MONITORING NETWORK

14 MONITORING NETWORK

§ 354.32. Introduction to Monitoring Networks
This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.

This section describes the Sustainable Groundwater Management Act (SGMA) monitoring networks in the Delta-Mendota Subbasin (Basin), subsequently referred to as the "SGMA Monitoring Network."

14.1 Monitoring Network Objectives

§ 354.34. Monitoring Network

(a) Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.

(b) Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:

(1) Demonstrate progress toward achieving measurable objectives described in the Plan.

(2) Monitor impacts to the beneficial uses or users of groundwater.

(3) Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.

(4) Quantify annual changes in water budget components.

☑ **23 CCR § 354.34(a)**
☑ **23 CCR § 354.34(b)**

Pursuant to the California Code of Regulations Title 23 (23 CCR) Division 2 Chapter 1.5 Subchapter 2, the objective of the design and management of the SGMA Monitoring Network is to collect sufficient data to support assessment of the Sustainability Indicators relevant to the Basin, and the impacts to the beneficial uses and users of groundwater.

Per 23 CCR § 354.34(e), the SGMA Monitoring Network incorporates elements, to the extent possible, from existing monitoring programs that are active within the Basin (see **Section 5.2.1**) and includes additional components to comply with the Groundwater Sustainability Plan (GSP) Regulations. All monitoring will be performed in accordance with the protocols developed for the Basin, as described below in **Section 14.3**.

The objective of this SGMA Monitoring Network is to collect data with sufficient temporal frequency and adequate spatial density to evaluate GSP implementation in the Basin as it relates to:

- Monitoring short-term, seasonal, and long-term trends in groundwater and related surface water conditions;
- Demonstrating progress toward achieving the Measurable Objectives (MOs) described in the GSP;
- Monitoring impacts to the beneficial uses and users of groundwater;
- Monitoring changes in groundwater conditions relative to the MOs and Minimum Thresholds (MTs);
- Quantifying annual changes in water budget components; and,
- Monitoring impacts of Projects and Management Actions (P/MAs) within the Basin and in adjacent basins, such as the Red Top Subsidence Mitigation Project.

14.2 Description of Monitoring Network

§ 354.34. Monitoring Network

(d) The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.

(e) A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.

(f) The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:

(1) Amount of current and projected groundwater use.

(2) Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.

(3) Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.

(4) Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

(g) Each Plan shall describe the following information about the monitoring network:

(1) Scientific rationale for the monitoring site selection process.

(2) Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.

(3) For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.

(h) The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.

As shown in **Figure MN-1** through **Figure MN-6** and in **Figure MN-9** and **Figure MN-10**, **Figure MN-1Figure MN-10**the Basin's SGMA Monitoring Network is composed of Representative Monitoring Sites (RMS) where Sustainability Management Criteria (SMCs) have been established or will be established once baseline data have been collected. The SGMA Monitoring Network will include:

- Chronic Lowering of Groundwater Levels: 110 water level Representative Monitoring Wells (RMW-WL) (**Figure MN-1**);
- Reduction of Groundwater Storage: using Chronic Lowering of Groundwater Levels monitoring network as a proxy;
- Degraded Water Quality: 91 water quality Representative Monitoring Wells (RMW-WQ) (**Figure MN-5**);
- Land Subsidence: 35 survey points, four extensometers, and three Global Positioning System (GPS) subsidence monitoring stations, which will be evaluated alongside Basin-wide Interferometric Synthetic Aperture Radar (InSAR) data (**Figure MN-9**); and
- Depletions of Interconnected Surface Water: 25 Representative Monitoring Wells for Depletions of Interconnected Surface Water (RMW-ISW) and nine stream gauges (**Figure MN-10**).

The SGMA Monitoring Network consists of a series of monitoring sites that meet the following criteria: The SGMA Monitoring Network consists of a series of monitoring sites that meet the following criteria:

(1) Some sites are included in the monitoring programs already implemented by the Groundwater Sustainability Agencies (GSAs) and/or other existing monitoring programs that are active within the Basin;

(2) The sites have been demonstrated to be representative of groundwater or other relevant conditions within the Basin;

(3) The sites are spatially distributed and located in proximity to beneficial uses and users of groundwater (e.g., public supply wells, production wells, and groundwater dependent ecosystems [GDEs]);

(4) The sites that are located in proximity to critical infrastructure (e.g., the Delta-Mendota Canal [DMC], the California Aqueduct, Chowchilla Bypass, Fresno Slough, Mendota Pool, and San Joaquin River);

(5) Under the Memorandum of Agreement (MOA; **Appendix D**) guiding development of this GSP, each GSA must maintain at least one RMW-WL and one RMW-WQ in each aquifer from which pumping occurs, either within its GSA boundaries or within the area of influence of the pumping that is occurring; and

(6) The RMS are where SMCs (e.g., MOs, MTs and Interim Milestones [IMs]) will be defined for at least one of the relevant Sustainability Indicators for the Basin[50]:

- Chronic Lowering of Groundwater Levels;
- Reduction of Groundwater Storage;
- Degraded Water Quality;
- Land Subsidence; and

[50] As discussed below in **Section 14.2.3**, the Basin is at little to no risk for Seawater Intrusion; therefore, the Sustainability Indicator is not applicable.

- Depletions of Interconnected Surface Water.

Per 23 CCR § 354.34(g), other factors considered in the development of the SGMA Monitoring Network and the selection of each monitoring site and RMS include:

- Availability of existing technical information (e.g., well location, construction information, condition, status, etc.);
- Quality and reliability of historical data at the site;
- "Representativeness" to local groundwater conditions and nearby well populations (per 23 CCR § 354.36); and
- Projected availability of long-term access to the site.

Pursuant to 23 CCR § 354.34(f), the spatial distribution, spatial density, and temporal frequency of measurements collected from each site is determined for each applicable Sustainability Indicator based on the following considerations:

- Amount of current and projected groundwater use;
- Aquifer characteristics, including any vertical and/or lateral barriers to groundwater flow;
- Potential impacts to beneficial uses and users of groundwater, land uses, and property interests affected by groundwater production and the adjacent subbasins; and
- Availability of historical data to evaluate long-term trends in groundwater conditions associated with the above factors.

Table MN-1 summarizes the site type, site count, measured constituent(s), measurement frequency, and spatial density of the SGMA Monitoring Network for each of the relevant Sustainability Indicators mentioned above. As discussed in **Section 13.2**, the SMCs for Chronic Lowering of Groundwater Levels will be used as a proxy for Reduction of Groundwater Storage. As such, the SGMA Monitoring Network for water levels will also be used to address the Groundwater Storage Sustainability Indicator. Further details about the SGMA Monitoring Network for each Sustainability Indicator can be found in **Sections 14.2.1** through **14.2.6**.

Pursuant to 23 CCR § 354.34(i), in all cases the SGMA Monitoring Network will adhere to the monitoring protocols specified for the Basin as described in **Section 14.3**.

14.2.1 Monitoring Network for Chronic Lowering of Groundwater Levels

§ 354.34. Monitoring Network

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:

(A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.

(B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.

☑ 23 CCR § 354.34(c)(1)

The SGMA Monitoring Network for Chronic Lowering of Groundwater Levels consists of 110 RMW-WLs distributed across the Basin. The majority (102) of the RMW-WLs are existing wells, with the remaining eight to be constructed during GSP implementation. Of the RMW-WLs, 60 are screened in the Upper Aquifer, and 50 are screened in the Lower Aquifer. Specific details regarding these wells are listed in **Table MN-1**, and the RMW-WL locations are shown on **Figure MN-1**.

Per 23 CCR § 354.34, the selection of these RMW-WLs has been informed by the existing local monitoring programs, including the former California Statewide Groundwater Elevation Monitoring (CASGEM) monitoring program, and leverages historical data wherever possible to help assess and quantify Basin response to GSP implementation relative to historical and projected future groundwater conditions. The RMW-WLs were selected based on the following considerations:

- **GSA jurisdiction** – Under the MOA (**Appendix D**) guiding development of this GSP, each GSA must maintain a minimum of one RMW-WL in each aquifer from which it has groundwater pumping either within its GSA boundaries or within the area of influence of the pumping that is occurring.
- **Current and projected groundwater use** – The RMW-WLs are distributed across the Basin with focus on the areas with the highest densities of domestic wells, public wells, or other production wells.
- **Aquifer characteristics** – The RMW-WLs are screened within the Basin's two principal aquifers and are distributed for comprehensive coverage of each aquifer.
- **Potential impacts to beneficial uses and users of groundwater, land uses or property interests, and adjacent basins** – As mentioned above, RMW-WLs are most concentrated in the areas of highest well density (**Figure MN-2**). The RMW-WL locations have also been selected to provide monitoring near critical infrastructure, including the Delta-Mendota Canal, California Aqueduct, Chowchilla Bypass, Fresno Slough, Mendota Pool, and San Joaquin River, as shown in **Figure MN-3**, as well as other dams, levees, canals, pumping stations, and roads. Several RMW-WLs are proximate to the Basin boundary and will be used to monitor cross-boundary flows between the Basin and adjacent subbasins. As discussed below in **Section 14.2.6**, water levels in the RMW-ISW will be monitored to assess hydraulic gradients between surface water features, GDEs, and the

Upper Aquifer. **Figure MN-4** shows the locations of RMW-WLs relative to wetlands, vegetation, and interconnected surface water features in the Basin.

- **Availability, quality, and reliability of historical data** – Out of the existing RMW-WLs, 71 of them (69%) have a historical record spanning at least five years. About 31% of the RMW-WLs have associated water level records spanning at least 20 years and have at least one water level measurement recorded in the last ten years (i.e., since January 2013). Thirty-nine of the RMW-WLs are included in the Basin's CASGEM network. In preparing and populating the Basin Data Management System (DMS), Quality Assurance/Quality Control (QA/QC) checks were implemented to help ensure entry and maintenance of valid and accurate data.
- **Availability of site-specific technical information** – All of the RMW-WLs have known geographic coordinates, and most have known ground surface elevations and reference point elevations. Where exact elevations are not known, they are calculated from digital elevation models. Moreover, 82% of the existing RMW-WLs contain known well depths, well screen intervals, or both. For RMW-WLs where well construction information is incomplete or currently unavailable, the GSAs are developing plans to fill these data gaps in accordance with 23 CCR § 354.38 and as part of GSP implementation. All RMW-WLs have been confirmed to have access ports for water level measurement collection.
- **"Representativeness" to local groundwater conditions** – The wells chosen to serve as RMW-WLs must be representative of local groundwater conditions, which is determined by the following factors: well construction (i.e., the well depth and perforated interval) must be sufficient to represent the Principal Aquifers; well location must be representative of land and water use practices in the surrounding area; and the measured water level response to short- and longer-term conditions (i.e., seasonal and multi-year trends) is consistent with measurements in other nearby wells, where available.
- **Long-term access** – For each RMW-WL, the California Department of Water Resources (DWR) Best Management Practices #2 for Monitoring Network and Identification of Data Gaps (DWR, 2016b) recommends that GSAs secure long-term agreements with associated landowners/well owners allowing local GSA representatives year-round, long-term access to the site to conduct monitoring for SGMA compliance purposes. All wells have been confirmed to have landowner access for water level measurement collection.

Monitoring Well Density

According to *Best Management Practices (BMP) #2 Monitoring Networks and Identification of Data Gaps* (DWR, 2016b), monitoring well density should be between 0.2 and 10 wells per 100 square miles. The recommended minimum monitoring well density for the Basin is four wells per 100 square miles if the Basin produces more than 10,000 acre-feet per year (AFY) pumping per 100 square miles (DWR, 2016b). Accordingly, for the 1,195-square-mile Basin, the recommended number of RMW-WLs is at least 48 wells in the Upper Aquifer. The Lower Aquifer exists only where the Corcoran Clay is present, covering an area of 1,027 square miles. The recommended number of monitoring wells for the Lower Aquifer is therefore 41. The 60 RMW-WLs in the Upper Aquifer and 50 RMW-WLs in the Lower Aquifer comprising the SGMA Monitoring Network exceed this recommendation. Additionally, each GSA maintains at least one RMW-WL in each Principal Aquifer from which local pumping occurs. There is an approximately 50 square mile

area in the southeastern portion of the Lower Aquifer that does not contain RMW-WLs; however, as shown in **Figure MN-2**, there are very few pumping wells in this area, therefore, this is not considered a data gap.

14.2.2 Monitoring Network for Reduction of Groundwater Storage

§ 354.34. Monitoring Network

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(2) Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.

☑ **23 CCR § 354.34(c)(2)**

As described in **Sections 13.2.1.3** and **13.2.2.1**, the SMCs for the Reduction of Groundwater Storage are directly tied to those developed for Chronic Lowering of Groundwater Levels. As such, the SGMA Monitoring Network for Reduction of Groundwater Storage will be comprised of the same RMW-WLs described in **Section 14.2.1**. The information collected from this SGMA Monitoring Network will be sufficient to estimate the change in annual groundwater in storage.

14.2.3 Monitoring Network for Seawater Intrusion

§ 354.34. Monitoring Network

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(3) Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.

…

(j) An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.

☑ **23 CCR § 354.34(c)(3)**
☑ **23 CCR § 354.34(j)**

As described in **Section 13.3.1**, seawater intrusion is not present and not likely to occur within the Basin. Therefore, the Seawater Intrusion Sustainability Indicator is not applicable to the Basin and no SMCs for this Sustainability Indicator are defined. As such, per the stipulations defined under 23 CCR § 354.32(j), a monitoring network has not been defined for the Seawater Intrusion Sustainability Indicator.

14.2.4 Monitoring Network for Degraded Water Quality

§ 354.34. Monitoring Network

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(4) Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.

☑ 23 CCR § 354.34(c)(4)

Per California Water Code (CWC) Section 10725, the powers and authorities granted to GSAs to affect sustainable groundwater management under SGMA include, but are not limited to, conducting investigations, registering and metering of groundwater extraction facilities, acquiring surface water or groundwater, reclaiming waters for subsequent beneficial use, regulating groundwater extraction, and establishing accounting rules for groundwater extraction allocations. Regulatory oversight authority for drinking water quality rests with the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) and not with the GSAs. As discussed in **Section 13.4.1**, Undesirable Results would only be experienced if the water quality conditions are caused by groundwater management (i.e., groundwater recharge or extraction) within the Basin. To monitor groundwater conditions requires adequate spatial well density, depth discrete well perforation intervals, and measurements that capture temporal water quality and level conditions in the principal aquifers.

Monitoring data can demonstrate the potential nexus between groundwater management and elevations in the Basin and constituent concentrations in the water produced by wells. Per 23-CCR § 354.32(e), the selection of these RMS has been informed by existing local monitoring programs and leverages historical data wherever possible to help assess and quantify Basin response to GSP implementation relative to historical and projected future groundwater conditions.

The SGMA Monitoring Network for Degraded Water Quality consists of 91 RMW-WQs distributed across the Basin. The majority (83) of the RMW-WLs are existing wells, with the remaining eight to be constructed during GSP implementation. Of the RMW-WQs, 48 are screened in the Upper Aquifer and 43 are screened in the Lower Aquifer. Specific details regarding these wells are shown in **Figure MN-5** and summarized in **Table MN-1**. The SGMA Monitoring Network for Degraded Water Quality was selected based on the following considerations:

- **GSA jurisdiction** – Under the MOA (**Appendix D**) guiding development of this GSP, each GSA must maintain a minimum of one RMW-WQ in each aquifer in which it has groundwater pumping either within its GSA boundaries or within the area of influence of the pumping that is occurring.
- **Current and projected groundwater use** – As required by the MOA, each GSA must monitor water quality in each principal aquifer from which water is extracted within its boundaries. Thus, sampling occurs wherever water is used. **Figure MN-6 shows the locations of RMW-WQs relative to production wells throughout the Basin**. The RMW-WQs include eight Public Water System (PWS) wells. These wells are already sampled and analyzed relative to drinking water quality standards, which are the most stringent current and projected water quality standards in the Basin. Additional wells listed in **Table MN-1** include 31 agricultural production wells (i.e., irrigation wells), four domestic wells, one industrial well, and 32 dedicated monitoring wells.

- **Aquifer characteristics** – All RMW-WQs are screened in the alluvial materials that form the Basin's principal aquifers. Monitoring of water quality is conducted in both aquifers at various depths which provides sufficient sampling to characterize the production zones of the principal aquifers.
- **Potential impacts to beneficial uses and users of groundwater, land uses or property interests, and adjacent Basins (or GSAs)** – Drinking water is the most sensitive beneficial use of water in the Basin. The PWS wells are required to meet drinking water standards in the Basin (i.e., compliance with Title 22 CCR drinking water regulations for Maximum Contaminant Levels [MCLs]). Additionally, the requirement that each GSA maintains a minimum of one RMW-WQ in each aquifer from which groundwater is extracted ensures that water quality is monitored in areas with known domestic wells.
- **Availability, quality, and reliability of historical data** – Historical data for at least one Constituent of Concern are available in 61 of the 88 existing RMW-WQs and have been compiled into the Basin DMS. Data collection for the remaining wells will commence in calendar year 2024 and results included as part of the next Annual Report (Water Year [WY] 2024). Wells that are sampled as part of existing monitoring programs, such as Title 22, Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS), or the Irrigated Lands Regulatory Program (ILRP), are subject to validation during the reporting process. Additionally, in preparing and populating the Basin DMS, QA/QC checks were implemented to help ensure entry and maintenance of valid and accurate data.
- **Availability of site-specific technical information** – As shown in **Table MN-1**, the existing RMW-WQs have known coordinates, and 79% have known well construction information (including total depth, perforated intervals, or both). For the RMW-WQs where well construction information is incomplete or currently unavailable, the GSAs are developing plans to fill these data gaps in accordance with 23 CCR § 354.38 and as part of GSP implementation (**Section 14.5**).
- **"Representativeness" to local groundwater conditions** – As previously mentioned, the RMW-WQs are considered representative of local conditions given that the well depths and perforated intervals sample from a sufficient range of depths to represent conditions in both principal aquifers, and the wells are located throughout the Basin in GSAs that represent urban, domestic, and agricultural land uses. Furthermore, where historical data are available, average total dissolved solids (TDS) and nitrate concentrations in RMW-WQs over the 2005 – 2014 and 2015 – 2023 periods show good agreement with the concentration contours generated for those periods using all GSA-provided and publicly available data (as described in **Sections 8.5.2.2** and **8.5.2.5**), indicating that water quality in these wells is representative of conditions in the respective principal aquifers. **Figure MN-7** and **Figure MN-8** show plots of RMW-WQ measured average concentration data versus concentration contours from these two time periods for TDS and nitrate as nitrogen, respectively.
- **Long-term access** – For each RMW-WQ that is not a PWS or directly owned by the GSA, the GSAs have secured long-term agreements with associated land / well owners allowing local GSA representatives access to the site to conduct monitoring for SGMA compliance purposes. Data from the PWS wells will be accessed via the Safe Drinking Water Information System (SDWIS) Drinking Water Watch website.

Monitoring Well Density

The recommended monitoring well density is at least four wells per 100 square miles (see previous discussion for the water level monitoring network in **Section 14.2.1**). Accordingly, the recommended number of RMW-WQs in the Upper Aquifer is 48, and the recommended number of wells in the Lower Aquifer, which covers a lesser spatial extent, is 41. The 48 RMW-WQs in the Upper Aquifer and 43 RMW-WQs in the Lower Aquifer comprising the SGMA Monitoring Network comply with this recommendation. Additionally, within each GSA, there is at least one RMW-WQ in each principal aquifer from which local pumping occurs.

14.2.5 Monitoring Network for Land Subsidence

> *§ 354.34. Monitoring Network*
>
> *(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:*
>
> *(5) Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.*

☑ 23 CCR § 354.34(c)(5)

The SGMA Monitoring Network for Land Subsidence consists of 42 Representative Monitoring Sites for Land Subsidence (RMS-LS), including 35 survey points, four extensometers, and three continuous Global Positioning System (CGPS) points. Several of the sites are managed by federal agencies, including the United States Geological Survey (USGS), United States Bureau of Reclamation (USBR), and EarthScope Consortium (formerly University NAVSTAR Consortium or UNAVCO). Additionally, the entire Basin will be monitored for compliance with subsidence SMCs using InSAR data published quarterly by DWR.

Specific details regarding each of the above sites are listed in **Table MN-2** and site locations are shown in **Figure MN-9**. These sites were selected based on the following considerations:

- **Potential impacts to beneficial uses and users of groundwater, land uses or property interests** – The sites are situated in proximity to critical infrastructure facilities within the Basin, including the Delta-Mendota Canal, California Aqueduct, Chowchilla Bypass, San Joaquin River, Fresno Slough, Mendota Pool, and other dams, levees, local canals, pumping stations, and roads.
- **Availability, quality, and reliability of historical data** – All of the RMS-LS have historic elevation or compaction data, including 16 with records starting prior to the year 2000. Data collected at sites monitored by the USGS or USBR undergo the respective agency's validation process prior to release. Additionally, in preparing and populating the Basin DMS, QA/QC checks were implemented to help ensure entry and maintenance of valid and accurate data.
- **Long-term access** – As previously noted, all RMS-LS have been confirmed to have sufficient access for data collection.

In addition to the above monitoring and the utilization of DWR's InSAR surveys, the GSAs will gather and consider data from other USBR checkpoints along the Delta-Mendota Canal and from the San Joaquin River Restoration Program (SJRRP) geodetic network as data become available.

14.2.6 Monitoring Network for Depletions of Interconnected Surface Water

§ 354.34. Monitoring Network

(c) Each monitoring network shall be designed to accomplish the following for each sustainability indicator:

(6) Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:

(A) Flow conditions including surface water discharge, surface water head, and baseflow contribution.

(B) Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.

(C) Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.

(D) Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.

☑ **23 CCR § 354.34(c)(6)**
☑ **23 CCR § 354.34(j)**

23 CCR § 354.28(c) states that the SMCs for Depletions of Interconnected Surface Water "shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." Monitoring the depletion of interconnected surface water must therefore characterize the spatial and temporal changes in the exchange between surface water and groundwater conditions by collecting data to characterize the following:

- Flow conditions including surface water discharge, surface water head ("stage"), and baseflow contribution.
- The approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.
- Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.
- Vertical groundwater gradients near surface water features.
- Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.

Water table and streamflow changes can be characterized with measured water levels in shallow wells located near stream gauging stations (stream gauges are locations where surface water level elevation [stage] and/or volumetric discharge [flow] are measured). The SGMA Monitoring Network for Depletions of Interconnected Surface Water that was developed for the Basin is comprised of 34 Representative Monitoring Sites for Depletions of Interconnected Surface Water (RMS-ISW), 25 of which are wells and

nine of which are stream gages, as shown in **Figure MN-10** and summarized in **Table MN-1**. Six of the wells are part of nested sets. Of the 34 RMS-ISW, 18 wells and seven stream gages currently exist, and an additional seven wells and two stream gages will be constructed during GSP implementation. The sites were selected based on the following considerations:

- **Current and projected groundwater use** – To the extent possible, the RMW-ISWs are located near surface water features and GDEs, which are environmental users of groundwater.
- **Aquifer characteristics** – 16 of the 25 RMW-ISW wells are or will be screened within the top 50 feet of shallow alluvial materials. These relatively shallow well depths are considered representative of the shallow water-bearing zone conditions. The deeper wells in the ISW monitoring network will allow monitoring of potential relationships with production zone conditions and shallow water levels. As such, the SGMA Monitoring Network is sufficient to monitor potential shallow groundwater level changes due to GSA management actions in the Basin.
- **Potential impacts to beneficial uses and users of groundwater, land uses or property interests** – As described in **Sections 7.1.4**, **8.7**, and **8.8**, shallow groundwater is common, particularly in the eastern part of the Basin, with most GDEs located within the Grassland area. As such, the RMS-ISWs are located near surface water features and the GDEs to monitor any potential impacts of groundwater use and management to beneficial users (including environmental users) (**Figure MN-4**).
- **Availability, quality, and reliability of historical data** – In addition to the groundwater monitoring record described in **Section 14.2.1**, the majority of the existing surface water RMS-ISWs have continuous records of at least 15 years, with three that extend back to the 1990s. In preparing and populating the Basin DMS, QA/QC checks were implemented to help ensure entry and maintenance of valid and accurate data.
- **Availability of site-specific technical information** – As shown in **Table MN-1**, all existing RMS-ISWs have location coordinates and all but one of the existing wells have known construction information that includes perforated intervals.
- **"Representativeness" to local groundwater conditions** – The sites "representativeness" to local groundwater conditions is determined by location relative to the surface water features and well construction. **Figure MN-10** indicates that the RMW-ISWs are located along streams and/or near GDEs and are representative of water table conditions in the Basin near these surface water features.
- **Long-term access** – The GSAs have secured long-term access for the RMS-ISWs to conduct monitoring for SGMA compliance purposes.

14.3 Monitoring Protocols for Data Collection and Monitoring

§ 352.2. Monitoring Protocols

Each Plan shall include monitoring protocols adopted by the Agency for data collection and management, as follows:

(a) Monitoring protocols shall be developed according to best management practices.

(b) The Agency may rely on monitoring protocols included as part of the best management practices developed by the Department, or may adopt similar monitoring protocols that will yield comparable data.

(c) Monitoring protocols shall be reviewed at least every five years as part of the periodic evaluation of the Plan, and modified as necessary.

§ 354.34. Monitoring Network

(i) The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.

☑ **23 CCR § 352.2**
☑ **23 CCR § 354.34(i)**

Pursuant to 23 CCR § 354.32, in all cases the SGMA Monitoring Network will adhere to the monitoring protocols developed by the Basin GSAs. Monitoring is needed to track changes in Basin conditions, Sustainability Indicators, and the effectiveness of GSP implementation to achieve groundwater sustainability. Data collection protocols for groundwater levels, groundwater quality, land subsidence, and surface water are detailed below and are designed for compatibility with the 23 CCR and DWR's "BMP #1 for Groundwater Monitoring Protocols, Standards, and Sites" (DWR, 2016a).

The Basin's monitoring protocols are designed to ensure the following:

1. Data are collected from the correct location with proper site identification;
2. Data are accurate and reproducible;
3. Data represent conditions in the Basin;
4. All salient information is recorded to check and correct data; and
5. Data are handled in a way that ensures data integrity.

14.3.1 Protocols for Groundwater Level Measurements

Groundwater level measurements shall be collected at least quarterly (e.g., in October, January, April and July), except when required more frequently per the Basin's Pumping Reduction Plan (**Section 16.1.1**). The groundwater level data will be used to support adaptive management of the Basin and to support required data analysis and reporting. The following data collection protocols should be followed by the field technician:

- Water level measurements should be taken in wells that are not influenced by recent pumping. Measurements should be taken at least two hours, and preferably longer, after the well was last pumped. Local knowledge of a particular well's behavior may be used to determine a suitable

waiting period if two hours is insufficient. Multiple measurements can be collected from the well to verify that equilibrium has been reached.

- Depth to water (DTW) shall be measured by an electronic sounder, chalked steel tape, or datalogging pressure transducer. As required by 23 CCR § 352.4(a)(3), DTW shall be recorded to at least the nearest 0.1 foot and preferably to the nearest 0.01 foot. Other measurement methods such as airlines and acoustic sounders may not provide the required accuracy of 0.1 foot.
- DTW shall be measured from a specific, easily identifiable, and clearly marked reference point (RP) on the well casing. As required by 23 CCR § 352.4(a)(4), the reference point elevation (RPE) should be surveyed relative to the North American Vertical Datum of 1988 (NAVD 88) to an accuracy of 0.5 foot and preferably to an accuracy of 0.1 foot or less. Hand-held GPS units likely will not provide vertical elevation measurements accurate enough to meet these requirements.
- For artesian or flowing wells, site-specific procedures should be developed to collect accurate water level data. This procedure may require the installation of a temporary manometer where the flow is directed to a vertical tube that is tall enough to prevent the flow so the height of the water can be measured above the RP. Alternatively, the well could be capped with a valve and a separate pressure gauge, and the water pressure is measured after closing the valve and the pressure converted to feet of water (one pound per square inch equals 2.31 feet of water height).
- Groundwater elevation shall be calculated as:

  $$GWE = RPE - DTW$$

  Where:

  GWE = Groundwater Elevation;

  RPE = Reference Point Elevation; and

  DTW = Depth to Water
- Consistent units of feet, tenths of feet, and hundredths of feet should be used, and measurements should not be recorded in units of feet and inches.
- The site identifier, date, time (24-hour format), method of measurement, height of RPE above or below the ground surface, DTW, groundwater elevation, name of technician, and any factors that may influence the DTW measurements such as weather, nearby irrigation or pumping, flooding, or well condition shall be recorded in a field log or sheet. If a measurement cannot be obtained, the reason the measurement was not collected should be recorded.
- Any well caps, plugs, or locks should be replaced and access points such as doors or gates returned to the condition found upon arrival at the site.
- Measurement devices shall be rinsed or cleaned as necessary before and after measuring each well and routinely maintained and tested in accordance with manufacturer's instructions to ensure measurement accuracy.

Where and when deemed appropriate, data loggers may be implemented to record water levels more frequently (e.g., hourly, daily, weekly, and so forth). Groundwater levels may be recorded using pressure

transducers equipped with data loggers installed in monitoring wells. The following general protocols must be followed when installing a pressure transducer in a monitoring well or for recording stream stage:

- Utilize the protocols above to determine the water levels in the monitoring well (or stilling well of streamflow station) and properly program and reference the transducer installation.
- Record the well identifier, the associated transducer serial number, transducer range, transducer accuracy, and cable serial number.
- Employ transducers able to record groundwater levels with an accuracy of at least 0.1 foot, and confirm the instrument has sufficient battery life, and data storage capacity, and can accommodate a range of groundwater level fluctuations and natural pressure drift.
- If using non-vented units, consistent and coincident logging of barometric pressures is required.
- Follow manufacturer specifications for installation, calibration, data logging intervals, battery life, correction procedure (if non-vented cables used), and anticipated life expectancy to assure that data quality objectives are being met for the GSP.
- Secure the cable to the well head with a well dock or another reliable method. Monitor against potential future cable slippage by marking cable at the same elevation of the RP.
- The transducer data should periodically be checked against hand measured groundwater levels to monitor electronic drift or cable movement. This should happen during routine site visits, at least annually, or as necessary to maintain data integrity. If drift is observed, the transducer should be removed and serviced before being reinstalled.

The data will be downloaded as necessary to ensure no data are lost, undergo QA/QC checks, and be entered into the Basin's DMS. Data collected with non-vented data logger cables should be corrected for atmospheric barometric pressure changes, as appropriate, prior to being entered into the DMS. After the technician is confident that the transducer data have been safely downloaded and stored, the data should be deleted from the data logger to ensure adequate memory storage remains.

14.3.2 Protocols for Water Quality Sampling

Water quality samples to be analyzed for all constituents for which SMCs have been set (arsenic, nitrate as nitrogen, 1,2,3-trichloropropane (1,2,3-TCP), gross alpha radioactivity, TDS, and hexavalent chromium) shall be collected at least twice annually during seasonal highs and lows, preferably at the same time that groundwater level measurements are collected. Wells with an observed MT exceedance during the last three years shall be sampled quarterly. General steps for water quality sampling include depth to groundwater measurement prior to purging, multi-meter calibration, installation of sampling pump (if required), purging of the well casing, water quality sample collection in lab-specified bottles, and following standard chain-of-custody guidelines for sample preservation and transport. All analyses should be performed by a laboratory certified under the State Environmental Laboratory Accreditation Program. The following data collection protocols should be followed by the field technician in addition to protocols identified in the USGS *National Manual for the Collection of Water-Quality Data*:

- Record the site identifier, date, time (24-hour format), condition of the well, DTW measurement, meter calibration information[51], purge volumes, meter readings during purging, water quality samples that were collected and preservation methods used, and the name of technician in a field log or sheet.
- Production wells shall be sampled while the well pump is running, with well water collected from a spigot near the wellhead. Samples should not be collected from storage tanks, at a long distance from the wellhead, or after any water treatment. Sample ports and sampling equipment must be cleaned prior to sample collection.
- Monitoring wells without a permanent pump installation shall be purged and sampled using a submersible pump or bailer. Submersible pump, tubing, and sampling equipment shall be cleaned before first use and between sample sites.
- If possible, a minimum of three casing volumes shall be purged from the well prior to sample collection. For larger wells and wells with permanent pump installations, purging of three casing volumes may not be necessary or practical depending on the well's operational history and operational constraints. If a well is pumped dry, the well will be allowed to recover within 90% of original water level prior to sampling. Professional judgment shall be used to determine well purging required to achieve a representative sample from the well.
- If applicable, field parameters (e.g., pH, specific conductance, temperature, and dissolved oxygen) shall be monitored using a multi-meter and flow cell during purging. Field parameters shall be allowed to stabilize during purging so that variation of each parameter is within appropriate pre-defined limits for three casing volumes. In cases where purging of three casing volumes is not practical, field parameters shall be stable for three successive measurements collected at least three minutes apart. All field instruments shall be calibrated daily and evaluated for drift throughout the day.
- Prior to collection, new sample bottles appropriate to each analysis shall be obtained from the analytical lab contracted for chemical analysis. Each sample bottle shall be clearly labeled after sampling with the site identifier, sample personnel, date, time of sample collection (24-hour format), preservative used, and required analysis. Samples shall be collected according to appropriate standards such as those listed in the *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association et al., 2023), the USGS *National Field Manual for the Collection of Water-Quality Data* (USGS, 2023b) or other appropriate guidance. The specific sample collection procedure should reflect the type of analysis to be performed. Samples should be collected under laminar flow conditions which may require reducing the flow rate prior to sample collection. Samples shall be filtered as recommended for the specific analytes.
- After collection, all sample bottles shall immediately be preserved as required, dried, sealed in zip-closure polyethylene bags, and placed on ice in an insulated cooler for temporary storage and transport to the analytical lab. All samples shall be delivered to the laboratory following standard chain-of-custody control guidelines within their prescribed holding times.

[51] Ideally, a multi-meter shall be used to collect field parameters prior to sample collection. As applicable, multi-meter probes shall be calibrated per manufacturer specifications using standards closest to that of the anticipated well-water.

- Field duplicates and field blank samples shall be collected and analyzed for QA/QC purposes. Duplicate samples will be collected, processed, and analyzed in the field using the same methodology as the primary sample, with an assigned dummy site identifier. Field blanks shall be collected for quality assurances purposes. Field blanks will be collected using deionized water, processed in the field, and then submitted to the laboratory with a dummy site identifier.
- Consistent analytical methods shall be used to measure concentrations to the extent practical. In all cases, data shall be quantified using consistent units and measurement types (e.g. nitrate as N versus nitrate as NO3)

14.3.3 Protocols for Land Subsidence Measurements

Land subsidence data shall be collected annually from the Basin's monitoring network and downloaded from public sources annually or when published. Pursuant to DWR's BMP#1 (DWR, 2016a), evaluating and monitoring land subsidence can utilize multiple data sources and numerous techniques to evaluate the specific conditions and associated causes. The following guidelines will be followed:

- The use of existing subsidence monitoring sites will be incorporated to the greatest extent possible. Publicly available data will be downloaded and stored in the Basin's DMS following QA/QC.
- Leveling and GPS surveys conducted by the GSAs will follow surveying standards set out in the *Caltrans Surveys Manual* (California Department of Transportation, 2021).
- Measurements will be in the same vertical datum, preferably NAVD88.

14.3.4 Protocols for Streamflow Measurements

Streamflow measurements shall be conducted monthly. Monitoring streamflow is important for water budget analyses and for the evaluation of stream depletions associated with groundwater conditions. The following guidelines have been adopted from the GSP Regulations and DWR's BMP#1 (DWR, 2016a):

- The use of existing streamflow monitoring sites will be incorporated to the greatest extent possible.
- Establishment of new streamflow monitoring sites will consider the existing network and the objectives of the new locations. Professional judgement will be used to determine the appropriate permitting that may be necessary for the installation of any monitoring location along surface water bodies. Regular and frequent access will be necessary for these sites for data collection, site maintenance, and development of rating curves.
- To establish a new streamflow monitoring site, special consideration must be made to select an appropriate location for measuring stage and discharge. Once a site is selected and established, a relationship of stream stage and discharge is necessary to provide continuous estimates of streamflow. Numerous measurements of discharge at several different stream stages are necessary to develop a rating curve(s) correlating stage and discharge. A stilling well and pressure transducer with a datalogger can be used to record stage on a continuous basis and discharge can be estimated using the rating curve.

- Streamflow measurements shall be collected, analyzed, and reported in accordance with the procedures outlined in USGS Water Supply Paper 2175, *Volume 1 – Measurement of Stage and Discharge* and *Volume 2 – Computation of Discharge* (Rantz, 1982b, 1982a). This methodology is currently being used by the USGS and DWR for existing streamflow monitoring.
- Continue coordinating with the adjacent subbasins on the use of existing streamflow monitoring sites and on the installation of new sites.

14.3.5 Protocols for Data Management and Reporting

Records of all data collected will be maintained in the Basin DMS. Prior to importation, standard QA/QC checks will be undertaken to help ensure the validity and accuracy of data.

- DTW measurements shall be converted to groundwater elevations by subtracting the DTW from the reference point elevation following the protocols for groundwater level measurements described above.
- Groundwater elevation shall be plotted on individual well hydrographs. Groundwater elevations which vary significantly from previous measurements shall be evaluated to determine if the measurement is questionable due to a substantial change relative to historical conditions. If determined that the measurement is anomalous, the measurement will be flagged as questionable in the Basin DMS.
- Laboratory reports shall be checked to ensure all samples were analyzed within the prescribed holding times.
- Laboratory reports shall be checked to ensure all laboratory blank analyses were determined acceptable by the laboratory.
- Constituent detections in the field blank shall be tabulated and compared to their respective practical quantitation limit.
- Field duplicate results shall be compared to the primary sample results. Ideally, concentrations should agree within 10% or have differences within their respective practical quantitation limit. If concentrations from duplicate samples vary by more than 25%, the GSA may ask the laboratory to reanalyze the constituent to confirm the result is reasonable.
- Major cations and anions possess positive and negative charges, respectively, and therefore, the sum of cations should equal the sum of anions in any water sample for which a comprehensive suite of cations and anions are measured. An anion-cation charge balance shall be calculated for using mass-charge concentrations in milliequivalents per liter (meq/L), with the difference between the two sums reported as a percentage where:

$$\frac{Anions - Cations}{Anions + Cations} \times 100$$

  In general, a 5% or less difference is acceptable. Deviations can be greater if other constituents in the groundwater are not accounted for within the major anions and cations categories. If the anion/cation balance difference exceeds 15%, the GSA may ask the laboratory to reanalyze certain constituents or the entire sample to confirm the result is accurate.

- All non-detects shall be clearly identified in the DMS, and the reporting limit shall be recorded.
- At a minimum, arsenic, nitrate as nitrogen, 1,2,3-TCP, gross alpha radioactivity, TDS, and hexavalent chromium concentrations shall be plotted on individual well chemographs to monitor trends and ensure concentrations are reasonable.

After QA/QC, all data shall be imported into the Basin DMS as soon as practical. Applicable data will also be integrated into Annual Reports, as required by DWR, and will be uploaded to the SGMA data portal. Per the GSP Regulations (23-CCR § 352.4), the following reporting standards apply to all categories of information, unless otherwise indicated:

- Water volumes shall be reported in acre-feet (AF).
- Surface water flow shall be reported in cubic feet per second (cfs) and water volumes shall be reported in AF.
- Field measurements of elevations of groundwater, surface water, and land surface shall be measured and reported in feet to an accuracy of at least 0.1 feet relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described.
- Reference point elevations shall be measured and reported in feet to an accuracy of at least 0.5 feet, or the best available information, relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described.
- Geographic locations shall be reported in GPS coordinates by latitude and longitude in decimal degree to five decimal places, to a minimum accuracy of 30 feet, relative to the North American Datum of 1983 (NAD83), or another national standard that is convertible to NAD83.

14.4 Representative Monitoring

§ 354.36. Representative Monitoring

Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:

(a) Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.

(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:

(1) Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.

(2) Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.

(c) The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.

☑ 23 CCR § 354.36

14.4.1.1 Designated Representative Monitoring Sites

☑ 23 CCR § 354.36(a)
☑ 23 CCR § 354.36(c)

"Representative monitoring" refers to monitoring sites within a broader network of sites that typifies one or more conditions within the Basin or a subarea of the Basin. As described in **Section 14.2**, the Basin GSAs have defined a SGMA Monitoring Network for each relevant Sustainability Indicator. The SGMA Monitoring Network is composed of RMS for which SMCs have been or will be established. The rationale for selecting RMS is described for each Sustainability Indicator in **Sections 14.2.1** through **14.2.6**.

The RMS and associated data collection activities include a subset of sites and activities that are already part of existing monitoring and reporting programs that will now also be used for SGMA reporting purposes. The data from these RMS will be used to monitor the Sustainability Indicators and evaluate GSP implementation with respect to meeting the Sustainability Goal defined for the Basin. This objective can be achieved by data showing compliance with the Basin SMCs.

As discussed in **Section 14.2**, each RMS was selected to ensure that it represents general conditions in the area, with specific considerations regarding the following: (1) current and projected groundwater use, (2) aquifer characteristics, (3) potential impacts to beneficial uses and users of groundwater, land uses or property interests, and adjacent basins, (4) availability, quality, and reliability of historical data, (5) availability of site-specific technical information, and (6) "representativeness" to local groundwater conditions.

14.4.1.2 Use of Groundwater Elevations as Proxy for Monitoring Other Sustainability Indicators

Correlation Between Groundwater Elevations and Other Sustainability Indicators

☑ 23 CCR § 354.36(b)(1)

Water level measurements and calculated groundwater elevations may be used as a proxy for monitoring other Sustainability Indicators when they are correlated, uncertainty is adequately represented by the specified margin of operational flexibility, and the RMS are shown to reflect general conditions in the Basin or subarea of the Basin. Reduction of Groundwater Storage is correlated to water levels because groundwater storage changes are quantified by the physical properties of the aquifer (storativity) and water level change. The SGMA Monitoring Network for Chronic Lowering of Groundwater Levels will therefore be used as a proxy to monitor Reduction of Groundwater Storage, and the SMCs have been defined to be protective of Reduction of Groundwater Storage.

Margin of Operational Flexibility

☑ 23 CCR § 354.36(b)(2)

As stated in **Section 13.2.1**, a significant and unreasonable reduction in groundwater storage would be a reduction in usable groundwater storage of more than 10% in each aquifer relative to the amount of usable groundwater storage when groundwater elevations are at their Chronic Lowering of Groundwater Levels MOs. If all RMW-WLs were to reach their Chronic Lowering of Groundwater Levels MTs, the reduction in groundwater storage relative to the MO would be approximately 10%. Since only 25% of RMW-WLs may reach their MT before triggering an Undesirable Result for Chronic Lowering of Groundwater Levels, the actual reduction in storage would be less. Therefore, as explained in **Section 13.2.3**, as long as there is no Undesirable Result for Chronic Lowering of Groundwater Levels, there cannot be an Undesirable Result for Reduction in Groundwater Storage. Thus, the Chronic Lowering of Groundwater Levels SMCs are protective of groundwater storage and provide a sufficient margin of operational flexibility.

14.5 Assessment and Improvement of Monitoring Network

§ 354.38. Assessment and Improvement of Monitoring Network

(a) Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.

(b) Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.

(c) If the monitoring network contains data gaps, the Plan shall include a description of the following:

(1) The location and reason for data gaps in the monitoring network.

(2) Local issues and circumstances that limit or prevent monitoring.

(d) Each Agency shall describe steps that will be taken to fill data gaps before the next five- year assessment, including the location and purpose of newly added or installed monitoring sites.

(e) Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:

(1) Minimum threshold exceedances.

(2) Highly variable spatial or temporal conditions.

(3) Adverse impacts to beneficial uses and users of groundwater.

(4) The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.

☑ **23 CCR § 354.38**

As required by 23 CCR § 354.38, the Basin's SGMA Monitoring Network will be reevaluated in each Periodic Evaluation, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the Sustainability Goal for the Basin.

In all cases, the SGMA Monitoring Network developed for each Sustainability Indicator currently includes a sufficient density and spatial distribution of monitoring sites to meet the monitoring objectives outlined in **Section 14.1**. In most cases, the existing RMS selected for each Sustainability Indicator also conform to the best management practices for monitoring networks outlined in DWR's BMP #2 (DWR, 2016b). Incomplete or unavailable construction information for some of the RMW-WLs and RMW-WQs is recognized as a data gap which will be filled by the GSAs as part of GSP implementation.

For the RMS currently missing construction information, the GSAs will work to fill the data gaps by locating documented well construction information or conducting surveying and video logging. In the event these data gaps cannot be readily filled, the GSAs will identify alternative sites or develop plans to construct new RMS as the GSAs deem necessary.

14.6 Reporting Monitoring Data to the Department

§ 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.

☑ 23 CCR § 354.40

Data collected from the SGMA Monitoring Network will be uploaded to the Basin DMS and reported to the DWR in accordance with the Monitoring Protocols developed for the Basin. Additional data collected as part of other regular monitoring programs implemented within the Basin (see **Section 5.2.1.1**) may be used in conjunction with data collected from the SGMA Monitoring Network to meet compliance with GSP Regulations regarding annual reporting (23 CCR § 356.2) or as otherwise deemed necessary by the GSAs.

TABLE MN-1
Summary of Representative Monitoring Wells
Delta-Mendota Subbasin

Local Site ID	DMS ID	GSA Group	GSA	Monitoring Site Type	Sustainability Indicator(s) (1)				CASGEM Station ID	Monitoring Site Location						Reference Point			Well Type	Well Status	Well Completion Type	Well Construction Details		DWR Well Completion Report No. (2)	Principal Aquifer(s) Monitored
					Groundwater Level	Groundwater Storage	Groundwater Quality	Interconnected Surface Water		Latitude	Longitude	Township	Range	Section	Quarter	Ground Surface Elevation	Reference Point Elevation	Reference Point Description				Total Completed Depth	Perforation Depths		
13S16E30A001M	09-004	Aliso Water District GSA Group	Aliso Water District GSA	Well	x	x			367755N1202599W001	36.77614	-120.25930	13S	16E	30		178.92	177.42		Irrigation	Active	Single Well			13S16E30A001M	Upper
Aliso-South Planned		Aliso Water District GSA Group	Aliso Water District GSA	Well	x	x	x			36.78263	-120.26268					163.14			Monitoring						Lower
13S15E14M001M	09-003	Aliso Water District GSA Group	Aliso Water District GSA	Well	x	x	x		367985N1203102W001	36.79860	-120.30920	13S	15E	14		166.89	166.39		Irrigation	Active	Single Well			13S15E14M001M	Upper
12S16E31G001M	09-002	Aliso Water District GSA Group	Aliso Water District GSA	Well	x	x	x		368438N1202621W001	36.84390	-120.26110	12S	16E	31		180.86	179.86		Irrigation	Active	Single Well			12S16E31G001M	Upper
2480-72	09-001	Aliso Water District GSA Group	Aliso Water District GSA	Well	x	x			368491N1203504W001	36.84797	-120.35053	12S	15E	32		158.34	157.34		Irrigation	Active	Single Well	335	160-328	12S15E32B002M	Upper
Aliso-North Planned		Aliso Water District GSA Group	Aliso Water District GSA	Well	x	x	x			36.90120	-120.28235					176.34			Monitoring						Lower
KRCDTID03	07-009	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x			366000N1202300W001	36.60276	-120.23201	15S	16E	28		169.23	169.96	Sounding Tube	Irrigation	Active	Single Well	543	434-510		Upper
WSJ001	07-018	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		366098N1202626W001	36.60980	-120.26264	15S	16E	19		170.31	170.31	GSE from DEM	Public Supply		Single Well	205	165-205		Upper
TW-4	07-014	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		366758N1202678W001	36.64294	-120.24050	14S	16E	30		157.50	157.50	GSE from DEM	Monitoring		Part of a nested/multi-completion well	690	650-690		Lower
TW-4 Upper	07-033	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		366758N1202678W002	36.64294	-120.24050	14S	16E	30		157.50	157.50	GSE	Monitoring	Active	Part of a nested/multi-completion well	700	405 - 445		Upper
KRCDTID02	07-010	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x			366500N1202500W001	36.66167	-120.24100	14S	16E	33		160.35	160.46	Sounding Tube	Irrigation	Active	Single Well	540	295-535		Upper
TW-5	07-015	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		366430N1202404W001	36.67579	-120.26784	15S	16E	9		167.51	167.51	GSE from DEM	Monitoring		Unknown	670	630-670		Lower
PWD Well 20	07-036	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x			36.77070	-120.64828					286.68	157.50	GSE	Irrigation		Single Well				Lower
Well 18	07-189	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x			36.80762	-120.61143					233.88			Irrigation		Single Well	1220	600-1200		Lower
CDMGSA-01C	07-031	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		368176N1207307W003	36.81760	-120.73073	13S	11E	11		347.79	350.39	2.60' above ground surface	Monitoring	Active	Part of a nested/multi-completion well	608	320 - 340		Upper
CDMGSA-01D	07-032	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		368176N1207307W004	36.81760	-120.73073	13S	11E	11		347.79	350.30	2.51' above ground surface	Monitoring	Active	Part of a nested/multi-completion well	608	505 -525		Lower
Well 31	07-212	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x			36.82214	-120.65364					219.75			Irrigation	Active	Single Well	1030	550-1010		Lower
AGC100012335-GDACX00005	07-170	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x			36.84885	-120.67171					212.52			Industrial	Active	Single Well		130-190		Upper
	07-234	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x			36.85089	-120.65116					194.43			Irrigation	Active	Single Well	910	750-900		Lower
MP102.04L	08-002	Central Delta-Mendota GSA Group	Widren Water District GSA	Well	x	x	x		368790N1205784W001	36.87901	-120.57835	12S	13E	20		164.65	164.65	GSE	Irrigation	Active	Single Well	420	183-223, 233-393		Upper
MP098.74L	07-035	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x			368871N1206355W001	36.88710	-120.63545	12S	12E	14		125.00	125.33	None provided	Irrigation	Active	Single Well	400	300 - 390		Upper
MC18-1	07-007	Central Delta-Mendota GSA Group	Oro Loma Water District GSA	Well	x	x	x		368896N1206702W001	36.88960	-120.67020	12S	12E	16	NW	161.40	160.45	Black mark on top of PVC casing-north side: 0.95' below	Monitoring	Active	Nested Well	550	530-550	12S12E16E003M	Lower
MC18-2		Central Delta-Mendota GSA Group	Oro Loma Water District GSA	Well	x	x	x		368896N1206702W002	36.88960	-120.67020					161.40	159.00		Observation	Active	Nested Well	395	375-395	12S12E16E02AM	Upper
MP093.27L (Well 500)	07-028	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		369064N1207276W001	36.90641	-120.72764	12S	11E	12		133.92	135.58	None provided	Irrigation	Active	Single Well	647.5	438.9-462.2, 508.9-600.4		Lower
MP091.68R	07-005	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x			369097N1207554W001	36.90970	-120.75540	12S	11E	3	SE	145.17	146.33	Paint mark	Irrigation	Inactive	Single Well	615	365-425, 426-455, 456-495, 496-615	12S11E03Q001M	Lower
MC15-1	07-002	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		370173N1208999W001	37.01730	-120.89990	10S	10E	32	SE	176.30	175.46	Black mark on top of PVC casing-north side: 0.84 below land surface. USGS Well.	Monitoring	Active	Unknown	355	335-355	10S10E32L001M	Lower
MC15-2	07-003	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		370173N1208999W002	37.01730	-120.89990	10S	10E	32	SE	176.30	175.38	Black mark on top of PVC casing-north side: 0.92 below land surface. USGS Well.	Monitoring	Active	Unknown	160	150-160	10S10E32L002M	Upper
Well 1	07-017	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Well	x	x	x		370929N1209258W001	37.09294	-120.92581	10S	9E	1		103.96	106.10	GSE from DEM	Other		Single Well		170-253		Upper

TABLE MN-1
Summary of Representative Monitoring Wells
Delta-Mendota Subbasin

Local Site ID	DMS ID	GSA Group	GSA	Monitoring Site Type	Sustainability Indicator(s) (1)				CASGEM Station ID	Monitoring Site Location						Reference Point			Well Type	Well Status	Well Completion Type	Well Construction Details		DWR Well Completion Report No. (2)	Principal Aquifer(s) Monitored
					Groundwater Level	Groundwater Storage	Groundwater Quality	Interconnected Surface Water		Latitude	Longitude	Township	Range	Section	Quarter	Ground Surface Elevation	Reference Point Elevation	Reference Point Description				Total Completed Depth	Perforation Depths		
TSS-MW-325		Farmers Water District GSA Group	Farmers Water District GSA	Well	x	x	x			36.76386	-120.32586					156.40	158.60		Monitoring		Part of a nested/multi-completion well	325	300-320		Upper
TSS-MW-485		Farmers Water District GSA Group	Farmers Water District GSA	Well	x	x	x			36.76386	-120.32606					156.40	158.20		Monitoring		Part of a nested/multi-completion well	485	460-480		Lower
SPRECK-MW-7	12-001	Fresno County GSA Group	County of Fresno GSA - Delta-Mendota Management Area A	Well	x	x				36.74963	-120.31976	13S	15E	34	SE	160.00	160.00	TOC	Monitoring	Active	Single Well	150	110-150	T13S/R15E-34	Upper
1PU-2		Grassland GSA Group	Grasslands GSA	Well	x	x				37.04636	-120.81100					110.70	110.95	Distance from ground to reference	Irrigation		Single Well	275	195-225		Upper
1PL-4	11-022	Grassland GSA Group	County of Merced GSA - Delta-Mendota	Well	x	x				37.10565	-120.83528					90.00	91.50		Irrigation	Active	Single Well	702	360-420, 480-702		Lower
1PL-7		Grassland GSA Group	Grasslands GSA	Well	x	x				37.11378	-120.78279					95.30	96.53	Distance from ground to reference	Irrigation		Single Well	480	310-480		Lower
1PU-1	11-013	Grassland GSA Group	Grasslands GSA	Well	x	x				37.14347	-120.87239	9S	10E	6		87.00	87.60		Irrigation	Inactive	Single Well	322	180-260		Upper
1PL-6		Grassland GSA Group	Grasslands GSA	Well	x	x				37.16350	-120.81814					87.40	88.92	Distance from ground to reference	Irrigation		Single Well	510	310-510		Lower
1PL-1	11-010	Grassland GSA Group	Grasslands GSA	Well	x	x	x			37.18202	-120.90650					81.00	83.00		Irrigation	Active	Single Well	750	370-410, 500-740		Lower
3PL-2		Grassland GSA Group	Grasslands GSA	Well	x	x				37.21662	-120.88951					77.00	78.60		Other	Active	Single Well	780	300-760		Lower
1PL-5	11-021	Grassland GSA Group	Grasslands GSA	Well	x	x	x			37.25372	-120.94015					76.59			Irrigation	Active	Single Well	675	315-675		Lower
2MU-4		Grassland GSA Group	Grasslands GSA	Well	x	x		x		37.29914	-120.94467					62.70	65.70	GSE and RPE from Summers Eng.	Monitoring		Single Well	32	12-32		Upper
2PU-1	19-002	Grassland GSA Group	County of Merced GSA - Delta-Mendota	Well	x	x				37.30793	-120.98812					72.64			Irrigation	Active	Single Well				Upper
2MU-5		Grassland GSA Group	Grasslands GSA	Well	x	x		x		37.30833	-120.93264					64.80	66.80	GSE and RPE from Summers Eng.	Monitoring		Single Well	24			Upper
2MU-1		Grassland GSA Group	Grasslands GSA	Well	x	x		x		37.31014	-120.94883					63.30	66.30	GSE and RPE from Summers Eng.	Monitoring		Single Well	39	14-39		Upper
1PU-3		Grassland GSA Group	Grasslands GSA	Well	x	x				37.31892	-120.98410					68.00	68.71	Distance from ground to reference	Irrigation		Single Well	525	30-180		Upper
Merc_9	01-128	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x			37.22013	-121.05580					153.22			Irrigation		Single Well	100	50-100		Upper
Merc_11	01-129	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x			37.23438	-121.04344					157.82			Irrigation		Single Well	138	36-138		Upper
MP058.28L	01-005	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	Well	x	x			372424N1210754W001	37.24066	-121.07519	08S	08E	15	NE	179.58	179.58		Irrigation	Active	Single Well	170	120-150	08S08E15G001M	Upper
91	01-006	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x		372604N1210611W001	37.26042	-121.06110	8S	8E	11		136.10	137.60	Concrete pad	Irrigation	Active	Single Well	260	120-210		Lower
MC10-2	01-004	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x		372907N1210875W002	37.29070	-121.08750	7S	8E	28	SE	177.40	176.82	Black mark on top of PVC casing-north	Monitoring	Active	Unknown	135	115-135	07S08E28R002M	Upper
MP051.66L	01-008	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x		373330N1210857W001	37.33295	-121.08571	7S	8E	16	NE	123.42	124.17		Unknown		Single Well		290-470		Lower
	05-124	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	Well	x	x	x			37.36257	-121.06959								Irrigation		Single Well	220			Upper
MP045.78R	01-003	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x		374061N1211212W001	37.40620	-121.12127	6S	8E	20	NW	177.50	180.90		Irrigation	Inactive	Single Well	721		06S08E20D002M	Lower
P259-1	06-001	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	Well	x	x	x		374316N1210994W001	37.43139	-121.09940	6S	8E	9	NW	113.00	112.18	Black mark on top of PVC casing-north	Monitoring	Active	Unknown	430	390-410	06S08E09E001M	Lower
P259-3	06-002	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	Well	x	x	x		374316N1210994W003	37.43139	-121.09940	6S	8E	9	NW	113.00	112.18		Monitoring	Active	Unknown	115	95-115	06S08E09E003M	Upper
Floragold Well	02-109	Northern Delta-Mendota GSA Group	City of Patterson GSA	Well	x	x	x			37.46980	-121.15038					118.05			Irrigation	Active	Single Well	360	300-320		Upper
WELL 02 - NORTH 5TH ST	02-002	Northern Delta-Mendota GSA Group	City of Patterson GSA	Well	x	x	x		374712N1211328W002	37.47120	-121.13283	5S	8E	30		102.99	102.99	GSE from DEM	Other		Single Well	360	170-356		Lower
Keystone well	02-009	Northern Delta-Mendota GSA Group	City of Patterson GSA	Well	x	x	x		374772N1211672W001	37.47718	-121.16722	05S	07E	26		138.84	138.84		Irrigation	Active	Single Well	286			Upper
MW-3	03-002	Northern Delta-Mendota GSA Group	City of Patterson GSA	Well	x	x			374816N1211350W001	37.48156	-121.13503	5S	8E	19		96.16	96.16	PID April 2019 Control Survey	Monitoring	Unknown	Single Well	260	220-250		Upper
WSJ003	03-003	Northern Delta-Mendota GSA Group	Patterson Irrigation District GSA	Well	x	x			374940N1210862W001	37.49400	-121.08620	5S	8E	16		57.93	57.93	PID April 2019 Control Survey	Irrigation		Single Well	255	130-250		Upper
ISW-2 Planned		Northern Delta-Mendota GSA Group	Patterson Irrigation District GSA	Well	x	x	x			37.49710	-121.08325														Upper
ISW-2 Planned		Northern Delta-Mendota GSA Group	Patterson Irrigation District GSA	Well	x	x	x			37.49710	-121.08325														Lower
MW-2	03-001	Northern Delta-Mendota GSA Group	Patterson Irrigation District GSA	Well	x	x	x		375015N1211011W001	37.50146	-121.10113	5S	8E	16		58.72	58.72	PID April 2019 Control Survey	Monitoring	Active	Single Well	250	220-250		Upper

TABLE MN-1
Summary of Representative Monitoring Wells
Delta-Mendota Subbasin

Local Site ID	DMS ID	GSA Group	GSA	Monitoring Site Type	Sustainability Indicator(s) (1)				CASGEM Station ID	Monitoring Site Location						Reference Point			Well Type	Well Status	Well Completion Type	Well Construction Details		DWR Well Completion Report No. (2)	Principal Aquifer(s) Monitored
					Groundwater Level	Groundwater Storage	Groundwater Quality	Interconnected Surface Water		Latitude	Longitude	Township	Range	Section	Quarter	Ground Surface Elevation	Reference Point Elevation	Reference Point Description				Total Completed Depth	Perforation Depths		
MP033.71L	01-002	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x		375313N1212242W001	37.53138	-121.22431	5S	7E	5		161.00	162.60	Paint mark	Irrigation	Inactive	Single Well	510	235-475	05S07E05F001M	Lower
Grayson Well 274A	04-007	Northern Delta-Mendota GSA Group	West Stanislaus Irrigation District GSA	Well	x	x	x			37.55000	-121.17644					69.20	70.30	GSE	Monitoring		Single Well				Lower
MP030.43R	01-001	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x		375509N1212609W001	37.55086	-121.26092	4S	6E	36	NW	212.60	213.70	Paint mark	Irrigation	Inactive	Single Well	475	230-475	04S06E36C001M	Lower
Grayson Well 274	04-006	Northern Delta-Mendota GSA Group	West Stanislaus Irrigation District GSA	Well	x	x	x			37.56234	-121.17676					52.69	52.80	GSE	Domestic		Single Well				Upper
ARRA 28	04-008	Northern Delta-Mendota GSA Group	West Stanislaus Irrigation District GSA	Well	x	x	x			37.57996	-121.27710					134.36	140.00	GSE	Irrigation		Single Well				Lower
	05-127	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	Well	x	x	x			37.59623	-121.22098					127.26			Irrigation		Single Well	230	70-140		Upper
121	04-001	Northern Delta-Mendota GSA Group	West Stanislaus Irrigation District GSA	Well	x	x	x		376129N1212942W001	37.61290	-121.29420	4S	6E	3		133.00	135.70	Concrete pad	Irrigation	Active	Single Well	600	400-570	Unknown	Lower
213 River Rd		Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	Well	x	x	x			37.63491	-121.24376								Irrigation			300			Lower
MP021.12L	01-007	Northern Delta-Mendota GSA Group	DM-II GSA	Well	x	x	x		376429N1213651W001	37.64286	-121.36512	3S	5E	25		185.52	185.52	GSE from DEM	Unknown	Unknown	Single Well		400-570	Unknown	Lower
WSID Planned #1		Northern Delta-Mendota GSA Group	West Stanislaus Irrigation District GSA	Well	x	x	x			37.65273	-121.31102								Monitoring						Upper
WSID Planned #1		Northern Delta-Mendota GSA Group	West Stanislaus Irrigation District GSA	Well	x	x	x			37.65273	-121.31102								Monitoring						Lower
MW1LA Planned		SJREC Water Authority GSA Group	County of Fresno GSA - Delta-Mendota Management Area B	Well	x	x	x			36.71124	-120.25874					164.71			Monitoring		dual completion monitoring well				Lower
MW1UA Planned		SJREC Water Authority GSA Group	County of Fresno GSA - Delta-Mendota Management Area B	Well	x	x	x			36.71124	-120.25874					164.71			Monitoring		dual completion monitoring well				Upper
HANS-7C1	13-001	SJREC Water Authority GSA Group	County of Fresno GSA - Delta-Mendota Management Area B	Well	x	x				36.73400	-120.37915	14S	15E	7	NW	169.74	172.00	TOC	Public Supply	Active	Single Well	200	140-200	T14S/R15E-7C1	Upper
USGS-31J6	13-004	SJREC Water Authority GSA Group	City of Mendota GSA	Well	x	x			37957	36.75517	-120.37320	13S	15E	31	SE	154.00	154.00	TOC	Monitoring	Active	Single Well	495	480-490	13S15E31J006M	Lower
TL-HS-3	13-003	SJREC Water Authority GSA Group	County of Fresno GSA - Delta-Mendota Management Area B	Well	x	x				36.77304	-120.36233	13S	15E	29	NW	149.62	151.90	sounding port in well cap	Irrigation	Active	Single Well	410	120-410	T13S/R15E-29F2	Upper
Mendota City #7		SJREC Water Authority GSA Group	City of Mendota GSA	Well	x	x	x			36.78405	-120.34527					163.14			Public Supply		Single Well	420	260-395		Upper
1005	14-002	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			36.78689	-120.37704	13	15	19		151.50	153.10				Unknown	260			Upper
Elrod #4 Well #21		SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			36.85206	-120.39960					149.00	153.70		Irrigation		Single Well	316	159-252		Upper
Firebaugh Well #17		SJREC Water Authority GSA Group	City of Firebaugh GSA	Well	x	x	x			36.85422	-120.44180					148.00	148.50		Public Supply		Single Well	220	140-185		Upper
26B		SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x				36.86067	-120.51073					166.39									Lower
CCID 2723		SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			36.86125	-120.51044					156.00			Monitoring		Single Well	720	450-530, 530-610, 610-690, 690-700		Lower
1043	14-007	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			36.93200	-120.54200	11	13	34		120.00	122.10			Active	Unknown	180		11S13E34E001M	Upper
1011	14-005	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			36.97830	-120.58000	11	13	17		120.00	123.70				Unknown	175		11S13E17E001M	Upper
SDMW West - Lower Aquifer		SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x	x		36.98352	-120.50053					123.00			Monitoring		Part of a nested/multi-completion well	400	330-380		Lower
SDMW West - Upper Aquifer		SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x	x		36.98352	-120.50053					123.00			Monitoring		Part of a nested/multi-completion well	210	190-210		Upper
SDMW East - Lower Aquifer		SJREC Water Authority GSA Group	County of Madera GSA - Delta-Mendota	Well	x	x	x	x		36.98381	-120.49898					124.90			Monitoring		Part of a nested/multi-completion well	400	340-390		Lower
SDMW East - Upper Aquifer		SJREC Water Authority GSA Group	County of Madera GSA - Delta-Mendota	Well	x	x	x	x		36.98381	-120.49898					124.90			Monitoring		Part of a nested/multi-completion well	180	150-180		Upper
1006	14-003	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.01570	-120.66700	10	12	35		100.00	103.40				Unknown	190			Upper

TABLE MN-1
Summary of Representative Monitoring Wells
Delta-Mendota Subbasin

Local Site ID	DMS ID	GSA Group	GSA	Monitoring Site Type	Sustainability Indicator(s) (1)				CASGEM Station ID	Monitoring Site Location						Reference Point			Well Type	Well Status	Well Completion Type	Well Construction Details		DWR Well Completion Report No. (2)	Principal Aquifer(s) Monitored
					Groundwater Level	Groundwater Storage	Groundwater Quality	Interconnected Surface Water		Latitude	Longitude	Township	Range	Section	Quarter	Ground Surface Elevation	Reference Point Elevation	Reference Point Description				Total Completed Depth	Perforation Depths		
1056	14-021	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.03177	-120.83356	10	10	25		120.70	122.05		Irrigation	Active	Single Well	610	400-600		Lower
1008	14-004	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.04090	-120.89100	10	10	26		145.00	146.50				Unknown	220		10S10E28A001M	Upper
CLB Well #12		SJREC Water Authority GSA Group	City of Los Banos GSA	Well	x	x	x			37.05231	-120.86840					127.00	129.70		Domestic		Single Well	266	140-160. 230-240, 250-256		Upper
CLB Well #10		SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.05317	-120.82600					109.00	111.00		Domestic		Single Well	218	125-165, 198-208		Upper
2410	14-008	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.06000	-120.61200	10	12	13		111.00	112.45				Unknown	200		10S12E13L001M	Upper
CLB Well #8		SJREC Water Authority GSA Group	City of Los Banos GSA	Well	x	x	x			37.08072	-120.83084					100.00	101.60		Domestic		Single Well	267	165-183, 200-210, 220-247		Upper
Well 01	07-016	SJREC Water Authority GSA Group	County of Merced GSA - Delta-Mendota	Well	x	x	x		371004N1210072W001	37.10043	-121.00725	10S	9E	5		152.56	152.56		Public Supply	Active	Single Well		185-225		Lower
1ML-5	11-005	SJREC Water Authority GSA Group	County of Merced GSA - Delta-Mendota	Well	x	x				37.10615	-120.93611	9S	9E	24		98.00	100.90		Monitoring	Inactive	Part of a nested/multi-completion well				Lower
1ML-6	11-006	SJREC Water Authority GSA Group	County of Merced GSA - Delta-Mendota	Well	x	x				37.10750	-120.93136	9S	9E	24		100.00	102.60		Monitoring	Inactive	Part of a nested/multi-completion well				Lower
TIWD #17		SJREC Water Authority GSA Group	Turner Island Water District GSA - Delta-Mendota	Well	x	x	x			37.15494	-120.75037					88.00			Monitoring		Single Well	140			Upper
1027	14-020	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.17346	-121.01840	9	9	6		139.80	140.40		Monitoring	Active	Single Well	280			Lower
1014	14-006	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.17360	-120.99553	9	9	5		112.00	114.50				Unknown	120		09S09E05R001M	Upper
Gustine City #5		SJREC Water Authority GSA Group	City of Gustine GSA	Well	x	x	x			37.25248	-120.99326					95.00	95.50		Public Supply		Single Well	451	370-444		Lower
Gustine City #6		SJREC Water Authority GSA Group	City of Gustine GSA	Well	x	x	x			37.25735	-120.99682					94.30	95.30		Public Supply		Single Well	231	149-169, 169-230		Upper
CCID Well #2	14-001	SJREC Water Authority GSA Group	City of Newman GSA	Well	x	x	x			37.30700	-121.05400	7	8	23		106.00	107.50				Unknown	341			Upper
Newman City #6		SJREC Water Authority GSA Group	City of Newman GSA	Well	x	x	x			37.31809	-121.03062					91.00	91.50		Public Supply		Single Well	510	350-500		Lower
Newman City #8		SJREC Water Authority GSA Group	City of Newman GSA	Well	x	x	x			37.32212	-121.01333					80.00	80.50		Public Supply		Single Well	498	180-480		Lower
1050	14-019	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	Well	x	x	x			37.37365	-121.05724	6	8	35		105.60	112.20		Monitoring	Active	Single Well	600			Lower

Abbreviations
amsl = above mean sea level
bgs = below ground surface
CASGEM = California Statewide Groundwater Elevation Monirtoring
DEM = Digital Elevation Model
DM-II = Delta-Mendota II
DMS = Delta-Mendota Subbasin
DWR = California Department of Water Resources
ft = feet
GSA = Groundwater Sustainability Agency
GSE = ground surface elevation
NAD83 = North American Datum of 1983
PID = Patterson Irrigation District
PVC = polyvinyl chloride
RPE = reference point elevation
SJREC = San Joaquin River Exchange Contractors
SJRRP = San Joaquin River Restoration Project
TOC = Top of Casing
WCR = Well Completion Report

Notes
(1) Seawater intrusion is not considered to be a sustainability indicator of concern to the Delta-Mendota Subbasin and is thus not monitored for SGMA compliance.
(2) The filename of the well log is given in cases where such a log is available but does not contain a DWR Well Completion Report number.
(3) Wells MW-09-49B and SWA are located directly outside of the basin and are part of the SJRRP monitoring network with monitoring data published regularly.
(4) One additional Lower Aquifer Representative Monitoring Well for groundwater level and groundwater quality will be added within the Central Delta-Mendota GSA Group.

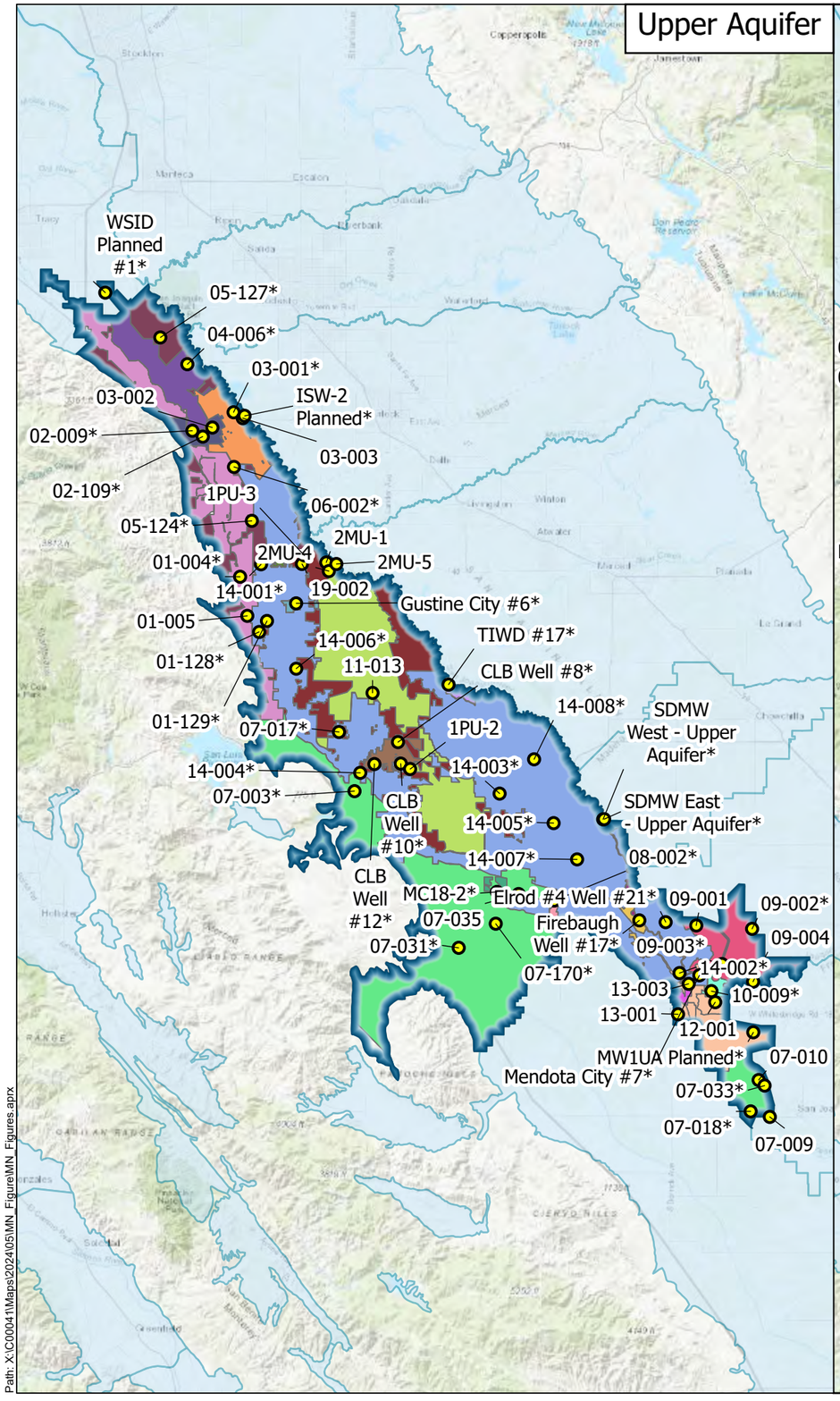
TABLE MN-2
Summary of Land Subsidence Representative Monitoring Sites
Delta-Mendota Subbasin

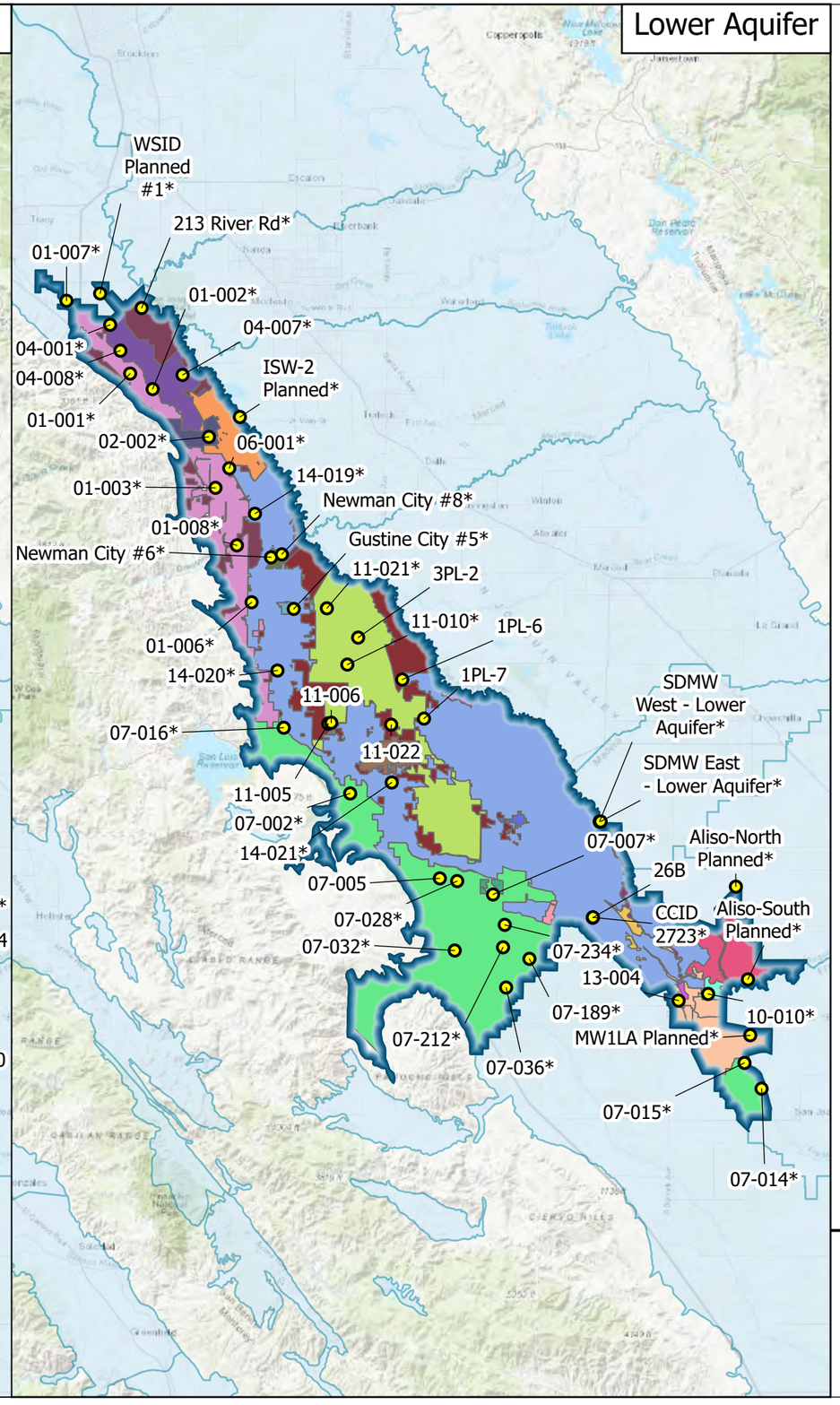
Site ID	Local ID	GSA Group	GSA	Monitored By	Monitoring Site Type	Frequency of Measurement	Monitoring Site Location		Ground Surface Elevation	Site Description / Notes
							Latitude (° NAD83)	Longitude (° NAD83)	(ft amsl)	
09-006	Aliso WD 1	Aliso Water District GSA Group	Aliso Water District GSA	United States Bureau of Reclamation	Extensometer		36.87232	-120.31729		
09-007	DWR at Gravelly Ford Canal	Aliso Water District GSA Group	Aliso Water District GSA	Aliso Water District	GPS-Survey		36.80779	-120.16887		Benchmark at Rogers Road Bridge; Starting point for City of Patterson subsidence survey
07-019	AG-24	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Tranquillity Irrigation District	GPS - Surveyed		36.67046	-120.26962		
07-021	Subsidence Monitoring Point #11	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	United States Bureau of Reclamation	GPS - Surveyed		37.06673	-120.96664		
07-022	Subsidence Monitoring Point #12	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	United States Bureau of Reclamation	GPS - Surveyed		37.01873	-120.90058		
07-024	Subsidence Monitoring Point #14	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	United States Bureau of Reclamation	GPS - Surveyed		36.88986	-120.66982		
07-025	Subsidence Monitoring Point #15	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	United States Bureau of Reclamation	GPS - Surveyed		36.89033	-120.65520		
07-026	TID A	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Tranquillity Irrigation District	GPS - Surveyed		36.66158	-120.24111		
07-027	TID B	Central Delta-Mendota GSA Group	Central Delta-Mendota GSA	Tranquillity Irrigation District	GPS - Surveyed		36.61011	-120.24237		
10-008	Yearout	Farmers Water District GSA Group	Farmers Water District GSA	United States Geological Survey	Extensometer		36.76011	-120.31326		
11-018	108	Grassland GSA Group	County of Merced GSA - Delta-Mendota	United States Bureau of Reclamation	GPS-Survey		37.24766	-120.85145		
11-020	152	Grassland GSA Group	County of Merced GSA - Delta-Mendota	United States Bureau of Reclamation	GPS-Survey		37.19243	-120.83977		
01-009	P252	Northern Delta-Mendota GSA Group	DM-II GSA	UNAVCO	GPS - Automated		37.16960	-121.05770		
01-010	Subsidence Monitoring Point #1	Northern Delta-Mendota GSA Group	DM-II GSA	United States Bureau of Reclamation	GPS - Surveyed		37.65489	-121.39772		Benchmark at Check 8
01-011	Subsidence Monitoring Point #2	Northern Delta-Mendota GSA Group	DM-II GSA	United States Bureau of Reclamation	GPS - Surveyed		37.61797	-121.32504		Benchmark at Check 10
01-012	Subsidence Monitoring Point #3	Northern Delta-Mendota GSA Group	DM-II GSA	United States Bureau of Reclamation	GPS - Surveyed		37.56004	-121.27075		MP29.82
01-013	Subsidence Monitoring Point #4	Northern Delta-Mendota GSA Group	DM-II GSA	United States Bureau of Reclamation	GPS - Surveyed		37.55548	-121.25076		Benchmark at Check 14
01-014	Subsidence Monitoring Point #5	Northern Delta-Mendota GSA Group	DM-II GSA	United States Bureau of Reclamation	GPS - Surveyed		37.52182	-121.21845		
01-016	Subsidence Monitoring Point #9	Northern Delta-Mendota GSA Group	DM-II GSA	United States Bureau of Reclamation	GPS - Surveyed		37.29046	-121.08780		
01-017	Subsidence Monitoring Point #10	Northern Delta-Mendota GSA Group	DM-II GSA	United States Bureau of Reclamation	GPS - Surveyed		37.15180	-121.03902		
02-003	Floragold Well	Northern Delta-Mendota GSA Group	City of Patterson GSA	City of Patterson	GPS - Surveyed		37.46985	-121.15038		First benchmark in subbasin with full data set (Chrisman Road Bridge)
02-004	Subsidence Monitoring Point #6	Northern Delta-Mendota GSA Group	City of Patterson GSA	United States Bureau of Reclamation	GPS - Surveyed		37.47172	-121.17744		Benchmark at Check 4
02-005	Well 2	Northern Delta-Mendota GSA Group	City of Patterson GSA	City of Patterson	GPS - Surveyed		37.47120	-121.13283		Benchmark at Farmbridge; Starting point for West Stanislaus ID
02-006	Well 4	Northern Delta-Mendota GSA Group	City of Patterson GSA	City of Patterson	GPS - Surveyed		37.47945	-121.14055		Benchmark at Check 6
02-008	Well 11	Northern Delta-Mendota GSA Group	City of Patterson GSA	City of Patterson	GPS - Surveyed		37.47650	-121.10990		Benchmark at Check 5
03-004	Locust Avenue Well	Northern Delta-Mendota GSA Group	Patterson Irrigation District GSA	Patterson Irrigation District	GPS - Surveyed		37.46162	-121.11488		
03-005	Pumping Plant No. 2	Northern Delta-Mendota GSA Group	Patterson Irrigation District GSA	Patterson Irrigation District	GPS - Surveyed		37.48012	-121.09787		
03-006	River Station	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	Patterson Irrigation District	GPS - Surveyed		37.49718	-121.08259		USGS Extensometer (P-259)

TABLE MN-2
Summary of Land Subsidence Representative Monitoring Sites
Delta-Mendota Subbasin

Site ID	Local ID	GSA Group	GSA	Monitored By	Monitoring Site Type	Frequency of Measurement	Monitoring Site Location		Ground Surface Elevation	Site Description / Notes
							Latitude (° NAD83)	Longitude (° NAD83)	(ft amsl)	
04-003	WSID 11	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	West Stanislaus Irrigation District	GPS - Surveyed		37.56920	-121.21998		Benchmark at Check 16
04-004	WSID 21	Northern Delta-Mendota GSA Group	West Stanislaus Irrigation District GSA	West Stanislaus Irrigation District	GPS - Surveyed		37.55839	-121.24414		
04-005	WSID 2	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA		GPS - Surveyed		37.58400	-121.20130		
06-006	Subsidence Monitoring Point #8	Northern Delta-Mendota GSA Group	Northwestern Delta-Mendota GSA	United States Bureau of Reclamation	GPS - Surveyed		37.42016	-121.13078		Russell Ave Bridge
07-023	Subsidence Monitoring Point #13	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA	United States Bureau of Reclamation	GPS - Surveyed		36.96896	-120.83173		
09-008	LIFESON	SJREC Water Authority GSA Group	County of Madera GSA - Delta-Mendota	United States Bureau of Reclamation	Extensometer		36.77409	-120.28435		
11-019	137	SJREC Water Authority GSA Group	County of Merced GSA - Delta-Mendota	United States Bureau of Reclamation	GPS-Survey		37.05472	-120.74306		
12-010	P304-PBO	SJREC Water Authority GSA Group	County of Fresno GSA - Delta-Mendota Management Area B	UNAVCO	GPS - Automated		36.73796	-120.35354		
13-010	Fordel-Ext	SJREC Water Authority GSA Group	City of Mendota GSA	United States Geological Survey	Extensometer		36.75562	-120.36911		
14-014	P303	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA		GPS - Automated		37.05440	-120.70530		
14-015	PT 150	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA				37.33714	-121.02847		
14-016	PT 147	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA				36.96627	-120.56497		
14-017	PT AC5729	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA				37.05652	-120.89082		
14-018	PT 129	SJREC Water Authority GSA Group	San Joaquin River Exchange Contractors GSA				36.85731	-120.46283		

Abbreviations
amsl = above mean sea level
DM-II = Delta-Mendota II
DMC = Delta-Mendota Canal
DWR = California Department of Water Resources
ft = feet
GPS = Global Positioning System
GSA = Groundwater Sustainability Agency
NAD83 = North American Datum of 1983
SJRRP = San Joaquin River Restoration Program
UNAVCO = University NAVSTAR Consortium





Legend

- RMW-WL
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- California Groundwater Basin

GSA

- Aliso Water District
- Central Delta-Mendota Region Multi-Agency GSA
- City of Dos Palos GSA
- City of Firebaugh
- City of Gustine
- City of Los Banos
- City of Mendota
- City of Newman
- City of Patterson
- County of Madera
- DM-II
- Farmers Water District
- Fresno County
- Grasslands Groundwater Sustainability Agency
- Merced County
- Northwestern Delta-Mendota GSA
- Ora Loma Water District
- Patterson Irrigation District
- San Joaquin River Exchange Contractors Water Authority
- Turner Island Water District
- West Stanislaus Irrigation District
- Widren Water District GSA

Notes

1. All locations are approximate.
2. Asterisk (*) denotes wells that are also Representative Monitoring Wells for Degraded Water Quality.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Abbreviations

DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
RMW-WL = Representative Monitoring Well for Chronic Lowering of Groundwater Levels

Sources

1. GSA boundaries. California Department of Water Resources. August 25, 2023.
2. Groundwater basins and subbasins. California Department of Water Resources. August 25, 2023.
3. Basemap is ESRI's topographic map, obtained 28 May 2024.

N

0 12 24
Miles

Representative Monitoring Network for Chronic Lowering of Groundwater Levels

DRAFT

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09

Figure MN-1

Path: X:\C00041\Maps\20241105\MN_FigureMN_Figures.aprx

Upper Aquifer

WSID Planned #1*
05-127*
04-006*
03-001*
03-002
ISW-2 Planned*
02-009*
03-003
02-109*
1PU-3
06-002*
05-124*
2MU-1
2MU-4
2MU-5
01-004*
14-001*
19-002
Gustine City #6*
01-005
14-006*
TIWD #17*
01-128*
11-013
CLB Well #8*
01-129*
14-008*
SDMW West - Upper Aquifer*
07-017*
1PU-2
14-004*
14-003*
07-003*
CLB Well #10*
SDMW East - Upper Aquifer*
14-005*
14-007*
08-002*
CLB Well #12*
MC18-2*
Elrod #4
Well #21*
09-001
09-002*
07-035
Firebaugh Well #17*
09-003*
09-004
07-031*
07-170*
14-002*
13-003
10-009*
13-001
12-001
MW1UA Planned*
07-010
Mendota City #7*
07-033*
07-018*
07-009

Lower Aquifer

WSID Planned #1*
213 River Rd*
01-007*
01-002*
04-007*
04-001*
04-008*
ISW-2 Planned*
01-001*
02-002*
06-001*
14-019*
01-003*
Newman City #8*
01-008*
Gustine City #5*
Newman City #6*
11-021*
3PL-2
01-006*
11-010*
1PL-6
14-020*
1PL-7
11-006
SDMW West - Lower Aquifer*
07-016*
11-022*
SDMW East - Lower Aquifer*
11-005
07-002*
14-021*
07-007*
Aliso-North Planned*
26B
07-005
CCID 2723*
Aliso-South Planned*
07-028*
07-234*
07-032*
13-004
07-189*
10-010*
07-212*
MW1LA Planned*
07-036*
07-015*
07-014*

Legend

- RMW-WL

Production Wells
Well Use
- Domestic
- Public
- Agricultural
- Industrial
- Unknown
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- California Groundwater Basin

GSA Groups
- Aliso Water District
- Central Delta-Mendota
- Farmers Water District
- Fresno County
- Grassland Water District
- Northern Delta-Mendota
- San Joaquin River Exchange Contractors

Notes
1. All locations are approximate.
2. Asterisk (*) denotes wells that are also Representative Monitoring Wells for Degraded Water Quality.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Abbreviations
DWR = California Department of Water Resources
RMW-WL = Representative Monitoring Well for Chronic Lowering of Groundwater Levels

Sources
1. Groundwater basins and subbasins. California Department of Water Resources. August 25, 2023.
2. Production wells obtained from DWR's Online System of Well Completion Reports October 2023 and filtered as described in Section 5.1.5.
3. Basemap is ESRI's topographic map, obtained 28 May 2024.

N

0 12 24
Miles

Representative Monitoring Network for Chronic Lowering of Groundwater Levels Relative to Production Wells

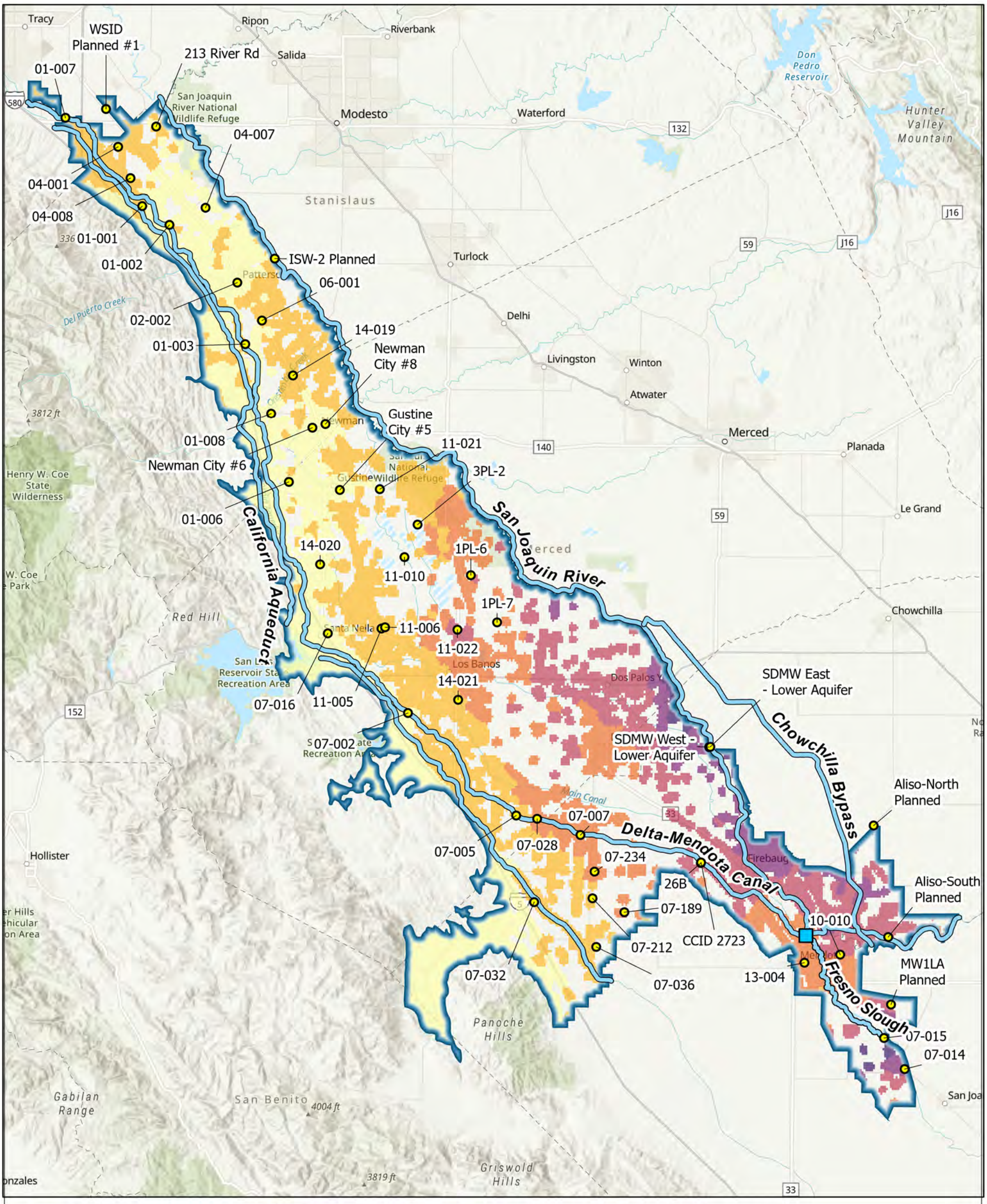
DRAFT

Delta-Mendota Subbasin
July 2024
C00041.09

Figure MN-2

eki environment & water

Path: X:\C00041\Maps\2024\05\MN_Figure\MN_Figures.aprx



Legend

- RMW-WL
- Mendota Pool
- Other Critical Infrastructure
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)

2015 - 2023 Vertical Displacement (ft.)

- <- -2.5
- -2.5 - -2
- -2 - -1.5
- -1.5 - -1
- -1 - -0.5
- -0.5 - 0
- > 0

Notes

1. All locations are approximate.
2. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 May 2024.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. DWR. (2023). TRE ALTAMIRA InSAR Dataset [Raster]. (https://sgma.water.ca.gov/webgis/config/custom/html/SGMADataViewer/doc/#tre-altamira-insar-dataset)
4. Delta-Mendota Canal and California Aqueduct from the National Hydrologic Dataset.
5. Chowchilla Bypass from Madera County.

DRAFT

Abbreviations

DWR = California Department of Water Resources
ft. = Feet
GSA = Groundwater Sustainability Agency
InSAR = Interferometric Synthetic Aperture Radar
RMW-WL = Representative Monitoring Well for Chronic Depletion of Groundwater Levels

N

0 8 16

Miles

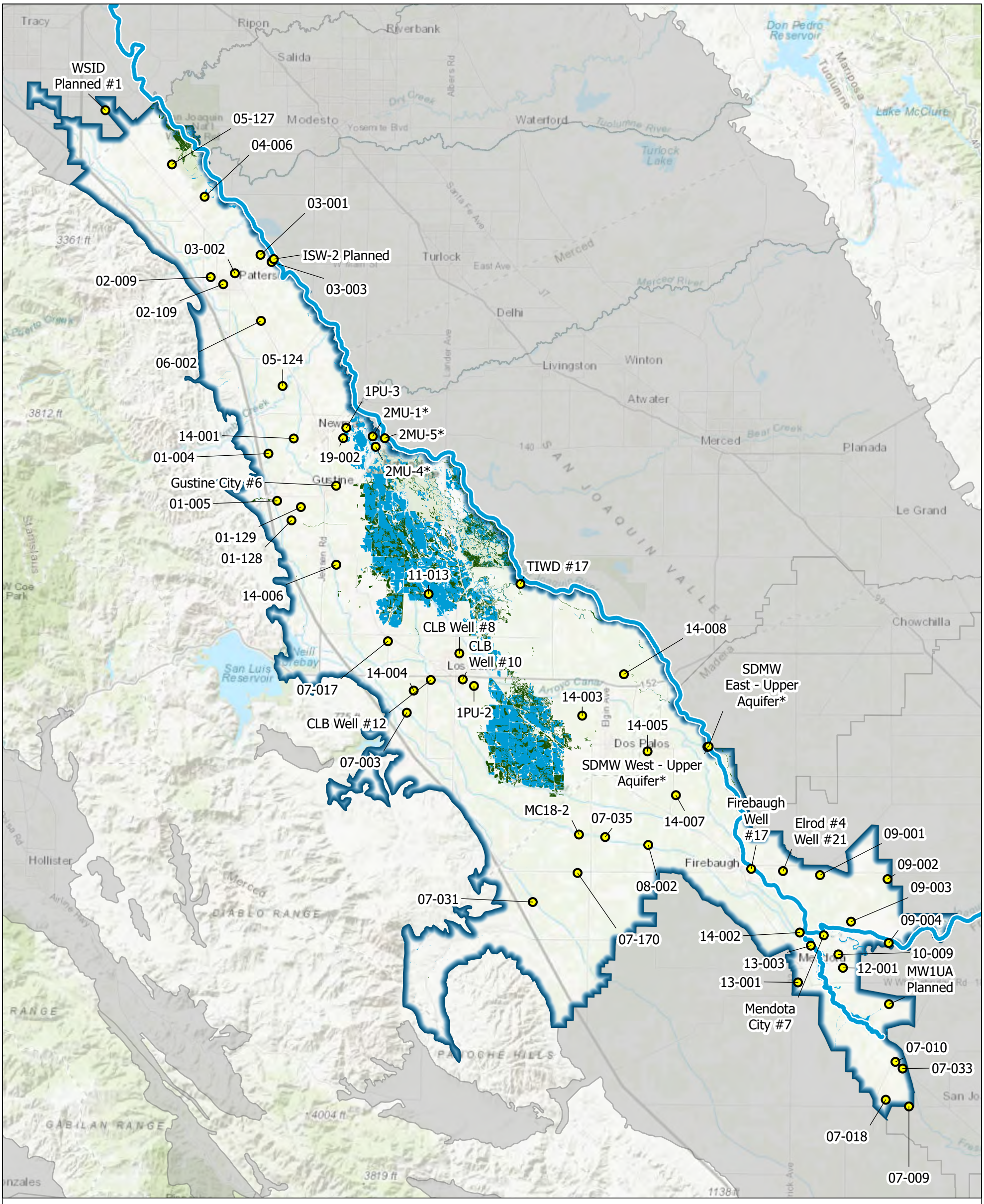
Lower Aquifer Representative Monitoring Network for Chronic Lowering of Groundwater Levels Relative to Land Subsidence

Delta-Mendota Subbasin
July 2024
C00041.09

Figure MN-3

eki environment & water

Path: X:\C00041\Maps\2024\05\MN_Figure\MN_Figures.aprx



Legend

- RMW-WL
- Interconnected Surface Water
- Fresno Slough
- Vegetation
- Wetlands
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- California Groundwater Basin

Notes

1. All locations are approximate.
2. Asterisk (*) denotes wells that are also Representative Monitoring Wells for Depletion of ISW.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Abbreviations

GDE = Groundwater Dependent Ecosystem
ISW = Interconnected Surface Water
RMW-WLs = Representative Monitoring Wells for Chronic Lowering of Groundwater Levels
TNC = The Nature Conservancy
NCCAG = Natural Communities Commonly Associated with Groundwater

Sources

1. Groundwater basins and subbasins. California Department of Water Resources. August 25, 2023.
2. Basemap is ESRI's topographic map, obtained 28 May 2024.
3. GDE locations determined from the Ducks Unlimited and TNC's NCCAG datasets and processed as described in Section 8.8.

N

0 8 16

Miles

Upper Aquifer Representative Monitoring Network for Chronic Lowering of Groundwater Levels Relative to Groundwater Dependent Ecosystems and Interconnected Surface Water

Delta-Mendota Subbasin
July 2024
C00041.09

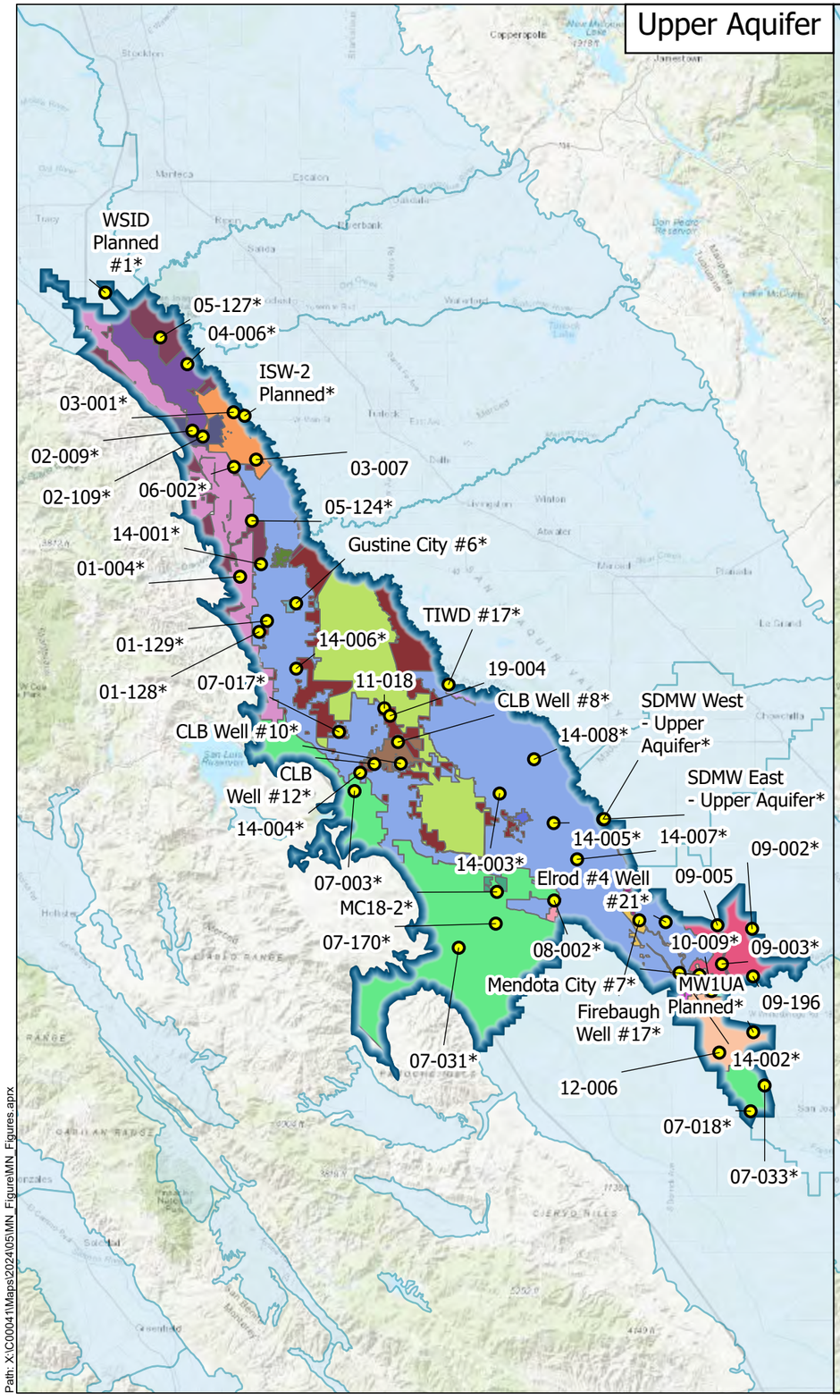
Figure MN-4

DRAFT

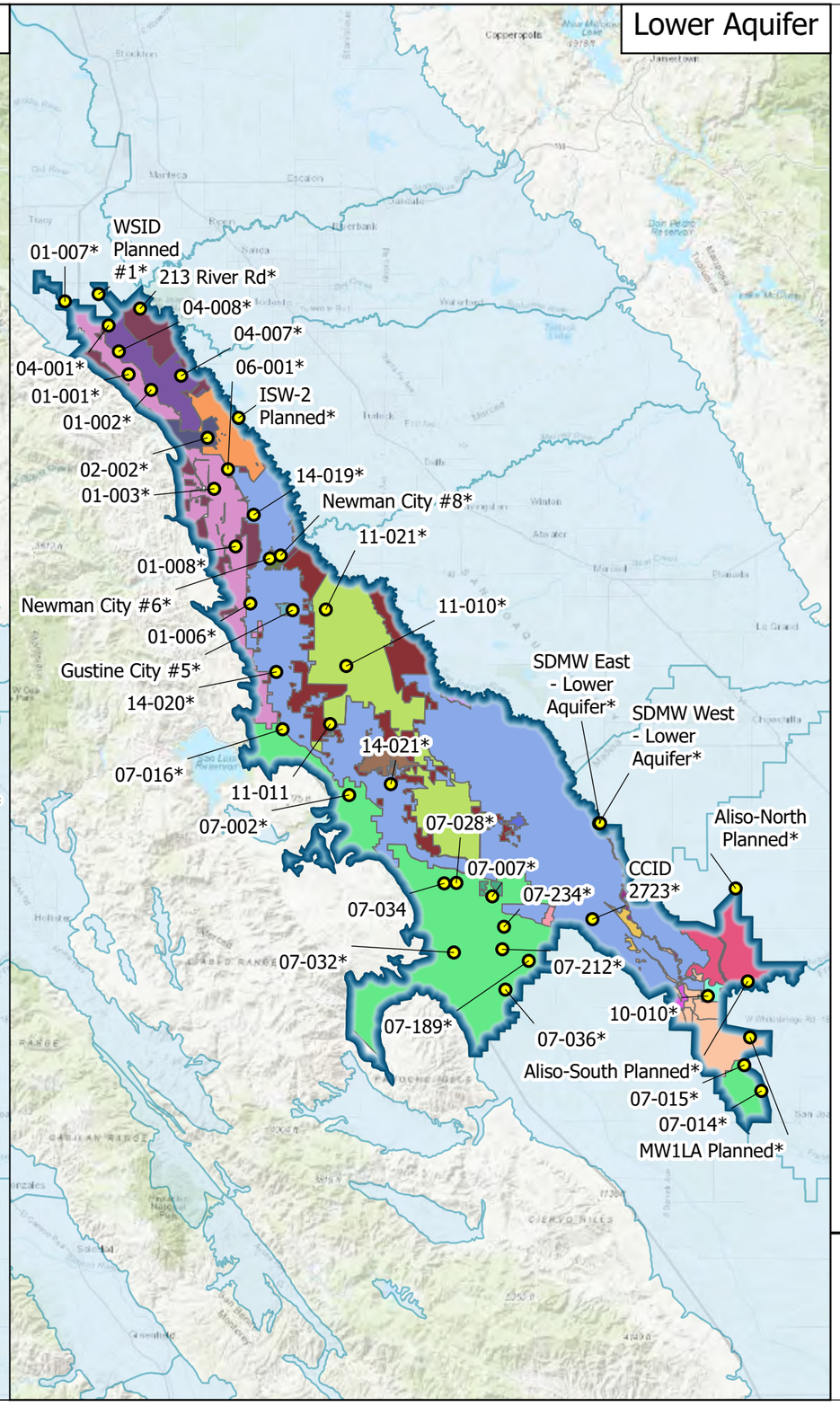
eki environment & water

Path: X:\C00041\Maps\2024\05\MN_Figure\MN_Figures.aprx

Upper Aquifer



Lower Aquifer



Legend

- RMW-WQ
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- California Groundwater Basin

GSA

- Aliso Water District
- Central Delta-Mendota Region Multi-Agency GSA
- City of Dos Palos GSA
- City of Firebaugh
- City of Gustine
- City of Los Banos
- City of Mendota
- City of Newman
- City of Patterson
- County of Madera
- DM-II
- Farmers Water District
- Fresno County
- Grasslands Groundwater Sustainability Agency
- Merced County
- Northwestern Delta-Mendota GSA
- Ora Loma Water District
- Patterson Irrigation District
- San Joaquin River Exchange Contractors Water Authority
- Turner Island Water District
- West Stanislaus Irrigation District
- Widren Water District GSA

Notes

1. All locations are approximate.
2. Asterisk (*) denotes wells that are also Representative Monitoring Wells for Chronic Lowering of Groundwater Levels.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Abbreviations

DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
RMW-WQ = Representative Monitoring Well for Degraded Water Quality

Sources

1. GSA boundaries. California Department of Water Resources. August 25, 2023.
2. Groundwater basins and subbasins. California Department of Water Resources. August 25, 2023.
3. Basemap is ESRI's topographic map, obtained 28 May 2024.

N

0 12 24
Miles

DRAFT

Representative Monitoring Network for Degraded Water Quality

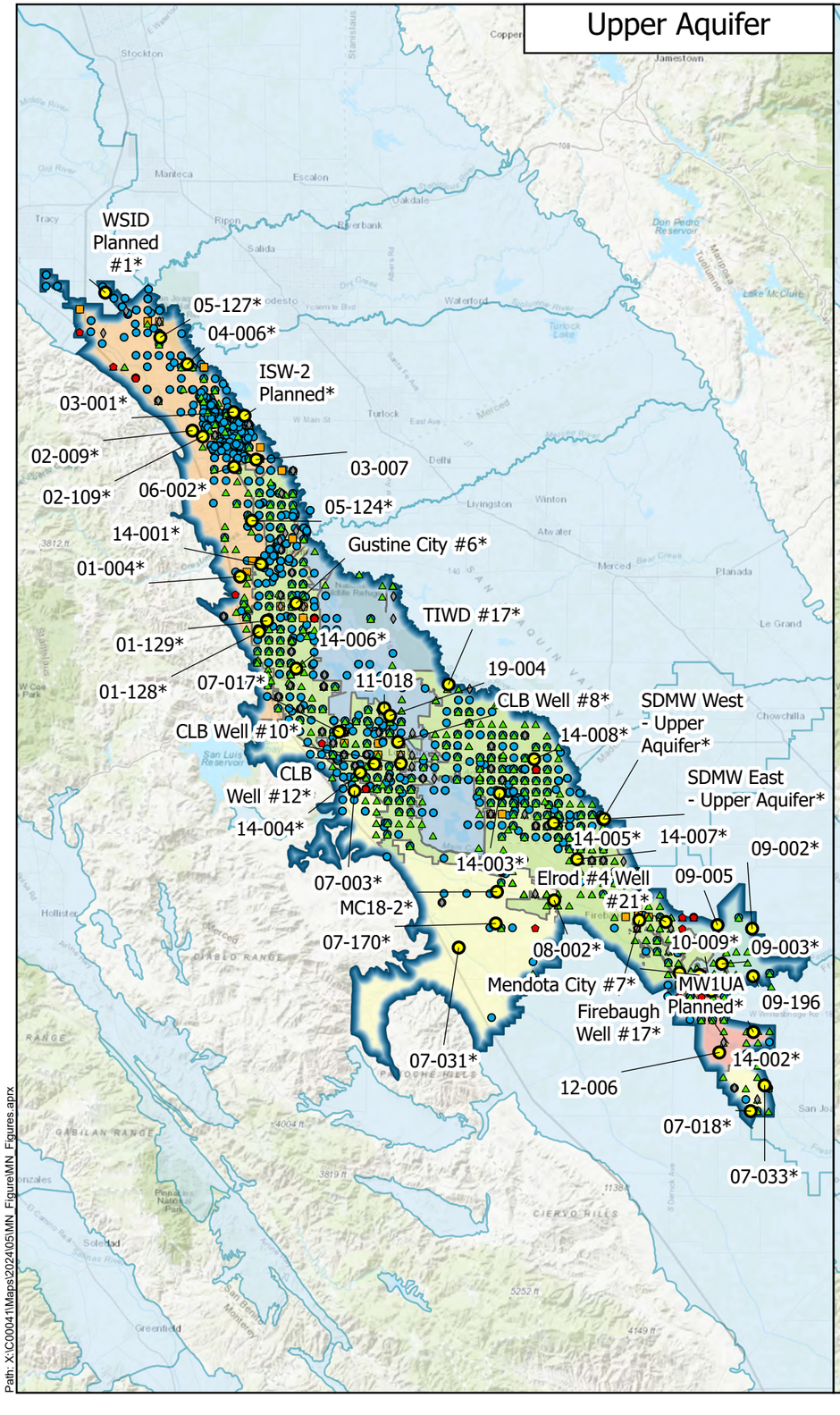
Delta-Mendota Subbasin
July 2024
C00041.09

Figure MN-5

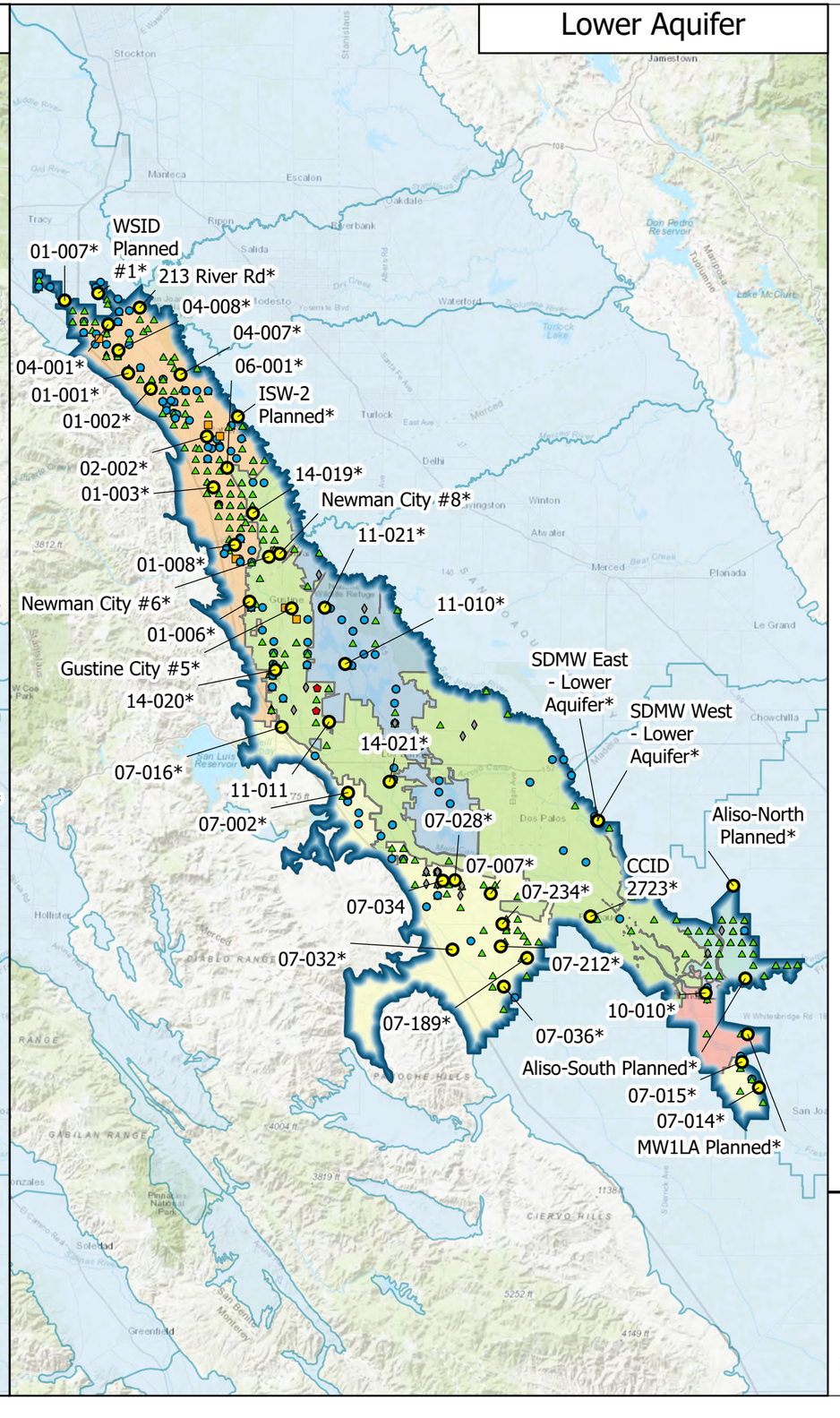
eki environment & water

Path: X:\C00041\Maps\2024\05\MN_Figure\MN_Figures.aprx

Upper Aquifer



Lower Aquifer



Legend

- RMW-WQ

Production Wells

Well Use

- Domestic
- Public
- Agricultural
- Industrial
- Unknown
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- California Groundwater Basin

GSA Groups

- Aliso Water District
- Central Delta-Mendota
- Farmers Water District
- Fresno County
- Grassland Water District
- Northern Delta-Mendota
- San Joaquin River Exchange Contractors

Notes

1. All locations are approximate.
2. Asterisk (*) denotes wells that are also Representative Monitoring Wells for Chronic Lowering of Groundwater Levels.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Abbreviations

DWR = California Department of Water Resources
RMW-WQ = Representative Monitoring Well for Degraded Water Quality

Sources

1. Groundwater basins and subbasins. California Department of Water Resources. August 25, 2023.
2. Production wells obtained from DWR's Online System of Well Completion Reports October 2023 and filtered as described in Section 5.1.5.
3. Basemap is ESRI's topographic map, obtained 28 May 2024.

N

0 12 24

Miles

DRAFT

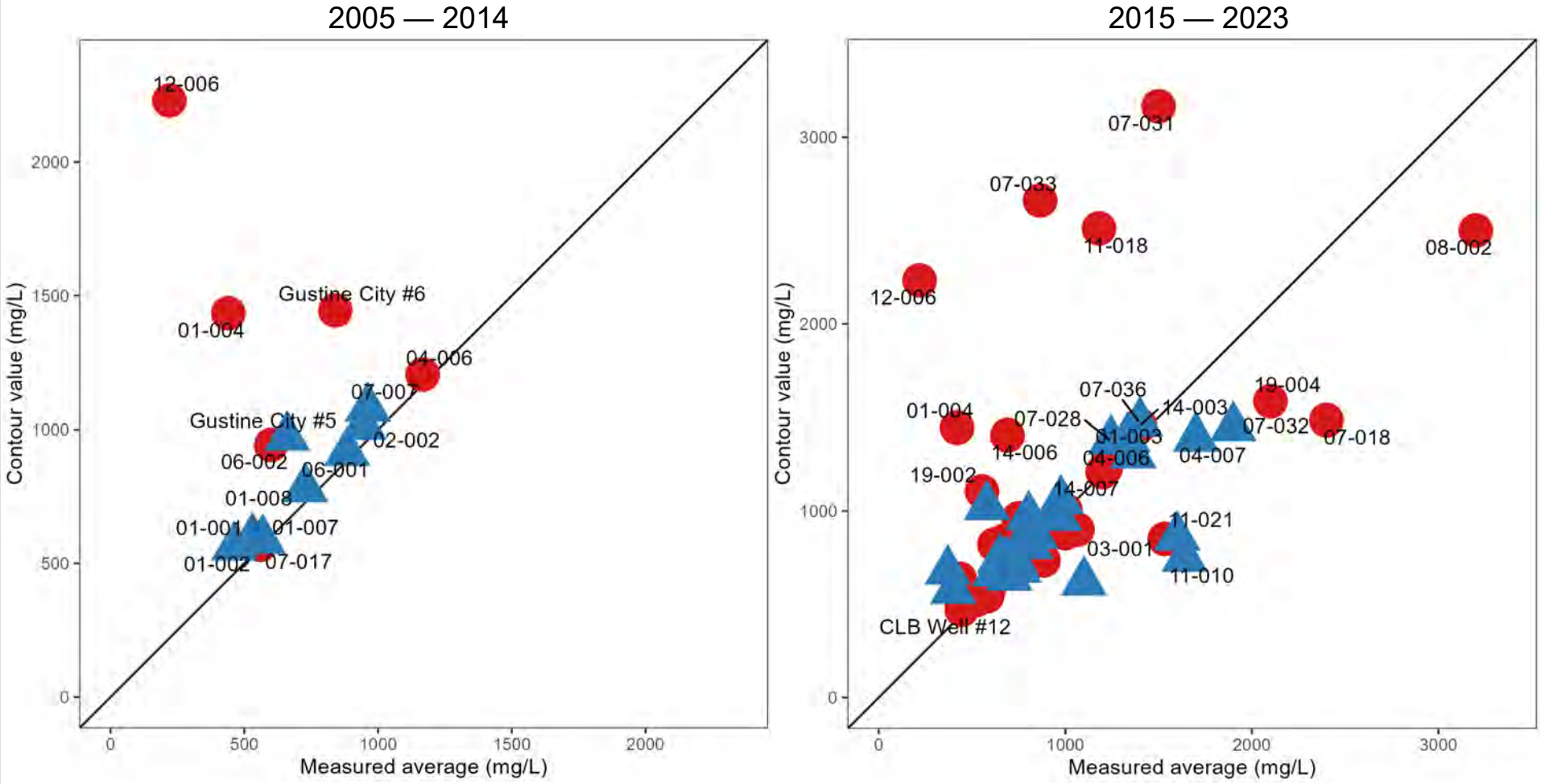
Representative Monitoring Network for Degraded Water Quality Relative to Production Wells

Delta-Mendota Subbasin
July 2024
C00041.09

Figure MN-6

eki environment & water

Path: X:\C00041\Maps\2024\05\MN_Figure\MN_Figures.aprx



Abbreviations

mg/L = milligrams per liter

RMW-WQ = Representative Monitoring well for Degraded Water Quality

Legend

Upper Aquifer

Lower Aquifer

Notes

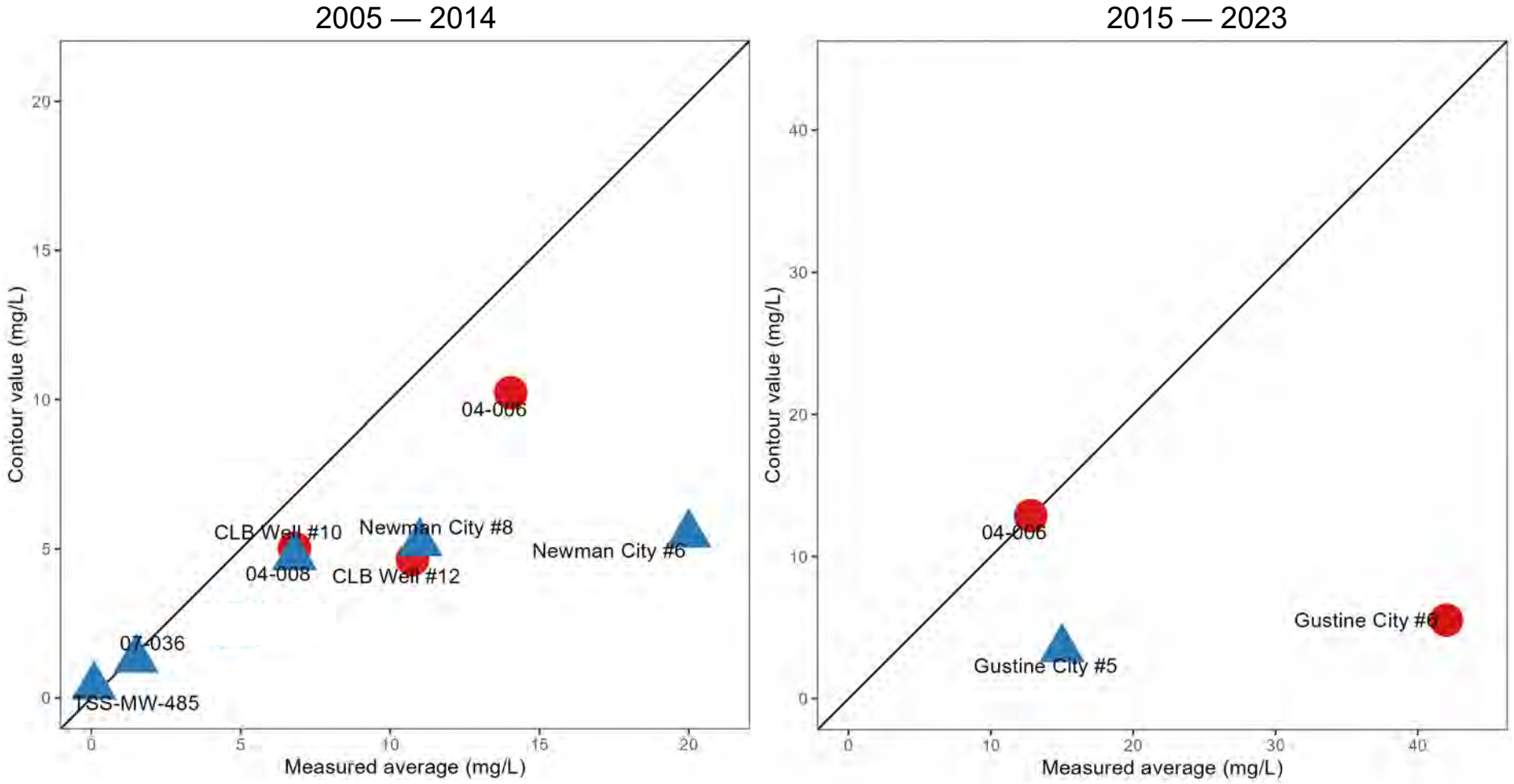
1. Local values from concentration contours in figures GWC-32 and GWC-35 compared with average concentrations measured at RMW-WQs in the same time periods.

Comparison of Measured Total Dissolved Solids Concentrations with Concentration Contours

Delta-Mendota Subbasin
February 2024
C00041.09

eki environment & water

Figure MN-7



Abbreviations

mg/L = milligrams per liter
N = nitrogen
RMW-WQ = Representative Monitoring well for Degraded Water Quality

Legend

Upper Aquifer

Lower Aquifer

Notes

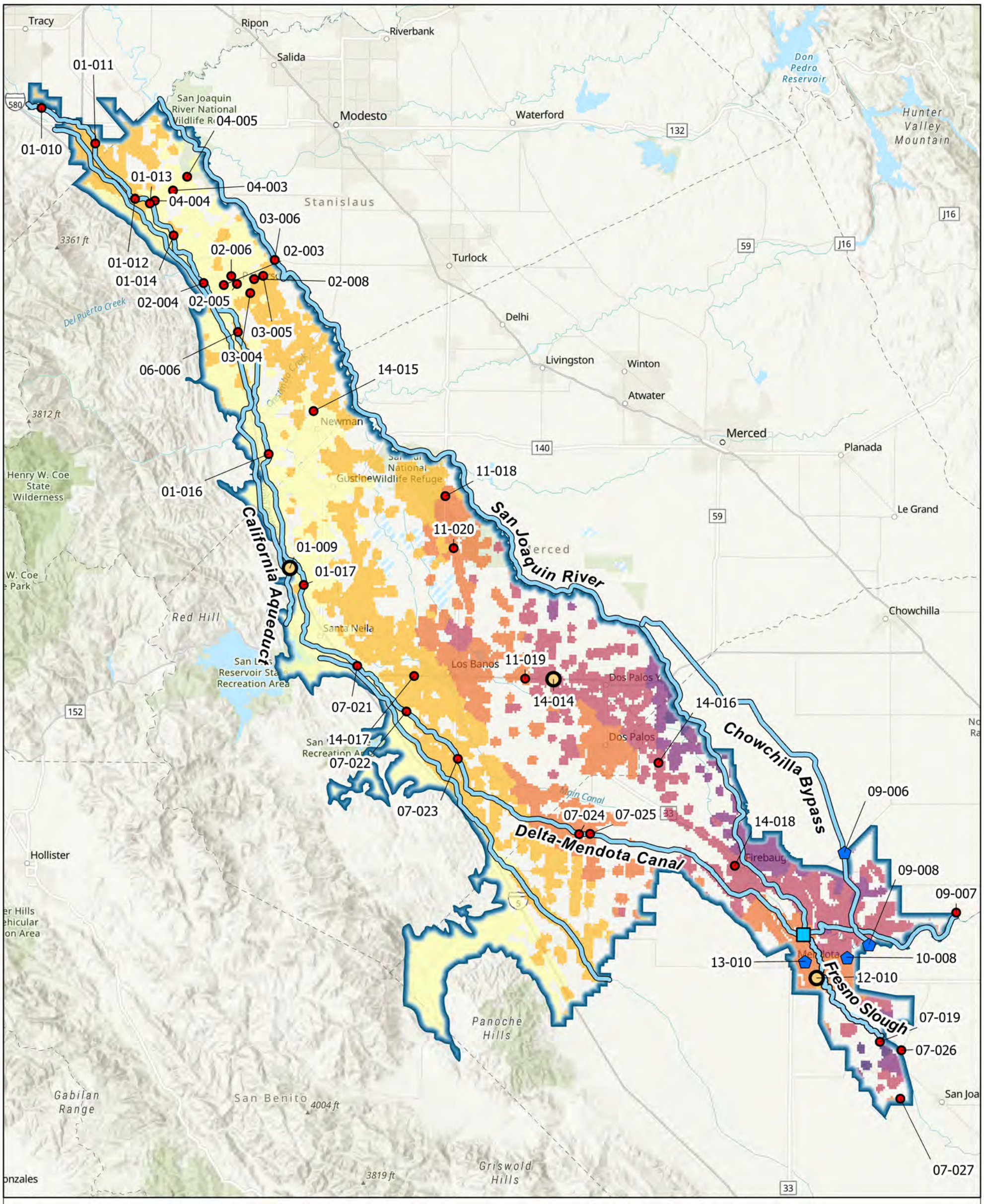
1. Local values from concentration contours in figures GWC-32 and GWC-35 compared with average concentrations measured at RMW-WQs in the same time periods.
2. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Comparison of Measured Nitrate as N Concentrations with Concentration Contours

Delta-Mendota Subbasin
February 2024
C00041.09

eki environment & water

Figure MN-8



Legend

- Mendota Pool
- Other Critical Infrastructure

RMS-LS

- Survey Point
- Extensometer
- Continuous GPS
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)

2015 - 2023 Vertical Displacement (ft.)

- <- -2.5
- -2.5 - -2
- -2 - -1.5
- -1.5 - -1
- -1 - -0.5
- -0.5 - 0
- > 0

Notes

1. All Locations are approximate.
2. Subsidence data will also be collected at all locations from InSAR data published by DWR and from locations shown in Figure GWC-42.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 28 May 2024.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. DWR. (2023). TRE ALTAMIRA InSAR Dataset [Raster]. (https://sgma.water.ca.gov/webgis/config/custom/html/SGMADataViewer/doc/#tre-altamira-insar-dataset)
4. Delta-Mendota Canal and California Aqueduct from the National Hydrologic Dataset.
5. Chowchilla Bypass from Madera County.

Abbreviations

DWR = California Department of Water Resources
ft. = Feet
GSA = Groundwater Sustainability Agency
GPS = Global positioning System
InSAR = Interferometric Synthetic Aperture Radar
RMS-LS = Representative Monitoring Site for Land Subsidence

N

0 8 16
Miles

DRAFT

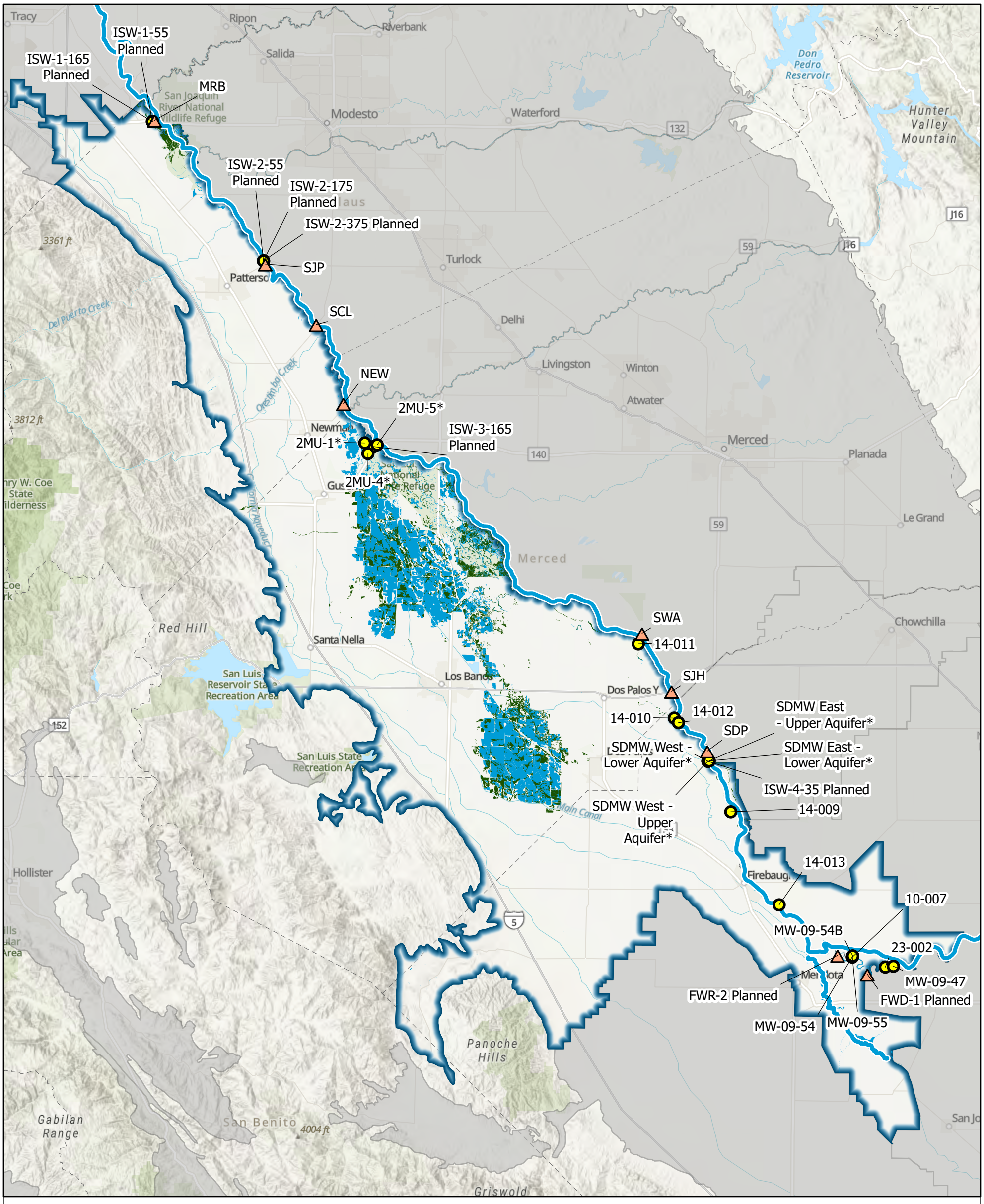
Representative Monitoring Network for Land Subsidence

Delta-Mendota Subbasin
July 2024
C00041.09

Figure MN-9

eki environment & water

Path: X:\C00041\Maps\2024\05\MN_Figure\MN_Figures.aprx



Legend

RMS-ISW
- Well
- Stream Gage
- Interconnected Surface Water

Potential Groundwater Dependent Ecosystems
- Vegetation
- Wetlands
- California Groundwater Basin
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)

Notes
1. All locations are approximate.
2. Asterisk (*) denotes wells that are also Representative Monitoring Wells for Chronic Lowering of Groundwater Levels.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Abbreviations
GDE = Groundwater Dependent Ecosystem
RMS-ISW = Representative Monitoring Site for Depletion of Interconnected Surface Water
TNC = The Nature Conservancy
NCCAG = Natural Communities Commonly Associated with Groundwater

Sources
1. Groundwater basins and subbasins. California Department of Water Resources. August 25, 2023.
2. Basemap is ESRI's topographic map, obtained 28 May 2024.
3. GDE locations determined from the Ducks Unlimited and TNC's NCCAG datasets and processed as described in Section 8.8.

N

0 8 16
Miles

Representative Monitoring Network for Depletion of Interconnected Surface Water

DRAFT

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09

Figure MN-10

Path: X:\C00041\Maps\2024\05\MN_FigureIMN_Figures.aprx