local Agency Management Program
ADLLV	Arroyo de la Laguna at Verona	LAVWMA	Livermore-Amador Valley Water Management Agency
ADVP	Arroyo Del Valle Pleasanton	lbs	Pounds
AF	Acre-feet	LDV	Lake Del Valle
AFY	Acre-feet per year	LLNL	Lawrence Livermore National Laboratory
ALP	Arroyo Las Positas	LRI	Livermore Rain Index
ALP_ELCH	Arroyo Las Positas above El Charro	LTCP	Low-Threat Underground Storage Tank Closure Policy
ALPL	Arroyo Las Positas near Livermore	LWRP	Livermore Water Reclamation Plant
ALTC	Altamont Creek	MCL	Maximum contaminant level
AMHAG	Arroyo Mocho Hageman	mg/L	Milligrams per Liter
AM_KB	Arroyo Mocho at Kaiser Bridge	MGDP	Mocho Groundwater Demineralization Plant
AMNL	Arroyo Mocho near Livermore	MOU	Memorandum of Understanding
AMP	Arroyo Mocho Pleasanton	msl	Mean sea level
AOC	Area of Concern	MTBE	Methyl tertiary-butyl ether
AVADLL	Arroyo Valle at Arroyo de la Laguna	N	Nitrogen
AVBLC	Arroyo Valle below Lang Canyon	NC	North Canyons
AVNL	Arroyo Valle near Livermore	ng/L	Nanograms per Liter
BBID	Byron-Bethany Irrigation District	NL	Notifications Level
bgs	Below ground surface	NMP	Nutrient Management Plan
BMPs	Best management practices	NO_3	Nitrate Ion

CaCO3	Calcium carbonate	OWTS	Onsite wastewater treatment system
CASGEM	California Statewide Groundwater Elevation Monitoring	PCE	Tetrachloroethylene
CCNP	Chabot Canal near Pleasanton	PFAS	Per- and polyfluoroalkyl substances
CCR	California Code of Regulations	PFBS	Perfluorobutanesulfonic acid
CEC	Constituents-of-emerging-concern	PFHxS	Perfluorohexane sulfonate
CEQA	California Environmental Quality Act	PFOA	Perfluorooctanoic acid
cfs	Cubic feet per second	PFOS	Perfluorooctanesulfonic acid
CIMIS	California Irrigation Management Information System	POTW	Publicly owned treatment works
CIP	Capital Improvement Program	ppb	Parts per billion
COLs	Chain of Lakes	ppt	Parts per trillion
Cr	Chromium	PPWTP	Patterson Pass Water Treatment Plant
CrVI	Hexavalent chromium	PRG	Preliminary Remediation goals
CWS	California Water Service	RL	Response Level
CY	Calendar year	RO	Reverse osmosis
DCE	Dichloroethene	RP	Responsible Party
DERWA	DSRSD-EBMUD Recycled Water Authority	RWQCB	California Regional Water Quality Control Board
DDW	California State Water Resources Control Board Division of Drinking Water	SBA	South Bay Aqueduct
DSRSD	Dublin San Ramon Services District	SGMA	Sustainable Groundwater Management Act
DTSC	Department of Toxic Substances Control	SFPUC	San Francisco Public Utilities Commission
DVWTP	Del Valle Water Treatment Plant	SMP	Salt Management Plan
DWR	California Department of Water Resources	SMP	Surface mining permit
EBMUD	East Bay Municipal Utilities District	SNMP	Salt Nutrient Management Plan
EBRPD	East Bay Regional Parks District	SVE	Soil vapor extraction
EIR	Environmental Impact Report	SWP	State Water Project
EPA	Environmental Protection Agency	SWRCB	State Water Resources Control Board
ESL	Environmental screening level	TAF	Thousand acre-feet
ETo	Evapotranspiration	TCE	Trichloroethylene
ft	Feet	TDS	Total dissolved solids
Ft msl	Feet above mean sea level	TKN	Total Kjeldahl nitrogen
GDE	Groundwater-dependent ecosystem	TSS	Toxic Sites Surveillance
GIS	Geographic information system	USEPA	U.S. Environmental Protection Agency
GPQ	Groundwater Pumping Quota	USGS	U.S. Geological Survey
GSA	Groundwater Sustainability Agency	VA	Veteran's Administration
GSP	Groundwater Sustainability Plan	WBIC	Weather-Based Irrigation Controller
GWMP	Groundwater Management Plan	WMP	Well Master Plan
GWE	Groundwater Elevation	WWMP	Wastewater Management Plan
HI	Hydrologic Inventory	WY	Water year (October 1 through September 30)

1 Climatological Monitoring

1.1 Program Changes

Historically, Station 15E (CM_015E or 15E) was used as the representative station for rainfall within Livermore Valley Groundwater Basin (Basin) because of its extensive historical record; however, CM_015E was relocated in 2020 and the data was no longer available in a consistent and regular basis. After evaluating data quality and availability, Zone 7 Water Agency (Zone 7) determined that data from the nearby Livermore Municipal Airport Station (CM_KLVK or KLVK) will be more reliable and representative. Therefore, starting in the 2021 Water Year (WY) KLVK was selected to replace CM_015E. Accordingly, Zone 7's Livermore Rainfall Index (LRI), which represents a long-term historical record for the Basin, will primarily consist of CM_015E data up through June 2020 and CM_KLVK data thereafter.

For more information on the Climatological Monitoring Program; see the following sections of Zone 7's *First Five-Year Periodic Evaluation to the Alternative Groundwater Sustainability Plan* (2021 Alternative GSP):

- **Section 5.2.1:** Existing Monitoring and Management Programs
- **Section 14.2.7.1:** Other Monitoring Networks – Climatological Monitoring Program

1.2 Results for the 2023 Water Year

Zone 7 uses a network of climatological stations (mapped on ***Figure 1-1*** and tabulated on ***Table 1-1***) to provide high-quality precipitation and evaporation data for water inventory calculation and management decisions, including both daily record stations and 15-minute record stations. Rainfall and evaporation information is provided in the following tables.

- ***Table 1-2*** - Monthly Precipitation Data, 2023 WY
- ***Figure 1-2*** – Graph of Livermore Index Rainfall, 2023 WY
- ***Table 1-3*** - Historical Monthly Precipitation (inches), Livermore Rainfall Index, 1871 to 2023 WY
- ***Table 1-4*** - Monthly Evapotranspiration Data, 2023 WY
- ***Table 1-5*** - Historical Monthly Pan Evaporation (inches), Lake Del Valle Station, Livermore

At the time of this report, the California Department of Water Resources (DWR) had not categorized the 2023 WY; however, using the Water Year Type methodology developed by DWR

(DWR, 2021), the 2023 WY is estimated to be a 'Wet' WY for this report. ***Figure 1-2*** shows that the water year total for the Livermore Rainfall Index (LRI) was at 25.52 inches (176% of average). Total rainfall on the watershed was 191% of average. Total rainfall from individual stations ranged from 20.89 inches (165% of average) at Station CM_024 to 56.47 inches (233% of average) at CM_044 (Lick Observatory in Santa Clara County).

The network average evapotranspiration (ETo) for the 2023 WY was 45.60 inches (98% of normal), ranging from 42.80 inches at the Lake del Valle Station (CM_LDV, 99% of normal) to 50.65 inches at the CIMIS Station 191 (CM_191, 99% of normal).

1.3 Attached Tables and Figures

Table 1-1: *Table of Climatological Stations, 2023 WY*
Table 1-2*: Monthly Precipitation Data, 2023 WY*
Table 1-3*: Historical Monthly Precipitation, Livermore Rainfall Index, 1871 to 2023 WYs*
Table 1-4*: Monthly Evapotranspiration Data, 2023 WY*
Table 1-5*: Historical Monthly Pan Evaporation, Lake del Valle Station, 1969 to 2023 WYs*

Figure 1-1*: Climatological Monitoring Stations with Average Rainfall*
Figure 1-2*: Graph of Livermore Index Rainfall*

TABLE 1-1
TABLE OF CLIMATOLOGICAL STATIONS
2023 WATER YEAR

PRECIPITATION NETWORK								
SITE ID	MAP LABEL	STATION NAME	LOCATION	OBSERVER	ELEV-ATION	ESTAB-LISHED	15 MIN RECORD	MEAN ANNUAL (IN)
CM_015E*	15E	NOAA Livermore	California Way, Livermore	NOAA	527	1871	-	14.48
CM_017	17	Del Valle Plant	601 East Vallecitos Rd, Livermore	ZONE 7	640	1974	1978 to Present	15.85
CM_024	24	Patterson Plant	Patterson Pass Rd, Livermore	ZONE 7	680	1963	1969 to 2016	12.77
CM_034	34	Mocho Wellfield	Santa Rita Rd, Pleasanton	ZONE 7	340	1968	1970 to 2010	17.75
CM_044	44	Mt Hamilton	Lick Observatory, Mt. Hamilton	Lick Observatory	4209	1881	-	24.61
CM_101	101	Tassajara	Camino Tassajara Rd, Danville	Mrs. Joan Hansen	800	1912	-	18.35
CM_170	170	Parkside	Parkside Drive, Pleasanton	ZONE 7	330	1986	1986 to 2005	20.50
CM_191	191	CIMIS Station	Alameda County Fairgrounds Golf Course	DWR	335	2004	2004 to Present	17.27
CM_8SI	8SI	California Eight Station Index	Index of 8 Stations in Northern California	DWR	NA	1921	-	50.19
CM_ALTC_BD	ALTC_BD	Altamont Creek	at ALTC_BD surface water station	ZONE 7	500	2015	2015 to Present	12.78
CM_AMNL	AMNL	Arroyo Mocho Near Livermore	at AMNL surface water station	ZONE 7	750	2015	2015 to Present	11.47
CM_AMP	AMP	Arroyo Mocho Pleasanton	At AMP Surface Water Station	ZONE 7	335	2016	2016 to Present	11.65
CM_KLVK*	KLVK	Livermore Municipal Airport	Livermore Municipal Airport	NOAA	395	1998	-	13.63
CM_LG1_DB	LG1_DB	Line G-1 at Dublin BLVD	Dublin Blvd and Scarlett Dr, Dublin	ZONE 7	336	2019	2019 to Present	12.93
CM_LJ1_BDB	LJ1_BDB	Line J-1 Below Dublin BLVD	Dublin Doulevard, Dublin	ZONE 7	332	2019	2019 to Present	17.41
CM_NC	NC	North Canyons Office	Zone 7's North Canyons building	ZONE 7	450	2015	2015 to Present	12.27
CM_SGE	SGE	Sunol Glen Elementary	Sunol Glen Elementary School, Sunol	ZONE 7	253	2016	2016 to Present	17.21
CM_TC_BI580	TC_BI580	Tassajara Creek below I-580	Old Santa Rita Rd, Pleasanton	ZONE 7	342	2018	2019 to Present	14.01
EVAPORATION/EVAPOTRANSPIRATION NETWORK**								
SITE ID	MAP LABEL	STATION NAME	LOCATION	OBSERVER	ELEV-ATION	ESTAB-LISHED	15 MIN RECORD	ETo MEAN ANNUAL (IN)
CM_LDV	LDV	Lake Del Valle	Lake Del Valle	DWR	760	1968	-	43.41
CM_LWRP	LWRP	Livermore Water Reclamation Plant	W. Jack London Blvd & Hwy 84, Livermore	LWRP	410	1974	-	45.57
CM_191	191	CIMIS Station	Alameda County Fairgrounds Golf Course	DWR	335	2004	2004 to Present	51.25

* Livermore Rainfall Index (CM_LRI) comprises of CM_015E to June 2020 and CM_KLVK thereafter.

** Stations LDV and LWRP record evaporation using pan evaporation equipment. ETo in table above is derived using : ETo= Pan Evaporation x 0.6402

TABLE 1-2
MONTHLY PRECIPITATION DATA
2023 WATER YEAR

MONTHLY PRECIPITATION IN INCHES

WATER YEAR MONTH	MONITORING STATION																2023 Network Average	% Historic Network Average
	LRI	17	24	34	44	101	170	191	ALTC	AMNL	AMP	LG1_DB	LJ1_BDB	NC	SGE	TC_BI580		
OCT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.05	0.00	0.01	0.7%
NOV	1.83	1.63	1.03	2.05	2.83	1.73	2.37	2.10	1.70	1.28	1.76	1.83	2.00	1.67	2.45	1.99	1.89	108.6%
DEC	8.09	6.14	5.81	6.95	15.84	12.21	7.80	11.32	3.82	4.76	5.50	4.76	6.99	3.87	6.81	5.44	7.26	261.5%
JAN	6.36	8.17	6.78	10.28	12.65	8.85	13.36	8.42	7.79	8.38	11.21	7.62	12.47	8.63	10.33	10.67	9.50	301.0%
FEB	3.01	2.97	2.64	3.52	9.62	4.66	3.82	4.20	2.25	2.59	2.94	2.84	3.62	2.09	2.99	2.83	3.54	141.0%
MAR	5.75	5.18	4.35	6.20	13.46	8.10	8.25	7.30	5.64	4.66	6.29	3.82	7.19	5.22	6.82	6.07	6.52	241.0%
APR	0.08	0.10	0.06	0.43	0.00	0.14	0.49	0.13	0.06	0.09	0.06	0.06	0.09	0.06	0.16	0.06	0.13	10.0%
MAY	0.34	0.28	0.21	0.66	1.90	0.58	0.63	0.52	0.33	0.25	0.57	0.63	0.64	0.30	0.65	0.65	0.57	123.5%
JUN	0.01	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.01	10.8%
JUL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
AUG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0%
SEP	0.05	0.05	0.01	0.02	0.17	0.02	0.03	0.04	0.02	0.04	0.02	0.02	0.03	0.02	0.04	0.02	0.04	26.9%
TOTAL	**25.52**	**24.56**	**20.89**	**30.12**	**56.47**	**36.29**	**36.75**	**34.03**	**21.62**	**22.06**	**28.36**	**21.63**	**33.03**	**21.87**	**30.31**	**27.75**	**29.45**	
% AVG	**176%**	**155%**	**164%**	**170%**	**229%**	**198%**	**179%**	**197%**	**169%**	**192%**	**243%**	**186%**	**283%**	**188%**	**260%**	**238%**	**186%**	

* Not included in Network Average due to insufficient age

** Not enough data for average calculation.

LRI Livermore Rain Index (CM_015E to June 2020 and CM_KLVK thereafter)

DISTRIBUTION OF DAILY PRECIPITATION

Number of days with rainfall greater than reference

Rainfall (inches)	MONITORING STATION																2023 Network Average
	LRI	17	24	34	44	101	170	191	ALTC	AMNL	AMP	LG1_DB	LJ1_BDB	NC	SGE	TC_BI580	
>Trace	68	71	59	72	75	72	69	73	65	72	73	63	71	61	82	69	70
>0.1	41	43	44	42	64	49	50	46	39	41	43	39	48	39	48	43	45
>0.5	17	15	15	18	39	23	21	22	14	15	18	15	22	17	22	17	19
>1	7	7	5	10	17	13	14	9	4	2	7	4	9	4	7	7	8
>2	1	0	0	1	6	1	2	2	1	1	1	1	2	1	1	1	1

TABLE 1-3
HISTORICAL MONTHLY PRECIPITATION
LIVERMORE RAINFALL INDEX (LRI)
1871 to 2023 WATER YEARS

Water Year	OCTWY	NOVWY	DECWY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL OCT-SEP	TOTAL JULY-JUNE	% AVERAGE OCT-SEP
1871	NA	NA	NA	1.42	1.93	0.36	1.25	0.02	0.00	0.00	0.00	0.00	NA	NA	NA
1872	0.00	1.13	11.69	2.15	2.69	0.65	0.43	0.00	0.32	0.00	0.00	0.00	19.06	19.06	132%
1873	0.00	1.22	3.87	1.04	3.73	0.68	0.15	0.00	0.00	0.00	0.00	0.00	10.69	10.69	74%
1874	0.42	0.70	4.48	2.96	1.03	1.34	0.95	0.32	0.06	0.00	0.00	0.30	12.56	12.26	87%
1875	1.67	2.03	0.20	5.40	1.20	0.35	0.00	0.00	0.52	0.00	0.00	0.00	11.37	11.67	79%
1876	0.00	7.23	1.62	2.68	3.01	4.39	0.73	0.33	0.00	0.00	0.00	0.00	19.99	19.99	138%
1877	1.26	0.10	0.00	2.47	0.56	1.10	0.13	0.39	0.00	0.00	0.00	0.00	6.01	6.01	42%
1878	1.27	1.29	0.73	4.61	6.73	2.01	0.96	0.06	0.00	0.00	0.00	0.00	17.66	17.66	122%
1879	0.24	0.31	0.17	2.83	1.78	2.49	0.75	1.34	0.20	0.00	0.00	0.00	10.11	10.11	70%
1880	0.83	1.06	1.94	1.48	1.80	1.45	6.51	0.91	0.00	0.00	0.00	0.00	15.98	15.98	110%
1881	0.00	0.65	7.75	2.40	2.62	1.06	1.93	0.00	0.04	0.00	0.00	0.00	16.45	16.45	114%
1882	0.08	0.78	1.97	1.07	1.72	4.85	1.03	0.20	0.00	0.00	0.00	0.34	12.04	11.70	83%
1883	1.52	1.48	0.38	2.38	0.63	3.45	1.50	2.18	0.00	0.00	0.00	0.35	13.87	13.86	96%
1884	1.52	0.57	0.44	4.03	5.29	5.92	2.70	0.20	1.73	0.00	0.10	0.30	22.80	22.75	158%
1885	1.14	0.02	6.22	1.72	0.36	0.78	1.29	0.08	0.00	0.00	0.00	0.05	11.66	12.01	81%
1886	0.00	6.20	1.94	4.20	0.24	1.18	2.36	0.00	0.00	0.40	0.00	0.00	16.52	16.17	114%
1887	0.30	0.70	0.81	0.90	6.23	0.23	1.60	0.00	0.00	0.00	0.00	0.80	11.57	11.17	80%
1888	0.00	0.61	3.51	3.20	0.94	2.51	0.60	0.66	0.30	0.00	0.00	0.76	13.09	13.13	90%
1889	0.00	3.80	2.21	0.46	0.67	5.15	0.51	2.25	0.00	0.00	0.00	0.00	15.05	15.81	104%
1890	3.94	2.95	8.63	5.24	3.71	2.85	0.86	0.48	0.00	0.00	0.00	1.20	29.86	28.66	206%
1891	0.00	0.00	3.31	0.54	4.18	2.50	1.88	0.40	0.15	0.00	0.00	1.32	14.28	14.16	99%
1892	0.05	0.38	4.42	0.84	1.08	3.96	0.90	1.30	0.00	0.00	0.00	0.45	13.38	14.25	92%
1893	1.65	4.97	7.27	3.02	3.12	3.68	1.40	0.73	0.00	0.00	0.00	0.00	25.84	26.29	179%
1894	0.00	1.59	2.14	4.97	5.36	0.81	0.58	1.19	0.52	0.00	0.00	1.45	18.61	17.16	129%
1895	1.15	0.50	8.56	6.83	1.56	1.81	1.26	1.25	0.00	0.00	0.00	0.22	23.14	24.37	160%
1896	0.83	1.69	1.28	7.16	0.17	1.50	3.11	0.39	0.00	0.00	0.73	0.55	17.41	16.35	120%
1897	1.48	3.02	1.71	1.89	3.54	4.04	0.24	0.00	0.08	0.00	0.00	0.06	16.06	17.28	111%
1898	1.43	0.52	1.31	1.47	1.78	0.78	0.45	0.96	0.35	0.00	0.00	0.95	10.00	9.11	69%
1899	0.74	0.25	1.61	2.60	0.08	4.81	0.35	0.15	0.22	0.00	0.00	0.00	10.81	11.76	75%
1900	2.52	2.49	2.07	2.44	0.34	1.11	0.86	1.10	0.00	0.00	0.00	0.18	13.11	12.93	91%
1901	1.93	4.48	1.06	2.69	5.15	0.95	1.80	1.58	0.00	0.00	0.00	0.68	20.32	19.82	140%
1902	0.70	1.99	0.74	0.99	3.62	2.69	0.75	0.32	0.00	0.00	0.13	0.00	11.93	12.48	82%
1903	0.47	2.07	0.87	3.19	0.94	5.65	0.81	0.12	0.00	0.00	0.00	0.00	14.12	14.25	98%
1904	0.00	2.16	0.59	0.89	4.18	3.71	1.56	0.24	0.00	0.00	0.32	1.62	15.27	13.33	106%
1905	1.00	0.78	1.42	2.43	2.30	3.12	0.93	1.89	0.00	0.00	0.00	0.00	13.87	15.81	96%
1906	0.00	1.01	1.18	5.56	2.67	5.18	0.95	1.61	0.56	0.00	0.00	0.20	18.92	18.72	131%
1907	0.03	1.34	6.45	3.22	1.86	8.85	0.47	0.16	0.56	0.00	0.00	0.00	22.94	23.14	159%
1908	0.81	0.04	3.90	2.27	1.35	0.73	0.28	0.53	0.00	0.00	0.00	0.03	9.94	9.91	69%
1909	0.27	0.60	1.55	10.18	3.96	1.94	0.00	0.00	0.05	0.00	0.00	0.62	19.17	18.58	132%
1910	0.75	1.68	5.77	2.50	1.14	1.90	0.10	0.00	0.04	0.00	0.00	0.10	13.98	14.50	97%
1911	0.29	0.10	1.32	12.60	1.42	4.45	0.69	0.24	0.07	0.00	0.00	0.00	21.18	21.28	146%
1912	0.43	0.29	1.71	2.66	0.20	1.99	0.73	0.94	0.65	0.00	0.00	0.48	10.08	9.60	70%
1913	0.71	0.44	0.81	2.63	0.38	1.65	0.54	0.58	0.01	0.27	0.02	0.00	8.04	8.23	56%
1914	0.00	2.47	3.17	7.10	2.11	0.66	0.76	0.45	0.19	0.00	0.00	0.00	16.91	17.20	117%
1915	0.45	0.33	3.96	4.16	5.79	1.50	0.66	2.66	0.00	0.00	0.00	0.00	19.51	19.51	135%
1916	0.00	0.76	4.41	11.35	2.17	1.47	0.21	0.05	0.00	0.00	0.00	0.44	20.86	20.42	144%
1917	0.50	0.68	3.28	1.06	3.37	1.08	0.15	0.02	0.00	0.00	0.00	0.04	10.18	10.58	70%
1918	0.00	0.43	0.66	0.59	3.08	3.32	0.61	0.00	0.00	0.00	0.00	5.72	14.41	8.73	100%
1919	0.39	2.38	1.51	1.03	4.58	2.33	0.05	0.00	0.00	0.00	0.00	0.48	12.75	17.99	88%
1920	0.15	0.33	2.21	0.22	0.71	3.52	1.07	0.00	0.13	0.00	0.00	0.00	8.34	8.82	58%
1921	2.03	1.43	3.81	3.38	0.59	0.83	0.16	1.05	0.00	0.00	0.00	0.05	13.33	13.28	92%
1922	0.15	1.17	3.38	1.51	5.46	1.83	0.23	0.27	0.00	0.00	0.00	0.00	14.00	14.05	97%
1923	0.54	2.86	5.43	1.80	0.65	0.15	2.15	0.00	0.02	0.00	0.00	0.82	14.42	13.60	100%
1924	0.25	0.76	0.87	1.40	0.93	0.65	0.28	0.07	0.00	0.00	0.00	0.00	5.21	6.03	36%
1925	1.30	1.53	2.63	1.02	3.74	1.14	1.75	1.41	0.04	0.00	0.00	0.00	14.56	14.56	101%
1926	0.00	0.97	1.14	2.44	3.58	0.16	3.11	0.11	0.00	0.00	0.00	0.00	11.51	11.51	80%
1927	0.93	2.83	0.78	1.74	3.49	1.54	1.73	0.10	0.18	0.00	0.00	0.03	13.35	13.32	92%
1928	1.71	1.43	2.00	1.46	0.89	3.43	1.43	0.45	0.00	0.00	0.00	0.00	12.80	12.83	88%
1929	0.00	2.57	2.76	1.26	0.87	1.07	0.70	0.03	0.83	0.00	0.00	0.00	10.09	10.09	70%

TABLE 1-3
HISTORICAL MONTHLY PRECIPITATION
LIVERMORE RAINFALL INDEX (LRI)
1871 to 2023 WATER YEARS

Water Year	OCTWY	NOVWY	DECWY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL OCT-SEP	TOTAL JULY-JUNE	% AVERAGE OCT-SEP
1930	0.01	0.00	1.81	3.64	1.91	1.88	1.14	0.43	0.00	0.00	0.00	0.20	11.02	10.82	76%
1931	0.58	1.15	0.26	3.45	1.67	0.57	0.36	0.93	0.11	0.00	0.00	0.00	9.08	9.28	63%
1932	0.27	1.89	5.63	1.29	3.15	0.19	0.41	0.37	0.00	0.00	0.00	0.00	13.20	13.20	91%
1933	0.00	0.51	2.03	4.51	0.44	2.09	0.13	0.70	0.03	0.00	0.00	0.01	10.45	10.44	72%
1934	0.75	0.00	3.69	1.29	2.86	0.00	0.13	0.60	0.53	0.00	0.00	0.27	10.12	9.86	70%
1935	0.62	2.71	2.32	3.53	0.52	3.16	3.28	0.00	0.00	0.00	0.04	0.00	16.18	16.41	112%
1936	0.79	0.21	1.53	3.28	6.76	0.71	0.63	0.46	0.10	0.00	0.00	0.00	14.47	14.51	100%
1937	0.40	0.02	3.26	3.38	4.13	5.07	0.68	0.17	0.20	0.00	0.00	0.00	17.31	17.31	120%
1938	0.55	2.46	4.57	2.40	6.14	4.09	0.90	0.02	0.00	0.00	0.00	0.00	21.13	21.13	146%
1939	1.00	1.08	0.52	2.40	1.57	2.18	0.53	0.18	0.00	0.00	0.00	0.16	9.62	9.46	66%
1940	1.23	0.15	0.78	8.13	5.14	2.60	0.35	0.14	0.00	0.00	0.00	0.25	18.77	18.68	130%
1941	0.50	0.43	4.63	3.24	4.19	2.07	2.76	0.23	0.00	0.00	0.03	0.00	18.08	18.30	125%
1942	0.72	0.89	5.34	3.89	1.68	1.42	3.10	1.00	0.00	0.00	0.00	0.09	18.13	18.07	125%
1943	1.08	3.05	1.73	4.48	1.68	2.39	1.14	0.00	0.06	0.00	0.00	0.00	15.61	15.70	108%
1944	0.30	0.53	1.23	2.36	4.89	1.01	0.94	0.73	0.00	0.00	0.00	0.00	11.99	11.99	83%
1945	0.77	3.41	2.03	0.87	3.68	3.19	0.20	0.17	0.00	0.00	0.02	0.00	14.34	14.32	99%
1946	1.07	2.07	2.98	0.76	1.23	1.69	0.02	0.61	0.00	0.24	0.00	0.02	10.69	10.45	74%
1947	0.02	2.93	2.07	0.69	1.45	2.34	0.53	0.17	0.36	0.00	0.00	0.00	10.56	10.82	73%
1948	1.84	0.85	0.51	0.20	1.11	2.79	2.50	1.03	0.16	0.03	0.00	0.00	11.02	10.99	76%
1949	0.46	0.34	2.71	1.39	2.47	3.38	0.02	0.34	0.00	0.03	0.16	0.05	11.35	11.14	78%
1950	0.08	1.20	1.21	4.65	1.54	1.44	0.85	0.59	0.01	0.00	0.00	0.08	11.65	11.81	81%
1951	1.84	5.95	4.95	2.23	1.81	1.82	0.55	0.35	0.06	0.00	0.00	0.00	19.56	19.64	135%
1952	1.04	3.01	6.07	7.60	1.40	2.36	2.20	0.16	0.04	0.00	0.00	0.10	23.98	23.88	166%
1953	0.01	2.11	6.33	2.07	0.05	1.12	1.42	0.61	0.59	0.00	0.15	0.00	14.46	14.41	100%
1954	0.21	1.33	0.64	2.19	2.27	3.00	0.73	0.16	0.27	0.00	0.00	0.04	10.84	10.95	75%
1955	0.00	1.68	3.33	2.45	1.69	0.38	1.28	0.65	0.00	0.00	0.01	0.01	11.48	11.50	79%
1956	0.01	1.31	10.15	5.49	1.15	0.14	1.92	0.63	0.00	0.00	0.00	0.63	21.43	20.82	148%
1957	0.79	0.03	0.48	2.65	2.23	1.30	1.14	2.65	0.04	0.00	0.00	0.05	11.36	11.94	79%
1958	1.06	0.37	1.62	3.16	5.37	4.44	3.74	0.66	0.41	0.00	0.00	0.02	20.85	20.88	144%
1959	0.09	0.14	0.86	2.45	3.59	0.29	0.35	0.00	0.00	0.00	0.07	1.89	9.73	7.79	67%
1960	0.00	0.00	0.75	2.98	4.12	0.60	0.48	0.42	0.00	0.02	0.00	0.01	9.38	11.31	65%
1961	0.05	2.92	1.25	2.08	1.04	1.92	1.03	0.69	0.19	0.00	0.13	0.16	11.46	11.20	79%
1962	0.15	2.24	0.82	0.73	5.61	1.82	0.22	0.00	0.00	0.00	0.00	0.00	11.59	11.88	80%
1963	3.64	0.28	1.55	1.40	4.50	2.60	3.47	0.70	0.00	0.00	0.00	0.33	18.47	18.14	128%
1964	0.93	3.18	0.19	2.37	0.08	1.57	0.21	0.48	0.32	0.00	0.12	0.04	9.49	9.66	66%
1965	0.85	2.44	4.91	2.11	0.59	1.73	1.53	0.00	0.00	0.00	0.21	0.00	14.37	14.32	99%
1966	0.03	4.22	3.23	1.05	1.17	0.17	0.33	0.10	0.12	0.17	0.00	0.11	10.70	10.63	74%
1967	0.00	3.43	2.35	6.14	0.29	4.15	4.65	0.19	0.48	0.00	0.00	0.02	21.70	21.96	150%
1968	0.24	0.88	1.62	3.93	0.90	2.40	0.43	0.15	0.00	0.00	0.00	0.00	10.55	10.57	73%
1969	0.43	2.48	3.04	6.28	4.76	0.55	1.24	0.08	0.00	0.00	0.00	0.00	18.86	18.86	130%
1970	1.10	0.49	2.34	5.38	1.18	1.42	0.40	0.07	0.32	0.00	0.00	0.00	12.70	12.70	88%
1971	0.41	5.24	5.27	1.19	0.33	1.75	1.37	0.54	0.00	0.00	0.00	0.13	16.23	16.10	112%
1972	0.04	0.46	3.27	0.90	0.79	0.14	0.64	0.00	0.04	0.00	0.00	0.58	6.86	6.41	47%
1973	2.98	4.91	2.22	5.50	3.38	2.63	0.29	0.03	0.00	0.00	0.00	0.08	22.02	22.52	152%
1974	2.08	3.71	3.80	1.50	0.71	2.69	1.62	0.00	0.00	0.00	0.00	0.00	16.11	16.19	111%
1975	0.50	0.66	1.98	0.84	3.65	5.24	1.42	0.00	0.06	0.10	0.35	0.00	14.80	14.35	102%
1976	1.27	0.08	0.21	0.30	1.46	0.48	0.39	0.00	0.18	0.00	0.91	0.95	6.23	4.82	43%
1977	0.50	0.50	0.73	1.15	0.83	0.82	0.16	1.01	0.00	0.10	0.00	0.22	6.02	7.56	42%
1978	0.13	1.34	3.07	5.44	2.95	3.07	2.49	0.01	0.00	0.00	0.00	0.04	18.54	18.82	128%
1979	0.00	2.16	0.58	4.52	3.19	1.86	0.88	0.34	0.00	0.06	0.00	0.00	13.59	13.57	94%
1980	1.51	1.13	2.66	4.16	4.24	1.36	1.32	0.48	0.00	0.70	0.00	0.00	17.56	16.92	121%
1981	0.04	0.28	1.18	3.97	1.11	2.94	0.61	0.11	0.00	0.00	0.00	0.06	10.30	10.94	71%
1982	2.07	3.44	2.57	5.29	2.16	5.58	1.50	0.00	0.28	0.00	0.01	1.48	24.38	22.95	168%
1983	2.24	3.72	2.80	6.28	5.56	6.14	3.51	0.21	0.00	0.00	0.50	1.02	31.98	31.95	221%
1984	0.27	5.44	3.44	0.33	1.87	1.00	0.53	0.01	0.03	0.00	0.00	0.04	12.96	14.44	90%
1985	1.25	4.71	1.51	0.48	1.25	2.62	0.32	0.07	0.22	0.00	0.03	0.13	12.59	12.47	87%
1986	0.89	2.69	1.97	2.04	7.11	4.09	0.40	0.14	0.00	0.01	0.00	0.45	19.79	19.49	137%
1987	0.04	0.08	0.92	1.83	3.47	2.30	0.16	0.09	0.00	0.00	0.00	0.00	8.89	9.35	61%
1988	0.87	1.40	2.30	1.78	0.38	0.26	1.15	0.45	0.10	0.00	0.00	0.00	8.69	8.69	60%
1989	0.11	1.92	2.03	0.81	0.95	2.94	0.88	0.08	0.10	0.00	0.00	1.33	11.15	9.82	77%

TABLE 1-3
HISTORICAL MONTHLY PRECIPITATION
LIVERMORE RAINFALL INDEX (LRI)
1871 to 2023 WATER YEARS

Water Year	OCTWY	NOVWY	DECWY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL OCT-SEP	TOTAL JULY-JUNE	% AVERAGE OCT-SEP
1990	1.13	1.02	0.10	1.54	2.46	0.87	0.37	1.78	0.00	0.02	0.00	0.06	9.35	10.60	65%
1991	0.08	0.39	1.45	0.31	2.20	5.87	0.34	0.35	0.08	0.00	0.21	0.04	11.32	11.15	78%
1992	1.65	0.31	1.19	1.39	4.61	1.97	0.43	0.00	0.09	0.00	0.00	0.00	11.64	11.89	80%
1993	0.90	0.15	4.99	6.41	4.53	2.91	0.63	0.51	0.30	0.00	0.00	0.00	21.33	21.33	147%
1994	0.57	2.00	1.81	0.94	3.33	0.15	1.20	1.78	0.04	0.00	0.00	0.00	11.82	11.82	82%
1995	0.58	3.08	1.36	6.64	0.33	6.66	1.02	0.92	0.70	0.00	0.00	0.00	21.29	21.29	147%
1996	0.00	0.01	5.37	5.17	4.10	2.34	1.91	1.05	0.00	0.00	0.00	0.00	19.95	19.95	138%
1997	1.08	2.55	4.43	5.81	0.15	0.06	0.15	0.29	0.17	0.00	0.42	0.00	15.11	14.69	104%
1998	0.28	4.23	1.95	5.47	7.30	2.37	1.37	2.00	0.13	0.00	0.00	0.18	25.28	25.52	175%
1999	0.54	2.48	0.73	3.23	3.33	1.67	0.99	0.08	0.01	0.00	0.03	0.04	13.13	13.24	91%
2000	0.15	1.26	0.25	4.61	4.87	1.25	0.59	0.69	0.18	0.00	0.01	0.24	14.10	13.92	97%
2001	1.97	0.49	0.45	1.92	2.89	1.22	1.80	0.00	0.12	0.00	0.00	0.09	10.95	11.11	76%
2002	0.37	1.92	5.09	0.72	0.62	1.65	0.16	0.68	0.00	0.00	0.00	0.00	11.21	11.30	77%
2003	0.00	2.65	7.01	0.66	1.31	1.07	3.09	0.95	0.00	0.00	0.29	0.00	17.03	16.74	118%
2004	0.02	2.02	3.57	2.19	4.01	0.39	0.18	0.11	0.00	0.00	0.00	0.58	13.07	12.78	90%
2005	2.77	0.89	3.01	2.81	3.55	3.41	1.53	1.03	0.05	0.00	0.00	0.25	19.30	19.63	133%
2006	0.17	0.65	5.40	2.22	1.32	4.79	2.60	0.34	0.00	0.00	0.00	0.00	17.49	17.74	121%
2007	0.20	1.68	2.25	0.52	3.92	0.33	0.44	0.11	0.00	0.00	0.00	0.21	9.66	9.45	67%
2008	1.12	0.71	2.05	4.79	1.89	0.10	0.02	0.00	0.00	0.00	0.00	0.00	10.68	10.89	74%
2009	0.33	1.40	1.56	1.34	3.31	2.29	0.23	0.51	0.11	0.00	0.00	0.31	11.39	11.08	79%
2010	2.79	0.21	2.02	3.53	2.36	1.57	2.10	0.24	0.00	0.00	0.00	0.00	14.82	15.13	102%
2011	1.00	2.02	3.87	0.78	2.69	4.10	0.22	0.46	1.07	0.00	0.00	0.00	16.21	16.21	112%
2012	1.06	0.93	0.04	1.52	0.52	2.57	2.01	0.02	0.12	0.00	0.00	0.01	8.80	8.79	61%
2013	0.27	3.40	4.22	1.07	0.47	0.33	0.44	0.14	0.04	0.00	0.00	0.33	10.71	10.38	74%
2014	0.00	1.30	0.38	0.08	2.58	1.25	0.98	0.00	0.01	0.00	0.00	0.22	6.80	6.91	47%
2015	0.17	1.19	8.23	0.00	1.62	0.25	0.78	0.50	0.33	0.00	0.01	0.05	13.13	13.29	91%
2016	0.02	2.49	2.55	3.95	0.69	3.30	2.14	0.21	0.00	0.00	0.00	0.00	15.35	15.41	106%
2017	3.34	1.37	2.62	8.10	6.07	2.09	1.93	0.03	0.02	0.00	0.00	0.00	25.57	25.57	177%
2018	0.18	2.20	0.06	3.30	0.57	4.44	1.68	0.01	0.00	0.00	0.00	0.00	12.44	12.44	86%
2019	0.18	1.64	1.54	2.66	6.31	2.58	0.30	1.63	0.00	0.00	0.00	0.22	17.06	16.84	118%
2020	0.00	0.97	2.91	0.96	0.00	2.45	0.82	0.26	0.00	0.00	0.11	0.00	8.48	8.59	59%
2021	0.00	0.33	1.10	2.74	0.40	0.89	0.13	0.00	0.00	0.00	0.00	0.00	5.59	5.70	39%
2022	5.22	0.71	4.85	0.02	0.03	0.48	1.03	0.00	0.00	0.00	0.00	0.49	12.83	12.34	89%
2023	0.00	1.83	8.09	6.36	3.01	5.75	0.08	0.34	0.01	0.00	0.00	0.05	25.52	25.96	176%
MAXIMUM	5.22	7.23	11.69	12.60	7.30	8.85	6.51	2.66	1.73	0.70	0.91	5.72	31.98	31.95	221%
MINIMUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.21	4.82	36%
MEAN	0.73	1.62	2.68	2.90	2.44	2.19	1.07	0.46	0.11	0.01	0.03	0.23	14.48	14.51	100%

Livermore Rainfall Index (LRI) comprises of CM_015E to June 2020 and CM_KLVK thereafter.

TABLE 1-4
MONTHLY EVAPOTRANSPIRATION (ETo, in Inches)
2023 WATER YEAR

Month	Station			2023 Network Average	% Historic Network Average
	LDV*	LWRP*	191		
OCT	3.55	3.76	3.69	3.67	105.3%
NOV	1.68	1.79	2.11	1.86	106.5%
DEC	0.56	0.94	1.02	0.84	69.3%
JAN	1.25	1.41	1.67	1.44	124.0%
FEB	1.34	1.19	2.05	1.53	92.1%
MAR	1.77	2.01	3.05	2.28	82.0%
APR	3.89	3.88	5.26	4.34	109.0%
MAY	4.60	4.48	5.55	4.88	88.4%
JUN	5.55	5.66	6.68	5.96	91.6%
JUL	7.61	7.25	7.96	7.61	105.9%
AUG	6.66	6.54	6.92	6.70	104.4%
SEP	4.31	4.43	4.69	4.48	87.9%
TOTAL	**42.80**	**43.35**	**50.65**	**45.60**	
% AVG	**99%**	**95%**	**99%**	**98%**	

* Measured as Pan Evaporation and converted to ETo

ETo values for pan evaporation stations were approximated using : ETo= Pan Evaporation x 0.64

TABLE 1-5
HISTORICAL MONTHLY PAN EVAPORATION
LAKE DEL VALLE STATION, LIVERMORE (CM_LDV in Inches)
1969 to 2023 WATER YEARS

Water Year	OCTWY	NOVWY	DECWY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL OCT-SEP	TOTAL JULY-JUNE	% AVERAGE OCT-SEP
1969	3.20	2.50	1.54	0.66	1.08	4.89	5.92	9.99	7.84	11.38	11.77	8.32	69.09	NA	102%
1970	4.04	2.94	1.12	1.23	2.29	4.96	5.83	8.88	8.88	11.52	9.92	9.16	70.77	71.64	104%
1971	5.07	2.14	1.05	1.33	2.12	3.67	5.17	6.54	8.91	10.92	10.30	9.12	66.34	66.60	98%
1972	5.91	3.01	1.49	1.53	2.01	4.74	6.52	8.84	10.03	11.63	10.40	7.12	73.23	74.42	108%
1973	3.67	1.30	0.93	1.14	1.20	2.98	6.36	8.69	10.59	10.89	10.21	7.33	65.29	66.01	96%
1974	4.70	1.86	0.85	1.40	1.73	2.40	4.16	7.31	9.14	9.68	9.73	7.94	60.90	61.98	90%
1975	5.52	2.15	1.44	1.73	1.99	3.01	3.64	8.27	8.63	9.45	9.39	7.45	62.67	63.73	92%
1976	3.72	2.28	1.58	2.45	1.96	3.94	5.56	8.47	9.85	9.80	7.05	6.80	63.46	66.10	94%
1977	4.82	2.75	2.59	1.08	2.12	3.84	7.15	5.48	9.28	11.24	8.89	6.74	65.98	62.76	97%
1978	5.12	2.70	1.37	0.99	1.43	2.57	3.73	8.69	8.91	10.52	10.24	7.90	64.17	62.38	95%
1979	5.80	2.24	1.51	1.25	1.29	2.29	4.80	8.36	11.02	10.40	9.23	9.47	67.66	67.22	100%
1980	4.14	1.85	1.95	1.66	1.40	3.82	4.78	6.22	8.18	9.41	9.17	7.16	59.74	63.10	88%
1981	5.86	3.30	1.79	1.08	2.18	2.83	5.80	8.11	11.82	11.34	10.23	7.72	72.06	68.51	106%
1982	4.43	2.10	1.14	1.23	2.10	2.25	4.59	7.55	7.31	10.34	10.58	6.83	60.45	61.99	89%
1983	4.53	1.50	1.54	1.72	1.54	2.17	4.05	6.71	8.34	10.44	9.35	7.82	59.71	59.85	88%
1984	4.37	1.86	1.08	1.52	1.79	4.29	5.32	9.04	9.88	11.99	9.80	9.24	70.18	66.76	103%
1985	4.02	1.63	1.11	1.18	2.70	3.09	5.95	7.75	10.40	11.49	9.23	6.38	64.93	68.86	96%
1986	5.05	2.27	1.11	1.11	1.75	3.55	4.96	7.44	8.67	10.20	8.88	6.10	61.09	63.01	90%
1987	4.84	3.47	1.22	1.45	2.08	3.19	6.43	7.90	8.73	8.46	8.97	7.29	64.03	64.49	94%
1988	4.71	1.71	1.50	1.21	2.94	5.17	5.30	7.22	8.92	11.46	8.90	7.90	66.94	63.40	99%
1989	4.81	1.85	1.64	1.39	1.57	2.75	5.75	7.70	9.30	11.30	9.14	6.41	63.61	65.02	94%
1990	4.86	2.95	1.75	1.57	1.83	3.64	5.74	7.86	9.18	10.19	9.21	7.09	65.87	66.23	97%
1991	6.56	3.48	1.95	1.86	2.44	2.63	5.00	6.42	8.50	10.25	8.00	7.61	64.70	65.33	95%
1992	6.45	3.03	1.71	0.96	1.65	2.84	5.91	8.87	8.23	10.01	10.76	7.82	68.24	65.51	101%
1993	5.12	2.79	1.19	1.21	1.42	2.83	4.93	6.61	9.64	10.23	10.02	8.18	64.17	64.33	95%
1994	4.65	3.27	1.22	1.49	1.36	4.12	5.23	6.38	10.01	10.03	10.31	7.44	65.51	66.16	97%
1995	4.94	1.66	0.76	0.73	1.61	2.33	4.75	5.22	8.18	10.06	10.39	7.65	58.28	57.96	86%
1996	6.23	2.80	0.88	1.33	1.66	3.85	6.38	8.12	9.68	12.03	11.13	7.48	71.57	69.03	106%
1997	5.44	2.05	1.04	1.02	2.67	4.82	6.45	8.95	9.40	10.32	8.78	8.52	69.46	72.48	102%
1998	5.25	1.82	1.60	1.19	0.96	2.80	4.36	4.13	7.10	9.91	10.57	7.51	57.20	56.83	84%
1999	4.51	1.63	1.41	1.32	1.58	2.93	5.25	7.04	8.70	10.51	8.58	7.53	60.99	62.36	90%
2000	6.86	2.73	2.51	1.57	1.55	3.91	5.48	7.16	9.66	9.23	9.82	7.86	68.35	68.06	101%
2001	3.84	1.84	1.68	1.45	2.20	4.14	4.86	10.05	10.92	9.78	9.75	7.98	68.49	67.89	101%
2002	6.56	2.56	1.47	1.97	2.56	4.63	5.65	7.82	9.87	11.08	9.87	9.13	73.17	70.60	108%
2003	5.64	3.23	1.73	1.26	2.31	4.04	4.05	7.62	9.78	12.14	9.23	8.84	69.87	69.74	103%
2004	6.71	1.72	1.12	1.08	2.22	4.99	7.38	8.66	9.46	10.16	9.88	8.76	72.14	73.55	106%
2005	4.86	2.21	1.54	1.14	1.54	3.20	4.93	6.60	8.37	11.13	10.65	7.41	63.58	63.19	94%
2006	5.19	2.50	1.50	1.52	2.47	3.04	3.81	8.54	9.82	12.43	9.37	8.42	68.61	67.58	101%
2007	5.27	2.09	2.22	1.98	1.71	4.34	5.86	8.58	9.59	9.814	10.45	7	68.90	71.86	102%
2008	4.45	3.25	1.68	1.37	2.14	4.60	6.65	8.66	10.37	10.54	10.54	8.42	72.67	70.43	107%
2009	6.27	2.40	1.35	2.04	1.95	3.90	6.24	8.52	9.09	11.053	10.12	8.63	71.566	71.26	106%
2010	4.84	3.00	1.28	1.20	1.61	3.91	4.65	6.40	9.52	10.2	9.08	8.26	63.95	66.21	94%
2011	4.98	2.43	1.13	1.53	2.46	2.64	5.64	7.13	8.22	10.25	9.62	8.46	64.49	63.70	95%
2012	4.73	2.30	2.93	2.49	2.84	3.46	5.52	8.84	10.19	11.27	10.58	8.08	73.23	71.63	108%
2013	5.28	2.55	1.89	1.48	2.51	4.74	7.61	9.09	10.20	11.78	9.35	7.45	73.93	75.28	109%
2014	6.04	3.41	2.59	3.43	2.43	4.66	6.23	10.51	10.77	11.05	9.56	7.6	78.28	78.65	115%
2015	6.26	2.73	1.16	1.79	2.65	4.96	6.62	7.31	10.01	10.73	10	9.37	73.59	71.70	109%
2016	5.81	2.19	1.20	0.75	2.80	3.30	5.70	7.92	11.87	12.29	9.71	9.06	72.6	71.64	107%
2017	4.74	2.32	1.56	1.16	1.49	3.78	5.18	8.93	9.78	12.02	10.04	8.34	69.34	70.00	102%
2018	6.53	2.15	2.60	1.51	3.33	3.46	5.30	7.95	10.43	12.22	9.84	8.11	73.43	73.66	108%
2019	5.88	4.07	1.70	1.93	1.57	3.22	5.99	6.27	10.99	11.55	11.25	8.36	72.78	71.79	107%
2020	6.99	4.01	1.20	1.27	3.82	3.29	5.64	9.41	10.80	11.26	11	7.68	76.37	77.59	113%
2021	7.73	3.33	2.16	2.56	2.45	4.58	7.24	9.69	10.66	11.12	10.06	8.64	80.22	80.34	118%
2022	5.89	2.29	1.05	1.71	3.02	4.83	6.37	9.48	10.94	10.67	9.81	8.82	74.88	75.40	110%
2023	5.55	2.63	0.88	1.95	2.10	2.77	6.08	7.19	8.67	11.89	10.4	6.74	66.85	67.12	99%
Maximum	**7.73**	**4.07**	**2.93**	**3.43**	**3.82**	**5.17**	**7.61**	**10.51**	**11.87**	**12.43**	**11.77**	**9.47**	**80.22**	**80.34**	**118%**
Minimum	**3.20**	**1.30**	**0.76**	**0.66**	**0.96**	**2.17**	**3.64**	**4.13**	**7.10**	**8.46**	**7.05**	**6.10**	**57.20**	**56.83**	**84%**
Mean	**5.26**	**2.49**	**1.51**	**1.48**	**2.04**	**3.63**	**5.54**	**7.87**	**9.51**	**10.78**	**9.80**	**7.90**	**67.81**	**67.83**	**100%**

ETo can be approximated using: ETo= Pan Evaporation x 0.6402

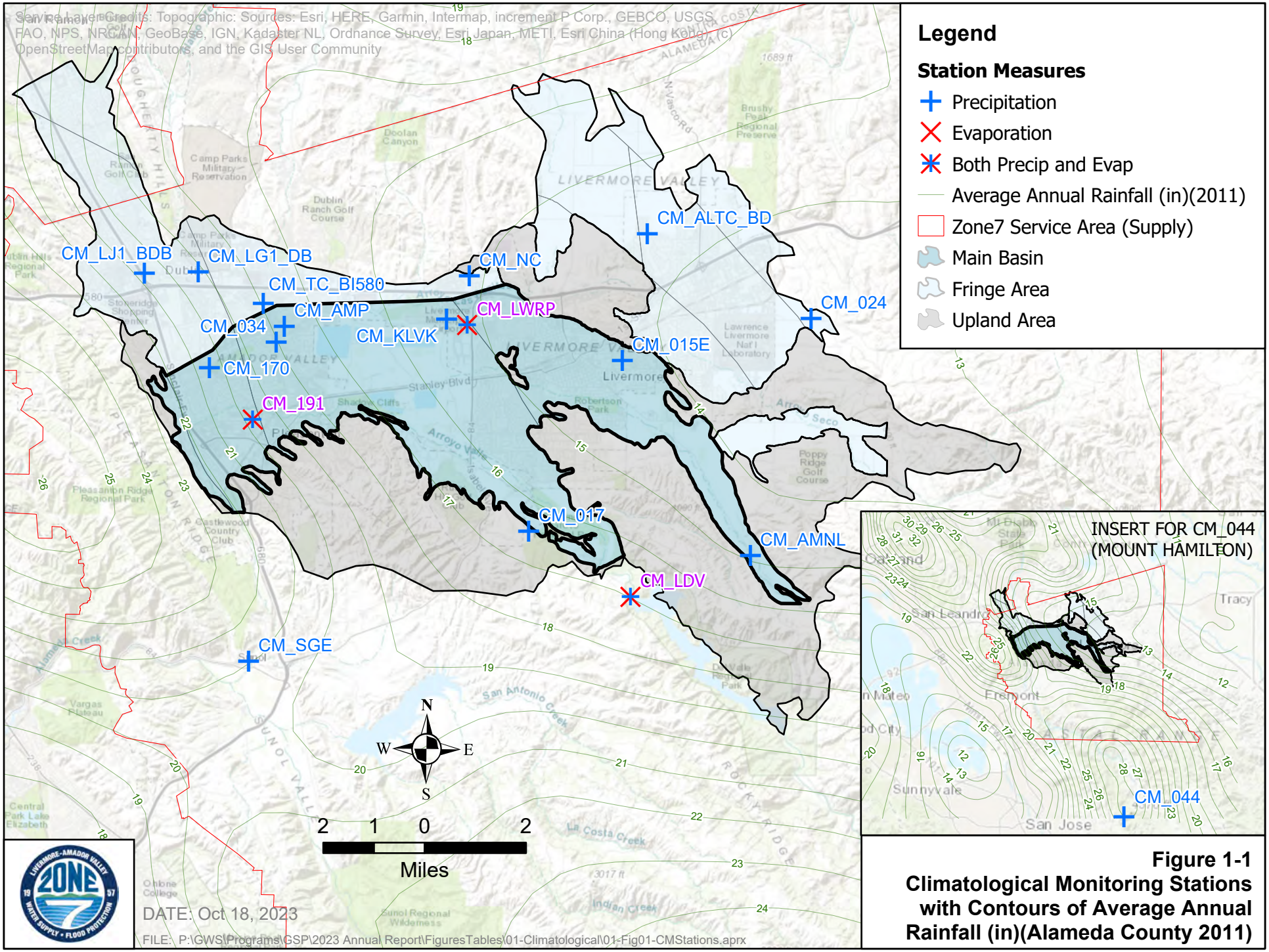
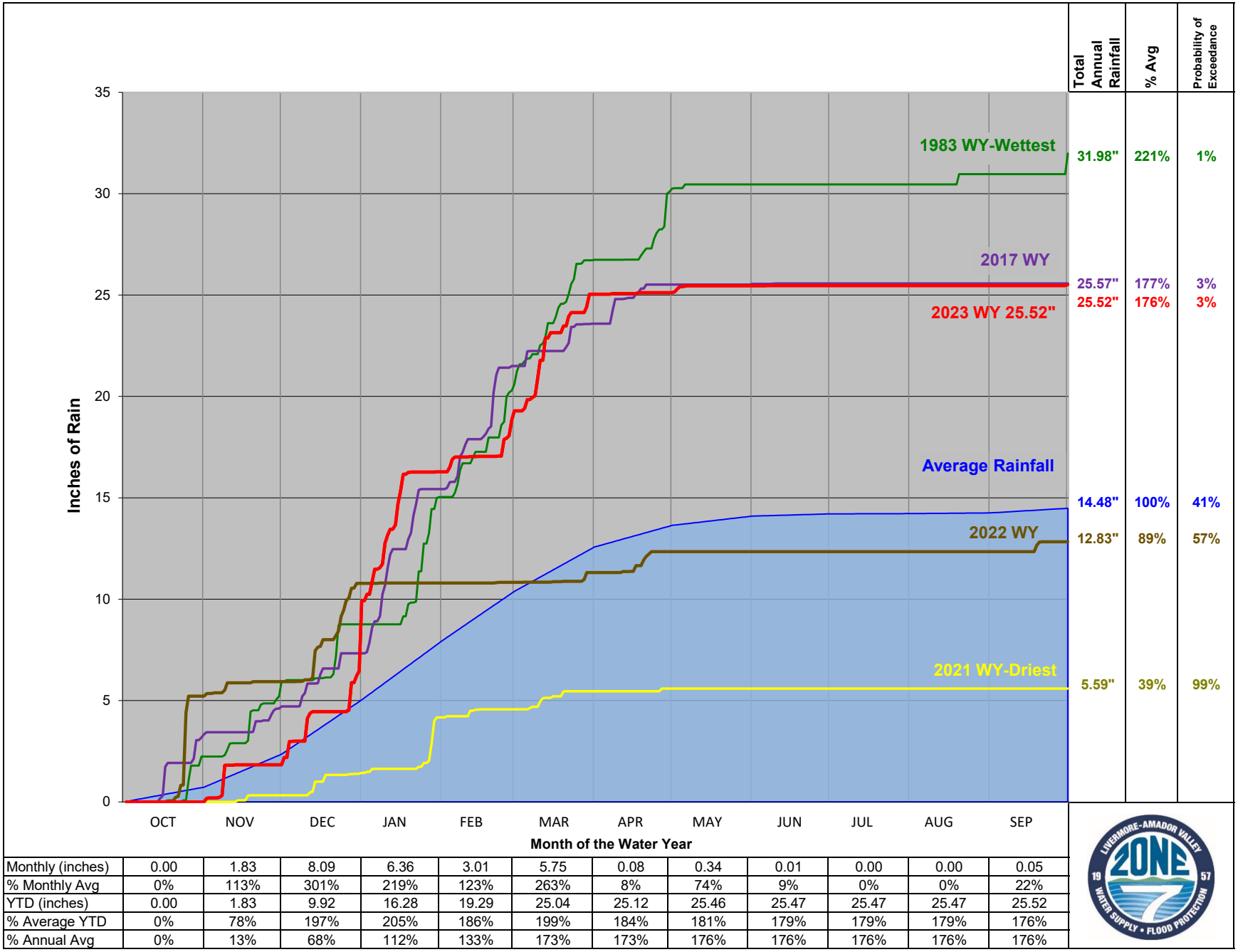


Figure 1-1
Climatological Monitoring Stations with Contours of Average Annual Rainfall (in)(Alameda County 2011)

FIGURE 1-2
Graph of Livermore Rainfall Index (in inches)
(Station CM_015E to 2020, Station CM_KLVK after 2020)



Monthly (inches)	0.00	1.83	8.09	6.36	3.01	5.75	0.08	0.34	0.01	0.00	0.00	0.05
% Monthly Avg	0%	113%	301%	219%	123%	263%	8%	74%	9%	0%	0%	22%
YTD (inches)	0.00	1.83	9.92	16.28	19.29	25.04	25.12	25.46	25.47	25.47	25.47	25.52
% Average YTD	0%	78%	197%	205%	186%	199%	184%	181%	179%	179%	179%	176%
% Annual Avg	0%	13%	68%	112%	133%	173%	173%	176%	176%	176%	176%	176%

3/8/2024
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2 Surface Water Monitoring

2.1 Program Changes

Four new stream gauges were added to the Surface Water Monitoring Program during the 2023 WY, primarily for flood monitoring: ALP_NFR, ALTC_PS, LM_LA, LG3_FD (see ***Table 2-1***). For more information on the Surface Water Monitoring Program, see the following sections of the 2022 Alternative GSP:

- **Section 5.2.1:** Existing Monitoring and Management Programs
- **Section 14.2.7.2:** Other Monitoring Networks – Surface Water Monitoring Program

2.2 Results for the 2023 Water Year

All 37 surface water stations monitored for the 2023 WY are mapped on ***Figure 2-1*** and listed in ***Table 2-1***. ***Table 2-2*** tabulates monthly flows during the 2023 WY at 16 stations along the main streams over the Basin. ***Table 2-3*** presents the water quality results from all stations sampled during the 2023 WY to identify the quality of water recharging and discharging from the Basin.

Table 2-A below summarizes the natural flows that flowed from the upper watershed into the three recharging stream reaches for the 2023 WY:

Table 2-A: Natural Flows from Upper Watershed, 2023 WY

Station	Stream	Natural Flow (AF)	Percent of Average
AVBLC*	Arroyo Valle	106,027	418%
AMNL	Arroyo Mocho	11,297	318%
ALPL	Arroyo Las Positas	17,290	309%
TOTAL Natural Inflow		**134,614**	390%

* Natural flow into Lake del Valle

Table 2-B below summarizes the South Bay Aqueduct (SBA) releases to the recharging streams for “artificial” (or “conservation”) recharge during the 2023 WY:

Table 2-B: South Bay Aqueduct Releases, 2023 WY

Station	Stream	Released (AF)	Percent of Average
SBA_TO2_AV	Arroyo Valle	4,960	165%
SBA_AM	Arroyo Mocho	2,728	81%
SBA_ALTC	Arroyo Las Positas	0	0%
TOTAL SBA Releases		**7,688**	**114%**

From December 2022 through March 2023, DWR released 68,903 acre-feet (AF) from Lake del Valle into Arroyo Valle to prevent flooding in the lake (a.k.a. flood release).

"Live stream" conditions were maintained in the Arroyo Valle with natural and artificial flows from November 2022 through September 2023.

Zone 7 was able to provide 758 AF of water to East Bay Regional Parks District (EBRPD) for Shadow Cliffs Lake recharge. For comparison, during the 2022 WY, EBRPD was unable to divert any water from the Arroyo Valle for Shadow Cliffs recharge.

- Peak flows and average flows are shown in ***Table 2-C*** below:

Table 2-C: Peak and Annual Mean Flows, 2023 WY

Stream	Station	Peak (cfs)	Annual Mean (cfs)
Arroyo Valle	AVNL	3,210	108.6
Arroyo Mocho	AMHAG	2,761	25.0
Arroyo Las Positas	ALPL	6,448	23.9
Arroyo de la Laguna	ADLLV	12,000	266

- A total of 192,575 AF of water flowed out of the Valley past Station Arroyo de la Laguna at Verona (ADLLV); 359% of average.

2.3 Attached Tables and Figures

***Table 2-1**: Table of Surface Water Monitoring Stations and Monitoring Frequencies, 2023 WY*
***Table 2-2:** Monthly Flows, 2023 WY*
***Table 2-3:** Table of Surface Water Quality Results, 2023 WY*

***Figure 2-1**: Map of Surface Water Monitoring Sites, 2023 WY*

TABLE 2-1
TABLE OF SURFACE WATER MONITORING STATIONS
AND MONITORING INFORMATION
2023 WATER YEAR

Station ID	Station Name	Stream	Station Type	Flow Range	Flow Freq	Water Temp	SC	pH	Sediment	WQ Freq	Flow By	Sample By
ARROYO VALLE - LINE E												
AVBLC	Arroyo Valle below Lang Canyon	Arroyo Valle	Gauge Height	Entire	15 Min	15 Min	-	-	-	Annual	USGS	Zone 7
LDV_FLD_GATE	Lake Del Valle Flood Gate	Lake Del Valle	Calculated	Entire	15 Min	-	-	-	-	-	DWR	
SBA_TO2_AV	SBA Turnout 2 to Arroyo Valle	SBA Turnout 2	Flow Meter	Entire	15 Min	15 Min	-	-	-	-	DWR	
SBA_TO1_AV	SBA Turnout 1 to Arroyo Valle	SBA Turnout 1	Estimated	Entire	Daily	-	-	-	-	-	DWR	
AVNL	Arroyo Valle near Livermore	Arroyo Valle	Gauge Height	Entire	15 Min	15 Min	-	-	-	Quarterly	USGS	Zone 7
AVDCC	Arroyo Valle at Dry Creek Confluence	Arroyo Valle	Water Temp Only		-	15 Min	-	-	-	-		
AV_ISABEL	Arroyo Valle at Isabel	Arroyo Valle	Water Temp Only		-	15 Min	-	-	-	-		
AV_DIV_SC	Arroyo Valle Diversion to Shadow Cliffs	Arroyo Valle	Flow Meter	Entire	Daily	-	-	-	-	-	EBRPD	
ADVP	Arroyo Valle at Pleasanton	Arroyo Valle	Gauge Height	Entire	15 Min	15 Min	-	-	-	Quarterly	Zone 7	Zone 7
AVADLL	Arroyo Valle above Arroyo De La Laguna	Arroyo Valle	Water Temp Only		-	15 Min	-	-	-	-		
ARROYO MOCHO - LINE G												
AMNL	Arroyo Mocho near Livermore	Arroyo Mocho	Gauge Height	Entire	15 Min	15 Min	-	-	-	Annual	Zone 7	Zone 7
SBA_AM	SBA Turnout to Arroyo Mocho	SBA Turnout	Flow Meter	Entire	15 Min	-	-	-	-	-	DWR	
AMHAG	Arroyo Mocho at Livermore	Arroyo Mocho	Gauge Height	Entire	15 Min	-	-	-	Daily	Annual	Zone 7	Zone 7
MA_VUL_COPE	Vulcan Discharge to Cope Lake	Arroyo Mocho	Flow Meter	Entire	Daily	-	-	-	-	-	Vulcan	
MA_COPE_I	Cope Lake to Lake I	Arroyo Mocho	Gauge Height	Entire	Hourly	-	-	-	-	-	Zone 7	
AM_KB	Arroyo Mocho at Kaiser Bridge	Arroyo Valle	Gauge Height	Entire	15 Min	-	-	-	-	Annual	Zone 7	Zone 7
LG3_FD	Line G3 at Fairlands Drive	Line G3	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
AMP	Arroyo Mocho near Pleasanton	Arroyo Mocho	Gauge Height	Entire	15 Min	15 Min	-	-	Daily	Annual	Zone 7	Zone 7
ARROYO SECO - LINE P												
LLNL_ALP	LLNL Treated Groundwater Discharge to ALP	LLNL Treatment Effluent	Estimated	Entire	Daily	-	-	-	-	-	LLNL	
AS_SFR	Arroyo Seco at Southfront Rd	Arroyo Seco	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
ALTAMONT CREEK - LINE R												
SBA_ALTC	SBA Turnout to Altamont Creek	SBA Turnout	Flow Meter	Entire	15 Min	-	-	-	-	-	DWR	
ALTC_PS	Altamont Creek at Pasatiempo Street	Altamont Creek	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
ALTC_BD	Altamont Creek at Bluebell Drive	Altamont Creek	Gauge Height	High	15 Min	15 Min	-	-	-	-	Zone 7	
ARROYO LAS POSITAS - LINE H												
ALP_NFR	Arroyo Las Positas at North Front Road	Arroyo Las Positas	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
ALPL	Arroyo Las Positas at Livermore	Arroyo Las Positas	Gauge Height	Entire	15 Min	15 Min	-	-	Daily	Annual	Zone 7	Zone 7
ALP_ELCH	Arroyo Las Positas above El Charro Road	Arroyo Las Positas	Gauge Height	Entire	15 Min	15 Min	-	-	-	Annual	Zone 7	Zone 7
LINE M												
LM_LA	Line M at Lindbergh Ave	Collier Canyon Creek	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
CHABOT CANAL - LINE G-1												
LG1_DB	Line G1 at Dublin Blvd	Line G1	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
CC_BSRD	Chabot Canal below Stoneridge Drive nr Pleasanton	Chabot Canal	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
SOUTH SAN RAMON CREEK - LINE J												
SSRC_AAVBLVD	South San Ramon Creek above Amador Valley Blvd	SAN RAMON CREEK	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	Zone 7	
LJ1_BDB	Line J1 Below Dublin Blvd	Line J1	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
TASSAJARA CREEK - LINE K												
TC_BI580	Tassajara Creek below Interstate 580	Tassajara Creek	Gauge Height	High	15 Min	15 Min	-	-	-	-	BalanceHydro	
ALAMO CANAL - LINE F												
AC_WCD	Alamo Creek at Willow Creek Dr near Dublin	Alamo Creek	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	
ACNP	Alamo Canal near Pleasanton	Alamo Canal	Gauge Height	Entire	15 Min	-	-	-	-	-	USGS	
ARROYO DE LA LAGUNA - LINE B												
ADLLCMNP	Arroyo De La Laguna at Corte Madrid near Pleasanton	Arroyo De La Laguna	Gauge Height	Entire	15 Min	-	-	-	-	-	USGS	
ADLLV	Arroyo De La Laguna at Verona	Arroyo De La Laguna	Gauge Height	Entire	15 Min	15 Min	15 Min	15 Min	-	Annual	USGS	Zone 7
ADLL_HWY84	Arroyo De La Laguna at Highway 84 in Sunol	Arroyo De La Laguna	Gauge Height	Entire	15 Min	15 Min	-	-	-	-	BalanceHydro	

Freq = Frequency. Flow Range = range of accurate data for flow measurements. SC = Specific Conductance. WQ = Water Quality. Min = Minutes.
Quarterly Water Quality Samples are required for water rights requirements.
Stations are ordered from upstream to downstream on each stream line.
Highlighted stations are new for the Water Year

TABLE 2-2
MONTHLY FLOWS (Acre-Feet)
2023 WATER YEAR

Station	Abbrev	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Arroyo Valle														
below Lang Canyon	AVBLC	0	0	16,206	47,738	5,210	29,135	5,154	1,678	723	132	32	18	106,027
SBA Releases	SBA_TO2_AV	7	7	591	86	257	6	171	1,011	703	728	724	670	4,960
Lake Flood Gate	LDV_FLD_GATE	0	0	530	43,617	206	24,549	0	0	0	0	0	0	68,903
Near Livermore	AVNL	18	31	681	46,161	539	25,099	1,889	1,410	778	725	687	642	78,658
Diversion to Shadow Cliffs	AV_DIV_SC	0	0	0	96	118	114	138	144	137	10	0	1	758
Recharged Artificial	AV_RC	0	0	736	6	128	0	96	927	640	468	558	531	4,090
Recharged Natural	AV_RN	18	66	849	2,935	352	3,328	336	380	68	146	23	0	8,501
at Pleasanton	ADVP	0	15	1,115	55,400	369	27,686	1,457	140	70	110	106	111	86,579
Arroyo Mocho														
Near Livermore	AMNL	0	0	1,565	4,806	214	4,489	187	31	5	1	0	0	11,297
SBA Releases	SBA_AM	0	0	0	0	42	0	0	449	689	720	620	208	2,728
Recharged Artificial	AM_RC	0	0	0	0	40	0	0	402	689	648	628	280	2,687
Recharged Natural	AM_RN	0	52	1,141	3,340	450	1,464	291	37	5	1	0	1	6,782
at Livermore	AMHAG	0	50	2,146	8,550	488	6,029	513	182	74	14	34	23	18,101
at Kaiser Bridge	AM_KB	0	34	1,440	6,040	388	6,434	397	35	0	0	0	0	14,767
Near Pleasanton*	AMP	74	559	5,962	14,901	2,180	12,785	978	442	167	130	102	80	38,360
Arroyo Las Positas														
SBA Releases	SBA_ALTC	0	0	0	0	0	0	0	0	0	0	0	0	0
at Livermore	ALPL	143	399	3,566	6,710	1,080	3,944	461	328	222	166	145	126	17,290
Recharged Artificial	ALP_RC	0	0	0	0	0	0	0	0	0	0	0	0	0
Recharged Natural	ALP_RN	80	78	1,071	1,050	57	105	108	64	51	61	55	58	2,838
above El Charro	ALP_ELCH	69	353	1,965	6,342	1,306	4,751	524	355	178	112	97	79	16,130
Alamo Canal/Arroyo de la Laguna														
Near Pleasanton	ACNP	93	674	9,090	199	55	121	16	13	6	4	4	4	10,276
at Verona	ADLLV	238	1,585	22,182	93,446	8,025	58,360	4,463	1,890	782	590	510	505	192,575

SBA Releases = Zone 7 releases from the South Bay Aqueduct to streams ("artificial")
Recharged Natural = stream recharge from rainfall runoff ("natural").
Recharged Artificial = recharge from South Bay Aqueduct Releases
* Below confluence with Arroyo Las Positas

TABLE 2-3
SURFACE WATER QUALITY RESULTS
2023 WATER YEAR

SITE ID	Date	Time	FLOW (cfs)	TEMP. °C	SC mS/cm	pH	Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
							Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
ADLLV	9/27/2023	12:05	8.9*	NA	1136	8.2	64	40	125	2.4	368	106	166	0.29	13.7	880	3.6	< 100	< 1	705	325
ADVP	11/8/2022	11:25	0.8	10.8	237	7.2	12	13	8	2.4	26	13	51	1.06	1.7	< 200	3	< 200	< 2	119	84
ADVP	3/30/2023	15:49	36.3	12	324	8.2	28	16	18	2.2	144	27	16	0.52	11.1	140	< 1	< 100	< 1	194	136
ADVP	6/27/2023	16:28	3.4	23.9	360	8.2	29	17	16	1.8	149	27	29	< 0.1	11.3	140	2.3	< 100	< 1	207	140
ADVP	9/14/2023	16:39	1.6	23	369	8.2	25	15	30	1.9	157	22	33	< 0.1	6.9	200	2.1	< 100	< 1	213	124
ALP_ELCH	9/14/2023	14:32	1.1	20	1369	8.3	60	53	161	2.3	434	91	219	1.31	17.5	2250	3.2	< 100	< 1	828	368
ALPL	9/14/2023	13:06	1.9	20.2	1384	8.2	70	55	151	2	453	87	205	3.35	25.7	2110	2.6	< 100	2.1	839	401
AM_KB	11/8/2022	10:43	45.7	10.9	71	7.2	4	3	5	2.1	23	4	6	0.66	2.1	< 200	2.9	< 200	< 2	40	22
AMHAG	11/8/2022	12:57	2.1	11.7	77	7	5	2	6	1.8	24	4	6	0.76	2.4	< 200	3.2	< 200	< 2	42	20
AMNL	8/8/2023	17:38	0.4	24	1007	7.9	53	91	52	4.4	576	65	44	< 0.1	16.5	810	1.3	< 100	< 1	611	506
AMP	9/14/2023	15:21	1.5	22.3	1322	8.4	60	53	154	3.1	383	75	232	0.72	17.8	1690	3.2	< 100	< 1	794	368
AVBLC	8/8/2023	16:35	0.7*	28.4	700	8.4	60	44	43	2.7	331	92	29	< 0.1	16.7	860	1.1	< 100	< 1	453	331
AVNL	3/30/2023	16:48	13.7*	11.8	372	8.1	33	18	23	2.4	160	40	18	0.61	13.1	210	1	< 100	< 1	231	156
AVNL	6/27/2023	17:29	17.6*	15.8	323	8.4	28	17	17	1.8	150	30	12	0.31	3	200	1.1	< 100	< 1	187	140
AVNL	9/14/2023	17:30	10.8*	17.3	376	8.2	33	21	19	2.1	174	42	14	0.29	11.6	140	1.5	< 100	< 1	232	168

* Daily mean flow

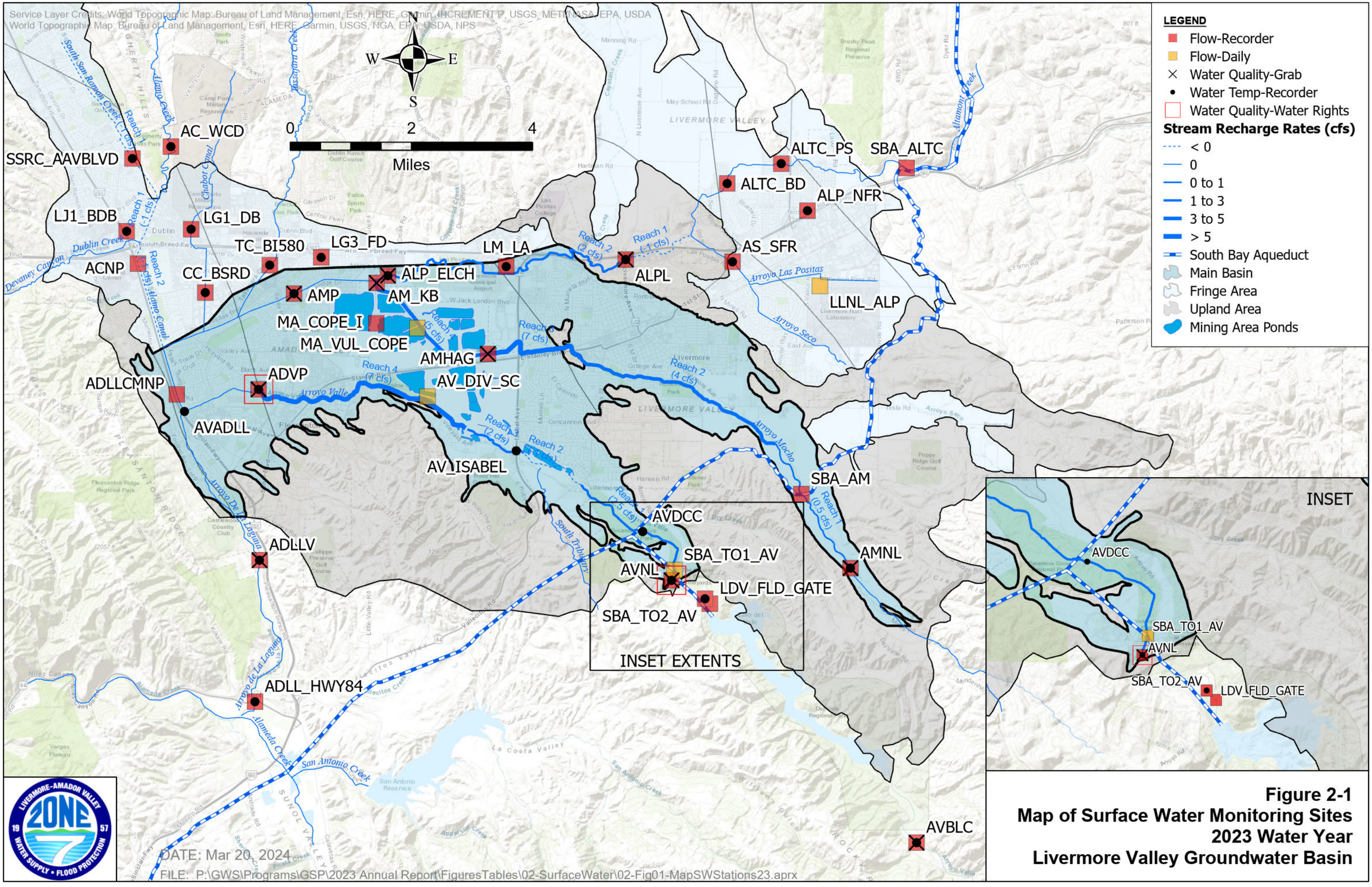


Figure 2-1
Map of Surface Water Monitoring Sites
2023 Water Year
Livermore Valley Groundwater Basin

3 Mining Area Monitoring

3.1 Program Changes

Presently, two mining companies, CEMEX and Vulcan Materials, have on-going surface mining operations for the excavation and sale of sands and gravels in the central portion of the Main Basin Management Area (Main Basin). The Mining Area Monitoring Program includes water level measurements and water quality analysis for many of the mining area ponds or quarry lakes within the mined area. No changes were made to the program in the 2023 WY. For more information on the Mining Area Program, see the following sections of the 2021 Alternative GSP:

- **Section 5.2.1:** Existing Monitoring and Management Programs
- **Section 14.2.7.3:** Other Monitoring Networks – Chain of Lakes/Mining Area Monitoring Program

3.2 Results for the 2023 Water Year

Figure 3-1 shows a map of the gravel mining pits and ponds that includes Fall 2023 WY groundwater elevation contours for the Upper Aquifer. ***Figure 3-2*** shows the planned locations of the future Chain of Lakes following mining activities (planned completion in 2058). ***Table 3-1*** summarizes the water levels observed in the mining area ponds for the 2023 WY. ***Table 3-2*** shows water quality results from grab samples of mining ponds for the 2023 WY. Per- and polyfluoroalkyl substances (PFAS) results from the mining ponds are shown in ***Table 3-3***. Water quality results from the mining ponds are discussed in ***Section 6: Groundwater Quality***.

The following ponds were actively mined during the 2023 WY:

Table 3-A: Ponds Actively Mined during 2023 WY

Pond	Chain of Lake	Mining Company
MA-R028	Lake D	Vulcan Materials (formerly Calmat)
MA-P046	Lake J	CEMEX (formerly RMC Lonestar)
MA-P042	Lake B	CEMEX (formerly RMC Lonestar).

- Mining Ponds MA-R028 (Lake D) and MA-P042 (Lake B) have been mined to depths such that the ponds appear to be in contact with both the Upper and Lower Aquifers. These two pond elevations are included in both the Upper and Lower Aquifer groundwater elevation contour maps presented in ***Section 5: Groundwater Elevations***.

- Pond MA-R024 was mined deeper than the depth shown on the reclamation plan. The footprint of the excavation includes a portion of Lake E and former Pond 7 to the west. The pond is temporarily being used as a silt pond. Once the silt fills in the bottom of the excavation to the final reclamation depth, a berm will be placed between Lake E and former Pond 7.

- Vulcan Materials Company (Vulcan) continues to transfer its pumped groundwater into various ponds and eventually discharges any excess water into Cope Lake. In the 2023 WY Vulcan discharged 2,258 AF into Cope Lake.

- Above-normal rainfall in January and February impacted both quarries.

    - The Arroyo Mocho experienced high water flows that breached the eastern bank of the arroyo in the area near Vulcan's freshwater pond (R4 on **Figure 3-1**). The entire flow was temporarily diverted into R4, which then overflowed to R3 and eventually overflowed into Cope Lake. Vulcan temporarily repaired the banks of the Arroyo Mocho with input from USACE and RWQCB. A permanent repair will likely be necessary after Vulcan obtains permits.

    - DWR, under the direction of the USACE, conducted flood releases (up to 3,000 cfs) from Lake Del Valle into the Arroyo Valle during January and February. As a result, the Arroyo Valle breached into the southeastern corner of P41 (in the eastern portion of Lake A), which subsequently caused a berm-breach into P28. Eventually the southwest corner of P28 breached back into the Arroyo Valle. As a result, the Arroyo Valle is now unintentionally being diverted through Lake A. CEMEX is working on obtaining permits to repair the breaches and allow the Arroyo Valle to flow separately from the lake. There was also a considerable amount of material deposited into Lake A during the high flows.

- CEMEX transferred its pumped groundwater into other onsite ponds and used some water as a gravel wash water source.

- Estimated groundwater transfers and losses associated with the mining area are shown in ***Table 3-B*** below.

Table 3-B: Estimated Groundwater Transfer and Losses in Mining Area, 2023 WY (AF)

Activity	2023 WY (AF)	Typical/ Average (AF)
Mining Area Transfers*		
Vulcan to Cope Lake	2,258	8,700
Cope Lake to Lake I	2,102	7,000
Diverted to Shadow Cliffs	758	600
Mining Area Losses		
Processing Losses**	700	700
Net Pond Precip/Evaporation	1,900	2,400
Pumped GW Exported from Valley	0	0

* Transfers made to locations outside of the quarries.
** Estimated

- Zone 7 provided 758 AF of water to EBRPD for Shadow Cliffs Lake recharge.

3.3 Attached Tables and Figures

***Table 3-1**: Semiannual Water Levels in Mining Area Ponds, 2023 WY*
***Table 3-2**: Water Quality Results for Mining Area Water Samples, 2023 WY*
***Table 3-3**: PFAS Water Quality Results from Mining Area Ponds, 2023 WY*

***Figure 3-1**: Gravel Mining Pits with Groundwater Elevation Contours (Fall 2023)*
***Figure 3-2**: Future Chain of Lakes*

TABLE 3-1
SEMIANNUAL WATER LEVELS IN MINING AREA PONDS
2023 WATER YEAR

POND PTS					CURRENT POND STATUS				POND ELEVATION (ft)				EXCAVATION									CURRENT EXCAVATION STATUS		
Pond Name	Description	Chain of Lake	Map Name	Pond Status	Pond Area (acre)	Contact with Aquifer	Pond Activity	Mining Use	Fall 22	Spring 23	Fall 23	WY Diff	Orig Excavation Name	Excavation Plan	Original Rename	Current Excavation	Orig Owner	Current Owner	Deepest Depth (ft)	Permit Number	Permit Status	Current Status	Current Depth	Excavated Area (acre)
MA-C001	Lake C - southeast	C	C1	Existing	4.9	No	Static	Unused	352.54	356.88	354.02	1.48	MA-C001	Future Excavation		MA-C001	CalMat	Vulcan	360	SMP 16	Active	Excavated	360	32.2
MA-C002		C	C2	Backfilled									MA-C002	Future Excavation		MA-C002	CalMat	Vulcan	360	SMP 16	Active	Backfilled	360	6.1
MA-C003		C	C3	Backfilled									MA-C003	Future Excavation		MA-C003	CalMat	Vulcan	360	SMP 16	Active	Backfilled	360	11.3
MA-C004		C	C4	Backfilled									MA-C004	Future Excavation		MA-C004	CalMat	Vulcan	390	SMP 16	Active	Backfilled		1.7
MA-C005			C5	Backfilled									MA-C005	Done		MA-C005	CalMat	Vulcan	290	SMP 16	Reclaiming	Backfilled		19.2
MA-C006		C	C6/ Lake C	Seasonal									MA-C006	Future Excavation		MA-C006	CalMat	Vulcan	385	SMP 16	Active	Excavated	385	12.4
MA-C007		D	C7/ Lake D	Backfilled									MA-C007	Future Excavation		MA-C007	CalMat	Vulcan	330	SMP 16	Active	Backfilled		22.1
MA-C008		D	C8/ Lake D	Future									MA-C008	Future Excavation		MA-C008	CalMat	Vulcan		SMP 16	Other	#N/A	#N/A	#N/A
MA-C009	Lake D - northeast	D	C9	Renumbered									MA-C009	Renumbered	MA-R028	MA-R028	CalMat	Vulcan	310	SMP 16	Active	Active Mining	165	62.9
MA-C010	Lake D - southeast	D	C10/ Lake D	Renumbered									MA-C010	Renumbered	MA-R028	MA-R028	CalMat	Vulcan	310	SMP 16	Active	Active Mining	165	62.9
MA-R002	Old		R2	Backfilled									MA-R002	Renumbered	MA-R012	MA-R012	Rhodes and Jamieson	Vulcan		SMP 16	Other	Backfilled		39.4
MA-R003	R3		R3	Existing	2.2	No	Pumped Into	Settling Pond	343.82	343.68	344.14	0.32	MA-R003	Done		MA-R003	Rhodes and Jamieson	Vulcan	240	SMP 16	Active	Excavated	240	14.8
MA-R004	R4		R4	Existing	10.9	Yes	In Flux	Water Storage	315.55	316.71	313.59	-1.96	MA-R004	Future Backfill		MA-R004	Rhodes and Jamieson	Vulcan	240	SMP 16	Active	Excavated	240	16.5
MA-R005	R5		R5	Backfilled									MA-R005	Done		MA-R005	Rhodes and Jamieson	Vulcan	240	SMP 16	Active	Backfilled		31.1
MA-R008	Lake G	G	R8	Existing	1.9	No	Pumped From	Settling Pond	NM	NM	NM		MA-R008	Future Desilting		MA-R008	Rhodes and Jamieson	Vulcan	260	SMP 16	Active	Excavated	260	46
MA-R009	Now R27		R9	Renumbered									MA-R009	Renumbered	MA-R017	MA-R027	Rhodes and Jamieson	Vulcan	300	SMP 16	Other	Excavated	300	59.5
MA-R010			R10	Backfilled									MA-R010	Done		MA-R010	Rhodes and Jamieson	Vulcan	370	SMP 16	Active	Backfilled		2.2
MA-R011	R11		R11	Backfilled									MA-R011	Done		MA-R011	Rhodes and Jamieson	Vulcan	370	SMP 16	Active	Backfilled		3.4
MA-R013	R13		R13	Backfilled									MA-R013	Done		MA-R013	Rhodes and Jamieson	Vulcan	270	SMP 16	Active	Backfilled		28.3
MA-R014	R14		R14	Backfilled									MA-R014	Done		MA-R014	Rhodes and Jamieson	Vulcan	380	SMP 16	Active	Backfilled		11.5
MA-R016	Now R23		R16	Renumbered									MA-R016	Renumbered	MA-R023	MA-R024	Rhodes and Jamieson	Vulcan	200	SMP 16	Other	Backfilling	200	86.9
MA-R017	Now R27		R17	Renumbered									MA-R017	Renumbered	MA-R027	MA-R027	Rhodes and Jamieson	Vulcan	300	SMP 16	Other	Excavated	300	59.5
MA-R018	Now R22	F	R18	Renumbered									MA-R018	Renumbered	MA-R022	MA-R022	Rhodes and Jamieson	Vulcan	290	SMP 16	Other	Excavated	290	79.3
MA-R019	Now R27. Vulcan Pond		R19	Renumbered									MA-R019	Renumbered	MA-R027	MA-R027	Rhodes and Jamieson	Vulcan	300	SMP 16	Other	Excavated	300	59.5
MA-R021	R21		R21	Existing	26.9	No	Static	Unused	NM	NM	NM		MA-R021	Future Backfill		MA-R021	Rhodes and Jamieson	Vulcan	280	SMP 16	Active	Excavated	280	44.2
MA-R022	Lake F	F	R22	Existing	60.3	No	Pumped From	Settling Pond	362.32	361.94	363.23	0.91	MA-R022	Future Desilting		MA-R022	Rhodes and Jamieson	Vulcan	290	SMP 16	Active	Excavated	290	79.3
MA-R023	Vulcan Pond 5		R23	Existing	21.9	No	Pumped Into	Water Storage	361.23	361.3	362.62	1.39	MA-R023	Future Backfill		MA-R023	Rhodes and Jamieson	Vulcan	270	SMP 16	Active	Excavated	270	27.5
MA-R024	Lake E - south	E	R24	Merged									MA-R024	Future Backfill		MA-R024	Rhodes and Jamieson	Vulcan	200	SMP 16	Active	Backfilling	200	86.9
MA-R024A	Lake E - southeast	E	R24A	Existing	64.7	Yes	Pumped Into	Settling Pond	249.76	283.88	283.68	33.92	MA-R024	Future Backfill		MA-R024	Rhodes and Jamieson	Vulcan	200	SMP 16	Active	Backfilling	200	86.9
MA-R025	Lake E - north	E	R25	Backfilled									MA-R025	Future Excavation		MA-R025	Rhodes and Jamieson	Vulcan	300	SMP 16	Active	Backfilled		43.7
MA-R027	Vulcan Pond 4		R27	Existing	16.1	No	In Flux	Water Storage	NM	NM	NM		MA-R027	Future Backfill		MA-R027	Rhodes and Jamieson	Vulcan	300	SMP 16	Active	Excavated	300	59.5
MA-R028	Lake D - northwest	D	R28	Existing	2.6	Yes	Pumped From	Active Mining	169.04	175.6	173.5	4.46	MA-R028	Future Excavation		MA-R028	Rhodes and Jamieson	Vulcan	165	SMP 16	Active	Active Mining	165	62.9
MA-K015	Shadow Cliffs	Sh.Cliff	ShCliffs	Existing	81.7	Yes	Pumped Into	Unused	315.47	323.59	330.84	15.37	MA-K015	Recreation		MA-K015	Kaiser Sand and Gravel	EBRP	265	closed	Reclaimed	Excavated	265	142.3
MA-K018	Lake Boris		K18	Existing	9.3	Yes	Static	Unused	345.94	350.45	350.71	4.77	MA-K018	ConnectedToAV		MA-K018	Kaiser Sand and Gravel	EBRP	330	closed	Reclaimed	Excavated	330	24.5
MA-K019A	BMX Park Pond		K19A	Existing	2.1	Yes	Static	Unused	NM	NM	NM		MA-K019A	ConnectedToAV		MA-K019	Kaiser Sand and Gravel	EBRP	335	closed	Reclaimed	Backfilled		11.1
MA-K021	Old Cope	Cope	K21	Renumbered									MA-K021	Renumbered	MA-K030	MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Other	Reclaimed	240	233.9
MA-K021A	Old Cope cell	Cope	K21A	Renumbered									MA-K021	Renumbered	MA-K030	MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Other	Reclaimed	240	233.9
MA-K021B	Old Cope Cell	Cope	K21B	Renumbered									MA-K021	Renumbered	MA-K030	MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Other	Reclaimed	240	233.9
MA-K024	K24		K24	Backfilled									MA-K024	Done		MA-K024	Kaiser Sand and Gravel	Steelwave	220	closed	Reclaimed	Backfilled		87.9
MA-K025		Cope	K25	Renumbered									MA-K025	Renumbered	MA-K030	MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Other	Reclaimed	240	233.9
MA-K026		Cope	K26	Renumbered									MA-K026	Renumbered	MA-K030	MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Other	Reclaimed	240	233.9
MA-K028	Lake H	H	LkH	Existing	62.1	Yes	Static	Unused	285.19	291.16	290.61	5.42	MA-K028	Done		MA-K028	Kaiser Sand and Gravel	Hansen	220	SMP 31/36	Reclaiming	Reclaiming	220	89.6
MA-K030	Cope Lake	Cope	Cope	Existing	176	No	Pumped Into	Unused	323.18	330.25	331.43	8.25	MA-K030	Done		MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Reclaimed	Reclaimed	240	233.9
MA-K030_NE	Northeast cell of Cope		K30NE	Merged									MA-K030	Done		MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Reclaimed	Reclaimed	240	233.9
MA-K030_SE	Southeast cell of Cope		K30SE	Merged									MA-K030	Done		MA-K030	Kaiser Sand and Gravel	Zone 7	240	SMP 31/36	Reclaimed	Reclaimed	240	233.9
MA-K031	Now K37		K31	Renumbered									MA-K031	Renumbered	MA-K036	MA-K037	Kaiser Sand and Gravel	Zone 7	220	SMP 31/36	Other	Reclaimed	220	300.8
MA-K032			K32	Backfilled									MA-K032	Done		MA-K032	Kaiser Sand and Gravel	Commercial	335	closed	Reclaimed	Backfilled		34.2
MA-K033			K33	Backfilled									MA-K033	Done		MA-K033	Kaiser Sand and Gravel	EBRP	335	closed	Reclaimed	Backfilled		12.8
MA-K034	Now K37		K34	Renumbered									MA-K034	Renumbered	MA-K037	MA-K037	Kaiser Sand and Gravel	Zone 7	220	SMP 31/36	Other	Reclaimed	220	300.8
MA-K035	Now K37		K35	Renumbered									MA-K035	Renumbered	MA-K037	MA-K037	Kaiser Sand and Gravel	Zone 7	200	SMP 31/36	Other	Reclaimed	220	300.8
MA-K036	Now K37		K36	Renumbered									MA-K036	Renumbered	MA-K037	MA-K037	Kaiser Sand and Gravel	Zone 7	220	SMP 31/36	Other	Reclaimed	220	300.8
MA-K037	Lake I	I	LkI	Existing	234.4	Yes	Static	Unused	275.67	279.85	286.85	11.18	MA-K037	Done		MA-K037	Kaiser Sand and Gravel	Zone 7	220	SMP 31/36	Active	Reclaimed	220	300.8
MA-P001		J	P1	Backfilled									MA-P001	Future Excavation		MA-P001	Pleasanton Gravel Company	Cemex	360	SMP 23	Active	Backfilled		0.8
MA-P002		J	P2	Existing									MA-P002	Future Excavation		MA-P002	Pleasanton Gravel Company	Cemex	360	SMP 23	Active	Excavated	360	1.9
MA-P003		B	P3	Backfilled									MA-P003	Future Excavation		MA-P003	Pleasanton Gravel Company	Cemex	360	SMP 23	Active	Backfilled		8.5
MA-P004		B	P4	Backfilled									MA-P004	Future Excavation		MA-P004	Pleasanton Gravel Company	Cemex	360	SMP 23	Active	Excavated	360	7.8

NM = Not Measured
WY Diff = Water Year Difference (Fall to Fall)

TABLE 3-1
SEMIANNUAL WATER LEVELS IN MINING AREA PONDS
2023 WATER YEAR

POND PTS					CURRENT POND STATUS				POND ELEVATION (ft)				EXCAVATION									CURRENT EXCAVATION STATUS		
Pond Name	Description	Chain of Lake	Map Name	Pond Status	Pond Area (acre)	Contact with Aquifer	Pond Activity	Mining Use	Fall 22	Spring 23	Fall 23	WY Diff	Orig Excavation Name	Excavation Plan	Original Rename	Current Excavation	Orig Owner	Current Owner	Deepest Depth (ft)	Permit Number	Permit Status	Current Status	Current Depth	Excavated Area (acre)
MA-P006	P6		P6	Backfilled									MA-P006	Done		MA-P006	Pleasanton Gravel Company	Cemex	280	SMP 23	Active	Backfilled		28.8
MA-P007			P7	Backfilled									MA-P007	Done		MA-P007	Pleasanton Gravel Company	Cemex	280	SMP 23	Active	Backfilled		16.7
MA-P008	Now P42		P8	Renumbered									MA-P008	Renumbered	MA-P022	MA-P042	Pleasanton Gravel Company	Cemex		SMP 23	Other	Active Mining	255	101.8
MA-P010	P10	B	P10	Existing	1	Yes	Static	Unused	356.07	367.97	362.67	6.6	MA-P010	Future Excavation		MA-P010	Pleasanton Gravel Company	Cemex	340	SMP 23	Active	Excavated	340	34
MA-P010A	Top Con Middle	B	P10A	Existing	11.3	Yes	Static	Unused	NM	NM	NM		MA-P010	Future Excavation		MA-P010	Pleasanton Gravel Company	Cemex	340	SMP 23	Active	Excavated	340	34
MA-P011	P11		P11	Backfilled									MA-P011	Done		MA-P011	Pleasanton Gravel Company	Cemex	340	SMP 23	Active	Backfilled	340	6.9
MA-P012	Island Pond		P12	Existing	12.7	Yes	Static	Unused	347.27	350.99	351.49	4.22	MA-P012	Recreation		MA-P012	Pleasanton Gravel Company	EBRP	330	SMP 23	Reclaimed	Excavated	330	29.5
MA-P013	P13		P13	Seasonal		Yes	Static	Unused	NM	NM	NM		MA-P013	Done		MA-P013	Pleasanton Gravel Company	Cemex	300	SMP 23	Active	Excavated		2.6
MA-P018			P18	Renumbered									MA-P018	Renumbered	MA-P023	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P019	Now P27	D	P19	Renumbered									MA-P019	Renumbered	MA-P027	MA-P027	Pleasanton Gravel Company	Cemex		SMP 23	Other	Excavated	250	31
MA-P021	None		P21	Backfilled									MA-P021	Done		MA-P021	Pleasanton Gravel Company	Cemex	240	SMP 23	Active	Backfilled		10.5
MA-P022	Now P42	B	P22	Renumbered									MA-P022	Renumbered	MA-P035	MA-P042	Pleasanton Gravel Company	Cemex		SMP 23	Other	Active Mining	255	101.8
MA-P023	Now P43		P23	Renumbered									MA-P023	Renumbered	MA-P043	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P024	Now P43		P24	Renumbered									MA-P024	Renumbered	MA-P030	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P025	Now P43		P25	Renumbered									MA-P025	Renumbered	MA-P030	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P026	Now P43		P26	Renumbered									MA-P026	Renumbered	MA-P031	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P027	Lake D - southwest	D	P27	Existing	9.2	Yes	Static	Unused	NM	NM			MA-P027	Future Reclamation		MA-P027	Pleasanton Gravel Company	Cemex	250	SMP 23	Active	Excavated	250	31
MA-P028	Lake A - west	A	P28	Existing	7.1	Yes	Static	Unused	401.85	403.74	403.34	1.49	MA-P028	Future Reclamation		MA-P028	Pleasanton Gravel Company	Cemex	360	SMP 23	Active	Reclaiming	360	24.6
MA-P029	Lake A - south backfill		P29	Backfilled									MA-P029	Future Reclamation		MA-P029	Pleasanton Gravel Company	Cemex		SMP 23	Active	Backfilled		
MA-P030	Now P43		P30	Renumbered									MA-P030	Renumbered	MA-P033	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P031	Now P43		P31	Renumbered									MA-P031	Renumbered	MA-P037	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P033	Now P43		P33	Renumbered									MA-P033	Renumbered	MA-P043	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P034			P34	Backfilled									MA-P034	Done		MA-P034	Pleasanton Gravel Company	Cemex	270	SMP 23	Active	Backfilled		46
MA-P035	Now P42		P35	Renumbered									MA-P035	Renumbered	MA-P042	MA-P042	Pleasanton Gravel Company	Cemex		SMP 23	Other	Active Mining	255	101.8
MA-P036	Now P43		P36	Renumbered									MA-P036	Renumbered	MA-P043	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P037	Now P43		P37	Renumbered									MA-P037	Renumbered	MA-P043	MA-P043	Pleasanton Gravel Company	Cemex		SMP 23	Other	Backfilling	240	130.9
MA-P040	Lake C - northwest	C	P40	Seasonal									MA-P040	Future Reclamation		MA-P040	Pleasanton Gravel Company	Cemex	260	SMP 23	Active	Excavated	260	14.5
MA-P041	Lake A - east	A	P41	Existing	46.4		Static	Unused	409.44	404.31	403.86	-5.58	MA-P041	Future Reclamation		MA-P041	Pleasanton Gravel Company	Cemex	370	SMP 23	Active	Reclaiming	370	91.3
MA-P042	Lake B - west	B	P42	Existing	8.2	Yes	Pumped From	Active Mining	NM	NM	NM		MA-P042	Future Reclamation		MA-P042	Pleasanton Gravel Company	Cemex	255	SMP 23	Active	Active Mining	255	101.8
MA-P042A	Lake B - east	B	P42A	Existing	0.3	Yes	Pumped From	Active Mining	256.25	264.82	259.54	3.29	MA-P042	Future Reclamation		MA-P042	Pleasanton Gravel Company	Cemex	255	SMP 23	Active	Active Mining	255	101.8
MA-P042B	Lake B - middle	B	P42B	Existing	0.4	Yes	Pumped From	Active Mining	NM	NM	NM		MA-P042	Future Reclamation		MA-P042	Pleasanton Gravel Company	Cemex	255	SMP 23	Active	Active Mining	255	101.8
MA-P043	P43		P43	Existing	80.4	No	In Flux	Settling Pond	NM	NM	NM		MA-P043	Future Backfill		MA-P043	Pleasanton Gravel Company	Cemex	240	SMP 23	Active	Backfilling	240	130.9
MA-P044	P44	B	P44	Existing	13.1	Yes	In Flux	Water Storage	319.29	342.23	347.36	28.07	MA-P044	Done		MA-P044	Pleasanton Gravel Company	Cemex	250	SMP 23	Active	Excavated	250	20
MA-P045	P45		P45	Existing	16.2	Yes	In Flux	Water Storage	NM	NM	NM		MA-P045	Done		MA-P045	Pleasanton Gravel Company	Cemex	310	SMP 23	Active	Excavated	310	25
MA-P046	Lake J	J	P46	Existing	9.1	Yes	Pumped From	Active Mining	262.96	275.63	274.02	11.06	MA-P046	Excavating		MA-P046	Pleasanton Gravel Company	Cemex	250	SMP 23	Active	Active Mining	250	23.8

NM = Not Measured
WY Diff = Water Year Difference (Fall to Fall)

TABLE 3-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
MA-C001	4/26/23	ZONE7	21.9	1173	8.7	44	59	98	2.9	253	94	207	< 0.1	0.4	520	2	< 100	3	642	353
MA-K015	4/26/23	ZONE7	26.2	749	8.9	30	34	73	3.9	186	70	93	< 0.1	2.6	450	2.7	< 100	1.7	416	215
MA-K018	5/2/23	ZONE7	18.9	402	8.6	36	20	27	2.3	173	35	27	< 0.1	7.5	190	1.3	< 100	< 1	246	172
MA-K028	9/20/23	ZONE7	23.5	965	8.9	24	68	96	2.6	289	77	154	< 0.1	15.8	770	3.2	< 100	< 1	601	340
MA-K028	5/2/23	ZONE7	17.5	959	8.6	36	60	91	2.5	320	73	138	0.42	16.5	880	2.6	< 100	2.5	588	337
MA-K030	9/20/23	ZONE7	23.9	629	9	25	45	47	2.9	199	42	91	< 0.1	5.4	320	6.6	< 100	< 1	371	247
MA-K030	5/2/23	ZONE7	19.3	567	9.4	26	40	43	2.7	201	43	76	< 0.1	0.9	390	5.6	< 100	1.4	378	230
MA-K037	9/20/23	ZONE7	25.1	815	8.7	26	58	66	2.8	250	62	126	< 0.1	7.9	590	4.1	< 100	< 1	486	304
MA-K037	5/2/23	ZONE7	19.4	801	8.7	32	58	71	2.7	256	63	116	0.16	9.8	660	2.9	< 100	2.2	489	319
MA-P010	4/27/23	ZONE7	26.3	408	8.4	27	18	26	2.7	124	46	33	< 0.1	3.4	150	1.7	< 100	< 1	221	142
MA-P012	5/2/23	ZONE7	17.6	425	8.2	32	18	26	2.1	169	37	30	< 0.1	8.1	200	1.2	< 100	< 1	240	154
MA-P028	4/27/23	ZONE7	21.4	455	8.7	35	20	29	2.2	172	41	33	0.27	7.1	210	< 1	< 100	< 1	263	170
MA-P041	4/27/23	ZONE7	23.9	460	9	34	21	31	2.2	157	42	35	0.25	6.6	220	1.3	< 100	< 1	269	172
MA-P042A	4/27/23	ZONE7	22.4	685	8.1	48	26	45	1.8	202	51	86	< 0.1	10.9	380	< 1	< 100	1.8	370	227
MA-P044	4/27/23	ZONE7	22.2	557	8.5	41	24	54	2.2	164	49	85	< 0.1	7.9	360	1.1	< 100	1.9	350	201
MA-P046	4/27/23	ZONE7	25	839	8.3	53	34	61	2.1	257	56	97	0.68	11.6	440	< 1	< 100	2.5	450	272
MA-R003	4/26/23	ZONE7	20.8	593	8.6	31	34	39	2.3	202	38	74	< 0.1	8.6	300	1.7	< 100	1.8	341	218
MA-R004	4/26/23	ZONE7	20.4	634	8.5	40	34	37	2.9	222	41	70	0.64	14.6	300	< 1	< 100	3	360	240
MA-R022	4/26/23	ZONE7	24.1	629	8.8	31	36	44	1.8	177	41	91	< 0.1	7.3	340	2.6	< 100	1.8	352	226
MA-R023	4/26/23	ZONE7	24.8	631	8.8	34	34	38	2.8	197	40	76	< 0.1	5.8	290	2.4	< 100	1.6	339	225
MA-R024A	4/26/23	ZONE7	19.8	598	8.5	39	35	36	2.3	213	40	71	0.71	15	300	< 1	< 100	3.2	356	242
MA-R028	4/26/23	ZONE7	25.2	683	8.4	47	37	37	1.8	256	40	71	1.9	19.5	270	< 1	< 100	3.7	392	270

TABLE 3-3
PFAS WATER QUALITY RESULTS FROM MINING AREA PONDS
2023 WATER YEAR
(Only PFAS Compounds with detected concentrations shown)

Well	Chain of Lake	Label	Sampled	Units	PFAS COMPOUNDS (with Response Level)					
					PFBS	PFHpA	PFHxA	PFHxS	PFOA	PFOS
					5000	-	-	20	10	40
MA-K015	Sh.Cliff	ShCliffs	4/26/23	ng/L	2.7	2.3	4.5	2.8	5	2.9
MA-K028	H	LkH	5/2/23	ng/L	12	4.1	12	40	10	110
MA-K028	H	LkH	9/20/23	ng/L	12	5.2	13	41	12	59
MA-K030	Cope	Cope	5/2/23	ng/L	4.2	2.2	4.3	8.9	4.5	11
MA-K030	Cope	Cope	9/20/23	ng/L	5	2.8	5.5	8.8	5.8	8.5
MA-K037	I	LkI	5/2/23	ng/L	7.3	2.8	6.7	26	7.2	99
MA-K037	I	LkI	9/20/23	ng/L	< 10	< 10	< 10	28	< 10	100
MA-R003		R3	4/26/23	ng/L	4.5	2.3	5.2	6.9	5.4	7.3
MA-R004		R4	4/26/23	ng/L	4.4	2	4.3	7.4	4.4	7.2
MA-R022	F	R22	4/26/23	ng/L	2.9	< 2.0	2.3	4.7	3.3	21
MA-R023		R23	4/26/23	ng/L	4.3	2.4	4.5	8.5	5.1	10
MA-R024A	E	R24A	4/26/23	ng/L	4.4	2.5	5	7.7	5.1	7.8

Red Text = Concentration above Response Level

LEGEND

2023 Contour Upper Fall

- Contours (Interval = 10')
- Hatch pattern towards lower elevation
- Supply
- Monitor
- Nested
- Ponds

Mining Pond Areas 2023

- In Flux
- Pumped From
- Pumped Into
- Static
- Backfilled
- Not In Contact With Groundwater
- Future Chain of Lakes (revised 2019)
- Rivers
- Main Basin
- Fringe Areas
- Upland Areas

N
W E
S

0 2,000 4,000
Feet

DATE: Mar 12, 2024

FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\03-MiningArea\03-Fig01-02-MiningMaps2023.aprx

Figure 3-1
Gravel Mining Pits with Groundwater Elevation Contours (Fall 2023)
Livermore Valley Groundwater Basin

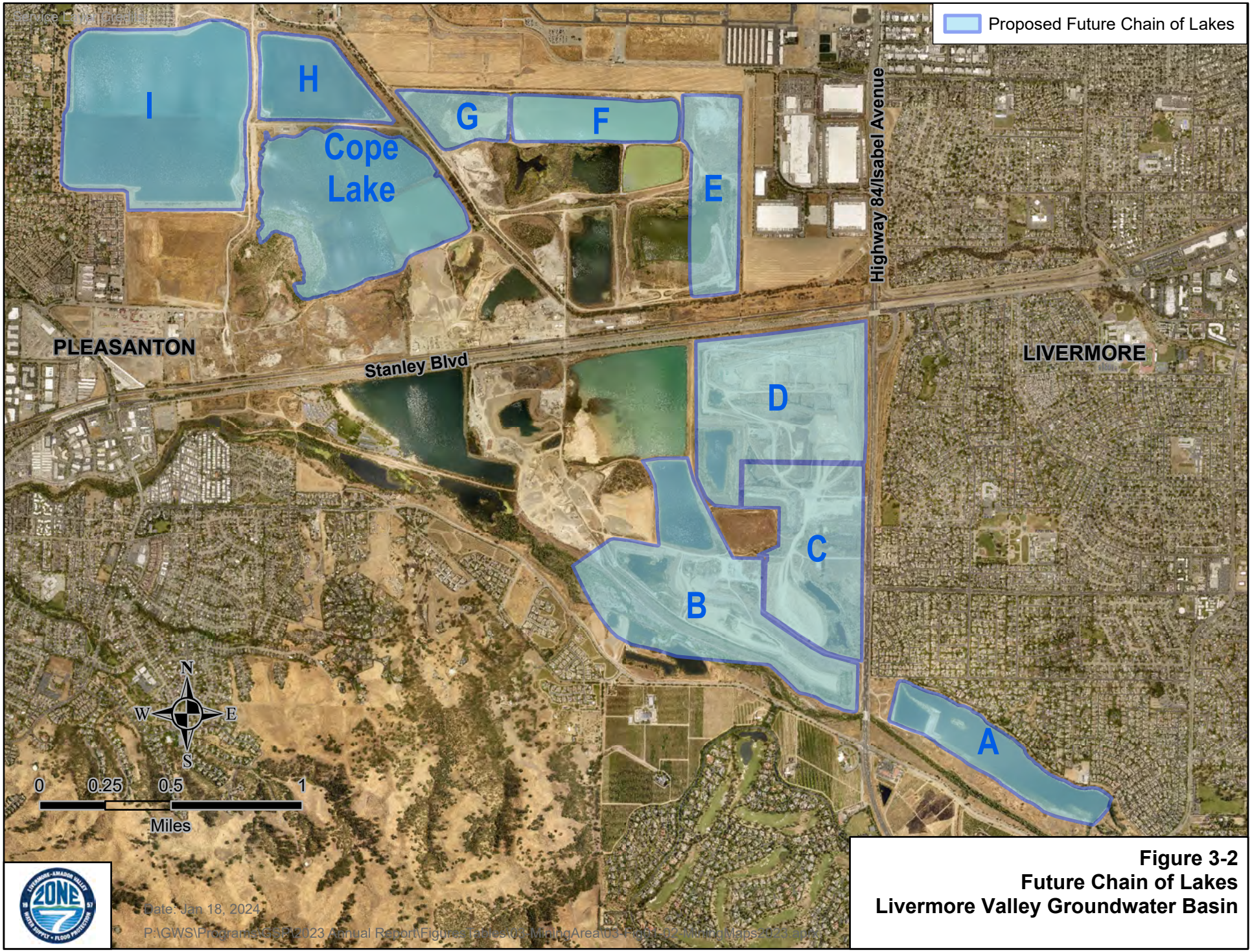


Figure 3-2
Future Chain of Lakes
Livermore Valley Groundwater Basin

4 Interconnected Surface Water-Groundwater Monitoring

4.1 Program Changes

As part of the 2021 Alternative GSP, Zone 7 made significant changes to the Interconnected Surface Water-Groundwater Monitoring Program including:

- Identifying potential Interconnected Surface Water (ICSW) and or Groundwater Dependent Ecosystems (GDE) areas that were not recognized in the 2016 Alternative GSP.
- Identifying 14 wells as Representative Monitoring Sites for Interconnected Surface Water (RMS-ICSW).
- Creating Sustainability Management Criteria (SMCs) for these RMS-ICSW (see ***Table 4-A*** below).

Table 4-A: SMCs for Depletions of Interconnected Surface Water

Undesirable Results Definition	Undesirable Results Criteria	Minimum Threshold (MT)	Measurable Objective (MO)
When groundwater extractions in the Basin cause significant and unreasonable depletions of hydrologically connected surface water, such that beneficial uses and users of the surface water (including the likely GDEs and protected species) are significantly and unreasonably harmed. Specifically, a significant and unreasonable negative effect would be experienced if the health of the GDE areas in the Basin are adversely impacted by mechanisms that can be directly attributed to pumping-related lowering of groundwater levels over time, rather than effects of natural or climactic processes and/or unfavorable hydrologic conditions or land use changes.	If and when Depletions of Interconnected Surface Water occur as a result of unsustainable groundwater extraction such that groundwater levels decline below their MTs in greater than 40% of the RMS-ICSW for more than two consecutive years.	Historic low water levels measured at each RMS-ICSW, or when unavailable, estimated from Zone 7 groundwater elevation rasters.	Minimum water levels measured between 2014 and 2020 at each RMS-ICSW, or when unavailable, estimated from Zone 7 groundwater elevation rasters.

GDE = Groundwater Dependent Ecosystems
RMS-ICSW = Representative Monitoring Sites for Interconnected Surface Water

More detail is available in the following sections of the 2021 Alternative GSP:

- **Section 1.2.5:** Surface Water-Groundwater Interaction/Groundwater Dependent Ecosystems Program Update

- **Section 8.8:** Current and Historical Groundwater Conditions - Groundwater Dependent Ecosystems
- **Section 13.6:** Sustainability Indicators – Depletions of Interconnected Surface Water
- **Section 14.2.6:** Monitoring Network for Depletions of Interconnected Surface Water
- **Section 14.4:** Representative Monitoring

4.2 Results for the 2023 Water Year

Figure 4-1 shows the hydrographs for the two RMS-ICSW in the vicinity of the Springtown Alkali Sink. ***Figure 4-2*** shows hydrographs for all the RMS-ICSW wells. ***Table 4-1*** compares water level measurements from the seasonal high and seasonal low 2023 WY monitoring events to the Minimum Thresholds (MTs) and Measurable Objectives (MOs) defined at RMS-ICSW wells in the 2021 Alternative GSP. The table also shows the change in elevation from the previous year's seasonal low to this year's seasonal low. Groundwater levels rebounded in all wells from last year's drought and ended the year above MOs with the exception of RMS-ICSW Well 3S2E33C001 [33C1] which was measured at 1.37 ft below the MO during the seasonal low (Fall) 2023 WY monitoring event. Water levels remained above the MT at 33C1 during the seasonal low (Fall) monitoring event, and all RMS-ICSW wells were measured above their MTs and MOs during the seasonal high (i.e., spring) monitoring event. The MO exceedance observed at 33C1 does not currently constitute an Undesirable Result (UR) per the definition shown in ***Table 4-A***.

4.3 Attached Tables and Figures

Table 4-1*: 2023 Groundwater Elevations at Representative Monitoring Sites for ICSW*

Figure 4-1*: Hydrographs in the Vicinity of the Alkali Sink & Springtown Springs*
Figure 4-2*: Spider Map of Representative Monitoring Sites for Interconnected Surface Water*

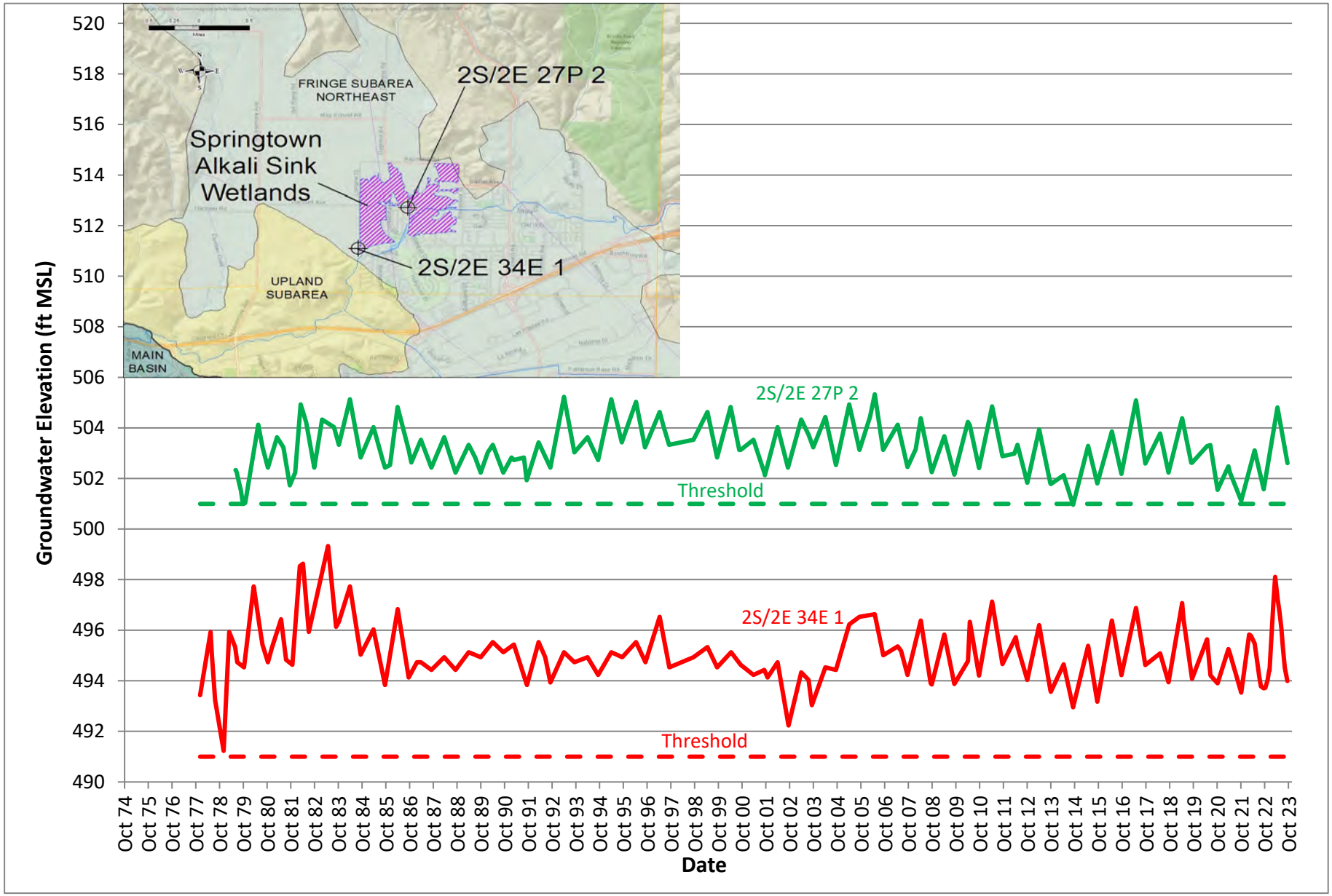
TABLE 4-1
GROUNDWATER ELEVATIONS AT REPRESENTATIVE MONITORING SITES FOR INTERCONNECTED SURFACE WATER
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

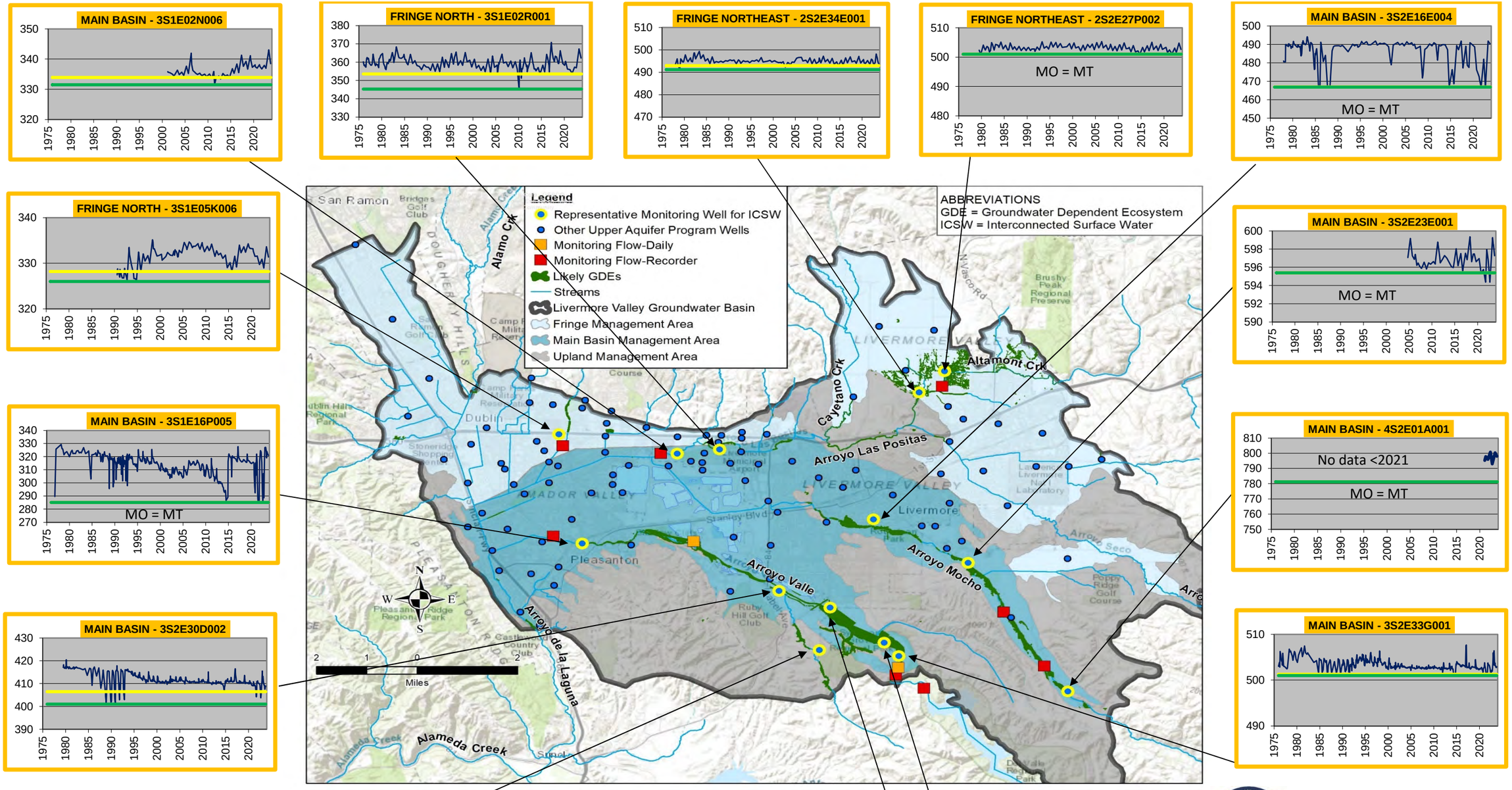
RMS Well		*Management Area/Unit*			*2023 Water Year (in ft)*					*SMCs for ICSW (ft above MSL)*				
Well Name	*Map*	*Area*	*Subarea*	*Aquifer*	*Season High GWE*	*Season Low GWE*	*Change from 2022**	*Height above MT*	*Height above MO*	*MT*	*IM-5*	*IM-10*	*IM-15*	*MO*
3S2E30D002	30D2	Main	Amador	Upper	410.66	408.72	4.92	7.72	2.22	401	403.8	404.7	405.6	406.5
3S1E16P005	16P5	Main	Amador	Upper	324.27	321.38	14.27	36.18	36.18	285.2	285.2	285.2	285.2	285.2
3S2E33G001	33G1	Main	Amador	Upper	503.22	502.73	0.57	1.73	1.43	501	501.1	501.2	501.2	501.3
3S2E29F004	29F4	Main	Amador	Upper	448.78	448.75	4.2	10.95	4.15	437.8	441.2	442.3	443.5	444.6
3S2E33C001	33C1	Main	Amador	Upper	489.81	484.83	-0.43	2.73	-1.37	482.1	484.2	484.8	485.5	486.2
3S1E02N006	2N6	Main	Camp	Upper	343.09	338.49	1.55	6.99	4.59	331.5	333.9	333.9	333.9	333.9
3S2E16E004	16E4	Main	Mocho II	Upper	491.76	490.29	23.37	23.39	23.29	466.9	466.9	466.9	466.9	467
3S2E23E001	23E1	Main	Mocho II	Upper	599.25	597.27	2.9	1.87	1.87	595.4	595.4	595.4	595.4	595.4
4S2E01A001	1A1	Main	Mocho II	Upper	800.34	797.97	4.91	16.77	16.77	781.2	781.2	781.2	781.2	781.2
2S2E27P002	27P2	Fringe	Spring	Upper	504.81	502.61	1.04	1.61	1.61	501	501	501	501	501
2S2E34E001	34E1	Fringe	May	Upper	497.21	493.99	0.29	2.79	0.99	491.2	492.1	492.4	492.7	493
3S1E05K006	5K6	Fringe	Camp	Upper	333.6	331.34	2.4	5.34	3.14	326	328.2	328.2	328.2	328.2
3S1E02R001	2R1	Fringe	Camp	Upper	367.29	362.29	5.4	16.99	8.69	345.3	349.4	350.8	352.2	353.6
3S2E32E007	32E7	Upland	Upland	Upper	593.75	592.99	0.85	1.59	1.59	591.4	591.4	591.4	591.4	591.4

RMS = Representative Monitoring Site
GWE = Groundwater Elevation (in ft above Mean Sea Level)
SMC = Sustainable Management Criteria
ICSW = Interconnected Surface Water
MSL = Mean Sea Level
IM = Interim Milestone
MO = Measurable Objective
MT = Minimum Threshold
* = 2023 Seasonal Low minus 2022 Seasonal Low

Main
Fringe
Upland

FIGURE 4-1
HYDROGRAPHS IN THE VICINITY OF THE ALKALI SINK AND SPRINGTOWN SPRINGS
LIVERMORE VALLEY GROUNDWATER BASIN





LEGEND

Orange	Representative Monitoring Site
Blue	Upper Aquifer
Yellow	Measurable Objective
Green	Minimum Threshold

Elevations in feet above Mean Sea Level
Vertical gridlines in graphs every 10 feet

Figure 4-2
Hydrographs for Interconnected Surface Water 1975-2023
Livermore Valley Groundwater Basin

5 Groundwater Elevation Monitoring

5.1 Program Changes

The following changes were made to the Groundwater Elevation Monitoring Program for the 2023 WY.

Table 5-A: Program Well Changes during the Water Year

Action	Reason	Note
3S2E21N001 was substituted by 3S2E20R002	Water level probe gets stuck in well.	3S2E20R002 is in the same area and is screened at roughly the same interval
1S4E31P005 and 2S3E01D001 were removed from program	Former CASGEM wells not in groundwater basin.	Wells are to be monitored by another agency.

Zone 7 installed 9 groundwater monitoring devices equipped with telemetry that allow real-time monitoring of groundwater levels including 6 of the 8 Representative Monitoring Sites for Water Levels (RMS-WL). Zone 7 intends to expand the system over the next several years to outfit all RMS-WL wells and expand the real-time monitoring capability across the main and fringe basins.

Zone 7's 2021 Alternative GSP established SMCs for Chronic Lowering of Groundwater Levels as shown in ***Table 5-B*** below.

Table 5-B: SMCs for Chronic Lowering of Groundwater Levels

Undesirable Results Definition	Undesirable Results Criteria	Minimum Threshold (MT)	Measurable Objective (MO)
If and when a chronic decline in groundwater levels over the course of the planning and implementation horizon significantly and unreasonably impairs the reasonable and beneficial use of, and access to, groundwater for beneficial uses and users within the Basin.	Water levels in greater than 25% of the RMS-WLs decline below their respective MTs for two consecutive years.	Difference between the historic low water level and maximum annual rate of groundwater change for each RMS-WL, or the historic low if annual groundwater level change data are unavailable.	Historic low water level for each RMS-WL.

RMS-WL = Representative Monitoring Sites for Water Levels

For more information on general groundwater gradients, water level trends, and the groundwater elevation program; see the following sections of the 2021 Alternative GSP:

- **Section 1.2.1:** Groundwater Level Program Updates
- **Section 8.3:** Current and Historical Groundwater Conditions - Groundwater Elevations and Flow Directions
- **Section 13.1:** Sustainability Indicators – Chronic Lowering of Groundwater Levels
- **Section 14.2.1:** Monitoring Network for Chronic Lowering of Groundwater Levels
- **Section 14.4:** Representative Monitoring

5.2 Results for the 2023 Water Year

5.2.1 General

Figure 5-1 and ***Table 5-1*** show all of the wells in the 2023 WY Groundwater Elevation Program. ***Table 5-2*** shows wells construction information for each of the wells. ***Table 5-3*** shows water level measurements from all wells in the program for the 2023 WY. ***Table 5-4*** shows water level measurements in Representative Monitoring Sites for Water Level (RMS-WL) and their groundwater elevations relative to the MOs and MTs established in the 2021 Alternative GSP.

In general, groundwater levels for the 2023 WY followed a typical seasonal pattern observed from the historical data:

- rising in the beginning of the year with rainfall recharge and minimal pumping occurring,
- levelling off in late spring, and
- dropping during the second half of the WY as rainfall ceased and pumping demands increased.

The general groundwater gradients in both the Upper and Lower Aquifers were from east to west and ranged from 0.005 to 0.025 feet/feet (ft/ft), except across the major groundwater barriers between the basin (e.g., the Main and Fringe – especially across the northwestern portion of the Main Basin) and across the Livermore Fault that represents the boundary between the Mocho 2 and Amador Subareas. In general, the groundwater gradient runs toward the center of the Basin where there are piezometric depressions created around several municipal wellfields and actively dewatered quarry excavations that extend into the Lower Aquifer.

Most of the groundwater elevation declines in the Basin (the steepest groundwater gradient) occur in the central area of the Main Basin, where the mining pits (MA-R028, MA-P042, and MA-P046) are being excavated. These quarry dewatering operations create groundwater depressions in pits where water is pumped and mounds in unlined pits where excess water is stored. In fact,

the lowest groundwater elevation in the Basin corresponded to the pond in mining pit MA-R028 (future Lake D) at 173.5 feet above mean sea level (ft msl). The water from the dewatering of MA-P042 and MA-P046 (future Lakes B and J, respectively) was discharged into other adjacent clay-lined mining pits. The water from pit MA-R028 (future Lake D) was discharged into MA-R024, where it likely recharged back into the Basin.

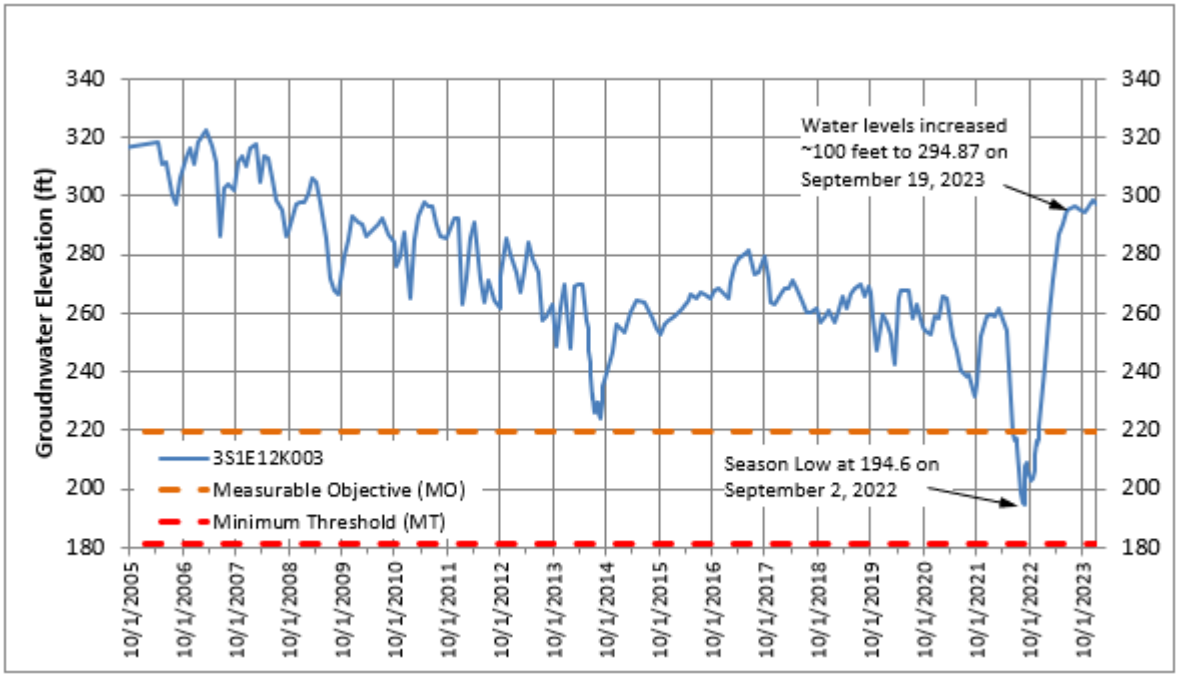
As is usually the case, water levels in the Fringe Management Area (Fringe Area) and Upland Management Area (Upland Area) stayed relatively constant throughout the 2023 WY. Wells located in the Fringe and Upland Areas rely mainly on natural recharge to maintain water supply. During below normal, dry, and critically dry hydrologic years, natural recharge may not be sufficient to maintain the groundwater levels in these wells and lack of sufficient natural recharge can potentially cause loss of production in these wells. In order to sustainably manage these Management Areas, groundwater pumping must be limited to available supply from natural recharge.

5.2.2 Representative Monitoring Sites for Water Levels (RMS-WL)

Figure 5-2 shows locations of all RMS-WL for the 2023 WY. ***Figure 5-3*** shows hydrographs of historical and recent groundwater elevations at all RMS-WL, respectively. These hydrographs further demonstrate the seasonal trends observed in both the Upper/Fringe Aquifers and the Lower Aquifer. The seasonal fluctuations are greater in the Lower Aquifer where more pumping occurs to meet seasonal demands in the warmer months, and when surface water treatment plant outages occur.

Table 5-4 compares water level measurements from the seasonal high (Spring) and seasonal low (Fall) 2023 WY monitoring events to the MTs and MOs defined at RMS-WL wells in the 2023 Alternative GSP. The table also shows the change in elevation from the previous year's seasonal low to this year's seasonal low. Groundwater elevations in all Main Basin RMS-WL wells rose significantly relative to 2022 WY conditions, especially in the Lower Aquifer (e.g., by as much as 87.6 ft at RMS-WL 3S1E12K003 in the Amador East Subarea). Water levels were measured above their respective MTs and MOs at all RMS-WL wells during the most recent, seasonal low (Fall) 2023 WY monitoring event. On September 2, 2022, the water level in RMS-WL 3S1E12K003 was about 25 below the MO. Zone 7 closely monitored the decreasing water level in this RMS-WL well as it approached and exceeded the MO threshold. In response, Zone 7 performed several management actions described in **Section 11.3**. As a result of these management actions (and assisted by rainfall later in the month), the water level in this RMS-WL rose about 100 feet to end the 2023 WY at 75 feet above the MO (see ***Figure 5-A*** below).

Figure 5-A: Groundwater Elevations in the Amador East Subarea Lower Aquifer RMS-Well



In the Fringe Aquifer, water elevations in the RMS-WL wells stayed relatively constant throughout the 2023 WY, generally varying by less than 2.5 ft compared to groundwater levels in 2022 WY.

5.2.3 Upper and Fringe Aquifers

Figure 5-4 and ***Figure 5-5*** show 2023 WY groundwater elevation contours in the Upper and Fringe Aquifers during seasonal high (Spring) and seasonal low (Fall) conditions, respectively. ***Figure 5-6*** shows the difference in water elevations from Fall 2022 to Fall 2023. ***Figure 5-7*** shows the depth to water using Fall 2023 water levels. Upper Aquifer water levels generally rose significantly (e.g., by as much as 35 feet in the western portion of the Amador Subarea), owing to above average groundwater recharge (from rainfall and stream sources) and below average municipal pumping from the Basin.

Water levels in wells in the southwestern portion of the Basin near the Arroyo de la Laguna (as indicated primarily by the RMS-WL for the Bernal Subarea Upper Aquifer 3S1E20C007 [20C7] and nearby well 3S1E29M004 [29M4]) were below the upper threshold groundwater elevation at which Basin overflow occurs (i.e., about 295 ft msl). Consequently, no water overflowed from the Upper Aquifer into the Arroyo de la Laguna and exited the Basin during the 2023 WY.

5.2.4 Lower Aquifer

Figure 5-8 and Figure 5-9 show 2023 WY groundwater elevation contours in the Lower Aquifer during seasonal high (Spring) and seasonal low (Fall) conditions, respectively. Figure 5-10 shows

the difference in groundwater elevations from Fall 2022 to Fall 2023. Figure 5-11 shows the height of water levels above historic lows, which was used to create the Measurable Objectives for the Main Basin.

Groundwater elevations in the Lower Aquifer rebounded significantly (e.g., by as much as 145 feet in the eastern portion of the Amador Subarea) from the previous year because of above-average groundwater recharge (from rainfall and stream sources) and below-average municipal pumping. In general, groundwater elevations in the Main Basin remained well above historic lows (up to about 150 ft) except in the central and southern portion of the Amador Sub-area where two current mining excavations (MA-R028 by Vulcan and MA-P042 by CEMEX, see Section 3) have extended down into the Lower Aquifer and gone below the historic low. Mining Area Pond MA-R-028 appeared to be about 33 ft below the historic low as of the seasonal low (Fall) 2023 WY monitoring event. (see Figure 5-11).

5.3 Attached Tables and Figures

***Table 5-1**: Groundwater Elevation Program Wells and Respective Monitoring Frequency*
***Table 5-2**: Well Construction Details*
***Table 5-3**: Table of Semiannual Groundwater Levels, Fall 2022 To Fall 2023*
***Table 5-4**: Table of Semiannual Groundwater Levels in Representative Monitoring Sites, Fall 2022 To Fall 2023*

***Figure 5-1**: Map of Wells in Water Level Monitoring Network*
***Figure 5-2**: Representative Monitoring Sites*
***Figure 5-3**: Hydrographs, 1975 to 2023 WYs*
***Figure 5-4**: Groundwater Gradient Map, Upper Aquifer, Spring 2023 WY*
***Figure 5-5**: Groundwater Gradient Map, Upper Aquifer, Fall 2023 WY*
***Figure 5-6**: Change in Groundwater Elevation, Upper Aquifer, Fall 2022 WY to Fall 2023 WY*
***Figure 5-7**: Depth to Groundwater, Upper Aquifer, Fall 2023 WY*
***Figure 5-8**: Groundwater Gradient Map, Lower Aquifer, Spring 2023 WY*
***Figure 5-9**: Groundwater Gradient Map, Lower Aquifer, Fall 2023 WY*
***Figure 5-10**: Change in Groundwater Elevation, Lower Aquifer, Fall 2022 WY to Fall 2023 WY*
***Figure 5-11**: Map of Groundwater Levels Above Historical Lows, Lower Aquifer, Fall 2023 WY*

TABLE 5-1
MONITORING WELLS IN 2023 GROUNDWATER LEVELS PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Meas By	Frequency (per year)	Recorder (min)	RMS-WL	RMS-ICSW	Water Right
2S1E32E001	32E1	End of Arnold Rd	None	Upper	Static-Monitor	Active	Zone 7	2				
2S1E32N001	32N1	Camp Parks	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
2S1E32Q001	32Q1	Summer Glen Dr	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
2S1E33L001	33L1	Gleason Dr @ Tassajara	None	Upper	Static-Monitor	Active	Zone 7	2				
2S1E33P002	33P2	Central Pkwy at Emerald Glen Pk	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
2S1E33R001	33R1	Central Pkwy @ Grafton	None	Upper	Static-Monitor	Active	Zone 7	2				
2S1W15F001	15F1	BOLLINGER	Fringe-Bishop	Upper	Static-Monitor	Active	Zone 7	2				
2S1W26C002	26C2	PINE VALLEY	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
2S1W36E003	36E3	Kolb Park	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
2S1W36F001	36F1	Dublin High shallow	Fringe-Dublin	Lower	Static-Nested	Active	Zone 7	2				
2S1W36F002	36F2	Dublin High mid	Fringe-Dublin	Lower	Static-Nested	Active	Zone 7	2				
2S1W36F003	36F3	Dublin High deep	Fringe-Dublin	Lower	Static-Nested	Damaged	Zone 7	2				
2S2E21L001	21L1	Merlin	Fringe-May	Upper	Supply-Domestic	Active	Zone 7	2				
2S2E27C002	27C2	Dagnino Rd	Fringe-Spring	Upper	Supply-Domestic	Active	Zone 7	2				
2S2E27K001	27K1	Model Airport	Fringe-Spring	Upper	Supply-Livestock	Inactive	Zone 7	2				
2S2E27M002	27M2	Kwan	Fringe-May	Upper	Supply-Domestic	Active	Zone 7	2				
2S2E27P002	27P2	hartford ave east	Fringe-Spring	Upper	Static-Monitor	Active	Zone 7	2			✓	
2S2E28D002	28D2	May School	Fringe-May	Upper	Static-Monitor	Active	Zone 7	2				
2S2E28J002	28J2	FCC Well	Fringe-May	Lower	Supply-Industrial	Active	Zone 7	2				
2S2E28Q001	28Q1	hartford ave	Fringe-May	Upper	Static-Monitor	Active	Zone 7	2				
2S2E32K002	32K2	jenson's N liv. Ave	Fringe-Cayetano	Upper	Static-Monitor	Active	Zone 7	2				
2S2E34E001	34E1	Mud City	Fringe-May	Upper	Static-Monitor	Active	Zone 7	12		✓	✓	
2S2E34Q002	34Q2	Hollyhock & Crocus	Fringe-Spring	Upper	Static-Monitor	Active	Zone 7	2				
3S1E01F002	1F2	Constitution Dr	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E01H003	1H3	Collier Canyon g1	Fringe-Camp	Upper	Static-Monitor	Active	LWRP	2				
3S1E01J004	1J04	Collier Vineyards	Fringe-Camp	Lower	Supply-Irrigation	Active	Zone 7	2				
3S1E01L001	1L1	Kitty Hawk	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E01P002	1P2	Airport gas g5	Main-Amador	Upper	Static-Monitor	Active	LWRP	2				
3S1E01P003	1P3	New airport well	Main-Amador	Lower	Supply-Unspecified	Inactive	Zone 7	2				
3S1E02J002	2J2	Maint. Bldg	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E02J003	2J3	Doolan Rd East	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E02K002	2K2	Doolan Rd West	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E02M003	2M3	Friesman Rd North	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E02N006	2N6	Friesman Rd South	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2			✓	
3S1E02P003	2P3	Crosswinds Church	Fringe-Camp	Lower	Supply-Domestic	Active	Zone 7	2				
3S1E02Q001	2Q1	LPGC #1	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E02R001	2R1	Beebs	Main-Amador	Upper	Static-Monitor	Active	LWRP	2			✓	

TABLE 5-1
MONITORING WELLS IN 2023 GROUNDWATER LEVELS PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Meas By	Frequency (per year)	Recorder (min)	RMS-WL	RMS-ICSW	Water Right
3S1E03G002	3G2	fallon rd	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E04A001	4A1	SMP-DUB-2	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E04J005	4J5	Pimlico shallow	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E04J006	4J6	Pimlico deep	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E04Q002	4Q2	gulfstream	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E05K006	5K6	Rosewood shallow	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2			✓	
3S1E05K007	5K7	Rosewood deep	Fringe-Camp	Lower	Static-Monitor	Active	Zone 7	2				
3S1E05L003	5L3	Oracle	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E05P006	5P6	Owens Park	Fringe-Camp	Upper	Static-Monitor	Active	Zone 7	2				
3S1E06F003	6F3	Dublin Ct	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	12		✓		
3S1E06G005	6G5	Nissan Repair	Fringe-Dublin	Lower	Supply-Industrial	Intent to Use	Zone 7	2				
3S1E06N002	6N2	DSRSD MW-3	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
3S1E06N003	6N3	DSRSD MW-4	Fringe-Dublin	Upper	Static-Monitor	Active	DSRSD	2				
3S1E06N006	6N6	DSRSD NE-76	Fringe-Dublin	Upper	Static-Monitor	Active	DSRSD	2				
3S1E07B002	7B2	Hopyard rd	Fringe-Dublin	Lower	Static-Monitor	Active	Zone 7	2				
3S1E07B012	7B12	Hacienda Arch	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
3S1E07D001	7D1	DSRSD SW-75	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	2				
3S1E07D003	7D3	DSRSD SE-70	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	2				
3S1E07D004	7D4	DSRSD SE-35	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	2				
3S1E07G007	7G7	Chabot Well	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
3S1E07J005	7J5	Thomas Hart School	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
3S1E08B001	8B1	Lizard Well	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E08G004	8G4	Apache	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E08H009	8H9	Mocho 4 Nested Shallow	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E08H010	8H10	Mocho 4 Nested Middle	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E08H011	8H11	Mocho 4 Nested deep	Main-Amador	Deep	Static-Nested	Active	Zone 7	2				
3S1E08H013	8H13	Mocho 3 mon	Main-Amador	Deep	Static-Monitor	Active	Zone 7	2				
3S1E08H018	M4	Mocho 4	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2	15			
3S1E08K001	8K1	Cockroach well	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E08N001	8N1	sports park	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E09B001	St1	Stoneridge	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E09H010	9H10	NW Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	Zone 7	2				
3S1E09H011	9H11	NW Lake I Deep	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E09H013	9H13	Lister	Main-Amador	Upper	Supply-Domestic	Active	Zone 7	2				
3S1E09J007	9J7	SW Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	Zone 7	2				
3S1E09J008	9J8	SW Lake I Middle	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E09J009	9J9	SW Lake I Deep	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				

TABLE 5-1
MONITORING WELLS IN 2023 GROUNDWATER LEVELS PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Meas By	Frequency (per year)	Recorder (min)	RMS-WL	RMS-ICSW	Water Right
3S1E09M002	M1	Mocho 1	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E09M003	M2	Mocho 2	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E09M004	M3	Mocho 3	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E09P005	9P5	Key_AmW_U (Mohr Key)	Main-Amador	Upper	Static-Monitor	Active	Zone 7	12	15	✓		
3S1E09P009	9P9	Mohr Ave Shallow	Main-Amador	Lower	Static-Nested	Active	Zone 7	12	15			
3S1E09P010	9P10	Key_AmW_L	Main-Amador	Lower	Static-Nested	Active	Zone 7	12		✓		
3S1E09P011	9P11	Mohr Ave Deep	Main-Amador	Lower	Static-Nested	Active	Zone 7	12				
3S1E10A002	10A2	El Charro Rd	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E10B008	10B8	Kaiser Rd Shallow	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E10B009	10B9	Kaiser Rd Middle 1	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E10B010	10B10	Kaiser Rd Middle 2	Main-Amador	Lower	Static-Nested	Unknown	Zone 7	2				
3S1E10B011	10B11	Kaiser Rd Deep	Main-Amador	Deep	Static-Nested	Active	Zone 7	2				
3S1E10B014	COL5 Mon	COL 5 Monitoring	Main-Amador	Lower	Static-Monitor	Unknown	Zone 7	2				
3S1E10B016	COL5	COL 5	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E10D002	10D2	Stoneridge Shallow	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E10D003	10D3	Stoneridge Middle 1	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E10D004	10D4	Stoneridge Middle 2	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E10D005	10D5	Stoneridge Deep	Main-Amador	Deep	Static-Nested	Active	Zone 7	2				
3S1E10D007	10D7	North Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	Zone 7	2				
3S1E10D008	10D8	North Lake I Cluster 2	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E10K002	COL1 Mon	COL 1 Monitoring	Main-Amador	Lower	Static-Monitor	Active	Zone 7	12				
3S1E10K003	COL1	COL 1	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E10N002	10N2	South Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	Zone 7	2				
3S1E10N003	10N3	South Lake I Deep	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E11B001	11B1	Airport West	Main-Amador	Upper	Static-Monitor	Active	LWRP	2				
3S1E11C003	11C3	LAVWMA ROW	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E11G001	11G1	Key_AmE_U	Main-Amador	Upper	Static-Nested	Active	Zone 7	12		✓		
3S1E11G002	11G2	Rancho Charro Middle 1	Main-Amador	Lower	Static-Nested	Active	Zone 7	12				
3S1E11G003	11G3	Rancho Charro Middle 2	Main-Amador	Lower	Static-Nested	Active	Zone 7	12				
3S1E11G004	11G4	Rancho Charro Deep	Main-Amador	Deep	Static-Nested	Active	Zone 7	12				
3S1E11M002	COL2 Mon	COL 2 Monitoring	Main-Amador	Lower	Static-Monitor	Active	Zone 7	2				
3S1E11M003	COL2	COL 2	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E11P006	11P6	New Jamieson Residence	Main-Amador	Lower	Supply-Domestic	Active	Zone 7	2				
3S1E12A002	12A2	Airport South	Main-Amador	Upper	Static-Monitor	Active	LWRP	2				
3S1E12D002	12D2	LWRP G6	Main-Amador	Upper	Static-Monitor	Active	LWRP	2				
3S1E12G001	12G1	Oaks Park Shallow	Main-Amador	Upper	Static-Monitor	Active	LWRP	2				
3S1E12H004	12H4	LWRP Shallow	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				

TABLE 5-1
MONITORING WELLS IN 2023 GROUNDWATER LEVELS PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Meas By	Frequency (per year)	Recorder (min)	RMS-WL	RMS-ICSW	Water Right
3S1E12H005	12H5	LWRP Middle 1	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E12H006	12H6	LWRP Middle 2	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E12H007	12H7	LWRP Deep	Main-Amador	Deep	Static-Nested	Active	Zone 7	2				
3S1E12K002	12K2	Oaks Park Mid	Main-Amador	Lower	Static-Nested	Active	Zone 7	12				
3S1E12K003	12K3	Key_AmE_L	Main-Amador	Lower	Static-Nested	Active	Zone 7	12		✓		
3S1E12K004	12K4	Oaks Park Deep	Main-Amador	Deep	Static-Nested	Active	Zone 7	12				
3S1E13P005	13P5	LGA Grant Nested 1	Main-Amador	Upper	Static-Nested	Active	Zone 7	2				
3S1E13P006	13P6	LGA Grant Nested 2	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E13P007	13P7	LGA Grant Nested 3	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E13P008	13P8	LGA Grant Nested 4	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E14B001	14B1	Industrial Asphalt	Main-Amador	Lower	Supply-Industrial	Active	Zone 7	2				
3S1E14D002	14D2	South Cope Lake	Main-Amador	Lower	Static-Monitor	Active	Zone 7	2				
3S1E15F003	15F3	Kaiser #8	Main-Amador	Lower	Supply-Unspecified	Inactive	Zone 7	2				
3S1E15J003	15J3	shadow cliff	Main-Amador	Lower	Supply-Unspecified	Unknown	Zone 7	2				
3S1E15M003	15M3	Bush/Valley South	Main-Amador	Lower	Static-Monitor	Active	Zone 7	2				
3S1E16A002	P8	Pleas 8	Main-Amador	Lower	Supply-Municipal	Active	Pleas	2				
3S1E16A004	16A4	Bush/Valley Mid	Main-Amador	Lower	Static-Monitor	Active	Zone 7	2				
3S1E16B001	16B1	Bush/Valley North	Main-Amador	Deep	Static-Monitor	Active	Zone 7	2				
3S1E16C002	16C2	Santa Rita Valley Shallow	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E16C003	16C3	Santa Rita Valley Middle	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E16C004	16C4	Santa Rita Valley Deep	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S1E16E004	16E4	black ave - cultural	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E16L002	P4	Pleas 4	Main-Amador	Lower	Supply-Municipal	Inactive	Pleas	2				
3S1E16L005	P5	Pleas 5	Main-Amador	Lower	Supply-Municipal	Active	Pleas	2				
3S1E16L007	P6	Pleas 6	Main-Amador	Lower	Supply-Municipal	Active	Pleas	2				
3S1E16P005	16P5	Vervais Monitor	Main-Amador	Upper	Static-Monitor	Active	Zone 7	12			✓	✓
3S1E16R001	16R1	Stanley Berry Farm	Main-Amador	Lower	Supply-Unspecified	Unknown	Zone 7	2				
3S1E17B004	17B4	Casterson	Main-Amador	Lower	Supply-Unspecified	Unknown	Zone 7	2				
3S1E17D003	17D3	Hopyard Nested Shallow	Main-Bernal	Lower	Static-Nested	Active	Zone 7	2				
3S1E17D004	17D4	Hopyard Nested Middle 1	Main-Bernal	Lower	Static-Nested	Active	Zone 7	2				
3S1E17D005	17D5	Hopyard Nested Middle 2	Main-Bernal	Lower	Static-Nested	Active	Zone 7	2				
3S1E17D006	17D6	Hopyard Nested Middle 3	Main-Bernal	Lower	Static-Nested	Active	Zone 7	2				
3S1E17D007	17D7	Hopyard Nested Deep	Main-Bernal	Deep	Static-Nested	Active	Zone 7	2				
3S1E17D010	H7	Hopyard 7	Main-Bernal	Lower	Static-Monitor	Active	Zone 7	2				
3S1E17D011	17D11	Hopyard 9 Monitoring Well	Main-Bernal	Lower	Static-Monitor	Active	Zone 7	2				
3S1E17D012	H9	Hopyard 9	Main-Bernal	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E18A005	P7	Pleas 7	Main-Bernal	Lower	Supply-Municipal	Inactive	Pleas	2				

TABLE 5-1
MONITORING WELLS IN 2023 GROUNDWATER LEVELS PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Meas By	Frequency (per year)	Recorder (min)	RMS-WL	RMS-ICSW	Water Right
3S1E18A006	H6	Hopyard 6	Main-Bernal	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E18E004	18E4	Valley Trails II	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E18J002	18J2	camino segura	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E18N001	18N1	merritt	Main-Bernal	Lower	Supply-Irrigation	Unknown	Zone 7	2				
3S1E19A010	SF-B	SFWD South (B)	Main-Bernal	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E19A011	SF-A	SFWD North (A)	Main-Bernal	Lower	Supply-Municipal	Active	Zone 7	2				
3S1E19C004	19C4	del valle & laguna	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E19K001	19K1	680/bernal	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E20C003	20C3	Fairgrounds Potable Backup	Main-Bernal	Lower	Supply-Unspecified	Active	Zone 7	2				
3S1E20C007	20C7	Key_Bern_U	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	12	15	✓		✓
3S1E20C008	20C8	Key_Bern_L	Main-Bernal	Lower	Static-Nested	Active	Zone 7	12		✓		
3S1E20C009	20C9	Fair Nested Deep	Main-Bernal	Lower	Static-Nested	Active	Zone 7	12				
3S1E20J004	20J4	civic center	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E20M011	20M11	S.F "M"LINE	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E20Q002	20Q2	20Q2	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E22D002	22D2	vineyard trailer	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S1E23J001	23J1	1627 vineyard trailer	Main-Amador	Lower	Supply-Domestic	Unknown	Zone 7	2				
3S1E24Q001	24Q1	Ruby Hills	Main-Amador	Lower	Supply-Irrigation	Unknown	Zone 7	2				
3S1E25C003	25C3	Katz Winery Mansion	Main-Amador	Upper	Static-Monitor	Unknown	Zone 7	2				
3S1E28M002	28M2	Bargar	Upland	Upper	Supply-Unspecified	Active	Zone 7	2				
3S1E29M004	29M4	f.c. channel	Main-Castle	Upper	Static-Monitor	Active	Zone 7	12				✓
3S1E29P002	29P2	castlewood dr	Main-Bernal	Upper	Static-Monitor	Active	Zone 7	2				
3S1E33G005	33G5	Pleasanton Calippe 33G5	Upland	Upper	Static-Monitor	Unknown	Zone 7	2				
3S1W01B009	1B9	DSRSD Shallow	Fringe-Dublin	Lower	Static-Nested	Unknown	Zone 7	2				
3S1W01B010	1B10	DSRSD Middle	Fringe-Dublin	Lower	Static-Nested	Unknown	Zone 7	2				
3S1W01B011	1B11	DSRSD Deep	Fringe-Dublin	Lower	Static-Nested	Unknown	Zone 7	2				
3S1W01J001	1J1	DSRSD MW-1	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	2				
3S1W02A002	2A2	McNamara's	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
3S1W12B002	12B2	Stoneridge Mall Rd	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
3S1W12J001	12J1	DSRSD South	Fringe-Dublin	Upper	Static-Monitor	Active	Zone 7	2				
3S1W13J001	13J1	muirwood dr	Main-Castle	Upper	Static-Monitor	Active	Zone 7	2				
3S2E01F002	1F2	Brisa at Circuit City	Fringe-Spring	Upper	Static-Monitor	Active	Zone 7	2				
3S2E02B002	2B2	south front rd	Fringe-Spring	Upper	Static-Monitor	Active	Zone 7	2				
3S2E03A001	3A1	Bluebell	Fringe-Spring	Upper	Static-Monitor	Active	Zone 7	2				
3S2E03K003	3K3	first & S. front rd	Fringe-Mocho I	Upper	Static-Monitor	Active	Zone 7	2				
3S2E05N001	5N1	Spider Well	Main-Mocho II	Mixed	Supply-Unspecified	Inactive	Zone 7	2				
3S2E07C002	7C2	jaws - york way - G4	Main-Mocho II	Upper	Static-Monitor	Active	LWRP	2				

TABLE 5-1
MONITORING WELLS IN 2023 GROUNDWATER LEVELS PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Meas By	Frequency (per year)	Recorder (min)	RMS-WL	RMS-ICSW	Water Right
3S2E07H002	7H2	dakota	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	2				
3S2E07N002	7N2	Isabel & Arroyo Mocho	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S2E07P003	CWS24	CWS 24	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S2E07R002	7R2	CWS 31 Monitoring	Main-Mocho II	Deep	Static-Monitor	Active	Zone 7	2				
3S2E07R003	CWS31	CWS 31	Upland	Lower	Supply-Municipal	Active	Zone 7	2				
3S2E08H002	8H2	North k	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	2				
3S2E08H003	8H3	Key_Mo2_L	Main-Mocho II	Lower	Static-Nested	Active	Zone 7	12		✓		
3S2E08H004	8H4	N Liv Ave Deep	Main-Mocho II	Lower	Static-Nested	Active	Zone 7	12				
3S2E08K002	8K2	Key_Mo2_U (Livermore Key)	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	12	15	✓		
3S2E08N002	CWS14	CWS 14	Main-Mocho II	Lower	Supply-Municipal	Active	Zone 7	2				
3S2E08P001	CWS8	CWS 8	Main-Mocho II	Lower	Supply-Municipal	Active	Zone 7	2				
3S2E08Q009	8Q9	D-2	Main-Mocho II	Lower	Static-Monitor	Active	Zone 7	2				
3S2E09Q004	9Q4	school st	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	2				
3S2E10F003	10F3	hexcel	Fringe-Mocho I	Upper	Static-Monitor	Active	Zone 7	2				
3S2E10Q001	10Q1	almond	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	2				
3S2E10Q002	10Q2	LLNL W-703	Main-Mocho II	Lower	Static-Monitor	Unknown	LLNL	2				
3S2E11C001	11C1	joan way	Fringe-Mocho I	Upper	Static-Monitor	Active	Zone 7	2				
3S2E12C004	12C4	LLNL W-486	Fringe-Spring	Upper	Static-Monitor	Unknown	LLNL	2				
3S2E12J003	12J3	LLNL W-017A	Fringe-Spring	Lower	Static-Monitor	Unknown	LLNL	2				
3S2E14A003	14A3	S. vasco @east ave	Fringe-Mocho I	Upper	Static-Monitor	Active	LLNL	2				
3S2E14B001	14B1	5763 east ave	Fringe-Mocho I	Lower	Supply-Domestic	Unknown	Zone 7	2				
3S2E15E002	15E2	Retzlaff Winery	Main-Mocho II	Lower	Supply-Irrigation	Active	Zone 7	2				
3S2E15L001	15L1	Concannon MW-2	Main-Mocho II	Upper	Static-Monitor	Active	Other	2				
3S2E15L002	15L2	Concannon MW-6D	Main-Mocho II	Upper	Static-Monitor	Active	Other	2				
3S2E15M002	15M2	Concannon MW-1	Main-Mocho II	Upper	Static-Monitor	Active	Other	2				
3S2E15M003	15M3	Concannon MW-5D	Main-Mocho II	Upper	Static-Monitor	Active	Other	2				
3S2E15Q006	15Q6	Concannon Old Pumping	Main-Mocho II	Lower	Supply-Irrigation	Abandoned	Zone 7	2				
3S2E15Q008	15Q 8	Concannon MW-4	Main-Mocho II	Upper	Static-Monitor	Active	Other	2				
3S2E15R017	15R17	Buena Vista Shallow	Main-Mocho II	Upper	Static-Nested	Active	Zone 7	2				
3S2E15R018	15R18	Buena Vista Deep	Main-Mocho II	Lower	Static-Nested	Active	Zone 7	2				
3S2E15R020	15R20	Concannon MW-3	Main-Mocho II	Upper	Static-Monitor	Active	Other	2				
3S2E16A003	16A3	Memory Gardens	Main-Mocho II	Lower	Supply-Irrigation	Active	Zone 7	2				
3S2E16C001	CWS15	CWS 15	Main-Mocho II	Lower	Supply-Municipal	Active	Zone 7	2				
3S2E16E004	16E4	pepper tree	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	2			✓	
3S2E18B001	CWS20	CWS 20	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	2				
3S2E18E001	18E1	Stanley East of Isabel	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S2E19D007	19D7	Isabel Shallow	Main-Amador	Upper	Static-Nested	Active	Zone 7	2				

TABLE 5-1
MONITORING WELLS IN 2023 GROUNDWATER LEVELS PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Meas By	Frequency (per year)	Recorder (min)	RMS-WL	RMS-ICSW	Water Right
3S2E19D008	19D8	Isabel Middle 1	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S2E19D009	19D9	Isabel Middle 2	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S2E19D010	19D10	Isabel Deep	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S2E19N003	19N3	Shallow Cemex Nested	Main-Amador	Upper	Static-Nested	Active	Zone 7	2				
3S2E19N004	19N4	Deep Cemex Nested	Main-Amador	Lower	Static-Nested	Active	Zone 7	2				
3S2E20M001	20M1	Alden Lane	Main-Amador	Lower	Supply-Unspecified	Active	Zone 7	2				
3S2E20R002	20R2	Ravenswood South Well	Upland	Upper	Supply-Irrigation	Active	Zone 7	2				
3S2E21K009	21K9	Marina Ave	Upland	Upper	Supply-Domestic	Active	Zone 7	2		✓		
3S2E21N001	21N1	Ravenswood North Well	Upland		Supply-Irrigation	Active	#N/A	2				
3S2E22B001	22B1	grapes	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	2				
3S2E23E001	23E1	Murrieta Nested Shallow	Main-Mocho II	Upper	Static-Nested	Active	Zone 7	2			✓	
3S2E23E002	23E2	Murrieta Nested Deep	Main-Mocho II	Lower	Static-Nested	Active	Zone 7	2				
3S2E24A001	24A1	S. greenville	Fringe-Mocho I	Upper	Static-Monitor	Active	Zone 7	12		✓		
3S2E26J002	26J2	mines rd	Main-Mocho II	Upper	Static-Monitor	Active	Zone 7	2				
3S2E29F004	29F4	Wetmore	Main-Amador	Upper	Static-Monitor	Active	Zone 7	12			✓	✓
3S2E29L001	29L1 (P3)	Sycamore Grove P3	Main-Amador	Upper	Static-Monitor	Active	Zone 7	2				
3S2E30C001	30C1	Vineyard 30C 1	Main-Amador	Lower	Supply-Unspecified	Active	Zone 7	2				
3S2E30D002	30D2	vineyard	Main-Amador	Upper	Static-Monitor	Active	Zone 7	12	15		✓	✓
3S2E32E007	32E7	DVWTP 32E7	Upland	Upper	Static-Monitor	Active	Zone 7	2			✓	
3S2E33C001	33C1	Sycamore Grove P1	Main-Amador	Upper	Static-Monitor	Inactive	Zone 7	2			✓	
3S2E33G001	33G1	Crohare	Main-Amador	Upper	Static-Monitor	Active	Zone 7	12			✓	✓
3S2E33K001	33K1	VA	Main-Amador	Upper	Static-Monitor	Unknown	VA	4				
3S2E33L001	33L1	VA/CROHARE FENCE	Main-Amador	Upper	Static-Monitor	Unknown	VA	4				
3S3E06Q003	6Q3	PPWTP South Monitoring	Fringe-Altamont	Upper	Static-Monitor	Active	Zone 7	2				
3S3E07D002	7D2	7D 2	Fringe-Spring	Upper	Static-Monitor	Active	LLNL	2				
3S3E20L004	20L4	Vail on Tesla	Fringe-Mocho I	Upper	Supply-Domestic	Active	Zone 7	2				
3S3E20R004	20R4	Buonanno on Tesla	Fringe-Mocho I	Upper	Supply-Domestic	Active	Zone 7	2				
3S3E21C001	21C1	Russell on Reuss	Upland	Upper	Supply-Domestic	Active	Zone 7	2				
4S2E01A001	1A1	Gallagher Ag	Main-Mocho II	Upper	Supply-Irrigation	Active	Zone 7	2			✓	
4S3E06E004	6E4	Gallagher Domestic	Main-Mocho II	Upper	Supply-Domestic	Active	Zone 7	2				
WELLS IN THE GROUNDWATER LEVELS PROGRAM = 252												

RMS = Representative Monitoring Site
ICSW = Interconnected Surface Water
WL = Water Levels

TABLE 5-2
WELL CONSTRUCTION DETAILS
2023 WATER YEAR

Well	Map	Alias	Basin	Aquifer	Type	Status	Completed Date	RP (ft MSL)	Well Depth (ft)	Well Diam (in)	Screened Interval (ft)
2S1E32E001	32E1	End of Arnold Rd	None	Upper	Static-Monitor	Active	12/28/2000	392.56	70	2	55 - 70
2S1E32N001	32N1	Camp Parks	Fringe-Camp	Upper	Static-Monitor	Active	7/1/1976	360.79	44	2.5	34 - 39
2S1E32Q001	32Q1	Summer Glen Dr	Fringe-Camp	Upper	Static-Monitor	Active	12/29/2000	367.55	45	2	30 - 45
2S1E33L001	33L1	Gleason Dr @ Tassajara	None	Upper	Static-Monitor	Active	12/27/2000	389.46	80	2	65 - 80
2S1E33P002	33P2	Central Pkwy at Emerald Glen Pk	Fringe-Camp	Upper	Static-Monitor	Active	12/20/2000	370.05	55	2	45 - 55
2S1E33R001	33R1	Central Pkwy @ Grafton	None	Upper	Static-Monitor	Active	10/23/2001	358.5	60	2	40 - 60
2S1W15F001	15F1	BOLLINGER	Fringe-Bishop	Upper	Static-Monitor	Active	9/28/1976	439.44	60	2.5	50.3 - 55.3
2S1W26C002	26C2	PINE VALLEY	Fringe-Dublin	Upper	Static-Monitor	Active	9/28/1976	406.53	50	2.5	40 - 45
2S1W36E003	36E3	Kolb Park	Fringe-Dublin	Upper	Static-Monitor	Active	9/13/1977	346.51	60	2.5	50 - 55
2S1W36F001	36F1	Dublin High shallow	Fringe-Dublin	Lower	Static-Nested	Active	5/8/1996	342.71	190	2	140 - 180
2S1W36F002	36F2	Dublin High mid	Fringe-Dublin	Lower	Static-Nested	Active	5/8/1996	342.71	320	2	270 - 310
2S1W36F003	36F3	Dublin High deep	Fringe-Dublin	Lower	Static-Nested	Damaged	5/8/1996	342.71	520	2	440 - 510
2S2E21L001	21L1	Merlin	Fringe-May	Upper	Supply-Domestic	Active	5/1/1973	563	168	10	49 - 168
2S2E27C002	27C2	Dagnino Rd	Fringe-Spring	Upper	Supply-Domestic	Active	10/7/1969	542.14	108	8	41 - 56
2S2E27K001	27K1	Model Airport	Fringe-Spring	Upper	Supply-Livestock	Inactive	4/28/1954	524.46	96	8	49 - 88
2S2E27M002	27M2	Kwan	Fringe-May	Upper	Supply-Domestic	Active	7/16/1975	524.52	112	6	0 - 0
2S2E27P002	27P2	hartford ave east	Fringe-Spring	Upper	Static-Monitor	Active	6/18/1979	505.43	68	4	35 - 63
2S2E28D002	28D2	May School	Fringe-May	Upper	Static-Monitor	Active	11/2/1976	555.15	55	2.5	44 - 49
2S2E28J002	28J2	FCC Well	Fringe-May	Lower	Supply-Industrial	Active	7/26/1984	522.29	230	6	50 - 230
2S2E28Q001	28Q1	hartford ave	Fringe-May	Upper	Static-Monitor	Active	11/2/1976	513.04	28	2.5	17.6 - 22.6
2S2E32K002	32K2	jenson's N liv. Ave	Fringe-Cayetano	Upper	Static-Monitor	Active	12/20/1977	507.43	43	2.5	33 - 38
2S2E34E001	34E1	Mud City	Fringe-May	Upper	Static-Monitor	Active	12/21/1977	499.73	49	2.5	40 - 45
2S2E34Q002	34Q2	Hollyhock & Crocus	Fringe-Spring	Upper	Static-Monitor	Active	12/12/2001	507.24	50	2	25 - 50
3S1E01F002	1F2	Constitution Dr	Fringe-Camp	Upper	Static-Monitor	Active	12/18/2000	428.44	40	2	25 - 40
3S1E01H003	1H3	Collier Canyon g1	Fringe-Camp	Upper	Static-Monitor	Active	12/20/1977	422.8	80	2.5	70 - 75
3S1E01J004	1J04	Collier Vineyards	Fringe-Camp	Lower	Supply-Irrigation	Active	2/6/2018	420.1	300	12	260 - 280
3S1E01L001	1L1	Kitty Hawk	Fringe-Camp	Upper	Static-Monitor	Active	12/19/2000	403.04	70	2	60 - 70
3S1E01P002	1P2	Airport gas g5	Main-Amador	Upper	Static-Monitor	Active	12/11/1975	389.64	50	2.5	40 - 45
3S1E01P003	1P3	New airport well	Main-Amador	Lower	Supply-Unspecified	Inactive	7/28/1988	394.44	480	12	245 - 460
3S1E02J002	2J2	Maint. Bldg	Fringe-Camp	Upper	Static-Monitor	Active	7/16/2003	380.89	41	2	31 - 41
3S1E02J003	2J3	Doolan Rd East	Fringe-Camp	Upper	Static-Monitor	Active	7/16/2003	406.35	65	2	55 - 65
3S1E02K002	2K2	Doolan Rd West	Fringe-Camp	Upper	Static-Monitor	Active	12/10/1975	397.04	46	2.5	36.5 - 41.5
3S1E02M003	2M3	Friesman Rd North	Fringe-Camp	Upper	Static-Monitor	Active	11/13/2000	365.04	50	2	35 - 50
3S1E02N006	2N6	Friesman Rd South	Main-Amador	Upper	Static-Monitor	Active	11/13/2000	366.14	55	2	40 - 55
3S1E02P003	2P3	Crosswinds Church	Fringe-Camp	Lower	Supply-Domestic	Active	9/26/1977	371.73	380	10	340 - 372
3S1E02Q001	2Q1	LPGC #1	Main-Amador	Upper	Static-Monitor	Active	7/16/2003	369.92	45	2	35 - 45
3S1E02R001	2R1	Beebs	Main-Amador	Upper	Static-Monitor	Active	11/1/1975	376.29	33	2.5	21 - 26

TABLE 5-2
WELL CONSTRUCTION DETAILS
2023 WATER YEAR

Well	Map	Alias	Basin	Aquifer	Type	Status	Completed Date	RP (ft MSL)	Well Depth (ft)	Well Diam (in)	Screened Interval (ft)
3S1E03G002	3G2	fallon rd	Fringe-Camp	Upper	Static-Monitor	Active	1/18/1978	354.24	50	2.5	40 - 45
3S1E04A001	4A1	SMP-DUB-2	Fringe-Camp	Upper	Static-Monitor	Active	10/23/2001	350.67	49.5	2	29.5 - 49.5
3S1E04J005	4J5	Pimlico shallow	Fringe-Camp	Upper	Static-Monitor	Active	10/25/2001	345.2	47	2	22 - 47
3S1E04J006	4J6	Pimlico deep	Fringe-Camp	Upper	Static-Monitor	Active	10/24/2001	345.55	110	2	65 - 110
3S1E04Q002	4Q2	gulfstream	Main-Amador	Upper	Static-Monitor	Active	12/13/1977	345.42	90	2.5	80 - 85
3S1E05K006	5K6	Rosewood shallow	Fringe-Camp	Upper	Static-Monitor	Active	6/7/1990	346.05	75	4	40 - 70
3S1E05K007	5K7	Rosewood deep	Fringe-Camp	Lower	Static-Monitor	Active	6/8/1990	346.19	150	4	134 - 144
3S1E05L003	5L3	Oracle	Fringe-Camp	Upper	Static-Monitor	Active	12/11/2001	339.43	40	2	15 - 40
3S1E05P006	5P6	Owens Park	Fringe-Camp	Upper	Static-Monitor	Active	12/19/2000	336.65	35	2	25 - 35
3S1E06F003	6F3	Dublin Ct	Fringe-Dublin	Upper	Static-Monitor	Active	9/29/1976	329.82	36	2.5	27 - 32
3S1E06G005	6G5	Nissan Repair	Fringe-Dublin	Lower	Supply-Industrial	Intent to Use	8/31/1977	332.22	200	8	103 - 178
3S1E06N002	6N2	DSRSD MW-3	Fringe-Dublin	Upper	Static-Monitor	Active	3/20/1985	335.2	67	4	47 - 67
3S1E06N003	6N3	DSRSD MW-4	Fringe-Dublin	Upper	Static-Monitor	Active	12/4/1984	340.74	72		52 - 72
3S1E06N006	6N6	DSRSD NE-76	Fringe-Dublin	Upper	Static-Monitor	Active	11/9/2007	333.58	75	2	50 - 70
3S1E07B002	7B2	Hopyard rd	Fringe-Dublin	Lower	Static-Monitor	Active	5/17/1979	327.77	152	4	143 - 149
3S1E07B012	7B12	Hacienda Arch	Fringe-Dublin	Upper	Static-Monitor	Active	7/31/2002	327.82	70	2	50 - 70
3S1E07D001	7D1	DSRSD SW-75	Fringe-Dublin	Upper	Static-Monitor	Unknown	11/6/2007	330.09	75	2	54 - 74
3S1E07D003	7D3	DSRSD SE-70	Fringe-Dublin	Upper	Static-Monitor	Unknown	11/2/2007	332.28	70	2	45 - 65
3S1E07D004	7D4	DSRSD SE-35	Fringe-Dublin	Upper	Static-Monitor	Unknown	11/2/2007	332.55	35	2	20 - 35
3S1E07G007	7G7	Chabot Well	Fringe-Dublin	Upper	Static-Monitor	Active	1/22/2002	327.33	55	2	35 - 55
3S1E07J005	7J5	Thomas Hart School	Fringe-Dublin	Upper	Static-Monitor	Active	7/10/2002	326.78	50	2	30 - 50
3S1E08B001	8B1	Lizard Well	Main-Amador	Upper	Static-Monitor	Active	5/31/1979	338.28	148	4	55 - 82
3S1E08G004	8G4	Apache	Main-Amador	Upper	Static-Monitor	Active	12/19/2001	341.47	85	2	60 - 85
3S1E08H009	8H9	Mocho 4 Nested Shallow	Main-Amador	Lower	Static-Nested	Active	12/12/1996	338.53	240	2	210 - 230
3S1E08H010	8H10	Mocho 4 Nested Middle	Main-Amador	Lower	Static-Nested	Active	12/12/1996	339.26	440	2	290 - 430
3S1E08H011	8H11	Mocho 4 Nested deep	Main-Amador	Deep	Static-Nested	Active	12/21/1996	339.26	720	2	520 - 720
3S1E08H013	8H13	Mocho 3 mon	Main-Amador	Deep	Static-Monitor	Active	12/11/1998	338.96	800	2	570 - 790
3S1E08H018	M4	Mocho 4	Main-Amador	Lower	Supply-Municipal	Active	11/1/2000	341.94	745	20	515 - 730
3S1E08K001	8K1	Cockroach well	Main-Amador	Upper	Static-Monitor	Active	1/23/1978	332.37	99	2.5	89 - 94
3S1E08N001	8N1	sports park	Main-Bernal	Upper	Static-Monitor	Active	8/27/1976	323.68	72	2.5	62 - 67
3S1E09B001	St1	Stoneridge	Main-Amador	Lower	Supply-Municipal	Active	1/28/1992	349.23	810	20	250 - 800
3S1E09H010	9H10	NW Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	11/22/2004	352.89	145	2	120 - 140
3S1E09H011	9H11	NW Lake I Deep	Main-Amador	Lower	Static-Nested	Active	11/22/2004	353.04	190	2	165 - 185
3S1E09H013	9H13	Lister	Main-Amador	Upper	Supply-Domestic	Active		354	145	8	0 - 0
3S1E09J007	9J7	SW Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	11/23/2004	357.36	145	2	120 - 140
3S1E09J008	9J8	SW Lake I Middle	Main-Amador	Lower	Static-Nested	Active	11/23/2004	357.55	305	2	280 - 300
3S1E09J009	9J9	SW Lake I Deep	Main-Amador	Lower	Static-Nested	Active	11/23/2004	357.68	505	2	480 - 500

TABLE 5-2
WELL CONSTRUCTION DETAILS
2023 WATER YEAR

Well	Map	Alias	Basin	Aquifer	Type	Status	Completed Date	RP (ft MSL)	Well Depth (ft)	Well Diam (in)	Screened Interval (ft)
3S1E09M002	M1	Mocho 1	Main-Amador	Lower	Supply-Municipal	Active	4/6/1964	343.95	530	16	150 - 510
3S1E09M003	M2	Mocho 2	Main-Amador	Lower	Supply-Municipal	Active	5/4/1967	347.47	575	18	250 - 570
3S1E09M004	M3	Mocho 3	Main-Amador	Lower	Supply-Municipal	Active	11/1/2000	342.89	498	20	315 - 493
3S1E09P005	9P5	Key_AmW_U (Mohr Key)	Main-Amador	Upper	Static-Monitor	Active	12/6/1977	349.4	105	2.5	95 - 100
3S1E09P009	9P9	Mohr Ave Shallow	Main-Amador	Lower	Static-Nested	Active	3/23/2005	349.44	210	2	185 - 205
3S1E09P010	9P10	Key_AmW_L	Main-Amador	Lower	Static-Nested	Active	3/23/2005	349.66	310	2	285 - 305
3S1E09P011	9P11	Mohr Ave Deep	Main-Amador	Lower	Static-Nested	Active	3/23/2005	349.44	425	2	405 - 420
3S1E10A002	10A2	El Charro Rd	Main-Amador	Upper	Static-Monitor	Active	5/10/1979	367.35	88	4	70 - 80
3S1E10B008	10B8	Kaiser Rd Shallow	Main-Amador	Lower	Static-Nested	Active	6/18/1997	353.6	200	2	100 - 190
3S1E10B009	10B9	Kaiser Rd Middle 1	Main-Amador	Lower	Static-Nested	Active	6/18/1997	353.49	294	2	244 - 284
3S1E10B010	10B10	Kaiser Rd Middle 2	Main-Amador	Lower	Static-Nested	Unknown	6/18/1997	353.52	600	2	400 - 590
3S1E10B011	10B11	Kaiser Rd Deep	Main-Amador	Deep	Static-Nested	Active	6/18/1997	353.52	810	2	660 - 800
3S1E10B014	COL5 Mon	COL 5 Monitoring	Main-Amador	Lower	Static-Monitor	Unknown	2/26/2014	355.59	690	2	390 - 690
3S1E10B016	COL5	COL 5	Main-Amador	Lower	Supply-Municipal	Active	7/19/2014	357.58	690	18	390 - 690
3S1E10D002	10D2	Stoneridge Shallow	Main-Amador	Lower	Static-Nested	Active	9/10/1998	349.32	212	2	182 - 212
3S1E10D003	10D3	Stoneridge Middle 1	Main-Amador	Lower	Static-Nested	Active	9/10/1998	349.28	322	2	262 - 312
3S1E10D004	10D4	Stoneridge Middle 2	Main-Amador	Lower	Static-Nested	Active	9/10/1998	349.3	616	2	366 - 606
3S1E10D005	10D5	Stoneridge Deep	Main-Amador	Deep	Static-Nested	Active	9/10/1998	349.32	790	2	720 - 780
3S1E10D007	10D7	North Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	12/10/2004	361.06	145	2	118 - 138
3S1E10D008	10D8	North Lake I Cluster 2	Main-Amador	Lower	Static-Nested	Active	12/10/2004	361.02	215	2	190 - 210
3S1E10K002	COL1 Mon	COL 1 Monitoring	Main-Amador	Lower	Static-Monitor	Active	1/17/2007	358.68	590.6	4	195.5 - 585.6
3S1E10K003	COL1	COL 1	Main-Amador	Lower	Supply-Municipal	Active	2/27/2008	363.79	530	18	205 - 530
3S1E10N002	10N2	South Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	12/2/2004	357.92	195	2	125 - 145
3S1E10N003	10N3	South Lake I Deep	Main-Amador	Lower	Static-Nested	Active	12/2/2004	358	195	2	170 - 190
3S1E11B001	11B1	Airport West	Main-Amador	Upper	Static-Monitor	Active	12/11/1975	369.35	43	2.5	33 - 38
3S1E11C003	11C3	LAVWMA ROW	Main-Amador	Upper	Static-Monitor	Active	12/22/2003	364.82	55	2	35 - 55
3S1E11G001	11G1	Key_AmE_U	Main-Amador	Upper	Static-Nested	Active	4/8/1997	371.62	120	2	100 - 110
3S1E11G002	11G2	Rancho Charro Middle 1	Main-Amador	Lower	Static-Nested	Active	4/8/1997	371.61	350	2	230 - 340
3S1E11G003	11G3	Rancho Charro Middle 2	Main-Amador	Lower	Static-Nested	Active	4/8/1997	371.64	590	2	380 - 580
3S1E11G004	11G4	Rancho Charro Deep	Main-Amador	Deep	Static-Nested	Active	4/8/1997	371.68	790	2	620 - 780
3S1E11M002	COL2 Mon	COL 2 Monitoring	Main-Amador	Lower	Static-Monitor	Active	9/25/2007	365.96	700	4.5	199 - 699
3S1E11M003	COL2	COL 2	Main-Amador	Lower	Supply-Municipal	Active	2/14/2008	369.24	684	18	345 - 684
3S1E11P006	11P6	New Jamieson Residence	Main-Amador	Lower	Supply-Domestic	Active	3/10/2000	376.67	400	5	240 - 380
3S1E12A002	12A2	Airport South	Main-Amador	Upper	Static-Monitor	Active	12/11/1975	401.35	69	2.5	63.7 - 68.7
3S1E12D002	12D2	LWRP G6	Main-Amador	Upper	Static-Monitor	Active		384.45	44.6		36 - 41
3S1E12G001	12G1	Oaks Park Shallow	Main-Amador	Upper	Static-Monitor	Active	12/12/1975	404.47	73	2.5	63 - 68
3S1E12H004	12H4	LWRP Shallow	Main-Amador	Lower	Static-Nested	Active	1/8/1998	407.75	270	2	185 - 260

TABLE 5-2
WELL CONSTRUCTION DETAILS
2023 WATER YEAR

Well	Map	Alias	Basin	Aquifer	Type	Status	Completed Date	RP (ft MSL)	Well Depth (ft)	Well Diam (in)	Screened Interval (ft)
3S1E12H005	12H5	LWRP Middle 1	Main-Amador	Lower	Static-Nested	Active	1/8/1998	407.78	400	2	360 - 390
3S1E12H006	12H6	LWRP Middle 2	Main-Amador	Lower	Static-Nested	Active	1/8/1998	407.75	480	2	410 - 468
3S1E12H007	12H7	LWRP Deep	Main-Amador	Deep	Static-Nested	Active	1/8/1998	407.67	684	2	609 - 674
3S1E12K002	12K2	Oaks Park Mid	Main-Amador	Lower	Static-Nested	Active	11/1/2005	406.29	300	2	210 - 295
3S1E12K003	12K3	Key_AmE_L	Main-Amador	Lower	Static-Nested	Active	11/1/2005	406.83	475	2	355 - 470
3S1E12K004	12K4	Oaks Park Deep	Main-Amador	Deep	Static-Nested	Active	11/1/2005	406.71	575	2	550 - 570
3S1E13P005	13P5	LGA Grant Nested 1	Main-Amador	Upper	Static-Nested	Active	11/2/2010	393.7	135	2	110 - 130
3S1E13P006	13P6	LGA Grant Nested 2	Main-Amador	Lower	Static-Nested	Active	11/2/2010	393.72	255	2	230 - 250
3S1E13P007	13P7	LGA Grant Nested 3	Main-Amador	Lower	Static-Nested	Active	11/2/2010	393.46	375	2	350 - 370
3S1E13P008	13P8	LGA Grant Nested 4	Main-Amador	Lower	Static-Nested	Active	11/2/2010	393.6	605	2	580 - 600
3S1E14B001	14B1	Industrial Asphalt	Main-Amador	Lower	Supply-Industrial	Active		384.2	435	8	200 - 410
3S1E14D002	14D2	South Cope Lake	Main-Amador	Lower	Static-Monitor	Active	8/30/2006	371.83	740	14.5	170 - 740
3S1E15F003	15F3	Kaiser #8	Main-Amador	Lower	Supply-Unspecified	Inactive	7/20/1965	368.99	625	14	195 - 615
3S1E15J003	15J3	shadow cliff	Main-Amador	Lower	Supply-Unspecified	Unknown	12/2/1980	344.59	196	8	154 - 184
3S1E15M003	15M3	Bush/Valley South	Main-Amador	Lower	Static-Monitor	Active	12/15/1998	362.88	600	2	280 - 590
3S1E16A002	P8	Pleas 8	Main-Amador	Lower	Supply-Municipal	Active	3/27/1992	358.2	500	20	200 - 495
3S1E16A004	16A4	Bush/Valley Mid	Main-Amador	Lower	Static-Monitor	Active	12/3/1998	359.36	603	2	280 - 580
3S1E16B001	16B1	Bush/Valley North	Main-Amador	Deep	Static-Monitor	Active	12/18/1998	355.81	805	2	605 - 800
3S1E16C002	16C2	Santa Rita Valley Shallow	Main-Amador	Lower	Static-Nested	Active	4/14/2005	344.38	190	2	165 - 185
3S1E16C003	16C3	Santa Rita Valley Middle	Main-Amador	Lower	Static-Nested	Active	4/14/2005	344.27	305	2	280 - 300
3S1E16C004	16C4	Santa Rita Valley Deep	Main-Amador	Lower	Static-Nested	Active	4/14/2005	344.16	375	2	355 - 370
3S1E16E004	16E4	black ave - cultural	Main-Amador	Upper	Static-Monitor	Active	12/15/1977	351.69	105	2.5	95 - 100
3S1E16L002	P4	Pleas 4	Main-Amador	Lower	Supply-Municipal	Inactive	4/6/1949	355.86	151	12	56 - 136
3S1E16L005	P5	Pleas 5	Main-Amador	Lower	Supply-Municipal	Active	4/4/1962	358.05	685	18	149 - 650
3S1E16L007	P6	Pleas 6	Main-Amador	Lower	Supply-Municipal	Active	6/1/1966	354.47	647	18	165 - 647
3S1E16P005	16P5	Vervais Monitor	Main-Amador	Upper	Static-Monitor	Active	10/8/1976	354.51	75	2.5	64 - 69
3S1E16R001	16R1	Stanley Berry Farm	Main-Amador	Lower	Supply-Unspecified	Unknown	3/5/1958	362.5	239	10	70 - 226
3S1E17B004	17B4	Casterson	Main-Amador	Lower	Supply-Unspecified	Unknown	1/1/1950	337.69	248	8	0 - 248
3S1E17D003	17D3	Hopyard Nested Shallow	Main-Bernal	Lower	Static-Nested	Active	8/6/1996	325.13	108	4	92 - 98
3S1E17D004	17D4	Hopyard Nested Middle 1	Main-Bernal	Lower	Static-Nested	Active	8/6/1996	325.14	236	4	206 - 226
3S1E17D005	17D5	Hopyard Nested Middle 2	Main-Bernal	Lower	Static-Nested	Active	8/6/1996	325.13	308	4	266 - 286
3S1E17D006	17D6	Hopyard Nested Middle 3	Main-Bernal	Lower	Static-Nested	Active	8/6/1996	325.12	408	4	378 - 398
3S1E17D007	17D7	Hopyard Nested Deep	Main-Bernal	Deep	Static-Nested	Active	8/6/1996	325.13	684	4	654 - 674
3S1E17D010	H7	Hopyard 7	Main-Bernal	Lower	Static-Monitor	Active	9/20/1996	328.13	425	24	150 - 415
3S1E17D011	17D11	Hopyard 9 Monitoring Well	Main-Bernal	Lower	Static-Monitor	Active	12/16/1998	324.84	603	2	340 - 505
3S1E17D012	H9	Hopyard 9	Main-Bernal	Lower	Supply-Municipal	Active	11/5/1999	327.9	315	18	235 - 310
3S1E18A005	P7	Pleas 7	Main-Bernal	Lower	Supply-Municipal	Inactive	2/15/1968	329.05	454	18	120 - 440

TABLE 5-2
WELL CONSTRUCTION DETAILS
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Well	Map	Alias	Basin	Aquifer	Type	Status	Completed Date	RP (ft MSL)	Well Depth (ft)	Well Diam (in)	Screened Interval (ft)
3S1E18A006	H6	Hopyard 6	Main-Bernal	Lower	Supply-Municipal	Active	2/1/1987	326.74	500	18	158 - 490
3S1E18E004	18E4	Valley Trails II	Main-Bernal	Upper	Static-Monitor	Active	5/31/1979	320.21	83	4	69 - 79
3S1E18J002	18J2	camino segura	Main-Bernal	Upper	Static-Monitor	Active	10/20/1977	323.02	71	2.5	61 - 66
3S1E18N001	18N1	merritt	Main-Bernal	Lower	Supply-Irrigation	Unknown	12/13/1962	319.43	708	12	229 - 708
3S1E19A010	SF-B	SFWD South (B)	Main-Bernal	Lower	Supply-Municipal	Active		337.02	331		189 - 327
3S1E19A011	SF-A	SFWD North (A)	Main-Bernal	Lower	Supply-Municipal	Active	10/9/2001	334.27	330	18	196 - 320
3S1E19C004	19C4	del valle & laguna	Main-Bernal	Upper	Static-Monitor	Active	6/11/1979	322.23	78	4	68 - 73
3S1E19K001	19K1	680/bernal	Main-Bernal	Upper	Static-Monitor	Active	12/8/1975	321.54	57.6	2.5	47.6 - 52.6
3S1E20B002	20B2	Fairgrounds Potable	Main-Bernal	Lower	Supply-Unspecified	Active	12/27/1961	344.03	500	12	218 - 500
3S1E20C003	20C3	Fairgrounds Potable Backup	Main-Bernal	Lower	Supply-Unspecified	Active		338.6	110	14	74 - 107
3S1E20C007	20C7	Key_Bern_U	Main-Bernal	Upper	Static-Monitor	Active	6/15/2000	338.66	153	2	65 - 145
3S1E20C008	20C8	Key_Bern_L	Main-Bernal	Lower	Static-Nested	Active	10/20/2008	338.67	315	2	295 - 315
3S1E20C009	20C9	Fair Nested Deep	Main-Bernal	Lower	Static-Nested	Active	10/20/2008	338.78	515	2	495 - 515
3S1E20J004	20J4	civic center	Main-Bernal	Upper	Static-Monitor	Active	12/5/1975	331.62	72	2.5	62 - 67
3S1E20M011	20M11	S.F "M"LINE	Main-Bernal	Upper	Static-Monitor	Active	10/12/1977	325.73	71	2.5	61 - 66
3S1E20Q002	20Q2	20Q2	Main-Bernal	Upper	Static-Monitor	Active	2/17/1976	325.82	65	10	45 - 53
3S1E22D002	22D2	vineyard trailer	Main-Amador	Upper	Static-Monitor	Active	10/28/1976	368.05	72	2.5	62 - 67
3S1E23J001	23J1	1627 vineyard trailer	Main-Amador	Lower	Supply-Domestic	Unknown	3/4/1958	428.2	120	8	0 - 120
3S1E24Q001	24Q1	Ruby Hills	Main-Amador	Lower	Supply-Irrigation	Unknown	10/1/1993	427.5	440	14	200 - 400
3S1E25C003	25C3	Katz Winery Mansion	Main-Amador	Upper	Static-Monitor	Unknown	11/28/1990	454.16	146	2	70 - 140
3S1E28M002	28M2	Bargar	Upland	Upper	Supply-Unspecified	Active	2/8/1962	390.01	141	5	80 - 141
3S1E29M004	29M4	f.c. channel	Main-Castle	Upper	Static-Monitor	Active	12/4/1975	310.94	57	2.5	47 - 52
3S1E29P002	29P2	castlewood dr	Main-Bernal	Upper	Static-Monitor	Active	12/9/1975	302.82	42	2.5	32 - 37
3S1E33G005	33G5	Pleasanton Calippe 33G5	Upland	Upper	Static-Monitor	Unknown	7/21/2006	408.53	35	2	11 - 35
3S1W01B009	1B9	DSRSD Shallow	Fringe-Dublin	Lower	Static-Nested	Unknown	2/15/1996	333.56	162	2	122 - 152
3S1W01B010	1B10	DSRSD Middle	Fringe-Dublin	Lower	Static-Nested	Unknown	2/15/1996	333.57	414	2	274 - 404
3S1W01B011	1B11	DSRSD Deep	Fringe-Dublin	Lower	Static-Nested	Unknown	2/15/1996	333.74	560	2	480 - 550
3S1W01J001	1J1	DSRSD MW-1	Fringe-Dublin	Upper	Static-Monitor	Unknown	12/4/1984	334.36	70		47 - 64
3S1W02A002	2A2	McNamara's	Fringe-Dublin	Upper	Static-Monitor	Active	10/7/1976	369.4	47	2.5	37 - 42
3S1W12B002	12B2	Stoneridge Mall Rd	Fringe-Dublin	Upper	Static-Monitor	Active	6/21/1996	342.89	39.5	4	20 - 50
3S1W12J001	12J1	DSRSD South	Fringe-Dublin	Upper	Static-Monitor	Active	12/9/1975	329.31	62	2.5	52 - 57
3S1W13J001	13J1	muirwood dr	Main-Castle	Upper	Static-Monitor	Active	10/7/1976	343.94	48	2.5	39 - 44
3S2E01F002	1F2	Brisa at Circuit City	Fringe-Spring	Upper	Static-Monitor	Active	12/22/1977	572.99	68.6	2.5	59 - 64
3S2E02B002	2B2	south front rd	Fringe-Spring	Upper	Static-Monitor	Active	6/7/1976	539.45	46	2.5	36.9 - 41.9
3S2E03A001	3A1	Bluebell	Fringe-Spring	Upper	Static-Monitor	Active	12/21/1977	517.63	54	2.5	44 - 49
3S2E03K003	3K3	first & S. front rd	Fringe-Mocho I	Upper	Static-Monitor	Active	12/12/1977	522.83	60	2.5	50 - 55
3S2E05N001	5N1	Spider Well	Main-Mocho II	Mixed	Supply-Unspecified	Inactive	10/5/1977	444	210	10	0 - 210

TABLE 5-2
WELL CONSTRUCTION DETAILS
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Well	Map	Alias	Basin	Aquifer	Type	Status	Completed Date	RP (ft MSL)	Well Depth (ft)	Well Diam (in)	Screened Interval (ft)
3S2E07C002	7C2	jaws - york way - G4	Main-Mocho II	Upper	Static-Monitor	Active	4/6/1978	420.84	49	2.5	39 - 44
3S2E07H002	7H2	dakota	Main-Mocho II	Upper	Static-Monitor	Active	7/29/1989	442.85	54	2	44 - 54
3S2E07N002	7N2	Isabel & Arroyo Mocho	Main-Amador	Upper	Static-Monitor	Active	12/20/2012	422	162	2	132 - 152
3S2E07P003	CWS24	CWS 24	Main-Amador	Lower	Supply-Municipal	Active	4/4/1972	431.46	510	16	300 - 490
3S2E07R002	7R2	CWS 31 Monitoring	Main-Mocho II	Deep	Static-Monitor	Active	3/4/2002	446	805	2	750 - 805
3S2E07R003	CWS31	CWS 31	Upland	Lower	Supply-Municipal	Active	9/20/2002	446	583	16	410 - 528
3S2E08F001	CWS10	CWS 10	Main-Mocho II	Lower	Supply-Municipal	Active	5/15/1954	456.24	470	16	143 - 433
3S2E08H002	8H2	North k	Main-Mocho II	Upper	Static-Monitor	Active	6/14/1976	469.61	46	2.5	36 - 41
3S2E08H003	8H3	Key_Mo2_L	Main-Mocho II	Lower	Static-Nested	Active	7/10/2009	477.4	195	2	170 - 190
3S2E08H004	8H4	N Liv Ave Deep	Main-Mocho II	Lower	Static-Nested	Active	7/10/2009	476.97	385	2	360 - 380
3S2E08K002	8K2	Key_Mo2_U (Livermore Key)	Main-Mocho II	Upper	Static-Monitor	Active	12/13/1977	464.78	74	2.5	64 - 69
3S2E08N002	CWS14	CWS 14	Main-Mocho II	Lower	Supply-Municipal	Active	1/16/1958	453.64	526	10	140 - 515
3S2E08P001	CWS8	CWS 8	Main-Mocho II	Lower	Supply-Municipal	Active	11/1/1948	468.2	273	10	122 - 263
3S2E08Q009	8Q9	D-2	Main-Mocho II	Lower	Static-Monitor	Active	6/15/1999	464.7	114	2	99 - 114
3S2E09Q004	9Q4	school st	Main-Mocho II	Upper	Static-Monitor	Active	11/1/1977	504.5	80	2.5	70 - 75
3S2E10F003	10F3	hexcel	Fringe-Mocho I	Upper	Static-Monitor	Active	12/12/1977	534.84	45	2.5	35 - 40
3S2E10Q001	10Q1	almond	Main-Mocho II	Upper	Static-Monitor	Active	11/1/1976	555.36	43.5	2.5	33.5 - 39
3S2E10Q002	10Q2	LLNL W-703	Main-Mocho II	Lower	Static-Monitor	Unknown	12/3/1990	549.33	325	4.5	298 - 325
3S2E11C001	11C1	joan way	Fringe-Mocho I	Upper	Static-Monitor	Active	11/1/1976	556.49	66.2	2.5	56.2 - 61.2
3S2E12C004	12C4	LLNL W-486	Fringe-Spring	Upper	Static-Monitor	Unknown	3/11/1988	591.46	108	4.5	100 - 108
3S2E12J003	12J3	LLNL W-017A	Fringe-Spring	Lower	Static-Monitor	Unknown	5/20/1981	628.84	160	5	127 - 157
3S2E14A003	14A3	S. vasco @east ave	Fringe-Mocho I	Upper	Static-Monitor	Active	12/13/1977	601.87	110	2.5	100 - 105
3S2E14B001	14B1	5763 east ave	Fringe-Mocho I	Lower	Supply-Domestic	Unknown	5/26/1983	593.36	300	9	146 - 234
3S2E15E002	15E2	Retzlaff Winery	Main-Mocho II	Lower	Supply-Irrigation	Active	11/14/1983	549.69	192	8	104 - 189
3S2E15L001	15L1	Concannon 2	Main-Mocho II	Upper	Static-Monitor	Active	10/10/2013	561.5	40.5	2	20 - 40.5
3S2E15L002	15L2	Concannon 6D	Main-Mocho II	Upper	Static-Monitor	Active	1/14/2015	560.8	70.5	2	40 - 70
3S2E15M002	15M2	Concannon 1	Main-Mocho II	Upper	Static-Monitor	Active	10/10/2013	549.46	45	2	25 - 45
3S2E15M003	15M3	Concannon 5D	Main-Mocho II	Upper	Static-Monitor	Active	1/13/2015	548.4	75.8	2	45.3 - 75.3
3S2E15Q006	15Q6	Concannon Old Pumping	Main-Mocho II	Lower	Supply-Irrigation	Abandoned	3/28/1980	577.56	301	12	220 - 301
3S2E15Q008	15Q 8	Concannon 4	Main-Mocho II	Upper	Static-Monitor	Active	1/14/2015	584.4	41	2	10.5 - 40.5
3S2E15R017	15R17	Buena Vista Shallow	Main-Mocho II	Upper	Static-Nested	Active	12/14/2006	592.41	63	2	38 - 58
3S2E15R018	15R18	Buena Vista Deep	Main-Mocho II	Lower	Static-Nested	Active	12/15/2007	592.47	138	2	113 - 133
3S2E15R020	15R20	Concannon 3	Main-Mocho II	Upper	Static-Monitor	Active	1/14/2015	589.4	51	2	20.5 - 50.5
3S2E16A003	16A3	Memory Gardens	Main-Mocho II	Lower	Supply-Irrigation	Active	5/1/1972	527.06	240	10	91 - 240
3S2E16C001	CWS15	CWS 15	Main-Mocho II	Lower	Supply-Municipal	Active	2/18/1958	510.97	584	16	150 - 523
3S2E16E004	16E4	pepper tree	Main-Mocho II	Upper	Static-Monitor	Active	12/15/1977	506.26	45	2.5	35 - 40
3S2E18B001	CWS20	CWS 20	Main-Amador	Lower	Supply-Municipal	Active	1/30/1961	438.56	497	16	190 - 465

TABLE 5-2
WELL CONSTRUCTION DETAILS
2023 WATER YEAR

Well	Map	Alias	Basin	Aquifer	Type	Status	Completed Date	RP (ft MSL)	Well Depth (ft)	Well Diam (in)	Screened Interval (ft)
3S2E18E001	18E1	Stanley East of Isabel	Main-Amador	Upper	Static-Monitor	Active	4/22/1977	423.86	133.8	2.5	123.8 - 128.8
3S2E19D007	19D7	Isabel Shallow	Main-Amador	Upper	Static-Nested	Active	1/29/1999	415.07	180	2	100 - 180
3S2E19D008	19D8	Isabel Middle 1	Main-Amador	Lower	Static-Nested	Active	1/29/1999	415.04	260	2	210 - 260
3S2E19D009	19D9	Isabel Middle 2	Main-Amador	Lower	Static-Nested	Active	1/29/1999	414.98	390	2	280 - 390
3S2E19D010	19D10	Isabel Deep	Main-Amador	Lower	Static-Nested	Active	1/29/1999	414.89	470	2	420 - 470
3S2E19N003	19N3	Shallow Cemex Nested	Main-Amador	Upper	Static-Nested	Active	7/27/2018	418.45	120	2	105 - 115
3S2E19N004	19N4	Deep Cemex Nested	Main-Amador	Lower	Static-Nested	Active	7/27/2018	417.96	203	2	188 - 198
3S2E20M001	20M1	Alden Lane	Main-Amador	Lower	Supply-Unspecified	Active	9/15/1928	478.79	184	12	0 - 184
3S2E20R002	20R2	Ravenswood South Well	Upland	Upper	Supply-Irrigation	Active	5/1/1985	523.15	257	9	107 - 252
3S2E21K009	21K9	Marina Ave	Upland	Upper	Supply-Domestic	Active		567.08		6	0 - 0
3S2E21N001	21N1	Ravenswood North Well	Upland		Supply-Irrigation	Active	5/14/1987	522	320	8	110 - 310
3S2E22B001	22B1	grapes	Main-Mocho II	Upper	Static-Monitor	Active	7/8/1976	585.88	31.9	2.5	21.9 - 26.9
3S2E23E001	23E1	Murrieta Nested Shallow	Main-Mocho II	Upper	Static-Nested	Active	9/2/2004	613.36	40	2	20 - 35
3S2E23E002	23E2	Murrieta Nested Deep	Main-Mocho II	Lower	Static-Nested	Active	9/2/2004	613.23	110	2	95 - 105
3S2E24A001	24A1	S. greenville	Fringe-Mocho I	Upper	Static-Monitor	Active	11/1/1976	717.7	46.3	2.5	36.3 - 41.3
3S2E26J002	26J2	mines rd	Main-Mocho II	Upper	Static-Monitor	Active	12/27/1977	689.92	44	2.5	34 - 39
3S2E29F004	29F4	Wetmore	Main-Amador	Upper	Static-Monitor	Active	10/28/1976	457.5	36	2.5	26 - 31
3S2E29L001	29L1 (P3)	Sycamore Grove P3	Main-Amador	Upper	Static-Monitor	Active	11/29/2001	463.64	23	2	8 - 23
3S2E30C001	30C1	Vineyard 30C 1	Main-Amador	Lower	Supply-Unspecified	Active	3/16/1995	439.41	150	6	125 - 145
3S2E30D002	30D2	vineyard	Main-Amador	Upper	Static-Monitor	Active	6/18/1979	431.6	44	4	24 - 39
3S2E32E007	32E7	DVWTP 32E7	Upland	Upper	Static-Monitor	Active	7/16/1991	610.94	37	6	19 - 34
3S2E33C001	33C1	Sycamore Grove P1	Main-Amador	Upper	Static-Monitor	Inactive	11/29/2001	497.63	20	2	5 - 20
3S2E33G001	33G1	Crohare	Main-Amador	Upper	Static-Monitor	Active	12/12/1975	511.52	17	2.5	9 - 14
3S2E33K001	33K1	VA	Main-Amador	Upper	Static-Monitor	Unknown		546.83	15	2.5	7 - 12
3S2E33L001	33L1	VA/CROHARE FENCE	Main-Amador	Upper	Static-Monitor	Unknown		557.63	16	2.5	11 - 16
3S3E06Q003	6Q3	PPWTP South Monitoring	Fringe-Altamont	Upper	Static-Monitor	Active	8/29/2016	681.07	30	2	20 - 30
3S3E07D002	7D2	7D 2	Fringe-Spring	Upper	Static-Monitor	Active	11/1/1976	621.94	72	2.5	64 - 69
3S3E19C002	19C2	Wilker well 2	Fringe-Mocho I	Upper	Supply-Domestic	Active		740.7	66	8	0 - 66
3S3E20L004	20L4	Vail on Tesla	Fringe-Mocho I	Upper	Supply-Domestic	Active	8/15/2005	862.38	340	5	0 - 0
3S3E20R004	20R4	Buonanno on Tesla	Fringe-Mocho I	Upper	Supply-Domestic	Active		923.77		6	0 - 0
3S3E21C001	21C1	Russell on Reuss	Upland	Upper	Supply-Domestic	Active	1/1/1977	1067.2	128	12	60 - 124
4S2E01A001	1A1	Gallagher Ag	Main-Mocho II	Upper	Supply-Irrigation	Active	2/6/2015	819.76	130	6	45 - 130
4S3E06E004	6E4	Gallagher Domestic	Main-Mocho II	Upper	Supply-Domestic	Active	5/28/1976	807.68	220	10	184 - 212
TOTAL WELLS IN THE BOTH THE GROUNDWATER LEVELS & QUALITY PROGRAMS = 255											

RP = Reference Point Elevation (in feet above Mean Sea Level)

TABLE 5-3
SEMIANNUAL GROUNDWATER LEVELS
(Feet above Mean Sea Level, NAVD88)
FALL 2022 TO FALL 2023

					Fall 2022		Spring 2023		Fall 2023		Change in Elevation (ft)		
											Seasonal		Annual
Well Number	Display Name	Well Depth	Aquifer	Subarea	Depth to Water	GW Elev	Depth to Water (ft)	GW Elev	Depth to Water (ft)	GW Elev	Fall 22 to Spring 23	Spring 23 to Fall 23	Fall 22 to Fall 23
2S1E32E001	32E1	70	Upper	None	42.5	350.1	36.4	356.2	38.0	354.6	6.1	-1.6	4.5
2S1E32N001	32N1	44	Upper	Fringe-Camp	20.6	340.2	16.7	344.1	18.8	342.0	4.0	-2.2	1.8
2S1E32Q001	32Q1	45	Upper	Fringe-Camp	30.8	336.7	26.8	340.7	27.9	339.7	4.0	-1.1	2.9
2S1E33L001	33L1	80	Upper	None	56.7	332.8	54.4	335.1	53.4	336.1	2.3	1.0	3.3
2S1E33P002	33P2	55	Upper	Fringe-Camp	37.3	332.8	34.3	335.7	34.1	336.0	2.9	0.3	3.2
2S1E33R001	33R1	60	Upper	None	23.6	334.9	20.5	338.0	20.7	337.8	3.1	-0.2	2.8
2S1W15F001	15F1	60	Upper	Fringe-Bishop	11.5	427.9	8.0	431.4	10.1	429.3	3.5	-2.1	1.4
2S1W26C002	26C2	50	Upper	Fringe-Dublin	27.2	379.4	17.9	388.6	22.8	383.8	9.2	-4.8	4.4
2S1W36E003	36E3	60	Upper	Fringe-Dublin	5.1	341.4	2.6	343.9	4.3	342.2	2.5	-1.7	0.8
2S1W36F001	36F1	190	Lower	Fringe-Dublin	16.0	326.7	12.9	329.9	13.5	329.2	3.1	-0.7	2.5
2S1W36F002	36F2	320	Lower	Fringe-Dublin	10.6	332.2	11.3	331.4	10.4	332.4	-0.8	1.0	0.2
2S1W36F003	36F3	520	Lower	Fringe-Dublin	29.6	313.2	29.4	313.4	25.6	317.1	0.2	3.8	4.0
2S2E21L001	21L1	168	Upper	Fringe-May	37.5	525.5	35.2	527.8	35.5	527.6	2.3	-0.2	2.0
2S2E27C002	27C2	108	Upper	Fringe-Spring	16.4	525.7	11.4	530.8	12.3	529.8	5.0	-0.9	4.1
2S2E27K001	27K1	96	Upper	Fringe-Spring	10.6	513.9	5.6	518.9	8.7	515.8	5.0	-3.1	1.9
2S2E27M002	27M2	112	Upper	Fringe-May	9.7	514.8	5.1	519.4	13.9	510.6	4.6	-8.8	-4.2
2S2E27P002	27P2	68	Upper	Fringe-Spring	3.9	501.6	0.6	504.8	2.8	502.6	3.2	-2.2	1.0
2S2E28D002	28D2	55	Upper	Fringe-May	31.2	524.0	30.0	525.2	29.3	525.9	1.3	0.7	1.9
2S2E28J002	28J2	230	Lower	Fringe-May	8.0	514.3	4.8	517.5	6.7	515.6	3.2	-1.9	1.3
2S2E28Q001	28Q1	28	Upper	Fringe-May	8.6	504.4	2.3	510.7	8.0	505.0	6.3	-5.7	0.6
2S2E32K002	32K2	43	Upper	Fringe-Cayetano	10.3	497.2	6.6	500.9	9.0	498.5	3.7	-2.4	1.3
2S2E34E001	34E1	49	Upper	Fringe-May	6.0	493.7	2.5	497.2	5.7	494.0	3.5	-3.2	0.3
2S2E34Q002	34Q2	50	Upper	Fringe-Spring	4.0	503.2	2.1	505.1	3.7	503.6	1.9	-1.6	0.3
3S1E01F002	1F2	40	Upper	Fringe-Camp	21.8	406.7	17.9	410.6	19.5	409.0	3.9	-1.6	2.3
3S1E01H003	1H3	80	Upper	Fringe-Camp	31.0	391.8	24.0	398.8	26.0	396.8	7.0	-2.0	5.0
3S1E01J004	1J04	300	Lower	Fringe-Camp	NA	NA	NA	NA	NA	NA	-	-	-
3S1E01L001	1L1	70	Upper	Fringe-Camp	62.2	340.8	56.8	346.3	52.0	351.1	5.4	4.8	10.2
3S1E01P002	1P2	50	Upper	Main-Amador	29.0	360.6	14.0	375.6	15.0	374.6	15.0	-1.0	14.0
3S1E01P003	1P3	480	Lower	Main-Amador	171.8	222.6	106.4	288.0	98.7	295.8	65.4	7.8	73.2
3S1E02J002	2J2	41	Upper	Fringe-Camp	17.8	363.1	8.0	372.9	12.4	368.5	9.8	-4.3	5.5
3S1E02J003	2J3	65	Upper	Fringe-Camp	29.6	376.8	26.7	379.7	25.9	380.5	2.9	0.8	3.7
3S1E02K002	2K2	46	Upper	Fringe-Camp	28.1	369.0	23.7	373.3	25.1	371.9	4.4	-1.4	2.9
3S1E02M003	2M3	50	Upper	Fringe-Camp	16.1	349.0	11.4	353.7	12.6	352.5	4.7	-1.2	3.5
3S1E02N006	2N6	55	Upper	Main-Amador	29.2	336.9	23.1	343.1	27.7	338.5	6.1	-4.6	1.6
3S1E02P003	2P3	380	Lower	Fringe-Camp	152.2	219.5	86.6	285.2	79.6	292.2	65.6	7.0	72.7
3S1E02Q001	2Q1	45	Upper	Main-Amador	23.1	346.9	13.3	356.7	18.3	351.7	9.8	-5.0	4.8
3S1E02R001	2R1	33	Upper	Main-Amador	19.4	356.9	9.0	367.3	14.0	362.3	10.4	-5.0	5.4
3S1E03G002	3G2	50	Upper	Fringe-Camp	12.1	342.1	11.0	343.2	12.2	342.1	1.1	-1.2	-0.1
3S1E04A001	4A1	50	Upper	Fringe-Camp	20.6	330.1	17.6	333.0	17.9	332.8	3.0	-0.3	2.7
3S1E04J005	4J5	47	Upper	Fringe-Camp	19.0	326.2	14.5	330.7	16.7	328.6	4.5	-2.2	2.3
3S1E04J006	4J6	110	Upper	Fringe-Camp	23.2	322.4	19.4	326.2	20.1	325.4	3.8	-0.7	3.1
3S1E04Q002	4Q2	90	Upper	Main-Amador	67.4	278.0	59.6	285.9	56.0	289.4	7.9	3.6	11.4
3S1E05K006	5K6	75	Upper	Fringe-Camp	17.1	328.9	12.5	333.6	14.7	331.3	4.7	-2.3	2.4
3S1E05K007	5K7	150	Lower	Fringe-Camp	27.2	319.0	21.8	324.4	20.9	325.3	5.4	0.9	6.3
3S1E05L003	5L3	40	Upper	Fringe-Camp	14.0	325.4	12.3	327.2	13.1	326.3	1.7	-0.8	0.9
3S1E05P006	5P6	35	Upper	Fringe-Camp	14.8	321.8	10.5	326.2	12.4	324.3	4.4	-1.9	2.4
3S1E06F003	6F3	36	Upper	Fringe-Dublin	6.3	323.5	4.2	325.7	5.6	324.2	2.1	-1.5	0.7
3S1E06G005	6G5	200	Lower	Fringe-Dublin	11.8	320.4	10.2	322.1	10.2	322.0	1.7	0.0	1.6
3S1E06N002	6N2	67	Upper	Fringe-Dublin	15.0	320.2	12.5	322.7	14.2	321.0	2.5	-1.7	0.8
3S1E06N003	6N3	72	Upper	Fringe-Dublin	NA	NA	18.6	322.2	NA	NA	-	-	-
3S1E06N006	6N6	75	Upper	Fringe-Dublin	NA	NA	14.4	319.2	NA	NA	-	-	-
3S1E07B002	7B2	152	Lower	Fringe-Dublin	12.9	314.8	11.3	316.5	11.2	316.6	1.7	0.1	1.8
3S1E07B012	7B12	70	Upper	Fringe-Dublin	15.1	312.8	13.3	314.6	13.9	313.9	1.8	-0.7	1.1
3S1E07D001	7D1	75	Upper	Fringe-Dublin	NA	NA	17.6	312.5	NA	NA	-	-	-
3S1E07D003	7D3	70	Upper	Fringe-Dublin	NA	NA	20.5	311.8	NA	NA	-	-	-
3S1E07D004	7D4	35	Upper	Fringe-Dublin	NA	NA	13.4	319.2	NA	NA	-	-	-
3S1E07G007	7G7	55	Upper	Fringe-Dublin	17.8	309.6	15.6	311.7	16.1	311.3	2.1	-0.4	1.7
3S1E07J005	7J5	50	Upper	Fringe-Dublin	28.7	298.1	15.9	310.9	29.4	297.4	12.7	-13.5	-0.8
3S1E08B001	8B1	148	Upper	Main-Amador	53.6	284.7	53.6	284.7	52.2	286.1	0.0	1.5	1.4
3S1E08G004	8G4	85	Upper	Main-Amador	68.4	273.1	62.0	279.5	55.3	286.2	6.3	6.8	13.1
3S1E08H009	8H9	240	Lower	Main-Amador	100.4	238.1	58.5	280.1	51.0	287.5	42.0	7.5	49.4
3S1E08H010	8H10	440	Lower	Main-Amador	135.3	204.0	59.3	280.0	52.3	286.9	76.0	7.0	83.0
3S1E08H011	8H11	720	Deep	Main-Amador	177.3	162.0	84.7	254.6	84.5	254.8	92.6	0.3	92.9
3S1E08H013	8H13	800	Deep	Main-Amador	173.2	165.8	78.0	261.0	77.0	262.0	95.2	0.9	96.2
3S1E08H018	M4	745	Lower	Main-Amador	NA	NA	NA	NA	57.4	284.5	-	-	-
3S1E08K001	8K1	99	Upper	Main-Amador	80.1	252.3	64.9	267.4	50.4	281.9	15.1	14.5	29.6
3S1E08N001	8N1	72	Upper	Main-Bernal	66.4	257.3	60.8	262.9	NA	NA	5.6	-	-
3S1E09B001	St1	810	Lower	Main-Amador	NA	NA	NA	NA	56.7	292.6	-	-	-
3S1E09H010	9H10	145	Upper	Main-Amador	80.1	272.8	72.9	280.0	66.0	286.9	7.2	6.9	14.1
3S1E09H011	9H11	190	Lower	Main-Amador	95.6	257.5	70.7	282.4	63.7	289.4	24.9	7.0	31.9

U = Upper; L = Lower; NM = Not Measured; NA = Not Available; OBS = Obstructed; - = Not Applicable
Highlighted = Representative Monitoring Site

TABLE 5-3
SEMIANNUAL GROUNDWATER LEVELS
(Feet above Mean Sea Level, NAVD88)
FALL 2022 TO FALL 2023

					Fall 2022		Spring 2023		Fall 2023		Change in Elevation (ft)		
											Seasonal		Annual
Well Number	Display Name	Well Depth	Aquifer	Subarea	Depth to Water	GW Elev	Depth to Water (ft)	GW Elev	Depth to Water (ft)	GW Elev	Fall 22 to Spring 23	Spring 23 to Fall 23	Fall 22 to Fall 23
2S1E32E001	32E1	70	Upper	None	42.5	350.1	36.4	356.2	38.0	354.6	6.1	-1.6	4.5
2S1E32N001	32N1	44	Upper	Fringe-Camp	20.6	340.2	16.7	344.1	18.8	342.0	4.0	-2.2	1.8
2S1E32Q001	32Q1	45	Upper	Fringe-Camp	30.8	336.7	26.8	340.7	27.9	339.7	4.0	-1.1	2.9
2S1E33L001	33L1	80	Upper	None	56.7	332.8	54.4	335.1	53.4	336.1	2.3	1.0	3.3
2S1E33P002	33P2	55	Upper	Fringe-Camp	37.3	332.8	34.3	335.7	34.1	336.0	2.9	0.3	3.2
2S1E33R001	33R1	60	Upper	None	23.6	334.9	20.5	338.0	20.7	337.8	3.1	-0.2	2.8
3S1E09H013	9H13	145	Upper	Main-Amador	82.5	271.5	74.8	279.2	68.3	285.7	7.7	6.5	14.2
3S1E09J007	9J7	145	Upper	Main-Amador	86.3	271.1	77.7	279.7	70.5	286.9	8.6	7.1	15.8
3S1E09J008	9J8	305	Lower	Main-Amador	112.9	244.6	75.7	281.9	68.4	289.2	37.3	7.3	44.6
3S1E09J009	9J9	505	Lower	Main-Amador	144.8	212.9	76.8	280.9	69.2	288.5	68.0	7.6	75.6
3S1E09M002	M1	530	Lower	Main-Amador	NA	NA	NA	NA	NA	NA	-	-	-
3S1E09M003	M2	575	Lower	Main-Amador	117.4	230.0	67.6	279.8	59.7	287.8	49.8	8.0	57.8
3S1E09M004	M3	498	Lower	Main-Amador	NA	NA	81.2	261.7	38.1	304.8	-	43.1	-
3S1E09P005	9P5	105	Upper	Main-Amador	80.9	268.5	70.2	279.2	62.5	286.9	10.7	7.7	18.4
3S1E09P009	9P9	210	Lower	Main-Amador	93.0	256.6	69.5	280.1	61.7	287.9	23.4	7.9	31.3
3S1E09P010	9P10	310	Lower	Main-Amador	108.4	241.1	68.8	280.7	61.2	288.3	39.6	7.6	47.2
3S1E09P011	9P11	425	Lower	Main-Amador	136.0	213.4	68.9	280.5	61.0	288.4	67.1	7.9	75.0
3S1E10A002	10A2	88	Upper	Main-Amador	69.5	297.9	56.8	310.6	62.9	304.5	12.7	-6.1	6.6
3S1E10B008	10B8	200	Lower	Main-Amador	88.7	264.9	69.3	284.3	62.6	291.0	19.4	6.7	26.1
3S1E10B009	10B9	294	Lower	Main-Amador	105.8	247.7	69.5	284.0	62.8	290.7	36.2	6.7	42.9
3S1E10B010	10B10	600	Lower	Main-Amador	136.6	217.0	71.5	282.1	65.8	287.8	65.1	5.7	70.8
3S1E10B011	10B11	810	Deep	Main-Amador	156.8	196.8	73.8	279.8	71.6	281.9	83.0	2.2	85.2
3S1E10B014	COL5 Mon	690	Lower	Main-Amador	146.4	209.2	76.6	279.0	69.4	286.2	69.8	7.2	77.0
3S1E10B016	COL5	690	Lower	Main-Amador	NA	NA	NA	NA	72.0	285.6	-	-	-
3S1E10D002	10D2	212	Lower	Main-Amador	92.5	256.8	65.4	283.9	58.5	290.8	27.1	6.9	34.0
3S1E10D003	10D3	322	Lower	Main-Amador	104.1	245.2	66.7	282.6	59.2	290.1	37.4	7.5	44.9
3S1E10D004	10D4	616	Lower	Main-Amador	129.9	219.4	88.8	260.5	59.8	289.5	41.1	29.0	70.1
3S1E10D005	10D5	790	Deep	Main-Amador	155.1	194.2	70.8	278.5	60.4	288.9	84.3	10.4	94.7
3S1E10D007	10D7	145	Upper	Main-Amador	85.1	276.0	80.7	280.4	73.8	287.3	4.4	6.9	11.3
3S1E10D008	10D8	215	Lower	Main-Amador	103.5	257.6	76.7	284.4	69.8	291.2	26.8	6.8	33.6
3S1E10K002	COL1 Mon	591	Lower	Main-Amador	112.4	246.3	74.7	284.0	68.8	289.9	37.7	5.9	43.7
3S1E10K003	COL1	530	Lower	Main-Amador	NA	NA	NA	NA	74.0	289.8	-	-	-
3S1E10N002	10N2	195	Upper	Main-Amador	85.4	272.5	78.0	279.9	70.9	287.0	7.4	7.1	14.5
3S1E10N003	10N3	195	Lower	Main-Amador	99.4	258.6	75.7	282.3	68.8	289.2	23.7	6.8	30.6
3S1E11B001	11B1	43	Upper	Main-Amador	35.0	334.4	26.0	343.4	29.0	340.4	9.0	-3.0	6.0
3S1E11C003	11C3	55	Upper	Main-Amador	32.9	331.9	27.8	337.0	30.3	334.5	5.1	-2.5	2.6
3S1E11G001	11G1	120	Upper	Main-Amador	85.7	285.9	61.2	310.5	54.3	317.3	24.6	6.9	31.4
3S1E11G002	11G2	350	Lower	Main-Amador	137.6	234.0	82.1	289.5	76.9	294.7	55.5	5.2	60.7
3S1E11G003	11G3	590	Lower	Main-Amador	157.8	213.8	87.9	283.7	80.9	290.8	69.9	7.1	77.0
3S1E11G004	11G4	790	Deep	Main-Amador	184.5	187.2	95.4	276.3	84.3	287.4	89.1	11.0	100.2
3S1E11M002	COL2 Mon	700	Lower	Main-Amador	125.0	241.0	80.7	285.3	75.0	291.0	44.3	5.7	50.0
3S1E11M003	COL2	684	Lower	Main-Amador	NA	NA	NA	NA	79.7	289.5	-	-	-
3S1E11P006	11P6	400	Lower	Main-Amador	NA	NA	92.2	284.5	87.1	289.6	-	5.1	-
3S1E12A002	12A2	69	Upper	Main-Amador	44.0	357.4	31.0	370.4	30.0	371.4	13.0	1.0	14.0
3S1E12D002	12D2	45	Upper	Main-Amador	NA	NA	29.0	355.5	29.0	355.5	-	0.0	-
3S1E12G001	12G1	73	Upper	Main-Amador	65.0	339.5	57.0	347.5	53.0	351.5	8.0	4.0	12.0
3S1E12H004	12H4	270	Lower	Main-Amador	175.4	232.4	111.5	296.3	106.8	300.9	63.9	4.7	68.6
3S1E12H005	12H5	400	Lower	Main-Amador	209.2	198.6	125.0	282.8	115.6	292.2	84.2	9.4	93.6
3S1E12H006	12H6	480	Lower	Main-Amador	212.4	195.4	127.7	280.1	117.0	290.8	84.7	10.7	95.4
3S1E12H007	12H7	684	Deep	Main-Amador	215.0	192.7	195.6	212.1	184.7	223.0	19.4	10.9	30.3
3S1E12K002	12K2	300	Lower	Main-Amador	168.3	238.0	106.6	299.7	106.0	300.3	61.7	0.6	62.3
3S1E12K003	12K3	475	Lower	Main-Amador	199.6	207.2	120.0	286.9	112.0	294.9	79.7	8.0	87.6
3S1E12K004	12K4	575	Deep	Main-Amador	205.5	201.2	149.6	257.1	136.8	270.0	55.9	12.8	68.7
3S1E13P005	13P5	135	Upper	Main-Amador	117.6	276.2	103.9	289.8	101.4	292.3	13.6	2.5	16.2
3S1E13P006	13P6	255	Lower	Main-Amador	170.2	223.5	114.7	279.0	109.2	284.5	55.5	5.5	61.0
3S1E13P007	13P7	375	Lower	Main-Amador	178.0	215.5	109.1	284.4	101.0	292.5	68.9	8.1	77.0
3S1E13P008	13P8	605	Lower	Main-Amador	190.1	203.5	157.3	236.4	146.1	247.5	32.8	11.1	43.9
3S1E14B001	14B1	435	Lower	Main-Amador	159.1	225.1	103.2	281.0	98.4	285.8	55.9	4.9	60.7
3S1E14D002	14D2	740	Lower	Main-Amador	127.5	244.4	86.9	285.0	81.8	290.1	40.6	5.1	45.7
3S1E15F003	15F3	625	Lower	Main-Amador	158.7	210.3	87.8	281.2	78.9	290.1	70.9	8.9	79.8
3S1E15J003	15J3	196	Lower	Main-Amador	139.3	205.3	58.4	286.2	49.6	295.0	80.9	8.8	89.7
3S1E15M003	15M3	600	Lower	Main-Amador	164.8	198.1	98.8	264.1	85.3	277.6	66.0	13.5	79.5
3S1E16A002	P8	500	Lower	Main-Amador	151.7	204.4	77.5	278.6	72.8	283.4	74.2	4.8	79.0
3S1E16A004	16A4	603	Lower	Main-Amador	153.3	206.1	79.4	280.0	70.3	289.1	73.9	9.1	83.0
3S1E16B001	16B1	805	Deep	Main-Amador	170.2	185.6	78.4	277.5	67.7	288.1	91.9	10.7	102.5
3S1E16C002	16C2	190	Lower	Main-Amador	109.9	234.4	64.8	279.6	56.1	288.3	45.2	8.7	53.8
3S1E16C003	16C3	305	Lower	Main-Amador	143.2	201.1	64.5	279.8	55.7	288.6	78.7	8.8	87.5
3S1E16C004	16C4	375	Lower	Main-Amador	156.7	187.5	64.9	279.3	55.7	288.5	91.8	9.2	101.0
3S1E16E004	16E4	105	Upper	Main-Amador	96.2	255.5	68.5	283.2	57.4	294.3	27.7	11.1	38.8
3S1E16L002	P4	151	Lower	Main-Amador	109.5	236.8	69.9	276.4	59.6	286.7	39.6	10.3	49.9

U = Upper; L = Lower; NM = Not Measured; NA = Not Available; OBS = Obstructed; - = Not Applicable
Highlighted = Representative Monitoring Site
P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Tbl03-TblSAWaterLevels23.xlsx

TABLE 5-3
SEMIANNUAL GROUNDWATER LEVELS
(Feet above Mean Sea Level, NAVD88)
FALL 2022 TO FALL 2023

					Fall 2022		Spring 2023		Fall 2023		Change in Elevation (ft)		
											Seasonal		Annual
Well Number	Display Name	Well Depth	Aquifer	Subarea	Depth to Water	GW Elev	Depth to Water (ft)	GW Elev	Depth to Water (ft)	GW Elev	Fall 22 to Spring 23	Spring 23 to Fall 23	Fall 22 to Fall 23
2S1E32E001	32E1	70	Upper	None	42.5	350.1	36.4	356.2	38.0	354.6	6.1	-1.6	4.5
2S1E32N001	32N1	44	Upper	Fringe-Camp	20.6	340.2	16.7	344.1	18.8	342.0	4.0	-2.2	1.8
2S1E32Q001	32Q1	45	Upper	Fringe-Camp	30.8	336.7	26.8	340.7	27.9	339.7	4.0	-1.1	2.9
2S1E33L001	33L1	80	Upper	None	56.7	332.8	54.4	335.1	53.4	336.1	2.3	1.0	3.3
2S1E33P002	33P2	55	Upper	Fringe-Camp	37.3	332.8	34.3	335.7	34.1	336.0	2.9	0.3	3.2
2S1E33R001	33R1	60	Upper	None	23.6	334.9	20.5	338.0	20.7	337.8	3.1	-0.2	2.8
3S1E16L005	P5	685	Lower	Main-Amador	NA	NA	66.5	279.8	61.2	285.1	-	5.3	-
3S1E16L007	P6	647	Lower	Main-Amador	NA	NA	5.5	338.0	59.4	284.1	-	-53.9	-
3S1E16P005	16P5	75	Upper	Main-Amador	47.4	307.1	30.2	324.3	33.1	321.4	17.2	-2.9	14.3
3S1E16R001	16R1	239	Lower	Main-Amador	144.5	218.0	76.4	286.1	63.3	299.2	68.1	13.1	81.2
3S1E17B004	17B4	248	Lower	Main-Amador	99.2	238.5	71.1	266.6	58.6	279.1	28.1	12.6	40.7
3S1E17D004	17D4	236	Lower	Main-Bernal	87.0	238.2	60.3	264.9	47.8	277.3	26.7	12.5	39.2
3S1E17D005	17D5	308	Lower	Main-Bernal	87.0	238.1	60.1	265.0	47.7	277.4	26.9	12.4	39.3
3S1E17D006	17D6	408	Lower	Main-Bernal	73.7	251.5	57.1	268.0	47.2	277.9	16.5	9.9	26.4
3S1E17D007	17D7	684	Deep	Main-Bernal	21.3	303.8	18.7	306.5	18.2	307.0	2.6	0.5	3.2
3S1E17D010	H7	425	Lower	Main-Bernal	86.5	241.7	62.3	265.8	50.1	278.0	24.2	12.2	36.4
3S1E17D011	17D11	603	Lower	Main-Bernal	71.5	253.4	56.5	268.3	47.3	277.6	14.9	9.3	24.2
3S1E17D012	H9	315	Lower	Main-Bernal	NA	NA	NA	NA	NA	NA	-	-	-
3S1E18A005	P7	454	Lower	Main-Bernal	96.1	231.2	87.2	240.1	51.9	275.4	8.9	35.3	44.2
3S1E18A006	H6	500	Lower	Main-Bernal	NA	NA	NA	NA	50.9	275.9	-	-	-
3S1E18E004	18E4	83	Upper	Main-Bernal	57.1	263.1	56.0	264.2	43.0	277.3	1.1	13.1	14.2
3S1E18J002	18J2	71	Upper	Main-Bernal	62.6	260.4	60.8	262.3	45.7	277.4	1.8	15.1	16.9
3S1E18N001	18N1	708	Lower	Main-Bernal	57.5	261.9	35.2	284.3	30.9	288.5	22.4	4.2	26.6
3S1E19A010	SF-B	331	Lower	Main-Bernal	95.4	241.7	NA	NA	63.5	273.6	-	-	31.9
3S1E19A011	SF-A	330	Lower	Main-Bernal	89.7	244.5	68.6	265.7	NA	NA	21.2	-	-
3S1E19C004	19C4	78	Upper	Main-Bernal	62.0	260.3	58.3	263.9	43.7	278.6	3.6	14.7	18.3
3S1E19K001	19K1	58	Upper	Main-Bernal	NA	NA	53.5	268.0	44.8	276.8	-	8.8	-
3S1E20C003	20C3	110	Lower	Main-Bernal	83.1	255.5	74.0	264.6	61.1	277.6	9.2	12.9	22.1
3S1E20C007	20C7	153	Upper	Main-Bernal	81.4	257.3	74.3	264.4	60.4	278.3	7.1	13.9	21.0
3S1E20C008	20C8	315	Lower	Main-Bernal	105.1	233.6	73.6	265.1	61.4	277.3	31.5	12.3	43.7
3S1E20C009	20C9	515	Lower	Main-Bernal	97.9	240.9	74.3	264.5	62.9	275.9	23.6	11.5	35.1
3S1E20J004	20J4	72	Upper	Main-Bernal	68.7	262.9	56.7	275.0	46.7	284.9	12.0	9.9	22.0
3S1E20M011	20M11	71	Upper	Main-Bernal	64.6	261.1	57.9	267.8	44.8	281.0	6.7	13.2	19.9
3S1E20Q002	20Q2	65	Upper	Main-Bernal	24.9	300.9	17.5	308.3	22.8	303.0	7.4	-5.3	2.1
3S1E22D002	22D2	72	Upper	Main-Amador	63.1	304.9	54.2	313.9	47.4	320.7	9.0	6.8	15.8
3S1E23J001	23J1	120	Lower	Main-Amador	NA	NA	88.6	339.7	85.7	342.5	-	2.9	-
3S1E24Q001	24Q1	440	Lower	Main-Amador	126.1	301.4	107.1	320.4	105.2	322.3	19.0	1.9	20.9
3S1E25C003	25C3	146	Upper	Main-Amador	100.3	353.9	76.4	377.7	81.5	372.7	23.8	-5.1	18.8
3S1E28M002	28M2	141	Upper	Upland	26.9	363.1	7.7	382.3	21.1	368.9	19.2	-13.4	5.8
3S1E29M004	29M4	57	Upper	Main-Castle	44.0	266.9	37.3	273.6	37.4	273.6	6.7	-0.1	6.7
3S1E29P002	29P2	42	Upper	Main-Bernal	30.8	272.1	26.8	276.0	29.1	273.8	3.9	-2.2	1.7
3S1E33G005	33G5	35	Upper	Upland	17.2	391.3	10.0	398.6	15.7	392.9	7.3	-5.7	1.6
3S1W01B009	1B9	162	Lower	Fringe-Dublin	11.9	321.7	8.9	324.7	10.3	323.2	3.0	-1.4	1.5
3S1W01B010	1B10	414	Lower	Fringe-Dublin	23.3	310.3	23.9	309.7	20.7	312.8	-0.6	3.1	2.6
3S1W01B011	1B11	560	Lower	Fringe-Dublin	9.8	323.9	10.7	323.0	9.2	324.5	-0.9	1.5	0.6
3S1W01J001	1J1	70	Upper	Fringe-Dublin	NA	NA	9.8	324.6	NA	NA	-	-	-
3S1W02A002	2A2	47	Upper	Fringe-Dublin	27.9	341.5	18.5	351.0	24.4	345.1	9.4	-5.9	3.5
3S1W12B002	12B2	40	Upper	Fringe-Dublin	21.9	321.0	16.3	326.6	20.3	322.6	5.6	-3.9	1.6
3S1W12J001	12J1	62	Upper	Fringe-Dublin	24.8	304.5	21.0	308.4	22.6	306.8	3.9	-1.6	2.3
3S1W13J001	13J1	48	Upper	Main-Castle	30.7	313.3	13.9	330.0	30.1	313.8	16.8	-16.2	0.6
3S2E01F002	1F2	69	Upper	Fringe-Spring	25.2	547.8	22.2	550.8	23.2	549.8	3.0	-1.0	2.0
3S2E02B002	2B2	46	Upper	Fringe-Spring	10.5	529.0	7.4	532.1	8.8	530.7	3.1	-1.4	1.7
3S2E03A001	3A1	54	Upper	Fringe-Spring	6.3	511.4	4.0	513.7	5.7	512.0	2.3	-1.7	0.6
3S2E03K003	3K3	60	Upper	Fringe-Mocho I	14.3	508.6	12.3	510.5	13.0	509.9	1.9	-0.6	1.3
3S2E05N001	5N1	210	Mixed	Main-Mocho II	43.0	401.0	25.0	419.0	31.0	413.0	17.9	-5.9	12.0
3S2E07C002	7C2	49	Upper	Main-Mocho II	30.0	390.8	21.0	399.8	23.0	397.8	9.0	-2.0	7.0
3S2E07H002	7H2	54	Upper	Main-Mocho II	38.5	404.4	21.3	421.6	25.4	417.5	17.2	-4.1	13.1
3S2E07N002	7N2	162	Upper	Main-Amador	150.5	271.5	88.6	333.4	94.7	327.4	61.9	-6.1	55.9
3S2E07P003	CWS24	510	Lower	Main-Amador	NA	NA	NA	NA	NA	NA	-	-	-
3S2E07R002	7R2	805	Deep	Main-Mocho II	NA	NA	2.3	443.7	3.6	442.4	-	-1.3	-
3S2E07R003	CWS31	583	Lower	Upland	NA	NA	71.0	375.0	NA	NA	-	-	-
3S2E08H002	8H2	46	Upper	Main-Mocho II	41.2	428.4	17.8	451.8	35.4	434.2	23.4	-17.6	5.8
3S2E08H003	8H3	195	Lower	Main-Mocho II	70.5	406.8	43.7	433.5	51.1	426.1	26.8	-7.4	19.3
3S2E08H004	8H4	385	Lower	Main-Mocho II	123.4	353.6	111.6	365.4	128.5	348.5	11.8	-16.9	-5.1
3S2E08K002	8K2	74	Upper	Main-Mocho II	50.0	414.8	22.9	441.9	30.1	434.7	27.1	-7.2	19.9
3S2E08N002	CWS14	526	Lower	Main-Mocho II	NA	NA	43.3	410.3	48.7	405.0	-	-5.3	-
3S2E08P001	CWS8	273	Lower	Main-Mocho II	NA	NA	31.9	436.3	37.4	430.8	-	-5.5	-
3S2E08Q009	8Q9	114	Lower	Main-Mocho II	46.0	418.7	17.4	447.3	23.7	441.0	28.6	-6.3	22.3
3S2E09Q004	9Q4	80	Upper	Main-Mocho II	45.1	459.4	12.2	492.3	20.7	483.8	32.9	-8.5	24.4
3S2E10F003	10F3	45	Upper	Fringe-Mocho I	15.4	519.5	9.7	525.1	12.2	522.6	5.7	-2.5	3.2

U = Upper; L = Lower; NM = Not Measured; NA = Not Available; OBS = Obstructed; - = Not Applicable
Highlighted = Representative Monitoring Site

TABLE 5-3
SEMIANNUAL GROUNDWATER LEVELS
(Feet above Mean Sea Level, NAVD88)
FALL 2022 TO FALL 2023

Well Number	Display Name	Well Depth	Aquifer	Subarea	Fall 2022		Spring 2023		Fall 2023		Change in Elevation (ft)		
											Seasonal		Annual
					Depth to Water	GW Elev	Depth to Water (ft)	GW Elev	Depth to Water (ft)	GW Elev	Fall 22 to Spring 23	Spring 23 to Fall 23	Fall 22 to Fall 23
2S1E32E001	32E1	70	Upper	None	42.5	350.1	36.4	356.2	38.0	354.6	6.1	-1.6	4.5
2S1E32N001	32N1	44	Upper	Fringe-Camp	20.6	340.2	16.7	344.1	18.8	342.0	4.0	-2.2	1.8
2S1E32Q001	32Q1	45	Upper	Fringe-Camp	30.8	336.7	26.8	340.7	27.9	339.7	4.0	-1.1	2.9
2S1E33L001	33L1	80	Upper	None	56.7	332.8	54.4	335.1	53.4	336.1	2.3	1.0	3.3
2S1E33P002	33P2	55	Upper	Fringe-Camp	37.3	332.8	34.3	335.7	34.1	336.0	2.9	0.3	3.2
2S1E33R001	33R1	60	Upper	None	23.6	334.9	20.5	338.0	20.7	337.8	3.1	-0.2	2.8
3S2E10Q001	10Q1	44	Upper	Main-Mocho II	29.4	526.0	15.0	540.4	21.5	533.9	14.4	-6.5	7.9
3S2E10Q002	10Q2	325	Lower	Main-Mocho II	NA	NA	NA	NA	NA	NA	-	-	-
3S2E11C001	11C1	66	Upper	Fringe-Mocho I	30.3	526.8	23.8	533.3	25.8	531.4	6.5	-2.0	4.5
3S2E12C004	12C4	108	Upper	Fringe-Spring	56.7	534.8	54.9	536.6	NA	NA	1.8	-	-
3S2E12J003	12J3	160	Lower	Fringe-Spring	NA	NA	84.4	546.7	NA	NA	-	-	-
3S2E14A003	14A3	110	Upper	Fringe-Mocho I	NA	NA	NA	NA	NA	NA	-	-	-
3S2E14B001	14B1	300	Lower	Fringe-Mocho I	67.3	526.1	59.4	534.0	60.9	532.5	7.9	-1.5	6.4
3S2E15E002	15E2	192	Lower	Main-Mocho II	61.9	487.8	22.7	527.0	33.0	516.7	39.2	-10.3	28.8
3S2E15L001	15L1	41	Upper	Main-Mocho II	NA	NA	10.8	550.6	24.9	536.5	-	-14.1	-
3S2E15L002	15L2	71	Upper	Main-Mocho II	47.2	513.9	10.8	550.4	24.8	536.3	36.5	-14.0	22.4
3S2E15M002	15M2	45	Upper	Main-Mocho II	NA	NA	14.6	534.8	27.3	522.1	-	-12.7	-
3S2E15M003	15M3	76	Upper	Main-Mocho II	57.0	492.1	15.3	533.8	27.4	521.7	41.7	-12.1	29.6
3S2E15Q006	15Q6	301	Lower	Main-Mocho II	61.9	515.7	47.9	529.7	51.8	525.7	14.0	-4.0	10.1
3S2E15Q008	15Q 8	41	Upper	Main-Mocho II	32.7	551.7	9.0	575.4	15.3	569.1	23.7	-6.3	17.4
3S2E15R017	15R17	63	Upper	Main-Mocho II	12.4	580.0	6.5	585.9	11.8	580.6	5.9	-5.3	0.6
3S2E15R018	15R18	138	Lower	Main-Mocho II	23.1	569.4	10.1	582.4	20.6	571.9	13.0	-10.5	2.5
3S2E15R020	15R20	51	Upper	Main-Mocho II	16.5	572.8	8.2	581.1	14.6	574.7	8.3	-6.4	1.9
3S2E16A003	16A3	240	Lower	Main-Mocho II	54.8	472.2	19.5	507.5	33.7	493.3	35.3	-14.2	21.1
3S2E16C001	CWS15	584	Lower	Main-Mocho II	NA	NA	NA	NA	86.4	424.6	-	-	-
3S2E16E004	16E4	45	Upper	Main-Mocho II	39.3	466.9	14.5	491.8	16.0	490.3	24.8	-1.5	23.4
3S2E18B001	CWS20	497	Lower	Main-Amador	NA	NA	NA	NA	67.4	371.2	-	-	-
3S2E18E001	18E1	134	Upper	Main-Amador	100.0	323.9	42.2	381.7	62.3	361.6	57.8	-20.1	37.7
3S2E19D007	19D7	180	Upper	Main-Amador	156.7	258.4	81.4	333.7	81.5	333.6	75.3	-0.1	75.2
3S2E19D008	19D8	260	Lower	Main-Amador	157.0	258.1	82.2	332.9	81.9	333.2	74.8	0.3	75.1
3S2E19D009	19D9	390	Lower	Main-Amador	206.1	208.9	156.4	258.6	143.2	271.8	49.8	13.1	62.9
3S2E19D010	19D10	470	Lower	Main-Amador	180.0	234.9	161.9	253.0	156.2	258.7	18.2	5.7	23.8
3S2E19N003	19N3	120	Upper	Main-Amador	46.7	371.8	40.4	378.0	38.0	380.5	6.3	2.5	8.7
3S2E19N004	19N4	203	Lower	Main-Amador	29.6	388.3	23.8	394.2	15.7	402.3	5.9	8.1	13.9
3S2E20M001	20M1	184	Lower	Main-Amador	59.8	419.0	41.4	437.4	55.7	423.1	18.4	-14.3	4.1
3S2E20R002	20R2	257	Upper	Upland	78.9	444.3	66.3	456.9	74.5	448.6	12.6	-8.3	4.3
3S2E21K009	21K9	0	Upper	Upland	90.4	476.7	88.0	479.1	90.7	476.4	2.4	-2.8	-0.3
3S2E21N001	21N1	320	0	Upland	NA	NA	69.5	-69.5	NA	NA	-	-	-
3S2E22B001	22B1	32	Upper	Main-Mocho II	NA	NA	10.5	575.4	15.8	570.1	-	-5.3	-
3S2E23E001	23E1	40	Upper	Main-Mocho II	19.0	594.4	14.1	599.3	16.1	597.3	4.9	-2.0	2.9
3S2E23E002	23E2	110	Lower	Main-Mocho II	16.6	596.6	11.8	601.5	14.0	599.3	4.8	-2.2	2.7
3S2E24A001	24A1	46	Upper	Fringe-Mocho I	20.9	696.8	15.5	702.2	18.4	699.3	5.4	-2.9	2.5
3S2E26J002	26J2	44	Upper	Main-Mocho II	12.3	677.7	6.0	683.9	8.4	681.5	6.2	-2.4	3.9
3S2E29F004	29F4	36	Upper	Main-Amador	13.0	444.6	8.7	448.8	8.8	448.8	4.2	0.0	4.2
3S2E29L001	29L1 (P3)	23	Upper	Main-Amador	13.5	450.1	9.8	453.8	9.3	454.3	3.7	0.5	4.2
3S2E30C001	30C1	150	Lower	Main-Amador	34.3	405.1	16.0	423.5	20.9	418.5	18.4	-5.0	13.4
3S2E30D002	30D2	44	Upper	Main-Amador	27.8	403.8	20.9	410.7	22.9	408.7	6.9	-1.9	4.9
3S2E32E007	32E7	37	Upper	Upland	18.8	592.1	17.2	593.8	18.0	593.0	1.6	-0.8	0.8
3S2E33C001	33C1	20	Upper	Main-Amador	12.4	485.3	7.8	489.8	8.4	489.2	4.6	-0.6	4.0
3S2E33G001	33G1	17	Upper	Main-Amador	9.4	502.2	8.3	503.2	8.8	502.7	1.1	-0.5	0.6
3S2E33K001	33K1	15	Upper	Main-Amador	NA	NA	NA	NA	6.3	540.6	-	-	-
3S2E33L001	33L1	16	Upper	Main-Amador	NA	NA	NA	NA	4.0	553.6	-	-	-
3S3E06Q003	6Q3	30	Upper	Fringe-Altamont	13.4	667.7	9.3	671.8	9.9	671.2	4.1	-0.6	3.5
3S3E07D002	7D2	72	Upper	Fringe-Spring	NA	NA	NA	NA	48.3	573.7	-	-	-
3S3E20L004	20L4	340	Upper	Fringe-Mocho I	82.4	780.0	NA	NA	113.0	749.4	-	-	-30.6
3S3E20R004	20R4	0	Upper	Fringe-Mocho I	54.3	869.5	NA	NA	29.8	894.0	-	-	24.5
3S3E21C001	21C1	128	Upper	Upland	34.5	1032.7	32.7	1034.5	32.4	1034.8	1.8	0.3	2.1
4S3E06E004	6E4	220	Upper	Main-Mocho II	10.5	797.2	1.2	806.5	0.7	807.0	9.3	0.6	9.9

U = Upper; L = Lower; NM = Not Measured; NA = Not Available; OBS = Obstructed; - = Not Applicable
Highlighted = Representative Monitoring Site
P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Tbl03-TblSAWaterLevels23.xlsx

TABLE 5-4
GROUNDWATER ELEVATIONS AT REPRESENTATIVE MONITORING SITES
FOR CHRONIC LOWERING OF GROUNDWATER ELEVATIONS
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

RMS Well		*Management Area/Unit*			*2023 Water Year (in ft)*					*SMCs for GWE (ft above Mean Sea Level)*				
Well Name	*Map*	*Area*	*Subarea*	*Aquifer*	*Season High GWE*	*Season Low GWE*	*Change from 2022**	*Height above MT*	*Height above MO*	*MT*	*IM-5*	*IM-10*	*IM-15*	*MO*
3S1E20C007	20C7	Main	Bernal	Upper	335.8	278.3	+21.0	133.5	98.8	144.8	153.4	162.1	170.8	179.5
3S1E20C008	20C8	Main	Bernal	Lower	336.6	277.3	+43.7	132.5	97.8	144.8	153.4	162.1	170.8	179.5
3S1E09P005	9P5	Main	Amador West	Upper	349.0	286.9	+18.4	107.2	80.2	179.8	186.5	193.2	199.9	206.7
3S1E09P010	9P10	Main	Amador West	Lower	349.6	288.3	+47.2	108.6	81.7	179.8	186.5	193.2	199.9	206.7
3S1E11G001	11G1	Main	Amador East	Upper	369.9	317.3	+31.4	136.4	97.5	181.0	190.7	200.4	210.2	219.9
3S1E12K003	12K3	Main	Amador East	Lower	406.7	294.9	+87.6	113.9	75.0	181.0	190.7	200.4	210.2	219.9
3S2E08K002	8K2	Main	Mocho II	Upper	464.4	434.7	+19.9	179.5	141.5	255.1	264.6	274.1	283.6	293.1
3S2E08H003	8H3	Main	Mocho II	Lower	475.1	426.1	+19.3	171.0	133.0	255.1	264.6	274.1	283.6	293.1
3S1E06F003	6F3	Fringe	Northwest	Upper	333.8	324.2	+0.7	19.2	9.6	305.0	307.4	309.8	312.2	314.6
2S2E34E001	34E1	Fringe	Northeast	Upper	500.0	494.0	+0.3	5.7	2.8	488.2	489.0	489.7	490.5	491.2
3S2E24A001	24A1	Fringe	East	Upper	718.5	699.3	+2.5	23.8	21.0	675.5	676.2	676.9	677.6	678.3
3S2E21K009	21K9	Upland	Upland	Upper	566.5	476.4	-0.3	6.3	6.3	470.1	470.1	470.1	470.1	470.1

RMS = Representative Monitoring Site
GWE = Groundwater Elevation (in ft above Mean Sea Level)
SMC = Sustainable Management Criteria
IM = Interim Milestone
MO = Measurable Objective
MT = Minimum Threshold
NA = Not Available
* = 2023 Seasonal Low minus 2022 Seasonal Low

Main
Fringe
Upland

LEGEND

- Upper Aquifer
- Lower Aquifer
- Deep Aquifer
- Supply
- Monitor
- Nested
- Representative (RMS)
- Streams
- Township-Range Line
- Mining Area Ponds

ABBREVIATIONS FOR MUNI WELLS
CWS= California Water Service
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
St = Stoneridge (Zone 7)
P = Pleasanton
SF = San Francisco Public Utilities Commission

2S/1W
2S/1E
2S/2E
2S/3E
3S/1W
3S/1E
3S/2E
3S/3E

FRINGE SUBAREA - NORTH
FRINGE SUBAREA - NORTHEAST
FRINGE SUBAREA - EAST
UPLAND SUBAREA
UPLAND SUBAREA
UPLAND SUBAREA
MAIN BASIN

N
W
E
S
0 2 4
Miles

DATE: Oct 12, 2023
FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig01-02-GMProgramWell2023.aprx

Figure 5-1
Map of Wells in
Water Level Monitoring Network
Livermore Valley Groundwater Basin

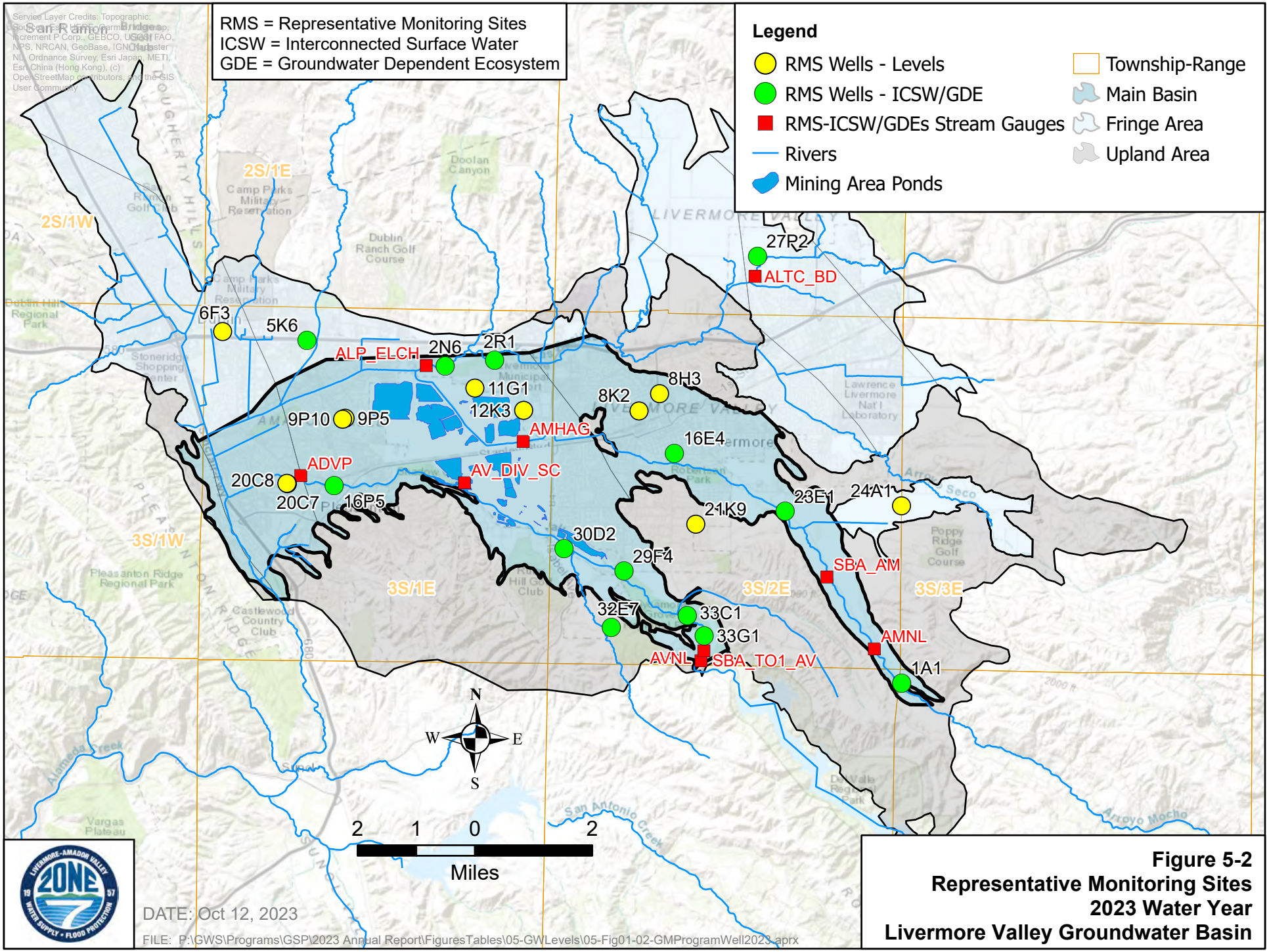

Figure 5-2
Representative Monitoring Sites
2023 Water Year
Livermore Valley Groundwater Basin

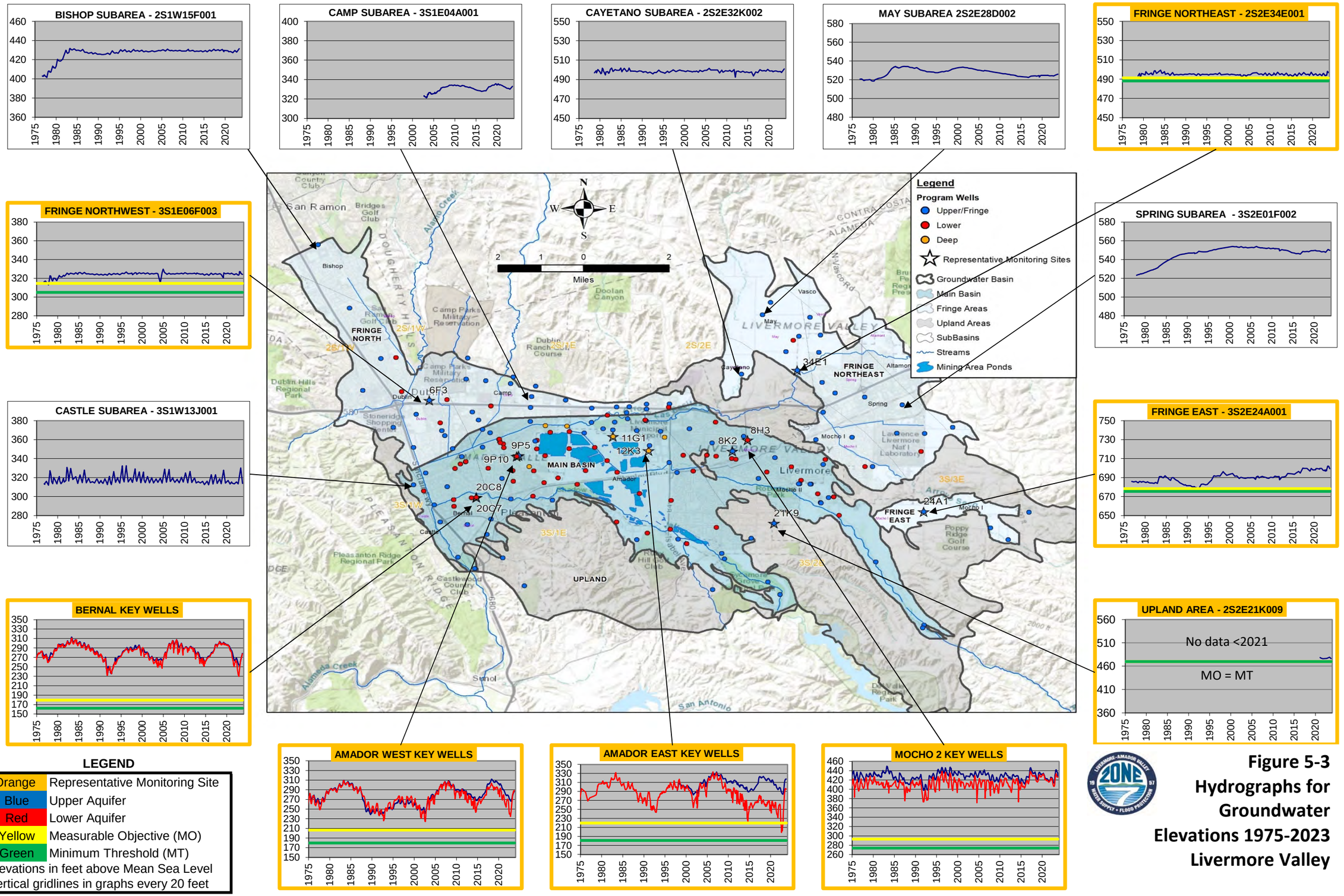

Figure 5-3
Hydrographs for Groundwater Elevations 1975-2023
Livermore Valley

LEGEND

Gradient Contours

- Contours (Interval = 10')
- Hatch pattern towards lower elevation

Wells - Upper Spring 2023

- Supply
- Monitor
- Nested
- Ponds
- SGMA Representative Well

Mining Pond Areas 2023

- In Flux
- Pumped From
- Pumped Into
- Static
- Not In Contact With Groundwater

Stream Recharge Rates (cfs)

- < 0
- 0
- 0 to 1
- 1 to 3
- 3 to 5
- > 5

- Township-Range
- Main Basin
- Fringe Area
- Upland Area

N
W E
S

0 2 4
Miles

DATE: Jan 18, 2024
FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig04-07-GradientsUpper2023.aprx

Figure 5-4
Groundwater Gradient Map
Upper Aquifer, Seasonal High, Spring 2023
Livermore Valley Groundwater Basin

LEGEND

Gradient Contours

- Contours (Interval = 10')
- Hatch pattern towards lower elevation

Wells - Upper Fall 2023

- Supply
- Monitor
- Nested
- Ponds
- SGMA Representative Well

Mining Pond Areas 2023

- In Flux
- Pumped From
- Pumped Into
- Static
- Not In Contact With Groundwater

Stream Recharge Rates (cfs)

- < 0
- 0
- 0 to 1
- 1 to 3
- 3 to 5
- > 5

- Township-Range
- Main Basin
- Fringe Area
- Upland Area

N
W E
S

0 2 4
Miles

DATE: Jan 18, 2024
FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig04-07-GradientsUpper2023.aprx

Figure 5-5
Groundwater Gradient Map
Upper Aquifer; Seasonal Low, Fall 2023
Livermore Valley Groundwater Basin

LEGEND

Elevation Difference* (ft)

- < -45
- -45 to -35
- -35 to -25
- -25 to -15
- -15 to -5
- -5 to 5
- 5 to 15
- 15 to 25
- 25 to 35
- 35 to 45
- 45 to 55
- Mining Area Ponds
- Streams
- Main Basin
- Fringe Area
- Upland Area

N
W E
S

0 2 4
Miles

* Fall 2023 Minus Fall 2022 so negative numbers represent a drop from 2022WY to 2023WY.

DATE: Jan 18, 2024
FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig04-07-GradientsUpper2023.aprx

Figure 5-6
Change in Groundwater Elevation
Upper Aquifer; Fall 2022 to Fall 2023
Livermore Valley Groundwater Basin

LEGEND

Depth to Groundwater (ft) 2023

- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 120
- 120 - 130
- 130 - 140
- 140 - 150
- Mining Area Ponds
- Streams
- Main Basin
- Fringe Area
- Upland Area

N

W E

S

0 2 4

Miles

DATE: Jan 18, 2024

FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig04-07-GradientsUpper2023.aprx

Figure 5-7
Depth to Groundwater
Upper Aquifer; Season Low, Fall 2023
Livermore Valley Groundwater Basin

ABBREVIATIONS FOR MUNICIPAL WELLS
COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
St = Stoneridge (Zone 7)
CWS = Cal Water Service
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND

Gradient Contours
- Contours (Interval = 10')
- Hatch pattern towards lower elevation

Wells - Lower Spring 2023
- Supply
- Monitor
- Nested
- Ponds
- SGMA Representative Well
- Mining Area Ponds
- Streams
- Township-Range Line
- Main Basin
- Fringe Area
- Upland Area

3S/1E
3S/2E
4S/1E
4S/2E

N
W
E
S

0 4,000 8,000
Feet

DATE: Jan 18,2024
FILE: P:\GWSM Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig08-11-GradientsLower2023.aprx

Figure 5-8
Groundwater Gradient Map
Lower Aquifer; Seasonal High, Spring 2023
Livermore Valley Groundwater Basin

ABBREVIATIONS FOR MUNICIPAL WELLS
COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
St = Stoneridge (Zone 7)
CWS = Cal Water Service
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND

Gradient Contours
- Contours (Interval = 10')
- Hatch pattern towards lower elevation

Wells - Lower Fall 2023
- Supply
- Monitor
- Nested
- Ponds
- SGMA Representative Well
- Mining Area Ponds
- Streams
- Township-Range Line
- Main Basin
- Fringe Area
- Upland Area
- Active Muni Well (no water level)

N
W E
S

0 4,000 8,000
Feet

DATE: Jan 18,2024
FILE: R:\GWSP\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig08-11-GradientsLower2023.aprx

Figure 5-9
Groundwater Gradient Map
Lower Aquifer; Seasonal Low, Fall 2023
Livermore Valley Groundwater Basin

ABBREVIATIONS FOR MUNICIPAL WELLS
COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
St = Stoneridge (Zone 7)
CWS = Cal Water Service
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND

Elevation Difference* (ft)

- < -45
- -45 to -35
- -35 to -25
- -25 to -15
- -15 to -5
- -5 to 5
- 5 to 15
- 15 to 25
- 25 to 35
- 35 to 45
- 45 to 55
- Mining Area Ponds
- Streams
- Active Muni Well
- Main Basin
- Fringe Area
- Upland Area

N
W E
S

0 4,000 8,000
Feet

* Fall 2023 Minus Fall 2022 so negative numbers represent a drop from 2022WY to 2023WY.

Figure 5-10
Change in Groundwater Elevation
Lower Aquifer; Fall 2022 to Fall 2023
Livermore Valley Groundwater Basin

DATE: Jan 18, 2024
FILE: R:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig08-11-GradientsLower2023.aprx

LEGEND

Feet Above Historic Lows

< -10	41 - 50	111 - 120
-10 - 0	51 - 60	121 - 130
1 - 10	61 - 70	131 - 140
11 - 20	71 - 80	141 - 150
21 - 30	81 - 90	151 - 160
31 - 40	91 - 100	>160
	101 - 110	

LEGEND

- Wells with Elev above Historic Lows (ft)
- Representative (RMS)
- Main Basin
- Fringe Area
- Upland Area
- Streams
- Mining Area Ponds

N

W E

S

0 4,000 8,000

Feet

DATE: Jan 18, 2024

FILE: R:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\05-GWLevels\05-Fig08-11-GradientsLower2023.aprx

Figure 5-11
Water Levels Above Historic Lows
Lower Aquifer; Seasonal Low, Fall 2023
Livermore Valley Main Groundwater Basin

6 Groundwater Quality Monitoring

6.1 Program Changes

Table 6-A below lists the changes that were made to the Groundwater Quality Monitoring Program for the 2023 WY.

Table 6-A: Program Wells Changes during the 2023 WY

Action	Reason	Note
Nested Wells 3S1W01B010 & B010 were removed from program	Sample pump will not fit down the wells.	Shallowest well in nested set can still be sampled.
Nested Wells 3S1E10N002 & N003 were added to program	For Lawrence Livermore National Laboratory (LLNL) Isotope Study and Lake I recharge monitoring.	
3S2E21N001 was added to program	Nearby Well 3S2E20R002 cannot be sampled.	

Zone 7's 2021 Alternative GSP also established the SMCs for Degraded Water Quality as shown in ***Table 6-B*** below.

Table 6-B: SMCs for Degraded Water Quality

Undesirable Results Definition	Undesirable Results Criteria	Minimum Threshold	Measurable Objective
If groundwater recharge or extraction causes significant and unreasonable degradation of water quality in the Basin, such that these changes impact the long-term viability of domestic, agricultural, municipal, environmental, or other beneficial uses over the planning and implementation horizon of this Alternative GSP. Significant and unreasonable changes to water quality associated with Undesirable Results would include a significant increase, on a regional basis, in concentrations of identified COCs above applicable state and federal regulatory thresholds, as a result of groundwater recharge or extraction.	If and when MTs are exceeded for any of the identified COCs in greater than 25% the RMS-WQs at least two consecutive years as a result of groundwater recharge or extraction, such that they cannot be managed to provide drinking water supply (i.e., that treatment or blending is not possible or practicable).	Greater of MCL (or other appropriate regulatory criteria) or the SGMA baseline concentration plus maximum historical annual range.	TDS: Recommended Secondary MCL (500 mg/L) in the Main Basin, Upper Secondary MCL (1,000 mg/L) or 2015 concentrations (whichever is greater) in the Fringe and Upland Areas. Nitrate: Primary MCL (10 mg/L) Boron: Health Risk Limit (HRL; 1,400 µg/L) Hexavalent Chromium: Primary MCL (50 µg/L)

SMC = Sustainable Management Criteria
COCs = Constituents of Concern
RMS-WQ = Representative Monitoring Sites for Water Quality
MCL = Maximum Contaminant Level
µg/L = micrograms per Liter
SGMA = Sustainable Groundwater Management Act
mg/L = milligrams per Liter
MT = Minimum Threshold
GSP = Groundwater Sustainability Plan
TDS = Total Dissolved Solids

For more information on general groundwater quality and the groundwater quality program, see the following sections of the 2021 Alternative GSP:

- **Section 1.2.3:** Groundwater Quality Program Updates
- **Section 8.6:** Current and Historical Groundwater Conditions - Groundwater Quality
- **Section 13.4:** Sustainability Indicators – Degraded Water Quality
- **Section 14.2.4:** Monitoring Network for Degraded Water Quality
- **Section 14.4:** Representative Monitoring

6.2 Results for the 2023 Water Year

6.2.1 General

Figure 6-1 and ***Table 6-1*** show all 230 wells in the 2023 WY Groundwater Quality Program. ***Table 5-2*** from ***Section 5: Groundwater Elevation Monitoring*** shows well construction information for each of the wells. ***Table 6-2*** shows metal and mineral results from all wells in the program for the 2023 Water Year. In general, concentrations of the constituents of concern (TDS, nitrate, boron, chromium, and PFAS) remain relatively unchanged over the last several years.

6.2.2 Total Dissolved Solids (TDS)

Table 6-3 shows TDS results for the 2023 WY in Representative Monitoring Sites for Degraded Water Quality (RMS-WQ) and their relative to the MOs and MTs defined in the 2021 Alternative GSP. Concentrations were below the MTs in all wells. Five wells had concentrations above the MOs including two wells in the Main Basin Upper Aquifer (3S1E11G001 [11G1] and 3S2E08K002 [8K2]), two in the Main Basin Lower Aquifer (3S1E20C008 [20C8] and 3S1E08H003 [8H3]), and one in the Fringe Area (3S2E24A001 [24A1]). As stated in the 2021 Alternative GSP, a UR for Degraded Water Quality occurs if and when:

MTs are exceeded for any of the identified constituents of concern in greater than 25% of the RMS-WQs at least two (2) consecutive years as a result of SGMA-related groundwater management activities such that they cannot be managed to provide drinking water supply (i.e., that treatment or blending is not possible or practicable).

Since no RMS-WQ had a concentration above the MT during the 2023 WY, there were no UR occurrences for Degraded Water Quality for TDS.

Figure 6-2 shows graphs of TDS concentrations from 1975 to 2023 in various wells including the RMS-WQ. ***Figure 6-3*** and ***Figure 6-4*** show TDS concentrations for the 2023 WY in the Upper and Lower Aquifers, respectively.

- During the 2023 WY, the TDS concentrations in groundwater continued to be lowest in areas adjacent to the artificially recharged Arroyos Valle and Mocho, where they were generally less than 500 micrograms per Liter (mg/L) in both the Upper and Lower Aquifers.

- There continues to be two main areas of the Basin where TDS concentrations exceed 1,000 mg/L in the Upper Aquifer:

    - In the northwestern Fringe Area and extending south into the Main Basin. This high TDS area is most likely due to the combination of the concentrating effects of urban irrigation, leaching of buried lacustrine and marine sediments, recharge of poorer quality water from Arroyo Las Positas, and legacy wastewater and sludge disposal practices in the Pleasanton and Dublin areas.

    - In the northeastern Fringe Area. This high-TDS area is likely due to poorer quality water that runs off marine sediments on the east and north of the Basin and recharges the Basin along the hill-fronts.

- Many of the supply wells in the Pleasanton area produced water with TDS concentrations greater than the basin objective of 500 mg/L (also used as the MO for the RMS-WQ wells) during the 2023 WY. The highest concentrations were detected as follows:

    - The highest concentration detected in a Zone 7 municipal well was in the Mocho 4 Well (M4) at 531 mg/L.

    - One of the San Francisco Public Utilities Commission (SFPUC) wells in the Bernal wellfield (SF-B) detected TDS at 984 mg/L.

    - A private irrigation well (3S1E17B004 [17B4]) located central to four active wellfields (Mocho, Hopyard, Bernal, and Busch Valley) had TDS at 769 mg/L.

6.2.3 Nitrates

Table 6-4 shows nitrate (as nitrogen, NO_3N) results for the 2023 WY in RMS-WQ and their relative to the MOs and MTs defined in the 2021 Alternative GSP. Concentrations were below the MTs in all wells but above the MOs in two wells, one in the Main Basin Lower Aquifer (3S2E08H003 [8H3]) and one in the Fringe Area (3S2E24A001 [24A1]). Since no RMS-WQ had a concentration above the MT, there were no UR occurrences for nitrate.

Figure 6-5 shows graphs of NO_3N concentrations from 1975 to 2023 in various wells including the RMS-WQ. ***Figure 6-6*** and ***Figure 6-7*** show $NO_{3-}N$ concentrations for the 2023 WY in the Upper and Lower Aquifers, respectively.

The Nutrient Management Plan (NMP) (*Zone 7, 2015b*) identified ten local high nitrate Areas of Concern (AOCs) where nitrate concentrations persist above the Basin Objective (which is the Maximum Contaminant Level [MCL], 10 mg/L $NO_{3-}N$). Overall, these AOCs have been decreasing in size and/or concentration or have been relatively stable over the last five years:

- **Happy Valley**—Two wells are near this area; however, only 3S1E28M002 (28M2) had a detectible result for nitrate (at 5.5 mg/L) in the 2023 WY.
- **Bernal**—Although 3S1E22D002 (22D2), which has been used to monitor this area, was sampled, the lab results were flagged as suspect, and the well could not be re-sampled during the 2023 WY. The well will be resampled in the 2024 WY.
- **Staples Ranch**—For the past few years, nitrate concentrations in this AOC have hovered around the Basin Objective. The well with the highest concentration during the 2022 WY, 3S1E05K006 (5K6), was sampled but lab results were flagged as suspect, and the well could not be resampled during the 2023 WY. The well will be resampled in the 2024 WY.
- **Constitution**—Nitrate concentrations in 3S1E01H003 (1H3) remain slightly above the above the Basin Objective at 17.9 mg/L during the 2023 WY compared to 16.7 mg/L in 2022 WY.
- **Jack London**—The highest nitrate concentration detected in this AOC was in 3S1E12A002 (12A2) at 20.7 mg/L during the 2023 WY compared to 12 mg/L in 2022 WY.
- **May School**—Historically, the nitrate concentration in this AOC has been characterized annually by the results of a single monitoring well (2S2E28D002 [28D2]), which have varied over the last 7 years between 16.7 mg/L and 42.8 mg/L (38 mg/L during the 2023 WY). Well 2S2E21L001 (21L1), which was added to the program in 2021, had a nitrate concentration of 17.4 mg/L (19.1 mg/L in 2022 WY).
- **Charlotte Way**— In the 2023 WY, only one well in this area exceeded the MCL: 14 mg/L in 3S2E03K003 (3K3, 12.9 mg/L in the 2022 WY). The concentration in 3S2E14A003 (14A3) has been hovering near the basin objective for the last few years.

Buena Vista—During the 2023 WY, one of the highest concentrations was again detected in the northeastern portion of the plume at 17.4 mg/L in 3S2E10Q001 (10Q1, 13.2 mg/L in the 2022 WY). Just to the southwest of that well, the concentration in 3S2E15L001 (15M2) was just under that at 16 mg/L (11 mg/L in 2022 WY). Overall, this nitrate plume, which also extends into the Lower Aquifer, has been relatively stable over the last five years.

Greenville—this AOC is characterized by the results of a two monitoring well: 3S2E24A001 (24A1) and 3S2E19C002 (19C2), which was added to the program in the 2021 WY. For the 2023 WY, 24A1

had a concentration of 32.8 mg/L (26.1 mg/L in the 2022 WY) and 19C2 had 20.3 mg/L (17 mg/L in the 2022 WY). Two other wells southeast of this AOC (3S3E20L004 [20L4] and 3S3E20R004 [20R4]) were added to the program in the 2021 WY and both had concentrations near the Basin Objective in 2022 WY (between 9 and 15 mg/L). However, both wells were inaccessible during the 2023 WY. These wells will be resampled in the 2024 WY.

Mines Road—For the 2023 WY, the nitrate concentration in 3S2E26J002 (26J2) was again below the Basin Objective at 0.6 mg/L (0.7 mg/L in 2022 WY). Two wells southeast of this AOC that were added to the program in the 2021 WY were also below the Basin Objective: 4S3E06E004 (6E4) was detected at 4.3 mg/L and 4S2E01A001 (1A1) was non-detect.

6.2.4 Boron

Table 6-5 shows boron results for the 2023 WY in RMS-WQ relative to the MOs and MTs defined in the 2021 Alternative GSP. Concentrations were below the MTs in all wells but were above the MOs in two wells in the Fringe Area (3S1E06F003 [6F3] and 2S2E34E001 [34E1]). Since no RMS-WQ had a concentration above the MT, there were no UR occurrences for boron.

Figure 6-8 shows graphs of boron concentrations from 1975 to 2023 in various wells including the RMS-WQ. ***Figure 6-9*** and ***Figure 6-10*** show boron concentrations for the 2023 WY in the Upper and Lower Aquifers, respectively. Boron exists at elevated concentrations in the areas of the Basin listed below. These localized concentrations of boron have been relatively stable for many years.

- Along the boundary between the northwestern Fringe Area and the Main Basin. The highest concentration was detected near the center of this area in 3S1E04J005 (4J5) at 10,200 micrograms per Liter (µg/L) the 2023 WY (9,400 µg/L in 2022 WY).

- In portions of the northeastern Fringe Area. The highest concentration detected in these areas in the 2023 WY was detected at 31,830 µg/L in 2S2E27P002 (27P2), compared to 32,800 µg/L in the 2022 WY.

- In the eastern Fringe Area. The highest concentration was detected in 3S2E21C001 (21C1, in the Upland Area) at 3,920 µg/L (3,600 µg/L in the 2022 WY).

6.2.5 Chromium

Table 6-6 shows total Chromium (Cr) results for the 2023 WY in RMS-WQ relative to the MOs and MTs defined in the 2021 Alternative GSP. Concentrations were below the MTs and MOs in all wells. Since no RMS-WQ had a concentration above the MT, there were no UR occurrences for chromium.

Figure 6-11 shows graphs of Cr concentrations from 1975 to 2023 in various wells including the RMS-WQ. ***Figure 6-12*** and ***Figure 6-13*** show Cr concentrations for the 2023 WY in the Upper and Lower Aquifers, respectively.

Cr concentrations were measured below 50 µg/L in all other non RMS-WQ wells sampled in 2023 WY except one, 3S1E12D002 (12D2), which was detected at 83 µg/L for the 2023 WY (not sampled during the 2022 WY). Additionally, water quality samples indicated a decrease in Cr concentrations at two other areas that historically have had concentrations above 50 µg/L:

- While samples from monitoring well 3S2E12C004 (12C4) in the northeastern Fringe Area have typically exhibited high Cr values in the past (e.g. 73 µg/L in the 2022 WY), the concentration was only 11 µg/L in the 2023 WY.

- In the 2020 WY Cr was detected at 108 µg/L in monitoring well 3S1E07G007 (7G7) in the northwestern Fringe Area just north of the Main Basin, however since the 2021 WY, the concentration has been below the detection limit.

6.2.6 PFAS

Table 6-7 shows 2023 WY PFAS results from all wells sampled in 2023 WY. ***Table 3-3*** in ***Section 3*** (Mining Area Monitoring) shows 2023 WY PFAS concentrations in the mining area ponds. The PFAS compound with the highest concentrations in the Basin has been Perfluorooctane Sulfonic Acid (PFOS). PFOS concentrations in the Upper and Lower Aquifers are shown on ***Figure 6-15*** and ***Figure 6-16***, respectively. Zone 7's PFAS management actions for the 2023 WY are described in ***Section 12.5***.

PFAS In General

- The majority of wells with elevated PFAS concentrations appear to be within an area in both the Upper and Lower Aquifers that stretches from the southwestern edge of the airport (north of the mining area) to Pleasanton's Wellfield (west of the mining area) and to Zone 7's Mocho Wellfield (northwest of the mining area).

- As a result of elevated PFAS concentrations in their wells, Pleasanton has ceased pumping from these wells.

- Currently, seven of Zone 7's ten municipal wells have had elevated PFAS concentrations over the past few years. Zone 7 has ceased pumping (and as a result can no longer sample) Mocho 1 since 2020 and, as a result of high concentrations of PFAS in previous water years, Chain of Lakes 1, 2, and 5 were shut down since 2022. Mocho Wells 2 and 3 are only operated so that pumped groundwater is diverted through the existing MGDP reverse osmosis plant and/or are blended with low-PFAS groundwater from Mocho Well

4. Due to elevated PFAS concentrations in Zone 7 municipal wells, only four were available for sampling in the 2023 WY.

Perfluorooctane Sulfonic Acid (PFOS)

- The highest PFOS concentration detected has been in well 3S1E02K002 (2K2) at 960 parts per trillion (ppt) in the 2023 WY (210 ppt in the 2022 WY and 970 ppt in the 2021 WY). Historically, the highest PFOS concentration detected in a Zone 7 municipal supply well was in Mocho 1 (3S1E09M002 or M1) at 110 ppt in 2020 WY.

- PFOS was detected in two of the four Zone 7 municipal wells sampled in the 2023 WY. PFOS was detected just above the 40 ppt Response Level (RL) specified by the California Department of Drinking Water (DDW) at 41 ppt in the Stoneridge well and was detected just above the Notification Level (NL) (6.5 ppt) at 6.7 ppt in Mocho 4. As further described in ***Section 12.5***, Zone 7 completed construction of its Stoneridge Well ion-exchange PFAS Treatment Facility in September 2023 and is currently being operated to deliver safe drinking water to local communities.

- Pleasanton's three municipal wells all had concentration of PFOS below the RL for PFOS, but above the NL. The highest concentration was detected at Well 8 (Pleas 8 or P8) at 29 ppt in the 2023 WY (23.8 ppt in the 2022 WY).

- PFOS was detected above the NL in two of the seven California Water Service (CWS) wells sampled in the 2023 WY. Both wells, CWS 10 and CWS 13, had maximum concentrations of 13 ppt for the 2023 WY.

- PFOS was detected in 12 mining pit lakes ranging from 2.9 ppt to 110 ppt in the 2023 WY (see ***Table 3-3***). The highest concentration was detected in Lake H at 110 ppt (compared to 24 ppt in 2022 WY).

Perfluorooctanoic Acid (PFOA)

- PFOA was not detected in any of Zone 7's actively pumping municipal wells in 2023 WY. In 2022 WY, the Mocho 3 and COL 1 wells had PFOA concentrations above the NL (5.1 ppt), at up to 5.9 ppt and 6.3 ppt, respectively.

Perfluorohexane Sulfonate (PFHxS)

- In 2022, DDW established a RL (20 ppt) and NL (3 ppt) for PFHxS.

- Areas of elevated PFHxS concentrations in the basin appear to reflect those of PFOS.

- Of the four Zone 7 municipal wells sampled in 2023 WY, only the Stoneridge Well had a concentration (33 ppt) above the RL. As mentioned above and further described in in

Section 12.5, Zone 7 completed construction of its Stoneridge Well ion-exchange PFAS Treatment Facility in September 2023 and is currently being operated to deliver safe drinking water to local communities.

Other PFAS Compounds

- Although additional PFAS compounds have also been detected in Zone 7's water supplies, the results were either below the NL (e.g., Perfluorobutanesulfonic acid [PFBS] at 500 ppt) or at present there are no regulatory guidelines for these contaminants.

6.3 Attached Tables and Figures

***Table 6-1**: Monitoring Wells in 2021 Groundwater Quality Program Wells*
***Table 6-2**: Water Quality Results for Metals and Minerals, 2023 WY*
***Table 6-3**: Total Dissolved Solids at Representative Monitoring Sites, 2023 WY*
***Table 6-4**: Nitrate at Representative Monitoring Sites, 2023 WY*
***Table 6-5**: Boron at Representative Monitoring Sites, 2023 WY*
***Table 6-6**: Chromium at Representative Monitoring Sites, 2023 WY*
***Table 6-7**: PFAS Water Quality Results from Wells, 2023 WY*

***Figure 6-1**: Map of Wells in the Water Quality Program, 2023 WY*
***Figure 6-2**: TDS Chemographs, 1975 to 2023 WYs*
***Figure 6-3**: TDS Concentrations; Upper Aquifer, 2023 WY*
***Figure 6-4**: TDS Concentrations; Lower Aquifer, 2023 WY*
***Figure 6-5**: Nitrate Chemographs, 1975 to 2023 WYs*
***Figure 6-6**: Nitrate as N Concentrations; Upper Aquifer, 2023 WY*
***Figure 6-7**: Nitrate as N Concentrations; Lower Aquifer, 2023 WY*
***Figure 6-8**: Boron Chemographs, 1975 to 2023 WYs*
***Figure 6-9**: Boron Concentrations; Upper Aquifer, 2023 WY*
***Figure 6-10**: Boron Concentrations; Lower Aquifer, 2023 WY*
***Figure 6-11**: Chromium Chemographs, 1975 to 2023 WYs*
***Figure 6-12**: Total Chromium Concentrations; Upper Aquifer, 2023 WY*
***Figure 6-13**: Total Chromium Concentrations; Lower Aquifer, 2023 WY*
***Figure 6-14**: PFOS Chemographs, 1975 to 2023 WYs*
***Figure 6-15**: PFOS Concentrations; Upper Aquifer, 2023 WY*
***Figure 6-16**: PFOS Concentrations; Lower Aquifer, 2023 WY*

TABLE 6-1
MONITORING WELLS IN 2023 GROUNDWATER QUALITY PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Sample By	Frequency (per year)	Temperature Recorder (min)	RMS-WQ	Water Right
2S1E32E001	32E1	End of Arnold Rd	None	Upper	Static-Monitor	Active	Contractor	1			
2S1E32N001	32N1	Camp Parks	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
2S1E32Q001	32Q1	Summer Glen Dr	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
2S1E33L001	33L1	Gleason Dr @ Tassajara	None	Upper	Static-Monitor	Active	Contractor	1			
2S1E33P002	33P2	Central Pkwy at Emerald Glen Pk	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
2S1E33R001	33R1	Central Pkwy @ Grafton	None	Upper	Static-Monitor	Active	Contractor	1			
2S1W15F001	15F1	BOLLINGER	Fringe-Bishop	Upper	Static-Monitor	Active	Contractor	1			
2S1W26C002	26C2	PINE VALLEY	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
2S1W36E003	36E3	Kolb Park	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
2S1W36F001	36F1	Dublin High shallow	Fringe-Dublin	Lower	Static-Nested	Active	Contractor	1			
2S1W36F002	36F2	Dublin High mid	Fringe-Dublin	Lower	Static-Nested	Active	Contractor	1			
2S2E21L001	21L1	Merlin	Fringe-May	Upper	Supply-Domestic	Active	Zone 7	1			
2S2E27M002	27M2	Kwan	Fringe-May	Upper	Supply-Domestic	Active	Zone 7	1			
2S2E27P002	27P2	hartford ave east	Fringe-Spring	Upper	Static-Monitor	Active	Contractor	1			
2S2E28D002	28D2	May School	Fringe-May	Upper	Static-Monitor	Active	Contractor	1			
2S2E28J002	28J2	FCC Well	Fringe-May	Lower	Supply-Industrial	Active	Contractor	1			
2S2E28Q001	28Q1	hartford ave	Fringe-May	Upper	Static-Monitor	Active	Contractor	1			
2S2E32K002	32K2	jenson's N liv. Ave	Fringe-Cayetano	Upper	Static-Monitor	Active	Contractor	1			
2S2E34E001	34E1	Mud City	Fringe-May	Upper	Static-Monitor	Active	Contractor	1		✓	
2S2E34Q002	34Q2	Hollyhock & Crocus	Fringe-Spring	Upper	Static-Monitor	Active	Contractor	1			
3S1E01F002	1F2	Constitution Dr	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E01H003	1H3	Collier Canyon g1	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E01J004	1J04	Collier Vineyards	Fringe-Camp	Lower	Supply-Irrigation	Active	Zone 7	1			
3S1E01L001	1L1	Kitty Hawk	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E01P002	1P2	Airport gas g5	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E01P003	1P3	New airport well	Main-Amador	Lower	Supply-Unspecified	Inactive	Contractor	1			
3S1E02J002	2J2	Maint. Bldg	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E02J003	2J3	Doolan Rd East	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E02K002	2K2	Doolan Rd West	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E02M003	2M3	Friesman Rd North	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E02N006	2N6	Friesman Rd South	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E02P003	2P3	Crosswinds Church	Fringe-Camp	Lower	Supply-Domestic	Active	Contractor	1			
3S1E02Q001	2Q1	LPGC #1	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E02R001	2R1	Beebs	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E03G002	3G2	fallon rd	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			

TABLE 6-1
MONITORING WELLS IN 2023 GROUNDWATER QUALITY PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Sample By	Frequency (per year)	Temperature Recorder (min)	RMS-WQ	Water Right
3S1E04A001	4A1	SMP-DUB-2	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E04J005	4J5	Pimlico shallow	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E04J006	4J6	Pimlico deep	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E04Q002	4Q2	gulfstream	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E05K006	5K6	Rosewood shallow	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E05K007	5K7	Rosewood deep	Fringe-Camp	Lower	Static-Monitor	Active	Contractor	1			
3S1E05L003	5L3	Oracle	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E05P006	5P6	Owens Park	Fringe-Camp	Upper	Static-Monitor	Active	Contractor	1			
3S1E06F003	6F3	Dublin Ct	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1		✓	
3S1E06N002	6N2	DSRSD MW-3	Fringe-Dublin	Upper	Static-Monitor	Active	DSRSD	1			
3S1E06N003	6N3	DSRSD MW-4	Fringe-Dublin	Upper	Static-Monitor	Active	DSRSD	1			
3S1E06N006	6N6	DSRSD NE-76	Fringe-Dublin	Upper	Static-Monitor	Active	DSRSD	1			
3S1E07B002	7B2	Hopyard rd	Fringe-Dublin	Lower	Static-Monitor	Active	Contractor	1			
3S1E07B012	7B12	Hacienda Arch	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
3S1E07D001	7D1	DSRSD SW-75	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	1			
3S1E07D003	7D3	DSRSD SE-70	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	1			
3S1E07D004	7D4	DSRSD SE-35	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	2			
3S1E07G007	7G7	Chabot Well	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
3S1E07J005	7J5	Thomas Hart School	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
3S1E08B001	8B1	Lizard Well	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E08G004	8G4	Apache	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E08H009	8H9	Mocho 4 Nested Shallow	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E08H010	8H10	Mocho 4 Nested Middle	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E08H011	8H11	Mocho 4 Nested deep	Main-Amador	Deep	Static-Nested	Active	Contractor	1			
3S1E08H013	8H13	Mocho 3 mon	Main-Amador	Deep	Static-Monitor	Active	Contractor	1			
3S1E08H018	M4	Mocho 4	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E08K001	8K1	Cockroach well	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E08N001	8N1	sports park	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E09B001	St1	Stoneridge	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E09H010	9H10	NW Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	Contractor	1			
3S1E09H011	9H11	NW Lake I Deep	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E09H013	9H13	Lister	Main-Amador	Upper	Supply-Domestic	Active	Zone 7	1			
3S1E09J007	9J7	SW Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	Contractor	1			
3S1E09J008	9J8	SW Lake I Middle	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E09J009	9J9	SW Lake I Deep	Main-Amador	Lower	Static-Nested	Active	Contractor	1			

TABLE 6-1
MONITORING WELLS IN 2023 GROUNDWATER QUALITY PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Sample By	Frequency (per year)	Temperature Recorder (min)	RMS-WQ	Water Right
3S1E09M002	M1	Mocho 1	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E09M003	M2	Mocho 2	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E09M004	M3	Mocho 3	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E09P005	9P5	Key_AmW_U (Mohr Key)	Main-Amador	Upper	Static-Monitor	Active	Contractor	2	15	✓	
3S1E09P009	9P9	Mohr Ave Shallow	Main-Amador	Lower	Static-Nested	Active	Contractor	2	15		
3S1E09P010	9P10	Key_AmW_L	Main-Amador	Lower	Static-Nested	Active	Contractor	2	15	✓	
3S1E09P011	9P11	Mohr Ave Deep	Main-Amador	Lower	Static-Nested	Active	Contractor	2			
3S1E10A002	10A2	El Charro Rd	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E10B008	10B8	Kaiser Rd Shallow	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E10B009	10B9	Kaiser Rd Middle 1	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E10B010	10B10	Kaiser Rd Middle 2	Main-Amador	Lower	Static-Nested	Unknown	Contractor	1			
3S1E10B011	10B11	Kaiser Rd Deep	Main-Amador	Deep	Static-Nested	Active	Contractor	1			
3S1E10B014	COL5 Mon	COL 5 Monitoring	Main-Amador	Lower	Static-Monitor	Unknown	Contractor	1			
3S1E10B016	COL5	COL 5	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E10D002	10D2	Stoneridge Shallow	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E10D003	10D3	Stoneridge Middle 1	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E10D004	10D4	Stoneridge Middle 2	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E10D005	10D5	Stoneridge Deep	Main-Amador	Deep	Static-Nested	Active	Contractor	1			
3S1E10K002	COL1 Mon	COL 1 Monitoring	Main-Amador	Lower	Static-Monitor	Active	Contractor	1			
3S1E10K003	COL1	COL 1	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E10N002	10N2	South Lake I Shallow	Main-Amador	Upper	Static-Nested	Active	#N/A	1			
3S1E10N003	10N3	South Lake I Deep	Main-Amador	Lower	Static-Nested	Active	#N/A	1			
3S1E11B001	11B1	Airport West	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E11C003	11C3	LAVWMA ROW	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E11G001	11G1	Key_AmE_U	Main-Amador	Upper	Static-Nested	Active	Contractor	1		✓	
3S1E11G002	11G2	Rancho Charro Middle 1	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E11G003	11G3	Rancho Charro Middle 2	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E11G004	11G4	Rancho Charro Deep	Main-Amador	Deep	Static-Nested	Active	Contractor	1			
3S1E11M002	COL2 Mon	COL 2 Monitoring	Main-Amador	Lower	Static-Monitor	Active	Contractor	1			
3S1E11M003	COL2	COL 2	Main-Amador	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E11P006	11P6	New Jamieson Residence	Main-Amador	Lower	Supply-Domestic	Active	Contractor	1			
3S1E12A002	12A2	Airport South	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E12D002	12D2	LWRP G6	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E12G001	12G1	Oaks Park Shallow	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E12H004	12H4	LWRP Shallow	Main-Amador	Lower	Static-Nested	Active	Contractor	1			

TABLE 6-1
MONITORING WELLS IN 2023 GROUNDWATER QUALITY PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Sample By	Frequency (per year)	Temperature Recorder (min)	RMS-WQ	Water Right
3S1E12H005	12H5	LWRP Middle 1	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E12H006	12H6	LWRP Middle 2	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E12H007	12H7	LWRP Deep	Main-Amador	Deep	Static-Nested	Active	Contractor	1			
3S1E12K002	12K2	Oaks Park Mid	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E12K003	12K3	Key_AmE_L	Main-Amador	Lower	Static-Nested	Active	Contractor	1		✓	
3S1E12K004	12K4	Oaks Park Deep	Main-Amador	Deep	Static-Nested	Active	Contractor	1			
3S1E13P005	13P5	LGA Grant Nested 1	Main-Amador	Upper	Static-Nested	Active	Contractor	1			
3S1E13P006	13P6	LGA Grant Nested 2	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E13P007	13P7	LGA Grant Nested 3	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E13P008	13P8	LGA Grant Nested 4	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E14B001	14B1	Industrial Asphalt	Main-Amador	Lower	Supply-Industrial	Active	Contractor	1			
3S1E14D002	14D2	South Cope Lake	Main-Amador	Lower	Static-Monitor	Active	Contractor	1			
3S1E15J003	15J3	shadow cliff	Main-Amador	Lower	Supply-Unspecified	Unknown	Contractor	1			
3S1E15M003	15M3	Bush/Valley South	Main-Amador	Lower	Static-Monitor	Active	Contractor	1			
3S1E16A002	P8	Pleas 8	Main-Amador	Lower	Supply-Municipal	Active	Pleas	1			
3S1E16A004	16A4	Bush/Valley Mid	Main-Amador	Lower	Static-Monitor	Active	Contractor	1			
3S1E16B001	16B1	Bush/Valley North	Main-Amador	Deep	Static-Monitor	Active	Contractor	1			
3S1E16C002	16C2	Santa Rita Valley Shallow	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E16C003	16C3	Santa Rita Valley Middle	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E16C004	16C4	Santa Rita Valley Deep	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S1E16E004	16E4	black ave - cultural	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E16L005	P5	Pleas 5	Main-Amador	Lower	Supply-Municipal	Active	Pleas	4			
3S1E16L007	P6	Pleas 6	Main-Amador	Lower	Supply-Municipal	Active	Pleas	4			
3S1E16P005	16P5	Vervais Monitor	Main-Amador	Upper	Static-Monitor	Active	Contractor	2			✓
3S1E17B004	17B4	Casterson	Main-Amador	Lower	Supply-Unspecified	Unknown	Contractor	1			
3S1E17D003	17D3	Hopyard Nested Shallow	Main-Bernal	Lower	Static-Nested	Active	Contractor	1			
3S1E17D004	17D4	Hopyard Nested Middle 1	Main-Bernal	Lower	Static-Nested	Active	Contractor	1			
3S1E17D005	17D5	Hopyard Nested Middle 2	Main-Bernal	Lower	Static-Nested	Active	Contractor	1			
3S1E17D006	17D6	Hopyard Nested Middle 3	Main-Bernal	Lower	Static-Nested	Active	Contractor	1			
3S1E17D007	17D7	Hopyard Nested Deep	Main-Bernal	Deep	Static-Nested	Active	Contractor	1			
3S1E17D011	17D11	Hopyard 9 Monitoring Well	Main-Bernal	Lower	Static-Monitor	Active	Contractor	1			
3S1E17D012	H9	Hopyard 9	Main-Bernal	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E18A006	H6	Hopyard 6	Main-Bernal	Lower	Supply-Municipal	Active	Zone 7	4			
3S1E18E004	18E4	Valley Trails II	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E18J002	18J2	camino segura	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			

TABLE 6-1
MONITORING WELLS IN 2023 GROUNDWATER QUALITY PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Sample By	Frequency (per year)	Temperature Recorder (min)	RMS-WQ	Water Right
3S1E19A010	SF-B	SFWD South (B)	Main-Bernal	Lower	Supply-Municipal	Active	DDW	1			
3S1E19A011	SF-A	SFWD North (A)	Main-Bernal	Lower	Supply-Municipal	Active	DDW	1			
3S1E19C004	19C4	del valle & laguna	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E19K001	19K1	680/bernal	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E20B002	20B2	Fairgrounds Potable	Main-Bernal	Lower	Supply-Unspecified	Active	DDW	1			
3S1E20C007	20C7	Key_Bern_U	Main-Bernal	Upper	Static-Monitor	Active	Contractor	2		✓	✓
3S1E20C008	20C8	Key_Bern_L	Main-Bernal	Lower	Static-Nested	Active	Contractor	1		✓	
3S1E20C009	20C9	Fair Nested Deep	Main-Bernal	Lower	Static-Nested	Active	Contractor	1			
3S1E20J004	20J4	civic center	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E20M011	20M11	S.F "M"LINE	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E20Q002	20Q2	20Q2	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E22D002	22D2	vineyard trailer	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S1E23J001	23J1	1627 vineyard trailer	Main-Amador	Lower	Supply-Domestic	Unknown	Contractor	1			
3S1E25C003	25C3	Katz Winery Mansion	Main-Amador	Upper	Static-Monitor	Unknown	Contractor	1			
3S1E28M002	28M2	Bargar	Upland	Upper	Supply-Unspecified	Active	Zone 7	1			
3S1E29M004	29M4	f.c. channel	Main-Castle	Upper	Static-Monitor	Active	Contractor	1			✓
3S1E29P002	29P2	castlewood dr	Main-Bernal	Upper	Static-Monitor	Active	Contractor	1			
3S1E33G005	33G5	Pleasanton Calippe 33G5	Upland	Upper	Static-Monitor	Unknown	Contractor	1			
3S1W01B009	1B9	DSRSD Shallow	Fringe-Dublin	Lower	Static-Nested	Unknown	Contractor	1			
3S1W01J001	1J1	DSRSD MW-1	Fringe-Dublin	Upper	Static-Monitor	Unknown	DSRSD	1			
3S1W02A002	2A2	McNamara's	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
3S1W12B002	12B2	Stoneridge Mall Rd	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
3S1W12J001	12J1	DSRSD South	Fringe-Dublin	Upper	Static-Monitor	Active	Contractor	1			
3S1W13J001	13J1	muirwood dr	Main-Castle	Upper	Static-Monitor	Active	Contractor	1			
3S2E01F002	1F2	Brisa at Circuit City	Fringe-Spring	Upper	Static-Monitor	Active	Contractor	1			
3S2E02B002	2B2	south front rd	Fringe-Spring	Upper	Static-Monitor	Active	Contractor	1			
3S2E03A001	3A1	Bluebell	Fringe-Spring	Upper	Static-Monitor	Active	Contractor	1			
3S2E03K003	3K3	first & S. front rd	Fringe-Mocho I	Upper	Static-Monitor	Active	Contractor	1			
3S2E05N001	5N1	Spider Well	Main-Mocho II	Mixed	Supply-Unspecified	Inactive	Contractor	1			
3S2E07C002	7C2	jaws - york way - G4	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E07H002	7H2	dakota	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E07N002	7N2	Isabel & Arroyo Mocho	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S2E07P003	CWS24	CWS 24	Main-Amador	Lower	Supply-Municipal	Active	CWS	1			
3S2E07R003	CWS31	CWS 31	Upland	Lower	Supply-Municipal	Active	CWS	1			
3S2E08F001	CWS10	CWS 10	Main-Mocho II	Lower	Supply-Municipal	Active	CWS	1			

TABLE 6-1
MONITORING WELLS IN 2023 GROUNDWATER QUALITY PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Sample By	Frequency (per year)	Temperature Recorder (min)	RMS-WQ	Water Right
3S2E08H002	8H2	North k	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E08H003	8H3	Key_Mo2_L	Main-Mocho II	Lower	Static-Nested	Active	Contractor	1		✓	
3S2E08H004	8H4	N Liv Ave Deep	Main-Mocho II	Lower	Static-Nested	Active	Contractor	1			
3S2E08K002	8K2	Key_Mo2_U (Livermore Key)	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1		✓	
3S2E08N002	CWS14	CWS 14	Main-Mocho II	Lower	Supply-Municipal	Active	CWS	1			
3S2E08Q009	8Q9	D-2	Main-Mocho II	Lower	Static-Monitor	Active	Contractor	1			
3S2E09Q004	9Q4	school st	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E10F003	10F3	hexcel	Fringe-Mocho I	Upper	Static-Monitor	Active	Contractor	1			
3S2E10Q001	10Q1	almond	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E10Q002	10Q2	LLNL W-703	Main-Mocho II	Lower	Static-Monitor	Unknown	LLNL	1			
3S2E11C001	11C1	joan way	Fringe-Mocho I	Upper	Static-Monitor	Active	Contractor	1			
3S2E12C004	12C4	LLNL W-486	Fringe-Spring	Upper	Static-Monitor	Unknown	LLNL	1			
3S2E12J003	12J3	LLNL W-017A	Fringe-Spring	Lower	Static-Monitor	Unknown	LLNL	1			
3S2E14A003	14A3	S. vasco @east ave	Fringe-Mocho I	Upper	Static-Monitor	Active	Contractor	1			
3S2E14B001	14B1	5763 east ave	Fringe-Mocho I	Lower	Supply-Domestic	Unknown	Contractor	1			
3S2E15E002	15E2	Retzlaff Winery	Main-Mocho II	Lower	Supply-Irrigation	Active	Contractor	1			
3S2E15L001	15L1	Concannon 2	Main-Mocho II	Upper	Static-Monitor	Active	Other	1			
3S2E15L002	15L2	Concannon 6D	Main-Mocho II	Upper	Static-Monitor	Active	Other	1			
3S2E15M002	15M2	Concannon 1	Main-Mocho II	Upper	Static-Monitor	Active	Other	1			
3S2E15M003	15M3	Concannon 5D	Main-Mocho II	Upper	Static-Monitor	Active	Other	1			
3S2E15Q008	15Q 8	Concannon 4	Main-Mocho II	Upper	Static-Monitor	Active	Other	1			
3S2E15R017	15R17	Buena Vista Shallow	Main-Mocho II	Upper	Static-Nested	Active	Contractor	1			
3S2E15R018	15R18	Buena Vista Deep	Main-Mocho II	Lower	Static-Nested	Active	Contractor	1			
3S2E15R020	15R20	Concannon 3	Main-Mocho II	Upper	Static-Monitor	Active	Other	1			
3S2E16A003	16A3	Memory Gardens	Main-Mocho II	Lower	Supply-Irrigation	Active	Contractor	1			
3S2E16C001	CWS15	CWS 15	Main-Mocho II	Lower	Supply-Municipal	Active	CWS	1			
3S2E16E004	16E4	pepper tree	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E18B001	CWS20	CWS 20	Main-Amador	Lower	Supply-Municipal	Active	CWS	1			
3S2E18E001	18E1	Stanley East of Isabel	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			
3S2E19D007	19D7	Isabel Shallow	Main-Amador	Upper	Static-Nested	Active	Contractor	1			
3S2E19D008	19D8	Isabel Middle 1	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S2E19D009	19D9	Isabel Middle 2	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S2E19D010	19D10	Isabel Deep	Main-Amador	Lower	Static-Nested	Active	Contractor	1			
3S2E19N003	19N3	Shallow Cemex Nested	Main-Amador	Upper	Static-Nested	Active	Contractor	1			
3S2E19N004	19N4	Deep Cemex Nested	Main-Amador	Lower	Static-Nested	Active	Contractor	1			

TABLE 6-1
MONITORING WELLS IN 2023 GROUNDWATER QUALITY PROGRAM
LIVERMORE VALLEY GROUNDWATER BASIN

Well	Map	Alias	Basin	Aquifer	Type	Status	Sample By	Frequency (per year)	Temperature Recorder (min)	RMS-WQ	Water Right
3S2E20M001	20M1	Alden Lane	Main-Amador	Lower	Supply-Unspecified	Active	Contractor	1			
3S2E21K009	21K9	Marina Ave	Upland	Upper	Supply-Domestic	Active	Zone 7	1		✓	
3S2E21N001	21N1	Ravenswood North Well	Upland		Supply-Irrigation	Active	Zone 7	1			
3S2E22B001	22B1	grapes	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E23E001	23E1	Murrieta Nested Shallow	Main-Mocho II	Upper	Static-Nested	Active	Contractor	1			
3S2E23E002	23E2	Murrieta Nested Deep	Main-Mocho II	Lower	Static-Nested	Active	Contractor	1			
3S2E24A001	24A1	S. greenville	Fringe-Mocho I	Upper	Static-Monitor	Active	Contractor	1		✓	
3S2E26J002	26J2	mines rd	Main-Mocho II	Upper	Static-Monitor	Active	Contractor	1			
3S2E29F004	29F4	Wetmore	Main-Amador	Upper	Static-Monitor	Active	Contractor	2			✓
3S2E30C001	30C1	Vineyard 30C 1	Main-Amador	Lower	Supply-Unspecified	Active	Contractor	1			
3S2E30D002	30D2	vineyard	Main-Amador	Upper	Static-Monitor	Active	Contractor	1			✓
3S2E32E007	32E7	DVWTP 32E7	Upland	Upper	Static-Monitor	Active	Contractor	1			
3S2E33C001	33C1	Sycamore Grove P1	Main-Amador	Upper	Static-Monitor	Inactive	Contractor	1			
3S2E33G001	33G1	Crohare	Main-Amador	Upper	Static-Monitor	Active	Contractor	2			✓
3S2E33K001	33K1	VA	Main-Amador	Upper	Static-Monitor	Unknown	VA	4			
3S2E33L001	33L1	VA/CROHARE FENCE	Main-Amador	Upper	Static-Monitor	Unknown	VA	4			
3S3E06Q003	6Q3	PPWTP South Monitoring	Fringe-Altamont	Upper	Static-Monitor	Active	Contractor	1			
3S3E07D002	7D2	7D 2	Fringe-Spring	Upper	Static-Monitor	Active	Contractor	1			
3S3E19C002	19C2	Wilker well 2	Fringe-Mocho I	Upper	Supply-Domestic	Active	Zone 7	1			
3S3E20L004	20L4	Vail on Tesla	Fringe-Mocho I	Upper	Supply-Domestic	Active	Zone 7	1			
3S3E20R004	20R4	Buonanno on Tesla	Fringe-Mocho I	Upper	Supply-Domestic	Active	Zone 7	1			
3S3E21C001	21C1	Russell on Reuss	Upland	Upper	Supply-Domestic	Active	Zone 7	1			
4S2E01A001	1A1	Gallagher Ag	Main-Mocho II	Upper	Supply-Irrigation	Active	Zone 7	1			
4S3E06E004	6E4	Gallagher Domestic	Main-Mocho II	Upper	Supply-Domestic	Active	Zone 7	1			
WELLS IN THE GROUNDWATER QUALITY PROGRAM = 234											

RMS = Representative Monitoring Site
WQ = Water Levels

TABLE 6-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
2S1E32E001	6/27/23	ZONE7	7.02	1223	7.3	123	29	112	1.1	572	30	114	9	38.5	< 100	3	< 100	1.6	769	427
2S1E32N001	6/27/23	ZONE7	18.7	1053	7.5	83	20	104	1.7	280	35	175	3.25	23.5	420	1.8	< 100	6.4	595	290
2S1E32Q001	6/27/23	ZONE7	22	1974	7.4	152	60	184	1.9	654	97	281	17.5	30	620	2.1	< 100	7.7	1206	627
2S1E33L001	6/29/23	ZONE7	27.9	1500	7.3	135	38	167	3.4	517	39	216	10.2	25.7	540	4.5	232	5.1	924	493
2S1E33P002	6/27/23	ZONE7	18.3	1870	7.3	132	57	193	3.7	686	49	277	7.61	23.5	880	1.8	< 100	10	1107	565
2S1E33R001	8/7/23	ZONE7	21.7	674	7.6	63	15	76	1.1	241	28	81	2.92	27.8	100	2.2	< 100	14	424	219
2S1W15F001	9/28/23	ZONE7	21	66	6.5	6	1	3	1	26	1	5	< 0.1	4.3	< 200	3.3	9210	< 2	34	19
2S1W26C002	6/29/23	ZONE7	20.5	614	7.2	83	16	38	0.8	351	26	17	1.98	30	130	3	< 100	1.1	393	274
2S1W36E003	6/29/23	ZONE7	19.1	907	7.2	114	23	58	0.6	389	85	68	3.23	36.4	140	4.1	< 100	1.8	591	380
2S1W36F001	6/29/23	ZONE7	22.1	340	7.7	56	6	12	5.7	218	1	7	< 0.1	7.7	< 200	6.7	< 200	16	203	165
2S2E21L001	5/1/23	ZONE7	17.3	1359	7.8	53	33	171	1.2	383	37	181	17.4	32.1	490	6	< 100	5.5	776	268
2S2E27M002	5/1/23	ZONE7	16.6	2127	8.1	51	60	307	0.6	557	150	334	7.82	34.2	2620	6.8	< 200	12	1252	375
2S2E27P002	7/20/23	ZONE7	21.1	4688	7.7	78	42	844	1.8	198	< 1	1493	< 0.1	27.8	31830	< 5	< 500	37	2585	368
2S2E28D002	7/27/23	ZONE7	22.5	1415	7.4	79	40	180	4	251	46	237	38	32.1	830	3.6	< 100	9.2	910	362
2S2E28J002	8/22/23	ZONE7	22.8	966	8.3	5	4	229	0.5	378	59	91	< 0.1	20.1	1670	< 1	< 100	2.2	595	28
2S2E28Q001	7/27/23	ZONE7	20.7	1169	7.8	43	37	190	1	378	99	158	1.88	32.1	810	11	< 100	3.3	756	259
2S2E32K002	8/7/23	ZONE7	20.6	947	7.8	41	33	136	1.7	316	55	127	2.41	38.5	530	5.6	< 100	13	599	238
2S2E34E001	7/27/23	ZONE7	21.2	1094	8.1	14	11	243	0.8	371	67	156	< 0.1	27.8	3110	25	< 100	3.8	706	80
2S2E34Q002	7/20/23	ZONE7	22.9	1813	7.6	71	62	213	1.1	258	130	386	1	32.1	3730	3.8	< 100	7.1	1027	432
3S1E01F002	6/20/23	ZONE7	18.9	1378	7	118	40	123	0.5	532	38	151	4.54	42.8	260	4.1	< 100	2.7	795	460
3S1E01H003	4/12/23	LWRP	-	1910	-	72	42	263	1.4	-	72	336	17.9	32	1300.	-	-	-	1120	-
3S1E01H003	6/7/23	ZONE7	21.1	1744	7.5	66	43	253	1.2	507	80	276	14.5	30	730	4.6	< 100	9.3	1064	342
3S1E01H003	9/18/23	LWRP	-	1927	-	89	54	304	1.7	-	69	343	17.9	31	1400.	-	-	-	1099	-
3S1E01L001	6/20/23	ZONE7	20.9	1225	7.5	52	25	195	1	578	48	77	8.91	32.1	2490	4.5	< 100	7.6	755	233
3S1E01P002	4/12/23	LWRP	-	1380	-	124	82	161	11	-	72	261	0.2	18	3000.	-	-	-	770	-
3S1E01P002	5/18/23	ZONE7	16.1	1105	7.5	57	35	137	2.5	329	64	165	0.32	20.8	2330	4.2	< 100	3.9	645	286
3S1E01P002	9/18/23	LWRP	-	1495	-	101	74	187	7.2	-	69	335	0.2	22	2400.	-	-	-	902	-
3S1E01P003	5/18/23	ZONE7	20.2	408	8.3	21	14	36	2.1	63	7	90	< 0.1	1.3	140	3.3	796	< 2	204	110
3S1E02J002	5/18/23	ZONE7	19.1	3235	7.4	178	92	464	3.3	599	249	725	10	30	5750	6.3	< 500	20	2082	824
3S1E02J003	6/20/23	ZONE7	20.7	1326	7.5	53	38	164	4.9	397	26	206	0.58	21	630	4.4	< 100	3	711	289
3S1E02K002	6/20/23	ZONE7	23.8	1185	7.8	23	21	223	1.6	454	43	110	7.32	20.1	960	5.1	< 100	10	699	145
3S1E02M003	6/28/23	ZONE7	22	1937	7.4	74	46	371	2.2	703	74	273	9.88	30	3030	11	388	17	1261	374
3S1E02N006	6/28/23	ZONE7	17.2	1525	8	77	46	190	1.3	502	79	240	0.17	18.4	3260	3.6	< 100	6.1	900	382
3S1E02P003	4/13/23	ZONE7	11.8	665	8.2	39	33	56	2	271	41	64	4.13	23.5	480	2.2	< 100	3.9	415	234
3S1E02Q001	6/28/23	ZONE7	19.8	469	7.1	29	11	53	12	239	6	36	< 0.1	19.7	700	3.6	787	< 2	284	117
3S1E02R001	4/12/23	LWRP	-	1600	-	85	60	166	2.4	-	67	248	5.9	33	2800.	-	-	-	930	-
3S1E02R001	5/18/23	ZONE7	18.7	1550	7.3	82	58	179	1.5	538	70	202	6.87	25.7	2500	5.3	< 100	5.6	915	444
3S1E02R001	9/18/23	LWRP	-	2020	-	115	84	219	1.9	-	64	440	15.8	26	3200.	-	-	-	1124	-
3S1E03G002	5/31/23	ZONE7	17.3	1545	7.7	59	33	246	1.7	654	26	195	< 0.1	20.5	1200	4	< 100	3.4	906	284
3S1E04A001	6/22/23	ZONE7	19.2	1533	7.4	106	26	165	1.3	417	30	271	4.78	23.5	350	2.2	< 100	5.6	850	372
3S1E04J005	1/19/23	ZONE7	16.7	2742	7.9	29	43	633	< 2.5	793	186	437	2.86	18	10200	8.2	< 500	< 5	1753	249
3S1E04J006	1/19/23	ZONE7	16.8	398	7.9	23	6	55	4.7	182	23	15	1.44	11.3	820	8	< 100	1.1	235	83
3S1E04Q002	2/6/23	ZONE7	16.4	1723	7.7	91	55	209	1.9	394	89	342	0.65	23.5	1840	4.2	< 100	< 1	1016	455
3S1E05K006	1/19/23	ZONE7	17.1	1646	10.6	143	13	189	4.6	3	153	401	15.8	0.9	1060	< 1	< 100	7.6	983	412
3S1E05K007	1/19/23	ZONE7	17.1	966	7.8	55	27	144	1.2	360	126	74	< 0.1	23.5	860	2.8	< 100	< 1	629	249
3S1E05L003	1/18/23	ZONE7	19	1084	7.6	59	34	165	0.8	400	142	81	< 0.1	23.5	960	2.9	< 100	< 1	704	288
3S1E05P006	1/19/23	ZONE7	17.1	3536	7.3	239	160	491	1.2	547	942	462	4.75	25.7	1620	< 5	< 500	< 5	2612	1257
3S1E06F003	6/22/23	ZONE7	19.7	4379	7.1	324	135	456	2.6	573	669	886	< 0.1	23.5	3330	5	< 500	17	2778	1366
3S1E06M002	11/16/22	DSRSD	17.5	8505	6.7	-	-	-	-	-	3320	395	0.12	-	-	-	-	-	6470	-
3S1E06M002	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	5J	-	< 5	-	-

- = Not Analyzed

Highlighted = Representative Monitoring Site

TABLE 6-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
3S1E06M002	5/2/23	DSRSD	16.1	8288	6.77	-	-	-	-	-	3060	369	< 2	-	-	-	-	-	6840	-
3S1E06M002	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	< 5	-	-
3S1E06N002	11/15/22	DSRSD	18.7	24630	6.41	-	-	-	-	-	1380	9430	< 5	-	-	-	-	-	18700	-
3S1E06N002	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	< 5	-	-
3S1E06N002	1/18/23	ZONE7	18.5	23430	6.8	1860	997	2550	5.8	409	1166	8695	< 0.1	20.8	880	26	< 2000	< 20	15496	8754
3S1E06N002	5/1/23	DSRSD	17.5	24450	6.17	-	-	-	-	-	1440	9320	< 2	-	-	-	-	-	20900	-
3S1E06N002	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	< 5	-	-
3S1E06N003	11/16/22	DSRSD	17.7	11470	6.88	-	-	-	-	-	243	4080	0.6	-	-	-	-	-	7950	-
3S1E06N003	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	6.6	-	< 5	-	-
3S1E06N003	5/1/23	DSRSD	17.4	10670	6.9	-	-	-	-	-	105	3670	0.86	-	-	-	-	-	8300	-
3S1E06N003	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	-	< 5	-	-
3S1E06N004	11/15/22	DSRSD	18.9	3111	6.88	-	-	-	-	-	842	131	< 5	-	-	-	-	-	2160	-
3S1E06N004	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	7.8	-	< 5	-	-
3S1E06N004	5/1/23	DSRSD	15.6	2631	6.97	-	-	-	-	-	604	150	1.83	-	-	-	-	-	1875	-
3S1E06N004	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	-	1.1	-	-
3S1E06N005	11/15/22	DSRSD	20.8	24650	7.47	-	-	-	-	-	6560	7140	0.52	-	-	-	-	-	20000	-
3S1E06N005	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	< 5	-	-
3S1E06N005	5/2/23	DSRSD	17.5	21400	7	-	-	-	-	-	6340	4830	< 2	-	-	-	-	-	18700	-
3S1E06N005	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	< 5	-	-
3S1E06N006	11/15/22	DSRSD	20.5	25580	7.17	-	-	-	-	-	1550	9580	0.16	-	-	-	-	-	16800	-
3S1E06N006	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	6.3	-	< 5	-	-
3S1E06N006	5/2/23	DSRSD	17	25240	6.67	-	-	-	-	-	1710	9250	< 2	-	-	-	-	-	20800	-
3S1E06N006	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	-	< 5	-	-
3S1E07B002	1/17/23	ZONE7	20.5	596	8.6	20	10	111	4.9	204	31	71	0.8	8.8	520	1.9	< 100	< 1	365	91
3S1E07B012	1/17/23	ZONE7	19.1	11650	7.3	462	349	2050	2.8	307	1748	3581	< 0.1	21.4	1830	< 10	< 1000	< 10	8366	2593
3S1E07D001	11/14/22	DSRSD	18.9	5562	7.12	-	-	-	-	-	131	1420	< 5	-	-	-	-	-	2820	-
3S1E07D001	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	< 5	-	-
3S1E07D001	5/2/23	DSRSD	18.8	4813	7.15	-	-	-	-	-	121	1370	< 2	-	-	-	-	-	2880	-
3S1E07D001	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	< 5	-	-
3S1E07D002	11/14/22	DSRSD	19.6	24090	7.05	-	-	-	-	-	11400	4400	3.4	-	-	-	-	-	22500	-
3S1E07D002	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	< 5	-	-
3S1E07D002	5/2/23	DSRSD	19	22960	6.93	-	-	-	-	-	9830	4040	0.1	-	-	-	-	-	22400	-
3S1E07D002	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	32	-	< 5	-	-
3S1E07D003	11/15/22	DSRSD	21.3	20380	7.3	-	-	-	-	-	373	7990	0.17	-	-	-	-	-	14000	-
3S1E07D003	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	68	-	< 5	-	-
3S1E07D003	5/2/23	DSRSD	18.9	21460	6.96	-	-	-	-	-	356	7970	< 2	-	-	-	-	-	15600	-
3S1E07D003	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	66	-	< 5	-	-
3S1E07D004	11/15/22	DSRSD	18.9	21040	7.52	-	-	-	-	-	6900	5130	< 5	-	-	-	-	-	17700	-
3S1E07D004	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	8.8	-	< 5	-	-
3S1E07D004	5/1/23	DSRSD	16.6	12520	7.3	-	-	-	-	-	4540	1760	< 2	-	-	-	-	-	11500	-
3S1E07D004	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	-	< 5	-	-
3S1E07G007	1/18/23	ZONE7	17.7	17580	7	457	569	3540	3.5	446	3043	5176	< 0.1	20.5	5120	< 20	< 2000	< 20	13029	3482
3S1E07J005	1/16/23	ZONE7	19.5	2216	7.3	110	79	341	1.6	807	269	220	0.49	25.7	5930	2.6	< 200	< 2	1447	598
3S1E08B001	2/6/23	ZONE7	17.3	1727	8	81	61	218	1.4	364	253	259	< 0.1	20.3	2380	5.3	412	< 1	1084	453
3S1E08G004	1/19/23	ZONE7	15.5	2210	7.2	143	62	347	2.1	694	340	237	0.67	27.8	4100	2.8	< 200	< 2	1504	612
3S1E08H009	2/8/23	ZONE7	15.1	924	7.6	60	53	75	1.8	360	50	86	5.24	27.8	770	5.5	< 200	9.8	561	368
3S1E08H010	2/8/23	ZONE7	15.3	1066	7.6	59	47	144	2.1	388	75	111	4.34	32.1	1420	5.6	277	8.6	688	342
3S1E08H011	2/8/23	ZONE7	14.8	856	7.6	52	40	81	2.2	308	56	76	2.31	30	820	1.1	< 100	5.8	504	295
3S1E08H013	2/8/23	ZONE7	18.6	430	10.1	13	3	81	3.5	28	49	62	0.63	10.5	520	4.3	< 200	< 2	255	44
3S1E08H018	10/3/22	ZONE7	20.6	927	7.6	56	36	80	2.4	344	63	88	2.31	25.7	690	1.2	< 100	4.6	531	288

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TABLE 6-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
3S1E08H018	4/10/23	ZONE7	20	842	7.7	56	35	78	2.5	311	57	77	2.24	27.8	700	1.1	< 100	6	497	284
3S1E08H018	7/12/23	ZONE7	19.6	858	7.6	58	35	82	2.3	314	57	84	2.18	27.8	690	1.2	< 100	6.3	511	289
3S1E08K001	1/17/23	ZONE7	16.7	1152	6.6	132	43	91	7.9	394	142	107	7.79	23.5	1000	1.8	< 100	5.3	775	506
3S1E08K001	6/21/23	ZONE7	24	1930	7.3	151	98	126	3.1	680	247	219	3.68	25.7	1750	1.4	< 100	9.2	1221	782
3S1E09B001	10/3/22	ZONE7	21.1	902	7.7	55	45	54	2.1	345	48	90	3.38	25.7	480	1.4	< 100	6.2	505	323
3S1E09B001	8/3/23	ZONE7	19.9	991	7.5	72	59	64	2.3	365	57	121	3.35	27.8	580	1.6	< 100	6.6	598	423
3S1E09H010	6/7/23	ZONE7	19.3	746	7.5	43	42	64	1.7	249	48	97	0.25	16.9	570	3.2	468	< 2	437	280
3S1E09H010	6/21/23	ZONE7	25.6	817	7.6	44	43	64	1.5	274	49	114	< 0.1	18.2	600	1.2	< 100	2	469	287
3S1E09H011	3/7/23	ZONE7	14	792	7.7	39	47	68	1.6	304	22	103	< 0.1	23.5	770	1.1	< 100	< 1	454	292
3S1E09H013	5/2/23	ZONE7	17.1	863	8	49	46	67	1.5	277	52	114	< 0.1	19.3	600	< 1	< 100	1.7	488	312
3S1E09J007	3/7/23	ZONE7	15.8	816	7.9	52	40	61	2	244	54	113	< 0.1	15.6	580	< 1	< 100	< 1	458	295
3S1E09J008	2/9/23	ZONE7	16.5	767	7.6	79	39	56	1.9	272	50	104	0.07	21.4	690	3.6	296	2	487	359
3S1E09J009	3/7/23	ZONE7	16.9	844	7.6	61	63	28	2	317	48	95	3.21	25.7	260	< 1	< 100	8	493	412
3S1E09M003	10/3/22	ZONE7	18.6	1040	7.5	63	39	57	1.9	299	58	110	0.88	21.4	580	< 1	< 100	3	502	319
3S1E09M003	4/10/23	ZONE7	18.5	869	7.5	67	40	55	2	284	55	108	0.94	23.5	600	< 1	< 100	4.2	495	333
3S1E09M003	7/12/23	ZONE7	17.9	890	7.5	72	41	59	1.9	279	55	117	0.8	23.5	580	< 1	< 100	4.5	511	349
3S1E09M004	10/3/22	ZONE7	19.6	1011	7.5	50	38	91	2.1	346	71	122	2	25.7	980	1	< 100	4.1	579	282
3S1E09P005	3/16/23	ZONE7	17.5	145	7.2	13	7	12	1.8	68	9	6	0.13	9.2	220	4.1	< 200	< 2	92	61
3S1E09P005	4/11/23	ZONE7	16.8	743	7.1	56	28	53	2.2	213	52	99	< 0.1	17.8	500	< 1	< 100	2.5	413	255
3S1E09P009	3/8/23	ZONE7	12.6	782	7.4	47	35	61	1.9	239	50	100	< 0.1	19.9	570	< 1	< 100	< 1	433	262
3S1E09P010	3/8/23	ZONE7	13.3	908	7.4	69	41	51	1.8	280	55	108	0.37	19.9	490	< 1	< 100	1.8	485	341
3S1E09P011	3/8/23	ZONE7	14.6	925	7.3	73	42	49	1.8	290	56	110	0.44	19.5	470	< 1	< 100	1.9	496	355
3S1E10A002	6/1/23	ZONE7	18.6	1735	7.2	68	81	192	1.8	495	115	272	8.41	27.8	2180	1.6	< 100	7.2	1046	502
3S1E10B008	4/10/23	ZONE7	20	1257	7.4	72	67	119	2.1	487	68	135	9.86	30	1710	2.1	< 100	8.8	777	456
3S1E10B009	4/10/23	ZONE7	21.5	567	7.9	30	18	69	1.5	217	42	53	0.4	19.5	620	8.1	< 100	1.6	343	149
3S1E10B010	4/10/23	ZONE7	20.7	984	7.6	56	51	80	1.8	380	53	99	4.42	27.8	1220	1.8	< 100	10	576	350
3S1E10B011	4/10/23	ZONE7	21.9	586	7.6	38	30	53	1.8	229	54	47	3.54	27.8	580	3.3	< 100	4.8	380	219
3S1E10B014	9/25/23	ZONE7	22.3	666	7.4	46	45	38	1.6	290	42	65	4.16	25.7	280	1.2	< 100	7.5	425	300
3S1E10D002	10/13/22	ZONE7	19.4	1016	7.5	63	31	56	1.7	283	50	103	0.85	17.5	480	< 1	< 100	1.8	466	286
3S1E10D002	3/7/23	ZONE7	12.3	1126	7.9	44	49	147	1.4	423	53	126	2.98	25.7	1600	7.5	< 100	1.8	669	312
3S1E10D003	10/13/22	ZONE7	18.7	1141	7.8	58	50	68	2.1	383	55	105	6.82	25.7	780	1.7	< 100	8.5	584	351
3S1E10D003	3/7/23	ZONE7	13.6	960	7.8	60	58	73	2.1	351	53	101	6.94	25.7	830	2	< 100	8.4	577	389
3S1E10D004	10/13/22	ZONE7	18.8	849	7.7	43	36	66	1.6	299	45	78	3.06	23.5	480	1.9	< 100	10	455	256
3S1E10D004	3/6/23	ZONE7	16.1	761	7.9	39	35	85	1.5	287	47	78	2.59	27.8	620	2.9	< 100	8.5	467	242
3S1E10D005	10/13/22	ZONE7	18	682	7.8	31	22	58	1.8	265	33	35	2.09	23.5	260	2.6	< 100	10	345	169
3S1E10D005	3/6/23	ZONE7	17.3	570	8	34	23	61	1.8	259	33	35	1.79	25.7	300	2.9	< 100	11	350	180
3S1E10K002	4/10/23	ZONE7	19.2	853	7.5	67	49	51	2	326	43	97	2.32	23.5	520	< 1	< 100	5.3	504	370
3S1E11B001	4/12/23	LWRP	-	1810	-	73	66	220	1.3	-	91	272	12.7	31	4000.	-	-	-	1060	-
3S1E11B001	5/30/23	ZONE7	18.9	1819	7.3	69	60	233	1.2	601	90	241	10.1	27.8	2730	3.8	< 100	17	1074	419
3S1E11B001	9/18/23	LWRP	-	1884	-	77	70	258	1.3	-	72	338	11.6	27	4100.	-	-	-	1094	-
3S1E11C003	6/28/23	ZONE7	192	1787	6.3	96	73	245	1.4	605	96	281	7.09	25.7	3090	6.8	221	2.6	1147	541
3S1E11G001	5/16/23	ZONE7	17.4	1127	7.2	63	77	68	3	441	64	118	9.87	36.4	700	4	896	7.9	690	475
3S1E11G002	5/16/23	ZONE7	18.6	829	7.7	66	49	49	2.3	349	42	77	4.93	25.7	310	4.8	382	11	506	367
3S1E11G003	5/16/23	ZONE7	20.7	638	7.8	44	46	30	2	292	39	45	3.85	30	260	3.9	< 200	12	398	300
3S1E11G004	5/16/23	ZONE7	20.2	739	7.5	44	42	52	2.5	318	49	62	2.66	25.7	400	3.9	373	8.7	446	283
3S1E11M002	6/1/23	ZONE7	19.4	428	10.5	5	10	55	4.1	6	34	74	2.61	< 0.2	260	< 1	< 100	20	208	53
3S1E11P006	6/20/23	ZONE7	19.7	735	7.8	62	29	41	1.6	236	46	85	0.71	18	370	< 1	< 100	3.4	404	274
3S1E12A002	4/12/23	LWRP	-	1220	-	61	84	58	2.3	-	67	140	20.7	36	600.	-	-	-	710	-
3S1E12A002	5/30/23	ZONE7	19.3	339	7.3	22	19	25	1.7	120	16	26	5.03	15	200	1.7	< 100	2.1	206	133
3S1E12A002	9/18/23	LWRP	-	1251	-	69	96	70	2.9	-	60	162	10.3	35	600.	-	-	-	669	-

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TABLE 6-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
3S1E12D002	4/12/23	LWRP	-	1540	-	80	82	141	3	-	65	96	14.1	38	2000.	-	-	-	930	-
3S1E12D002	5/30/23	ZONE7	19.6	1471	7.6	79	76	146	2.4	784	71	64	13.8	36.4	1240	3.9	< 100	83	929	511
3S1E12D002	9/18/23	LWRP	-	1698	-	97	98	172	3.3	-	62	174	15.8	35	3300.	-	-	-	1015	-
3S1E12G001	4/12/23	LWRP	-	1060	-	53	70	58	2.2	-	50	115	8.7	34	600.	-	-	-	590	-
3S1E12G001	6/21/23	ZONE7	20	1089	7.1	58	71	66	2.3	429	59	111	9.49	32.1	510	1.4	< 100	9.8	653	438
3S1E12G001	9/18/23	LWRP	-	1222	-	68	90	68	2.8	-	51	166	11.1	32	1100.	-	-	-	679	-
3S1E12H004	5/16/23	ZONE7	19.8	794	7.4	53	59	37	1.9	335	46	69	4.8	30	360	1.2	< 100	8.3	482	375
3S1E12H005	5/16/23	ZONE7	20.1	623	7.6	43	45	31	1.7	315	40	38	2.59	32.1	260	1.2	< 100	20	398	293
3S1E12H006	5/17/23	ZONE7	18.5	568	7.4	28	27	65	2.1	295	32	32	< 0.1	27.8	290	6.6	< 200	< 2	359	181
3S1E12H007	5/17/23	ZONE7	18.2	467	7.6	10	4	98	1.1	224	17	33	1.34	23.5	460	28	< 200	< 2	303	41
3S1E12K002	5/17/23	ZONE7	21.6	587	7.4	34	42	31	1.4	226	39	66	1.99	25.7	250	3.8	< 200	3.5	360	258
3S1E12K003	5/17/23	ZONE7	20.4	574	7.9	33	40	29	1.4	224	33	65	< 0.1	23.5	280	< 1	< 100	1.4	336	247
3S1E12K004	5/17/23	ZONE7	21.5	303	7.9	14	16	26	1.3	148	7	19	1.53	21.4	140	< 1	< 100	2.8	185	101
3S1E13P005	7/25/23	ZONE7	21.4	733	7.6	53	28	63	1.8	190	53	98	< 0.1	13.3	400	< 1	< 100	1.3	404	247
3S1E14B001	6/1/23	ZONE7	18.3	766	7.6	69	32	45	1.8	269	47	93	0.78	19	330	< 1	141	3.3	449	304
3S1E14D002	10/13/22	ZONE7	18	1512	7.7	65	59	109	2.1	479	71	157	7.39	25.7	1670	1.9	< 100	6.8	758	405
3S1E14D002	6/26/23	ZONE7	23.2	820	7.5	64	30	56	1.7	273	49	98	< 0.1	14.3	480	< 1	< 100	2.4	448	284
3S1E15M003	3/8/23	ZONE7	18.7	677	7.4	44	26	59	1.6	239	39	67	2.14	23.5	280	< 1	< 100	< 1	387	217
3S1E15M003	7/26/23	ZONE7	23.1	770	7.2	67	37	51	1.5	277	44	79	4.02	25.7	300	< 1	< 100	2.4	459	319
3S1E15M003	8/8/23	ZONE7	23.6	782	7.2	70	38	53	1.6	279	45	83	4.6	25.7	250	< 1	< 100	2.7	474	331
3S1E16A002	6/22/23	BABCOCK	-	860	7.47	80	-	-	-	-	-	-	-	-	-	-	-	-	530	-
3S1E16A004	3/16/23	ZONE7	11.7	494	8	49	24	24	4.7	190	84	12	0.06	7.5	300	8.7	250	< 2	299	221
3S1E16A004	7/26/23	ZONE7	21.8	828	7.4	98	37	39	1.9	317	53	89	1.2	23.5	300	< 1	< 100	5.2	503	397
3S1E16A004	8/8/23	ZONE7	22	834	7.4	98	37	40	2	319	52	86	1.29	23.5	310	< 1	< 100	5.2	502	397
3S1E16B001	2/9/23	ZONE7	18.5	548	7.6	62	24	38	1.7	246	34	40	2.45	25.7	260	4.4	242	12	365	254
3S1E16C002	10/10/22	ZONE7	16.6	821	7.3	67	32	53	1.7	274	58	102	0.44	19.9	590	< 1	< 100	2.5	471	300
3S1E16C002	4/12/23	ZONE7	16.1	866	7.5	47	13	126	2.3	186	130	96	< 0.1	20.5	340	< 1	< 100	2.4	527	172
3S1E16C003	10/10/22	ZONE7	17.5	833	7.3	69	33	51	1.8	289	57	103	0.46	20.1	580	< 1	< 100	2.7	480	308
3S1E16C003	4/12/23	ZONE7	16.2	947	7.5	80	32	59	2.8	326	60	105	0.97	27.8	680	1.6	< 100	5.1	532	332
3S1E16C004	10/10/22	ZONE7	19.2	960	7.5	84	32	60	2.2	358	63	103	1.68	23.5	400	1	< 100	4.7	552	342
3S1E16C004	4/12/23	ZONE7	16.4	838	7.7	80	29	51	2.7	296	55	81	2.72	25.7	390	< 1	< 100	4.9	483	319
3S1E16E004	2/6/23	ZONE7	15.3	1424	7.3	144	73	89	3.1	599	88	131	4.98	23.5	650	4.5	< 200	4.3	874	661
3S1E16E004	4/13/23	ZONE7	18.3	179	6.9	20	8	4	7	102	1	1	0.46	16.1	330	3.6	216	< 2	109	83
3S1E16L005	6/22/23	BABCOCK	-	860	7.41	79	-	-	-	-	-	-	-	-	-	-	-	-	470	-
3S1E16L007	6/22/23	BABCOCK	-	780	7.57	65	-	-	-	-	-	-	-	-	-	-	-	-	420	-
3S1E16P005	10/10/22	ZONE7	24.3	601	6.8	37	24	49	2.2	206	59	56	1.43	10.5	260	< 1	< 100	< 1	345	191
3S1E16P005	3/9/23	ZONE7	11.1	400	7	26	19	29	1.9	135	36	33	1	8.3	160	< 1	< 100	< 1	224	143
3S1E16P005	7/18/23	ZONE7	23.3	389	7	29	16	29	2.4	148	29	28	< 0.1	10.3	220	< 1	< 100	< 1	217	138
3S1E17B004	2/6/23	ZONE7	14.9	1277	7.7	126	68	63	2.4	550	67	121	5.62	21.4	700	< 1	< 100	3.1	769	595
3S1E17D003	10/12/22	ZONE7	21.2	1177	7.5	103	65	54	2.5	493	81	94	4.85	18.4	400	3.6	538	2.2	683	525
3S1E17D003	4/13/23	ZONE7	17.4	379	8.7	11	3	56	2.2	44	27	71	< 0.1	0.4	< 100	2.5	7110	< 2	196	40
3S1E17D004	10/12/22	ZONE7	22.4	1282	8.5	14	5	241	0.9	275	16	252	< 0.1	19.3	2380	9.2	< 100	< 1	692	56
3S1E17D004	2/7/23	ZONE7	16.9	1084	9.5	1	< 0	207	0.9	195	61	158	< 0.1	1.1	1190	3.9	2370	< 2	526	2
3S1E17D005	10/12/22	ZONE7	19.2	1368	8.4	16	10	229	0.8	276	14	250	< 0.1	14.8	2210	48	578	< 1	679	81
3S1E17D005	4/13/23	ZONE7	17.7	1032	9.1	3	4	226	0.9	188	22	208	< 0.1	0.4	1680	3.2	2630	< 2	585	24
3S1E17D006	10/12/22	ZONE7	19.4	1416	8.4	21	7	266	1.1	280	7	331	< 0.1	18.2	1420	6.4	311	< 1	796	81
3S1E17D006	2/7/23	ZONE7	17.1	1156	9.1	3	3	177	0.7	146	2	199	< 0.1	0.9	950	3.8	2270	< 2	501	20
3S1E17D007	10/12/22	ZONE7	17.2	1335	8.4	11	7	282	1.5	135	< 1	368	< 0.1	3.4	1570	24	2220	< 2	746	57
3S1E17D007	2/7/23	ZONE7	18.2	1365	8.5	9	7	239	1.6	141	< 1	359	< 0.1	2.6	1720	23	< 100	< 1	692	51
3S1E17D011	2/6/23	ZONE7	16.8	1332	8.3	19	5	259	0.9	281	2	285	< 0.1	23.5	2700	13	< 100	< 1	741	69

- = Not Analyzed

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TABLE 6-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
3S1E17D012	10/3/22	ZONE7	19.2	890	7.6	72	43	57	2	375	51	90	3.44	23.5	600	1	< 100	5.7	539	357
3S1E17D012	7/12/23	ZONE7	18.5	972	7.5	80	46	68	2	368	52	95	3.28	25.7	690	1.1	< 100	6.8	565	389
3S1E18A006	10/3/22	ZONE7	19.1	1075	7.4	81	50	71	1.9	440	92	94	2.89	23.5	600	1.5	< 100	4.7	643	408
3S1E18A006	7/12/23	ZONE7	18.2	1103	7.4	95	57	80	2	444	93	97	2.89	25.7	600	1.3	< 100	5.3	681	471
3S1E18E004	1/16/23	ZONE7	14.7	906	7.5	66	25	83	0.8	307	69	59	< 0.1	25.7	520	< 1	494	< 1	480	268
3S1E18J002	1/16/23	ZONE7	13.9	3888	7.8	160	282	544	1.4	1289	888	380	0.23	32.1	2920	42	< 500	< 5	2927	1562
3S1E19A010	9/14/23	UNKN	-	1780	7.17	188	91.6	71.1	-	-	140	211	1.75	-	-	< 2	171	< 10	984	829
3S1E19A011	6/22/23	UNKN	-	1310	7.28	126	67.9	53.5	-	-	191	120	-	-	-	< 2	< 100	< 10	739	544
3S1E20C007	3/9/23	ZONE7	13.9	706	7.1	55	32	49	2.1	263	52	69	1.81	16.9	380	< 1	< 100	1.8	414	270
3S1E20C007	7/18/23	ZONE7	20.8	700	7.1	57	28	50	1.9	251	53	62	2.3	18.4	360	< 1	< 100	2.6	404	257
3S1E20C008	3/9/23	ZONE7	15.8	927	7.4	85	50	41	2.1	396	50	85	2.35	21	250	< 1	< 100	3.2	540	418
3S1E20J004	3/14/23	ZONE7	16.2	1358	7.1	67	47	118	11	627	37	100	0.33	34.2	520	9.6	632	2.8	725	362
3S1E20Q002	3/14/23	ZONE7	17.7	2017	7	134	142	175	2.9	1039	137	160	< 0.1	21.4	1130	< 1	< 100	3.4	1284	920
3S1E22D002	3/15/23	ZONE7	18.1	219	7.2	24	9	20	5.9	94	6	7	2.46	18.6	120	6.7	815	3.4	148	98
3S1E23J001	3/15/23	ZONE7	13	454	8.3	25	14	48	2.3	135	56	34	0.98	11.3	190	< 1	< 100	< 1	262	120
3S1E25C003	3/15/23	ZONE7	12.8	645	7.9	26	19	80	3.2	147	53	97	< 0.1	9.6	280	< 1	288	< 1	360	143
3S1E28M002	5/2/23	ZONE7	17.4	1021	7.5	51	33	129	0.4	415	41	88	5.55	23.5	500	1.4	< 100	1.9	596	264
3S1E29M004	3/14/23	ZONE7	14.2	524	6.5	45	25	32	1.9	126	118	33	< 0.1	17.5	200	1.2	1370	< 1	334	215
3S1E29P002	3/14/23	ZONE7	17.6	1040	6.6	62	42	74	2.7	173	81	193	< 0.1	16.1	270	6.9	1750	2.3	556	328
3S1E33G005	3/14/23	ZONE7	15.5	1724	6.7	117	74	143	1.1	268	142	354	< 0.1	21.2	400	3.5	2390	< 1	984	597
3S1W01B009	9/27/23	ZONE7	19.5	1219	7.7	67	30	150	1.3	415	95	124	7.65	21.4	520	4.8	< 100	< 1	728	291
3S1W01J001	11/15/22	DSRSD	19.6	3000	6.96	-	-	-	-	-	552	256	< 5	-	-	-	-	-	1940	-
3S1W01J001	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	45	-	< 5	-	-
3S1W01J001	5/2/23	DSRSD	17.4	2920	7	-	-	-	-	-	512	246	< 2	-	-	-	-	-	1950	-
3S1W01J001	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	< 5	-	-
3S1W01J002	11/15/22	DSRSD	19.9	2307	7.07	-	-	-	-	-	364	212	15	-	-	-	-	-	1430	-
3S1W01J002	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	9.2	-	< 5	-	-
3S1W01J002	5/2/23	DSRSD	16.9	3068	7.21	-	-	-	-	-	626	262	7.93	-	-	-	-	-	2120	-
3S1W01J002	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	< 5	-	-
3S1W02A002	6/29/23	ZONE7	19.3	1519	7	191	40	97	0.6	649	70	191	1.34	21.4	380	1.9	< 100	3.2	936	643
3S1W12A009	11/16/22	DSRSD	20.1	6742	6.91	-	-	-	-	-	135	2280	< 5	-	-	-	-	-	4050	-
3S1W12A009	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	< 5	-	-
3S1W12A009	5/2/23	DSRSD	18.2	6856	6.77	-	-	-	-	-	138	2320	< 2	-	-	-	-	-	4620	-
3S1W12A009	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	< 5	-	-
3S1W12A010	11/16/22	DSRSD	20.2	1856	7.47	-	-	-	-	-	198	224	5.3	-	-	-	-	-	1060	-
3S1W12A010	11/19/22	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	7.4	-	< 5	-	-
3S1W12A010	5/2/23	DSRSD	18.9	2548	7.56	-	-	-	-	-	286	244	3.08	-	-	-	-	-	1640	-
3S1W12A010	5/5/23	DSRSD	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5	-	< 5	-	-
3S1W12B002	1/18/23	ZONE7	16.6	862	6.7	92	33	64	0.5	295	136	59	2.6	30	190	< 1	< 100	< 1	571	366
3S1W12J001	1/17/23	ZONE7	22.8	1158	7.6	83	29	169	0.9	386	160	120	< 0.1	25.7	640	2.4	< 100	< 1	778	327
3S1W13J001	3/14/23	ZONE7	16.4	896	7.2	95	43	48	0.8	304	97	74	2.91	27.8	200	< 1	< 100	< 1	548	415
3S2E01F002	8/7/23	ZONE7	19.8	2588	7.5	115	53	387	1.7	247	165	700	5.31	47.1	8250	3.2	< 200	16	1614	505
3S2E02B002	7/27/23	ZONE7	23.8	1783	7.3	132	43	193	2.4	285	93	400	2.38	30	2080	2.5	540	6.6	1045	507
3S2E03A001	7/27/23	ZONE7	20.7	962	7.6	56	31	124	1.1	290	78	126	5.16	38.5	1630	3.2	< 100	25	621	268
3S2E03K003	7/20/23	ZONE7	20.9	1205	7.5	67	46	127	2.1	327	97	122	14	32.1	1400	1.8	< 100	14	717	356
3S2E05N001	8/8/23	ZONE7	23	858	7.6	58	62	44	2.1	333	50	80	9.47	30	450	< 1	< 100	8	533	400
3S2E07C002	4/12/23	LWRP	-	1290	-	60	92	60	3.3	-	65	146	12.8	36	600.	-	-	-	720	-
3S2E07C002	6/7/23	ZONE7	19.1	1218	7.3	61	86	66	3.4	514	73	129	9.07	34.2	290	1.3	< 100	10	746	506
3S2E07C002	9/18/23	LWRP	-	1425	-	76	119	74	4.3	-	62	180	12.5	35	500.	-	-	-	789	-
3S2E07H002	6/7/23	ZONE7	21.9	1164	7.4	51	64	111	2.7	421	140	94	11.4	30	520	1.1	< 100	2.2	751	392

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TABLE 6-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
3S2E07N002	5/30/23	ZONE7	19.2	574	7.5	30	36	24	1.4	178	33	59	1.11	25.7	170	< 1	< 100	3.8	312	223
3S2E07R003	7/20/23	BSK	-	870	7.9	47	42	76	2.2	-	40	90	4.6	-	-	< 2	< 100	< 10	510	290
3S2E08F001	1/24/23	BSK	-	1000	-	60	69	40	< 2	-	62	97	9.2	-	-	< 2	< 100	< 10	550	430
3S2E08H002	7/24/23	ZONE7	24.8	1604	6.9	58	123	109	1.1	505	110	212	8.78	34.2	420	1.2	< 100	7.2	935	651
3S2E08H003	7/24/23	ZONE7	24.1	1247	7.2	79	82	62	1.5	416	71	132	11.1	32.1	490	< 1	< 100	6.8	714	535
3S2E08H004	7/24/23	ZONE7	20.2	1072	7.6	44	44	114	2	333	35	132	4.61	27.8	690	2.3	< 100	8.1	584	291
3S2E08K002	6/22/23	ZONE7	21.4	1115	7.4	55	71	53	1.9	368	74	125	8.32	30	420	< 1	< 100	5.8	628	431
3S2E08Q009	7/24/23	ZONE7	21.2	932	7.5	51	69	46	2.1	351	56	84	5.4	25.7	400	< 1	< 100	4.9	531	411
3S2E09Q001	8/2/23	BSK	-	960	-	59	64	47	< 2	-	54	78	6.3	-	-	< 2	< 100	< 10	530	410
3S2E09Q004	7/25/23	ZONE7	26	1208	7.4	47	90	80	1.4	389	98	160	7.8	38.5	960	< 1	< 100	6.2	741	488
3S2E10F003	7/20/23	ZONE7	18.5	1692	7.1	88	106	118	1.3	563	81	228	8.31	34.2	1370	1.4	< 100	6.1	971	656
3S2E10Q001	7/26/23	ZONE7	20.9	1565	7.1	77	116	113	1.3	461	111	209	17.4	36.4	1350	< 1	< 100	4.7	968	670
3S2E10Q002	3/21/23	ZONE7	-	704	8	47	34	46	1.8	198	57	79	5.47	27.8	770	1.4	< 100	5.8	416	257
3S2E11C001	7/20/23	ZONE7	19.3	723	7.7	46	18	79	1.8	174	50	103	1.38	32.1	360	1	< 100	4.7	422	189
3S2E12C004	3/21/23	ZONE7	-	1240	7.9	65	27	161	1.7	223	115	211	2.57	40.7	3140	5.7	< 200	11	744	273
3S2E12J003	3/21/23	ZONE7	-	675	8.2	40	15	73	3	67	61	150	0.38	23.5	380	2.1	< 100	< 1	401	162
3S2E14A003	9/25/23	ZONE7	21.8	1033	7.1	109	47	58	2.5	532	24	96	4.71	32.1	280	< 1	< 100	3.6	652	466
3S2E14B001	7/20/23	ZONE7	20.6	1057	7.5	79	43	78	2	334	48	124	10.6	30	710	< 1	< 100	11	617	374
3S2E15L001	9/20/23	UNKN	-	-	-	45	92	69	1.6	760	150	150	12	-	-	-	-	-	-	490
3S2E15L002	9/20/23	UNKN	19.5	-	7.43	49	98	72	1.5	790	140	160	11	-	-	-	-	-	-	520
3S2E15M002	9/20/23	UNKN	-	-	-	65	74	39	2.3	750	120	110	14	-	-	-	-	-	-	470
3S2E15M003	9/20/23	UNKN	20.7	-	7.49	57	87	59	1.7	890	100	130	7.3	-	-	-	-	-	-	500
3S2E15Q008	9/20/23	UNKN	20.7	-	7.24	58	110	66	1.7	890	160	150	5.4	-	-	-	-	-	-	600
3S2E15R017	7/19/23	ZONE7	23.1	930	7.6	47	83	45	2.2	337	59	96	10.3	30	610	4.5	645	8.5	574	459
3S2E15R018	7/19/23	ZONE7	25.5	665	7.7	52	44	35	1.7	311	43	47	1.18	30	250	< 1	< 100	1.2	412	311
3S2E15R020	9/20/23	UNKN	-	-	-	46	85	69	1.8	820	91	140	6.8	-	-	-	-	-	-	470
3S2E16A003	7/26/23	ZONE7	24.4	1103	7.5	54	99	53	1.6	363	89	127	9.83	30	470	< 1	< 100	4.1	676	543
3S2E16C001	9/19/23	BSK	-	760	-	40	45	40	< 2	-	46	56	1.4	-	-	< 2	970	< 10	410	290
3S2E16E004	6/22/23	ZONE7	20.4	770	7.1	33	46	51	2.2	277	50	80	3.62	18.4	310	< 1	< 100	3	433	272
3S2E18B001	2/13/23	BSK	-	620	-	30	31	52	< 2	-	26	70	7.4	-	-	< 2	< 100	< 10	330	200
3S2E18E001	6/21/23	ZONE7	18.1	497	7.5	33	34	24	1.7	211	33	41	1.96	25.7	220	< 1	< 100	3.1	305	222
3S2E19D007	4/11/23	ZONE7	20.6	1570	7.3	128	95	44	3	474	44	261	2.88	27.8	< 100	3.3	301	5.6	850	711
3S2E19D008	4/11/23	ZONE7	17.6	395	7.5	33	17	21	1.3	127	5	40	6.23	25.7	< 100	3	< 200	7.6	233	152
3S2E19D009	4/12/23	ZONE7	16.6	372	7.6	35	15	23	1.3	151	25	25	6.95	27.8	< 100	< 1	< 100	5.2	258	149
3S2E19D010	4/12/23	ZONE7	16.2	788	7.4	62	33	43	1.9	218	29	96	10.4	27.8	< 100	< 1	< 100	2.4	446	291
3S2E19N003	7/25/23	ZONE7	20.6	525	7.9	38	20	52	1.5	245	25	41	0.21	27.8	240	2	< 100	1.4	328	177
3S2E19N004	7/25/23	ZONE7	25.1	580	8	26	13	92	1.5	237	19	62	< 0.1	16.9	360	31	< 100	2	349	118
3S2E20M001	3/15/23	ZONE7	18.1	458	8.3	27	16	48	2.5	122	59	43	1.23	12.2	170	< 1	< 100	< 1	273	134
3S2E21K009	5/31/23	ZONE7	20.2	1241	7.6	51	54	94	1.9	196	12	286	6.27	25.7	< 100	1.2	< 100	3.5	649	350
3S2E21N001	5/2/23	ZONE7	18.9	215	8.3	11	5	26	1.5	65	26	13	0.17	7.5	100	< 1	< 100	< 1	124	49
3S2E22B001	7/17/23	ZONE7	19.7	1773	7.3	96	144	94	1.7	531	261	196	2.44	34.2	490	1	< 100	3.3	1099	832
3S2E23E001	7/19/23	ZONE7	29.2	919	7.8	49	68	54	2.2	331	43	81	16.9	23.5	440	< 1	< 100	3.4	559	402
3S2E23E002	7/19/23	ZONE7	25.9	1090	7.7	45	62	109	2.4	379	47	169	0.14	27.8	2750	2.1	< 100	3.4	651	367
3S2E24A001	8/7/23	ZONE7	21.7	1631	7	144	68	146	2	526	72	181	32.8	30	1140	< 1	< 100	5.2	1047	640
3S2E26J002	7/17/23	ZONE7	19.4	1045	7.5	53	78	74	2.4	479	61	83	0.6	16.5	640	< 1	< 100	1.5	607	453
3S2E29F004	3/16/23	ZONE7	18.2	796	7.5	72	33	54	2.1	266	81	81	1.34	16.5	370	3.5	< 100	< 1	477	316
3S2E29F004	7/17/23	ZONE7	20	724	7.7	72	29	48	1.9	287	61	50	< 0.1	17.3	350	4.2	< 100	< 1	422	299
3S2E30C001	3/15/23	ZONE7	19.5	756	7.7	60	36	54	1.8	273	46	74	6.72	27.8	430	2.4	< 100	1.6	464	298
3S2E30D002	3/15/23	ZONE7	16.9	604	7.2	48	27	45	2	195	50	63	4.14	16.9	250	< 1	< 100	< 1	366	231
3S2E32E007	3/16/23	ZONE7	20.1	1365	8.7	35	42	188	9.2	163	19	357	0.39	36.4	310	13	10200	23	769	261

- = Not Analyzed

Highlighted = Representative Monitoring Site

TABLE 6-2
WATER QUALITY RESULTS FOR SELECT METALS AND MINERALS
2023 WATER YEAR

			TEMP	EC		Mineral Constituents (mg/L)									Select Metals (ug/L)				TDS	Hard
SITE ID	DATE	By	°C	umhos/cm	pH	Ca	Mg	Na	K	HCO3	SO4	Cl	NO3N	SiO2	B	As	Fe	Cr	mg/L	mg/L
3S2E33C001	7/17/23	ZONE7	20.6	378	7.2	30	13	30	1.8	164	25	16	< 0.1	16.1	310	1	< 100	< 1	213	128
3S2E33G001	7/19/23	ZONE7	19.5	283	7.1	23	11	23	2.1	110	22	21	< 0.1	13.7	230	1	< 100	< 1	170	102
3S2E33G001	9/27/23	ZONE7	22	396	7.3	34	18	21	2.3	173	39	16	0.12	12.2	150	1.1	< 100	< 1	228	159
3S3E06Q003	8/8/23	ZONE7	22.5	1766	7.4	105	37	275	2.2	326	338	213	7.6	47.1	4860	1.6	< 100	6.9	1212	414
3S3E07D002	8/7/23	ZONE7	26.2	2192	7.4	115	56	318	2.4	266	287	396	6.32	47.1	6790	2.7	< 200	12	1381	518
3S3E19C002	5/1/23	ZONE7	16.9	1906	7.6	123	60	134	1.9	304	51	403	20.3	25.7	1410	1.2	< 100	5.8	1039	555
3S3E21C001	5/1/23	ZONE7	19.3	2704	7.8	82	78	384	11.5	662	460	349	< 0.1	55.6	3920	8.4	< 200	8.1	1750	526
4S2E01A001	5/1/23	ZONE7	19.8	1700	8.2	9	40	260	1.3	471	105	241	< 0.1	13.9	17000	1.6	< 100	7.1	909	187
4S3E06E004	5/1/23	ZONE7	17.2	2104	8	34	62	297	4.1	445	66	399	4.3	17.3	3710	2.3	< 200	11	1122	340

- = Not Analyzed
Highlighted = Representative Monitoring Site

TABLE 6-3
TOTAL DISSOLVED SOLIDS (TDS) AT REPRESENTATIVE MONITORING SITES
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

RMS Well		Management Area/Unit			TDS (mg/L)			SMCs for TDS (mg/L)				
Well Name	Map	Area	Subarea	Aquifer	2023 WY	Below MT	Below MO	MT	IM-5	IM-10	IM-15	MO
3S1E20C007	20C7	Main	Bernal	Upper	409	391	91	800	725	650	575	500
3S1E20C008	20C8	Main	Bernal	Lower	540	214	-40	754	691	627	564	500
3S1E09P005	9P5	Main	Amador West	Upper	253	1,055	247	1,308	1,106	904	702	500
3S1E09P010	9P10	Main	Amador West	Lower	485	132	15	617	588	559	529	500
3S1E11G001	11G1	Main	Amador East	Upper	690	272	-190	962	847	731	616	500
3S1E12K003	12K3	Main	Amador East	Lower	336	260	164	596	572	548	524	500
3S2E08K002	8K2	Main	Mocho II	Upper	628	68	-128	696	647	598	549	500
3S2E08H003	8H3	Main	Mocho II	Lower	714	4	-214	718	664	609	555	500
3S1E06F003	6F3	Fringe	Northwest	Upper	2,778	877	67	3,655	3,453	3,250	3,048	2,845
2S2E34E001	34E1	Fringe	Northeast	Upper	706	294	294	1,000	1,000	1,000	1,000	1,000
3S2E24A001	24A1	Fringe	East	Upper	1,047	132	-23	1,179	1,140	1,102	1,063	1,024
3S2E21K009	21K9	Upland	Upland	Upper	649	351	351	1,000	1,000	1,000	1,000	1,000

RMS	Representative Monitoring Sites
TDS	Total Dissolved Solids
mg/L	milligrams per liter
MT	Minimum Threshold
IM-#	Interim Milestone at # years
MO	Measurable Objective
SMC	Sustainable Management Criteria

TABLE 6-4
NITRATE (as NO_3N) AT REPRESENTATIVE MONITORING SITES
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

RMS Well		Management Area/Unit			Nitrate (mg/L)			SMCs Nitrate (mg/L)				
Well Name	Map	Area	Subarea	Aquifer	2023 WY	Below MT	Below MO	MT	IM-5	IM-10	IM-15	MO
3S1E20C007	20C7	Main	Bernal	Upper	2.055	7.9	7.9	10	10	10	10	10
3S1E20C008	20C8	Main	Bernal	Lower	2.35	7.7	7.7	10	10	10	10	10
3S1E09P005	9P5	Main	Amador West	Upper	0.065	9.9	9.9	10	10	10	10	10
3S1E09P010	9P10	Main	Amador West	Lower	0.37	9.6	9.6	10	10	10	10	10
3S1E11G001	11G1	Main	Amador East	Upper	9.87	9.5	0.1	19	17	15	12	10
3S1E12K003	12K3	Main	Amador East	Lower	ND	10.0	10.0	10	10	10	10	10
3S2E08K002	8K2	Main	Mocho II	Upper	8.32	7.9	1.7	16	15	13	12	10
3S2E08H003	8H3	Main	Mocho II	Lower	11.1	3.6	-1.1	15	14	12	11	10
3S1E06F003	6F3	Fringe	Northwest	Upper	ND	10.0	10.0	10	10	10	10	10
2S2E34E001	34E1	Fringe	Northeast	Upper	ND	10.0	10.0	10	10	10	10	10
3S2E24A001	24A1	Fringe	East	Upper	32.8	4.7	-22.8	38	31	24	17	10
3S2E21K009	21K9	Upland	Upland	Upper	6.27	3.7	3.7	10	10	10	10	10

RMS	Representative Monitoring Sites
Nitrate	Nitrate as Nitrogen
mg/L	milligrams per liter
MT	Minimum Threshold
IM-#	Interim Milestone at # years
MO	Measurable Objective
SMC	Sustainable Management Criteria
ND	Not Detected (i.e., below lab detection limits). Assumed 0 for calculations.

TABLE 6-5
BORON (B) AT REPRESENTATIVE MONITORING SITES
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

RMS Well		Management Area/Unit			Boron (ug/L)			SMCs Boron (ug/L)				
Well Name	Map	Area	Subarea	Aquifer	2023 WY	Below MT	Below MO	MT	IM-5	IM-10	IM-15	MO
3S1E20C007	20C7	Main	Bernal	Upper	380	1,020	1,020	1,400	1,400	1,400	1,400	1,400
3S1E20C008	20C8	Main	Bernal	Lower	250	1,150	1,150	1,400	1,400	1,400	1,400	1,400
3S1E09P005	9P5	Main	Amador West	Upper	500	900	900	1,400	1,400	1,400	1,400	1,400
3S1E09P010	9P10	Main	Amador West	Lower	490	910	910	1,400	1,400	1,400	1,400	1,400
3S1E11G001	11G1	Main	Amador East	Upper	700	700	700	1,400	1,400	1,400	1,400	1,400
3S1E12K003	12K3	Main	Amador East	Lower	280	1,120	1,120	1,400	1,400	1,400	1,400	1,400
3S2E08K002	8K2	Main	Mocho II	Upper	420	980	980	1,400	1,400	1,400	1,400	1,400
3S2E08H003	8H3	Main	Mocho II	Lower	490	910	910	1,400	1,400	1,400	1,400	1,400
3S1E06F003	6F3	Fringe	Northwest	Upper	3,330	1,260	-1,930	4,590	3,793	2,995	2,198	1,400
2S2E34E001	34E1	Fringe	Northeast	Upper	3,110	1,610	-1,710	4,720	3,890	3,060	2,230	1,400
3S2E24A001	24A1	Fringe	East	Upper	1,140	1,260	260	2,400	2,150	1,900	1,650	1,400
3S2E21K009	21K9	Upland	Upland	Upper	ND	1,400	1,400	1,400	1,400	1,400	1,400	1,400

RMS	Representative Monitoring Sites
ug/L	micrograms per liter
MT	Minimum Threshold
IM-#	Interim Milestone at # years
MO	Measurable Objective
SMC	Sustainable Management Criteria

TABLE 6-6
CHROMIUM (Cr) AT REPRESENTATIVE MONITORING SITES
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

RMS Well		Management Area/Unit			Chromium (ug/L)			SMCs Chromium (ug/L)				
Well Name	Map	Area	Subarea	Aquifer	2023 WY	Below MT	Below MO	MT	IM-5	IM-10	IM-15	MO
3S1E20C007	20C7	Main	Bernal	Upper	2.6	47	47	50	50	50	50	50
3S1E20C008	20C8	Main	Bernal	Lower	3.2	47	47	50	50	50	50	50
3S1E09P005	9P5	Main	Amador West	Upper	2.5	48	48	50	50	50	50	50
3S1E09P010	9P10	Main	Amador West	Lower	1.8	48	48	50	50	50	50	50
3S1E11G001	11G1	Main	Amador East	Upper	7.9	42	42	50	50	50	50	50
3S1E12K003	12K3	Main	Amador East	Lower	1.4	49	49	50	50	50	50	50
3S2E08K002	8K2	Main	Mocho II	Upper	5.8	44	44	50	50	50	50	50
3S2E08H003	8H3	Main	Mocho II	Lower	6.8	43	43	50	50	50	50	50
3S1E06F003	6F3	Fringe	Northwest	Upper	17	33	33	50	50	50	50	50
2S2E34E001	34E1	Fringe	Northeast	Upper	3.8	46	46	50	50	50	50	50
3S2E24A001	24A1	Fringe	East	Upper	5.2	45	45	50	50	50	50	50
3S2E21K009	21K9	Upland	Upland	Upper	3.5	47	47	50	50	50	50	50

RMS	Representative Monitoring Sites
Chromium	Total Chromium
ug/L	micrograms per liter
MT	Minimum Threshold
IM-#	Interim Milestone at # years
MO	Measurable Objective
SMC	Sustainable Management Criteria
ND	Not Detected (i.e., below lab detection limits). Assumed 0 for calculations.

TABLE 6-7
PFAS WATER QUALITY RESULTS FROM WELLS
2023 WATER YEAR
(Only PFAS Compounds with detected concentrations shown)

						PFAS COMPOUNDS (with Response Level)								
						PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA
Well	WellName	Type	Aquifer	Sampled	Units	5000	-	-	-	20	-	10	40	-
3S1E01F002	Constitution Dr	Static-Monitor	Upper	6/20/23	ng/L	21	< 2.0	8.2	19	16	< 2.0	16	25	-
3S1E01H003	Collier Canyon g1	Static-Monitor	Upper	6/7/23	ng/L	5.9	< 2.0	< 2.0	2.2	4	< 2.0	< 2.0	< 2.0	-
3S1E01L001	Kitty Hawk	Static-Monitor	Upper	6/20/23	ng/L	14	< 2.0	9.1	12	9.6	< 2.0	6.7	18	-
3S1E01P002	Airport gas g5	Static-Monitor	Upper	5/18/23	ng/L	7.1	< 2.0	< 2.0	< 2.0	9.9	< 2.0	2.3	21	-
3S1E01P003	New airport well	Supply-Unspecified	Lower	5/18/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	4	< 2.0	3.2	7.1	-
3S1E02J002	Maint. Bldg	Static-Monitor	Upper	5/18/23	ng/L	35	< 2.0	< 2.0	35	< 2.0	< 2.0	< 2.0	45	-
3S1E02K002	Doolan Rd West	Static-Monitor	Upper	6/20/23	ng/L	22	< 2.0	16	55	680	2.5	64	960	-
3S1E02N006	Friesman Rd South	Static-Monitor	Upper	6/28/23	ng/L	12	< 2.0	< 2.0	< 2.0	14	2.6	3.8	44	-
3S1E02Q001	LPGC #1	Static-Monitor	Upper	6/28/23	ng/L	< 3.2	< 3.2	< 3.2	6.5	< 3.2	< 3.2	< 3.2	5.8	< 3.2
3S1E02R001	Beebs	Static-Monitor	Upper	5/18/23	ng/L	14	< 2.0	< 2.0	2	10	2.5	7.1	38	-
3S1E04A001	SMP-DUB-2	Static-Monitor	Upper	6/22/23	ng/L	10	< 2.0	5	12	3.7	< 2.0	5.6	17	-
3S1E04J005	Pimlico shallow	Static-Monitor	Upper	1/19/23	ng/L	24	< 1.7	< 1.7	< 1.7	15	2.1	< 1.7	41	-
3S1E04J006	Pimlico deep	Static-Monitor	Upper	1/19/23	ng/L	23	< 1.7	3.5	5.7	< 1.7	< 1.7	10	15	-
3S1E04Q002	gulfstream	Static-Monitor	Upper	2/6/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	1.8	< 1.8	< 1.8	< 1.8	-
3S1E05K006	Rosewood shallow	Static-Monitor	Upper	1/19/23	ng/L	3.2	< 1.7	< 1.7	< 1.7	3.5	< 1.7	< 1.7	2.1	-
3S1E05K007	Rosewood deep	Static-Monitor	Lower	1/19/23	ng/L	< 1.7	< 1.7	< 1.7	< 1.7	5.8	< 1.7	< 1.7	1.9	-
3S1E05L003	Oracle	Static-Monitor	Upper	1/18/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	-
3S1E05P006	Owens Park	Static-Monitor	Upper	1/19/23	ng/L	10	< 1.7	< 1.7	< 1.7	3.5	< 1.7	< 1.7	3.7	-
3S1E06F003	Dublin Ct	Static-Monitor	Upper	6/22/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-
3S1E06N002	DSRSD MW-3	Static-Monitor	Upper	1/18/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	-
3S1E07G007	Chabot Well	Static-Monitor	Upper	1/18/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	-
3S1E07J005	Thomas Hart School	Static-Monitor	Upper	1/16/23	ng/L	6.8	< 1.8	< 1.8	< 1.8	2.8	< 1.8	< 1.8	2	-
3S1E08B001	Lizard Well	Static-Monitor	Upper	2/6/23	ng/L	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	-
3S1E08G004	Apache	Static-Monitor	Upper	1/19/23	ng/L	4.7	< 1.7	< 1.7	2.3	25	< 1.7	3.7	6.2	-
3S1E08H009	Mocho 4 Nested Shallow	Static-Nested	Lower	2/8/23	ng/L	3.7	< 1.8	< 1.8	2.3	16	< 1.8	1.9	12	-

Municipal Wells are Bold

Red Text = Concentration is above Response Level

TABLE 6-7
PFAS WATER QUALITY RESULTS FROM WELLS
2023 WATER YEAR
(Only PFAS Compounds with detected concentrations shown)

						PFAS COMPOUNDS (with Response Level)								
						PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA
Well	WellName	Type	Aquifer	Sampled	Units	5000	-	-	-	20	-	10	40	-
3S1E08H010	Mocho 4 Nested Middle	Static-Nested	Lower	2/8/23	ng/L	6.9	< 1.7	< 1.7	4.1	30	< 1.7	3.3	24	-
3S1E08H011	Mocho 4 Nested deep	Static-Nested	Deep	2/8/23	ng/L	1.7	< 1.7	< 1.7	< 1.7	6.4	< 1.7	< 1.7	5.7	-
3S1E08H013	Mocho 3 mon	Static-Monitor	Deep	2/8/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	7.5	< 1.8	2.2	5.7	-
3S1E08H018	**Mocho 4**	**Supply-Municipal**	**Lower**	**7/12/23**	**ng/L**	**2**	**< 1.8**	**< 1.8**	**< 1.8**	**6.4**	**< 1.8**	**< 1.8**	**6.7**	**-**
3S1E08K001	Cockroach well	Static-Monitor	Upper	6/21/23	ng/L	3.3	< 2.0	< 2.0	< 2.0	3.9	< 2.0	< 2.0	3.9	-
3S1E09B001	**Stoneridge**	**Supply-Municipal**	**Lower**	**8/3/23**	**ng/L**	**6.5**	**< 2.0**	**< 2.0**	**6**	**33**	**< 2.0**	**3.7**	**41**	**-**
3S1E09H010	NW Lake I Shallow	Static-Nested	Upper	6/21/23	ng/L	6.8	< 2.0	< 2.0	< 2.0	25	< 2.0	3.8	35	-
3S1E09H011	NW Lake I Deep	Static-Nested	Lower	3/7/23	ng/L	5	< 2.0	< 2.0	2.1	19	< 2.0	6	53	-
3S1E09H013	Lister	Supply-Domestic	Upper	5/2/23	ng/L	7.5	< 2.0	< 2.0	2	29	< 2.0	4.8	47	-
3S1E09J008	SW Lake I Middle	Static-Nested	Lower	2/9/23	ng/L	5.6	< 1.7	< 1.7	2.6	26	< 1.7	5.7	40	-
3S1E09P005	Key_AmW_U (Mohr Key)	Static-Monitor	Upper	3/16/23	ng/L	< 2.1	< 2.1	< 2.1	4.4	6.4	< 2.1	7.4	5.4	-
3S1E09P005	Key_AmW_U (Mohr Key)	Static-Monitor	Upper	4/11/23	ng/L	4.9	< 2.0	< 2.0	2.9	14	< 2.0	3.7	16	-
3S1E09P005	Key_AmW_U (Mohr Key)	Static-Monitor	Upper	9/27/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.2	-
3S1E09P009	Mohr Ave Shallow	Static-Nested	Lower	3/8/23	ng/L	6	< 2.0	< 2.0	2.7	16	< 2.0	4.7	24	-
3S1E09P010	Key_AmW_L	Static-Nested	Lower	3/8/23	ng/L	5.9	< 2.0	2.1	4.4	24	< 2.0	6.2	37	-
3S1E09P010	Key_AmW_L	Static-Nested	Lower	9/28/23	ng/L	7.6	< 2.0	2.3	4.9	19	< 2.0	6.8	< 2.0	-
3S1E10A002	El Charro Rd	Static-Monitor	Upper	6/1/23	ng/L	19	< 2.0	3.2	12	100	< 2.0	10	330	-
3S1E10B008	Kaiser Rd Shallow	Static-Nested	Lower	4/10/23	ng/L	31	< 2.0	8.3	28	140	< 2.0	18	-	-
3S1E10B009	Kaiser Rd Middle 1	Static-Nested	Lower	4/10/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	4.8	< 2.0	< 2.0	12	-
3S1E10B010	Kaiser Rd Middle 2	Static-Nested	Lower	4/10/23	ng/L	31	< 2.0	8	29	-	< 2.0	16	-	-
3S1E10B011	Kaiser Rd Deep	Static-Nested	Deep	4/10/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-
3S1E10D002	Stoneridge Shallow	Static-Nested	Lower	10/13/22	ng/L	23	< 1.6	4.9	18	72	< 1.6	8.1	82	< 1.6
3S1E10D002	Stoneridge Shallow	Static-Nested	Lower	3/7/23	ng/L	< 10	< 10	< 10	< 10	28	< 10	< 10	44	-
3S1E10D003	Stoneridge Middle 1	Static-Nested	Lower	10/13/22	ng/L	8	< 1.6	< 1.6	7.2	57	< 1.6	2.8	85	< 1.6
3S1E10D003	Stoneridge Middle 1	Static-Nested	Lower	3/7/23	ng/L	4.9	< 2.0	< 2.0	4.3	38	< 2.0	3	74	-

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PFAS WATER QUALITY RESULTS FROM WELLS
2023 WATER YEAR
(Only PFAS Compounds with detected concentrations shown)

						PFAS COMPOUNDS (with Response Level)								
						PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA
Well	WellName	Type	Aquifer	Sampled	Units	5000	-	-	-	20	-	10	40	-
3S1E10D004	Stoneridge Middle 2	Static-Nested	Lower	10/13/22	ng/L	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
3S1E10D004	Stoneridge Middle 2	Static-Nested	Lower	3/6/23	ng/L	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	-
3S1E10D005	Stoneridge Deep	Static-Nested	Deep	10/13/22	ng/L	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
3S1E10D005	Stoneridge Deep	Static-Nested	Deep	3/6/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	-
3S1E10K002	COL 1 Monitoring	Static-Monitor	Lower	4/10/23	ng/L	11	< 2.0	3.8	10	55	< 2.0	9.4	91	-
3S1E11B001	Airport West	Static-Monitor	Upper	5/30/23	ng/L	15	< 2.0	4.3	8.3	67	< 2.0	11	430	-
3S1E11C003	LAVWMA ROW	Static-Monitor	Upper	6/28/23	ng/L	19	< 3.2	3.3	11	70	< 3.2	11	190	< 3.2
3S1E11G001	Key_AmE_U	Static-Nested	Upper	5/16/23	ng/L	16	< 2.0	7.5	19	50	< 2.0	14	93	-
3S1E11G002	Rancho Charro Middle 1	Static-Nested	Lower	5/16/23	ng/L	6.6	< 2.0	< 2.0	3.9	19	< 2.0	2.5	50	-
3S1E11G003	Rancho Charro Middle 2	Static-Nested	Lower	5/16/23	ng/L	2.7	< 2.0	< 2.0	2.2	510	< 2.0	< 2.0	18	-
3S1E11G003	Rancho Charro Middle 2	Static-Nested	Lower	6/26/23	ng/L	4.3	< 3.3	3.3	5.7	16	< 3.3	< 3.3	110	< 3.3
3S1E11G004	Rancho Charro Deep	Static-Nested	Deep	5/16/23	ng/L	8.7	< 2.0	2.9	6.7	19	< 2.0	6.5	37	-
3S1E11G004	Rancho Charro Deep	Static-Nested	Deep	6/26/23	ng/L	4.8	< 2.0	< 2.0	4.7	14	< 2.0	3.3	32	-
3S1E11P006	New Jamieson Residence	Supply-Domestic	Lower	6/20/23	ng/L	5.1	< 2.0	2.7	6.3	13	< 2.0	5.8	13	-
3S1E12A002	Airport South	Static-Monitor	Upper	5/30/23	ng/L	5.6	2.4	7	11	30	< 2.0	20	260	-
3S1E12D002	LWRP G6	Static-Monitor	Upper	5/30/23	ng/L	< 2.0	< 2.0	< 2.0	2.4	9	< 2.0	2.4	43	-
3S1E12G001	Oaks Park Shallow	Static-Monitor	Upper	6/21/23	ng/L	11	< 2.0	6.6	13	11	< 2.0	16	38	-
3S1E12K002	Oaks Park Mid	Static-Nested	Lower	5/17/23	ng/L	2.9	< 2.0	2.3	2.8	9	< 2.0	4.7	9.2	-
3S1E12K003	Key_AmE_L	Static-Nested	Lower	5/17/23	ng/L	3.1	< 2.0	2.1	4.5	2.5	< 2.0	5	7.1	-
3S1E12K004	Oaks Park Deep	Static-Nested	Deep	5/17/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-
3S1E13P005	LGA Grant Nested 1	Static-Nested	Upper	7/25/23	ng/L	3.4	< 2.0	< 2.0	3.2	3.1	< 2.0	6.5	7.8	-
3S1E14B001	Industrial Asphalt	Supply-Industrial	Lower	6/1/23	ng/L	4.9	< 2.0	< 2.0	2.6	12	< 2.0	3	11	-
3S1E14D002	South Cope Lake	Static-Monitor	Lower	10/13/22	ng/L	7.7	< 1.6	1.9	5.4	29	< 1.6	4.9	34	< 1.6
3S1E14D002	South Cope Lake	Static-Monitor	Lower	6/27/23	ng/L	5.8	< 2.0	2	4.7	22	< 2.0	5.1	33	-
3S1E15M003	Bush/Valley South	Static-Monitor	Lower	3/8/23	ng/L	2.5	< 2.0	< 2.0	< 2.0	3.8	< 2.0	2.8	7.1	-

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						PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA
Well	WellName	Type	Aquifer	Sampled	Units	5000	-	-	-	20	-	10	40	-
3S1E15M003	Bush/Valley South	Static-Monitor	Lower	8/8/23	ng/L	8	< 2.0	2.5	3.2	7.4	< 2.0	6.3	12	-
3S1E16A002	**Pleas 8**	**Supply-Municipal**	**Lower**	**11/15/22**	**ng/L**	**6.2**	**<2**	**2.5**	**5.1**	**27**	**<2**	**3.7**	**29**	**<2**
3S1E16A002	**Pleas 8**	**Supply-Municipal**	**Lower**	**2/8/23**	**ng/L**	**5.1**	**<2**	**2.2**	**4**	**20**	**<2**	**2.4**	**23**	**-**
3S1E16A002	**Pleas 8**	**Supply-Municipal**	**Lower**	**5/4/23**	**ng/L**	**5.3**	**<2**	**2**	**3.4**	**22**	**<2**	**3.1**	**27**	**-**
3S1E16A002	**Pleas 8**	**Supply-Municipal**	**Lower**	**6/22/23**	**ng/L**	**5.6**	**<2**	**2.1**	**3.9**	**18**	**<2**	**3.1**	**19**	**-**
3S1E16A002	**Pleas 8**	**Supply-Municipal**	**Lower**	**7/6/23**	**ng/L**	**5.4**	**<1.8**	**2.3**	**4.1**	**22**	**<1.8**	**3.6**	**29**	**-**
3S1E16A002	**Pleas 8**	**Supply-Municipal**	**Lower**	**8/3/23**	**ng/L**	**7**	**<2**	**2**	**2.8**	**21**	**<2**	**3.2**	**21**	**-**
3S1E16A002	**Pleas 8**	**Supply-Municipal**	**Lower**	**9/7/23**	**ng/L**	**5.7**	**<1.8**	**2**	**3.9**	**21**	**<1.8**	**3.5**	**25**	**-**
3S1E16A004	Bush/Valley Mid	Static-Monitor	Lower	3/16/23	ng/L	4	< 2.1	< 2.1	3.2	5	< 2.1	2.4	4.9	-
3S1E16A004	Bush/Valley Mid	Static-Monitor	Lower	8/8/23	ng/L	5.8	< 2.0	3	4.7	27	< 2.0	4.7	33	-
3S1E16C002	Santa Rita Valley Shallow	Static-Nested	Lower	4/12/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	78	< 2.0	2.8	35	-
3S1E16C003	Santa Rita Valley Middle	Static-Nested	Lower	4/12/23	ng/L	5.8	< 2.0	2.7	5.4	19	< 2.0	4.2	9.5	-
3S1E16C004	Santa Rita Valley Deep	Static-Nested	Lower	4/12/23	ng/L	14	< 2.0	2.9	5.6	11	< 2.0	6	9.4	-
3S1E16E004	black ave - cultural	Static-Monitor	Upper	2/6/23	ng/L	7	< 1.7	2	2.8	26	< 1.7	5.7	13	-
3S1E16L005	**Pleas 5**	**Supply-Municipal**	**Lower**	**11/15/22**	**ng/L**	**5.3**	**<2**	**2**	**3.8**	**17**	**<2**	**4**	**21**	**<2**
3S1E16L005	**Pleas 5**	**Supply-Municipal**	**Lower**	**2/8/23**	**ng/L**	**3.6**	**<1.8**	**<1.8**	**2.6**	**12**	**<1.8**	**2.2**	**12**	**-**
3S1E16L005	**Pleas 5**	**Supply-Municipal**	**Lower**	**5/4/23**	**ng/L**	**4.8**	**<2**	**<2**	**3.2**	**13**	**<2**	**3.8**	**17**	**-**
3S1E16L005	**Pleas 5**	**Supply-Municipal**	**Lower**	**6/22/23**	**ng/L**	**4.2**	**<2**	**2**	**3.2**	**11**	**<2**	**4.1**	**13**	**-**
3S1E16L005	**Pleas 5**	**Supply-Municipal**	**Lower**	**7/6/23**	**ng/L**	**4.8**	**<2**	**2.1**	**4**	**13**	**<2**	**4.4**	**18**	**-**
3S1E16L005	**Pleas 5**	**Supply-Municipal**	**Lower**	**8/3/23**	**ng/L**	**5.3**	**<1.7**	**1.8**	**2.9**	**12**	**<1.7**	**3.9**	**11**	**-**
3S1E16L005	**Pleas 5**	**Supply-Municipal**	**Lower**	**9/7/23**	**ng/L**	**4.7**	**<2**	**<2**	**3.7**	**10**	**<2**	**4.1**	**14**	**-**
3S1E16L007	**Pleas 6**	**Supply-Municipal**	**Lower**	**11/15/22**	**ng/L**	**5.4**	**<2**	**2.2**	**4.5**	**21**	**<2**	**3.7**	**24**	**<2**
3S1E16L007	**Pleas 6**	**Supply-Municipal**	**Lower**	**2/8/23**	**ng/L**	**4.2**	**<1.8**	**1.9**	**2.7**	**16**	**<1.8**	**2.4**	**18**	**-**
3S1E16L007	**Pleas 6**	**Supply-Municipal**	**Lower**	**5/4/23**	**ng/L**	**4.8**	**<2**	**<2**	**3.5**	**18**	**<2**	**3.3**	**26**	**-**
3S1E16L007	**Pleas 6**	**Supply-Municipal**	**Lower**	**6/22/23**	**ng/L**	**<1.8**	**<1.8**	**<1.8**	**<1.8**	**4.8**	**<1.8**	**<1.8**	**3.5**	**-**

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2023 WATER YEAR
(Only PFAS Compounds with detected concentrations shown)

						PFAS COMPOUNDS (with Response Level)								
						PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA
Well	WellName	Type	Aquifer	Sampled	Units	5000	-	-	-	20	-	10	40	-
3S1E16L007	**Pleas 6**	**Supply-Municipal**	**Lower**	**7/6/23**	**ng/L**	**5.4**	**<2**	**2.1**	**4**	**18**	**<2**	**3.3**	**25**	**-**
3S1E16L007	**Pleas 6**	**Supply-Municipal**	**Lower**	**8/3/23**	**ng/L**	**4.1**	**<2**	**<2**	**2.2**	**16**	**<2**	**2.6**	**18**	**-**
3S1E16L007	**Pleas 6**	**Supply-Municipal**	**Lower**	**9/7/23**	**ng/L**	**5**	**<1.8**	**<1.8**	**3**	**16**	**<1.8**	**3**	**19**	**-**
3S1E16P005	Vervais Monitor	Static-Monitor	Upper	10/10/22	ng/L	25	8.1	3.5	6.5	4.8	4.4	14	21	< 1.8
3S1E17B004	Casterson	Supply-Unspecified	Lower	2/6/23	ng/L	4.6	< 1.9	< 1.9	3.6	14	< 1.9	2.7	8.2	-
3S1E17D003	Hopyard Nested Shallow	Static-Nested	Lower	4/13/23	ng/L	2.1	< 2.0	< 2.0	< 2.0	9.5	< 2.0	< 2.0	< 2.0	-
3S1E17D004	Hopyard Nested Middle 1	Static-Nested	Lower	2/7/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	2.9	< 1.8	-
3S1E17D005	Hopyard Nested Middle 2	Static-Nested	Lower	4/13/23	ng/L	< 2.0	< 2.0	< 2.0	2.4	3.1	< 2.0	< 2.0	2.7	-
3S1E17D006	Hopyard Nested Middle 3	Static-Nested	Lower	2/7/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	-
3S1E17D007	Hopyard Nested Deep	Static-Nested	Deep	2/7/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	-
3S1E17D012	**Hopyard 9**	**Supply-Municipal**	**Lower**	**7/12/23**	**ng/L**	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**	**< 1.7**	**-**
3S1E18A006	**Hopyard 6**	**Supply-Municipal**	**Lower**	**7/12/23**	**ng/L**	**< 1.8**	**< 1.8**	**< 1.8**	**< 1.8**	**< 1.8**	**< 1.8**	**< 1.8**	**< 1.8**	**-**
3S1E18E004	Valley Trails II	Static-Monitor	Upper	1/16/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	4.9	< 1.8	< 1.8	< 1.8	-
3S1E18J002	camino segura	Static-Monitor	Upper	1/16/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	16	< 1.8	< 1.8	< 1.8	-
3S1E19A011	**SFWD North (A)**	**Supply-Municipal**	**Lower**	**10/4/22**	**ng/L**	**<1.9**	**<1.9**	**<1.9**	**<1.9**	**2.6**	**<1.9**	**<1.9**	**<1.9**	**<1.9**
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	10/3/22	ng/L	4.3	<2	<2	2.3	11	<2	3.9	9.4	<2
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	12/5/22	ng/L	4.9	<2	<2	2.4	12	<2	3.8	10	<2
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	1/9/23	ng/L	3.7	<2	<2	<2	8.8	<2	2.7	5.7	-
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	2/21/23	ng/L	3.2	<2	<2	<2	9.6	<2	<2	4.7	-
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	5/16/23	ng/L	3.1	<1.7	<1.7	<1.7	11	<1.7	<1.7	6	-
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	5/24/23	ng/L	4.6	<1.8	<1.8	<1.8	14	<1.8	1.8	6.6	-
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	6/5/23	ng/L	3.3	<1.8	<1.8	<1.8	12	<1.8	<1.8	6.4	-
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	7/17/23	ng/L	3.4	<1.7	<1.7	<1.7	11	<1.7	<1.7	7	-
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	8/21/23	ng/L	<2	<2	<2	<2	<2	<2	<2	<2	-
3S1E20B002	Fairgrounds Potable	Supply-Unspecified	Lower	9/18/23	ng/L	4.4	<2	<2	<2	11	<2	2.3	8.1	-

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						PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA
Well	WellName	Type	Aquifer	Sampled	Units	5000	-	-	-	20	-	10	40	-
3S1W12B002	Stoneridge Mall Rd	Static-Monitor	Upper	1/18/23	ng/L	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	-
3S1W12J001	DSRSD South	Static-Monitor	Upper	1/17/23	ng/L	< 1.6	< 1.6	3.4	3.6	6.3	2.3	17	58	-
3S2E07C002	jaws - york way - G4	Static-Monitor	Upper	6/7/23	ng/L	16	< 10	16	30	51	< 10	27	80	-
3S2E07H002	dakota	Static-Monitor	Upper	6/7/23	ng/L	22	< 2.0	< 2.0	4.5	6.2	< 2.0	12	20	-
3S2E07N002	Isabel & Arroyo Mocho	Static-Monitor	Upper	5/30/23	ng/L	2.6	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	3.8	6.9	-
3S2E07P003	**CWS 24**	**Supply-Municipal**	**Lower**	**12/28/22**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**
3S2E07P003	**CWS 24**	**Supply-Municipal**	**Lower**	**2/9/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**
3S2E07R003	**CWS 31**	**Supply-Municipal**	**Lower**	**12/28/22**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**4.9**	**<2**	**<2**	**4.6**	**<2**
3S2E07R003	**CWS 31**	**Supply-Municipal**	**Lower**	**2/9/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**4.5**	**<2**	**<2**	**4.6**	**<2**
3S2E07R003	**CWS 31**	**Supply-Municipal**	**Lower**	**4/24/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**4.5**	**<2**	**<2**	**4.3**	**<2**
3S2E07R003	**CWS 31**	**Supply-Municipal**	**Lower**	**7/20/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**4.5**	**<2**	**<2**	**3.8**	**<2**
3S2E08F001	**CWS 10**	**Supply-Municipal**	**Lower**	**12/28/22**	**ng/L**	**3.9**	**<2**	**2.1**	**3.6**	**9.3**	**<2**	**4.9**	**12**	**<2**
3S2E08F001	**CWS 10**	**Supply-Municipal**	**Lower**	**2/7/23**	**ng/L**	**4.1**	**<1.8**	**2**	**3.3**	**8.7**	**<1.8**	**4**	**11**	**-**
3S2E08F001	**CWS 10**	**Supply-Municipal**	**Lower**	**2/14/23**	**ng/L**	**4.3**	**<2**	**2.5**	**3.8**	**9.9**	**<2**	**4.9**	**12**	**<2**
3S2E08F001	**CWS 10**	**Supply-Municipal**	**Lower**	**4/13/23**	**ng/L**	**4.7**	**<2**	**2.6**	**4.3**	**11**	**<2**	**5.5**	**13**	**<2**
3S2E08F001	**CWS 10**	**Supply-Municipal**	**Lower**	**7/25/23**	**ng/L**	**4.2**	**<2**	**2.2**	**4**	**9.5**	**<2**	**5**	**11**	**<2**
3S2E08K002	Key_Mo2_U (Livermore Key)	Static-Monitor	Upper	6/22/23	ng/L	11	< 2.0	7.9	14	8.3	< 2.0	21	20	-
3S2E08N002	**CWS 14**	**Supply-Municipal**	**Lower**	**12/28/22**	**ng/L**	**2.9**	**<2**	**<2**	**<2**	**4.5**	**<2**	**2.6**	**5**	**<2**
3S2E08N002	**CWS 14**	**Supply-Municipal**	**Lower**	**2/9/23**	**ng/L**	**2.9**	**<2**	**<2**	**<2**	**4**	**<2**	**2.6**	**4.8**	**<2**
3S2E08N002	**CWS 14**	**Supply-Municipal**	**Lower**	**4/17/23**	**ng/L**	**3.3**	**<2**	**<2**	**<2**	**4.7**	**<2**	**2.9**	**5.4**	**<2**
3S2E09Q001	**CWS 9**	**Supply-Municipal**	**Lower**	**12/28/22**	**ng/L**	**3.9**	**<2**	**<2**	**2.6**	**9.6**	**<2**	**3.4**	**12**	**<2**
3S2E09Q001	**CWS 9**	**Supply-Municipal**	**Lower**	**1/25/23**	**ng/L**	**3.9**	**<2**	**<2**	**2.5**	**11**	**<2**	**3.4**	**12**	**-**
3S2E09Q001	**CWS 9**	**Supply-Municipal**	**Lower**	**1/30/23**	**ng/L**	**3.9**	**<2**	**<2**	**2.7**	**11**	**<2**	**3.7**	**13**	**<2**
3S2E09Q001	**CWS 9**	**Supply-Municipal**	**Lower**	**4/5/23**	**ng/L**	**4.3**	**<2**	**<2**	**3**	**9.9**	**<2**	**3.3**	**13**	**<2**
3S2E09Q001	**CWS 9**	**Supply-Municipal**	**Lower**	**7/27/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**

Municipal Wells are Bold

Red Text = Concentration is above Response Level

TABLE 6-7
PFAS WATER QUALITY RESULTS FROM WELLS
2023 WATER YEAR
(Only PFAS Compounds with detected concentrations shown)

						PFAS COMPOUNDS (with Response Level)								
						PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA
Well	WellName	Type	Aquifer	Sampled	Units	5000	-	-	-	20	-	10	40	-
3S2E16C001	**CWS 15**	**Supply-Municipal**	**Lower**	**9/19/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**
3S2E18B001	**CWS 20**	**Supply-Municipal**	**Lower**	**12/28/22**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**3.2**	**<2**	**3.1**	**2.8**	**<2**
3S2E18B001	**CWS 20**	**Supply-Municipal**	**Lower**	**2/9/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**2.7**	**<2**	**2.6**	**2.5**	**<2**
3S2E18B001	**CWS 20**	**Supply-Municipal**	**Lower**	**4/3/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**2.7**	**<2**	**2.4**	**2.2**	**<2**
3S2E18B001	**CWS 20**	**Supply-Municipal**	**Lower**	**7/20/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**2.8**	**<2**	**2.6**	**2.3**	**-**
3S2E18B001	**CWS 20**	**Supply-Municipal**	**Lower**	**7/26/23**	**ng/L**	**<2**	**<2**	**<2**	**<2**	**2.9**	**<2**	**2.4**	**2.5**	**<2**
3S2E18E001	Stanley East of Isabel	Static-Monitor	Upper	6/21/23	ng/L	3.8	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	3.2	7.2	-
3S2E19D007	Isabel Shallow	Static-Nested	Upper	4/11/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	8.5	< 2.0	< 2.0	< 2.0	-
3S2E19D008	Isabel Middle 1	Static-Nested	Lower	4/11/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	2.1	< 2.0	< 2.0	< 2.0	-
3S2E19D009	Isabel Middle 2	Static-Nested	Lower	4/12/23	ng/L	< 2.0	< 2.0	< 2.0	< 2.0	18	< 2.0	< 2.0	< 2.0	-
3S2E19D010	Isabel Deep	Static-Nested	Lower	4/12/23	ng/L	4	< 2.0	5.1	13	5.6	< 2.0	11	7.5	-

Municipal Wells are Bold

Red Text = Concentration is above Response Level

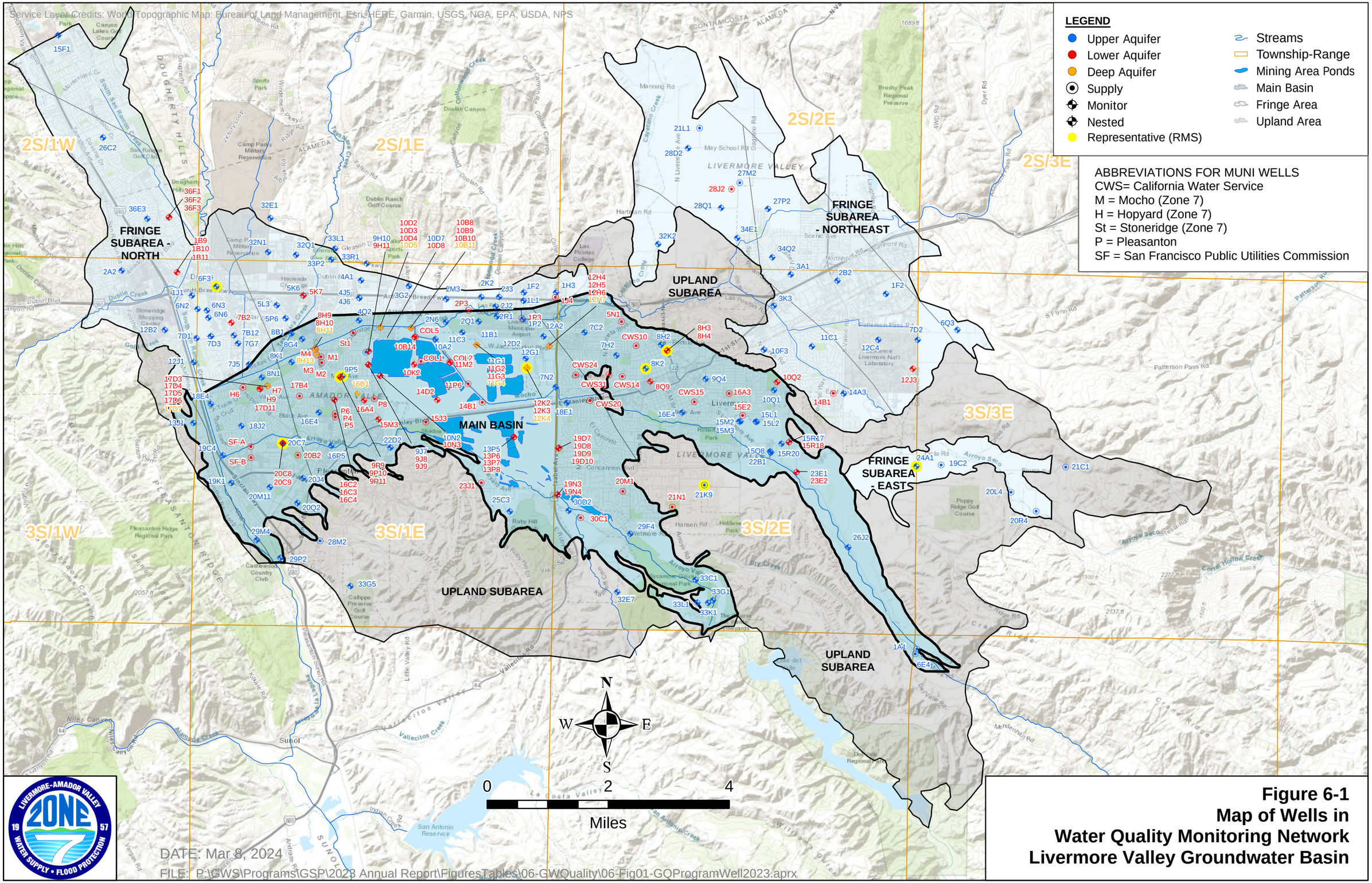
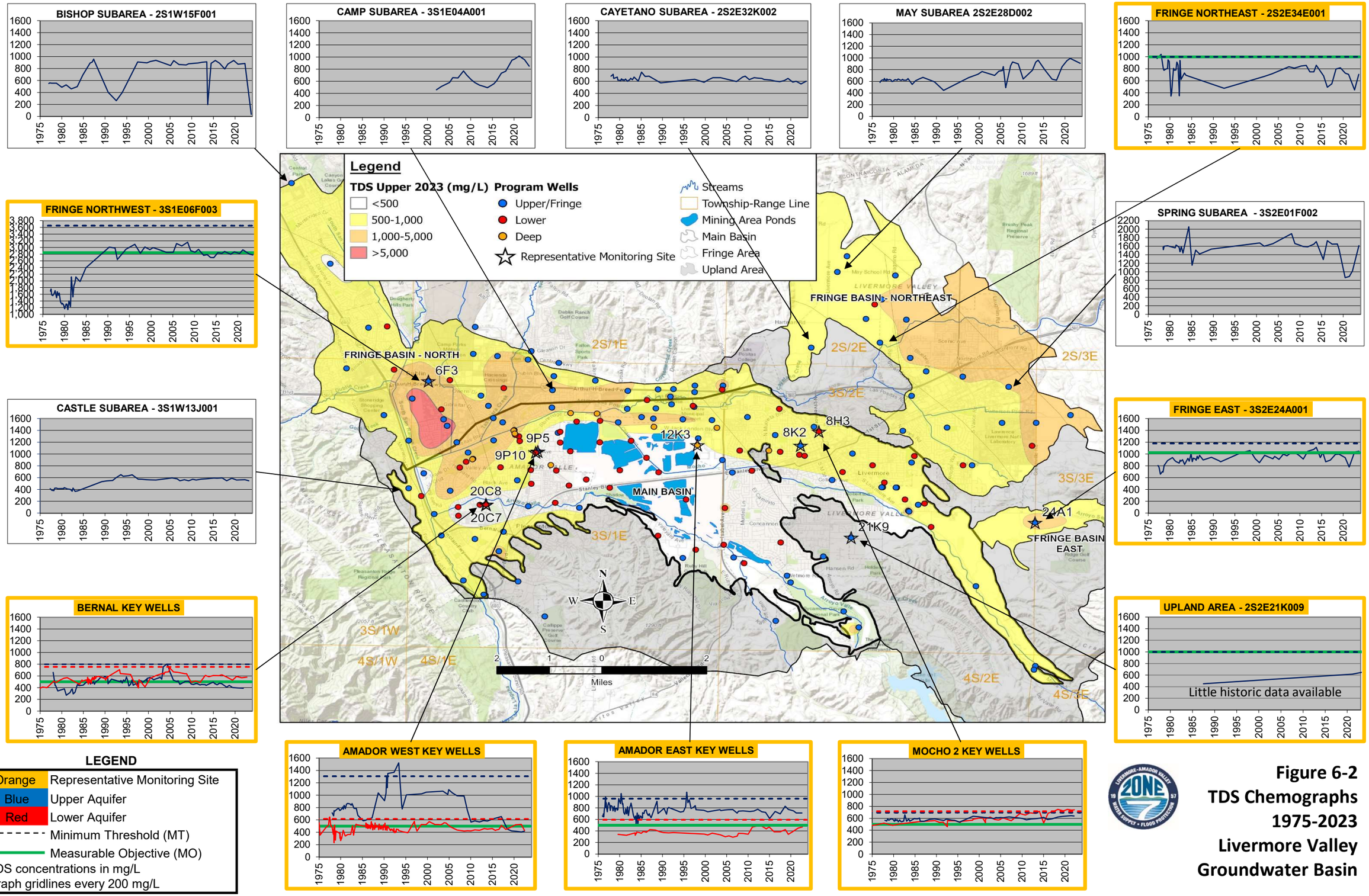


Figure 6-1
Map of Wells in
Water Quality Monitoring Network
Livermore Valley Groundwater Basin



LEGEND

Orange	Representative Monitoring Site
Blue	Upper Aquifer
Red	Lower Aquifer
- - - - - - -	Minimum Threshold (MT)
———	Measurable Objective (MO)

TDS concentrations in mg/L
Graph gridlines every 200 mg/L

Figure 6-2
TDS Chemographs
1975-2023
Livermore Valley
Groundwater Basin

Some contours are based on past data from wells not sampled in this Water Year. Maximum shown if multiple samples were taken in Water Year.

LEGEND

TDS Contours (mg/L)

- <500
- 500-1,000
- 1,000-5,000
- >5,000

Wells

- Supply
- Monitor
- Nested
- Pond
- Representative Monitoring Site

- Township-Range
- Streams
- Mining Area Ponds
- Main Basin
- Fringe Area
- Upland Area

N
W E
S

0 2 4
Miles

DATE: Mar 8, 2024

FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\06-GWQuality\06-Fig03-04-TDSMap2023.aprx

Figure 6-3
TDS Concentrations (mg/L)
Upper Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

ABBREVIATIONS FOR MUNICIPAL WELLS

COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
CWS = Cal Water Service
St = Stoneridge (Zone 7)
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND

TDS Contours (mg/L)
- <500
- 500-1,000
- 1,000-5,000
- >5,000

Wells
- Supply
- Monitor
- Nested

- Pond
- Representative Monitoring Site
- Streams
- Township/Range
- Mining Area Ponds
- Main Basin
- Fringe Area
- Upland Area

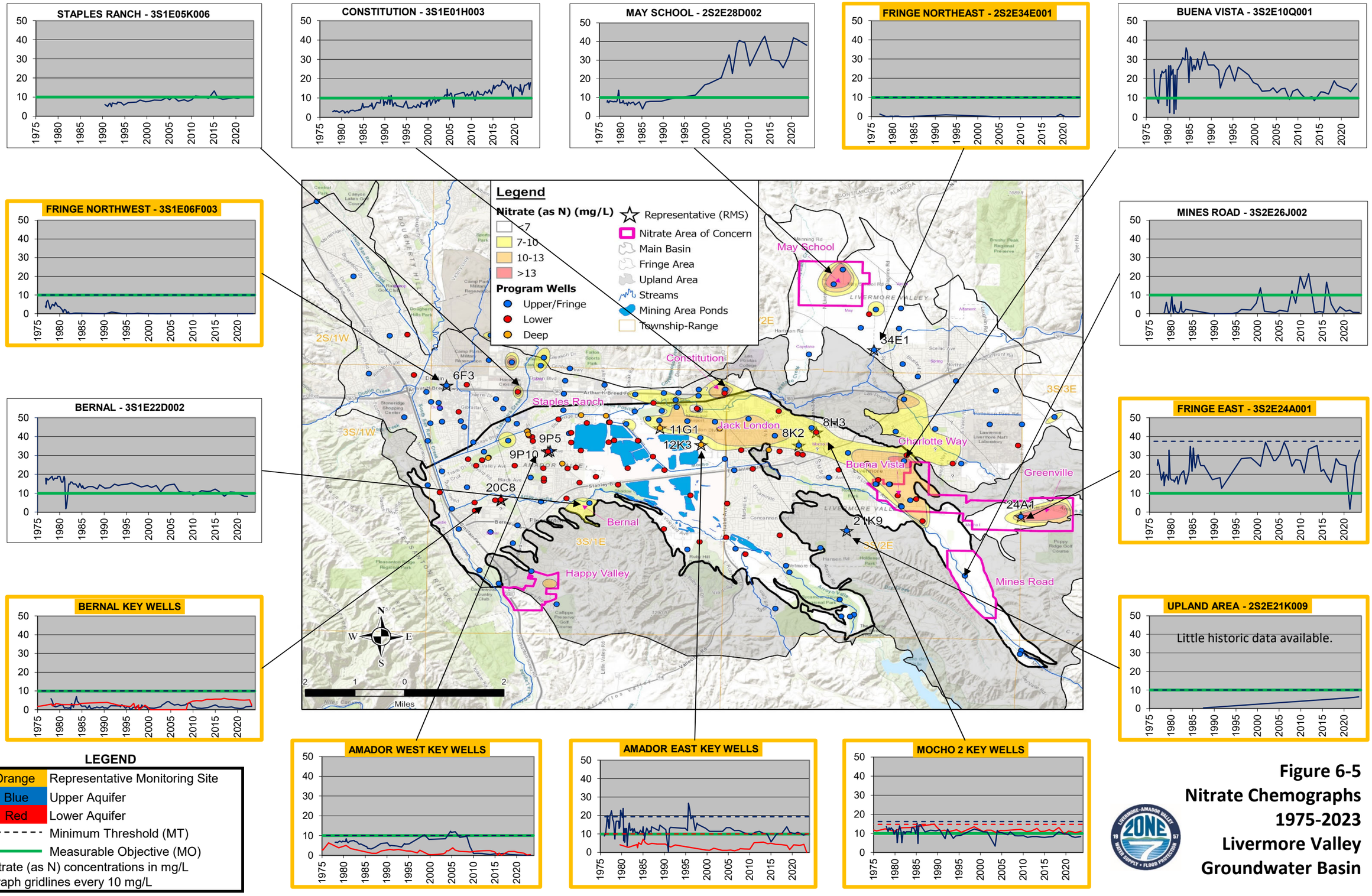
3S/1E
3S/2E
4S/1E
4S/2E

N
W
E
S

0 4,000 8,000
Feet

DATE: Mar 8, 2024
FILE: R:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\06-GWQuality\06-Fig03-04-TDSMap2023.aprx

Figure 6-4
TDS Concentrations (mg/L)
Lower Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

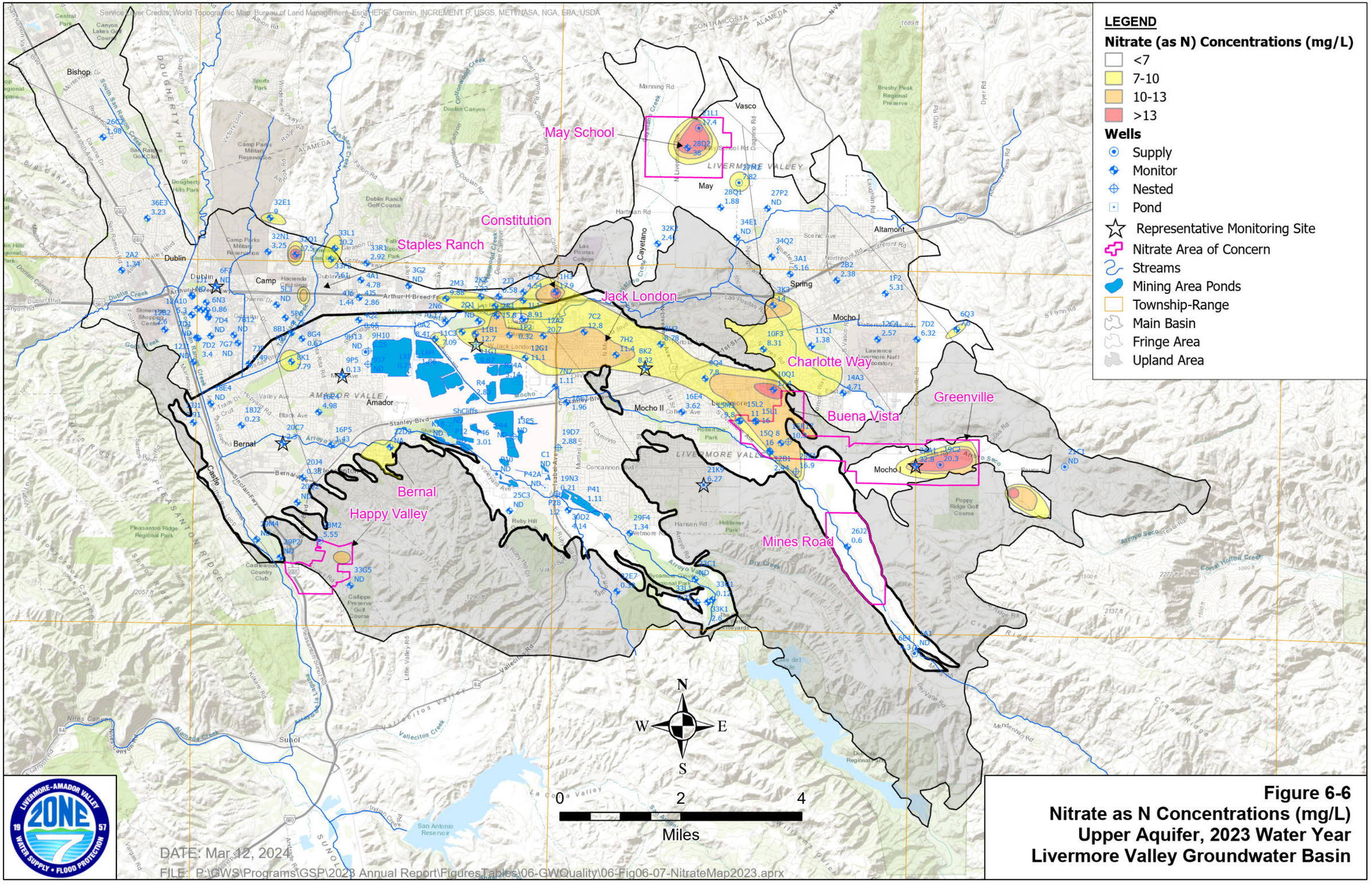


LEGEND

Orange	Representative Monitoring Site
Blue	Upper Aquifer
Red	Lower Aquifer
- - - - - - -	Minimum Threshold (MT)
———	Measurable Objective (MO)

Nitrate (as N) concentrations in mg/L
Graph gridlines every 10 mg/L

Figure 6-5
Nitrate Chemographs
1975-2023
Livermore Valley
Groundwater Basin



DATE: Mar 12, 2024
FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\06-GWQuality\06-Fig06-07-NitrateMap2023.aprx

Figure 6-6
Nitrate as N Concentrations (mg/L)
Upper Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

ABBREVIATIONS FOR MUNICIPAL WELLS
COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
CWS = Cal Water Service
St = Stoneridge (Zone 7)
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND

Nitrate (as N) Concentrations (mg/L)
- <7
- 7-10
- 10-13
- >13

Wells
- Supply
- Monitor
- Nested
- Pond
- Representative Monitoring Site
- Nitrate Area of Concern

- Streams
- Mining Area Ponds
- Township-Range
- Main Basin
- Fringe Area
- Upland Area

Nitrate (as N) Concentrations (mg/L)
2023 Nitrate (as N) Concentrations (mg/L)
- <7
- 7-10
- 10-13
- >13

Constitution
Staples Ranch
Jack London
Charlotte Way
Greenville
Buena Vista
Bernal
Happy Valley
Mines Road
3S/3E
3S/2E
3S/1E
LIVERMORE VALLEY

0 4,000 8,000
Feet

DATE: Mar 12, 2024
FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\06-GWQuality\06-Fig06-07-NitrateMap2023v2.aprx

Figure 6-7
Nitrate as N Concentrations (mg/L)
Lower Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

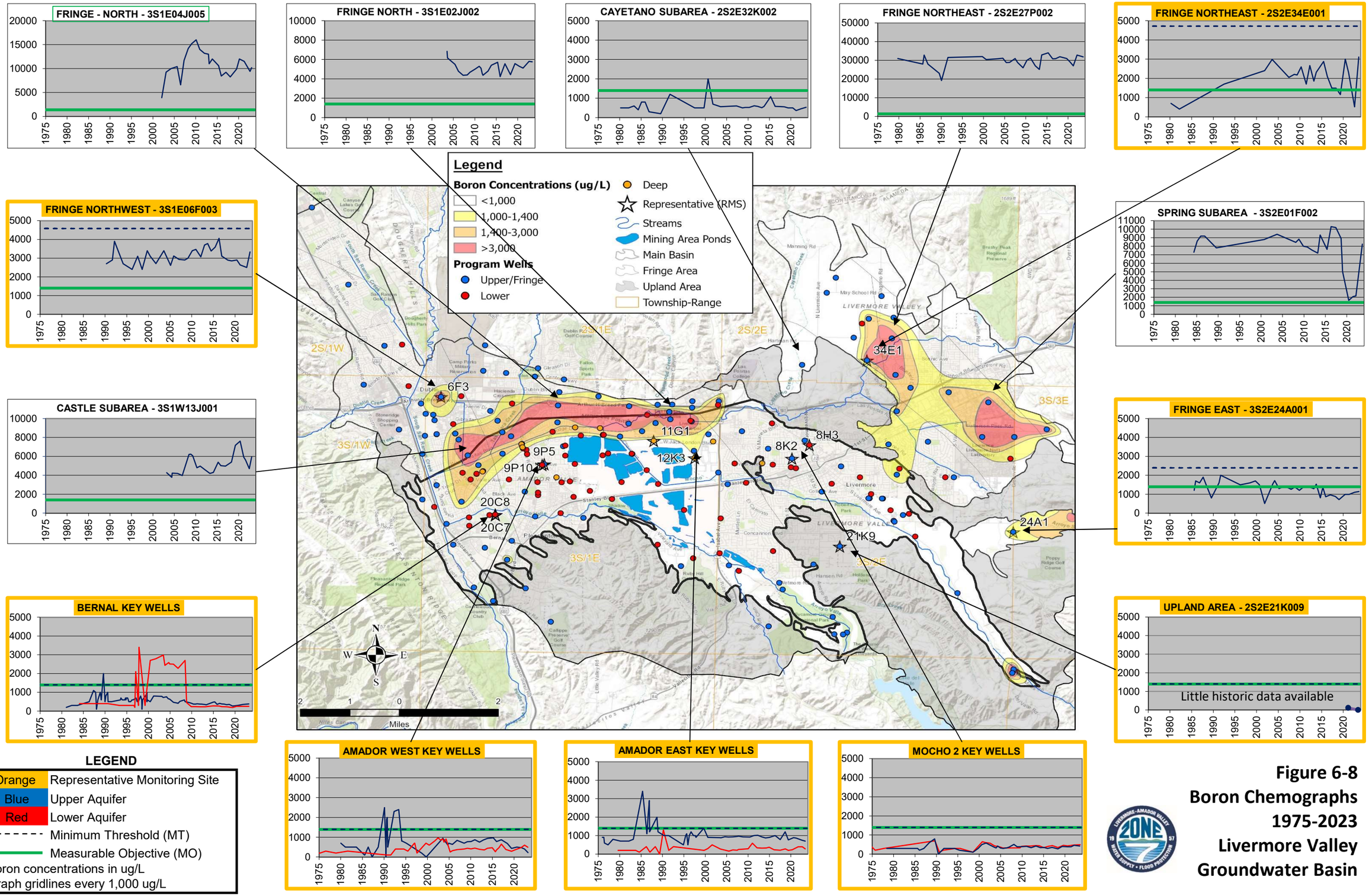


Figure 6-8
Boron Chemographs
1975-2023
Livermore Valley
Groundwater Basin

LEGEND

Boron Concentrations (ug/L)

- <1,000
- 1,000-1,400
- 1,400-3,000
- >3,000

Wells

- Supply
- Monitor
- Nested
- Pond
- Representative Monitoring Site

- Streams
- Mining Area Ponds
- Township-Range
- Main Basin
- Fringe Area
- Upland Area

N
W E
S

0 2 4
Miles

DATE: Mar 7, 2024
FILE: P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\06-GWQuality\06-Fig09-10-BoronMap2023.aprx

Figure 6-9
Boron Concentrations (µg/L)
Upper Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

ABBREVIATIONS FOR MUNICIPAL WELLS

COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
CWS = Cal Water Service
St = Stoneridge (Zone 7)
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND

Boron Concentrations (ug/L)
- <1,000
- 1,000-1,400
- 1,400-3,000
- >3,000

Wells
- Supply
- Monitor
- Nested
- Pond

Representative Monitoring Site
Streams
Township-Range
Mining Area Ponds
Main Basin
Fringe Area
Upland Area

N
W E
S

0 4,000 8,000
Feet

DATE: Mar 8, 2024
FILE: R:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\06-GWQuality\06-Fig09-10-BoronMap2023.aprx

Figure 6-10
Boron Concentrations (µg/L)
Lower Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

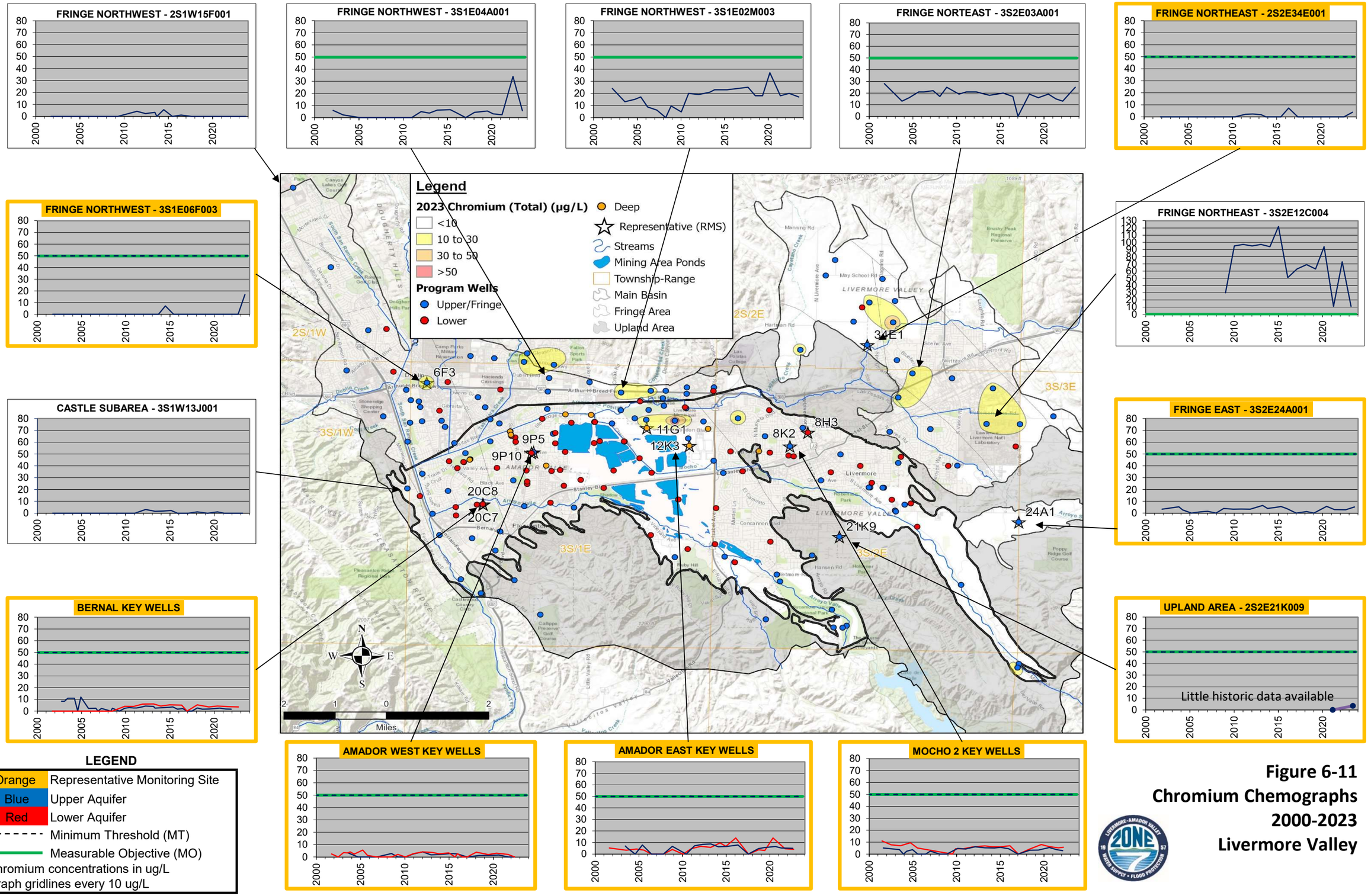


Figure 6-11
Chromium Chemographs
2000-2023
Livermore Valley

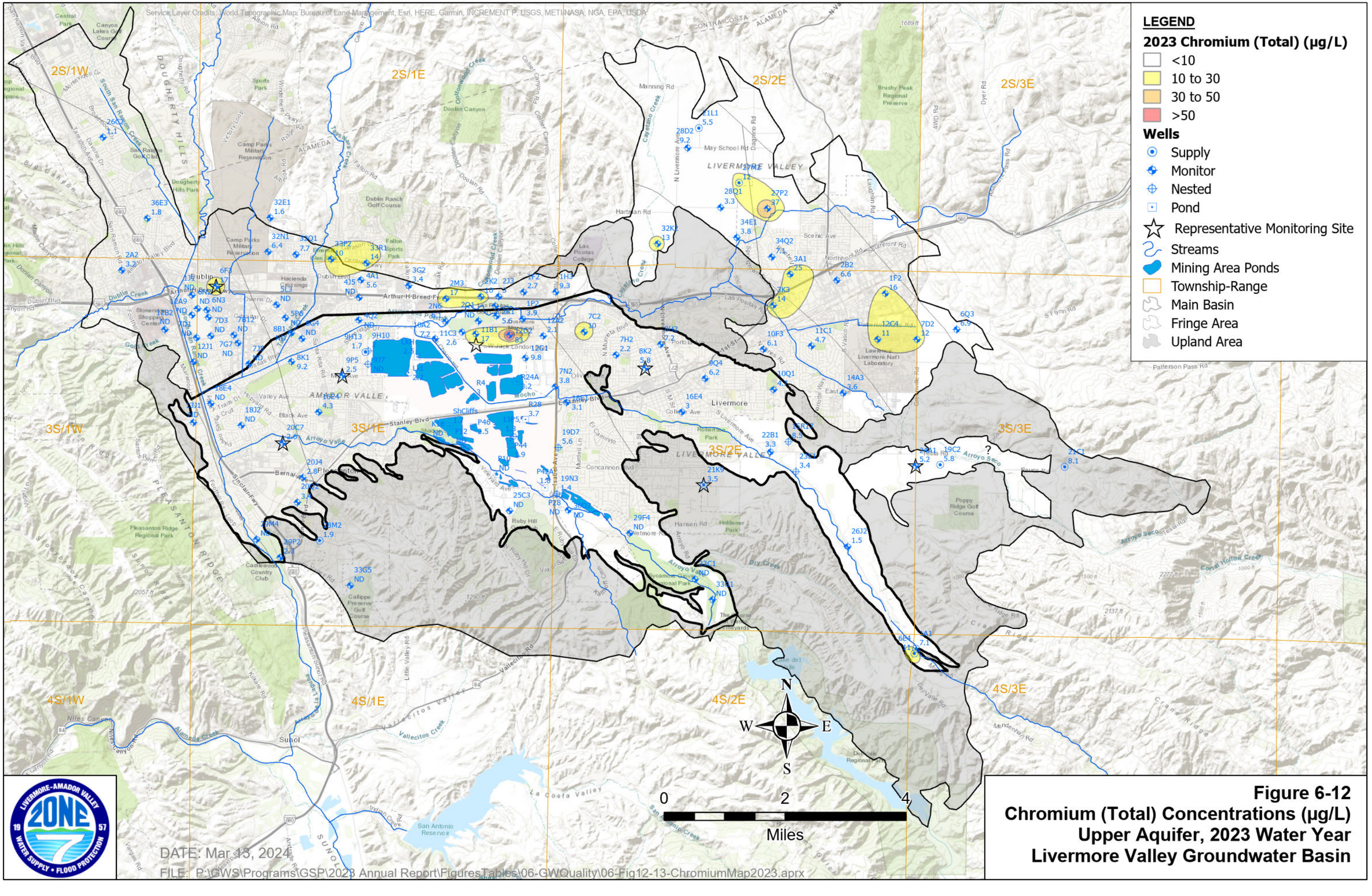


Figure 6-12
Chromium (Total) Concentrations (µg/L)
Upper Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

Service Layer Credits: World Topographic Map: Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, EPA, USDA

ABBREVIATIONS FOR MUNICIPAL WELLS
COL = Chain of Lakes (Zone 7)
M = Mocho (Zone 7)
H = Hopyard (Zone 7)
CWS = Cal Water Service
St = Stoneridge (Zone 7)
P = Pleasanton
SF = San Francisco Public Utilities Commission

LEGEND
2023 Chromium (Total) (µg/L)
- <10
- 10 to 30
- 30 to 50
- >50

Wells
- Supply
- Monitor
- Nested
- Supply-Municipal
- Pond
- Representative Monitoring Site

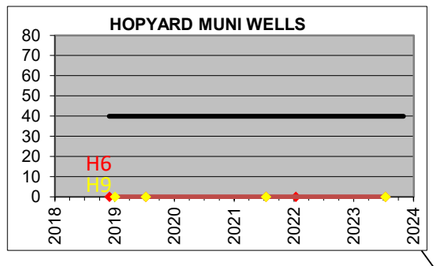
- Streams
- Township-Range
- Mining Area Ponds
- Main Basin
- Fringe Area
- Upland Area

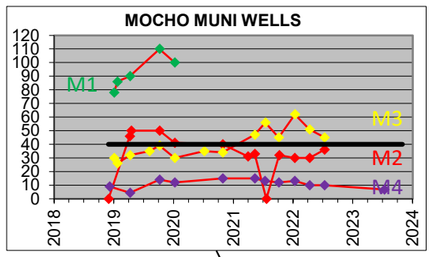
N
W E
S

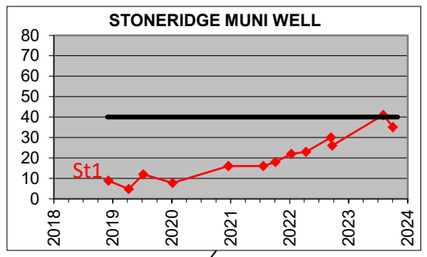
0 4,000 8,000
Feet

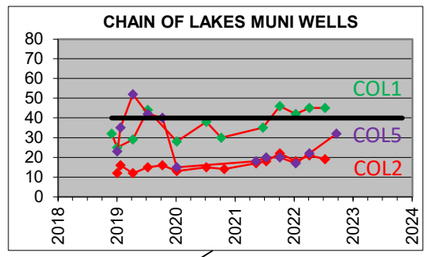
DATE: Mar 15, 2024
FILE: R:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\06-GWQuality\06-Fig12-13-ChromiumMap2023.aprx

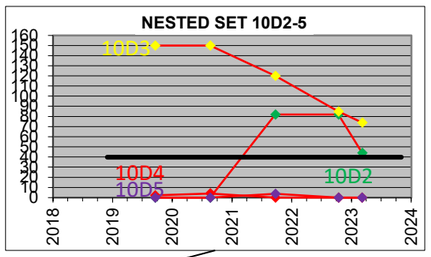
Figure 6-13
Chromium (Total) Concentrations (µg/L)
Lower Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

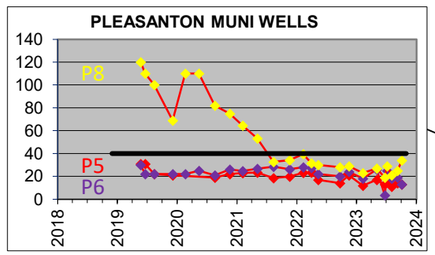


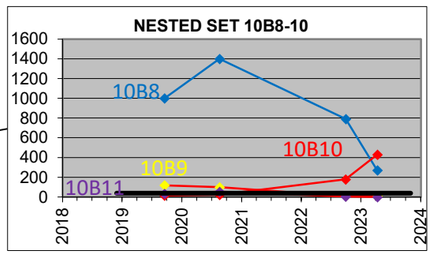


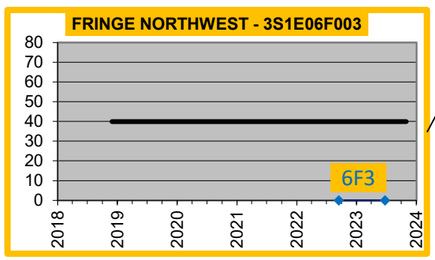


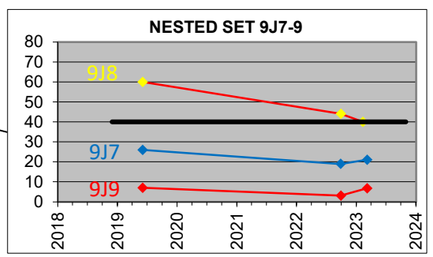


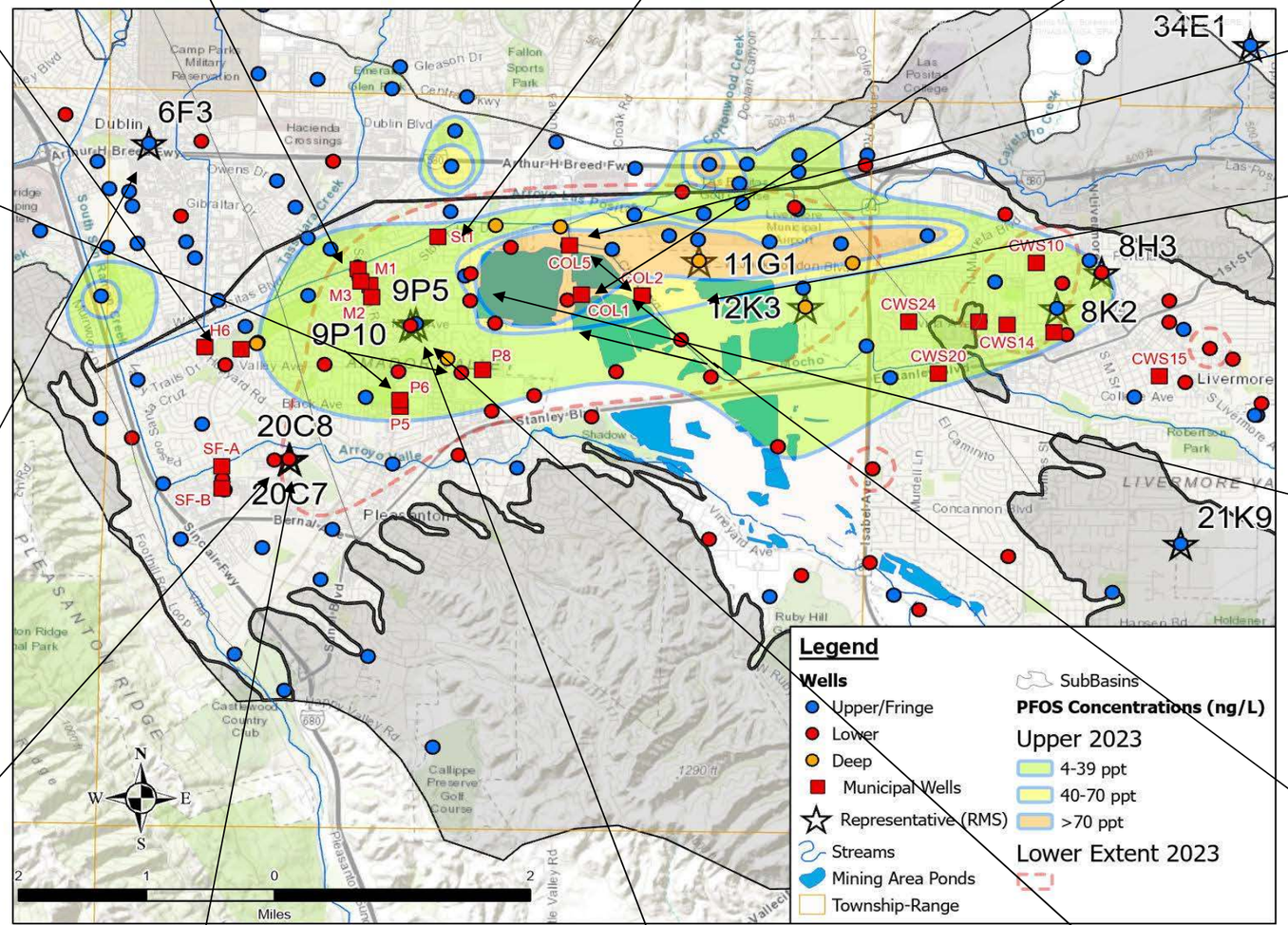


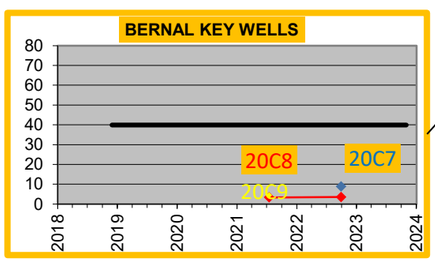


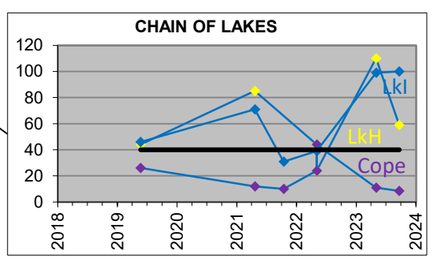








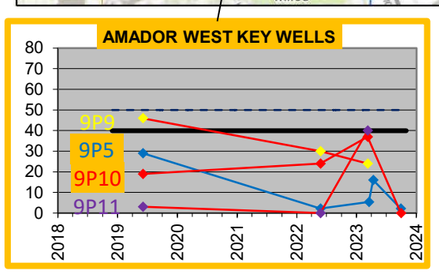


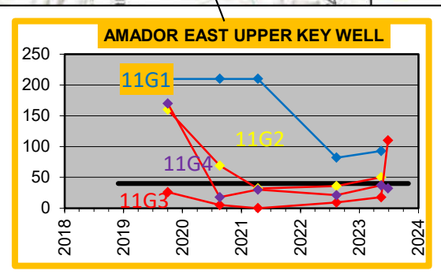


LEGEND

Orange	Representative Monitoring Site
Blue	Upper Aquifer
Red	Lower Aquifer
	DDW Response Level

PFOS concentrations in ng/L





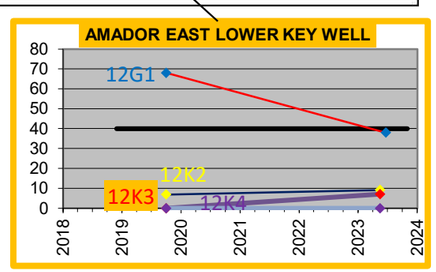


Figure 6-14
PFOS Chemographs
2018-2023
Livermore Valley

LEGEND

PFOS Concentrations (ng/L)
- 4-39 ppt
- 40-70 ppt
- >70 ppt

Wells
- Supply
- Monitor
- Nested
- Pond
- Representative Monitoring Site

- Streams
- Mining Area Ponds
- Township-Range
- Main Basin
- Fringe Area
- Upland Area

Basin Region Outline

Basin Region
- Main Basin
- Fringe Area
- Upland Area
- SubBasins
- MaskForESRIWorldTopoMap

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Figure 6-15
PFOS Concentrations (ng/L)
Upper Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

LEGEND

PFOS Concentrations (ng/L)
- 4-39 ppt
- 40-70 ppt
- >70 ppt

Wells
- Supply
- Monitor
- Nested
- Supply-Municipal
- Supply-Industrial

Streams
Mining Area Ponds
Main Basin
Fringe Area
Upland Area

5K7 1.9
M4 6.7
8H9 12
St1 41
10D3 85
10B9 12
1P2 7.1
11G3 110
9H11 53
9J8 40
COL1 Mon 91
12K3 7.1
9P10 37
11P6 13
14D2 34
14B1 11
H6 ND
H9 ND
17D4 ND
17B4 8.2
16C2 35
16A4 33
P8 29
P6 26
P5 21
15M3 12
SF-A ND
20B2 10
19D10 7.5
CWS10 13
CWS24 ND
CWS31 4.6
CWS14 5.4
CWS29 2.8
CWS9 13
CWS15 ND

Dublin
Pleasanton
Livermore
AMADOR VALLEY
LIVERMORE VALLEY
PLEASANTON RIDGE

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Feet

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Figure 6-16
PFOS Concentrations (ng/L)
Lower Aquifer, 2023 Water Year
Livermore Valley Groundwater Basin

7 Land Subsidence Monitoring

7.1 Program Changes

Zone 7's 2021 Alternative GSP established SMCs for Land Subsidence as shown in ***Table 7-A*** below.

Table 7-A: SMCs for Land Subsidence

Undesirable Results Definition	Undesirable Results Criteria	Minimum Threshold (MT)	Measurable Objective (MO)
If the occurrence of land subsidence substantially interferes with beneficial uses of groundwater and infrastructure within the Basin during the planning and implementation horizon of this Alternative GSP.	Water levels in greater than 25% of the RMS-WLs decline below their respective MTs for two consecutive years, that result in a confirmed decrease of 0.4 ft of land surface in any given cycle with a goal of experiencing no inelastic subsidence spatially and temporally. Not applicable to Upland Management Area.	Main Basin and Fringe Area: Chronic Lowering of Groundwater Levels used as a proxy, with the additional constraint of no more than 0.4 ft of inelastic land subsidence in any year. Upland Area: No MTs established.	Main Basin and Fringe Area: Chronic Lowering of Groundwater Levels used as a proxy. Upland Area: No MOs established.

RMS-WL = Representative Monitoring Sites for Water Levels

The 2021 Alternative GSP recommended continuing with Interferometric Synthetic Aperture Radar (InSAR) surveying on an annual basis, in lieu of the benchmark land surveys, to evaluate land subsidence over the entire Basin. Starting in the 2022 WY, Zone 7 used InSAR data publicly available through the DWR. This data can be viewed by the public with the SGMA Data Viewer at: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

For more information on the Land Subsidence program; see the following sections of the 2021 Alternative GSP:

- **Section 1.2.4:** Land Subsidence Program Update
- **Section 8.7:** Current and Historical Groundwater Conditions – Land Subsidence
- **Section 13.5:** Sustainability Indicators – Land Subsidence
- **Section 14.2.5:** Monitoring Network for Land Subsidence

- **Section 14.4:** Representative Monitoring

7.2 Results for the 2023 Water Year

Figure 7-1 shows the land surface elevation change (approximately 100-meter resolution) from Fall 2022 to Fall 2023. ***Figure 7-2*** shows cumulative land surface elevation change (raster obtained from DWR from June 2015 to Fall 2023 . Both figures show that land surface elevations generally rose (light grey and blue) within 0.2 ft, and in some areas dropped within 0.05 ft (dark grey). These elevation changes are within the range Zone 7 considers to be "elastic deformation" (i.e., rebounds to the original elevation when groundwater levels return to previous levels).

Some areas in the Fringe Area appear to have dropped more than 0.10 ft (indicated by orange). The location of these changes and proximity to points of increased surface elevation change indicate that these areas are likely a reflection of vegetation or crop changes, and not land subsidence.

7.3 Attached Tables and Figures

Figure 7-1*: Land Surface Elevation Change from Fall 2022 to Fall 2023*
Figure 7-2*: Land Surface Elevation Change from June 2015 to October 2023*

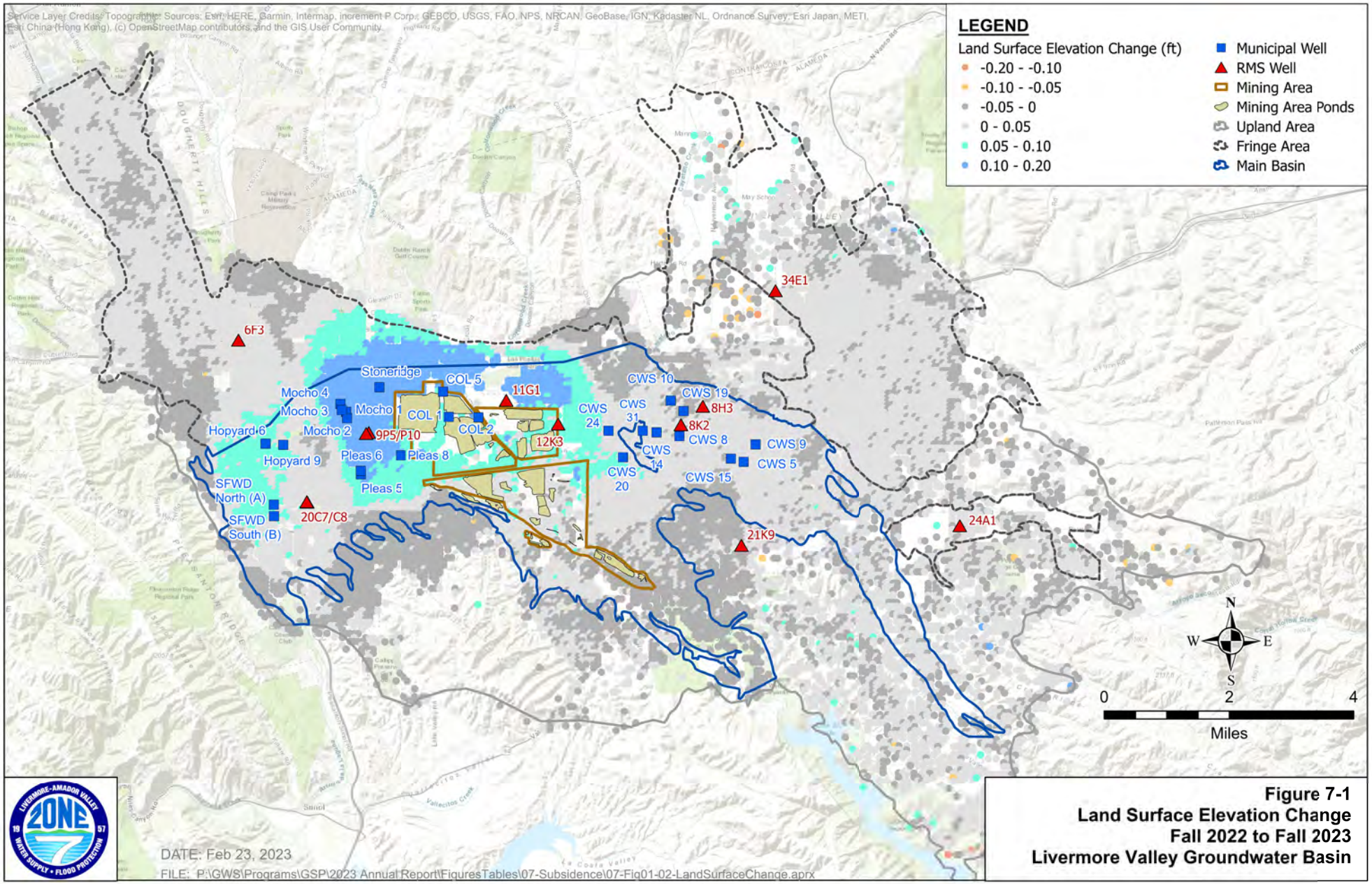

Figure 7-1
Land Surface Elevation Change
Fall 2022 to Fall 2023
Livermore Valley Groundwater Basin

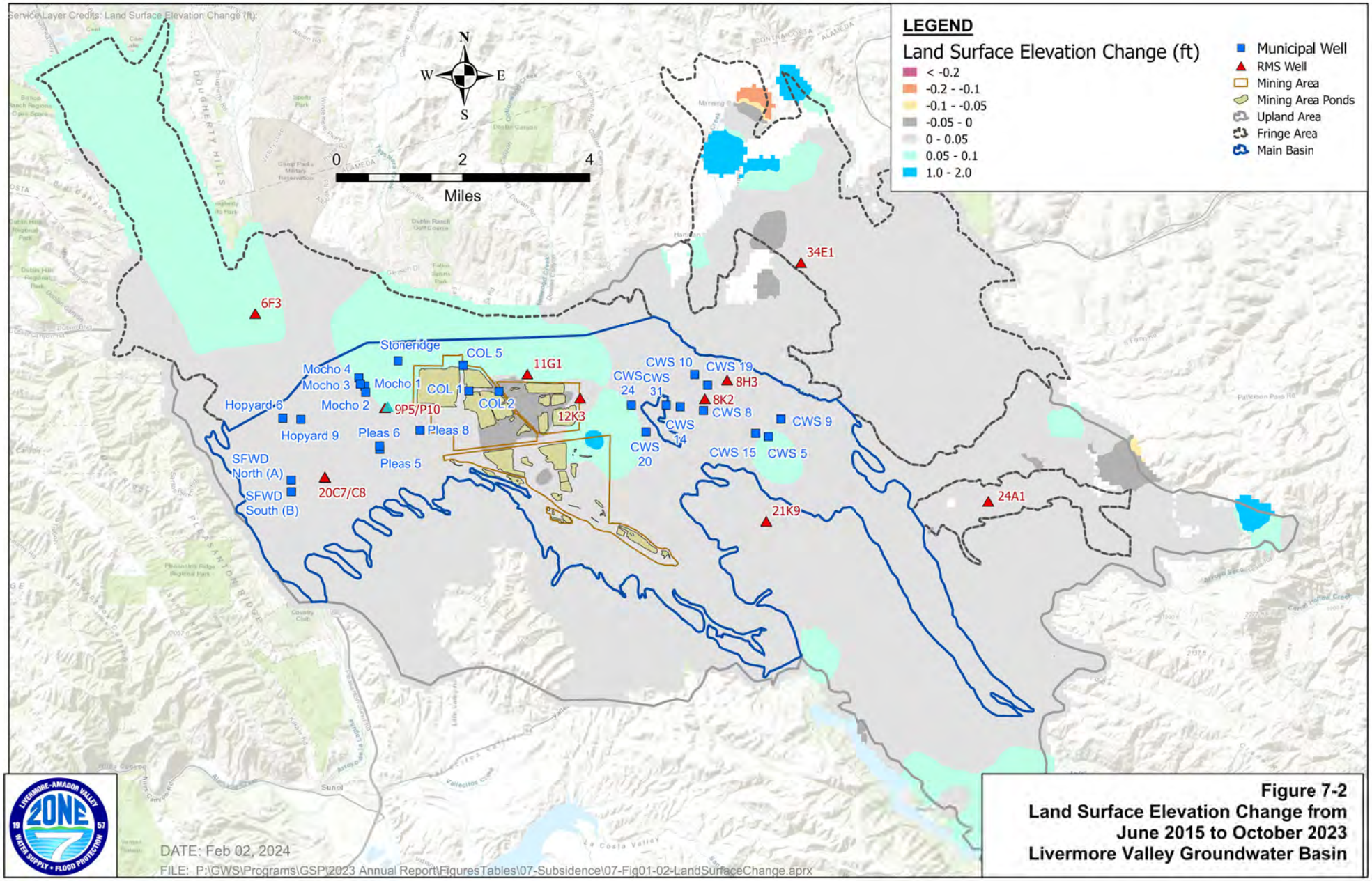

Figure 7-2
Land Surface Elevation Change from June 2015 to October 2023
Livermore Valley Groundwater Basin

8 Land Use Monitoring

8.1 Program Changes

There were no changes to the Land Use Monitoring Program during the 2023 WY. For more information on the Land Use program; see the following section of the 2021 Alternative GSP:

- **Section 5.1.4:** Existing Land Use and Water Use Sector and Source

8.2 Results for the 2023 Water Year

Figure 8-1 shows Land and Water Use overlying the Basin and ***Table 8-1*** tabulates the areas by Land Use Category, Water Use Type, and Basin Management Area. Although there was some in-fill development that occurred during the 2023 WY, no major land use change that would significantly affect the groundwater supply or groundwater quality was identified.

8.3 Attached Tables and Figures

Table 8-1*: Land Use Acreage, 2023 WY*

Figure 8-1*: Map of Land Use, 2023 WY*

TABLE 8-1
LAND USE ACREAGE (in acres)
2023 WATER YEAR
LIVERMORE VALLEY GROUNDWATER BASIN

Basin / Category / Irrigation Water Source	Main Basin					Fringe Areas					Upland Areas				
	DW	GW	RW	none	Total	DW	GW	RW	none	Total	DW	GW	RW	none	Total
Agriculture (non-vineyard)	56	94	0	0	150	6	28	0	0	34	146	47	0	0	193
Agriculture (vineyard)	1,351	19	0	0	1,370	391	0	0	0	391	1,724	1	0	0	1,725
Total Agricultural	***1,407***	***113***	***0***	***0***	***1,520***	***397***	***28***	***0***	***0***	***425***	***1,870***	***48***	***0***	***0***	***1,918***
Commercial and Business	1,406	42	400	0	1,848	3,858	117	1,268	1	5,244	387	15	28	0	430
Public	562	0	400	0	962	856	3	57	14	930	143	3	89	0	235
Public (Irrigated Park)	563	0	220	0	783	192	0	87	9	288	96	0	11	0	107
Residential (high density)	421	0	0	0	421	266	0	248	0	514	29	0	15	0	44
Residential (medium density)	6,446	0	17	0	6,463	5,274	0	45	0	5,319	2,938	0	49	0	2,987
Residential (low density)	147	150	0	0	297	19	1	0	0	20	186	194	0	0	380
Roads	0	0	0	77	77	0	0	0	701	701	0	0	0	93	93
Total Urban	***9,545***	***192***	***1,037***	***77***	***10,851***	***10,465***	***121***	***1,705***	***725***	***13,016***	***3,779***	***212***	***192***	***93***	***4,276***
Golf Course	140	90	126	0	356	229	15	66	0	310	466	160	0	0	626
Residential (rural)	41	155	0	0	196	27	374	0	0	401	160	192	0	0	352
Mining Area (pit)	0	0	0	1,908	1,908	0	0	0	0	0	0	0	0	0	0
Open Space	0	0	0	3,894	3,894	0	0	0	7,738	7,738	0	0	0	20,451	20,451
Water	0	0	0	1,084	1,084	0	0	0	65	65	0	0	0	170	170
Total Other	***181***	***245***	***126***	***6,886***	***7,438***	***256***	***389***	***66***	***7,803***	***8,514***	***626***	***352***	***0***	***20,621***	***21,599***
TOTALS FOR 2023 WY	**11,133**	**550**	**1,163**	**6,963**	**19,809**	**11,118**	**538**	**1,771**	**8,528**	**21,955**	**6,275**	**612**	**192**	**20,714**	**27,793**
TOTALS FOR 2022 WY	**11,280**	**550**	**1,163**	**6,816**	**19,809**	**11,461**	**546**	**1,771**	**8,177**	**21,955**	**6,409**	**611**	**192**	**20,581**	**27,793**
CHANGE SINCE PREVIOUS YEAR	**-147**	**0**	**0**	**147**	**0**	**-343**	**-8**	**0**	**351**	**0**	**-134**	**1**	**0**	**133**	**0**

Irrigation Water Sources
DW = Delivered Municipal Water
GW = Groundwater
RW = Recycled Water

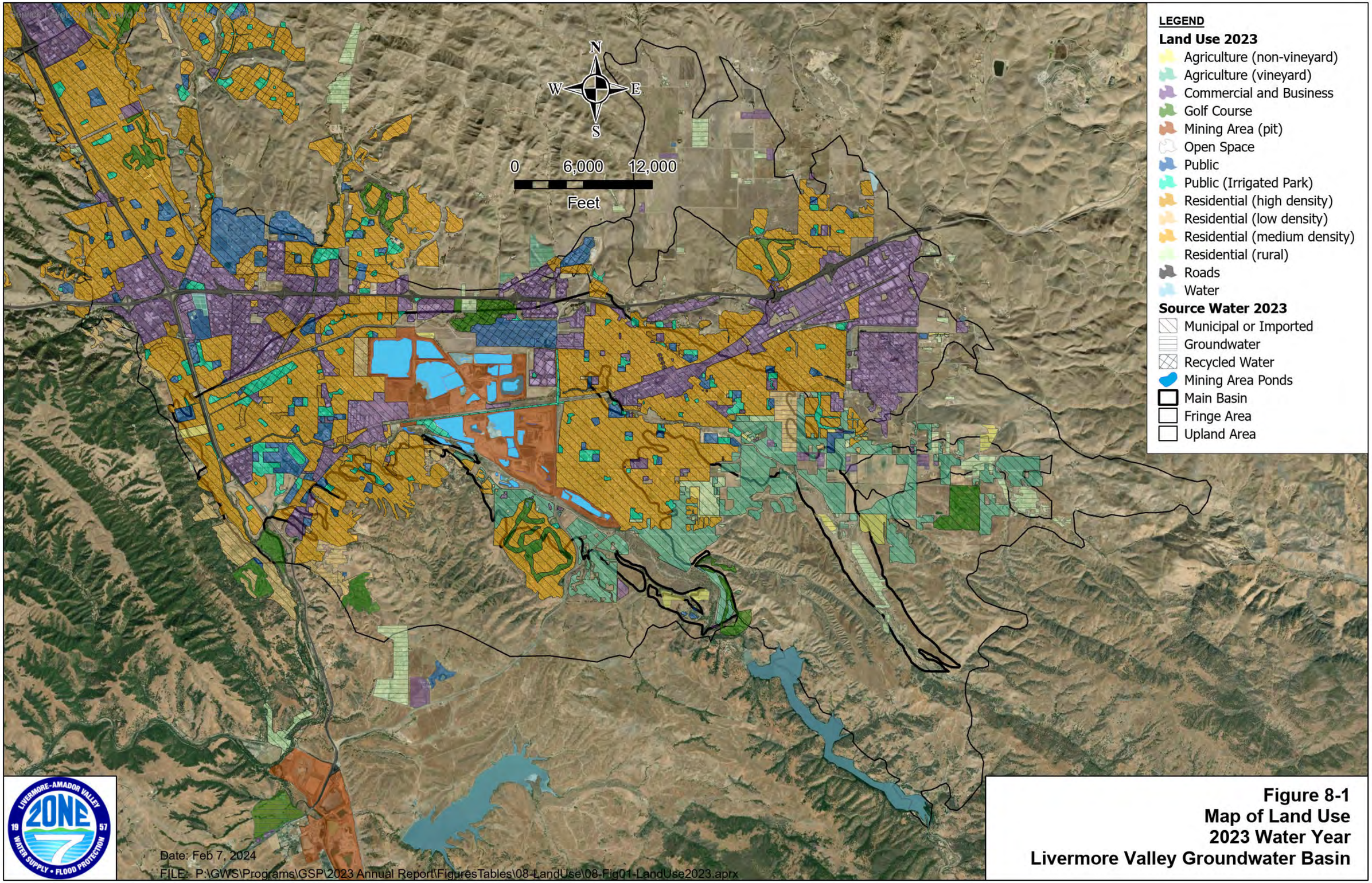

Figure 8-1
Map of Land Use
2023 Water Year
Livermore Valley Groundwater Basin

9 Wastewater and Recycled Water Monitoring

9.1 Program Changes

There were no changes to the Wastewater and Recycled Water Monitoring Program during the 2023 WY. See ***Section 8.10.2*** of the 2021 Alternative GSP for specific details about the Wastewater and Recycled Water Program.

9.2 Results for the 2023 Water Year

9.2.1 Wastewater and Recycled Water Volumes

Wastewater and recycled water application areas for 2023 WY are shown on ***Figure 9-1***. In the 2023 WY, about 97% of the wastewater produced over the Basin was treated at Livermore Wastewater Reclamation Plant (LWRP) and Dublin San Ramon Services District (DSRSD). A summary of the wastewater volumes for the 2023 WY are presented in ***Table 9-A*** below.

Table 9-A: Municipal Wastewater and Recycled Water Volumes, 2023 WY

Water Type	LWRP	DSRSD	Total
Wastewater Influent	6,557	15,300	21,857
Treated Effluent Exported via LAVWMA*	5,254	9,365	14,619
Total Volume Recycled	1,561	4,580	6,141
RW Applied to Main Basin**	**383**	**333**	**716**

* Does not include Zone 7 Demin Plant discharge to LAVWMA via DSRSD
** Recycled water applied over the Main Basin as landscape irrigation
DSRSD Dublin San Ramon Services District
LAVWMA Livermore-Amador Valley Water Management Agency
LWRP Livermore Wastewater Reclamation Plant
RW Recycled Water

In the 2023 WY recycled water accounted for about 13% of the Livermore Valley's total water supply and about 0.3% of the inflow to the Main Basin; however, of greater benefit, the recycled water potentially conserved up to 6,141 AF of water that might have otherwise come from groundwater storage.

The estimated 2023 WY leachate volumes from the Veterans (VA) Hospital wastewater treatment ponds located in southern Livermore, domestic onsite wastewater treatment systems (OWTS)

(e.g., septic systems), and leaking wastewater pipelines that run throughout the Basin are presented in ***Table 9-B*** below.

Table 9-B: Other Wastewater Volumes (AF), 2023 WY

	VA Hospital*	Septic Tanks*	Pipe Leakage**	Total
Wastewater Leachate	50	80	604	734

* Estimated total over the Main Basin

** Calculated. Includes leakage from sanitary sewer & RW pipes

9.2.2 Wastewater and Recycled Water Quality

Salt Loading

Table 9-C below presents the estimated salt loading over the Main Basin from applied wastewater and recycled water during the 2023 WY.

Table 9-C: Salt Loading from Applied Recycled Water and Wastewater, 2023 WY

Source	Volume (AF)	TDS Average (mg/L)	Salt Applied (tons)
LWRP RW	383	615	320
DSRSD RW	333	661	299
Total RW	*716*	*636*	*618*
VA Hospital	50	471	32
Septic	80	600	65
Pipe Leakage	604	465	382
Total WW	*734*	*480*	*479*
Total	***1,450***	***548***	***1,097***

DSRSD Dublin San Ramon Services District
LWRP Livermore Wastewater Reclamation Plant
RW Recycled Water
WW Wastewater

About 641 tons (approximately 3%) of the Main Basin's salt inflow (22,108 tons) was attributed to recycled water use over the Main Basin during the 2023 WY (see ***Table 12-2***). However, if potable water supplies had been used for this irrigation demand, the salt loading would have been about 276 tons (a reduction of only about 365 tons). This difference is less than the volume of salt removed by Zone 7's Mocho Groundwater Demineralization Plant (MGDP) (510 AF, see ***Table 12-C***).

Table 9-D below presents the estimated nitrogen loading over the Main Basin from applied wastewater and recycled water during the 2023 WY.

Table 9-D: Nitrogen Loading from Applied Recycled Water and Wastewater, 2023 WY

Source	Volume (AF)	Nitrogen Compounds (mg/L) NO3(N)	NO2(N)	TKN	Nitrogen Applied (lbs)
LWRP RW	383	0.7	0.7	53.5	56,096
DSRSD RW	333	0.1	0.5	0.0	156
Total RW	*716*	*0.4*	*0.6*	*28.6*	*56,252*
VA Hospital	50	7.9	0.1	6.5	1,133
Septic	80	35.0	0.0	0.0	1,719
Pipe Leakage	604	0.4	0.3	13.2	21,971
Total WW	*734*	*4.7*	*0.2*	*11.3*	*24,823*
Total	***1,450***	***2.6***	***0.4***	***19.8***	***81,075***

DSRSD Dublin San Ramon Services District
LWRP Livermore Wastewater Reclamation Plant
NO3(N) Nitrate as Nitrogen
NO2(N) Nitrite as Nitrogen
RW Recycled Water
TKN Total Kejldahl Nitrogen
WW Wastewater
lbs pounds

The table shows that approximately 81,075 pounds (lbs) of nitrogen was applied over the Main Basin during the 2023 WY. However, from a practical standpoint, much of the nitrogen will be removed from the percolate through soil denitrification and plant uptake processes.

9.3 Attached Tables and Figures

***Figure 9-1**: Wastewater and Recycled Water Application Areas, 2023 WY*

Service Layer Credits: World Topographic Map: Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, EPA, USDA

LEGEND

Wastewater Treatment Plants
- Dublin San Ramon Services District
- Livermore Wastewater Recycling Plant
- Veterans Administration Hospital
- LAVWMA Pipeline

Application of Recycled Water 2023
- DSRSD
- City of Livermore
- City of Pleasanton

Source of Recycled Water
- DSRSD
- LWRP
- Main Basin
- Fringe Area
- Upland Area
- Streams
- Mining Area Ponds

DSRSD

LWRP

VA Hospital

VA Ponds

VA Plant

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Figure 9-1
Wastewater and Recycled Water Application Areas 2023 WY
Livermore Valley Groundwater Basin

10 Groundwater Storage

10.1 Program Changes

There were no changes to the Groundwater Storage program for the 2023 Water Year. Starting last year, Zone 7 used the Department of Water Recourses' Integrated Water Flow Model Demand Calculator (IDC) model to calculate areal recharge totals for the basin instead of the Areal Recharge Model (ARM) that Zone 7 had previously developed in-house. In addition to calculating areal recharge totals for the 2023 WY, the IDC model was used to recalculate the areal recharge totals back to the 2016 WY (see ***Section 10.2.1***). As a result, some of the volumes presented herein may have changed from those presented in previous reports.

The 2021 Alternative GSP also established SMCs for Reduction of Groundwater Storage as shown in ***Table 10-A*** below.

Table 10-A: SMCs for Reduction of Groundwater Storage

Undesirable Results Definition	Undesirable Results Criteria	Minimum Threshold (MT)	Measurable Objective (MO)
If and when a reduction in storage in the Principal Aquifers of the Basin negatively affects the long-term viable access to groundwater for the beneficial uses and users within the Basin. Specifically, significant and unreasonable effects would include an aggregate reduction in usable groundwater storage of more than 50% within the Basin relative to the SGMA Baseline Storage volume for two consecutive years.	Water levels in greater than 25% of the RMS-WLs decline below their respective MTs for two consecutive years. Not applicable to Upland Management Area.	Main Basin and Fringe Area: Chronic Lowering of Groundwater Levels used as a proxy. Upland Area: No MTs established.	Main Basin and Fringe Area: Chronic Lowering of Groundwater Levels used as a proxy. Upland Area: No MOs established.

RMS-WL = Representative Monitoring Sites for Water Levels

The following sections in the 2021 Alternative GSP provide more information on the Groundwater Storage program and the improvements made to the HCM:

- **Section 1.2.2**: Groundwater Storage Program Updates
- **Section 8.4**: Current and Historical Groundwater Conditions – Groundwater Storage
- **Section 9**: Water Budget Information
- **Section 13.2**: Sustainability Management Criteria – Reduction of Groundwater Storage
- **Section 14.2.2**: Monitoring Network for Reduction of Groundwater Storage

10.2 Results for the 2023 Water Year

10.2.1 Total Storage

Zone 7 uses two methods for calculating groundwater storage in the Main Basin: The Groundwater Elevation (GWE) Method and the Hydrologic Inventory (HI) Method. The GWE method uses groundwater level data and storage coefficients for "nodes" (originally developed by DWR in 1974) to estimate the total volume of water in the Main Basin. The HI method involves accounting for inflows and outflows for each WY and adds the net change in storage to the previous year's volume. Storage volumes from the two methods are averaged to quantify the total storage of the Main Basin.

Figure 10-1 shows the Upper and Lower Aquifer groundwater elevations used to calculate the GWE method storage for the 2023 WY. The change in storage from Fall 2022 to Fall 2023 for each Main Basin node is shown in ***Figure 10-2***. ***Table 10-1*** shows the historical annual GWE groundwater storage volumes for each Subarea from the 1974 WY to 2023 WY.

The results of the HI method for the 2023 WY are summarized below in ***Table 10-B*** below. All the HI components are listed in ***Table 10-2*** along with their method of measurement and their approximate accuracy. The historic HI components and results for WYs 1974 to 2023 are tabulated in ***Table 10-3***, and charted in ***Figure 10-3*** along with the WY type (e.g., wet, normal, dry, etc.) noted for each year. ***Figure 10-4*** shows a map of the pumping well locations during the 2023 WY and a representation of the relative volumes of water pumped from each well.

Table 10-B: HI Method Groundwater Storage Supply and Demand Volumes, 2023 WY (AF)

CATEGORY	Sustainable Avg	2023	% of Avg	Change from 2022
SUPPLIES	**19,800**	**42,872**	**217%**	**28,272**
Stream Recharge Artificial	5,300	6,734	127%	5,433
Stream Recharge Natural	6,600	18,164	275%	13,293
Rainfall Recharge	4,300	12,623	294%	8,739
Applied Water Recharge	1,600	3,024	189%	769
Pipe Leakage	1,000	1,326	133%	39
Subsurface Inflow	1,000	1,000	100%	0
DEMANDS	**18,800**	**12,587**	**67%**	**-13,407**
Zone 7 Pumping excluding DSRSD	5,300	4,578	86%	-10,063
Other Pumping	8,400	4,596	55%	-1,508
Agricultural Pumping	400	813	203%	61
Mining Losses	1,400	700	50%	0
Evapotranspiration (Eto)	3,200	1,900	59%	-1,897
Subsurface Outflow	100	0	0%	0
NET CHANGE (SUPPLY – DEMAND)	**1,000**	**30,284**		**41,680**
TOTAL STORAGE (HI Method)		**245,164**		**30,284**

AF = acre-feet
Avg = average
DSRSD = Dublin San Ramon Services District

The groundwater storage volumes at the end of the 2023 WY for both the GWE and HI methods are presented below in ***Table 10-C***. The total groundwater storage for the Main Basin at the end of 2023 WY was calculated to be 245.1 thousand acre-feet (TAF), with 117 TAF of groundwater available as operational storage, which is about 93% of the total operational storage capacity (i.e., 126 TAF).

Table 10-C: Groundwater Storage Summary, 2023 WY (in TAF)*

Storage Calculation Method	End of 2022 WY	End of 2023 WY	Change in Storage
Groundwater Elevations (GWE)	218.6	245.0	26.4
Hydrologic Inventory (HI)	214.9	245.2	30.3
Total Storage (average of GWE & HI)	**216.7**	**245.1**	**28.4**
Operational Storage**	**88.7**	**117.1**	**28.4**

* Numbers rounded to nearest tenth TAF
** Operational Storage = Total Storage - Reserve Storage (i.e., 128 TAF)
GWE = Groundwater Elevation
HI = Hydrologic Inventory
TAF = Thousand acre-feet

10.2.2 Natural Recharge and Demand

Table 10-D below summarizes the "natural" recharge (inflows) and the "natural" demand (outflows to which natural recharge is allocated) for the 2023 WY.

Table 10-D: Natural Groundwater Inflow and Outflows, 2023 WY

Component	Estimated Sustainable Values (AFY)	2023 WY (AF)	Percentage of Sustainable Average
Natural Recharge	13,400	34,812	260%
Natural Demand	13,400	8,009	60%
Net Natural Recharge	0	26,802	200%*

AF = acre-feet
AFY = acre-feet per year
* = percent of Sustainable Natural Recharge

The retailer's Groundwater Pumping Quota (GPQ), along with their groundwater pumping volumes for the 2023 Calendar Year (CY), are shown in ***Table 10-E*** below. None of the retailers pumped more than their respective GPQ in 2023 WY.

Table 10-E: Retailer Groundwater Pumping and Quotas in 2023 Calendar Year (AF)

Retailer	GPQ	Carryover from 2022	Pumped in CY 2023	Carryover to 2022**
City of Pleasanton	3,500	700	0	700
Cal Water Service (CWS)	3,069	614	2,624	614
DSRSD (pumped by Zone 7)	645	0	645	0
City of Livermore (not used)*	31	-	0	-
Total	**7,214**	**1,314**	**3,269**	**1,314**

AF = Acre-feet
CY = Calendar Year
GPQ = Groundwater Pumping Quota
* = Livermore no longer pumps groundwater, GPQ not included in totals or carryover.
** = Maximum of 20% of GPQ can be carried over

10.2.3 Artificial Recharge and Demand — Conjunctive Use

Figure 10-5 shows the cumulative change net inflow/outflow from both natural and artificial components since 1974. ***Table 10-F*** below shows the artificial recharge and Zone 7's groundwater pumping totals for the 2023 WY.

Table 10-F: Conjunctive Use Supply and Demand, 2023 WY

Component	Estimated Sustainable Avg (AFY)	2023 WY (AF)	Percentage of Sustainable Average
Artificial Recharge	5,300	6,734	127%
Zone 7 Pumping	5,300	4,578	86%
Net Artificial Recharge	**0**	**2,156**	**41%***

AF = acre-feet
AFY = acre-feet per year
Avg = average
* = percent of Sustainable Artificial Recharge

Zone 7 implements conjunctive use practices within the Basin to the greatest extent possible given current hydrologic conditions and imported water supply availability. During the 2023 WY, Zone 7 released 7,526 AF from the South Bay Aqueduct (SBA) into the Arroyos Valle and Mocho for artificial recharge and water rights, of which 6,734 AF recharged.

10.3 Attached Tables and Figures

***Table 10-1**: Total Main Basin Storage by Subarea, 1974 to 2023 WYs*
***Table 10-2**: Description of Hydrologic Inventory Components*
***Table 10-3**: Groundwater Storage, Hydrologic Inventory Method, 2023 WY*
***Table 10-4**: Historical Groundwater Storage, Hydrologic Inventory Method, 1974 to 2023 WYs*

***Figure 10-1**: Mean Groundwater Elevations by Node, Upper and Lower Aquifers, Fall 2023*
***Figure 10-2**: Change in Groundwater Storage, Fall 2022 to Fall 2023*
***Figure 10-3**: Graph of Groundwater Storage, 1974 to 2023 WYs*
***Figure 10-4**: Map of Municipal and Private Supply Wells*
***Figure 10-5**: Cumulative Change in Natural and Artificial Recharge and Demand, 1974 to 2023 WYs*

TABLE 10-1
TOTAL MAIN BASIN STORAGE BY SUBAREA (AF)
GROUNDWATER ELEVATION METHOD
1974 TO 2023 WATER YEARS

Water Year	Bernal	Amador		Mocho II	Total
		Amador West	Amador East		
1974	49,651	52,916	80,671	29,821	213,060
1975	51,149	54,220	80,840	28,872	215,080
1976	54,180	56,319	86,194	29,012	225,705
1977	51,970	53,968	81,889	27,954	215,782
1978	50,272	52,077	79,541	27,751	209,641
1979	52,863	56,739	89,122	29,210	227,933
1980	55,952	60,000	94,014	29,500	239,466
1981	57,910	61,890	95,688	30,224	245,712
1982	57,623	61,228	93,235	29,156	241,242
1983	58,654	63,488	100,642	31,492	254,277
1984	59,021	64,418	102,569	31,626	257,635
1985	58,487	64,024	95,703	31,568	249,782
1986	56,723	60,837	95,019	27,719	240,298
1987	55,723	58,635	91,170	25,147	230,675
1988	54,486	53,217	83,377	25,672	216,752
1989	52,754	51,260	82,836	27,433	214,282
1990	50,712	50,879	80,834	27,321	209,746
1991	44,627	49,348	76,543	24,631	195,148
1992	30,308	35,438	74,566	43,818	184,131
1993	30,423	38,787	83,656	58,239	211,105
1994	31,677	39,437	88,395	56,467	215,976
1995	32,982	43,156	89,245	60,568	225,950
1996	33,009	42,917	87,138	60,599	223,663
1997	33,034	41,992	88,770	58,894	222,690
1998	33,092	43,411	88,084	61,066	225,652
1999	32,850	43,310	86,452	60,330	222,943
2000	32,670	42,591	87,530	59,680	222,471
2001	31,445	40,853	73,337	57,977	203,613
2002	31,453	37,537	84,092	59,398	212,480
2003	31,358	41,563	87,454	60,491	220,866
2004	31,277	43,784	79,385	59,360	213,806
2005	32,772	48,734	93,614	61,456	236,576
2006	33,192	53,464	91,791	60,422	238,870
2007	33,213	54,369	90,422	54,489	232,493
2008	33,176	54,160	91,842	55,851	235,029
2009	33,160	51,088	91,698	57,354	233,301
2010	33,160	50,282	92,022	58,911	234,376
2011	33,163	50,632	92,671	58,961	235,427
2012	32,578	47,442	90,418	57,905	228,343
2013	31,657	44,227	87,028	58,431	221,343
2014	31,054	42,116	82,569	53,727	209,466
2015	32,177	46,310	81,407	54,976	214,869
2016	32,998	52,834	82,958	57,333	226,122
2017	33,201	66,825	86,062	59,306	245,394
2018	33,220	70,197	85,733	56,109	245,259
2019	33,222	69,427	84,973	60,680	248,301
2020	33,171	61,399	86,567	56,462	237,599
2021	31,321	52,658	84,422	51,938	220,339
2022	30,568	52,439	83,284	52,272	218,563
2023	32,728	69,668	82,857	59,779	245,033

Calculated as one aquifer
Sum of Upper and Lower Aquifers

TABLE 10-2
DESCRIPTION OF HYDROLOGIC INVENTORY COMPONENTS
LIVERMORE VALLEY GROUNDWATER BASIN

COMPONENTS	*DESCRIPTION/REMARK*	*Direct/ Indirect*	*HOW CALCULATED/MEASURED*	*ESTIMATED ACCURACY*
SUPPLY INDICES				
Rainfall	Pleasanton rainfall (Parkside Office)	Direct	Measured by Zone 7	0.5 in
Evaporation	Evaporation at Lake Del Valle Station	Direct	Collected by DWR	0.5 in
Streamflow	Arroyo Valle Streamflow if Lake Del Valle Dam did not exist	Direct	USGS Stream Gage Station AV_BLC	10 AF
Water Year Type	Indicator of Water Year in Sacramento Valley	Direct	DWR California Data Exchange Center	-
SUPPLY COMPONENTS				
NATURAL STREAM RECHARGE				
ARROYO VALLE	AV natural recharge.	Indirect	Stream Inflows - Stream Outflows	100 AF
ARROYO MOCHO	AM natural recharge.	Indirect	Stream Inflows - Stream Outflows	100 AF
ARROYO LAS POSITAS	ALP natural recharge.	Indirect	Stream Inflows - Stream Outflows	100 AF
ARTIFICIAL RECHARGE				
ARROYO VALLE	Total artificial recharge on Arroyo Valle minus Prior Rights	Indirect	Stream Inflows - Stream Outflows	100 AF
ARROYO VALLE PRIOR RIGHTS	AVBLC flow that would have recharged if no dam.	Indirect	Formula based on AVBLC flow.	100 AF
ARROYO MOCHO	Total artificial recharge on Arroyo Mocho	Indirect	Stream Inflows - Stream Outflows	100 AF
ARROYO LAS POSITAS	Total artificial recharge on Arroyo Las Positas	Indirect	Stream Inflows - Stream Outflows	100 AF
INJECTION WELL RECHARGE	Injection at Hop 6 from 1998 to 2000	Direct	Metered by Zone 7	10 AF
RAINFALL RECHARGE	Recharge from rainfall	Indirect	Calculated by Areal Recharge Model	1000 AF
PIPE LEAKAGE	Pipe leakage that recharges the GW basin	Indirect	Estimated using length and age of pipes	500 AF
APPLIED WATER RECHARGE				
URBAN MUNICIPAL (GW & SBA)	Applied recharge in urban area - delivered water (GW & SBA)	Indirect	Calculated by Areal Recharge Model	100 AF
URBAN RECYCLED WATER	Applied water recharge from urban area - recycled water	Indirect	Calculated using Wastewater Plant deliveries	10 AF
AGRICULTURAL (SBA)	Total applied recharge from 'untreated' ag sources (untreated SBA)	Indirect	Calculated by Areal Recharge Model	100 AF
AGRICULTURAL (GW)	Total applied water recharge from groundwater ag sources	Indirect	Calculated by Areal Recharge Model	100 AF
GOLF COURSES (GW)	Applied water from golf courses on groundwater	Indirect	Calculated by Areal Recharge Model	100 AF
GOLF COURSES (RW)	Applied water from golf courses from recycled water	Indirect	Calculated using Wastewater Plant deliveries	10 AF
SUBSURFACE BASIN INFLOW	Subsurface Inflow from Northern Fringe Basin	Indirect	Estimated historically groundwater contours	500 AF
DEMAND COMPONENTS				
MUNICIPAL PUMPING				
ZONE 7	Total pumping by Zone 7, including pumping to waste	Direct	Metered by Zone 7	10 AF
DSRSD	*Pumping by Zone 7 for DSRSD.*	*Direct*	*DSRSD Groundwater Pumping Quota*	*10 AF*
PLEASANTON	Pumping by Pleasanton.	Direct	Metered by Pleasatnon	10 AF
CALIFORNIA WATER SERVICE	Pumping by CWS.	Direct	Metered by CWS	10 AF
SFPUC	Pumping by SF Public Utilities Commission	Direct	Metered by SFPUC	10 AF
FAIRGROUNDS	Pumping by Alameda County Fairgrounds	Indirect	Metered by Fairgrounds	10 AF
DOMESTIC	Pumping from active domestic, supply, and potable wells	Indirect	Estimated: Number of Wells x 0.5 AF/yr	50 AF
GOLF COURSES				
CASTLEWOOD GOLF COURSE	*Pumping for Castlewood Golf Course*	*Indirect*	*Estimated using historical meter data*	*50 AF*
TRI VALLEY GOLF CENTER	*Pumping for TriValley Golf Driving Range*	*Indirect*	*Calculated by Areal Recharge Model*	*50 AF*
AGRICULTURAL PUMPING	Unmetered pumping for agriculture	Indirect	Calculated by Areal Recharge Model	100 AF
MINING				
EXPORT	Total mining area releases that leave the basin	Indirect	Calculated from metered data and stream recharge rate	50 AF
EVAPORATION	Pond evaporation & rainfall.	Indirect	Calculated using lake area, evaporation, and rainfall	100 AF
PROCESSING	Mining Area processing losses	Indirect	Estimated at 700 AF/Yr	100 AF
SUBSURFACE BASIN OUTFLOW	Basin overflow leaving basin	Indirect	Formula based on GW elevation and synoptic data	100 AF

GW = Groundwater
SBA = South Bay Aqueduct
RW = Recycled Water
AF = Acre-feet

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1/30/2024

TABLE 10-3
GROUNDWATER STORAGE
HYDROLOGIC INVENTORY (HI) METHOD
2023 WATER YEAR (in Acre-Feet, except where indicated)

	Total for Water Year	Sustainable Average	Percent of Sust Avg
INDICES			
Rainfall at Livermore (inches)	24.37	14.46	169%
8 Station Rainfall Index (Northern CA)(inches)	66.64	50.16	133%
Evaporation at Lake Del Valle (inches)	66.85	67.14	100%
Arroyo Valle Stream flow (AF)	106,027	21,392	496%
SUPPLY TOTAL (AF)	**42,872**	**19,800**	**217%**
Stream Recharge	**24,898**	**11,900**	**209%**
[1] Natural Stream Recharge	18,121	5,700	318%
[1] Arroyo Valle Prior Rights	43	900	5%
[3] Artificial Stream Recharge	6,734	5,300	127%
Injection Well Recharge	**0**	**0**	**0%**
[1] **Rainfall Recharge**	**12,623**	**4,300**	**294%**
Lake Recharge	724	NA	NA
Pipe Leakage	**1,326**	**1,000**	**NA**
[1] **Applied Water Recharge**	**3,025**	**1,600**	**189%**
Urban - Municipal	1,891	1,280	148%
Urban - Groundwater	225	26	865%
Urban - Recycled Water	107	0	0%
Agriculture - Municipal (SBA)	675	92	734%
Agriculture/Golf - Groundwater	91	158	58%
Agriculture/Golf - Recycled	36	44	82%
[1] **Subsurface Inflow**	**1,000**	**1,000**	**100%**
DEMAND TOTAL (AF)	**12,587**	**18,800**	**67%**
Municipal Pumping	**9,174**	**13,700**	**67%**
[4] Zone 7	5,223	5,950	88%
[2] *Zone 7 pumping for DSRSD*	*645*	*645*	*100%*
GW through Demin Membranes	*474*	-	-
Demin Permeate to Z7 Distribution System	*420*	-	-
[2] City of Pleasanton	270	3,500	8%
[2] California Water Service	2,653	3,070	86%
[2] SFPUC	449	450	100%
[2] Fairgrounds	290	310	94%
[2] Domestic	69	200	35%
[2] Golf Courses	220	225	98%
[2] **Agricultural Pumping**	**813**	**400**	**203%**
[2] **Mining Use**	**2,600**	**4,600**	**57%**
Mining Discharges (Export) to Stream	0	700	0%
Mining Discharges to Cope Lake	*2,258*	*NA*	*NA*
Evaporation	1,900	3,200	59%
Processing	700	700	100%
GDE Uptake	*1,612*	*1,500*	*107%*
[1] **Subsurface Overflow**	**0**	**100**	**0%**
SUBTOTALS (AF)			
Sustainable Yield - Natural Recharge [sum of [1]]	34,812	13,400	260%
Sustainable Yield - Demand Components [sum of [2]]	8,009	13,400	60%
Net Natural	26,803		
Zone 7 - Artificial Recharge (Stream) [sum of [3]]	6,734	5,300	127%
Zone 7 - Municipal Pumping [sum of [4]]	4,578	5,300	86%
Net Artificial	2,156		
NET RECHARGE (Supply - Demand)	**30,285**	**1,000**	**3029%**
TOTAL STORAGE (AF)	**2023 WY**	**2022 WY**	**Δ Storage**
Hydrologic Inventory (HI)	245,165	214,880	30,285
Nodal GW Elevations (NGE)	245,033	218,563	26,470
Average Storage: (HI + NGE)/2	245,099	216,721	28,378
Available Storage: Avg Storage - Reserve (128K AF)	117,099	88,721	28,378

Sustainable average includes original estimates for Sustainable Yield components (shown with *)

Natural Component

Artificial Component

WRE:\MONITOR\GWStorage\2023WY\2023HydroInv.xlsx

3/22/2024

TABLE 10-4
HISTORICAL GROUNDWATER STORAGE
HYDROLOGIC INVENTORY (HI) METHOD
1974-2023 WATER YEARS (in Acre-Feet, except where indicated)

	WATER YEAR (Oct - Sep)																
COMPONENTS	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**
INDICES																	
Rainfall at Livermore (in)	16.1	14.8	6.2	6.0	18.5	13.6	17.6	10.3	24.4	32.0	13.0	12.6	19.8	8.9	8.7	11.2	9.4
8 Station Rain Index (N. CA)(in)	78.6	48.8	28.3	19.0	71.6	39.1	59.6	37.6	84.8	88.5	58.1	37.8	72.1	28.6	34.9	50.1	36.0
Evap at Lake Del Valle (in)	60.9	62.7	63.5	66.0	64.2	67.7	59.7	72.1	60.5	59.7	70.2	64.9	61.1	64.0	66.9	63.6	65.9
Arroyo Valle Stream flow (AF)	30538	28307	475	177	43749	9721	45800	5817	61427	125882	25653	7282	67903	3023	1506	1988	815
Water Year Type*	W	W	C	C	W	AN	W	D	W	W	AN	D	W	C	C	C	C
SUPPLY	**18,140**	**21,437**	**11,121**	**8,683**	**24,813**	**22,213**	**23,830**	**18,821**	**29,942**	**35,412**	**15,547**	**8,784**	**20,866**	**6,670**	**8,071**	**11,170**	**10,353**
Injection Well Recharge	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Stream Recharge	**11,340**	**15,400**	**6,910**	**3,820**	**16,330**	**16,110**	**16,480**	**15,040**	**16,420**	**17,158**	**9,486**	**4,747**	**9,045**	**3,565**	**4,549**	**7,880**	**7,026**
Artificial Stream Recharge	3,509	6,750	5,695	3,190	6,442	12,266	10,211	11,918	5,952	901	0	0	0	0	1,172	4,320	4,488
Natural Stream Recharge	6,060	7,110	1,100	630	8,850	2,860	4,850	2,200	8,620	14,387	8,326	3,541	8,168	2,696	2,653	2,589	2,250
Arroyo Valle Prior Rights	1,771	1,540	115	0	1,038	984	1,419	922	1,848	1,870	1,160	1,206	877	869	724	971	288
Rainfall Recharge	**3,031**	**2,523**	**0**	**0**	**4,398**	**2,002**	**3,891**	**967**	**11,423**	**16,357**	**3,110**	**1,249**	**9,008**	**290**	**398**	**283**	**141**
Pipe Leakage	**31**	**37**	**44**	**51**	**60**	**71**	**82**	**95**	**109**	**124**	**139**	**155**	**169**	**185**	**200**	**217**	**233**
Applied Water Recharge	**2,738**	**2,477**	**3,158**	**3,022**	**2,795**	**3,041**	**2,727**	**2,089**	**1,360**	**1,344**	**2,162**	**1,884**	**1,904**	**1,860**	**2,004**	**1,630**	**1,694**
Urban - Municipal	1,074	766	1,354	1,375	1,087	1,179	810	1,284	668	690	1,253	1,027	998	1,328	1,377	1,053	1,025
Urban - Groundwater	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban - Recycled Water	0	0	27	16	26	13	21	7	12	8	16	6	12	8	5	14	5
Agriculture - Municipal (SBA)	74	109	157	124	95	118	147	182	140	165	208	182	232	245	289	240	265
Agriculture/Golf - Groundwater	384	280	513	525	352	388	281	241	174	139	198	210	190	137	152	140	153
Agriculture/Golf - Recycled	0	0	64	68	75	73	73	60	54	63	62	55	61	47	63	60	64
Others	1,206	1,322	1,042	915	1,160	1,270	1,394	315	312	279	425	404	411	95	118	123	182
Subsurface Basin Inflow	**1,000**	**1,000**	**1,010**	**1,790**	**1,230**	**990**	**650**	**630**	**630**	**430**	**650**	**750**	**740**	**770**	**920**	**1,160**	**1,260**
DEMAND	**18,618**	**15,929**	**15,432**	**14,636**	**12,871**	**15,819**	**15,727**	**19,349**	**18,349**	**26,220**	**19,750**	**18,506**	**22,550**	**14,575**	**17,176**	**16,143**	**16,045**
Municipal Pumpage	**11,806**	**9,881**	**7,782**	**6,721**	**7,022**	**8,207**	**6,982**	**7,361**	**7,281**	**7,965**	**8,473**	**7,990**	**8,652**	**8,152**	**9,431**	**10,393**	**11,255**
Zone 7 (excluding DSRSD)	5,403	3,090	1,292	309	776	816	41	0	0	25	348	1,199	1,163	480	2,017	3,213	3,327
Zone 7 for DSRSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Pleasanton	2,264	2,497	1,707	3,271	2,640	3,273	2,961	3,089	3,565	3,886	3,486	3,056	3,705	3,310	3,548	3,316	3,856
Cal. Water Service	2,612	2,852	2,781	1,312	1,964	2,358	2,489	2,695	2,286	2,660	3,035	2,788	2,774	3,276	2,761	2,850	3,073
Camp Parks	769	808	980	925	796	881	819	808	713	630	647	40	0	0	0	0	0
SFWD	302	242	495	374	397	413	372	402	348	321	378	353	484	491	472	443	362
Fairgrounds	200	200	200	200	200	200	200	267	217	242	281	272	280	280	280	280	280
Domestic	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Golf Courses	156	92	227	230	149	166	0	0	52	101	198	182	146	215	253	191	257
Agricultural Pumpage	**3,744**	**2,217**	**4,596**	**4,970**	**3,191**	**3,711**	**2,628**	**2,433**	**1,295**	**1,342**	**1,556**	**1,914**	**1,911**	**1,470**	**1,476**	**1,166**	**1,478**
Mining Use	**3,068**	**3,831**	**3,054**	**2,945**	**2,658**	**3,751**	**5,586**	**9,005**	**7,613**	**13,953**	**7,481**	**7,402**	**11,387**	**4,353**	**5,869**	**4,484**	**3,312**
Subsurface Basin Overflow	**0**	**0**	**0**	**0**	**0**	**150**	**530**	**550**	**2,160**	**2,960**	**2,240**	**1,200**	**600**	**600**	**400**	**100**	**0**
NET RECHARGE (AF)	**-478**	**5,508**	**-4,311**	**-5,953**	**11,942**	**6,394**	**8,103**	**-528**	**11,593**	**9,192**	**-4,203**	**-9,722**	**-1,684**	**-7,906**	**-9,106**	**-4,973**	**-5,692**
INVENTORY STORAGE (AF)	**211,522**	**217,030**	**212,719**	**206,766**	**218,708**	**225,102**	**233,205**	**232,677**	**244,270**	**253,462**	**249,259**	**239,537**	**237,853**	**229,947**	**220,841**	**215,868**	**210,176**

STORAGE CALCULATION	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**
INVENTORY (Rounded to TAF)	212	217	213	207	219	225	233	233	244	253	249	240	238	230	221	216	210
GW ELEVATIONS (Rounded to TAF)	213	215	226	216	210	228	239	246	241	254	258	250	240	231	217	214	210
AVERAGE STORAGE (TAF)	**212**	**216**	**219**	**211**	**214**	**227**	**236**	**239**	**243**	**254**	**253**	**245**	**239**	**230**	**219**	**215**	**210**
AVAILABLE STORAGE (TAF)	**84**	**88**	**91**	**83**	**86**	**99**	**108**	**111**	**115**	**126**	**125**	**117**	**111**	**102**	**91**	**87**	**82**

Artificial Components | Natural Components

*Water Year Type (CDEC Sacramento Valley)
W = Wet; AN = Above Normal;
BN = Below Normal; D = Dry; C = Critical

TABLE 10-4
HISTORICAL GROUNDWATER STORAGE
HYDROLOGIC INVENTORY (HI) METHOD
1974-2023 WATER YEARS (in Acre-Feet, except where indicated)

	WATER YEAR (Oct - Sep)														
COMPONENTS	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
INDICES															
Rainfall at Livermore (in)	11.3	11.6	21.3	11.8	21.3	20.0	15.1	25.3	13.1	14.1	11.0	11.2	17.0	13.1	19.3
8 Station Rain Index (N. CA)(in)	32.2	36.0	65.3	31.8	85.4	61.3	68.8	82.4	54.8	56.7	33.0	46.3	59.7	47.3	57.4
Evap at Lake Del Valle (in)	64.7	68.2	64.2	65.5	58.3	71.6	69.5	57.2	61.0	68.3	68.5	73.2	69.9	72.1	63.6
Arroyo Valle Stream flow (AF)	9909	11692	52831	3424	67142	51058	54115	87819	15169	18949	8156	7848	19648	11410	26930
Water Year Type*	C	C	W	C	W	W	W	W	AN	AN	D	D	BN	D	W
SUPPLY	**12,715**	**10,610**	**28,529**	**16,095**	**29,095**	**22,556**	**24,184**	**27,853**	**20,780**	**23,211**	**15,691**	**24,052**	**29,840**	**19,778**	**31,021**
Injection Well Recharge	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**652**	**1,524**	**1,146**	**1**	**0**	**0**	**0**	**0**
Stream Recharge	**8,347**	**5,247**	**14,714**	**11,838**	**13,058**	**11,109**	**12,284**	**13,603**	**10,813**	**12,842**	**8,601**	**16,195**	**21,483**	**12,885**	**21,025**
Artificial Stream Recharge	3,261	914	5,621	7,883	4,672	2,968	5,314	2,343	5,174	8,019	3,428	10,588	11,409	8,084	11,143
Natural Stream Recharge	4,418	3,997	8,247	3,080	7,259	7,743	6,607	10,533	5,091	4,178	4,512	4,476	8,462	3,458	9,589
Arroyo Valle Prior Rights	668	337	846	876	1,127	398	362	727	548	644	660	1,131	1,612	1,343	293
Rainfall Recharge	**1,838**	**1,760**	**10,761**	**1,242**	**13,243**	**8,176**	**8,634**	**10,692**	**5,540**	**5,924**	**3,644**	**4,239**	**4,899**	**3,192**	**6,378**
Pipe Leakage	**249**	**267**	**285**	**304**	**324**	**344**	**365**	**387**	**410**	**434**	**461**	**490**	**518**	**548**	**579**
Applied Water Recharge	**602**	**1,766**	**1,440**	**1,621**	**1,480**	**2,007**	**2,221**	**1,709**	**1,743**	**1,960**	**1,985**	**2,129**	**1,940**	**2,153**	**2,039**
Urban - Municipal	222	1,288	1,108	1,252	1,060	1,467	1,632	1,472	1,549	1,743	1,770	1,888	1,749	1,926	1,834
Urban - Groundwater	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban - Recycled Water	2	0	11	14	13	18	21	15	12	21	19	30	10	14	15
Agriculture - Municipal (SBA)	242	279	177	192	257	347	401	104	57	64	59	67	66	64	63
Agriculture/Golf - Groundwater	109	133	96	100	92	100	109	68	60	67	67	73	68	73	70
Agriculture/Golf - Recycled	26	66	48	63	58	75	58	50	65	66	69	72	47	75	58
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsurface Basin Inflow	**1,680**	**1,570**	**1,330**	**1,090**	**990**	**920**	**680**	**810**	**750**	**906**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**
DEMAND	**21,104**	**17,237**	**13,555**	**15,503**	**16,064**	**20,683**	**25,574**	**25,342**	**25,691**	**26,885**	**27,357**	**23,991**	**21,531**	**24,338**	**17,828**
Municipal Pumpage	**17,355**	**13,331**	**9,132**	**6,499**	**4,594**	**6,324**	**8,824**	**10,264**	**11,832**	**15,520**	**17,806**	**19,307**	**17,123**	**19,635**	**14,686**
Zone 7 (excluding DSRSD)	8,119	5,136	2,215	213	368	2,388	1,565	1,682	4,912	6,140	9,864	11,047	7,734	11,175	6,213
Zone 7 for DSRSD	0	0	0	0	0	0	0	0	0	0	0	0	645	645	645
City of Pleasanton	4,164	3,368	3,252	2,578	1,262	1,333	3,208	3,935	2,563	4,558	3,112	3,579	3,674	3,688	3,604
Cal. Water Service	3,966	3,744	2,570	2,626	2,053	1,551	2,947	3,595	3,271	3,567	3,707	3,458	3,979	2,911	3,166
Camp Parks	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
SFWD	408	410	414	396	370	411	477	460	380	532	472	448	423	481	436
Fairgrounds	346	336	282	325	285	343	342	230	333	369	318	423	327	365	284
Domestic	100	113	113	116	116	117	117	113	116	109	109	134	134	167	131
Golf Courses	252	222	286	245	139	182	169	249	256	245	223	218	208	203	207
Agricultural Pumpage	**382**	**355**	**213**	**218**	**150**	**212**	**266**	**73**	**81**	**231**	**227**	**119**	**93**	**92**	**88**
Mining Use	**3,367**	**3,551**	**4,210**	**8,786**	**11,120**	**13,381**	**15,724**	**14,255**	**13,416**	**11,010**	**9,324**	**4,564**	**4,314**	**4,610**	**3,055**
Subsurface Basin Overflow	**0**	**0**	**0**	**0**	**200**	**766**	**760**	**750**	**362**	**125**	**0**	**0**	**0**	**0**	**0**
NET RECHARGE (AF)	**-8,389**	**-6,628**	**14,974**	**592**	**13,031**	**1,873**	**-1,390**	**2,511**	**-4,911**	**-3,674**	**-11,666**	**62**	**8,309**	**-4,560**	**13,193**
INVENTORY STORAGE (AF)	**201,787**	**195,159**	**210,133**	**210,725**	**223,756**	**225,629**	**224,239**	**226,750**	**221,839**	**218,165**	**206,499**	**206,561**	**214,870**	**210,310**	**223,503**

STORAGE CALCULATION	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
INVENTORY (Rounded to TAF)	202	195	210	211	224	226	224	227	222	218	206	207	215	210	224
GW ELEVATIONS (Rounded to TAF)	195	184	211	216	226	224	223	226	223	222	204	212	221	214	237
AVERAGE STORAGE (TAF)	**198**	**190**	**211**	**213**	**225**	**225**	**223**	**226**	**222**	**220**	**205**	**210**	**218**	**212**	**230**
AVAILABLE STORAGE (TAF)	**70**	**62**	**83**	**85**	**97**	**97**	**95**	**98**	**94**	**92**	**77**	**82**	**90**	**84**	**102**

Artificial Components | Natural Components

*Water Year Type (CDEC Sacramento Valley)
W = Wet; AN = Above Normal;
BN = Below Normal; D = Dry; C = Critical

TABLE 10-4
HISTORICAL GROUNDWATER STORAGE
HYDROLOGIC INVENTORY (HI) METHOD
1974-2023 WATER YEARS (in Acre-Feet, except where indicated)

COMPONENTS	WATER YEAR (Oct - Sep) 2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
INDICES															
Rainfall at Livermore (in)	17.5	9.7	10.7	11.4	14.8	16.2	8.8	10.7	6.8	13.1	15.4	25.6	12.4	17.1	10.5
8 Station Rain Index (N. CA)(in)	80.1	37.3	34.9	46.8	53.6	72.8	41.5	46.3	31.3	37.2	57.8	94.6	40.9	70.7	31.7
Evap at Lake Del Valle (in)	68.6	68.9	72.7	71.6	64.0	64.5	73.2	73.9	78.3	73.6	72.6	69.3	73.4	72.8	76.4
Arroyo Valle Stream flow (AF)	28325	2027	18059	11231	12914	28634	1557	7801	272	2217	19436	89173	2783	36944	2701
Water Year Type*	W	C	C	BN	AN	W	D	C	C	C	D	W	BN	W	D
SUPPLY	**23,960**	**14,998**	**16,258**	**18,659**	**25,382**	**27,315**	**18,442**	**20,158**	**10,452**	**18,753**	**29,018**	**38,181**	**17,943**	**23,096**	**14,021**
Injection Well Recharge	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Stream Recharge	**13,418**	**9,154**	**8,448**	**11,249**	**17,144**	**17,595**	**12,734**	**13,457**	**5,820**	**11,469**	**18,083**	**20,495**	**9,560**	**10,605**	**5,972**
Artificial Stream Recharge	4,583	4,811	2,229	3,984	6,773	4,555	8,778	7,887	3,826	3,766	8,910	9,615	6,773	2,943	2,461
Natural Stream Recharge	6,905	3,536	5,913	6,018	10,371	11,272	3,355	4,200	1,987	6,822	8,289	10,433	1,938	6,439	2,595
Arroyo Valle Prior Rights	1,930	807	306	1,247	0	1,768	601	1,370	7	881	884	447	849	1,223	916
Rainfall Recharge	**6,969**	**1,987**	**3,782**	**3,375**	**4,315**	**5,771**	**1,462**	**2,708**	**1,075**	**3,735**	**6,368**	**12,377**	**3,926**	**7,628**	**3,593**
Pipe Leakage	**610**	**642**	**675**	**708**	**742**	**776**	**811**	**847**	**884**	**921**	**958**	**996**	**1,034**	**1,146**	**1,209**
Applied Water Recharge	**1,962**	**2,214**	**2,353**	**2,327**	**2,181**	**2,172**	**2,435**	**2,147**	**1,674**	**1,629**	**2,609**	**3,313**	**2,423**	**2,717**	**2,247**
Urban - Municipal	1,747	1,983	2,124	2,064	1,894	1,849	2,061	1,750	1,229	1,143	1,523	2,156	1,393	1,778	1,250
Urban - Groundwater	0	0	0	0	0	0	0	0	0	0	61	82	67	80	62
Urban - Recycled Water	26	24	7	52	84	133	159	189	220	275	160	147	106	119	140
Agriculture - Municipal (SBA)	63	62	68	68	67	61	68	64	66	61	735	801	716	616	656
Agriculture/Golf - Groundwater	67	75	80	78	72	70	78	69	86	85	72	67	74	69	72
Agriculture/Golf - Recycled	59	71	74	66	64	59	70	75	73	65	59	60	66	57	67
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subsurface Basin Inflow	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**
DEMAND	**15,169**	**18,636**	**19,269**	**23,656**	**21,091**	**20,421**	**28,880**	**25,700**	**22,604**	**12,717**	**13,457**	**14,182**	**17,456**	**19,703**	**22,055**
Municipal Pumpage	**11,697**	**12,681**	**13,516**	**18,022**	**16,064**	**13,430**	**20,463**	**16,823**	**16,662**	**8,284**	**9,176**	**10,714**	**11,966**	**14,635**	**16,349**
Zone 7 (excluding DSRSD)	3,157	4,146	6,210	9,439	8,274	5,618	11,461	8,909	8,137	1,920	1,357	3,243	4,215	8,021	11,101
Zone 7 for DSRSD	645	645	645	645	645	646	644	646	645	645	645	645	645	645	645
City of Pleasanton	3,587	3,638	2,387	3,660	3,280	3,435	3,900	3,301	3,740	2,775	3,752	4,222	3,913	3,785	2,701
Cal. Water Service	3,106	2,971	3,143	3,123	2,844	2,673	3,333	2,770	3,085	2,012	2,575	1,878	2,389	1,296	904
Camp Parks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SFWD	467	494	492	446	417	442	482	482	398	309	286	214	253	286	322
Fairgrounds	441	443	289	335	284	301	318	350	286	268	231	208	196	270	321
Domestic	93	96	109	123	112	107	90	105	115	112	110	107	115	116	108
Golf Courses	199	249	241	250	208	208	236	260	257	243	220	198	240	216	247
Agricultural Pumpage	**88**	**87**	**96**	**95**	**94**	**85**	**95**	**486**	**640**	**590**	**684**	**655**	**691**	**674**	**720**
Mining Use	**3,385**	**4,947**	**4,452**	**5,346**	**4,934**	**6,906**	**8,322**	**8,391**	**5,302**	**3,843**	**3,597**	**2,813**	**4,236**	**3,585**	**4,840**
Subsurface Basin Overflow	**0**	**921**	**1,205**	**194**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**564**	**809**	**146**
NET RECHARGE (AF)	**8,790**	**-3,639**	**-3,011**	**-4,997**	**4,290**	**6,893**	**-10,438**	**-5,542**	**-12,153**	**6,037**	**15,561**	**23,999**	**487**	**3,394**	**-8,034**
INVENTORY STORAGE (AF)	**232,293**	**228,654**	**225,643**	**220,646**	**224,936**	**231,829**	**221,391**	**215,849**	**203,696**	**209,733**	**225,294**	**249,293**	**249,780**	**253,174**	**245,140**

STORAGE CALCULATION	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
INVENTORY (Rounded to TAF)	232	229	226	221	225	232	221	216	204	210	225	249	250	253	245
GW ELEVATIONS (Rounded to TAF)	239	232	235	233	234	235	228	221	209	215	226	245	245	248	238
AVERAGE STORAGE (TAF)	**236**	**231**	**230**	**227**	**230**	**234**	**225**	**219**	**207**	**212**	**226**	**247**	**248**	**251**	**241**
AVAILABLE STORAGE (TAF)	**108**	**103**	**102**	**99**	**102**	**106**	**97**	**91**	**79**	**84**	**98**	**119**	**120**	**123**	**113**

Artificial Components | Natural Components

*Water Year Type (CDEC Sacramento Valley)
W = Wet; AN = Above Normal;
BN = Below Normal; D = Dry; C = Critical

TABLE 10-4
HISTORICAL GROUNDWATER STORAGE
HYDROLOGIC INVENTORY (HI) METHOD
1974-2023 WATER YEARS (in Acre-Feet, except where indicated)

COMPONENTS	WATER YEAR (Oct - Sep) 2021	2022	2023	1974 - 2023 AVG	Sust Avg	TOTAL
INDICES						
Rainfall at Livermore (in)	5.1	11.0	24.4	14		
8 Station Rain Index (N. CA)(in)	24.0	43.0	66.6	52		
Evap at Lake Del Valle (in)	80.2	74.9	66.9	68		
Arroyo Valle Stream flow (AF)	2423	11866	106027	25,811		**1,290,552**
Water Year Type*	C	C	W			
SUPPLY	**9,803**	**14,599**	**42,872**	**20,316**	**19,800**	**1,015,793**
Injection Well Recharge	**0**	**0**	**0**	**66**	**0**	**3,322**
Stream Recharge	**2,703**	**6,172**	**24,898**	**11,886**	**11,900**	**594,325**
Artificial Stream Recharge	277	1,301	6,734	5,157	5,300	257,840
Natural Stream Recharge	1,887	4,581	18,121	5,864	5,700	293,203
Arroyo Valle Prior Rights	539	290	43	866	900	43,281
Rainfall Recharge	**2,818**	**3,884**	**12,623**	**4,753**	**4,300**	**237,628**
Pipe Leakage	**1,248**	**1,287**	**1,326**	**496**	**1,000**	**24,783**
Applied Water Recharge	**2,035**	**2,256**	**3,024**	**2,128**	**1,600**	**106,399**
Urban - Municipal	1,016	1,278	1,891	1,409	1,280	70,436
Urban - Groundwater	54	63	225	14	26	695
Urban - Recycled Water	148	128	107	53	0	2,636
Agriculture - Municipal (SBA)	670	669	675	232	92	11,594
Agriculture/Golf - Groundwater	79	75	91	142	158	7,100
Agriculture/Golf - Recycled	68	42	36	59	44	2,966
Others	0	0	0	219	0	10,973
Subsurface Basin Inflow	**1,000**	**1,000**	**1,000**	**987**	**1,000**	**49,336**
DEMAND	**28,668**	**25,995**	**12,587**	**19,653**	**18,800**	**982,629**
Municipal Pumpage	**22,806**	**20,746**	**9,174**	**12,016**	**13,700**	**600,796**
Zone 7 (excluding DSRSD)	15,795	14,641	4,578	4,650	5,300	232,493
Zone 7 for DSRSD	645	645	645	271	645	13,546
City of Pleasanton	3,802	2,587	270	3,201	3,500	160,045
Cal. Water Service	1,475	1,756	2,653	2,713	3,070	135,664
Camp Parks	0	0	0	176	0	8,819
SFWD	360	406	449	403	450	20,171
Fairgrounds	353	357	290	291	310	14,527
Domestic	107	107	69	108	200	5,406
Golf Courses	269	246	220	203	225	10,125
Agricultural Pumpage	**791**	**752**	**813**	**1,041**	**400**	**52,035**
Mining Use	**5,072**	**4,497**	**2,600**	**6,230**	**4,600**	**311,506**
Subsurface Basin Overflow	**0**	**0**	**0**	**366**	**100**	**18,292**
NET RECHARGE (AF)	**-18,865**	**-11,395**	**30,284**	**663**	**1,000**	**33,163**
INVENTORY STORAGE (AF)	**226,275**	**214,880**	**245,164**	**224,051**	**13,400**	

STORAGE CALCULATION	2021	2022	2023
INVENTORY (Rounded to TAF)	226	215	245
GW ELEVATIONS (Rounded to TAF)	220	219	245
AVERAGE STORAGE (TAF)	**223**	**217**	**245**
AVAILABLE STORAGE (TAF)	**95**	**89**	**117**

Artificial Components Natural Components

*Water Year Type (CDEC Sacramento Valley)
W = Wet; AN = Above Normal;
BN = Below Normal; D = Dry; C = Critical

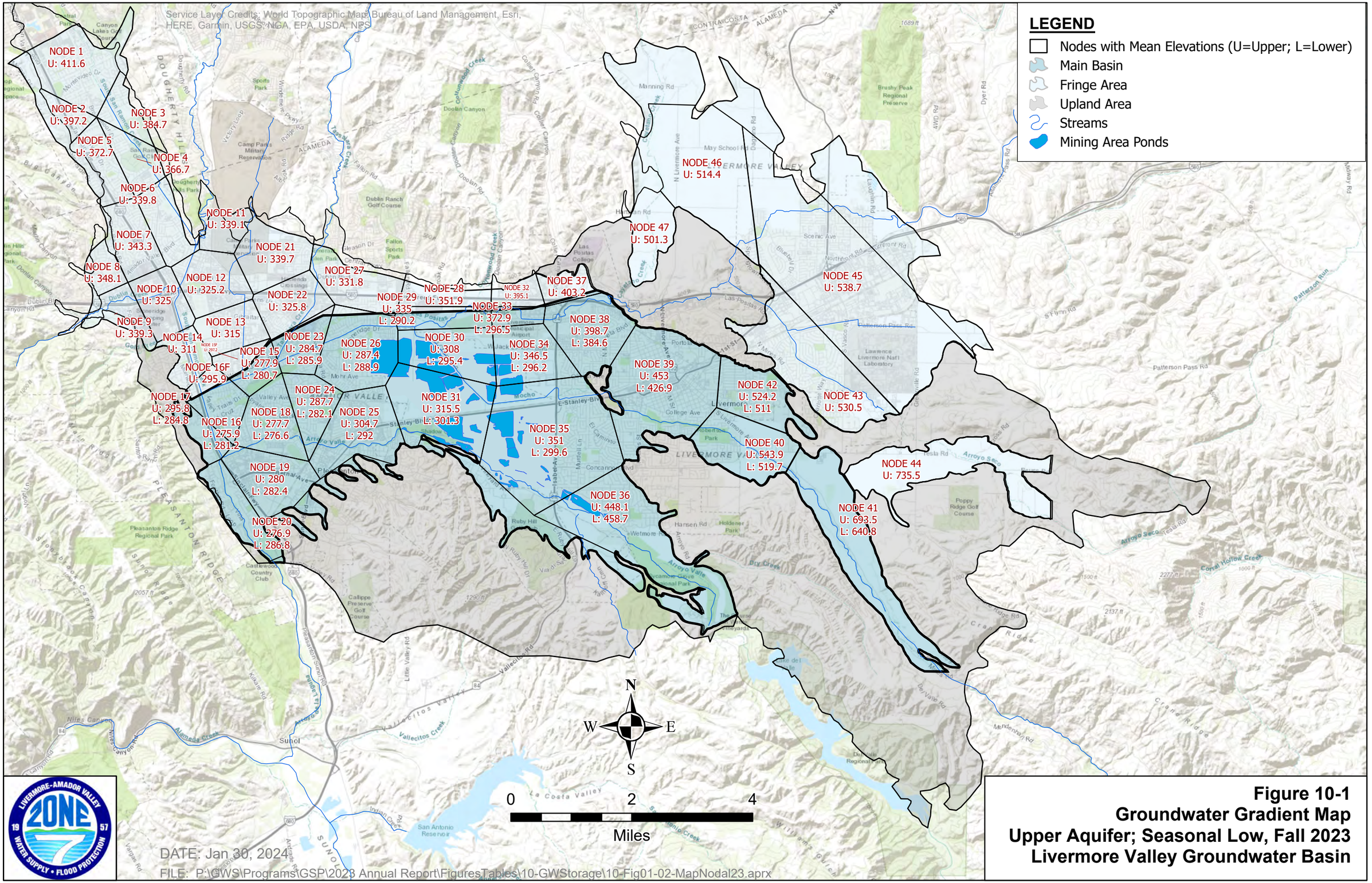


Figure 10-1
Groundwater Gradient Map
Upper Aquifer; Seasonal Low, Fall 2023
Livermore Valley Groundwater Basin

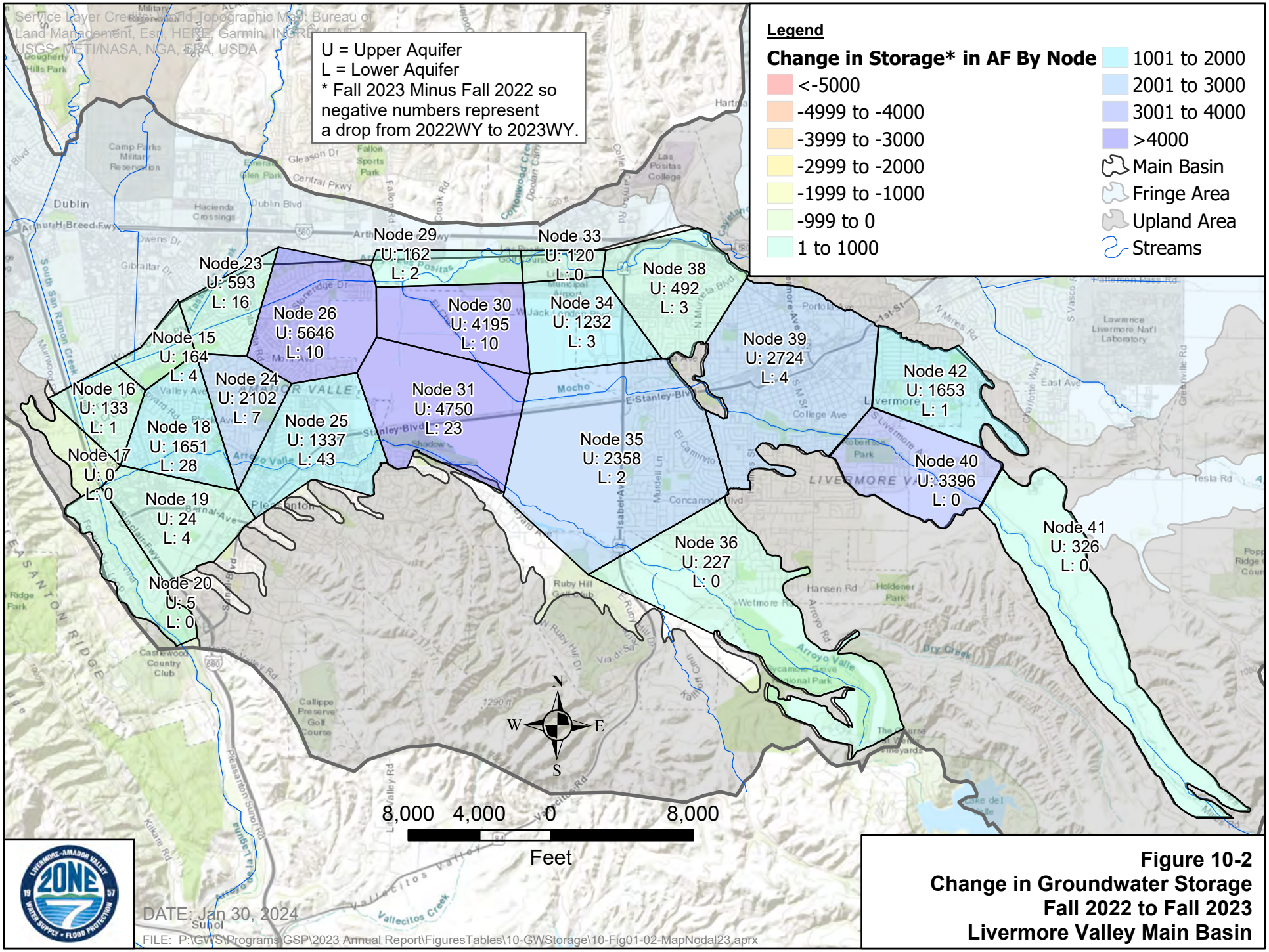
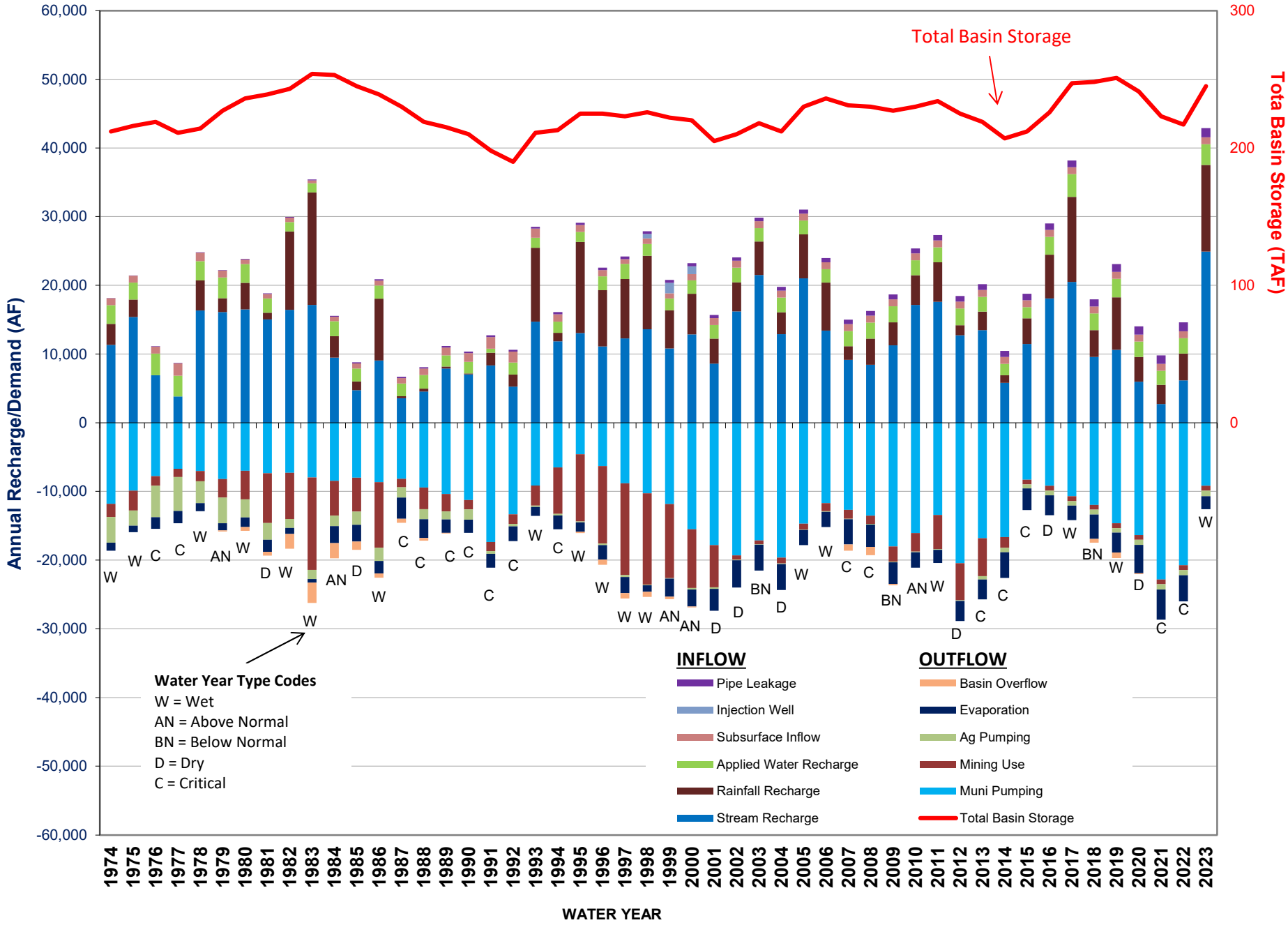


Figure 10-2
Change in Groundwater Storage
Fall 2022 to Fall 2023
Livermore Valley Main Basin

FIGURE 10-3
GRAPH OF GROUNDWATER STORAGE 1974 - 2023 WATER YEARS
LIVERMORE VALLEY GROUNDWATER BASIN



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3/6/2024

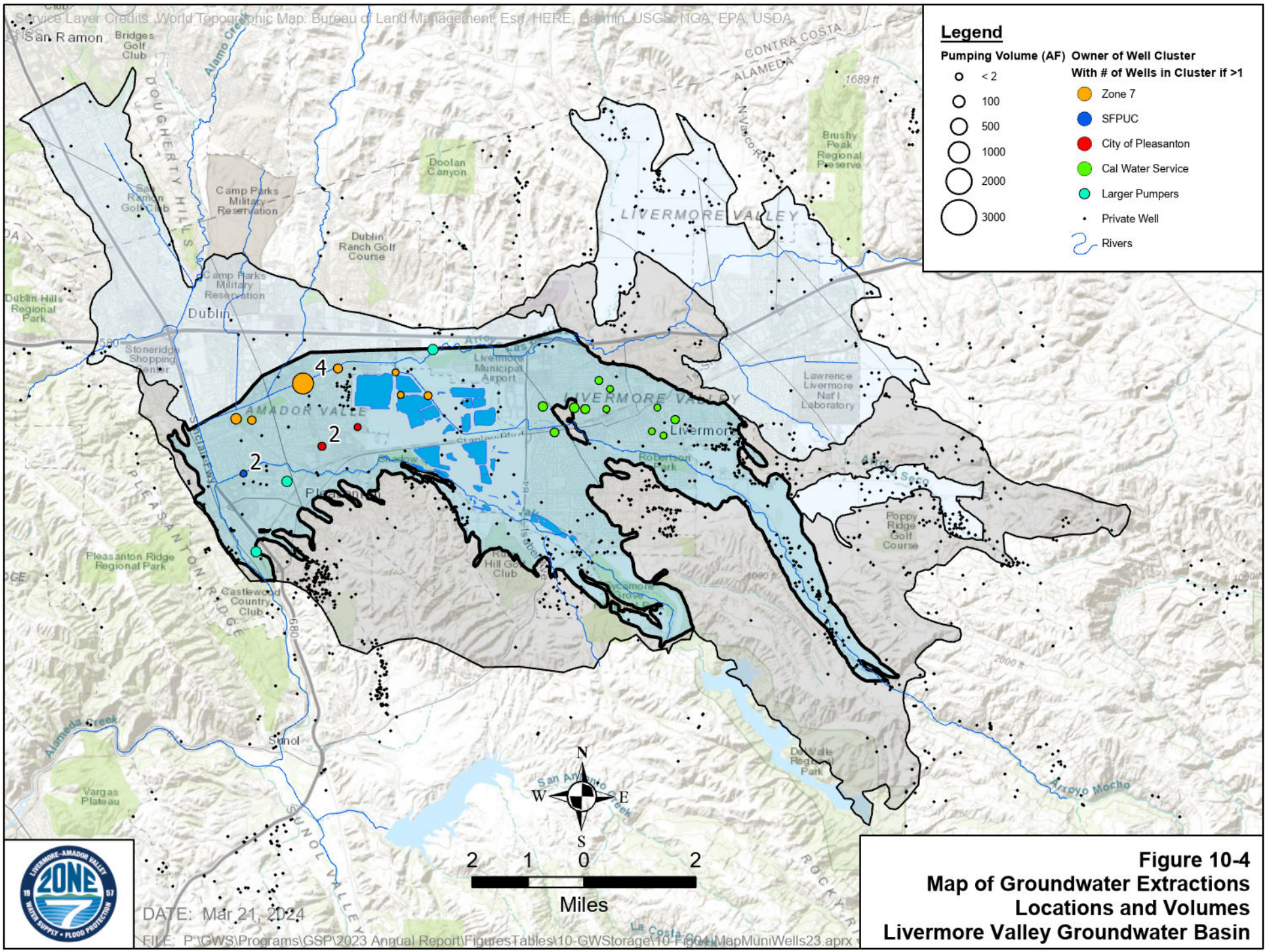
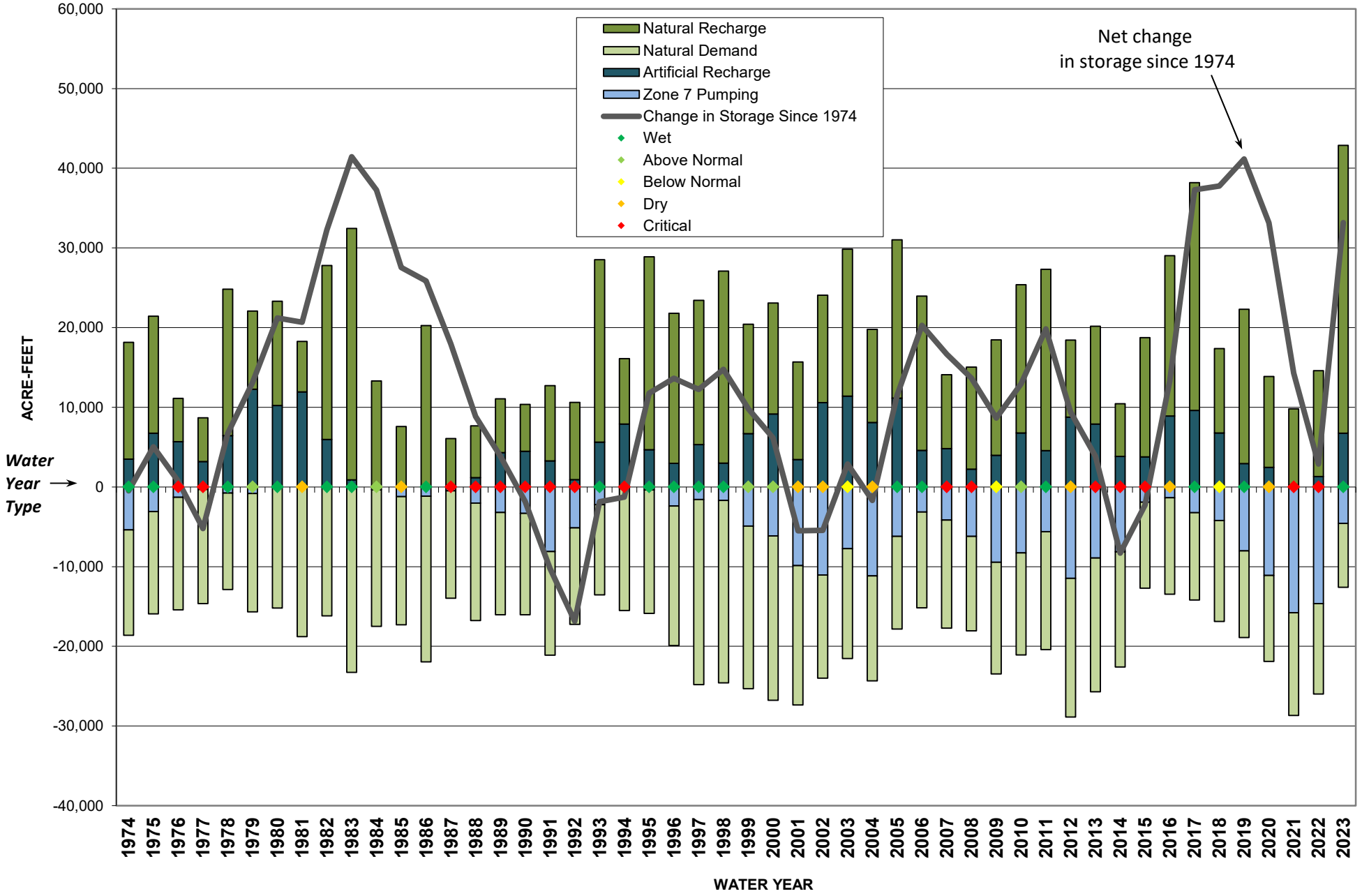


Figure 10-4
Map of Groundwater Extractions Locations and Volumes
Livermore Valley Groundwater Basin

FIGURE 10-5
CUMULATIVE CHANGE IN NATURAL AND ARTIFICIAL RECHARGE AND DEMAND 1974 - 2023 WATER YEARS
LIVERMORE VALLEY GROUNDWATER BASIN



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3/6/2024

11 Groundwater Supply Sustainability

11.1 Import of Surface Water

Imported surface water supplies secured by Zone 7 for the 2023 CY are shown in ***Table 11-A*** below***, Figure 11-1***, and are summarized below include:

- The State Water Project (SWP) Table A allocation for the 2023 CY was 100% of Zone 7's maximum allocation (80,619 AF). 38,400 AF of this was imported via the South Bay Aqueduct [SBA] for the 2023 CY, 10,000 AF was transferred, and the remaining 32,219 AF was carried over the 2024 CY. Zone 7 also imported 1,600 AF of water from its Article 56 allocation (previous year's carryover).

- Zone 7 imported 2,400 AF of water that was banked at San Luis Reservoir (Article 21) via the SBA.

- Zone 7 did not import any water from the Kern Groundwater Basin (Semitropic and Cawelo Water Districts) but did add an additional 9,000 AF of water to the basin. Zone 7 had a total of 95,600 AF stored in the Kern Groundwater Basin at the end of the CY.

- Zone 7 did not import from the Lover River Yuba Accord (Yuba) or from the Mojave Water Agency.

- Total imported surface water supplies in the 2023 CY (42,400 AF) made up 67% of regional water demands.

Table 11-A: Imported and Local Surface Water Sources (AF)*

Source	Available at end of 2022	Added in 2023	Imported in 2023	Transferred in 2023	Carryover to 2024
State Water Project	**10,200**	**83,019**	**42,400**	**10,000**	**32,219**
Table A (100% Allocation)	0	80,619	38,400	10,000	32,219
Article 56	10,200	0	1,600	0	0**
Article 21	0	2,400	2,400	0	0
Kern Groundwater Basin	**86,600**	**9,000**	**0**	**0**	**95,600**
Semitropic	65,900	9,000	0	0	74,900
Cawelo	20,700	0	0	0	20,700
Other Imported	**0**	**0**	**0**	**0**	**0**
Yuba/Dry Year Transfer	0	0	0	0	0
Mojave Water Agency	0	0	0	0	0
TOTAL IMPORTED	**96,800**	**92,019**	**42,400**	**10,000**	**127,819**
TOTAL LOCAL: Lake Del Valle (AV Water Rights)	**2,300**	**6,900**	**4,200**	**0**	**5,000**
TOTAL IMPORTED & LOCAL	**99,100**	**98,919**	**46,600**	**10,000**	**132,819**

* = All values accounted for and reported on a calendar year (CY) basis

** = excess Article 56 water cannot be carried over

AV = acre-feet

AV = Arroyo Valle

11.2 Basin-wide Water Production and Use

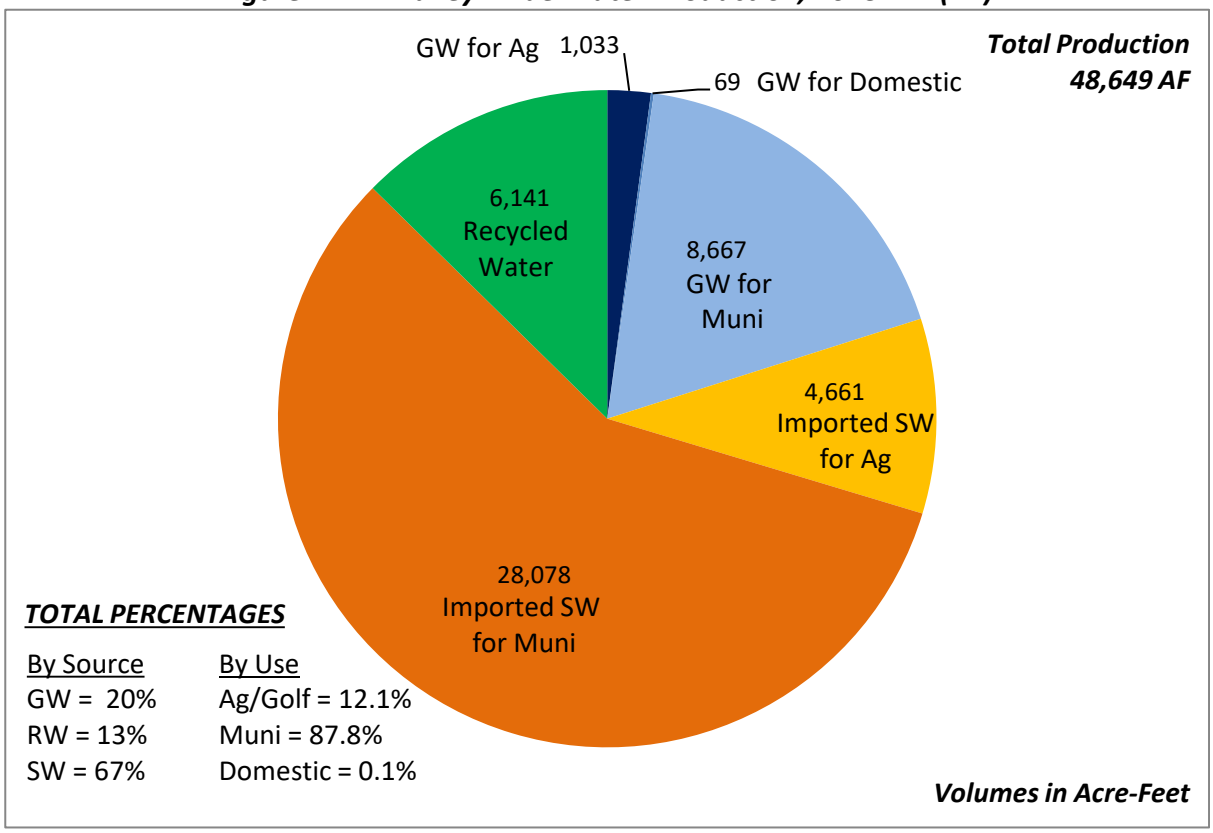
The volume of water produced and used in the Basin is shown in ***Figure 11-A*** (by WY) and ***Figure 11-1*** (by WY except where noted). ***Figure 11-2*** shows the historical percentage of groundwater production relative to total Basin-wide production from the 1974 to 2023 WYs. The following activities occurred during the 2023 WY:

- Total groundwater production in the Basin (including by Zone 7, retailers, agriculture, domestic, etc.) supplied about 20% of the total Basin-wide water demand in the 2023 WY.

- Of the 5,223 AF of groundwater pumped by Zone 7 (including pumped by Zone 7 for DSRSD) during the 2023 WY, about 5,032 AF was delivered to Zone 7's retailers; the remainder of which is accounted for in pumping losses and exported brine from the groundwater demineralization process.

- Zone 7's total produced groundwater was about 15% of the total treated water production that Zone 7 delivered to its retailers during the 2023 WY (on average, groundwater makes up about 16% of Zone 7's annual treated water deliveries).

Figure 11-A: Valley-Wide Water Production, 2023 WY (AF)



Ag = Agriculture; Muni = Municipal; GW= Groundwater; RW = Recycled Water; SW = Surface Water

11.3 Basin Management Actions in 2023 WY

Zone 7 implements conjunctive use practices within the Basin to the greatest extent possible given current hydrologic conditions and imported water supply availability. During the 2023 WY, Zone 7 released 7,526 AF from the SBA into the Arroyos Valle and Mocho for artificial recharge and water rights, of which 6,734 AF recharged.

As described in ***Section 5.2.2*** of last year's Annual Report (*Zone 7, 2023a*), the water elevation in the RMS-WL for the Amador East Subarea Lower Aquifer (3S1E12K003) dropped below the MO in June 2022 and had a seasonal low at 25.3 ft below the MO on September 2, 2022 (but was still 13.6 ft above the MT). In response, Zone 7 performed several management actions including:

- Increased the measurement interval in the 3S1E12K003 RMS-WL well from monthly to weekly from June to December 2022;
- Installed InSitu VuLink devices in seven wells (including five RMS-WL wells) with water level readings occurring every 15 minutes;
- Reduced pumping in Zone 7's nearby Chain of Lakes and Stoneridge wells; and

- Communicated with Cal Water Services regarding their two municipal wells (CWS 20 and CWS 24) in the Basin to the east of the RMS-WL.

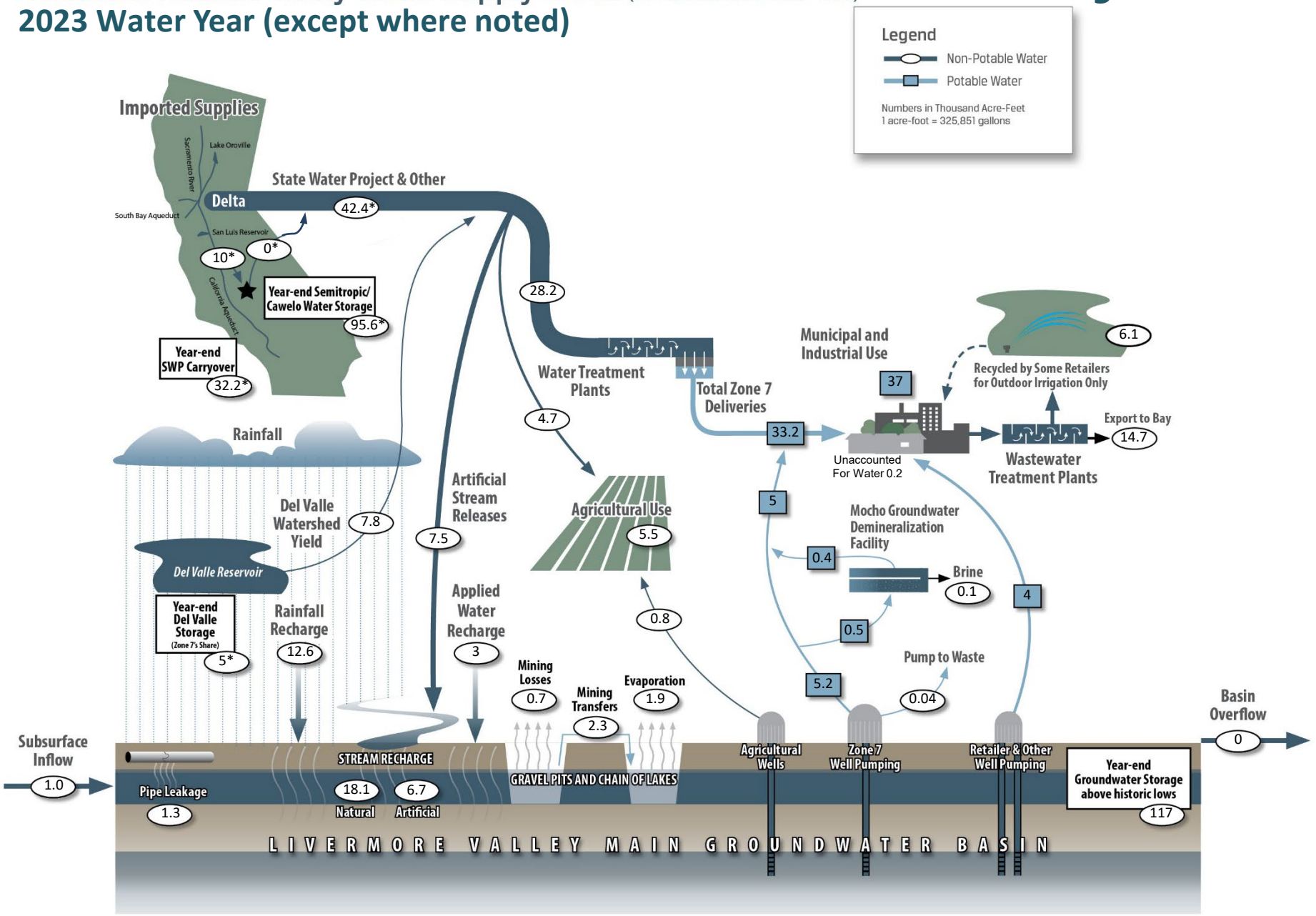
As a result of these management actions (and assisted by rainfall later in the beginning of the 2023 WY), the water level in this RMS-WL began increasing after September 2, 2022, exceeded the MO (219.9 ft msl) on December 13, 2022. Water levels in that well continued to rise during the 2023 WY (for a total of about 100 feet from the seasonal low) and ended at 75 feet above the MO (see **Table 5-4**)

11.4 Attached Tables and Figures

***Figure 11-1**: Livermore-Amador Valley Water Supply and Use, 2023 WY*
***Figure 11-2**: Valley Water Production from Imported Water and Groundwater, 1974 to 2023 WYs*

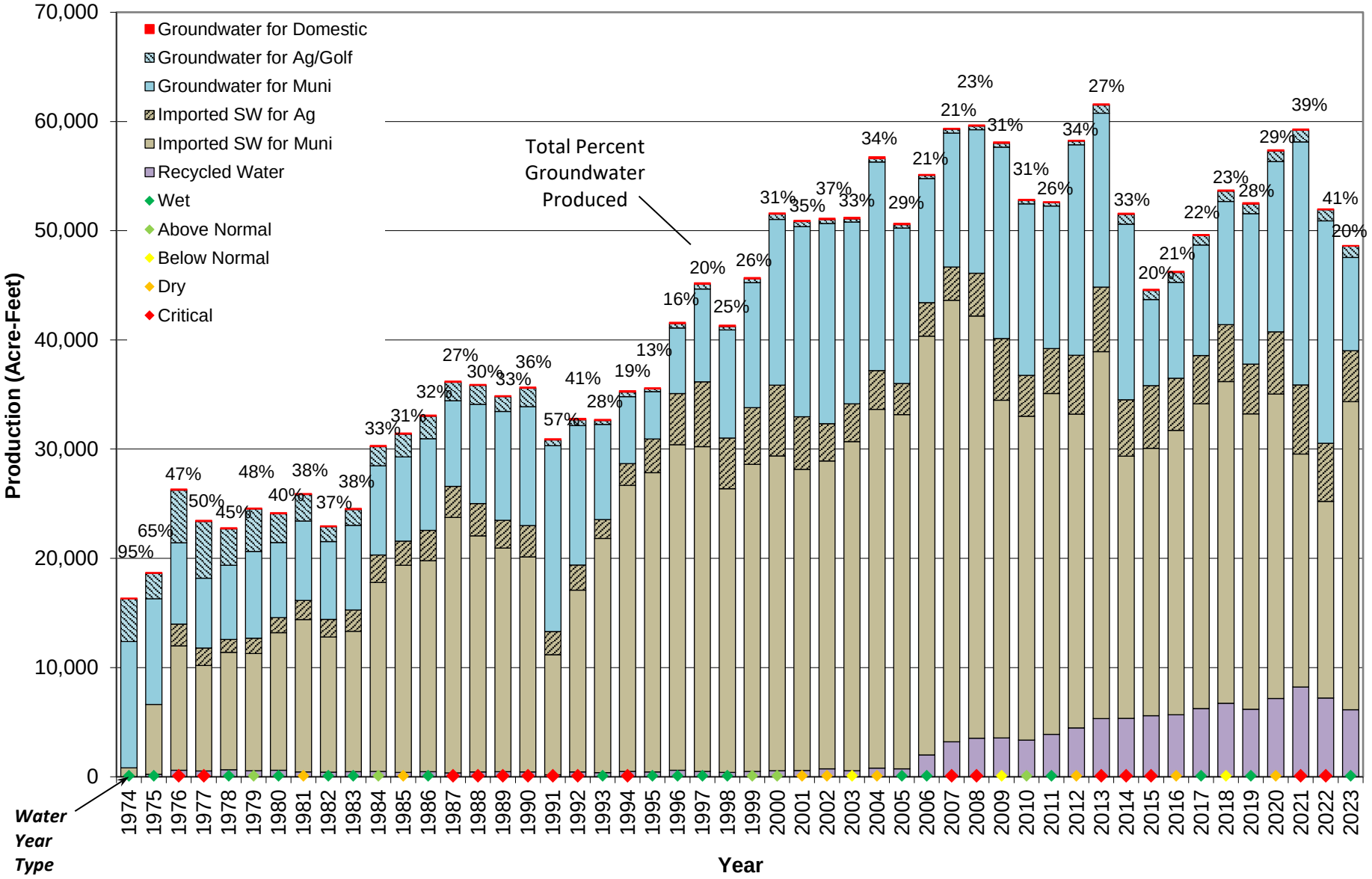
Livermore-Amador Valley Water Supply & Use (in Thousands of Acre-Feet)
2023 Water Year (except where noted)

Figure 11-1



* 2023 Calendar Year

FIGURE 11-2
VALLEY WATER PRODUCTION FROM IMPORTED WATER AND GROUNDWATER
1974 TO 2023 WATER YEARS



2/7/2024
P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\11-GWSupplyManagement\11-Fig A-PieChartTtlUse23.xlsx

12 Water Quality Sustainability

12.1 Well Ordinance Program

In addition to being a GSA, Zone 7 is a well permitting agency for the eastern part of Alameda County. Zone 7 administers the associated well permitting program within its service area including the three incorporated cities (Dublin, Livermore, and Pleasanton) pursuant to a Memorandum of Understanding (MOU) with Alameda County and ordinances adopted by the three cities. As a result, any planned new well construction, soil-boring construction, or well destruction must be permitted by Zone 7 before the work is started. Additionally, all unused or abandoned wells must be properly destroyed, or, if there are plans to use the well in the future, a signed statement of future intent must be filed with Zone 7.

During the 2023 WY, Zone 7 issued 125 drilling permits, 11 less than in the 2022 WY. ***Table 12-A*** details the breakdown of the types of permits issued during the 2023 WY and their quantities.

Table 12-A: Well Ordinance Permits Issued in the 2023 WY

Permit Type	Quantity
Geotechnical Investigations	69
Well Destructions	13
Contamination Investigations/Remediation	18
Water Supply Wells	8
Groundwater Monitoring	11
Cathodic Protection Wells	6
Total	***125***

- Eight (8) water supply well permits were issued in the 2023 WY. The pre-drought average was 25 per year.

- About 61% of the permitted well work was physically inspected by Zone 7 permit compliance staff; the remaining 39% could proceed with self-monitoring and reporting efforts when a licensed professional was supervising the project.

12.2 Toxic Site Surveillance Program

12.2.1 Program Description

Through the Toxic Site Surveillance (TSS) Program, Zone 7 documents and tracks polluted sites that pose a potential threat to drinking water. In general, the TSS Program monitors two types of contamination threatening groundwater: petroleum-based fuel products and industrial chemical contamination (e.g., chlorinated solvents).

The locations of all the toxic sites, and their proximity to the Basin's municipal water wells, are shown on the accompanying individual area maps (***Figure 12-1*** through ***Figure 12-3***, Livermore, Pleasanton/Sunol, and Dublin, respectively). ***Table 12-1*** contains a list of the active sites including the case status, its priority, and agency responsible for providing oversight for the case. In addition, copies of plans, reports, directive letters, and background data on the cases can be found at the State Water Resources Control Board's (SWRCB) GeoTracker website: http://geotracker.waterboards.ca.gov/. The GeoTracker number for each case (if one is assigned) is also included in ***Table 12-1***.

12.2.2 Program Changes

There were no changes to the TSS Program during the 2023 WY.

12.2.3 Results for the Water Year

12.2.3.1 Cases Closed

One toxic site was granted "Case Closed" status in the 2023 WY. This site is located in the Sunol Basin, which is south of the Livermore Valley Groundwater Basin, but is within Zone 7's service and well-permitting area. The location is shown on ***Figure 12-4*** and is summarized below.

- **Site 317: Walgreens Spill, Sunol**. ACDEH had evaluated this CPS case for closure under LTCP and has determined that residual subsurface contamination at the site presents a low risk to human health and the environment.

12.2.3.2 Sites Pending Closure Review

"Case Closure" was requested by representatives for the two contamination sites listed below. Their locations are provided on ***Figure 12-4.*** At the end of the 2023 WY, the lead agencies were still considering the requests but may ask for additional information before making their decision. Cases approved for closure by ACDEH must be reviewed and accepted by the RWQCB before they are officially closed. Information on each pending closure request, including Zone 7's recommendations, is summarized as follows:

- **Site 37: Applied Biosystems, Pleasanton**. This site has been operating under an Operation and Maintenance Agreement (OMA) since 2003 which required biannual groundwater monitoring. DTSC determined that the OMA for the site should be terminated. The OMA is no longer warranted because groundwater cleanup goals (California drinking water MCLs) have been met, as documented in the Five-Year Remedial Action Review Report, dated April 18, 2018. Staff does not object to the closure of this case if the remaining tasks are completed to DTSC satisfaction.

- **Site 259: Chevron #30-7233/Mills Square Park, Livermore**. ACDEH has determined that this case with lead contamination appears to qualify for case closure. The closure criteria are based on two goals:

    - To remove lead-impacted soil exceeding residential human health screening levels from ground surface to 3.0 ft in depth; and

    - To remove lead-impacted soil exceeding construction worker screening levels from 3.0 ft to 10 ft in depth, relative to the redeveloped park elevation.

    This cleanup goal was proposed to accommodate the park redevelopment and allow possible future land use that could include construction of multifamily or low-income residential land use. The LUST case was evaluated for closure in conformance with the State Water Resource Control Board's LTCP for leaking underground storage tanks. ACDEH has determined that the site meets all the LTCP General Criteria and Media Specific Criteria. If a change in land use other than as a commercial service station (i.e., residential, commercial, conservative land use, or if site redevelopment is planned), ACDEH must be notified. Staff does not object to the closure.

12.2.3.3 New Cases

No new cases were added to the Zone 7 TSS Program in the 2023 WY.

12.3 Salt Management

12.3.1 Program Changes

Zone 7's long-term salt management strategy includes monitoring and increasing municipal supply pumping, increasing operation of the Mocho Groundwater Demineralization Plant (MGDP), and conducting artificial groundwater recharge with low TDS water. No changes were made involving the Salt Management Program (SMP) or SMP strategies in the 2023 WY.

As mentioned above in ***Section 10.1***, groundwater storage volumes from the 2016 WY to present were recalculated for this year's report. Therefore, the previous year's salt totals presented in this year's report may be slightly different than those presented in last year's report.

12.3.2 Results for the Water Year

Salt balance calculations for the 2023 WY are tabulated in ***Table 12-B*** (summary) below and attached ***Table 12-2*** (detailed). ***Table 12-3*** summarizes the salt balance calculations from 1974 to 2023 WY. ***Figure 12-5*** graphs the salt inflows, outflows, and resulting Basin-wide salt concentrations from 1974 to 2023 WY.

Table 12-B: Salt Loading Summary, 2023 WY

Category	Volume (AF)	Salt Mass (Tons)	TDS Concentration (mg/L)	Change in Concentration from 2022 WY (mg/L)
Inflow	42,648	22,108	382	-126
Outflow	12,587	7,250	424	-45
Net (In – Out)	30,060	14,858		
Basin Total	**245,164**	**241,880**	**726**	**-51**

The following is a summary of the salt management actions conducted by Zone 7 during the 2023 WY:

- In the 2023 WY, the total salt mass added to the Main Basin by all the inflow (Supply) components was approximately 22,108 tons, whereas the total mass of salts removed from the Basin by all the outflow (Demand) components is estimated at 7,250 tons; a net increase of 14,858 tons.
- The salt load increase was accompanied by groundwater storage increase of 30,060 AF during the 2023 WY, which caused the end-of-water-year theoretical average TDS concentration for the Main Basin to decrease by 51 mg/L from the previous WY average.

After being operated sparingly throughout 2002 to conserve water during the drought, the MGDP resumed normal operation in 2023.

- During the 2023 WY, the MGDP produced 155 AF of brine (compared to 2 AF in the 2022 WY) that resulted in the export of about 510 tons of salt from the Main Basin through the Livermore-Amador Valley Water Management Agency (LAVWMA) pipeline (compared to 7 tons in the 2020 WY).
- Since its inception, the MGDP has exported over 19,596 tons of salt from the Livermore Valley (see ***Table 12-C*** below).

Table 12-C: Salts Removed by Zone 7's Mocho Groundwater Demineralization Plant

Water Year	Brine Volume Exported from Valley (AF)	Average Brine TDS Concentration (mg/L)	Salt Mass Exported (Tons)	Salt Removed per AF of Brine Export (Tons/AF)
2009	192	3,059	798	4.16
2010	675	3,010	2,760	4.09
2011	429	3,445	2,008	4.68
2012	935	3,198	4,062	4.34
2013	518	3,522	2,478	4.78
2014	214	3,607	1,049	4.9
2015	16	3,474	76	4.75
2016	51	2,662	184	3.61
2017	244	2,863	949	3.89
2018	268	3,209	1,168	4.36
2019	480	2,867	1,869	3.89
2020	344	2,633	1,230	3.58
2021	143	2,307	448	3.13
2022	2	2,609	7	3.5
2023	155	2,422	510	3.29
TOTAL	**4,666**	**3,092**	**19,596**	**4.2**

AF = acre-feet TDS = total dissolved solids

mg/L = milligrams per liter

12.4 Nutrient Management

During the 2023 WY, Zone 7 continued working with Alameda County Environmental Health (ACEH) to implement Zone 7's Nutrient Management Plan (NMP, Zone 7, 2015b) measures. One of these measures is that Zone 7 regulates commercial onsite wastewater treatment systems (OWTS, a.k.a., septic systems) to manage nitrate loading in the groundwater. In the 2023 WY, Zone 7 received seven applications for nonresidential OWTS: one application was approved by Zone 7 staff, two were approved by Zone 7's Board of Directors, and Zone 7 is working with ACEH to process the remaining applications.

12.5 PFAS Management

12.5.1 Program Changes

The SMCs for per- and polyfluoroalkyl substances (PFAS) have not been established, as Maximum Contaminant Levels (MCLs) are not yet available. However, Zone 7 is complying with the State Water Board's orders concerning PFAS compounds and meeting Response Levels established by the State Water Board's Division of Drinking Water. In 2022, the Department of Drinking Water (DDW) established Reporting and Notification Limits for PFHxS of 20 nanograms per Liter (ng/L) and 3 ng/L, respectively. In 2023, The Environmental Protection Agency (EPA) released proposed MCL of 4 ppt for both PFOS and PFOA (see table below).

Table 12-D: PFAS Regulatory Limits (in ppt)

Limit Type	PFOS	PFOA	PFHxS	PFBS
EPA Proposed MCL	4	4	1*	1*
DDW Notification Level (NL)	6.5	5.1	3	500
DDW Response Level (RL)	40	10	20	5,000

* Hazard Index

As a result, a 4 ppt contour was added to the PFOS figures (***Figures 6-14*** to ***6-16***) to show the approximate spatial extent of PFOS under the proposed EPA MCL.

Zone 7 has developed a PFAS management strategy consisting of PFAS monitoring, blending and treating, managing water quality, and diversifying groundwater resources. Zone 7 will continue to sample for PFAS compounds, identify possible sources, and perform PFAS mobilization modeling. SMCs for PFAS will be addressed in the next Alternative GSP update once additional data have been collected and regulatory criteria established.

12.5.2 Results for the Water Year

PFAS results are discussed in **Section 6.2.6** and presented in the following figures and tables in this report:

- *Table 3-3: PFAS Water Quality Results from Mining Area Ponds, 2023 WY*
- *Table 6-7: PFAS Water Quality Results from Wells, 2023 WY*
- *Figure 6-14: PFOS Chemographs, 1975 to 2023 WYs*
- *Figure 6-15: PFOS Concentrations; Upper Aquifer, 2023 WY*

- *Figure 6-16: PFOS Concentrations; Lower Aquifer, 2023 WY*

Several municipal wells, primarily in the western portion of the groundwater basin, have been impacted by PFAS compounds over the last few years. Pleasanton's three active municipal wells have all been detected with elevated PFAS concentration. As a result, Pleasanton has ceased pumping from all three of their wells and is studying options to acquire water from Zone 7 and/or drill additional municipal wells elsewhere in the basin. At least seven of Zone 7's ten municipal wells have also been detected with elevated PFAS concentrations. To meet the latest regulatory limits, Zone 7 has implemented the following management activities:

- Ceased pumping from the Mocho 1 Well in 2020;
- Diverted pumped groundwater from the Mocho 2 and 3 Wells through the existing Mocho Groundwater Demineralization Plant (MGDP) and/or blended with low-PFAS groundwater pumped from the Mocho 4 Well;
- Ceased pumping from the COL wells in 2022 and is currently installing a PFAS treatment system that is scheduled to be operational in late 2024; and
- Installed a new ion-exchange PFAS treatment facility at the Stoneridge Well.

In 2023 Zone 7 was awarded $16M in grant funding from DWR (Proposition 68, Round 2 Sustainable Groundwater Management Implementation) for the Stoneridge Well ion-exchange PFAS Treatment Facility. The facility was completed in September 2023 and a special board meeting/ribbon cutting ceremony was held at the facility on September 13, 2023. The facility is currently operational.

12.6 Attached Tables and Figures

***Table 12-1**: Toxic Site Surveillance - Active Site Summary, 2023 WY*
***Table 12-2**: Salt Loading 2023 WY*
***Table 12-3**: Historical Salt Loading, 1974 to 2023 WYs*

***Figure 12-1**: Toxic Site Surveillance; Livermore Area Sites*
***Figure 12-2**: Toxic Site Surveillance; Pleasanton and Sunol Area Sites*
***Figure 12-3**: Toxic Site Surveillance; Dublin Area Sites*
***Figure 12-4**: Toxic Site Surveillance; Cases with Status Changes in 2023 WY*
***Figure 12-5**: Main Basin Salt Loading and TDS Concentration, 1974 to 2023 WY*

TABLE 12-1
TOXIC SITES SURVEILLANCE - ACTIVE SITES SUMMARY
2023 WATER YEAR

Z7 ID	SITE NAME	ADDRESS	CITY	GEOTRACKER ID:	PRIORITY	STATUS	LEAD AGENCY
1	Lawrence Livermore Lab	7000 East Avenue	Livermore	T0600191466	3A3	8	DTSC
5	Sandia National Labs	7011 East Avenue	Livermore	T0600191470	3A3	8	RWQCB
10	Industrial Ladder Company	115 North Mines Road	Livermore	T10000009051	2A4	1	RWQCB
11	Intel Livermore Fabrication Plant 3	250 North Mines Road	Livermore	SL18368788	2A3	8	RWQCB
21	First Street Shell	4212 First Street	Pleasanton	T10000019989	2A3	3A	ACEH
36	Salinas Reinforcing Inc.	355 South Vasco Road	Livermore	SL18266687, T1000002097	3A3	5C	RWQCB
37	Applied Biosystems	6001 (Formerly 6177) Sunol Boulevard	Pleasanton	01280050	2C	8	DTSC
115	Livermore Arcade (Miller's Outpost)	1410/1554 First Street	Livermore	SL18227625	1A2	7	RWQCB
137	Busick Gearing Properties	6341 Scarlett Court	Dublin	SL20256874	2A3	5C	RWQCB
149	Hanson Aggregates	3000 Busch Road	Pleasanton	T10000009398	2A4	8	ACEH
164	Fuller Card Lock/Bay Counties CFN	533 Exchange Court and National Drive	Livermore	T10000011486	2A2	5C	ACEH

Z7 ID	SITE NAME	ADDRESS	CITY	GEOTRACKER ID:	PRIORITY	STATUS	LEAD AGENCY
212	Vallecitos Nuclear Center	6705 Vallecitos Road	Sunol	T10000000620	3A3	8	RWQCB
232	Groth Brothers Chevrolet	59 South L Street	Livermore	SL0600147081	2A2	8	RWQCB
242	Fairground Main Well (3S/1E 20B 2)	4501 Pleasanton Avenue	Pleasanton	T10000008240,T10000007	1A1	1	
250	Sunol Tree Gas	3004 andrade Road	Sunol	T0600114064	1A1	7	RWQCB
259	CHEVRON #30-7233 /Mills Square Park/Performing Arts Theater	2259 First Street	Livermore	T10000010536	2C	8	ACEH
284	Former Crow Canyon Dry Cleaner	7272 or 7242 San Ramon Road	Dublin	T06019764784	3C	5C	ACEH
291	Perciva/Metro Valley Cleaners	224 Rickenbacker Circle	Livermore	T06019748481	3A2	5C	ACEH
298	Former Chevron Records Facility	6400 Sierra Court	Dublin	SL0600196603	2B4	7	RWQCB
299	Nica Metals	101 Greenville Road	Livermore	SLT19765274	3A2	3A	ACEH
302	FCI Dublin	5701 8th Street	Dublin	SLT19749067	3A1	3B	ACEH
307	City of Pleasanton Theater Parking Lot	0 Kottinger Drive	Pleasanton	T10000001164	3B1	5C	ACEH
308	Green on Park Place	5411 Martinelli Way	Dublin	T10000005547	3B2	3B	ACEH

Z7 ID	SITE NAME	ADDRESS	CITY	GEOTRACKER ID:	PRIORITY	STATUS	LEAD AGENCY
311	Aster Apartments/Crown Chevrolet Cadillac Isuzu	6775 Golden Gate Drive (formerly 7544 Dublin Boulevard)	Dublin	T10000010517	3A1	5R	ACEH
312	Cemex Sunol	6527 Calaveras Road	Sunol	T10000003431	3A1	1	ACEH
318	G.I.G Oil Production Facility	8467 Patterson Pass Road	Livermore	T10000007269	2A4	8	ACEH
319	Former Clorox Site - Building 7	7200 - 7208 Johnson Drive	Pleasanton	T10000007118	2A2	5R	RWQCB
320	Dublin Crossroads Center & Park Ave Cleaners	7100-7120 Dublin Boulevard	Dublin	T10000004783	2A4	5C	ACEH
322	Niles Canyon Railway	9 Kilkare Road	Sunol	T10000006021	3B1	7	ACEH
323	Former American Cleaners	555 Main Street	Pleasanton	T10000008240	1A4	3A	RWQCB
324	Chestnut Square	1651 and 1665 Chestnut Street	Livermore	T10000007202	1A2	8	ACDEH
325	217 North N St	217 North N Street	Livermore	T10000011094	2A1	8	ACDEH
327	VIP Cleaners	1809 Santa Rita Road, Suite F	Pleasanton	T10000008254	2A2	7	RWQCB
329	Pleasanton French Laundry (Former)	560 Main Street	Pleasanton	T10000008241	2A4	3A	RWQCB
330	City Cleaners	4855 Hopyard Road, Suite C	Pleasanton	T10000008237	2A4	5R	RWQCB

Z7 ID	SITE NAME	ADDRESS	CITY	GEOTRACKER ID:	PRIORITY	STATUS	LEAD AGENCY
332	Renn Transportation Fuel Spill	I-680	Sunol	T10000013696	2A2	7	ACDEH
335	J Cleaners	2093 Railroad Avenue	Livermore	T10000008401	1A2	3B	RWQCB
336	Old Train Depot	2009 Railroad Avenue	Livermore	T10000016758	1A2	5C	RWQCB
337	Pacific Avenue Cleaners	3018 Pacific Avenue	Livermore	T10000008716	1A2	5C	RWQCB
338	Quality Cleaners	2048 First Street	Livermore	T10000014462	1A1	3B	RWQCB
339	Sparklizing Cleaners	855 Rincon	Livermore	T10000008739	1A2	5C	RWQCB
340	Arroyo Crossing	1364 Arroyo Road	Livermore	SL0600174278	3A1	8	RWQCB
341	Warmington Homes - Hansen Hills	Silvergate Drive	Livermore	SL18307727	3A1	NR	RWQCB
342	Camp Parks	0 Parks RFTA	Dublin	T06019796867	2A1	3A	ACEH
342	Camp Parks	0 Parks RFTA	Dublin	T06019796867	2A1	3A	ACEH
343	Laguna Oaks Site	3465 Old Foothill Road	Pleasanton	T06019749061	3A1	3B	RWQCB
344	Pleasanton Assisted Living Facility	0 JUNIPERO ST & SUNOL	Pleasanton	T06019724209	3A2	3B	RWQCB

Z7 ID	*SITE NAME*	*ADDRESS*	*CITY*	*GEOTRACKER ID:*	*PRIORITY*	*STATUS*	*LEAD AGENCY*

Z7 ID - corresponds to file number in TSS database and the location on site maps
OWNER - responsible party for the contamination investigation/cleanup
SITE NAME - indicates a site name if different from owner
PRIORITY - the first number of the priority code indicates whether the case is high priority (1), moderate priority (2), or low priority (3).
STATUS - the status code is based on the RWQCB ranking of the progress of a case (see below)
NOTES - highlights, cureent activites, or concerns at a site.

CASE STATUS CODES:
1 - Leak Confirmed
3A - Preliminary Site Assessment Workplan Submitted
3B - Preliminary Site Assessment Underway
5C - Pollution Characterization Underway
5R Remediation Workplan (Corrective Action Plan) Submitted
7 - Remediation Underway
8 - Post Remediation Monitoring Begun
CL - Case Closure
NR - Further investigation not required
ReO - Reopened

TABLE 12-2
MAIN BASIN SALT LOADING
2023 WATER YEAR

INFLOW COMPONENTS

	SURFACE WATER			RECHARGED WATER			SALT LOAD
	Volume Applied (AF)	TDS Conc (mg/L)	% Recharged	Volume Recharged (AF)	TDS Conc (mg/L)	Salt Load (Tons)	(Tons per TAF of Rch)
NATURAL STREAM RECHARGE	**219,287**	**460**	**8%**	**18,122**	**460**	**11,326**	**620**
Arroyo Valle	**183,169**	**213**	**5%**	**8,502**	**213**	**2,459**	**290**
Arroyo Mocho	18,828	611	36%	**6,782**	**611**	**5,629**	**830**
Arroyo Las Positas	17,289	840	16%	**2,838**	**840**	**3,238**	**1,140**
ARROYO VALLE PRIOR RIGHTS	**0**	**180**	**0%**	**43**	**180**	**11**	**240**
ARTIFICIAL STREAM RECHARGE	**7,526**	**180**	**89%**	**6,734**	**180**	**1,647**	**240**
Arroyo Valle	4,798	180	84%	**4,047**	**180**	**990**	**240**
Arroyo Mocho	2,728	180	98%	**2,687**	**180**	**657**	**240**
Arroyo Las Positas	0	180	0%	**0**	**180**	**0**	**0**
INJECTION WELL RECHARGE	**-**	**-**	**-**	**0**	**0**	**0**	**0**
RAINFALL RECHARGE	**9,231**	**0**	**137%**	**12,623**	**0**	**0**	**0**
LAKE RECHARGE	-	-	-	*724*	*375*	*369*	*510*
LEAKAGE	**-**	**-**	**-**	**1,326**	**500**	**901**	**680**
APPLIED WATER RECHARGE	**15,273**	**301**	**18%**	**2,800**	**1,641**	**6,241**	**2,230**
Urban - Municipal	11,624	284	16%	1,891	1,744	4,481	2,370
Urban - Recycled Water	535	674	20%	107	3,370	490	4,580
Agricultural - Municipal (SBA)	2,272	224	30%	675	754	691	1,020
Agricultural - Groundwater	662	477	14%	91	3,478	428	4,720
Golf Courses - Groundwater	0	342	0%	0	0	0	0
Golf Courses - Recycled Water	181	615	20%	36	3,080	151	4,180
SUBSURFACE BASIN INFLOW				**1,000**	**1,460**	**1,983**	**1,980**
TOTAL INFLOW				**42,648**	**382**	**22,108**	**520**

OUTFLOW COMPONENTS

		WATER EXTRACTED			SALT REMOVED
		Volume Removed (AF)	TDS Conc (mg/L)	Salt Removed (Tons)	(Tons/TAF of Export)
MUNICIPAL PUMPAGE		**9,174**	**512**	**6,377**	**700**
Zone 7 Wells - Hop, Stone, COL		**1,950**	**562**	**1,488**	**760**
Zone 7 Wells - Mocho		**3,273**	**516**	**2,293**	**700**
Demin Salts Exported from Valley	*(subset of Zone 7 - Mocho)*	*155*	*2,422*	*509*	*3,290*
Other		**3,951**	**484**	**2,596**	**660**
AGRICULTURAL PUMPAGE (all salt is reapplied)		**813**	**477**	**526**	**650**
MINING USE		**2,600**	**98**	**347**	**130**
Stream Export		0	365	0	0
	Discharge to Cope	*2,258*	*375*	*1,150*	*510*
Evaporation		1,900	0	0	0
Processing Losses		700	365	347	500
GROUNDWATER BASIN OVERFLOW		**0**	**520**	**0**	**0**
TOTAL OUTFLOW		**12,587**	**424**	**7,250**	**580**

NET IN 2023 WY	**30,060**	**364**	**14,858**	

TABLE 12-3
HISTORICAL SALT LOADING (in tons)
1974 TO 2023 WATER YEARS

SALT INFLOW COMPONENTS	1974	1975	1976	1977	1978	1979	1980
NATURAL STREAM RECHARGE	**3,210**	**3,464**	**874**	**581**	**4,638**	**1,723**	**2,706**
Total Arroyo Valle	**1,018**	**1,041**	**391**	**315**	**957**	**707**	**777**
Flood releases recharge	100	344	0	0	216	0	128
Non Flood Natural Inflow	918	697	391	315	741	707	649
Arroyo Mocho	**1,717**	**2,043**	**293**	**76**	**3,206**	**636**	**1,358**
Arroyo Las Positas	**475**	**380**	**190**	**190**	**475**	**380**	**571**
AV PRIOR RIGHTS	**361**	**418**	**31**	**0**	**494**	**267**	**386**
ARTIFICIAL STREAM RECHARGE	**986**	**2,201**	**1,914**	**2,289**	**3,286**	**3,699**	**2,897**
Arroyo Valle	293	1,174	509	883	1,427	1,599	1,234
Arroyo Mocho	340	497	875	876	1,350	1,570	1,432
Arroyo Las Positas	353	530	530	530	509	530	231
INJECTION WELL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**
RAINFALL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Lake Recharge	*0*	*0*	*0*	*0*	*0*	*0*	*0*
LEAKAGE	**21**	**25**	**30**	**35**	**41**	**48**	**56**
APPLIED WATER RECHARGE	**7,670**	**7,218**	**9,123**	**10,675**	**8,352**	**8,304**	**7,175**
Urban - Municipal	3,359	3,508	3,457	4,607	3,858	3,434	3,115
Urban - Recycled Water	1,815	1,930	2,232	1,937	1,928	2,119	1,966
Agricultural - Municipal (SBA)	202	304	437	890	485	331	416
Agricultural - Groundwater	2,294	1,476	2,997	3,241	2,081	2,420	1,678
Golf Courses - Groundwater	0	0	0	0	0	0	0
Golf Courses - Recycled Water	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0
SUBSURFACE BASIN INFLOW	**2,038**	**2,038**	**2,058**	**3,648**	**2,506**	**2,017**	**1,325**
NET INFLOW	**14,286**	**15,364**	**14,030**	**17,228**	**19,317**	**16,058**	**14,545**

OUTFLOW COMPONENTS	1974	1975	1976	1977	1978	1979	1980
MUNICIPAL PUMPAGE	**-7,217**	**-6,577**	**-5,074**	**-4,382**	**-4,579**	**-5,351**	**-4,458**
Zone 7 Wells - Hop, Stone, COL	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Zone 7 Wells - Mocho	**-3,303**	**-2,057**	**-842**	**-201**	**-506**	**-532**	**-26**
Demin Salts Exported from Valley	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Other Pumpage	**-3,914**	**-4,520**	**-4,232**	**-4,181**	**-4,073**	**-4,819**	**-4,432**
AGRICULTURAL PUMPAGE	**-2,289**	**-1,476**	**-2,997**	**-3,241**	**-2,081**	**-2,420**	**-1,678**
MINING USE	**-1,126**	**-1,725**	**-802**	**-668**	**-869**	**-1,603**	**-2,508**
Stream Export	-745	-1,345	-422	-287	-489	-1,223	-2,127
Evaporation	0	0	0	0	0	0	0
Processing Losses	-380	-380	-380	-380	-380	-380	-380
GROUNDWATER BASIN OVERFLOW	**0**	**0**	**0**	**0**	**0**	**-173**	**-612**
NET OUTFLOW	**-10,632**	**-9,778**	**-8,873**	**-8,291**	**-7,529**	**-9,547**	**-9,256**

NET SALT INFLOW (Tons)	**3,654**	**5,586**	**5,157**	**8,937**	**11,788**	**6,511**	**5,289**
CUMULATIVE SALT INFLOW (Tons)*	**3,654**	**9,240**	**14,397**	**23,334**	**35,122**	**41,633**	**46,922**

TDS Concentration Calculations	1974	1975	1976	1977	1978	1979	1980
Net Basin Recharge (AF)	-478	5,508	-4,311	-5,953	11,942	6,394	8,103
Basin Storage (HI Method)(AF)	211,522	217,030	212,719	206,766	218,708	225,102	233,205
Total Salt in Main Basin (tons)	133,252	138,838	143,995	152,932	164,720	171,231	176,520
Main Basin TDS Concentration (mg/L)	**464**	**471**	**498**	**544**	**554**	**560**	**557**
Cumulative Increase in TDS Conc (mg/L)**	**14**	**21**	**48**	**94**	**104**	**110**	**107**

* Basinwide salt buildup since 1973

** Basinwide TDS concentration increase relative to 1973 value of 450 mg/L

TABLE 12-3
HISTORICAL SALT LOADING (in tons)
1974 TO 2023 WATER YEARS

SALT INFLOW COMPONENTS	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
NATURAL STREAM RECHARGE	**1,513**	**4,803**	**7,657**	**5,286**	**3,058**	**4,941**	**2,852**	**2,610**	**2,782**	**2,480**
Total Arroyo Valle	**579**	**1,048**	**1,433**	**936**	**375**	**779**	**232**	**372**	**187**	**206**
Flood releases recharge	0	271	624	20	0	415	0	0	0	0
Non Flood Natural Inflow	579	777	809	916	375	364	232	372	187	206
Arroyo Mocho	**478**	**2,614**	**4,626**	**2,508**	**932**	**2,269**	**458**	**490**	**440**	**233**
Arroyo Las Positas	**456**	**1,141**	**1,598**	**1,842**	**1,751**	**1,893**	**2,162**	**1,748**	**2,155**	**2,041**
AV PRIOR RIGHTS	**251**	**502**	**381**	**236**	**328**	**286**	**283**	**325**	**356**	**125**
ARTIFICIAL STREAM RECHARGE	**3,238**	**1,617**	**184**	**0**	**0**	**0**	**0**	**525**	**1,585**	**1,809**
Arroyo Valle	1,719	663	0	0	0	0	0	0	51	132
Arroyo Mocho	1,394	894	184	0	0	0	0	525	1,534	1,677
Arroyo Las Positas	125	60	0	0	0	0	0	0	0	0
INJECTION WELL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
RAINFALL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Lake Recharge	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
LEAKAGE	**65**	**74**	**84**	**94**	**105**	**115**	**125**	**136**	**147**	**158**
APPLIED WATER RECHARGE	**5,507**	**4,709**	**4,723**	**5,046**	**5,938**	**6,632**	**5,558**	**6,834**	**6,015**	**6,541**
Urban - Municipal	3,035	3,076	3,064	3,183	3,592	4,100	3,810	4,791	4,498	4,850
Urban - Recycled Water	400	322	375	410	413	386	316	402	334	339
Agricultural - Municipal (SBA)	519	427	332	438	512	718	434	598	367	445
Agricultural - Groundwater	1,553	884	952	1,015	1,421	1,428	998	1,043	816	907
Golf Courses - Groundwater	0	0	0	0	0	0	0	0	0	0
Golf Courses - Recycled Water	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0
SUBSURFACE BASIN INFLOW	**1,284**	**1,284**	**876**	**1,325**	**1,528**	**1,508**	**1,569**	**1,875**	**2,364**	**2,568**
NET INFLOW	**11,858**	**12,989**	**13,905**	**11,987**	**10,957**	**13,482**	**10,387**	**12,305**	**13,249**	**13,681**

OUTFLOW COMPONENTS	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
MUNICIPAL PUMPAGE	**-4,700**	**-4,748**	**-5,410**	**-5,525**	**-5,752**	**-6,465**	**-5,537**	**-6,662**	**-6,915**	**-7,185**
Zone 7 Wells - Hop, Stone, COL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-54**	**-441**
Zone 7 Wells - Mocho	**0**	**0**	**-17**	**-227**	**-863**	**-869**	**-326**	**-1,425**	**-2,082**	**-1,683**
Demin Salts Exported from Valley	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Other Pumpage	**-4,700**	**-4,748**	**-5,393**	**-5,298**	**-4,889**	**-5,595**	**-5,211**	**-5,237**	**-4,779**	**-5,062**
AGRICULTURAL PUMPAGE	**-1,553**	**-844**	**-912**	**-1,015**	**-1,378**	**-1,428**	**-998**	**-1,043**	**-776**	**-944**
MINING USE	**-4,372**	**-4,161**	**-7,834**	**-2,857**	**-2,814**	**-6,011**	**-839**	**-2,301**	**-1,728**	**-918**
Stream Export	-3,992	-3,781	-7,454	-2,476	-2,433	-5,535	-364	-1,825	-1,253	-443
Evaporation	0	0	0	0	0	0	0	0	0	0
Processing Losses	-380	-380	-380	-380	-380	-475	-475	-475	-475	-475
GROUNDWATER BASIN OVERFLOW	**-635**	**-2,494**	**-3,418**	**-2,587**	**-1,386**	**-693**	**-693**	**-462**	**-122**	**0**
NET OUTFLOW	**-11,260**	**-12,247**	**-17,574**	**-11,984**	**-11,330**	**-14,597**	**-8,067**	**-10,468**	**-9,541**	**-9,047**

NET SALT INFLOW (Tons)	**598**	**742**	**-3,669**	**3**	**-373**	**-1,115**	**2,320**	**1,837**	**3,708**	**4,634**
CUMULATIVE SALT INFLOW (Tons)*	**47,520**	**48,262**	**44,593**	**44,596**	**44,223**	**43,108**	**45,428**	**47,265**	**50,973**	**55,607**

TDS Concentration Calculations	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Net Basin Recharge (AF)	-528	11,593	9,192	-4,203	-9,722	-1,684	-7,906	-9,106	-4,973	-5,692
Basin Storage (HI Method)(AF)	232,677	244,270	253,462	249,259	239,537	237,853	229,947	220,841	215,868	210,176
Total Salt in Main Basin (tons)	177,118	177,860	174,191	174,194	173,821	172,706	175,026	176,863	180,571	185,205
Main Basin TDS Concentration (mg/L)	**560**	**536**	**506**	**514**	**534**	**535**	**560**	**590**	**616**	**649**
Cumulative Increase in TDS Conc (mg/L)**	**110**	**86**	**56**	**64**	**84**	**85**	**110**	**140**	**166**	**199**

* Basinwide salt buildup since 1973

** Basinwide TDS concentration increase relative to 1973 value of 450 mg/L

TABLE 12-3
HISTORICAL SALT LOADING (in tons)
1974 TO 2023 WATER YEARS

SALT INFLOW COMPONENTS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NATURAL STREAM RECHARGE	**3,356**	**3,665**	**5,743**	**2,544**	**4,376**	**4,331**	**4,639**	**5,704**	**3,727**	**3,409**
Total Arroyo Valle	**575**	**743**	**1,083**	**300**	**1,034**	**400**	**1,450**	**1,661**	**1,361**	**956**
Flood releases recharge	98	0	528	0	472	336	183	524	0	55
Non Flood Natural Inflow	477	743	555	300	562	64	1,267	1,137	1,361	901
Arroyo Mocho	**1,023**	**814**	**2,174**	**995**	**1,580**	**2,627**	**1,741**	**2,292**	**996**	**857**
Arroyo Las Positas	**1,758**	**2,108**	**2,486**	**1,249**	**1,762**	**1,304**	**1,448**	**1,751**	**1,370**	**1,596**
AV PRIOR RIGHTS	**290**	**151**	**276**	**321**	**306**	**87**	**93**	**188**	**149**	**175**
ARTIFICIAL STREAM RECHARGE	**1,590**	**410**	**1,953**	**2,795**	**1,026**	**491**	**1,325**	**500**	**1,352**	**2,276**
Arroyo Valle	36	185	385	293	49	31	472	107	321	242
Arroyo Mocho	1,554	225	1,568	2,502	977	460	853	393	1,031	2,034
Arroyo Las Positas	0	0	0	0	0	0	0	0	0	0
INJECTION WELL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**204**	**497**	**498**
RAINFALL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Lake Recharge	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
LEAKAGE	**169**	**181**	**193**	**206**	**220**	**234**	**248**	**263**	**279**	**294**
APPLIED WATER RECHARGE	**6,918**	**5,793**	**5,109**	**4,989**	**3,323**	**4,071**	**4,887**	**4,367**	**3,479**	**4,314**
Urban - Municipal	6,023	4,884	4,370	4,221	2,700	3,207	3,927	3,744	2,841	3,489
Urban - Recycled Water	162	368	363	392	352	460	385	274	40	83
Agricultural - Municipal (SBA)	370	311	234	246	183	274	420	280	241	302
Agricultural - Groundwater	363	230	142	130	88	130	155	69	34	54
Golf Courses - Groundwater	0	0	0	0	0	0	0	0	102	123
Golf Courses - Recycled Water	0	0	0	0	0	0	0	0	221	263
Others	0	0	0	0	0	0	0	0	0	0
SUBSURFACE BASIN INFLOW	**3,423**	**3,199**	**2,710**	**2,221**	**2,017**	**1,875**	**1,386**	**1,651**	**1,528**	**1,846**
NET INFLOW	**15,746**	**13,399**	**15,984**	**13,076**	**11,268**	**11,089**	**12,578**	**12,877**	**11,011**	**12,812**

OUTFLOW COMPONENTS	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
MUNICIPAL PUMPAGE	**-11,014**	**-8,752**	**-6,072**	**-3,867**	**-2,681**	**-3,874**	**-5,192**	**-6,468**	**-6,101**	**-8,560**
Zone 7 Wells - Hop, Stone, COL	**-1,679**	**-1,185**	**-859**	**-85**	**-87**	**-754**	**-270**	**-475**	**-2,362**	**-2,553**
Zone 7 Wells - Mocho	**-3,313**	**-2,111**	**-609**	**-24**	**-125**	**-767**	**-682**	**-397**	**-167**	**-783**
Demin Salts Exported from Valley	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Other Pumpage	**-6,023**	**-5,455**	**-4,604**	**-3,757**	**-2,469**	**-2,353**	**-4,240**	**-5,596**	**-3,572**	**-5,224**
AGRICULTURAL PUMPAGE	**-249**	**-236**	**-142**	**-130**	**-88**	**-130**	**-155**	**-47**	**-46**	**-188**
MINING USE	**-970**	**-1,007**	**-2,134**	**-4,928**	**-6,883**	**-7,507**	**-9,983**	**-9,588**	**-8,642**	**-5,792**
Stream Export	-495	-532	-1,658	-4,453	-6,408	-7,041	-9,460	-9,084	-8,081	-5,316
Evaporation	0	0	0	0	0	0	0	0	0	0
Processing Losses	-475	-475	-475	-475	-475	-466	-523	-504	-561	-475
GROUNDWATER BASIN OVERFLOW	**0**	**0**	**0**	**0**	**-226**	**-968**	**-960**	**-998**	**-482**	**-175**
NET OUTFLOW	**-12,233**	**-9,995**	**-8,348**	**-8,925**	**-9,878**	**-12,479**	**-16,290**	**-17,101**	**-15,271**	**-14,715**

NET SALT INFLOW (Tons)	**3,513**	**3,404**	**7,636**	**4,151**	**1,390**	**-1,390**	**-3,712**	**-4,224**	**-4,260**	**-1,903**
CUMULATIVE SALT INFLOW (Tons)*	**59,120**	**62,524**	**70,160**	**74,311**	**75,701**	**74,311**	**70,599**	**66,375**	**62,115**	**60,212**

TDS Concentration Calculations	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Net Basin Recharge (AF)	-8,389	-6,628	14,974	592	13,031	1,873	-1,390	2,511	-4,911	-3,674
Basin Storage (HI Method)(AF)	201,787	195,159	210,133	210,725	223,756	225,629	224,239	226,750	221,839	218,165
Total Salt in Main Basin (tons)	188,718	192,122	199,758	203,909	205,299	203,909	200,197	195,973	191,713	189,810
Main Basin TDS Concentration (mg/L)	**688**	**725**	**700**	**712**	**675**	**665**	**657**	**636**	**636**	**640**
Cumulative Increase in TDS Conc (mg/L)**	**238**	**275**	**250**	**262**	**225**	**215**	**207**	**186**	**186**	**190**

* Basinwide salt buildup since 1973

** Basinwide TDS concentration increase relative to 1973 value of 450 mg/L

TABLE 12-3
HISTORICAL SALT LOADING (in tons)
1974 TO 2023 WATER YEARS

SALT INFLOW COMPONENTS	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NATURAL STREAM RECHARGE	**3,666**	**3,267**	**7,097**	**3,105**	**5,796**	**4,962**	**3,260**	**4,078**	**4,367**	**5,080**
Total Arroyo Valle	**1,823**	**1,399**	**2,833**	**1,081**	**3,652**	**2,274**	**1,450**	**2,691**	**2,554**	**2,974**
Flood releases recharge	0	193	302	0	731	0	0	327	0	1,383
Non Flood Natural Inflow	1,823	1,206	2,531	1,081	2,921	2,274	1,450	2,364	2,554	1,591
Arroyo Mocho	**575**	**886**	**2,996**	**838**	**1,241**	**1,813**	**839**	**380**	**540**	**1,211**
Arroyo Las Positas	**1,268**	**982**	**1,268**	**1,186**	**903**	**875**	**971**	**1,007**	**1,273**	**895**
AV PRIOR RIGHTS	**224**	**399**	**416**	**383**	**80**	**524**	**219**	**100**	**407**	**0**
ARTIFICIAL STREAM RECHARGE	**1,351**	**3,503**	**2,811**	**2,480**	**1,949**	**1,266**	**1,359**	**727**	**1,248**	**1,690**
Arroyo Valle	501	647	399	476	619	330	782	727	686	635
Arroyo Mocho	839	2,855	2,412	2,004	1,300	914	577	0	562	1,055
Arroyo Las Positas	11	1	0	0	30	22	0	0	0	0
INJECTION WELL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
RAINFALL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Lake Recharge	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
LEAKAGE	**313**	**333**	**352**	**372**	**393**	**414**	**436**	**458**	**481**	**504**
APPLIED WATER RECHARGE	**5,074**	**5,606**	**4,618**	**5,090**	**4,824**	**3,223**	**5,157**	**6,258**	**6,152**	**5,079**
Urban - Municipal	4,217	4,559	3,884	4,217	4,142	2,501	4,337	5,208	5,060	3,975
Urban - Recycled Water	79	136	44	60	40	107	96	30	202	327
Agricultural - Municipal (SBA)	308	378	294	300	293	249	230	474	416	323
Agricultural - Groundwater	49	53	54	57	42	42	42	46	45	45
Golf Courses - Groundwater	137	147	139	140	154	84	163	188	172	160
Golf Courses - Recycled Water	284	333	203	316	153	240	289	312	257	249
Others	0	0	0	0	0	0	0	0	0	0
SUBSURFACE BASIN INFLOW	**1,970**	**1,970**	**1,970**	**1,970**	**2,513**	**2,309**	**2,174**	**2,214**	**2,106**	**1,997**
NET INFLOW	**12,598**	**15,078**	**17,264**	**13,400**	**15,555**	**12,698**	**12,605**	**13,835**	**14,761**	**14,350**

OUTFLOW COMPONENTS	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MUNICIPAL PUMPAGE	**-10,467**	**-12,061**	**-11,096**	**-12,419**	**-10,057**	**-5,557**	**-8,423**	**-9,271**	**-14,577**	**-12,609**
Zone 7 Wells - Hop, Stone, COL	**-3,867**	**-3,690**	**-3,360**	**-4,198**	**-1,858**	**-1,382**	**-1,340**	**-3,217**	**-3,920**	**-1,290**
Zone 7 Wells - Mocho	**-1,745**	**-3,322**	**-2,271**	**-3,762**	**-3,003**	**-1,170**	**-1,976**	**-1,402**	**-5,448**	**-6,563**
Demin Salts Exported from Valley	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*-798*	*2,759*
Other Pumpage	**-4,855**	**-5,049**	**-5,465**	**-4,459**	**-5,196**	**-3,005**	**-5,107**	**-4,651**	**-5,208**	**-4,756**
AGRICULTURAL PUMPAGE	**-182**	**-94**	**-73**	**-79**	**-80**	**-46**	**-43**	**-68**	**-68**	**-73**
MINING USE	**-4,520**	**-475**	**-276**	**-438**	**-454**	**-658**	**-584**	**-714**	**-1,341**	**-1,428**
Stream Export	-4,006	-111	0	-84	-94	-218	-274	-305	-913	-1,057
Evaporation	0	0	0	0	0	0	0	0	0	0
Processing Losses	-514	-364	-276	-354	-360	-440	-310	-409	-428	-371
GROUNDWATER BASIN OVERFLOW	**0**	**0**	**0**	**0**	**0**	**0**	**-738**	**-1,080**	**-171**	**0**
NET OUTFLOW	**-15,169**	**-12,630**	**-11,445**	**-12,936**	**-10,591**	**-6,261**	**-9,788**	**-11,133**	**-16,157**	**-14,110**

NET SALT INFLOW (Tons)	**-2,571**	**2,448**	**5,819**	**464**	**4,964**	**6,437**	**2,817**	**2,702**	**-1,396**	**240**
CUMULATIVE SALT INFLOW (Tons)*	**57,641**	**60,089**	**65,908**	**66,372**	**71,336**	**77,773**	**80,590**	**83,292**	**81,896**	**82,136**

TDS Concentration Calculations	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Net Basin Recharge (AF)	-11,666	62	8,309	-4,560	13,193	8,790	-3,639	-3,011	-4,997	4,290
Basin Storage (HI Method)(AF)	206,499	206,561	214,870	210,310	223,503	232,293	228,654	225,643	220,646	224,936
Total Salt in Main Basin (tons)	187,239	189,687	195,506	195,970	200,934	207,371	210,188	212,890	211,494	211,734
Main Basin TDS Concentration (mg/L)	**667**	**676**	**670**	**686**	**662**	**657**	**677**	**695**	**706**	**693**
Cumulative Increase in TDS Conc (mg/L)**	**217**	**226**	**220**	**236**	**212**	**207**	**227**	**245**	**256**	**243**

* Basinwide salt buildup since 1973

** Basinwide TDS concentration increase relative to 1973 value of 450 mg/L

TABLE 12-3
HISTORICAL SALT LOADING (in tons)
1974 TO 2023 WATER YEARS

SALT INFLOW COMPONENTS	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NATURAL STREAM RECHARGE	**5,459**	**2,026**	**2,242**	**1,820**	**3,735**	**3,366**	**4,948**	**1,315**	**3,499**	**1,952**
Total Arroyo Valle	**3,039**	**553**	**963**	**356**	**1,664**	**1,620**	**2,392**	**249**	**1,153**	**285**
Flood releases recharge	150	0	0	0	0	0	404	0	16	0
Non Flood Natural Inflow	2,889	553	963	356	1,664	1,620	1,988	249	1,137	285
Arroyo Mocho	**2,056**	**949**	**751**	**973**	**1,472**	**945**	**1,882**	**430**	**1,648**	**834**
Arroyo Las Positas	**364**	**524**	**528**	**491**	**599**	**801**	**674**	**636**	**698**	**833**
AV PRIOR RIGHTS	**384**	**196**	**409**	**3**	**395**	**288**	**91**	**208**	**249**	**249**
ARTIFICIAL STREAM RECHARGE	**882**	**2,851**	**2,519**	**1,483**	**1,689**	**2,571**	**2,046**	**1,494**	**558**	**675**
Arroyo Valle	167	1,178	573	339	1,667	1,299	667	924	442	556
Arroyo Mocho	698	1,649	1,943	1,120	0	1,272	1,379	570	116	119
Arroyo Las Positas	17	24	3	24	22	0	0	0	0	0
INJECTION WELL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
RAINFALL RECHARGE	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Lake Recharge	*0*	*0*	*0*	*1,603*	*2,736*	*3,641*	*6,743*	*8,295*	*6,864*	*3,979*
LEAKAGE	**527**	**551**	**403**	**600**	**625**	**651**	**677**	**703**	**778**	**821**
APPLIED WATER RECHARGE	**4,295**	**6,074**	**8,158**	**5,654**	**6,505**	**6,810**	**5,023**	**6,675**	**7,016**	**8,357**
Urban - Municipal	3,107	4,625	6,457	3,685	3,969	4,285	3,361	4,633	4,973	5,811
Urban - Recycled Water	542	588	291	778	1,251	721	535	397	536	631
Agricultural - Municipal (SBA)	240	414	945	495	556	1,092	498	966	798	1,165
Agricultural - Groundwater	50	57	27	244	250	448	411	433	492	504
Golf Courses - Groundwater	113	131	184	181	183	0	0	0	0	0
Golf Courses - Recycled Water	243	259	254	271	296	264	218	246	217	246
Others	0	0	0	0	0	0	0	0	0	0
SUBSURFACE BASIN INFLOW	**2,024**	**2,092**	**448**	**1,834**	**2,051**	**2,078**	**2,106**	**2,078**	**2,187**	**2,201**
NET INFLOW	**13,571**	**13,790**	**14,179**	**11,394**	**15,000**	**15,764**	**14,891**	**12,473**	**14,287**	**14,255**

OUTFLOW COMPONENTS	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
MUNICIPAL PUMPAGE	**-9,873**	**-16,765**	**-12,781**	**-11,831**	**-6,080**	**-6,194**	**-7,635**	**-8,700**	**-10,427**	**-12,388**
Zone 7 Wells - Hop, Stone, COL	**-1,197**	**-2,785**	**-3,595**	**-2,639**	**-870**	**-750**	**-1,107**	**-1,938**	**-1,982**	**-4,441**
Zone 7 Wells - Mocho	**-4,040**	**-8,204**	**-3,997**	**-3,713**	**-1,080**	**-666**	**-2,200**	**-2,642**	**-4,895**	**-4,890**
Demin Salts Exported from Valley	*2,006*	*4,064*	*2,479*	*1,047*	*76*	*183*	*949*	*1,168*	*1,869*	*1,231*
Other Pumpage	**-4,625**	**-5,766**	**-5,179**	**-5,583**	**-4,128**	**-4,779**	**-4,326**	**-4,120**	**-3,549**	**-3,057**
AGRICULTURAL PUMPAGE	**-68**	**-77**	**-393**	**-515**	**-490**	**-550**	**-505**	**-532**	**-605**	**-619**
MINING USE	**-2,756**	**-3,064**	**-3,042**	**-502**	**-417**	**-378**	**-364**	**-388**	**-368**	**-363**
Stream Export	-2,368	-2,665	-2,655	-442	0	0	0	0	0	0
Evaporation	0	0	0	0	0	0	0	0	0	0
Processing Losses	-388	-399	-387	-364	-417	-378	-364	-388	-372	-363
GROUNDWATER BASIN OVERFLOW	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-506**	**-758**	**-113**
NET OUTFLOW	**-12,697**	**-19,906**	**-16,216**	**-12,848**	**-6,987**	**-7,122**	**-8,504**	**-10,126**	**-12,158**	**-13,483**

NET SALT INFLOW (Tons)	**874**	**-6,116**	**-2,037**	**-1,454**	**8,013**	**8,642**	**6,387**	**2,347**	**2,129**	**772**
CUMULATIVE SALT INFLOW (Tons)*	**83,010**	**76,894**	**74,857**	**73,403**	**81,416**	**90,058**	**96,445**	**98,792**	**100,921**	**101,693**

TDS Concentration Calculations	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Net Basin Recharge (AF)	6,893	-10,438	-5,542	-12,153	6,037	15,561	23,999	487	3,394	-8,034
Basin Storage (HI Method)(AF)	231,829	221,391	215,849	203,696	209,733	225,294	249,293	249,780	253,174	245,140
Total Salt in Main Basin (tons)	212,608	206,492	204,455	203,001	211,014	219,656	226,043	228,390	230,519	231,291
Main Basin TDS Concentration (mg/L)	**675**	**687**	**697**	**734**	**741**	**718**	**667**	**673**	**670**	**695**
Cumulative Increase in TDS Conc (mg/L)**	**225**	**237**	**247**	**284**	**291**	**268**	**217**	**223**	**220**	**245**

* Basinwide salt buildup since 1973

** Basinwide TDS concentration increase relative to 1973 value of 450 mg/L

TABLE 12-3
HISTORICAL SALT LOADING (in tons)
1974 TO 2023 WATER YEARS

SALT INFLOW COMPONENTS	2021	2022	2023	AVG	TOTAL
NATURAL STREAM RECHARGE	**1,599**	**3,095**	**11,325**	**3,755**	**187,731**
Total Arroyo Valle	**273**	**841**	**2,458**	**1,190**	**59,493**
Flood releases recharge	0	208	971	180	8,999
Non Flood Natural Inflow	273	633	1,487	1,010	50,494
Arroyo Mocho	**391**	**1,060**	**5,629**	**1,396**	**69,815**
Arroyo Las Positas	**935**	**1,194**	**3,238**	**1,168**	**58,423**
AV PRIOR RIGHTS	**168**	**102**	**11**	**251**	**12,571**
ARTIFICIAL STREAM RECHARGE	**87**	**460**	**1,647**	**1,546**	**77,294**
Arroyo Valle	87	460	990	539	26,956
Arroyo Mocho	0	0	657	936	46,786
Arroyo Las Positas	0	0	0	71	3,552
INJECTION WELL RECHARGE	**0**	**0**	**0**	**24**	**1,199**
RAINFALL RECHARGE	**0**	**0**	**0**	**0**	**0**
Lake Recharge	*299*	*-36*	*369*	*690*	*34,493*
LEAKAGE	**848**	**874**	**901**	**333**	**16,661**
APPLIED WATER RECHARGE	**9,479**	**10,322**	**6,241**	**6,099**	**304,960**
Urban - Municipal	6,704	7,618	4,481	4,171	208,552
Urban - Recycled Water	672	593	490	593	29,649
Agricultural - Municipal (SBA)	1,288	1,434	691	491	24,563
Agricultural - Groundwater	520	494	428	669	33,432
Golf Courses - Groundwater	0	0	0	50	2,501
Golf Courses - Recycled Water	295	183	151	125	6,263
Others	0	0	0		
SUBSURFACE BASIN INFLOW	**2,119**	**2,051**	**1,983**	**2,002**	**100,112**
NET INFLOW	**14,300**	**16,904**	**22,108**	**14,011**	**700,528**

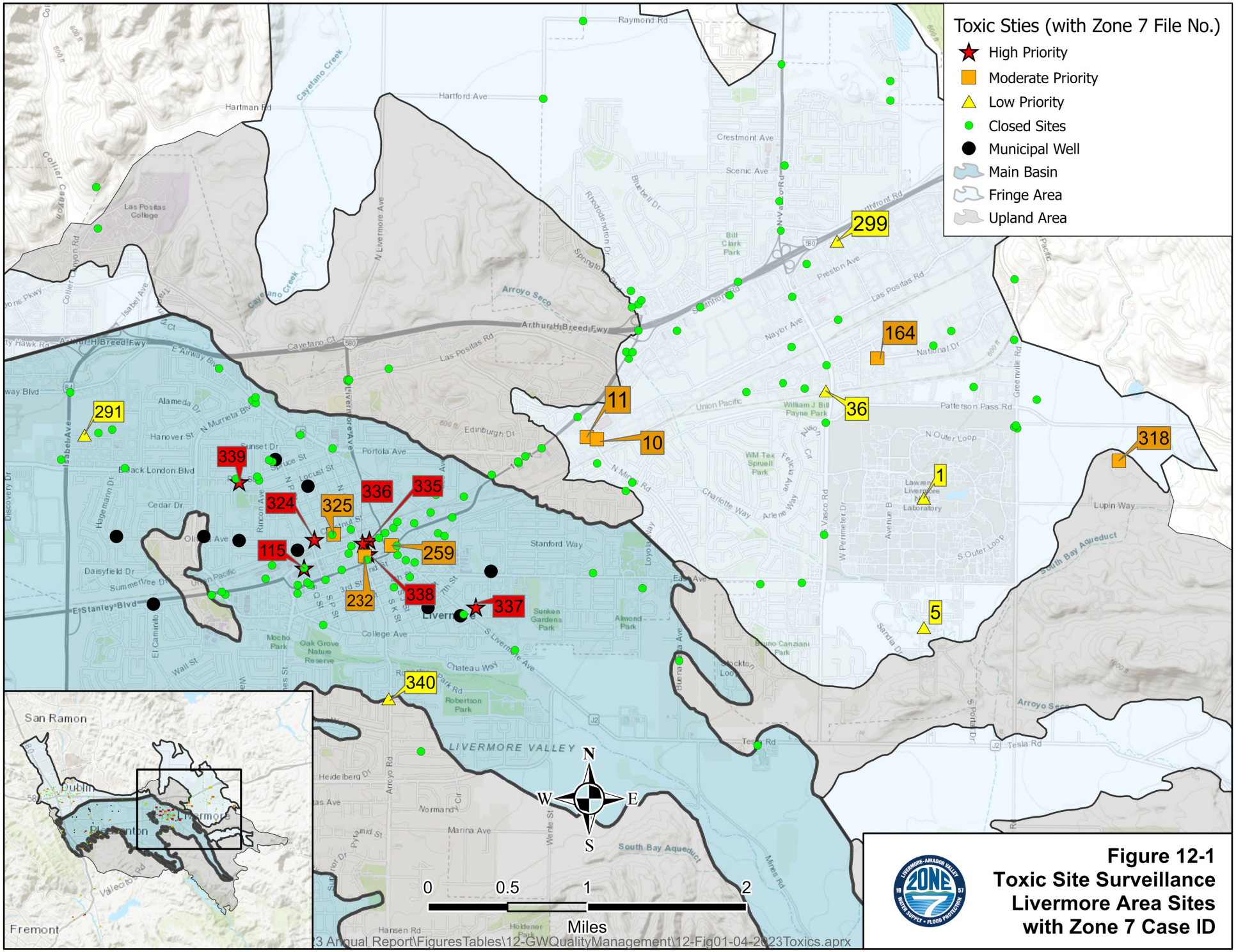
OUTFLOW COMPONENTS	2021	2022	2023	AVERAGE	TOTAL
MUNICIPAL PUMPAGE	**-17,856**	**-15,542**	**-6,377**	**-10,599**	**-378,874**
Zone 7 Wells - Hop, Stone, COL	**-6,420**	**-6,749**	**-1,488**	**-2,760**	**-68,997**
Zone 7 Wells - Mocho	**-6,961**	**-5,264**	**-2,293**	**-3,284**	**-82,092**
Demin Salts Exported from Valley	*449*	*6*	*509*	*360*	*17,997*
Other Pumpage	**-4,475**	**-3,529**	**-2,596**	**-4,556**	**-227,785**
AGRICULTURAL PUMPAGE	**-639**	**-607**	**-526**	**-708**	**-35,417**
MINING USE	**-409**	**-420**	**-347**	**-3,261**	**-163,036**
Stream Export	0	0	0	-2,078	-103,914
Evaporation	0	0	0	0	0
Processing Losses	-409	-420	-347	-413	-20,661
GROUNDWATER BASIN OVERFLOW	**0**	**0**	**0**	**-409**	**-20,450**
NET OUTFLOW	**-18,904**	**-16,569**	**-7,250**	**-11,765**	**-588,246**

NET SALT INFLOW (Tons)	**-4,604**	**335**	**14,858**	**2,246**	**112,282**
CUMULATIVE SALT INFLOW (Tons)*	**97,089**	**97,424**	**112,282**		

TDS Concentration Calculations	2021	2022	2023
Net Basin Recharge (AF)	-18,865	-11,395	30,284
Basin Storage (HI Method)(AF)	226,275	214,880	245,164
Total Salt in Main Basin (tons)	226,687	227,022	241,880
Main Basin TDS Concentration (mg/L)	**737**	**778**	**726**
Cumulative Increase in TDS Conc (mg/L)**	**287**	**328**	**276**

* Basinwide salt buildup since 1973

** Basinwide TDS concentration increase relative to 1973 value of 450 mg/L


Toxic Sties (with Zone 7 File No.)
High Priority
Moderate Priority
Low Priority
Closed Sites
Municipal Well
Main Basin
Fringe Area
Upland Area
299
164
11
10
36
318
1
291
339
324
325
336
335
115
259
232
338
337
5
340
LIVERMORE VALLEY
N
W
E
S
0
0.5
1
2
Miles
San Ramon
Dublin
Livermore
Pleasanton
Fremont
Vallecito Road
Figure 12-1
Toxic Site Surveillance
Livermore Area Sites
with Zone 7 Case ID

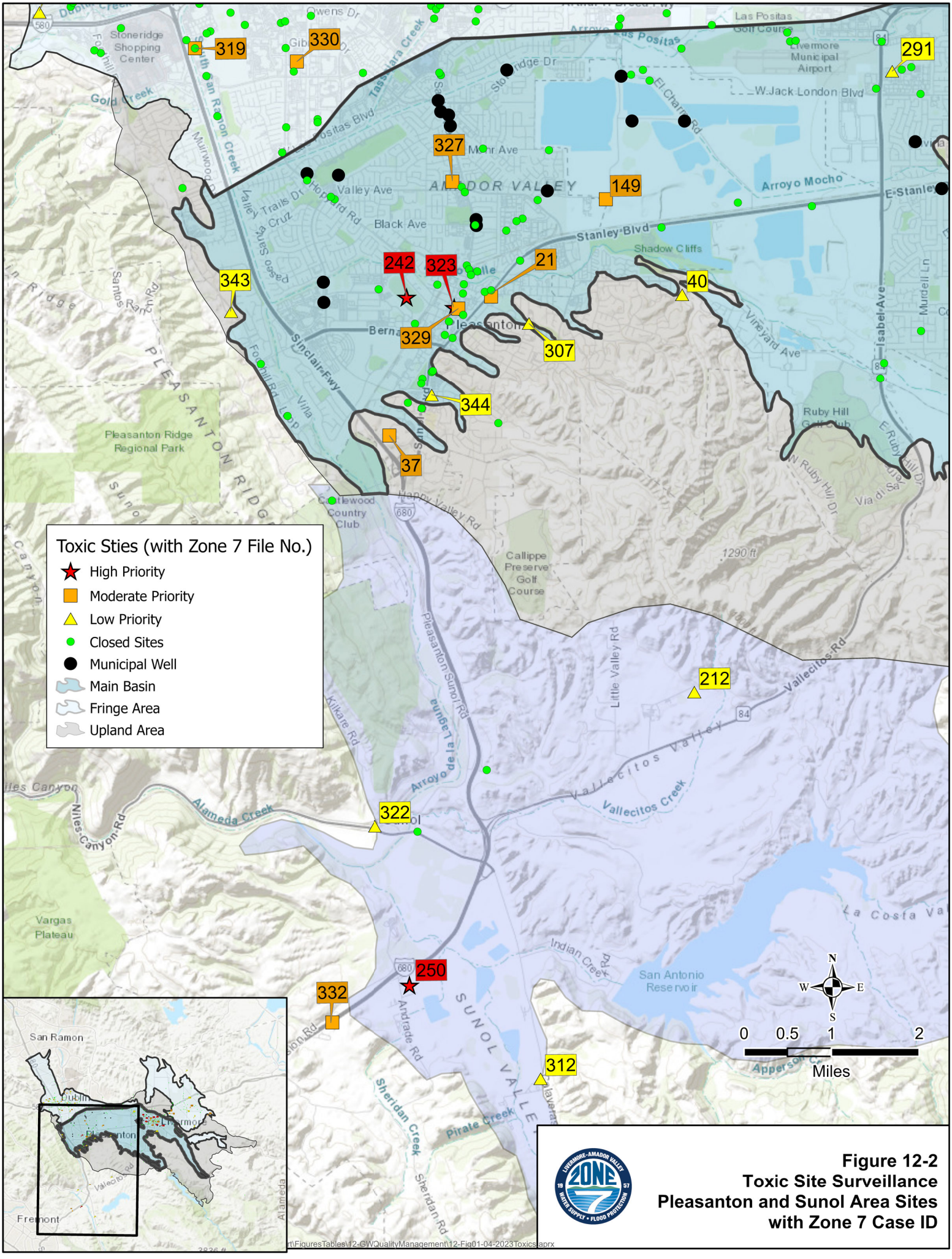


Figure 12-2
Toxic Site Surveillance
Pleasanton and Sunol Area Sites
with Zone 7 Case ID

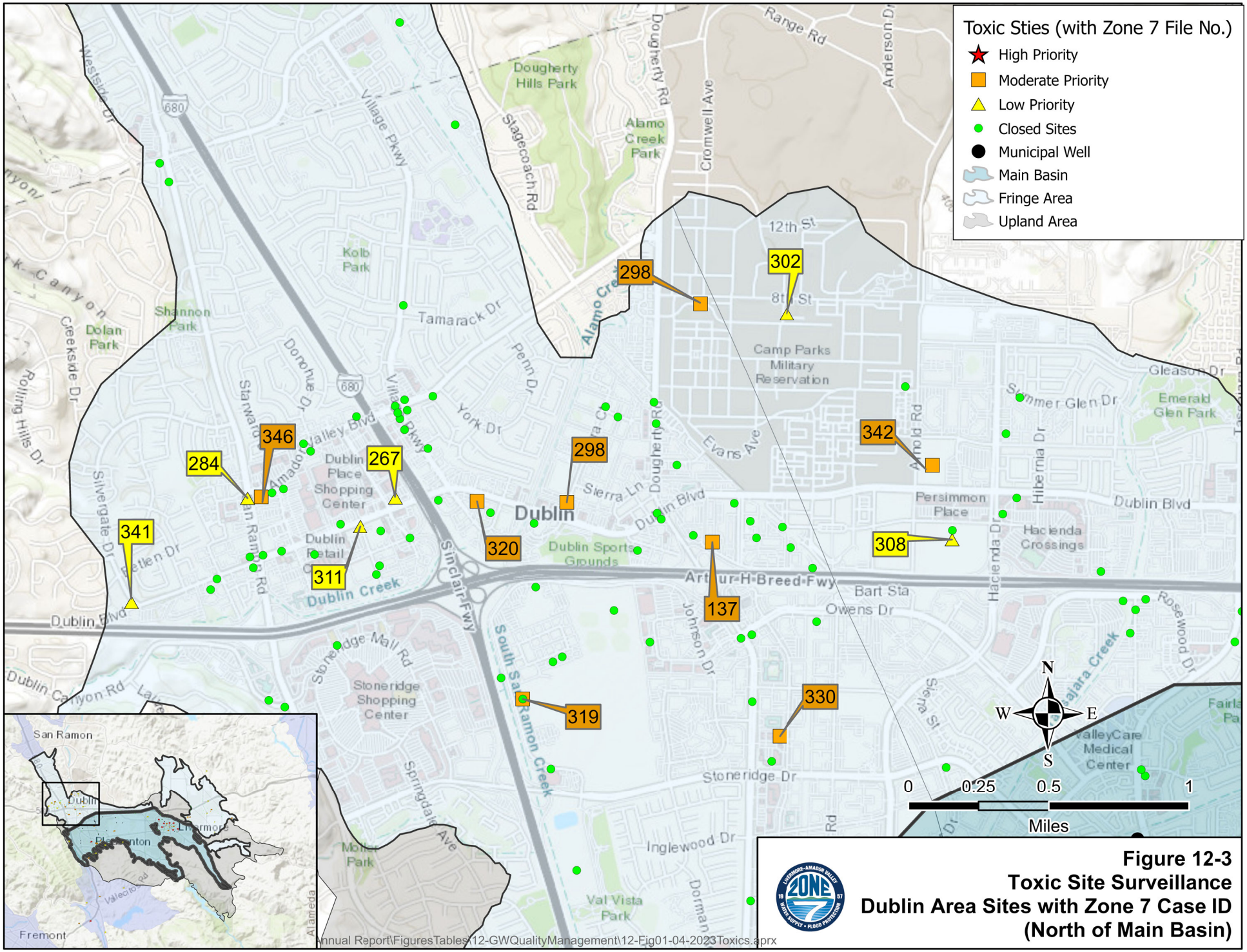


Figure 12-3
Toxic Site Surveillance
Dublin Area Sites with Zone 7 Case ID
(North of Main Basin)

nnual Report\FiguresTables\12-GWQualityManagement\12-Fig01-04-2023Toxics.aprx

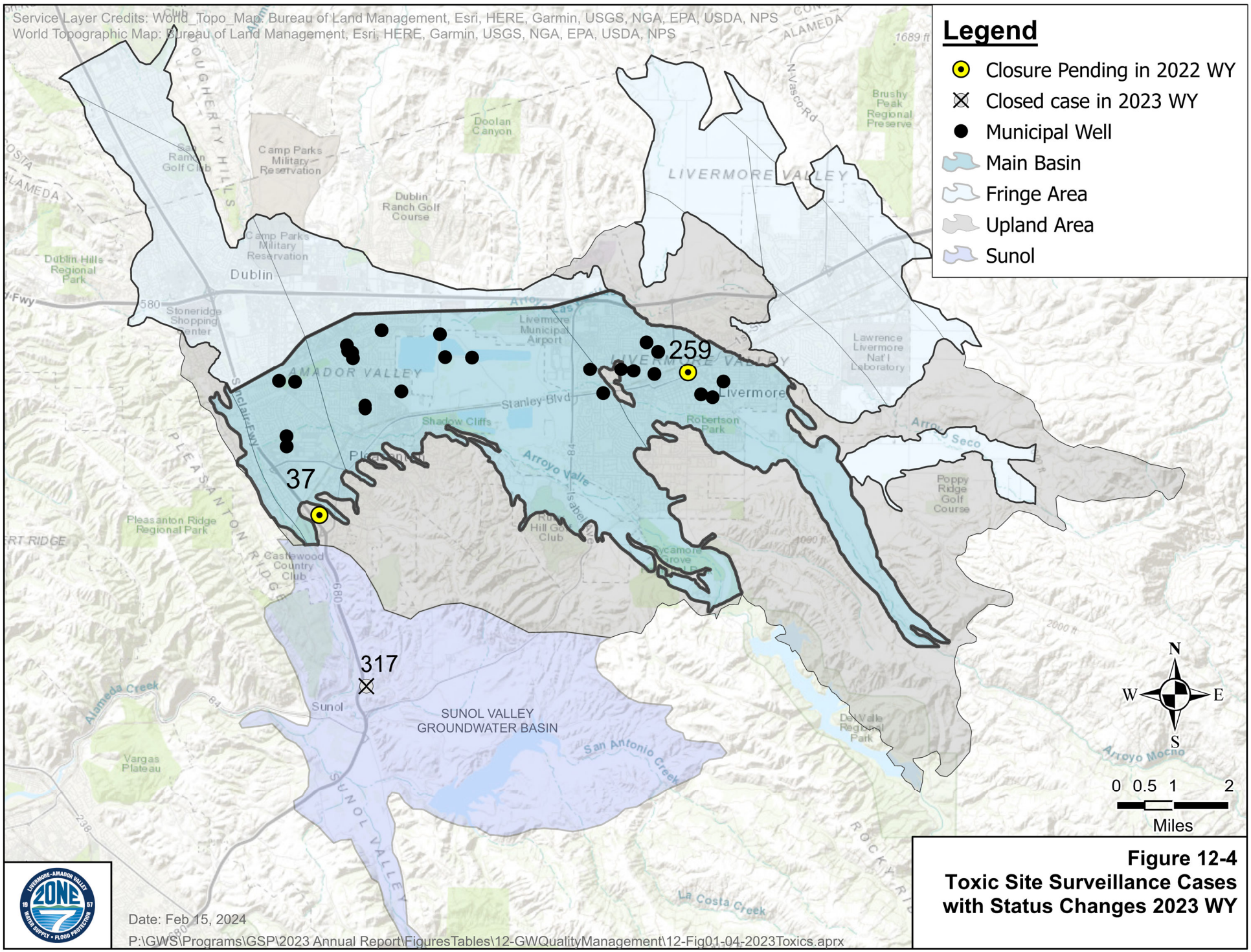
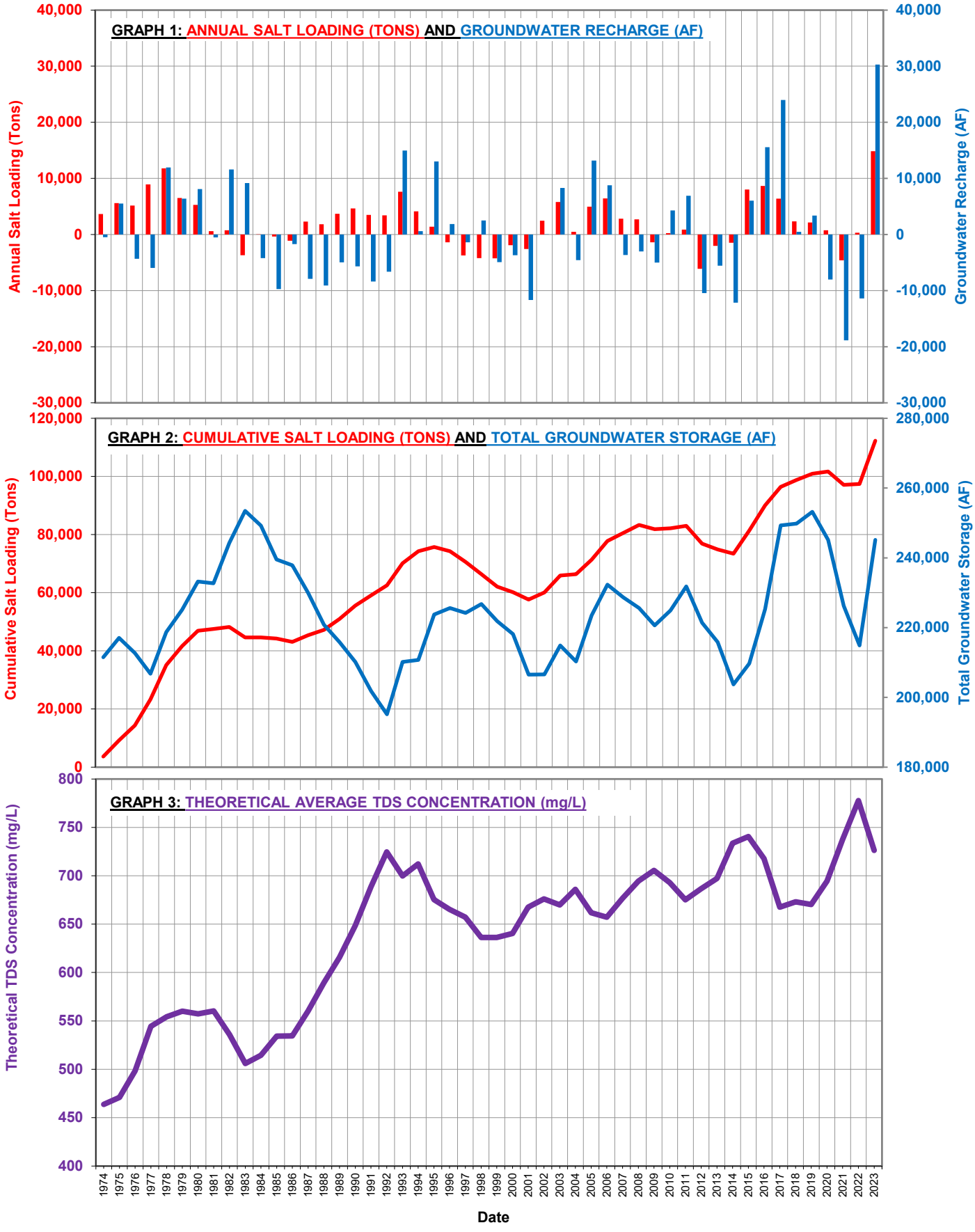

Service Layer Credits: World_Topo_Map: Bureau of Land Management, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
World Topographic Map: Bureau of Land Management, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
Legend
Closure Pending in 2022 WY
Closed case in 2023 WY
Municipal Well
Main Basin
Fringe Area
Upland Area
Sunol
259
37
317
LIVERMORE VALLEY
AMADOR VALLEY
SUNOL VALLEY
GROUNDWATER BASIN
Dublin
Livermore
Pleasanton
Sunol
Camp Parks Military Reservation
Dublin Ranch Golf Course
Doolan Canyon
Brushy Peak Regional Preserve
Dublin Hills Regional Park
Stoneridge Shopping Center
Livermore Municipal Airport
Lawrence Livermore Nat'l Laboratory
Stanley Blvd
Shadow Cliffs
Robertson Park
Arroyo Valle
Arroyo Seco
Poppy Ridge Golf Course
Pleasanton Ridge Regional Park
Castlewood Country Club
Vargas Plateau
Alameda Creek
San Antonio Creek
Arroyo Mocho
La Costa Creek
Del Valle Regional Park
N
W
E
S
0 0.5 1 2
Miles
Figure 12-4
Toxic Site Surveillance Cases with Status Changes 2023 WY
Date: Feb 15, 2024
P:\GWS\Programs\GSP\2023 Annual Report\FiguresTables\12-GWQualityManagement\12-Fig01-04-2023Toxics.aprx

FIGURE 12-5
MAIN BASIN SALT LOADING AND TDS CONCENTRATION
1974 to 2023 WATER YEARS



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