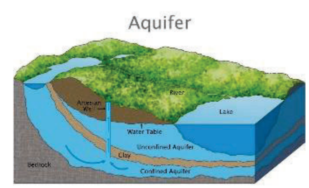
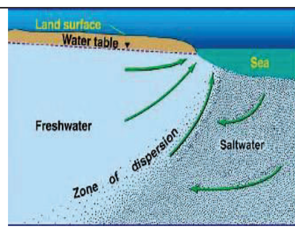
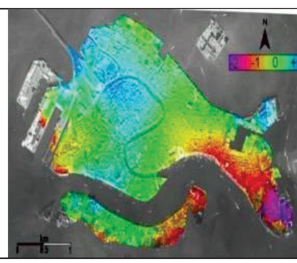
# 4 Monitoring Network

| Legal Requirements: |
|---|
| **§354.32** 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. |

Monitoring is a fundamental component of a groundwater management program. It is the method by which progress towards reaching measurable objectives and the goal of groundwater sustainability is ascertained. **Table 4-1** includes the sustainability indicators required for compliance with SGMA monitoring and reporting requirements. In areas where the current monitoring network does not meet SGMA objectives, this chapter discusses the current proposed monitoring network(s) and will identify current data gaps and propose measures to address these gaps in the future.

Table 4-1 Sustainable Indicator Monitoring

| | | | |
|---|---|---|---|
| **Groundwater Levels:**<br><br>Monitoring of static groundwater levels each spring and fall. |  | **Groundwater Storage:**<br><br>Estimated annual change in groundwater storage based on groundwater levels. |  |
| **Seawater Intrusion:**<br><br>Intrusion of seawater into local aquifers. <u>This is not applicable to the EKGSA.</u> |  | **Water Quality:**<br><br>Monitoring for water quality degradation that could impact available groundwater supplies. |  |
| **Land Subsidence:**<br><br>Surface land subsidence caused by groundwater withdrawals. |  | **Depletion of Interconnected Surface Water:**<br><br>Loss of permanent connections between surface water and groundwater. |  |

# 4.1 Introduction

**Legal Requirements:**
**§354.34(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.

This chapter describes the existing and developing monitoring networks in the East Kaweah Groundwater Sustainability Agency (EKGSA) that will collect data to determine short-term, seasonal, and long-term trends in groundwater conditions and related surface conditions. The data collected from the monitoring networks will provide necessary information to support the implementation of this Groundwater Sustainability Plan (GSP), evaluate the effectiveness of this GSP, and serve as a guide for decision making by the EKGSA management.

## 4.1.1 Monitoring Network Objectives

**Legal Requirements:**
**§354.34(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.*

The objectives of the various monitoring programs include the following:

1. *Establish a baseline for future monitoring;*
2. *Provide warning of potential future problems;*
3. *Use data gathered to generate information for water resources evaluation;*
4. *Help to quantify annual changes in water budget components;*
5. *Develop meaningful long-term trends in groundwater characteristics;*
6. *Provide comparable data from various places in the EKGSA Area;*
7. *Demonstrate progress toward achieving measurable objectives described in the GSP;*
8. *Monitor changes in groundwater conditions relative to minimum thresholds;*
9. *Monitor impacts to the beneficial uses or users of groundwater.*

The requirements for monitoring the groundwater levels will initially be fulfilled by utilizing existing monitoring programs and data from public wells. Throughout the Sub-basin there are several programs that currently monitor and report groundwater levels to DWR on a semiannual basis. The EKGSA will use these established monitoring points as the framework for the monitoring network and expand and improve upon it through implementation of the GSP. Whenever possible water quality will be monitored in conjunction with water level monitoring, in effort to develop a more robust groundwater quality data set. Where groundwater level monitoring is to occur in private wells, the EKGSA plans to seek landowner approval to use the wells in the monitoring network for water quality monitoring. The subsidence monitoring network will utilize available existing data sets and points in addition to adding several monitoring locations on key infrastructure within the EKGSA, primarily the Friant-Kern Canal (FKC) and a Plainview well.

### 4.1.2 Sustainability Indicator Monitoring Networks

**Legal Requirements**
**§354.34(c)** Each monitoring network shall be designed to accomplish the following for each sustainability indicator:
[§354.34(c)(1) through §354.34(c)(6) are individually listed below]
**§354.34(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.

The following sections (4.2 through 4.7) include descriptions of the monitoring networks within the EKGSA that will be utilized to meet criteria for the five sustainability indicators present: groundwater levels, groundwater storage, water quality, land subsidence, and depletion of interconnected surface water. The adequacy of the monitoring network is discussed for each sustainability indicator, as well as the quantitative values for the minimum thresholds, measurable objectives, and interim milestones. The sections also include a review of each monitoring network for site selection, monitoring frequency and density, identification of data gaps, and the current plans to fill data gaps. This information will be reviewed and evaluated during each five-year assessment.

When evaluating the adequacy of the monitoring network, three general types of data gaps will be considered:

1. *Temporal: A temporal data gap indicates that there is an insufficient frequency of monitoring. For instance, data may only be available for a well only in the Fall since it is rarely idle in the Spring. In addition, a privately owned well may have sporadic access due to locked security fencing, roaming dogs, change in ownership, etc.*
2. *Spatial: Spatial data gaps occur when there is an insufficient number or density of monitoring sites in a specific area.*
3. *Quality: Data may be available but be of poor or questionable accuracy. Poor data can lead to incorrect assumptions or biases, creating more inaccuracies than if no data had been collected at all. The data may not appear consistent with other data in the area, or with past readings at the monitoring site. The monitoring site may not meet all the desired criteria to provide reliable data, such as having information on perforation depth, etc.*

Improving the monitoring network(s) will aim to follow the Data Quality Objective (DQO) process that follows the U.S. EPA *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006). The DQO process is also outlined in the DWR's Best Management Practices for Monitoring Networks (2016a) and Monitoring Protocols (2016b). Leaning on this DQO process intends to help to ensure a repeatable and robust approach to collecting data with a specific goal in mind.

## 4.2 Seawater Intrusion

**Legal Requirements:**
**§354.34(c)(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.

The EKGSA is separated from the ocean by California's Coast Ranges, ~320-600 vertical feet, and ~120 miles (as the crow flies). Barring unprecedented tectonic upheaval, seawater intrusion is not an issue of particular concern in the Kaweah Sub-basin or EKGSA. In addition, there are no saline water lakes in or near the EKGSA. As a result, seawater intrusion is not discussed hereafter in this chapter as allowed by §354.34(j). Saline water intrusion from up-coning of deep saline groundwater is also not likely a problem given the typical depths to bedrock in the EKGSA, however TDS and other salts will be monitored as part of general water quality monitoring.

# 4.3 Groundwater Levels

**Legal Requirements:**
**§354.34(c)(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 monitor 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.*

**§354.34(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

## 4.3.1 Monitoring Network Description

Groundwater-level monitoring has been carried out for most of the past century. Existing groundwater wells with long monitoring histories make the best targets for continued monitoring. These wells are rare, and when they exist, their usefulness is often degraded by poor data quality. Most wells have incomplete temporal histories and lack consistent measurements for consecutive years throughout their operational lives. There is no recourse for historic temporal data gaps, but the temporal quality of future measurements in these wells can be ensured. Many existing wells do not have well logs or records with other construction information. Data containing the depth and perforation intervals is required according to SGMA guidelines. Matching a well to a construction log is a time-consuming process that is not guaranteed to be accurate and requires field verification. All existing wells in the monitoring network currently meet the SGMA guidelines for aquifer specificity as they are screened across a single water-bearing unit as there is only one aquifer underlying the EKGSA. Among the current records, data inconsistencies may arise due the fact that most of the historical well data is not derived from dedicated monitoring wells. Records may come from wells used for production; therefore, groundwater level measurements may be skewed by the frequency and timing of water level readings. For example, if water level readings were taken right after the well was pumped groundwater levels will appear to be much lower than if the aquifer was given appropriate time for recovery. Additionally, water level records may also be misrepresented if wells in the vicinity of the monitoring well underwent pumping activity that had an effect of the analyzed well. There is no way to pinpoint or correct historical data for this degree of uncertainty, so it further contributes to the degree of error associated with using available data. Future measurements will be extrapolated from a monitoring network with dedicated wells. The EKGSA will attempt to drill new monitoring wells in locations minimally affected by pumping, however, this is an aspect that cannot be directly controlled.

Existing monitoring networks and well information in or around the EKGSA that will be used to initially meet the monitoring criteria within the EKGSA include:

- Irrigation District wells: The EKGSA is made up of several irrigation districts that are Contractors with the Central Valley Project (CVP) of the Friant Division. These districts are: Stone Corral ID, Ivanhoe ID, Exeter ID, Lindmore ID, and Lindsay-Strathmore ID. As required per the CVP contracts, each of these districts maintain a network of wells monitored for groundwater levels. These networks were initially established in the 1950's and have been measuring groundwater levels in the spring and fall. This information has been used to map past spring and fall water elevations, depths to water, and changes in groundwater levels.
- CASGEM wells: DWR documents groundwater levels recorded by local agencies and reports them through the CASGEM program. The program was created by SBx7-6, Groundwater Monitoring, a part of the 2009 Comprehensive Water Package. The CASGEM system relies on records from deep wells within irrigation districts and municipalities since it does not currently own any dedicated monitoring wells. For the EKGSA area, most if not all, the CASGEM wells align with the Irrigation District wells. Thus, there is a good history to build from. Wherever available, this system takes readings

from wells and collects groundwater level data semi-annually in the spring and fall for reporting to DWR. The CASGEM network is proposed to be backbone of the initial groundwater level monitoring network when SGMA Implementation begins in 2020. Presently, the CASGEM network alone does not provide enough spatial density. Other well sources are proposed to bolster the network initially.

- Municipal wells: Municipalities within and surrounding the EKGSA include the cities of Woodlake, Exeter, Lindsay, Strathmore, Porterville, Ivanhoe, and Seville. Exeter and Porterville, both of which are located just outside the EKGSA, are the only cities that provide water to more than 3,000 municipal connections so they are required to conduct long-term resource planning to ensure there is an adequate water supply available to meet the community's existing and future water needs. These plans assess the reliability of water sources in a 20-year time frame and plans are updated every five years to ensure water resources are properly monitored. The remaining cities of Lindsay, Strathmore, Ivanhoe, and Seville currently do not fall under the regulatory requirements for creating plans outlining sustainable future water resources. The intent of the EKGSA is to utilize these public data sets when evaluating groundwater conditions.
- Public Water System Wells: Records from water wells in a few small public water systems in the portion of the EKGSA are anticipated to be used as part of the monitoring network. Water systems of interest in the EKGSA include Plainview, Tonyville, and Tooleville.
- Kaweah Delta Water Conservation District (KDWCD): The KDWCD spans some area within and adjacent to the EKGSA. KDWCD compiles semi-annual reports with data from its member agencies in addition to Kings County Water District and Tulare ID. Since 2002 the KDWCD has conducted an extensive monitoring program that takes groundwater level measurements in the spring and fall. Annual reports compare the reported levels to the levels obtained in the previous year.
- Private wells: In several parts of the EKGSA there are gaps in the current monitoring well coverage, therefore, records from private wells may be used to initially satisfy the monitoring network needs. Use of these wells would require landowners to execute agreements with the EKGSA to allow access and conduct and oversee the monitoring. This process is anticipated to be time intensive, so this option is not the most preferred method.
- Wells in adjacent GSAs: Groundwater level data from adjoining areas will likely be collected through data sharing agreements to help provide better interpret GSA boundary flow conditions (long term agreements still need to be prepared to collect/share data with other Subbasins/GSAs). Wells within the GKGSA, Kings River East GSA, Lower Tule River ID, and Eastern Tule GSA will aid in evaluating boundary conditions between the Kaweah and Kings Sub-basins and the Kaweah and Tule Sub-basins.

**Figure 4-1** shows the proposed locations for the initial groundwater level monitoring network for the EGKSA, and the different types of wells to be utilized. The two wells notated with stars in the northern portion of the EKGSA are proposed dedicated monitoring wells that are anticipated to receive Technical Support Services (TSS) assistance through DWR. The seven locations notated with large circles are locations with data gaps. The EKGSA will aim to obtain data from these regions (within half a mile) through agreement on private wells or through drilling dedicated monitoring wells during the first year(s) of implementation. It is understood that over the course of implementation the EKGSA will gradually convert the entire Monitoring Network to dedicated monitoring wells.

**Table 4-2** provides information on these monitoring points in a tabular format. This table sorts the monitoring locations by the ten threshold regions previously established in in **Chapter 3**. Each well contains data for the location, site type, monitoring frequency, monitored undesirable results, and groundwater level minimum thresholds and measurable objectives. At this time the EKGSA will monitor approximately seventy wells on a semi-annual or quarterly basis both inside and outside of the EKGSA boundary. Nine subsidence monitoring stations within the EKGSA boundary will be surveyed annually to monitor land subsidence.

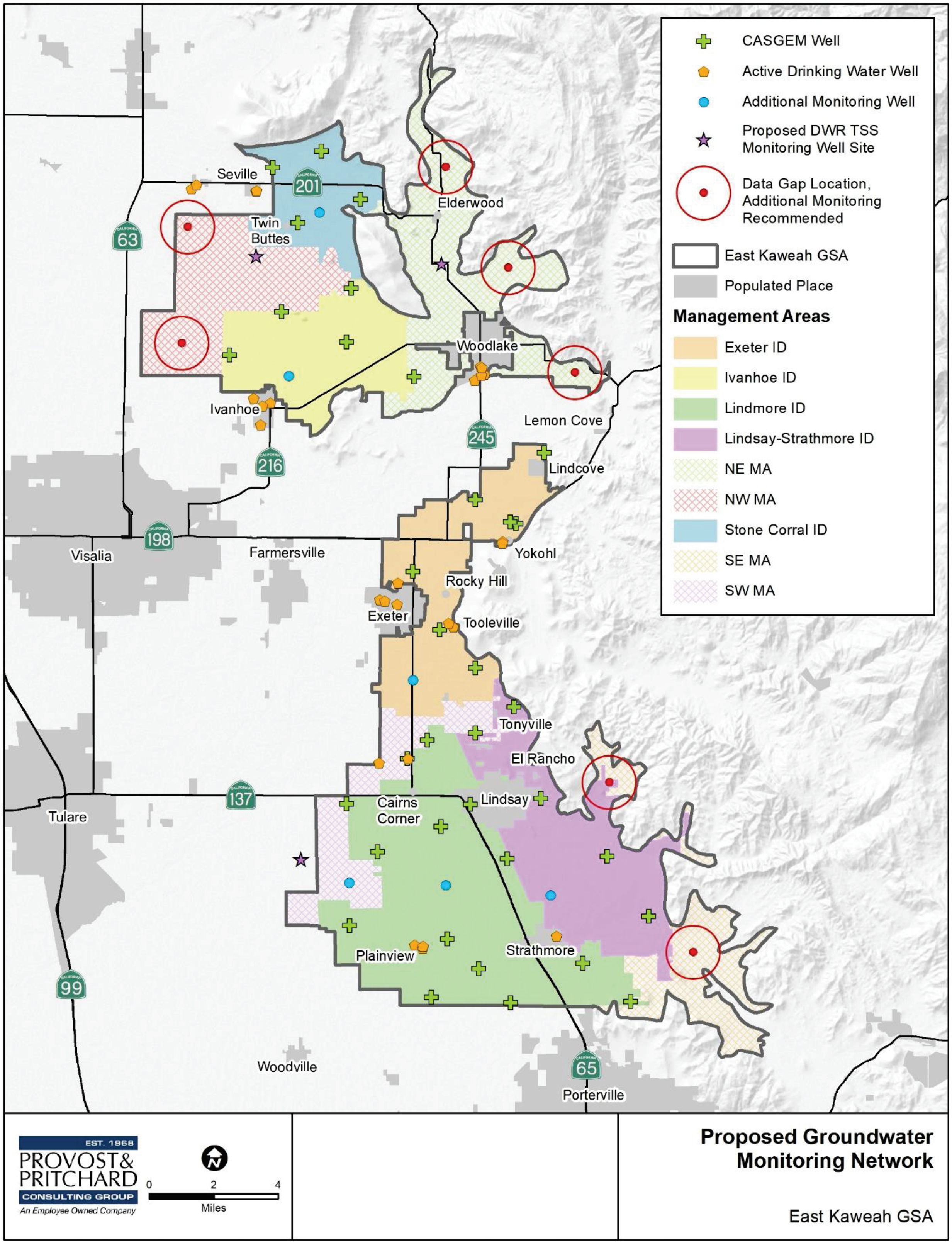



Figure 4-1: Initial Groundwater Monitoring Network

Table 4-2 Proposed Monitoring Network Information

| TR | Latitude | Longitude | Site Type | Frequency | URs Monitored | Groundwater MT (DTW ft.) | Groundwater MO (DTW ft.) |
|---|---|---|---|---|---|---|---|
| 1 - EK NW | 36.4281 | -119.2092 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 169 | 127 |
| 1 - EK NW | 36.4086 | -119.2381 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 169 | 127 |
| 1 - EK NW | 36.3992 | -119.2051 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 169 | 127 |
| 1 - EK NW | 36.385905 | -119.219633 | Drinking Water Monitoring Well | Quarterly | GW Quality | 169 | 127 |
| 1 - EK NW | 36.389279 | -119.224619 | Drinking Water Monitoring Well | Quarterly | GW Quality | 169 | 127 |
| 1 - EK NW | 36.387249 | -119.215311 | Drinking Water Monitoring Well | Quarterly | GW Quality | 169 | 127 |
| 2 - IID-SCID | 36.493 | -119.2142 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.5005 | -119.187 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.4788 | -119.1653 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.4682 | -119.2001 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.4388 | -119.1703 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.4146 | -119.1728 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.399028 | -119.135194 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.504083 | -119.181382 | Subsidence Survey Site | Annual | Subsidence | 102 | 68 |
| 2 - IID-SCID | 36.414025 | -119.139866 | Subsidence Monument | Annual | Subsidence | 102 | 68 |
| 2 - IID-SCID | 36.483936 | -119.156678 | Subsidence Survey Site | Annual | Subsidence | 102 | 68 |
| 2 - IID-SCID | 36.453177 | -119.223455 | Proposed Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 2 - IID-SCID | 36.472965 | -119.18822 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 102 | 68 |
| 3 - EK NE | 36.449941 | -119.120187 | Proposed Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 81 | 35 |
| 4 - RIVER | 36.3438 | -119.1012 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 76 | 44 |
| 4 - RIVER | 36.3649 | -119.0628 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 76 | 44 |
| 4 - RIVER | 36.333 | -119.0784 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 76 | 44 |
| 4 - RIVER | 36.3338 | -119.0817 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 76 | 44 |
| 4 - RIVER | 36.403201 | -119.097777 | Drinking Water Monitoring Well | Quarterly | GW Quality | 76 | 44 |
| 4 - RIVER | 36.4038 | -119.098318 | Drinking Water Monitoring Well | Quarterly | GW Quality | 76 | 44 |
| 4 - RIVER | 36.399822 | -119.097991 | Drinking Water Monitoring Well | Quarterly | GW Quality | 76 | 44 |
| 4 - RIVER | 36.400218 | -119.096258 | Drinking Water Monitoring Well | Quarterly | GW Quality | 76 | 44 |
| 4 - RIVER | 36.397603 | -119.101521 | Drinking Water Monitoring Well | Quarterly | GW Quality | 76 | 44 |
| 4 - RIVER | 36.325077 | -119.085966 | Drinking Water Monitoring Well | Quarterly | GW Quality | 76 | 44 |
| 4 - RIVER | 36.324287 | -119.086025 | Drinking Water Monitoring Well | Quarterly | GW Quality | 76 | 44 |
| 5 - EID | 36.3115 | -119.135806 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 162 | 103 |
| 5 - EID | 36.2853 | -119.1209 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 162 | 103 |
| 5 - EID | 36.325278 | -119.106389 | Subsidence Monument | Annual | Subsidence | 162 | 103 |
| 5 - EID | 36.311321 | -119.135088 | Subsidence Monument | Annual | Subsidence | 162 | 103 |
| 5 - EID | 36.296749 | -119.144649 | Drinking Water Monitoring Well | Quarterly | GW Quality | 162 | 103 |
| 5 - EID | 36.298267 | -119.151426 | Drinking Water Monitoring Well | Quarterly | GW Quality | 162 | 103 |
| 5 - EID | 36.306361 | -119.144192 | Drinking Water Monitoring Well | Quarterly | GW Quality | 162 | 103 |
| 5 - EID | 36.286649 | -119.113386 | Drinking Water Monitoring Well | Quarterly | GW Quality | 162 | 103 |
| 5 - EID | 36.288174 | -119.115877 | Drinking Water Monitoring Well | Quarterly | GW Quality | 162 | 103 |
| 6 - EK SE | 36.1833 | -119.0278 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 89 | 77 |

| TR | Latitude | Longitude | Site Type | Frequency | URs Monitored | Groundwater MT (DTW ft.) | Groundwater MO (DTW ft.) |
|---|---|---|---|---|---|---|---|
| 6 - EK SE | 36.1564 | -119.0048 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 89 | 77 |
| 7 - LSID | 36.2506 | -119.0795 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 123 | 78 |
| 7 - LSID | 36.2094 | -119.0645 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 123 | 78 |
| 7 - LSID | 36.1181 | -119.0148 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 123 | 78 |
| 8 - LID E | 36.1822 | -119.0831 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 164 | 99 |
| 8 - LID E | 36.1353 | -119.0412 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 164 | 99 |
| 8 - LID E | 36.1175 | -119.0812 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 164 | 99 |
| 8 - LID E | 36.1666 | -119.058459 | Subsidence Survey Site | Annual | Subsidence | 164 | 99 |
| 8 - LID E | 36.130819 | -119.05574 | Subsidence Survey Site | Annual | Subsidence | 164 | 99 |
| 8 - LID E | 36.165789 | -119.059314 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 164 | 99 |
| 8 - LID E | 36.147461 | -119.055979 | Drinking Water Monitoring Well | Quarterly | GW Quality | 164 | 99 |
| 9 - LID W | 36.2681 | -119.1009 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.2389 | -119.1009 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.2356 | -119.1278 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.1967 | -119.1201 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.2068 | -119.1038 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.1461 | -119.1165 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.12 | -119.1253 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.1328 | -119.099 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.2625 | -119.1356 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.1703 | -119.1173 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 218 | 134 |
| 9 - LID W | 36.142014 | -119.130089 | Drinking Water Monitoring Well | Quarterly | GW Quality | 218 | 134 |
| 9 - LID W | 36.143557 | -119.134656 | Drinking Water Monitoring Well | Quarterly | GW Quality | 218 | 134 |
| 9 - LID W | 36.142964 | -119.130025 | Drinking Water Monitoring Well, Subsidence Survey Site | Quarterly, Annual | GW Quality, Subsidence | 218 | 134 |
| 9 - LID W | 36.274669 | -119.103826 | Subsidence Survey Site | Annual | Subsidence | 218 | 134 |
| 10 - EK SW | 36.2273 | -119.1386 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 269 | 184 |
| 10 - EK SW | 36.2069 | -119.1723 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 269 | 184 |
| 10 - EK SW | 36.1853 | -119.1551 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 269 | 184 |
| 10 - EK SW | 36.1522 | -119.1706 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 269 | 184 |
| 10 - EK SW | 36.1714 | -119.1709 | Irrigation Monitoring Well | Semi-annual | GW levels, GW Storage, Interconnected SW, GW Quality | 269 | 184 |
| 10 - EK SW | 36.227331 | -119.138548 | Drinking Water Monitoring Well | Quarterly | GW Quality | 269 | 184 |
| Outside EK | 36.298705 | -119.154153 | Drinking Water Monitoring Well | Quarterly | GW Quality | N/A | N/A |
| Outside EK | 36.225396 | -119.154484 | Drinking Water Monitoring Well | Quarterly | GW Quality | N/A | N/A |
| Outside EK | 36.377371 | -119.220542 | Drinking Water Monitoring Well | Quarterly | GW Quality | N/A | N/A |
| Outside EK | 36.37186 | -119.100079 | Subsidence Survey Site | Annual | Subsidence | N/A | N/A |
| Outside EK | 36.482602 | -119.223352 | Drinking Water Monitoring Well | Quarterly | GW Quality | N/A | N/A |
| Outside EK | 36.482413 | -119.223388 | Drinking Water Monitoring Well | Quarterly | GW Quality | N/A | N/A |
| Outside EK | 36.483424 | -119.259406 | Drinking Water Monitoring Well | Quarterly | GW Quality | N/A | N/A |
| Outside EK | 36.485176 | -119.25665 | Drinking Water Monitoring Well | Quarterly | GW Quality | N/A | N/A |

### 4.3.2 Quantitative Values

**Legal Requirements:**
**§354.34(g)(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.

Threshold values are presented and discussed in **Chapter 3**. This includes details surrounding minimum threshold, measurable objective, and interim milestones.

### 4.3.3 Review and Evaluation of Monitoring Network

**Legal Requirements:**
**§354.38(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.

The monitoring network will be assessed and reviewed for adherence to SGMA requirements at the end of each five-year period, with the first period beginning in 2020 and concluding in 2025. As the monitoring network currently stands there are a few data gaps that may affect the interim monitoring of the overall sustainability goal of the basin, however, these will be addressed within the first five years of monitoring.

#### 4.3.3.1 Monitoring Frequency and Density

**Legal Requirements:**
**§354.34(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.*

Estimates for well densities necessary to adequately track monitoring objectives are in the CASGEM Groundwater Elevation Monitoring Guidelines (DWR, 2010). The CASGEM guidelines and Monitoring Network BMP reference the Hopkins (1984) approach which incorporates a relative well density based on the degree of groundwater used within a given area. The densities range from 1 well per 100 square miles to 1 well per 25 square miles based on the quantity of groundwater pumped. A minimum density of 1 well per 25 square miles is recommended for basins using over 100,000 AF of groundwater per year.

Groundwater use in the EKGSA currently exceeds 100,000 AF/year. As a result, a minimum well density of 1 well per 25 square miles will be used. For this evaluation, well density is tracked per 36-square mile Township, resulting in about 1.5 wells required per Township. A more conservative value of 2 wells per Township was adopted thereby improving upon the minimum density recommendation. Well densities in and around concentrated pumping areas and cities will be up to 4 wells per Township, whereas areas that have little to no pumping may have as few as 1 well per Township. The densest spatial distribution requirements require 10 wells per 100 square miles. With a total area of 183.3 square miles, the EKGSA would require 18 wells to meet the most stringent monitoring well network requirements.

As depicted in **Figure 4-1**, 35 CASGEM wells are located within the EKGSA. Quantitatively this is nearly double the required density, however, the placement of the CASGEM wells alone is not sufficient to provide an adequate monitoring network, especially for lands that lie outside of the irrigation districts within the

EKGSA. Furthermore, not all of these existing wells meet the criteria to be considered 'High Quality Monitoring Points'. High quality data is derived from wells that are deep enough to track seasonal fluctuations, have reliable access each spring and fall, and have information on the well depth and perforation intervals. In many cases the construction information (well depth and perforation intervals) are not known for the proposed Monitoring Network Wells. Due to the fact available information suggests the EKGSA overlies a single aquifer system, proposed wells that do not meet these guidelines will still be maintained in the monitoring network since they can still provide useful information about the behavior of the aquifer. Construction details (i.e. total depth and perforation intervals) from existing wells may be determined by video-surveying in the future. Obtaining existing well details is preferential since it would strengthen the status of existing monitoring wells that already have established histories. Eventually the GSA will own and/or oversee a monitoring network of wells of the correct specified density, however, the network of CASGEM wells will be used and expanded upon until this network is established.

Groundwater levels will be monitored at a minimum of twice each year in the Spring (likely March) and Fall (likely October). Spring measurements generally capture the recovery of the groundwater levels after an extended period of minimal agricultural irrigation demand, assuming normal rainfall. Fall measurements show a period after peak irrigation and other summertime urban demands have ceased, thereby yielding the cumulative impacts on the groundwater basin before any natural recovery has taken place.

#### 4.3.3.2 Site Selection

**Legal Requirements:**
**§354.34(g)** Each Plan shall describe the following information about the monitoring network:
**(1)** Scientific rationale for the monitoring site selection process.

The rationale for including an existing well, or adding a new well, into the groundwater level monitoring network includes the following:

- *The monitoring point contributes to meeting the minimum density necessary within the EKGSA.*
- *The monitoring point contributes to the minimum density of wells in a township/range.*
- *The monitoring point has performed adequately to provide information for annual reporting, groundwater contour maps, and estimation of storage change. A prolonged period of record is important to compare interpretations of historical data to future interpretations.*
- *Construction information for the well, including total completed depth and the perforated interval(s), is known.*
- *Access to the well is unrestricted and/or permission to access the monitoring point can be obtained.*
- *Dedicated monitoring wells are preferable to production wells, where feasible.*

#### 4.3.3.3 Identification of Data Gaps

**Legal Requirements:**
**§354.38(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.
**§354.38(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*

Existing groundwater-level monitoring has provided data to prepare groundwater contour maps and identify groundwater level trends over the decades. The existing monitoring system relies heavily on the member irrigation districts, but this only provides data for a portion of the EKGSA. To better represent hydraulic gradient and flow direction within the EKGSA, about seven wells should be strategically placed for regular monitoring in the EKGSA. **Figure 4-1** shows the approximate locations where additional monitoring wells are believed to be useful in accomplishing this goal and meeting the monitoring well density requirements set forth in the GSP. The EKGSA will try to fill these locations either through agreements with private landowners or by drilling new dedicated monitoring wells.

Other data gaps exist in the fact that most of the proposed monitoring network wells are privately owned production wells that are used for monitoring. Specific well construction information, including depth and perforated interval, are not known for many of the wells. Also, depending on how and when the data was collected, data points in some (or all) years may be skewed. Utilizing a production well as a monitoring well runs the risk of potential influence from recent pumping that may affect the 'static' reading aimed to be captured. It is believed that much of the recorded well data within the EKGSA is credible, however the EKGSA will continue to improve this data set going forward.

#### 4.3.3.4 Plans to Fill Data Gaps

**Legal Requirements:**
**§354.38 (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.

The EKGSA will oversee the groundwater level monitoring network, including filling areas with data gaps. This will be especially useful for the regions that are not currently monitored, such as outside irrigation district boundaries. As previously stated, **Figure 4-1** depicts the wells intended to fill spatial data gaps for initial implementation. The EKGSA will need to locate accessible private wells or drill new wells in the seven locations shown. Over time the EKGSA will transition to utilizing dedicated monitoring wells in its monitoring network.

To address data quality gaps related to unknown construction information, the EKGSA will utilize the following options:

- ***Collect well completion reports.*** *Accurate well Completion Reports (WCRs) can potentially provide missing well construction and completion information. These records could be collected from landowners or DWR. Due to the way that data is collected and dispersed, it is often difficult to correlate WCRs with actual wells. Locations of wells as reported on WCRs are often subjective, as they are based on the drillers' ability to convey spatial location. Multiple wells may exist within the area a well's log leads to. In some cases, wells have been destroyed or lost without documentation. Obtaining well logs directly from owners bypasses this confusion, though this is not a perfect solution. Private well owners may be unable or unwilling to provide logs for their wells.*
- ***Perform a video inspection of each well to obtain construction information.*** *In the absence of verified well logs a video inspection can be performed on wells to determine the total completed depth and perforated interval(s). Each video inspection currently ranges in costs between $2,500 and as much as $15,000 if required to lift and reinstall a pump to obtain access in production wells. There would also be additional costs for administration and outreach to landowners. The EKGSA would need to enter into private agreements with individual well owners for the use of these wells; as an incentive for participation the EKGSA would cover the cost of the well video assessment.*
- ***Abandoned Wells.*** *The EKGSA will assess the likelihood of monitoring former wells that have been abandoned. Use of these wells will potentially bolster the density of the monitoring network in areas with minimal coverage, likely involve less stringent access requirements, and are cheaper than drilling new wells. Additionally, since these wells are no longer in production, the monitoring of abandoned wells allows for better potential in gaining a static water level reading and better fulfill the requirements of Sub-Article 4.*
- ***Replace monitoring point with a dedicated monitoring well.*** *Dedicated monitoring wells could be installed and used in place of private wells. The construction information would be known and since the EKGSA would locate these wells, access issues would not be an issue. Dedicated monitoring wells are expensive to construct, and their installation will depend on available funding.*
- ***Replace monitoring point with another private well.*** *Private wells without documented construction information may potentially be replaced with other private wells that have verified well completion information. This option may be simpler and less costly than using video inspection and would be substantially less expensive than drilling new*

*dedicated monitoring wells. This method of network repair would side-step the expense of drilling new wells but would still be subject to availability and limitations arising from the missing historical record.*

# 4.4 Groundwater Storage

**Legal Requirements:**
**§354.34(c)(2)** Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.

## 4.4.1 Monitoring Network Description

The EKGSA is proposing to monitor changes in groundwater storage by utilizing groundwater levels as a proxy. Put simply, if groundwater levels decline to unacceptable levels it indicates an unacceptable volume of water was lost from groundwater storage or, given the shallow aquifer on the east side, an unacceptable amount of groundwater remains in storage. By utilizing the groundwater level monitoring as a proxy, the monitoring network for groundwater storage is the same as depicted in **Figure 4-1**. More background on groundwater aquifer characteristics and formation cross-sections is needed to evaluate groundwater storage is detailed in the Current and Historical Groundwater Conditions of the Basin Setting (**Chapter 2**). With groundwater level monitoring from year to year, calculations can be performed to estimate change in storage. This method uses average specific yield, basin area, and change in groundwater levels to determine the change in storage from year to year. Additionally, the calibrated Kaweah Sub-basin Groundwater Model can be used to estimate change in storage.

## 4.4.2 Quantitative Values

Groundwater storage values will be determined by comparing groundwater level changes from year to year through the groundwater level monitoring network. Threshold values are presented in **Chapter 3** and include minimum threshold, measurable objective, and interim milestones.

## 4.4.3 Review and Evaluation of Monitoring Network

### 4.4.3.1 Site Selection

Groundwater storage capacity has historically been calculated using local groundwater levels in conjunction with estimated specific yield values. The inadequacies in past groundwater level monitoring networks impacts these calculations since evaluating the change in groundwater storage is largely based on the spatial and temporal coverage of the groundwater level monitoring network. As such, site selection will correspond with the parameters set forth for the groundwater level monitoring sites.

### 4.4.3.2 Monitoring Frequency and Density

Change in groundwater storage will be estimated annually by comparing Spring groundwater level readings. Groundwater storage change will be estimated on a regional scale encompassing the entirety of the EKGSA through the development of groundwater contours from the Spring data.

### 4.4.3.3 Identification of Data Gaps

Gaps in current groundwater level monitoring networks have created corresponding inadequacies in the ability to calculate change in storage. Data gaps associated with aquifer characteristics, such as specific yield values used for storage estimates, are anticipated to be improved through the completion of different projects and studies undertaken by the Kaweah Sub-basin and the EKGSA (i.e. SkyTEM).

#### 4.4.3.4 Plans to Fill Data Gaps

Significant data gaps will be filled using the same methods used to address data gaps in the groundwater level network, as spatial data coverage is a critical component in the change in storage calculations. Aquifer evaluation at a Sub-basin scale was performed through a SkyTEM electromagnetic analysis. The results from this analysis were not ready in time for this initial GSP but will be available for future updates and modeling to improve the general knowledge of the aquifer characteristics moving forward.

# 4.5 Water Quality

**Legal Requirements:**
**§354.34(c)(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.

## 4.5.1 Monitoring Network Description

Water quality monitoring is an important aspect of groundwater management. It serves the following purposes:

1. Spatially characterize water quality according to soil types, soil salinity, geology, surface water quality, and land use;
2. Compare constituent levels at a specific well through time;
3. Determine the extent of groundwater quality problems in specific areas;
4. Identify groundwater quality protection and enhancement needs;
5. Identify impacts of recharge and surface water use on water quality;
6. Identify suitable crop types that are compatible with the water characteristics; and
7. Monitor the migration of contaminant plumes (such as nitrate).

Baseline groundwater quality conditions for the EKGSA are discussed in the Basin Setting (**Chapter 2**). Several agencies are involved in the monitoring and mitigation of groundwater quality in the surrounding area, such as:

- ***Groundwater Ambient Monitoring and Assessment Program (GAMA)-*** *California's comprehensive groundwater quality monitoring program was designed to identify the threats to California's groundwater resources as prescribed in the Groundwater Quality Monitoring Act of 2001 (AB 599). The program monitors ambient groundwater quality, provides hydrogeologic technical support to statewide programs, and includes projects that meet the statutory requirements of the Groundwater Quality Monitoring Act. Through collaboration with State and Regional Water Boards, the DWR, Department of Pesticide Regulations (DPR), USGS, Lawrence Livermore National Laboratory, and local well owners and agencies, GAMA aims to improve statewide groundwater quality monitoring and increase the availability of groundwater quality information to the public. More information on the GAMA program can be found at: https://www.waterboards.ca.gov/gama/. The GAMA program reports data for*
    - ***DHS –*** *Department of Health Services (now Department of Public Health, DPH).*
    - ***CA SDWIS –*** *California Safe Drinking Water Information System*
    - ***DWR –*** *Department of Water Resources*
    - ***DPR –*** *Department of Pesticide Regulation*
    - ***USGS –*** *United States Geological Survey*
    - ***EDF –*** *Environmental Defense Fund*
    - ***Geotracker and Envirostor Databases***
- ***Irrigated Lands Regulatory Program-*** *The Irrigated Lands Regulatory Program (ILRP) was initiated in 2003 to address pollutant discharges to surface water and groundwater from commercially irrigated lands. The primary purpose of the ILRP is to address key pollutants of concern including salinity, nitrates, and pesticides introduced through*

*runoff or infiltration of irrigation water. Within the EKGSA, the ILRP is administered by the Central Valley Regional Water Quality Control Board (CVRWQCB). The Kaweah Basin Water Quality Coalition (Coalition) was established in 2009 as a Joint Powers Agency to pool resources and combine regional efforts to comply with the regulatory requirements of the ILRP. Historically, the Coalition has only monitored surface water quality, but groundwater quality began being monitored in Fall of 2018. In April 2017, the Coalition released a Groundwater Quality Trend Monitoring Workplan – Phase I and submitted a follow-up Groundwater Quality Trend Monitoring Workplan – Phase II in May 2018. The CVRWQCB will ultimately decide whether the submitted network is representative of the impacts of irrigated agriculture of groundwater quality. Additional details of the monitoring network and specific well selection will follow formal CVRWQCB approval of the workplan. Results from annual monitoring will be documented in an annual report and publicly available via the GAMA Geotracker database. The ILRP groundwater trend monitoring program requires testing annually for nitrate as N, conductivity, pH, dissolved oxygen, and temperature in all network wells. In addition, every five years, network wells must also be tested for total dissolved solids, carbonate, bicarbonate, chloride, sulfate, boron, calcium, sodium, magnesium, and potassium.*

- ***CV-SALTS-*** *The Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS) program began in 2006 and is a collaborative stakeholder-driven and managed program to develop sustainable salinity and nitrate management planning for the Central Valley. CV-SALTS developed a Salt and Nitrate Management Plan (SNMP) to meet the requirements set forth in the State Recycled Water Policy adopted in 2009. The SNMP's goals are to provide a safe drinking water supply, achieve balanced salt and nitrate loadings, and implement a managed aquifer restoration program. Combined, the development of the SNMP and the proposed, corresponding Basin Plan amendments will establish a revised regulatory framework and provide the flexibility necessary to make salt and nitrate management decisions at the appropriate temporal, geographic and/or management scales. As a part of the larger SNMP, CV-SALTS also developed a Surveillance and Monitoring Program (SAMP) to monitor groundwater quality and comply with the Recycled Water Policy. The SAMP network developed two monitoring networks – one each for the shallow and deep aquifer zones. It is anticipated that implementation of the surveillance and monitoring program will occur soon after adoption of planned Basin Plan amendments. In March 2017, the CVRWQCB adopted a resolution accepting the SNMP and directing staff to initiate Basin Plan amendments for incorporation into the Basin Plans. On May 31, 2018 the CVRWQCB adopted the suggested Basin Plan amendments. These proposed Basin Plan amendments are currently undergoing the State Water Board adoption process and will be followed with the Office of Administrative Law and US EPA (as appropriate) adoption processes.*
- ***Municipal Water Suppliers-*** *Municipal water suppliers in the EKGSA include the City of Lindsay and the Strathmore Public Utility District. These entities test water quality on a routine basis for state and federally regulated inorganic and organic constituents, as well as coliform bacteria, as required by the Division of Drinking Water (DDW). Testing requirements vary based on the size of the system and constituents of concern with a history in the area. Water quality is tested at all production well sites and some monitor wells. The municipal water suppliers also prepare annual Consumer Confidence Reports to inform the public of water quality issues, as required by the State of California.*
- ***AB 3030 and SB 1938-*** *AB 3030 was established in 1992 to require certain local agencies to compile groundwater management plans (GMP) and SB 1938 was enacted to require agencies to identify a basin management strategy in the GMP to receive funding. AB 3030 introduced several technical considerations that apply to groundwater quality. The plans are to be updated once every five years. Under this program local agencies must successfully manage their groundwater resources and are encouraged to consider twelve voluntary components:*
    1. *The control of saline water intrusion.*
    2. *Identification and management of wellhead protection areas and recharge areas.*
    3. *Regulation of the migration of contaminated groundwater.*
    4. *The administration of a well abandonment and well destruction program.*
    5. *Mitigation of conditions of overdraft.*
    6. *Replenishment of groundwater extracted by water producers.*
    7. *Monitoring of groundwater levels and storage.*
    8. *Facilitating conjunctive use operations.*
    9. *Identification of well construction policies.*

**10.** *The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.*
**11.** *The development of relationships with state and federal regulatory agencies.*
**12.** *The review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination (AB 3030).*

Data from these groundwater monitoring sources indicate the common constituents of concern (COCs) in the EKGSA include: 1,2,3-Trichloropropane (1,2,3 TCP), 1,2-Dibromo-3-chloropropane (DBCP), Arsenic, Hexavalent Chromium, Nitrate, Perchlorate, Sodium, Chloride, and Total Dissolved Solids (TDS). Wells supplying drinking water (i.e. public systems) will be monitored for all of these COCs quarterly. Wells supplying irrigation water will be monitored for Chloride, Sodium, and TDS on a semiannual basis. Further information about these COCs, corresponding regulatory requirements, and contaminant plumes can be found in the Basin Setting (**Chapter 2**). These COCs are proposed to be monitored at all wells in the groundwater level monitoring network, based on their use to develop a more robust data set since current coverage of groundwater quality data is lacking for many parts of the EKGSA.

### 4.5.2 Quantitative Values

Threshold values for COCs are presented in **Chapter 3**. These values use MCL and prevalence data to provide minimum thresholds, measurable objectives, and interim milestones for each COC. **Table 4-3** repeats the monitoring network wells table, but this time shows the baseline 10-year (2008-2017) COC averages for the wells in the network with water quality data available. By comparison, only 15 of the approximately 70 wells to be monitored for water quality have data for establishing a baseline. This represents a significant data gap, however the intent of the EKGSA monitoring will strive to remedy this gap over the first years of implementation. Water quality degradation will be evaluated against the appropriate water quality standard at the time of the sample and on a 10-year rolling average to determine if the actions of the EKGSA degrade the beneficial use of water in the Subbasin.

### 4.5.3 Review and Evaluation of Monitoring Network

#### 4.5.3.1 Monitoring Frequency and Density

Water quality monitoring will be conducted at the wells proposed in the groundwater level monitoring network, based on the use of the well water (agricultural or municipal), on a semi-annual or quarterly basis. Agricultural wells will be sampled on a semi-annual basis while municipal wells will be sampled quarterly due to more stringent regulatory requirements. Over time if quality results indicate increasing COC concentrations, monitoring frequency may increase. The frequency of the data collection and the coverage gained by utilizing the groundwater level monitoring network should be sufficient to demonstrate seasonal, short-term (1 to 5 years) and long-term (5 to 10 years) trends in groundwater quality and its relationship to surface conditions and groundwater management activities by the EKGSA.

#### 4.5.3.2 Site Selection

The EKGSA is proposing to utilize the wells in the groundwater level monitoring network in order to gain more groundwater quality data throughout the EKGSA to better evaluate the location and concentrations of the COCs. By utilizing the proposed groundwater level network, the sites selected will correspond with the parameters set forth for the groundwater level monitoring sites.

The intent to monitor water quality specific to the well type in the monitoring network is to evaluate potential trends and impacts directly to the beneficial user, with the focus on agricultural and drinking water use. Evaluating agricultural quality goals will allow the EKGSA to evaluate quality trends for some of the largest use. Evaluating specific drinking water wells of communities within or near the EKGSA allows the EKGSA to evaluate the quality of drinking water for the vast majority of its resident. Sampling wells for the communities of Yettem, Seville, Ivanhoe, Woodlake, Exeter, Tooleville, Tonyville, Lindsay, Plainview, and Strathmore represent 80%-90% of the population within the EKGSA boundaries.

#### 4.5.3.3 Identification of Data Gaps

The absence of groundwater level data across the entirety of the EKGSA is a data gap. Future monitoring will need to address this data gap so the EKGSA can properly evaluate how groundwater management actions are impacting groundwater quality.

#### 4.5.3.4 Plans to Fill Data Gaps

The EKGSA's proposal to monitor COCs across the groundwater level monitoring network intends to fill some of the significant data gaps with respect to groundwater quality data. Monitoring over the first five years of implementation should provide more insight on groundwater quality (location, trends, etc.) in the EKGSA. The EKGSA will also collaborate, where appropriate and feasible, with other agencies tasked with tracking and/or improving groundwater quality for additional assistance with data gaps.

Table 4-3 COC Baseline 10-Year Average Concentration (2008-2017)

| TR | Latitude | Longitude | Site Type | Arsenic (ppb) | Chloride (ppm) | Chromium VI (ppb) | DBCP (ppb) | Nitrate (as N) (ppm) | Perchlorate (ppb) | Sodium (ppm) | TCP (ppt) | TDS (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 - EK NW | 36.4281 | -119.2092 | Irrigation Monitoring Well | | | | | | | | | |
| 1 - EK NW | 36.4086 | -119.2381 | Irrigation Monitoring Well | | | | | | | | | |
| 1 - EK NW | 36.3992 | -119.2051 | Irrigation Monitoring Well | | | | | | | | | |
| 1 - EK NW | 36.385905 | -119.219633 | Drinking Water Monitoring Well | 2.40 | 22.00 | 1.10 | 0.01 | 9.25 | | 43.75 | 0.02 | 390.00 |
| 1 - EK NW | 36.389279 | -119.224619 | Drinking Water Monitoring Well | 2.20 | 26.33 | 1.30 | 0.02 | 8.02 | | 38.67 | 0.05 | 416.67 |
| 1 - EK NW | 36.387249 | -119.215311 | Drinking Water Monitoring Well | | 43.00 | 1.40 | 0.05 | 11.47 | | 42.00 | | 460.00 |
| 2 - IID-SCID | 36.493 | -119.2142 | Irrigation Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.5005 | -119.187 | Irrigation Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.4788 | -119.1653 | Irrigation Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.4682 | -119.2001 | Irrigation Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.4388 | -119.1703 | Irrigation Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.4146 | -119.1728 | Irrigation Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.399028 | -119.135194 | Irrigation Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.504083 | -119.181382 | Subsidence Survey Site | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 - IID-SCID | 36.414025 | -119.139866 | Subsidence Monument | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 - IID-SCID | 36.483936 | -119.156678 | Subsidence Survey Site | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 2 - IID-SCID | 36.453177 | -119.223455 | Proposed Monitoring Well | | | | | | | | | |
| 2 - IID-SCID | 36.472965 | -119.18822 | Irrigation Monitoring Well | | | | | | | | | |
| 3 - EK NE | 36.449941 | -119.120187 | Proposed Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.3438 | -119.1012 | Irrigation Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.3649 | -119.0628 | Irrigation Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.333 | -119.0784 | Irrigation Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.3338 | -119.0817 | Irrigation Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.403201 | -119.097777 | Drinking Water Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.4038 | -119.098318 | Drinking Water Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.399822 | -119.097991 | Drinking Water Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.400218 | -119.096258 | Drinking Water Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.397603 | -119.101521 | Drinking Water Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.325077 | -119.085966 | Drinking Water Monitoring Well | | | | | | | | | |
| 4 - RIVER | 36.324287 | -119.086025 | Drinking Water Monitoring Well | | | | | | | | | |
| 5 - EID | 36.3115 | -119.135806 | Irrigation Monitoring Well | | | | | | | | | |
| 5 - EID | 36.2853 | -119.1209 | Irrigation Monitoring Well | | | | | | | | | |
| 5 - EID | 36.325278 | -119.106389 | Subsidence Monument | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5 - EID | 36.311321 | -119.135088 | Subsidence Monument | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 5 - EID | 36.296749 | -119.144649 | Drinking Water Monitoring Well | | 34.33 | 2.30 | 0.07 | 6.24 | 4.30 | 47.00 | | 390.00 |
| 5 - EID | 36.298267 | -119.151426 | Drinking Water Monitoring Well | | 18.67 | 2.10 | 0.06 | 5.19 | | 45.33 | | 390.00 |
| 5 - EID | 36.306361 | -119.144192 | Drinking Water Monitoring Well | 2.43 | 68.25 | 2.50 | 0.03 | 3.31 | | 56.25 | | 315.00 |
| 5 - EID | 36.286649 | -119.113386 | Drinking Water Monitoring Well | | 185.00 | 12.15 | | 8.59 | | 84.50 | | 550.00 |
| 5 - EID | 36.288174 | -119.115877 | Drinking Water Monitoring Well | 3.50 | 615.00 | | | 8.11 | | 200.00 | | 1350.00 |
| 6 - EK SE | 36.1833 | -119.0278 | Irrigation Monitoring Well | | | | | | | | | |

| TR | Latitude | Longitude | Site Type | Arsenic (ppb) | Chloride (ppm) | Chromium VI (ppb) | DBCP (ppb) | Nitrate (as N) (ppm) | Perchlorate (ppb) | Sodium (ppm) | TCP (ppt) | TDS (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 - EK SE | 36.1564 | -119.0048 | Irrigation Monitoring Well | | | | | | | | | |
| 7 - LSID | 36.2506 | -119.0795 | Irrigation Monitoring Well | | | | | | | | | |
| 7 - LSID | 36.2094 | -119.0645 | Irrigation Monitoring Well | | | | | | | | | |
| 7 - LSID | 36.1181 | -119.0148 | Irrigation Monitoring Well | | | | | | | | | |
| 8 - LID E | 36.1822 | -119.0831 | Irrigation Monitoring Well | | | | | | | | | |
| 8 - LID E | 36.1353 | -119.0412 | Irrigation Monitoring Well | | | | | | | | | |
| 8 - LID E | 36.1175 | -119.0812 | Irrigation Monitoring Well | | | | | | | | | |
| 8 - LID E | 36.1666 | -119.058459 | Subsidence Survey Site | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 8 - LID E | 36.130819 | -119.05574 | Subsidence Survey Site | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 8 - LID E | 36.165789 | -119.059314 | Irrigation Monitoring Well | | | | | | | | | |
| 8 - LID E | 36.147461 | -119.055979 | Drinking Water Monitoring Well | 2.40 | 36.00 | 2.10 | | 13.81 | | 60.25 | | 365.00 |
| 9 - LID W | 36.2681 | -119.1009 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.2389 | -119.1009 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.2356 | -119.1278 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.1967 | -119.1201 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.2068 | -119.1038 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.1461 | -119.1165 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.12 | -119.1253 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.1328 | -119.099 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.2625 | -119.1356 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.1703 | -119.1173 | Irrigation Monitoring Well | | | | | | | | | |
| 9 - LID W | 36.142014 | -119.130089 | Drinking Water Monitoring Well | 2.90 | 17.00 | 3.20 | 0.09 | 7.29 | | 51.50 | | 260.00 |
| 9 - LID W | 36.143557 | -119.134656 | Drinking Water Monitoring Well | 3.05 | 24.00 | 3.10 | | 10.36 | | 44.00 | | 250.00 |
| 9 - LID W | 36.142964 | -119.130025 | Drinking Water Monitoring Well, Subsidence Survey Site | 2.90 | 11.00 | 3.20 | 0.02 | 2.73 | | 54.00 | | 210.00 |
| 9 - LID W | 36.274669 | -119.103826 | Subsidence Survey Site | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 10 - EK SW | 36.2273 | -119.1386 | Irrigation Monitoring Well | | | | | | | | | |
| 10 - EK SW | 36.2069 | -119.1723 | Irrigation Monitoring Well | | | | | | | | | |
| 10 - EK SW | 36.1853 | -119.1551 | Irrigation Monitoring Well | | | | | | | | | |
| 10 - EK SW | 36.1522 | -119.1706 | Irrigation Monitoring Well | | | | | | | | | |
| 10 - EK SW | 36.1714 | -119.1709 | Irrigation Monitoring Well | | | | | | | | | |
| 10 - EK SW | 36.227331 | -119.138548 | Drinking Water Monitoring Well | 3.80 | 182.50 | 4.20 | 0.26 | 6.74 | 2.30 | 119.25 | | 577.50 |
| Outside EK | 36.298705 | -119.154153 | Drinking Water Monitoring Well | | 13.67 | 1.70 | 0.08 | 5.16 | | 41.33 | | 316.67 |
| Outside EK | 36.225396 | -119.154484 | Drinking Water Monitoring Well | 2.40 | 741.43 | 4.20 | | 4.69 | | 236.00 | | 1721.74 |
| Outside EK | 36.377371 | -119.220542 | Drinking Water Monitoring Well | | | | | | | | | |
| Outside EK | 36.37186 | -119.100079 | Subsidence Survey Site | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Outside EK | 36.482602 | -119.223352 | Drinking Water Monitoring Well | | | | | | | | | |
| Outside EK | 36.482413 | -119.223388 | Drinking Water Monitoring Well | | | | | | | | | |
| Outside EK | 36.483424 | -119.259406 | Drinking Water Monitoring Well | | | | | | | | | |
| Outside EK | 36.485176 | -119.25665 | Drinking Water Monitoring Well | | | | | | | | | |

# 4.6 Land Subsidence

**Legal Requirements:**
**§354.34(c)(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.

## 4.6.1 Monitoring Network Description

The EKGSA monitoring network plans to rely on multiple data sources including satellite analysis monitored by NASA, monitoring points overseen by the Kaweah Delta Water Conservation District (KDWCD) and CalTrans, and newly selected Friant-Kern Canal monitoring points the EKGSA will survey. The focus will be on how land subsidence is impacting critical infrastructure, namely the Friant-Kern Canal (FKC). Data and local experience suggest subsidence has historically not been an issue within the EKGSA, however, due to the heavy reliance on the FKC by member agencies of the EKGSA, subsidence will be closely monitored. The proposed network monitoring locations are shown in **Figure 4-2**. These points, in addition to data available through NASA and DWR (InSAR) will be used to evaluate subsidence in the EKGSA.

## 4.6.2 Quantitative Values

The quantitative values for measuring subsidence are presented in **Chapter 3**. Minimum thresholds, measurable objectives, and interim milestones have been established based on maximum allowable subsidence rates for maintaining key infrastructure in the EKGSA.

## 4.6.3 Review and Evaluation of Monitoring Network

Land subsidence monitoring has been performed by multiple agencies in the past. The coverage over the EKGSA region was sparse until Interferometric Synthetic Aperture Radar (InSAR) was introduced in 2015 to monitor subsidence in the region through satellite imagery analysis. Agencies currently monitoring subsidence in the area include:

**USGS Monitoring Network.** A subsidence monitoring network consisting of 31 extensometers was installed in the 1950s to quantify the subsidence occurring in the San Joaquin Valley. By the 1980's, the land subsidence monitoring efforts decreased. Since then, a new monitoring network was developed. The new network includes refurbished extensometers from the old network, continuous Global Positioning System (CGPS) stations, and use of InSAR. More information can be found on the USGS website:
https://ca.water.usgs.gov/land_subsidence/california-subsidence-measuring.html.

**NASA Monitoring Network.** NASA obtains subsidence data by comparing satellite images of Earth's surface over time. For the last few years, subsidence maps have been produced using InSAR observations from satellite and aircraft imaging. More information can be found on their website: https://www.nasa.gov/jpl/nasa-california-drought-causing-valley-land-to-sink.

**Kaweah Delta Water Conservation District:** KDWCD started a new monitoring network in 2016 and placed extensometers throughout the Kaweah Sub-basin to expand upon the long-standing USGS network of extensometers and establish an adequate number of subsidence monitoring stations to adequately monitor land elevation changes at areas most effected by subsidence in the Sub-basin. The goal is to monitor the inelastic land subsidence resulting from groundwater pumping.

#### 4.6.3.1 Site Selection

FKC monitoring points are being proposed to be added for the EKGSA's subsidence monitoring, given the focus on critical infrastructure. Six locations have been proposed along the FKC. These monitoring points are strategically situated near infrastructure along the FKC that is vital to maintain the long-term delivery capacity of the gravity-driven canal. This infrastructure includes existing check structures and bridges spaced north to south through the EKGSA. These points are depicted in **Figure 4-2**. Presently the FKC is not impacted by subsidence within the EKGSA, but it is a critical issue downstream, just south of the EKGSA. Including these specific monitoring points is considered adequate for evaluating the FKC and its capacity within the EKGSA.

A subsidence monitoring point is also being established at a well in the community of Plainview. Infrastructure such as roads, pipelines, and well casings are also susceptible to subsidence impacts. The EKGSA intends to monitor potential impacts to subsidence in an area of the EKGSA that may be more vulnerable to subsidence.

#### 4.6.3.2 Monitoring Frequency and Density

The proposed FKC and Plainview monitoring points will be monitored annually in March to evaluate subsidence impacts. The combination of monitoring points and additional spatial coverage from InSAR provides the appropriate density for monitoring. The InSAR data set is also available annually. The specific points surveyed by the EKGSA can be compared to the InSAR data.

#### 4.6.3.3 Identification of Data Gaps

Beyond the specific proposed monitoring points, no other data gaps were identified for the land subsidence monitoring network for the EKGSA. Subsidence has been an ongoing issue in portions of the Central Valley, thus monitoring systems have been put in place to evaluate the impacts. Over time these tools and data have improved and become more widespread.

#### 4.6.3.4 Plans to Fill Data Gaps

With the addition of survey points to critical infrastructure, and utilizing the InSAR data set as a backstop, the current subsidence monitoring network is believed to sufficiently cover the EKGSA.

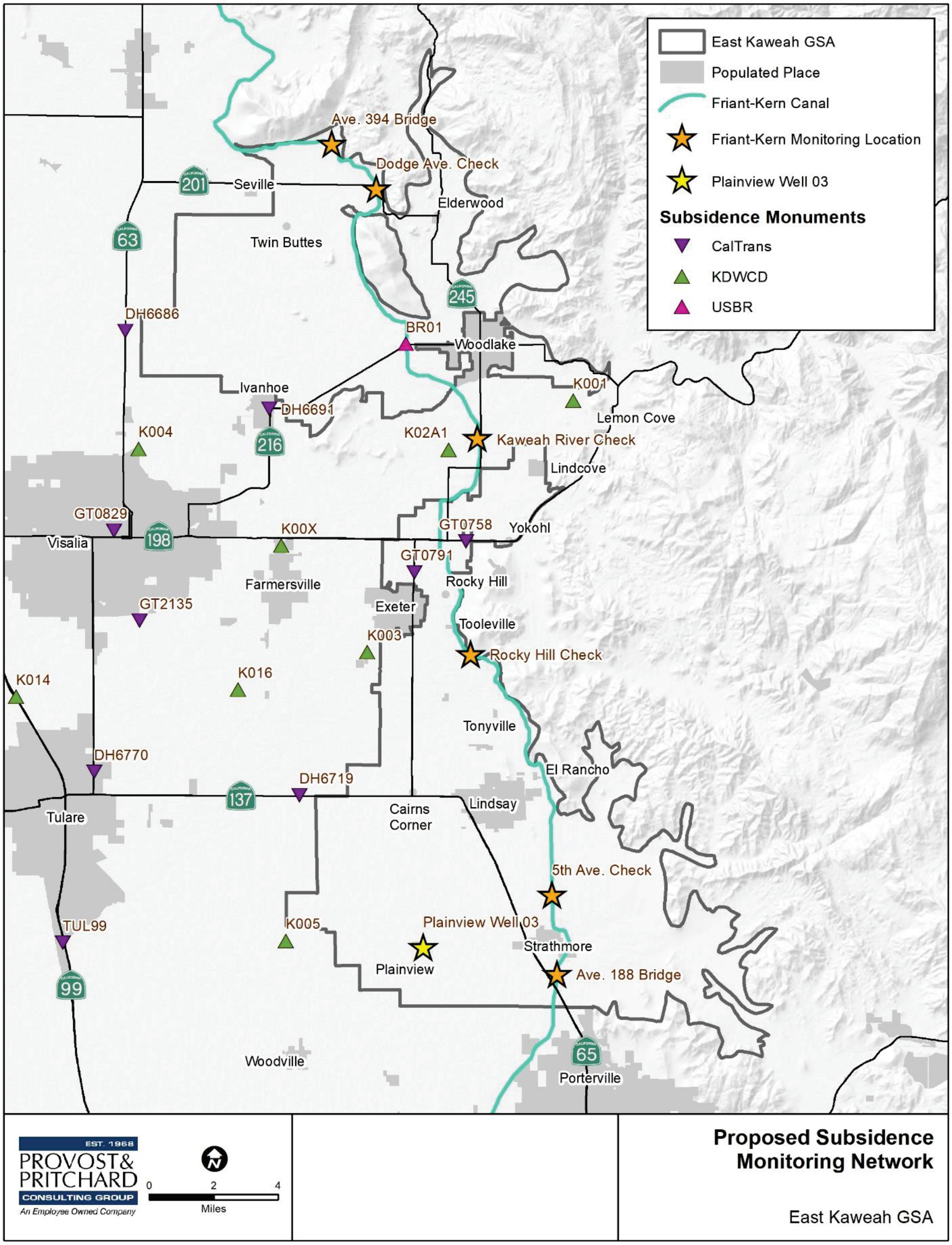



Figure 4-2: Subsidence Monitoring Network

# 4.7 Depletion of Interconnected Surface Water

**Legal Requirements:**
**§354.34(c)(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.*

## 4.7.1 Monitoring Network Description

The EKGSA is proposing to monitor interconnected groundwater and surface water by utilizing groundwater levels as a proxy. Groundwater and surface water need to be relatively close (within 30 feet) to have the potential for connection. Thus, tracking groundwater levels will allow the EKGSA to evaluate this sustainability indicator. By utilizing the groundwater level monitoring as a proxy, the monitoring network for interconnected surface water is the same as depicted in **Figure 4-1**.

## 4.7.2 Quantitative Values

The quantitative measures for the depletion of interconnected surface water are explained in further detail in Chapter 3. This includes description of minimum thresholds, measurable objectives, and interim milestones for the measurement of the impact on surface water with potential groundwater connection.

## 4.7.3 Review and Evaluation of Monitoring Network

Currently there is not a network in place that is specifically designed to monitor groundwater-surface water interconnections. Presently knowledge is obtained from the groundwater contours created from groundwater level monitoring data and local knowledge. Those familiar with the geology in the GSA indicate the Kaweah River is a gaining stream East of McKay's point. This is further substantiated by the fact that two of the Kaweah River's USGS stream gauges have not been dry during droughts throughout the history of the stream monitoring stations. Additionally, local residents do not recall a time, other than 2015, when the Kaweah River east of McKays Point has been dry. In 2015, amongst a critical drought, portions of the Kaweah River began to dry and standing water began to recede upstream. However, there was still some water remaining in the channel. Well records show that wells in this area have a depth to water less than 30 feet, possibly substantiating the claims that there is interconnected surface water. In addition to the Kaweah River, Lewis Creek is also suspected to have potential groundwater connection within LSID. There is a well approximately a half mile from Lewis Creek that consistently reads depth to groundwater less than 10 feet, due to a small perched aquifer. **Figure 4-3** depicts Spring 2015 depth to water (DTW) contours in the EKGSA. Areas with depths less than 30 feet are considered potential areas for groundwater-surface water connection. Some of these areas are actively farmed, which would reduce the potential footprint. The contours in the Figure also show that moving further west, away from the foothills, there is no interconnection due to the large depths to water.

### 4.7.3.1 Site Selection

The interconnected surface water monitoring will be adequately covered by the expanded groundwater level monitoring locations that were discussed earlier in this chapter.

### 4.7.3.2 Monitoring Frequency and Density

Monitoring of interconnected surface water will be evaluated concurrently with groundwater level monitoring.

#### 4.7.3.3 Identification of Data Gaps

Due to the absence of historic monitoring specifically related to groundwater-surface water connection, there are data gaps beyond that of local experience. The new proposed monitoring effort laid out in this GSP will likely shed light on the areas considered to be 'gaining' streams or connected due to perched groundwater. The new monitoring network may indicate other areas to have possible connection. In these instances, the EKGSA will adapt the monitoring to allow for further evaluation.

#### 4.7.3.4 Plans to Fill Data Gaps

The proposed additions to the groundwater level monitoring network is expected to be a benefit to the understanding of interconnected surface water. This will be especially beneficial in the portions of the EKGSA adjacent the foothills and ephemeral streams.

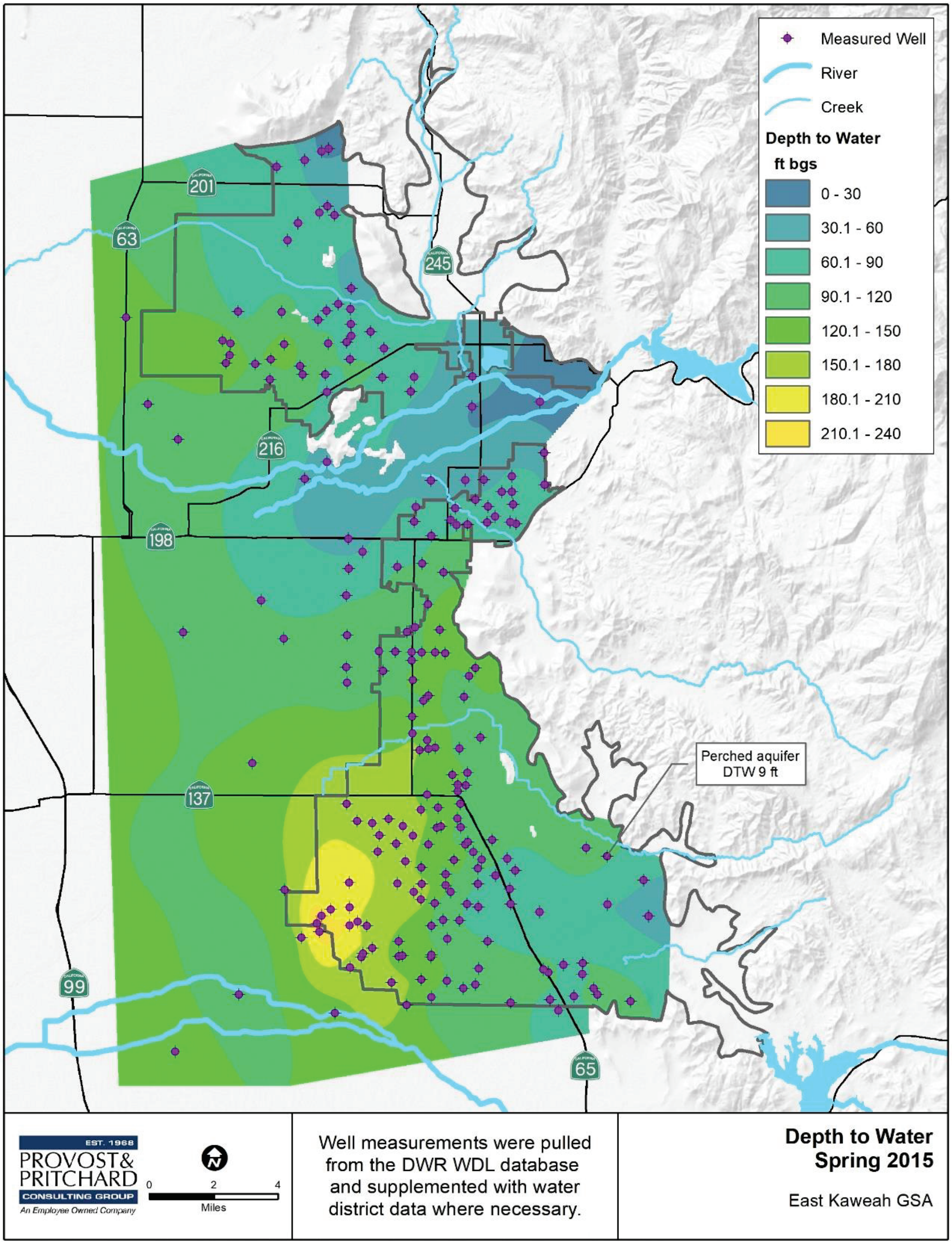



Figure 4-3: Spring 2015 Depth to Water Contours

# 4.8 Consistency with Standards

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|---|
| **Legal Requirements:**<br>**§354.34(g)** Each Plan shall describe the following information about the monitoring network:<br>**(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. |

The data gathered through the monitoring networks is and will continue to be consistent with the standards identified in Section 352.4 of the California Code of Regulations related to Groundwater Sustainability Plans. The main topics of Section 352.4 are outlined below.

- *Data reporting units and accuracy;*
- *Monitoring site information;*
- *Well attribute reporting;*
- *Map standards;*
- *Hydrograph requirements;*
- *Groundwater and surface water models;*
- *Availability of input and output files to DWR.*

# 4.9 Monitoring Protocols

| |
|---|
| **Legal Requirements:**<br>**§354.34(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. |

Groundwater level, groundwater quality, and land subsidence monitoring will generally follow the protocols identified in the *Monitoring Protocols, Standards, and Sites BMP* (DWR, December 2016b). This BMP largely leans on the U.S. EPA's DQO process. Refer to **Appendix 4-A** for a copy of the BMP. The EKGSA may develop standard monitoring forms in the future.

The following comments and exceptions to the BMP should be noted:

1. SGMA regulations require groundwater levels are measured to the nearest 0.1 feet. The BMP suggests measurements to the nearest 0.01 feet; however, this is not practical for many measurement methods. In addition, this level of accuracy would have little value since groundwater contours maps typically have 10 or 20-foot intervals, and storage calculations are based on groundwater levels rounded to the nearest foot. The accuracy of groundwater level measurements will vary based on the well type and condition. For instance, if significant oil is found in an agricultural well then readings to the nearest foot are the best one can achieve.
2. If used in a well suspected of contamination or if there are obvious signs of contamination (such as oil), well sounding equipment will be decontaminated after use.
3. Wells will be surveyed to a horizontal accuracy of 0.5 feet.
4. Unique well identifiers will be labeled on all public wells, and on private wells if permission is granted.
5. The BMP states that measurements each Spring and Fall should be taken 'preferably within a 1 to 2-week period'. This is likely not feasible due to the large number of wells in the GSA, and a 4-week period is requested for bi-annual monitoring and potentially be suggested to be taken in the Spring to capture peak groundwater levels.

6. If a vacuum or pressure release is observed, then water level measurements will be remeasured every 5 minutes until they stabilize.
7. In the field, water level measurements will be compared to previous records; if there is a significant difference then the measurement will be verified.
8. For water quality monitoring, field parameters for pH, electrical conductivity, and temperature will only be collected when required for the parameter being monitored. Determining if a well has been purged adequately may be ascertained by calculating a run time before sampling.

# 4.10 Representative Monitoring

**Legal Requirements:**
**§354.36** Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:
**§354.36(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.
**§354.36(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.*

The EKGSA plans to use groundwater elevations as a proxy for monitoring the sustainability indicators for aquifer storage and interconnected surface water. As mentioned, groundwater elevations will be a critical component of groundwater storage estimation.

Subsidence monitoring is not as straightforward since it cannot be directly attributed to groundwater levels. Therefore, it will be based on vital infrastructure within the EKGSA, namely the conveyance capacity of the Friant-Kern Canal. Reduced conveyance capacity of the Friant-Kern Canal has been recognized as an undesirable result explained in further detail in Section 4: Sustainable Management Criteria.

Groundwater quality is proposed to be tested in the monitoring wells within the EKGSA and compared to the current recognized standard the COCs assigned to a well based on the consumptive use of the groundwater pumped (agricultural or municipal). The intent for monitoring all wells is to develop a more robust data set for the COCs so that better understanding can be gained on the spatial distribution of these contaminants and potential correlation to activities within EKGSA control.

# 4.11 Data Storage and Reporting

**Legal Requirements:**
**§354.40** 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.

The Kaweah Subbasin is developing and will maintain a Data Management System (DMS) for storing and reporting information for the implementation of this GSP. Specifically, the monitoring network data will be collected and compiled into one central data system that can be easily referenced and displayed when needed. More information on the development and user guide is provided in **Appendix 4-B**.