

Executive Summary

The East Kaweah Groundwater Sustainability Agency (EKGSA) is a joint powers authority agency formed pursuant to California Government Code sections 6500, et. seq, between County of Tulare, City of Lindsay, Exeter Irrigation District, Ivanhoe Irrigation District, Lindmore Irrigation District, Lindsay-Strathmore Irrigation District, and Stone Corral Irrigation District. The agencies reside wholly within Tulare County. The EKGSA is one of three groundwater sustainability agencies (GSA's) formed in the Kaweah Subbasin of the San Joaquin Valley's Tulare Lake Basin (Groundwater Basin 5-22.11). It submitted formation documents to the State of California on June 6, 2017. The formation of the GSA was in response to the Sustainable Groundwater Management Act of 2014 (SGMA) that allows local agencies to form to develop and implement a Groundwater Sustainability Plan (GSP) with the intention of bringing the groundwater basin to sustainability.

SGMA requires governments and water agencies of high and medium priority basins to achieve sustainability by avoiding undesirable results. Under SGMA, these basins should reach sustainability within 20 years of implementing their GSP. For critically over-drafted basins, including the Kaweah Subbasin to which the EKGSA is a portion, the deadline for achieving sustainability will be 2040. This GSP is a planning document, based upon the currently available data and understanding for the area, laying the groundwork for implementing sustainable groundwater management. During implementation additional data will be gathered through studies, monitoring, and actions which will be utilized to fill data gaps to update and evaluate the understanding, planning, and decision-making processes. The EKGSA will be looking to work with stakeholders and Subbasin partners to work towards sustainable groundwater management.

ES 1 Introduction and Plan Area

The EKGSA is made of seven participating member agencies including County of Tulare, City of Lindsay, and several irrigation districts. Of these agencies the County of Tulare and the City of Lindsay are the only member agencies with direct land use planning authority. However, all the member agencies have an interest in land use planning policies, and how it will impact their continued development and water supplies.

EKGSA covers approximately 117,300 acres. Beneficial users within the plan area were identified with the Advisory Committee during the development of the Communication and Engagement Plan. These users are described in detail in Section 1.5.2 of Chapter 1. There are approximately 1,680 wells within the EKGSA boundary, based on information available from the Well Completion Report (WCR) database. In the EKGSA and Kaweah Subbasin, the primary surface water sources for groundwater replenishment include precipitation, Kaweah River flows, and San Joaquin River water via Friant CVP contracts. Average annual precipitation is 7 to 13 inches, increasing eastward. The EKGSA goals are to develop several recharge, storage, conservation, and/or water recycling projects utilizing these supplies.

SGMA requires that all groundwater basins across the State develop actions and projects intended to address six Undesirable Results (UR). The EKGSA's GSP will define each UR and how the EKGSA will aim to avoid these negative issues to be within sustainable trends by January 31, 2040. For each UR, the GSP will describe how the EKGSA will measure the indicators relative to established minimum thresholds. It will also describe the reporting structures that will serve as updated understanding of UR trends. The EKGSA intends to develop and implement a GSP that uses a holistic approach that maintains the quality of life and reaches groundwater sustainability within its jurisdictional boundary.

As part of the effort to consider interests of all beneficial uses and users of groundwater, the EKGSA formed two committees, a Technical Advisory Committee (TAC) and an Advisory Committee (AC), to assist in developing policy and giving guidance from technical, social, and impacted party perspectives.

The EKGSA is led by an Executive Director (ED) under direction of the EKGSA Board of Directors. The ED's role is to coordinate all the Board provided resources toward developing and implementing a GSP with the intention of achieving goals of SGMA by the year 2040.

ES 1.2 Summary of Basin Setting

The EKGSA is located on the eastern side of the Kaweah Subbasin and covers approximately one quarter of the Subbasin acreage. It is made up of two areas bisected by the Kaweah River. The unconsolidated sediments of the EKGSA form a single unconfined aquifer. Four different geomorphic regions are delineated in order to relate wells of similar hydrology. The major land use in the EKGSA is agriculture. Historical groundwater levels were examined, and the period from 1997 to 2017 was chosen as the base period. Using this 20-year base period, the GSP extensively evaluated water surface elevations (WSE) within the EKGSA.

The earliest records of groundwater levels in the EKGSA indicate that groundwater naturally flowed from the foothills of the Sierra Nevada east towards the valley trough to the southwest. Development of the Subbasin led to the formation of a vast cone of depression beneath the City of Lindsay in the first half of the twentieth century, which was initially remediated by deliveries from LSID's Kaweah River supplies, then further remediated by deliveries from the Friant-Kern Canal beginning in the 1950s. Groundwater contour maps of the region depict a gradual rebound of the Lindsay Cone that lasted until 1986, after which groundwater began to decline again.

Over the past 20 years, groundwater levels have continued to decline. Over the span base period, the Cottonwood Creek Interfan geomorphic region has lost approximately 40 feet of groundwater overall, with over 60 feet lost in a small area beneath Ivanhoe ID. The Kaweah River Alluvial Fan region has lost between 20 to 50 feet, with losses increasing with increase in distance from the Kaweah River. The Lewis Creek Interfan region has lost up to 150 feet of groundwater in the most critically impacted location west of Lindmore ID. A majority of the region exhibits groundwater declines between 70 and 100 feet. The wells in the upper foothill regions of the EKGSA have very sparse data available between 1997 and 2017. Declines in these regions have therefore not been quantified. Groundwater across the EKGSA is generally lower in 2017 than in 1997.

Defining the Basin Setting also requires an examination of groundwater quality issues. Through data obtained from public well sources within the Subbasin, several constituents of concern (COC) were designated, the most common being nitrate. Nitrate is prevalent throughout the Subbasin with higher concentrations tending to occur in the eastern portion of the Subbasin. Nitrate concentrations appear to correlate with areas that have greater than 50% of land use as orchards and vineyards. It was also noted that septic system density is greater in the eastern portion of Subbasin by comparison with the rest of the Subbasin. The nine COC that will be tracked within the EKGSA are listed in **Table ES-2**. These COC will be tracked through the Monitoring Network with respect to Undesirable Results with regard to agricultural or municipal use.

The water budget for the Subbasin provides an accounting and assessment of the average annual volume of groundwater and surface water entering (i.e., inflow) and leaving (i.e., outflow) the basin and enables an accounting of the cumulative change in groundwater in storage over time. From the data available for the base period from 1997 to 2017, the Kaweah Subbasin is currently estimated to have an annual overdraft of 77,600 acre-feet per year (AFY). The EKGSA is currently estimated to have an annual overdraft of approximately 28,000 AFY.

Through a Water Accounting Framework (WAF) coordinated amongst the Kaweah Subbasin GSAs, groundwater supplies were broken into three categories, Native, Foreign, and Salvaged. In general, this WAF defines Native portion of groundwater inflows to consist of those inflows which all well owners have access to on a pro-rata basis; Foreign portion to consist of all imported water entering the Subbasin from non-local sources under contract by local agencies or by purchase/exchange arrangements; and Salvaged portion to

consist of all local surface and groundwater supplies stored, treated and otherwise managed by an appropriator/owner of the supply and associated water infrastructure systems (e.g. storm water disposal systems and waste water treatment plants). Accounting for supplies in this fashion, the EKGSA is allotted nearly 125,000 AFY of the approximately 660,000 AFY currently accounted for the Kaweah Subbasin.

ES 1.3 Overview of Sustainability Indicators, Minimum Thresholds, and Measurable Objectives

Sustainability Goal

The Kaweah Subbasin's sustainability goal is for each GSA to manage groundwater resources to preserve the viability of existing agricultural enterprises of the region, domestic wells, and smaller communities that provide much of their job base in the Subbasin, including the school districts serving these communities. The goal will also strive to fulfill the water needs of existing and amended county and city general plans that commit to continued economic and population growth within Tulare County and portions of Kings County. The sustainability goal was derived from Basin Settings, Kaweah Subbasin Hydrologic Model (KSHM), historical and current groundwater conditions, and the water budget. This goal will be achieved via combined implementation of EKGSA, GKGSA, and MKGSA GSPs. Specifically, all GSPs are designed to identify phased implementation of projects and management actions to reduce long-term groundwater overdraft.

To achieve the Subbasin's sustainability goal, a combination of projects and management actions will be implemented over the next 20 years. It is currently estimated that there is approximately 28,000 AF/year of overdraft associated with the EKGSA. Interim goals for 5, 10, and 15 years were set to create a glide path for reaching sustainability goals by 2040. This "glide path" will mitigate groundwater level depletion by 5, 25, and 55 percent, respectively before reaching 100 percent by the 2040 deadline. By the time all projects and management actions have been completed, sustainable yield operation is currently estimated between 660,000 and 720,000 AF/year for the Kaweah Subbasin.

The key to demonstrating the Kaweah Subbasin is meeting its sustainability goal is by avoiding undesirable results. Sustainability indicators are the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, become undesirable results. Within the Kaweah Subbasin, five sustainability indicators are present in the basin:

1. *Chronic lowering of groundwater levels resulting in a significant and unreasonable depletion of supply.*
2. *Significant and unreasonable reduction of groundwater storage.*
3. *Significant and unreasonable degraded water quality.*
4. *Significant and unreasonable land subsidence.*
5. *Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of surface water.*

The sixth sustainability indicator, seawater intrusion, has been deemed to not be applicable within the Kaweah Subbasin due to the large distance from the Central California coast.

Management Areas and Threshold Regions

To facilitate GSP implementation, the EKGSA subdivided the GSA into nine management areas and ten threshold regions. Management area boundaries were determined leaning on the jurisdictional boundaries of the member irrigation districts (ID) located within the EKGSA. Non-districted areas, regions of the EKGSA that generally are not covered by an irrigation district, were demarcated and named using their intercardinal direction. Management areas include:

1. *Exeter ID Management Area*
2. *Ivanhoe ID Management Area*

3. *Lindmore ID Management Area*
4. *Lindsay-Strathmore ID Management Area*
5. *Northeast Management Area*
6. *Northwest Management Area*
7. *Stone Corral ID Management Area*
8. *Southeast Management Area*
9. *Southwest Management Area*

The EKGSA recognizes that groundwater behavior is unlikely to mirror the political boundaries of irrigation districts. Therefore, to adequately account for differences in hydrogeologic behavior and pumping rates while forming minimum thresholds and measurable objectives, the EKGSA was further subdivided into threshold regions using the 2040 minimum threshold groundwater level projections. The threshold region delineation process focused on combining areas mimicking similar hydrogeologic behavior (corroborated by historical data) in response to climate and pumping regime experienced during the base period (1997 - 2017). By determining minimum thresholds based from projecting hydrogeologic data over the base period, the EKGSA intended to capture the intricate relationships between threshold regions while setting minimum thresholds and measurable objectives. In total, each overlying management area contains one to three threshold regions, grouped by similar hydrogeologic characteristics. See **Figure ES-1** for a map showing the management areas and corresponding threshold regions. If, based upon collected data, it is determined there is need for different and/or additional monitoring and analysis for a sustainability indicator in a specific threshold region, it will be communicated in the required annual reports or five-year updates to this GSP.

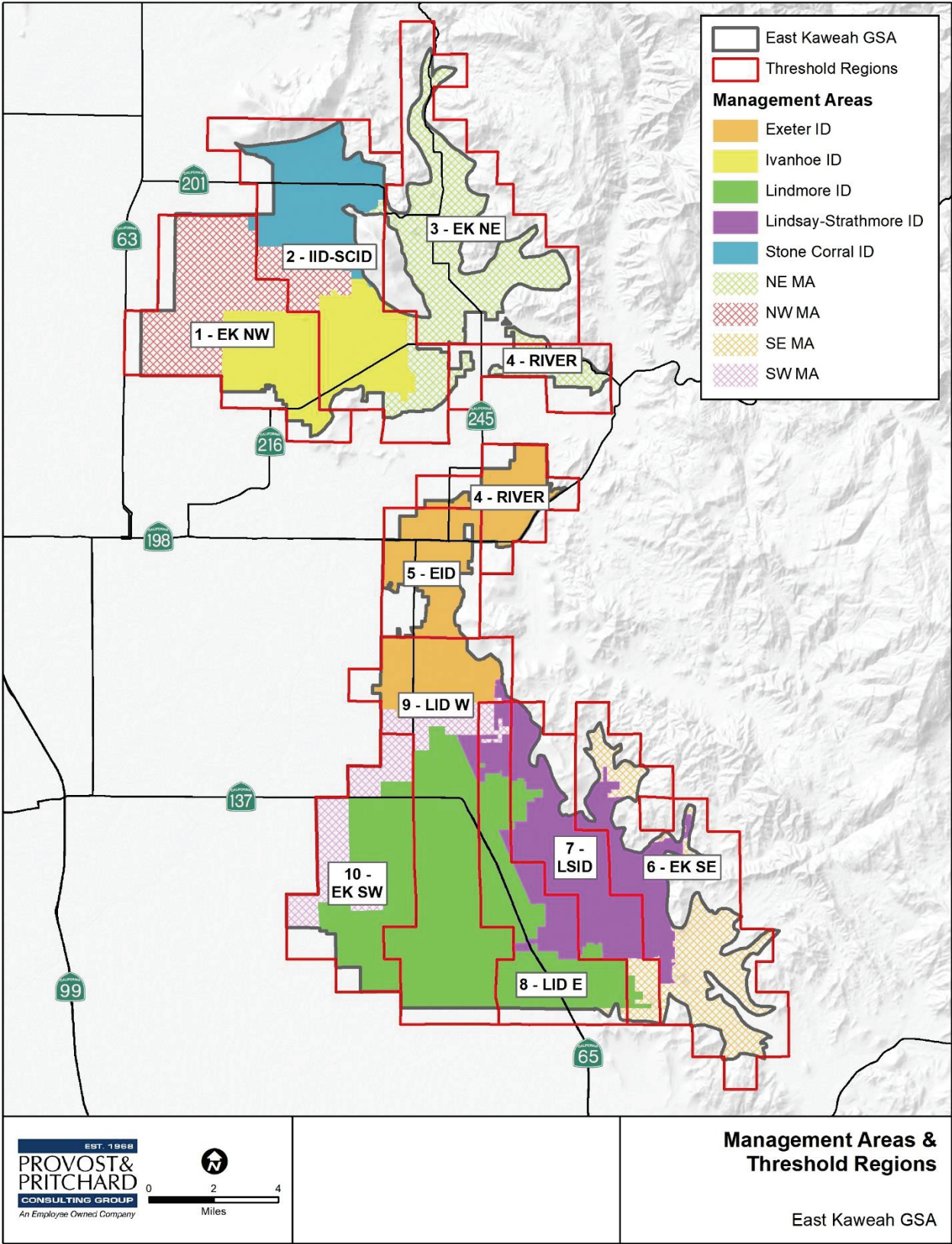


Figure ES-1 Map of EKGSA Management Areas and Overlapping Threshold Regions

Undesirable Results, Minimum Thresholds, and Measurable Objectives

To meet the goal of SGMA, the EKGSA has set undesirable results, minimum thresholds, and measurable objectives to provide quantitative support of the EKGSA's ability to reach sustainability by 2040. Demonstration of the absence of undesirable results for the five applicable sustainability indicators supports a determination that a basin is operating within its sustainable yield and, thus, that the sustainability goal has been achieved.

Undesirable results for each sustainability indicator were determined using an extensive, data informed, and stakeholder-inclusive process. The EKGSA Board of Directors (Board), considered stakeholder input and Technical Advisory Committee (TAC) expert advice, determined undesirable results based upon the relative levels would create significant and unreasonable results. The undesirable results would not only impact communities with the Kaweah Subbasin, historical and biological quality of life, but would also severely threaten regional agricultural economy and impact the world's food chain supply.

In addition to the quantitative description for each undesirable result, each undesirable result must also be substantiated using a quantitative minimum threshold. A minimum threshold is a quantitative value that represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, may cause an undesirable result(s) in the Subbasin. When setting minimum thresholds for each sustainability indicator, the relevant beneficial uses and users of groundwater were considered. In addition, EKGSA minimum thresholds were set at levels that are believed to not impede adjacent GSAs or subbasins from meeting their minimum thresholds or sustainability goals.

Measurable objectives are quantitative goals that reflect the desired groundwater conditions and allow the EKGSA to achieve the sustainability goal within 20 years. Measurable objectives were set so that there is a reasonable margin of operational flexibility between the minimum threshold and measurable objective that provides accommodation for droughts, climate change, conjunctive use operations, and other groundwater management activities. Interim milestones for the EKGSA implementation timeline were designed to allow the EKGSA to make progress over time toward the sustainability goal and are presented for each sustainability indicator. A summary of the undesirable results, minimum thresholds, measurable objective, and interim milestone for each sustainability indicator is presented in **Table ES-1**.

Table ES-1. Sustainable management criteria overview for the EKGSA

Sustainability Indicator	GW Elevation	GW Storage	SW-GW Connection	GW Quality	Land Subsidence
Undesirable Result	Unreasonable lowering of groundwater levels resulting in significant impacts to supply	Unreasonable reduction in groundwater storage	Unreasonable depletion of interconnected surface water and groundwater, where present	Unreasonable long-term changes of water quality concentrations from baseline conditions to significantly impact users of groundwater	Unreasonable impacts to critical infrastructure (i.e. Friant-Kern Canal)
Measurement Methodology	Groundwater Levels	Groundwater Levels (Proxy)	Groundwater Levels (Proxy)	Sampling for 3 COCs at Ag wells in Monitoring Network; Utilize public system Title 22 quality monitoring	Annual survey of set Mile Posts along the FKC and InSAR data when available and Plainview well point
Minimum Threshold	2040 Projected GW elevation based on the baseline (1997-2017) trend analysis of GW levels at wells throughout the GSA (10 Threshold Regions)	2040 Projected GW elevation based on the baseline (1997-2017) trend analysis of GW levels at wells throughout the GSA (10 Threshold Regions)	2040 Projected GW elevation based on the baseline (1997-2017) trend analysis of GW levels at wells throughout the GSA (10 Threshold Regions)	No long-term (10-yr. running average) increase in concentration beyond recognized Ag or Urban standards for those wells under the threshold. For those wells over the recognized Ag or Urban standards, no long-term increases by 20% in concentration	9.5" of subsidence in 2 year and cumulative (relate to no more than 10% capacity reduction in current capacity of the FKC)
Measurable Objective	Spring 2017	Spring 2017	Spring 2017	No unreasonable increase in concentration caused by groundwater pumping and recharge efforts.	No subsidence/impacts to CVP deliveries along the FKC related to groundwater pumping within the EKGSA
Interim Milestones	Proportionate to % of overdraft to be corrected in 5-year intervals through implementation period	Proportionate to % of overdraft to be corrected in 5-year intervals through implementation period	Proportionate to % of overdraft to be corrected in 5-year intervals through implementation period	No change from current Objective (re-evaluate at the 5-year milestone pending data collection)	No change from current Objective

ES 1.4 Monitoring Network

The monitoring network is the method by which progress toward reaching measurable objectives and the goal of groundwater sustainability is ascertained. The GSP outlines the monitoring networks for the five sustainability indicators used in the Subbasin. The objective of these monitoring networks is to establish and evaluate baseline conditions across the Subbasin and to detect trends related to undesirable results. Specifically, the monitoring network was developed to do the following:

- Monitor impacts to the beneficial uses or users of groundwater
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds
- Demonstrate progress toward achieving measurable objectives described in the GSP

To monitor the five sustainability indicators, the EKGSA is proposing to monitor groundwater levels, quality, and land surface subsidence. Groundwater levels will be used to track change in groundwater storage and interconnected surface water by proxy. Quality will be monitored through the network for constituents based on the use of the water, agricultural or municipal demand. Wells supplying agricultural demand will be sampled for three COC: Chloride, Sodium, and Total Dissolved Solids (TDS). Wells supplying municipal demand will be sampled for the nine COC shown in **Table ES-2**.

Table ES-2 Constituents of Concern with Respective Minimum Threshold

<i>Constituent</i>	<i>Threshold Level</i>		<i>Threshold Type</i>
<i>1,2,3-Trichloropropane (1,2,3 TCP)</i>	<i>0.005 ug/L</i>	<i>5 ppt</i>	<i>Primary MCL</i>
<i>1,2-Dibromo-3-chloropropane (DBCP)</i>	<i>0.2 ug/L</i>	<i>0.2 ppb</i>	<i>Primary MCL</i>
<i>Arsenic</i>	<i>10 ug/L</i>	<i>10 ppb</i>	<i>Primary MCL</i>
<i>Chloride</i>	<i>500 mg/L</i>	<i>500 ppm</i>	<i>Action Level</i>
	<i>106 mg/L</i>	<i>106 ppm</i>	<i>Agricultural Water Quality Goal</i>
<i>Hexavalent Chromium</i>	<i>20 ug/L</i>	<i>20 ppb</i>	<i>Health-Based Screening Level</i>
<i>Nitrate (as N)</i>	<i>10 mg/L</i>	<i>10 ppm</i>	<i>Primary MCL</i>
<i>Perchlorate</i>	<i>6 ug/L</i>	<i>6 ppb</i>	<i>Primary MCL</i>
<i>Sodium</i>	<i>50 mg/L</i>	<i>50 ppm</i>	<i>Action Level</i>
	<i>69 mg/L</i>	<i>69 ppm</i>	<i>Agricultural Water Quality Goal</i>
<i>Total Dissolved Solids (TDS)</i>	<i>1000 mg/L</i>	<i>1000 ppm</i>	<i>Secondary MCL</i>

The groundwater monitoring networks were largely developed and designed through existing data sources including wells from the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, member irrigation districts, and public water systems. The intent of the EKGSA monitoring network is to initially rely on currently used monitoring sites within the area and focus on data gap regions by adding to the monitoring network to bolster coverage in lacking areas. EKGSA plans to install new, dedicated monitoring wells through different funding sources and programs such as DWR's Technical Support Services program. Most wells in the monitoring network are already measured on the planned semi-annual basis. Historical and future measurements will be catalogued in the Kaweah Subbasin Data Management System (DMS). **Figure ES-2** shows the initial EGKSA Monitoring Network. The EKGSA in conjunction with the member agencies in the management areas will be responsible for oversight and reporting monitoring results. The requirements of all five sustainability indicators will met through the consistent monitoring of groundwater levels, quality and land-based monuments located on key infrastructure within the EKGSA.

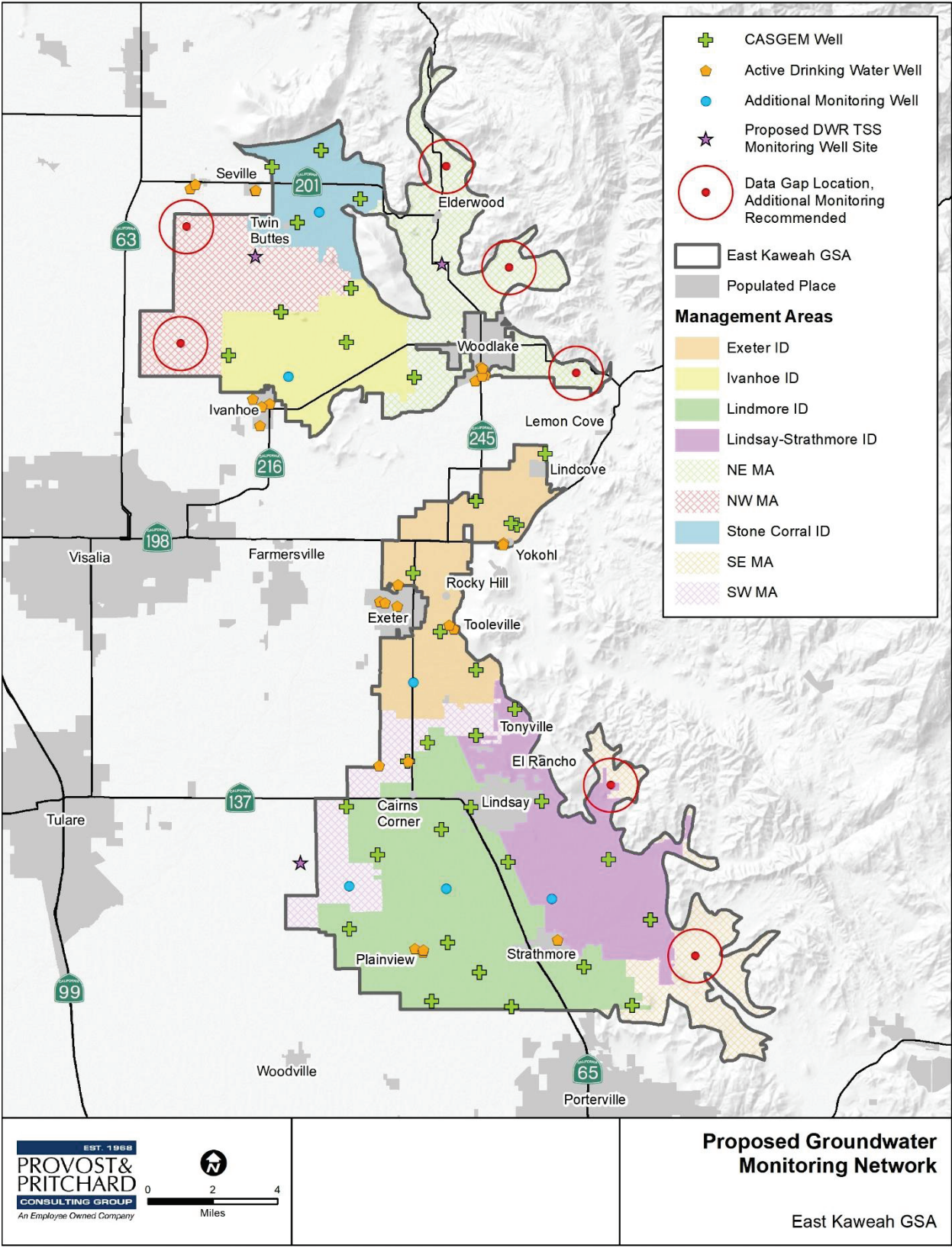


Figure ES-2 Initial EKGSA Groundwater Monitoring Network

ES 1.5 Overview of Projects and Management Actions

Two primary tools for sustainable groundwater management are project development for water supply augmentation and management actions for data collection and demand reduction. The goal of the EKGSA is to first develop projects to augment the water supply to overcome groundwater overdraft. However, if project development alone is unable to achieve the desired goals (i.e. avoiding Undesirable Results and achieving Measurable Objectives), then management actions or programs will need to be initiated. The projects described herein primarily focus on the capture, use, and recharge of available surface water supplies within the EKGSA to augment the water supply and reduce the impacts of groundwater pumping. Additionally, management actions have been developed that primarily focus on reducing water demand and associated reduction of groundwater pumping, along with increased data collection and associated actions including education and outreach, regulatory policies, incentive-based programs, and enforcement actions. The EKGSA considered many potential projects and management actions that could mitigate the groundwater overdraft within the area and help achieve sustainability, but ultimately determined that not all the identified potential projects and management actions are currently feasible for implementation. Projects that are currently envisioned for implementation are shown in **Table ES-3** and discussed in more detail in Chapter 5. Potential management actions that may be implemented are also discussed in more detail in **Chapter 5**.

Table ES-3 EKGSA Currently Identified Projects

Project ID	Project Title	Project Type	Estimated Annual Benefits AF/yr.	Generalized Priority
EK1	Lewis Creek Recharge	Recharge	3,000	High
EK2	Cottonwood Creek Recharge	Recharge	1,800	High
EK3	Yokohl Creek Recharge	Recharge	1,800	High
EK4	Rancho de Kaweah Water Management, Recharge, & Banking Project	Recharge	9,000	High
EK5	Lindmore/Exeter Dry Wells	Recharge	2,010	Medium
EK6	Lindsay Recharge Basin	Recharge	150	Medium
EK7	Wutchumna Ditch Recharge	Recharge	480	Medium
	Subtotal		18,240	AF/yr.

Projects and management actions may be implemented on different timelines. The EKGSA understands there are various levels of uncertainty with project and program implementation, and it is not unusual for it to take longer than originally estimated. In addition, some projects and management actions build upon others, and the accrual of expected benefits may take multiple years to be individually realized and vary substantially from year to year. Depending upon the success or failure of the initial GSP project and management action efforts to increase water supplies, reduce groundwater demands, and improve data collection, proposed implementation timelines may change and will be reevaluated each time this GSP is updated.

The projects that are currently being considered would yield an estimated average annual volume of approximately 18,200 AF/year if fully implemented as envisioned, which is over 60% of the currently estimated overdraft (28,000 AF/year) in the EKGSA. The remainder will be saved through projects yet to be developed and/or management actions, if necessary.

ES 1.6 Plan Implementation

The adoption of the GSP will be the official start of the Plan Implementation. The EKGSA will continue its efforts to engage the public and secure the necessary funding to successfully monitor and manage groundwater resources within the area in a sustainable manner. While the GSP is being reviewed by DWR, the EKGSA will coordinate with various stakeholders and beneficial users to improve the monitoring networks and begin the implementation of projects and management actions.

The GSP includes a preliminary estimate of implementation costs, identifies funding alternatives, and includes a preliminary implementation schedule for the potential projects and management actions of the EKGSA. All identified projects have been evaluated as potential investments that would assist in achieving the long-term goals of the EKGSA. The potential schedules and budgets presented in the GSP are estimates and may be adapted or eliminated should the EKGSA Board deem it necessary. **Figure ES-3** represents the estimated glide path to sustainability for the EKGSA, shown as cumulative mitigation.

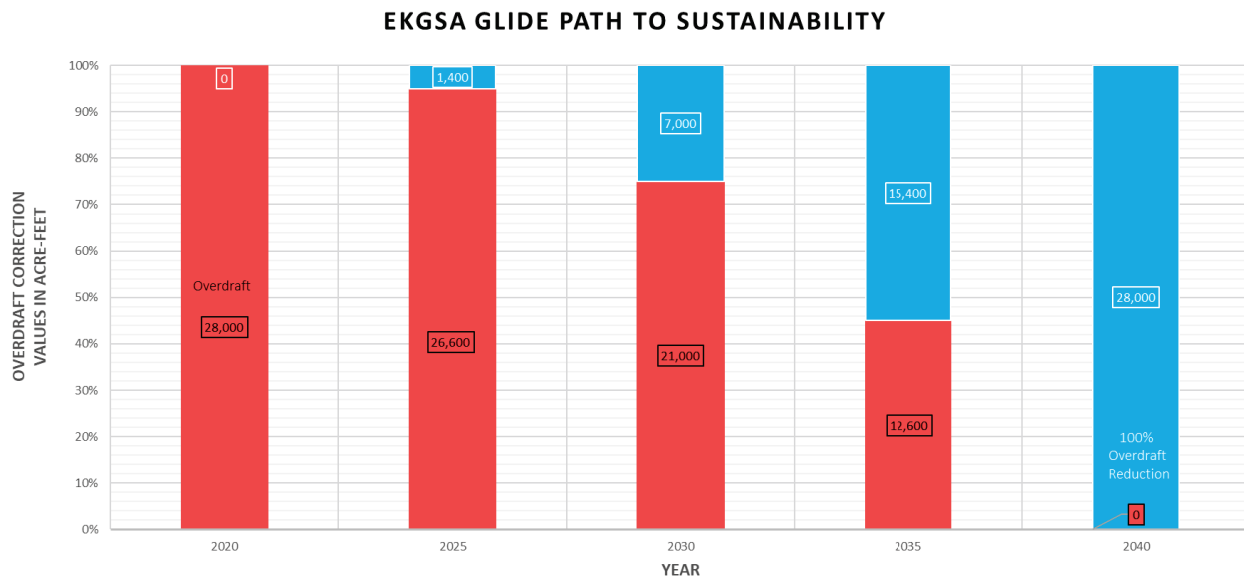


Figure ES-3 EKGSA Glide Path to Sustainability

Successful implementation of this GSP over the planning horizon will require ongoing efforts to engage stakeholders and the general public in the sustainability process, communicating the statutory requirement, the objectives of the GSP, and progress toward each identified measurable objective. In the context of this ongoing public communication, announcements of upcoming environmental hearings, project presentations, bid openings, and project construction schedules will be released on a regular basis. Public forums will include opportunities for public comment and feedback, to be addressed in an appropriate manner by EKGSA staff and/or consultants. The EKGSA, in conjunction with the member agencies, will provide notice to the public and other agencies through public meetings, newsletters, and its website (www.ekgsa.org), as the implementation of each project or management action is being considered. The EKGSA will report Subbasin operations, including current groundwater levels, extraction volume, surface water use, total water use, groundwater storage change, and progress of GSP implementation, to the public and DWR on an annual basis. Additionally, the EKGSA will report to the public and DWR at least every five years, and when the GSP is amended, Subbasin operations and progress in achieving sustainability. This will include current groundwater conditions, status of projects or management actions, evaluation of undesirable results relating to measurable objectives and minimum thresholds, changes in monitoring network, summary of enforcement or legal actions, and agency coordination efforts.