Executive Summary

Section 1 Introduction

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739 (Dickinson), SB 1168 (Pavley), and SB 1319 (Pavley), collectively known as the Sustainable Groundwater Management Act of 2014 (SGMA), which is codified in the California Water Code Section 10720 *et seq.* This legislation created a statutory framework for groundwater management in California that must be achieved during the planning and implementation horizon from 2020 to 2040 and sustained into the future without causing undesirable results. SGMA requires that the following six sustainability indicators must be considered:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- > Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality
- > Significant and unreasonable land subsidence
- Depletion of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

SGMA requires governments and water agencies of high and medium priority basins to halt groundwater overdraft and bring groundwater basins into balanced levels of pumping and recharge without causing significant and unreasonable undesirable results related to the six (6) sustainability indicators. Under SGMA, these basins must reach sustainability within 20 years of implementing their sustainability plans to avoid intervention by the State Water Resources Control Board (SWRCB). For critically over-drafted high priority basins such as the Kings Subbasin, of which Kings River East Groundwater Sustainability Agency (KREGSA) is one of seven groundwater agencies therein, the deadline for achieving sustainability is 2040.

KREGSA is a special act district formed for the purposes of implementing the Sustainable Groundwater Management Act (SGMA). Table ES-1 identifies agencies with jurisdiction boundaries in KREGSA.

| Table ES-1: | Jurisdictional | Boundaries in | n KREGSA |
|-------------|----------------|---------------|----------|
|-------------|----------------|---------------|----------|

| Agency | Total Agency Area (acres) | Area within GSA (acres) |
|-------------------------------------|------------------------------|----------------------------|
| Fresno County | 3,846,800 | 77,100 |
| Tulare County | 3,096,600 | 114,200 |
| City of Dinuba | 4,100 | 4,100 |
| City of Orange Cove | 1,200 | 1,200 |
| City of Reedley | 3,500 | 3,500 |
| Alta Irrigation District | 132,800 | 128,400 |
| Hills Valley Irrigation District | 4,300 | 3,100 |
| Orange Cove Irrigation District | 29,300 | 28,700 |
| Kings River Water District | 14,000 | 13,700 |
| Tri-Valley Water District | 2,300 | 2,000 |
| Cutler Public Utility District | 700 | 700 |
| East Orosi Public Utility District | 60 | 60 |
| London Community Services District | 200 | 200 |
| Orosi Public Utility District | 700 | 700 |
| Sultana Community Services District | 300 | 300 |

Note(s)

- 1. Area values greater than 100 acres are rounded to the nearest 100. Areas are approximations of areas defined by jurisdictional boundaries.
- Alta ID does not detach urban areas, so the following agencies are within its jurisdictional boundary: cities of Dinuba and Reedley, Cutler and Orosi Public Utility Districts, along with community services districts for London and Sultana.

The Kings River East GSA is governed by a Board of Directors comprised of seven (7) members that represent a diverse group of stakeholders, including, but not limited to, production agriculture, disadvantaged communities, cities, counties, and irrigation/water districts. Table ES-2 identifies current directors and their role. The Board of Directors has final authority in overseeing the implementation of sustainable groundwater management. Directors are elected officials with one (1) seat representing production agriculture.

| Director | Representing Agency | Function |
|--------------------|----------------------------|---------------------|
| Ernest Mendes | Fresno County | Chair |
| Mary Fast | City of Reedley | Vice-Chair |
| Jack Brandt | Alta Irrigation District | Secretary/Treasurer |
| Fernando Rubalcaba | Drinking Water District | Director |
| Eddie Valero | Tulare County | Director |
| David Brown | Irrigation/Water Districts | Director |
| Steve Boos | Ag Representative | Director |

Table ES-2: Kings River East GSA Board of Directors

The sustainability goal of the Kings Subbasin and this GSA is to ensure that by 2040 the basin is being managed in a sustainable manner to maintain a reliable water supply for current and future beneficial uses without experiencing undesirable results. This goal will be met by balancing water demand with available water supply and stabilizing the long-term trend of declining groundwater levels without significantly or unreasonably impacting groundwater storage, water quality, land subsidence or interconnected surface water. Given that KREGSA is located over one hundred (100) miles from the Pacific Ocean, seawater intrusion is not feasible and therefore not discussed in this GSP.

Section 2 Plan Area

The Kings Subbasin is located within the boundaries of the San Joaquin Valley Groundwater Basin in central California. The Kings Subbasin is primarily situated in Fresno County, but extends into Kings and Tulare counties. This basin and 12 other basins comprise the Tulare Lake hydrologic region. The Kings Subbasin boundary is defined in the Department of Water Resources (DWR) Bulletin 118 as DWR Subbasin No. 5-22.08.

KREGSA is one of seven GSAs within the Kings Subbasin and is in the eastern portion of the subbasin as shown in Figure ES-1.

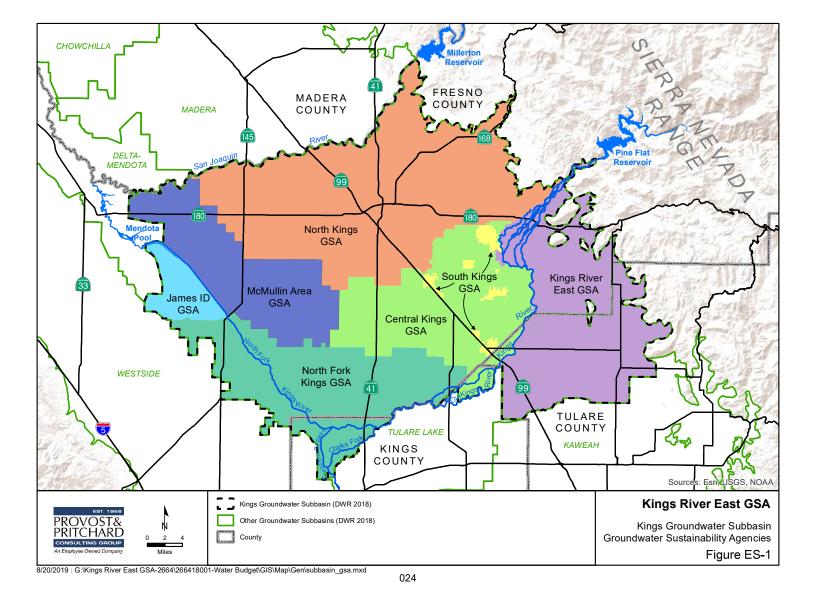
There are no known overlaps among GSAs within the Kings Subbasin and there are no adjudicated areas in the groundwater basin. Each of the GSAs within the Kings Subbasin is preparing their own individual GSP. This is appropriate because of the variations in land uses, crop mixes, subsurface geology, groundwater conditions and surface water supplies between the GSAs, all of which will affect the fundamentals and details of the resulting GSPs. The seven GSAs have cooperatively worked together since 2016 to coordinate the formation of the GSAs and develop other required elements of the GSPs. Pursuant to California Water Code Section 10727.6, the GSAs are required to use the same data and methodologies for the various assumptions in developing their GSPs, such as groundwater elevations, extraction data, surface water supply, total water use, change in storage, water budget and sustainable yield.

Five other groundwater subbasins border the Kings Subbasin as shown in Figure ES-1, including the Madera Subbasin, Kaweah Subbasin, Tulare Lake Subbasin, Westside Subbasin and Delta-Mendota Subbasin. KREGSA borders the Kaweah and Tulare Lake Subbasins.

Section 3 Basin Setting

Hydrogeological Conceptual Model

The Hydrogeologic Conceptual Model (HCM) provides a description of the general physical characteristics of the regional hydrology, geology, geologic structure, water quality, principal aquifers, and principal aquitards in the basin setting. The HCM is a written description accompanied by graphical representations of the hydrologic and hydrogeologic conditions that lays the foundation for development of water budgets, monitoring networks, and identification of data gaps. The narrative HCM description is for the Kings Subbasin, followed in each section by description applicable specifically to the KREGSA. The HCM was prepared utilizing published studies and resources and will be periodically updated as data gaps are addressed, and new information becomes available. The Kings Subbasin is an alluvial basin bounded north and south by the San Joaquin and Kings Rivers respectively, the Sierra Nevada mountains on the northeast, and the Westside and Delta-Mendota Subbasins to the west-southwest. The aquifer system is comprised of unconfined and confined

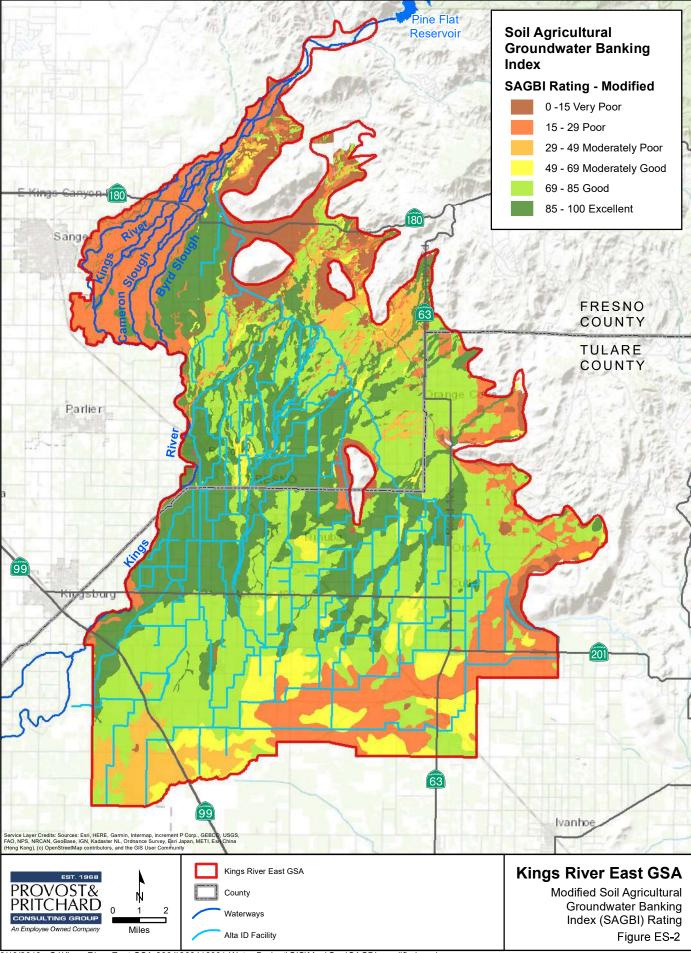


groundwater in the western parts of the subbasin where lacustrine clay beds exists. East of the lacustrine clays, locally significant clay beds separate shallower unconfined water from deeper confined groundwater. The Kings Subbasin is dominated by six major geomorphic features including the alluvial fans of the Kings and San Joaquin Rivers, dune sands, compound fans of intermittent streams between the Kings and San Joaquin Rivers, a compound fan south of the Kings River, and an area termed overflow lands near the topographic axis of the valley. The major geomorphic features are closely related to the surficial deposits which in turn relate to soil types. **Figure ES-2** is a soil map based on textural classification of soils in KREGSA. Generally, coarser materials exists and are identified on Older Alluvium, on the fans of the major rivers, in areas mapped as Dune Sands, as well as in areas where recent deposits are found along active stream courses; finer gained soils are found in the area of the compound fan of intermittent streams.

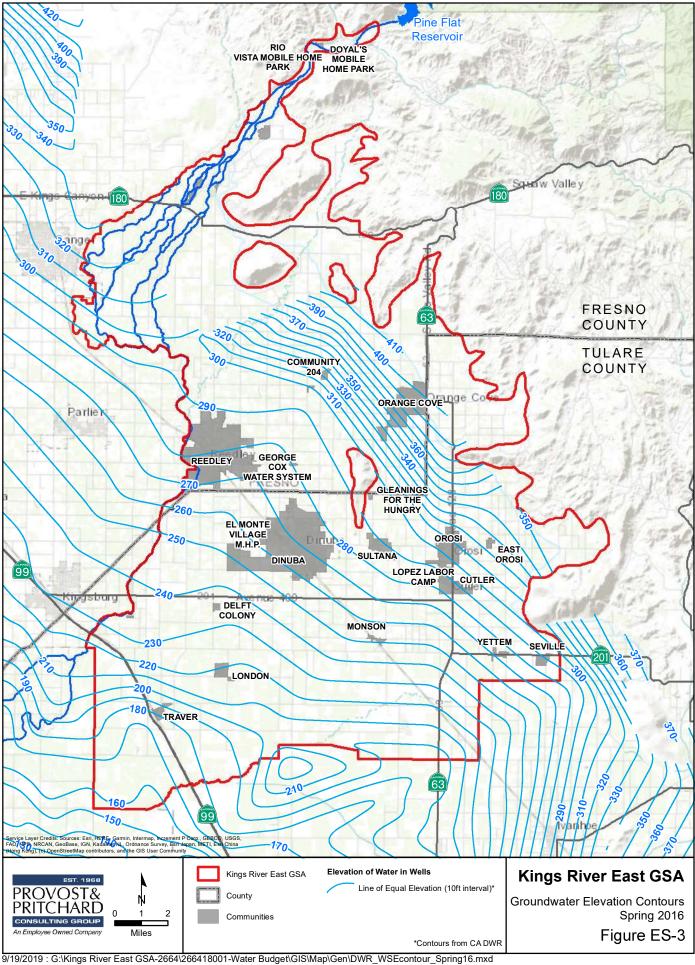
Groundwater Conditions

The natural direction of groundwater flow generally follows the topography from northeast to southwest, sloping from the Sierra Nevada on the east to the trough of the Valley at the western edge of the Kings Subbasin. Generally, groundwater flow is to the southwest within the entire subbasin with a few notable exceptions where municipal and irrigation pumping in parts of the Kings Subbasin have influenced the direction of groundwater flow or the influence of recharge from basins and the major rivers can be seen. Another exception to groundwater flow direction is observed along the westside of KREGSA as the Kings River creates a hydraulic divide from other parts of the Kings Subbasin (see Figure ES-3). This divide causes water to flow away from the Kings River back towards the midline of KREGSA or in a southwesterly direction, depending on location within the GSA. Unconfined groundwater conditions extend across essentially the entire Kings Subbasin. Groundwater levels in the southwest corner of KREGSA are impacted by a cone of depression created by significant groundwater pumping occurring in an area west of Goshen.

Outflows to other GSAs, basins, or Subbasins should not be included as inflow in GSPs for those GSAs, basins, or Subbasins to the extent water users in the KREGSA intend to control, distribute, store, spread, sink, treat, purify, recapture and salvage any such water including but not limited to groundwater, surface water, sewage and storm waters, imported or native return flows, for the beneficial use or uses of the KREGSA's inhabitants or the owners of rights to water in the KREGSA



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Groundwater Levels

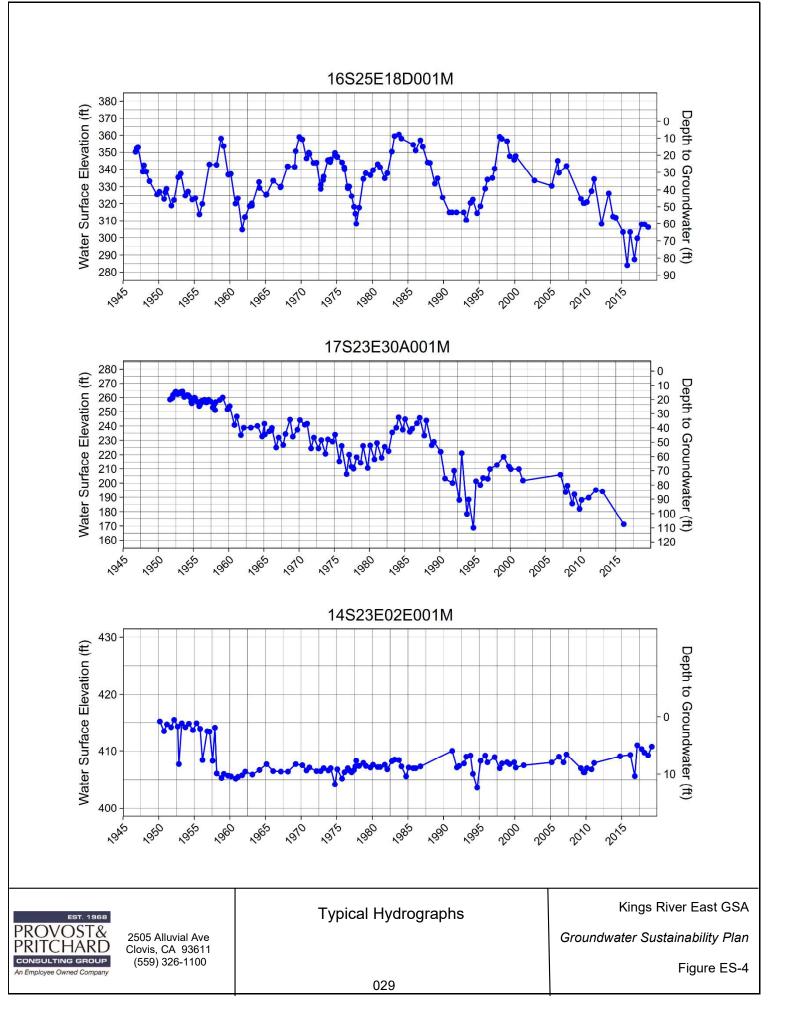
Groundwater levels have fallen significantly over the last century throughout the San Joaquin Valley including within certain areas of KREGSA. This is largely due to extraordinary groundwater extractions occurring in the Kaweah Subbasin. Pictured below in Figure ES-4 are typical well hydrographs within the Plan Area. Static or non-pumping water levels are typically measured in the spring and fall each year to capture the seasonal high and low points of the hydrologic cycle. Given the complex subsurface geology present in KREGSA, water level fluctuations may be rising, declining, or steady. Within Alta ID – represents nearly 75% of the total area within KREGSA – average water level declines for the past several decades varied from 0.2 to 1.4 feet per year with the greatest decline occurring southwest of State Route (SR) 99.

Groundwater Quality

Groundwater within the KREGSA area is used to meet agricultural, urban, and domestic demands. The groundwater quality assessment for the KREGSA Plan Area has been prepared using available information obtained from the California Groundwater Ambient Monitoring and Assessment (GAMA) Program database, which includes water quality information collected by the California Department of Water Resources (DWR), State Water Resources Control Board, Division of Drinking Water (SWRCB & DDW), and the United States Geological Survey (USGS). Additionally, this data set has been augmented with information available from previous scientific investigative data collection and reporting efforts. Specific water quality concerns include nitrate, DBCP, and 1,2,3-TCP. While some of these constituents are caused by human activity, several are naturally occurring.

Land Subsidence

Land subsidence was first identified and monitored beginning in the 1920s, then occasionally through the 1970s during periods when there was less access to surface water in portions of the San Joaquin Valley. The frequency of subsidence monitoring decreased after the 1970s, by which time access to surface water had increased due to the canals and water storage projects built in California, with less reliance on groundwater in the 1970s and 1980s to meet water demands in areas outside KREGSA. Subsidence monitoring increased again in the 2000s due to drought conditions, environmental regulations that resulted in lower surface water allocations to State Water Project (SWP) and Central Valley Project (CVP) contractors, and the local farmers and cities increasing reliance on groundwater. Recent monitoring indicates that there is minimal subsidence occurring in the KREGSA and it is primarily concentrated in a small area in southwest corner of the GSA. This ground elevation decline seems to correlate with increased pumping outside of KREGSA and the presence of the Corcoran Clay; the eastern extent of the Corcoran Clay is shown on Figure ES-5.



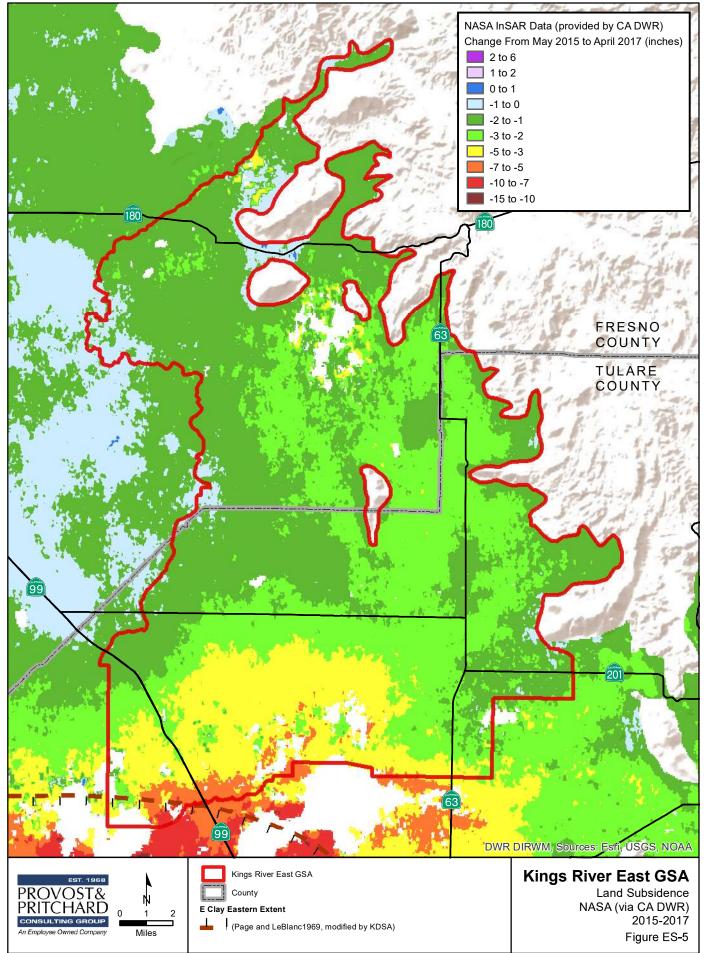
Water Budgets

A water budget is an accounting of all the water that flows into and out of a specified area and describes the various components of the hydrologic cycle. A water budget includes all the water supplies, demands, modes of groundwater recharge, and non-recoverable losses, making it possible to identify how much water is stored in a system and changes in groundwater storage during a given period. Aggregated water budgets have been prepared for the entire Kings Subbasin as well as detailed water budgets for the KREGSA.

Water budgets were prepared for a historical period (1997-2011), current period (2016-2017) and future periods (2040 and 2070). The historical water budget covers a hydrologically average period based on Kings River diversions and was developed to help calibrate the water budget process. The current water budget shows KREGA is in an overdraft condition and will require projects yielding at least 23,500 AF/year to be sustainable in 2040 – annual overdraft was estimated to be 11,000 acre-feet per year based on groundwater storage changes (a more accurate approach); difference between these two methods is within an acceptable margin of error. The future water budgets are based on numerous assumptions related to climate change, population growth, agency annexations, water conservation, and impacts of boundary flow from neighboring GSAs. These assumptions will likely change over time resulting in different conclusions. Another impact on KREGSA is groundwater flows to the south caused by a groundwater pumping depression directly to the south of KREGSA, which is expected to be partially mitigated by projects and programs in Greater Kaweah GSA. There is uncertainty in several aspects of the water budget, so the results should be viewed as guidelines rather than precise values.

Section 4 Sustainable Management Criteria

SGMA defines sustainable groundwater management as the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing



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undesirable results. The avoidance of undesirable results is important to the success of the GSP. Several requirements from GSP regulations have been grouped together under the heading of Sustainable Management Criteria, including a Sustainability Goal, Undesirable Results, Minimum Thresholds, and Measurable Objectives for various indicators of groundwater conditions. Development of these Sustainable Management Criteria is dependent on basin information developed and presented in **Section 3** of the GSP - the hydrogeologic conceptual model, groundwater conditions, and water budget sections of KREGSA's plan.

The goal of the Kings Subbasin and this GSA is to correct and end the long-term trend of a declining water table, with the understanding that water levels will fluctuate based on the season, hydrologic cycle, and changing groundwater demands within the basin and its proximity.

The conditions when the basin and this GSA will be considered sustainable are:

- The basin is continuously operated within its sustainable yield over a long-term average period. The sustainable yield varies from one GSA to another due to varying conditions such as surface water supplies.
- The current rate of decline of the groundwater table within the basin monitoring network indicator wells has been corrected and the multi-year trend of water elevations in these wells has been stabilized over a long-term average period.
- Groundwater levels are maintained to prevent Undesirable Results of the applicable sustainability indicators.

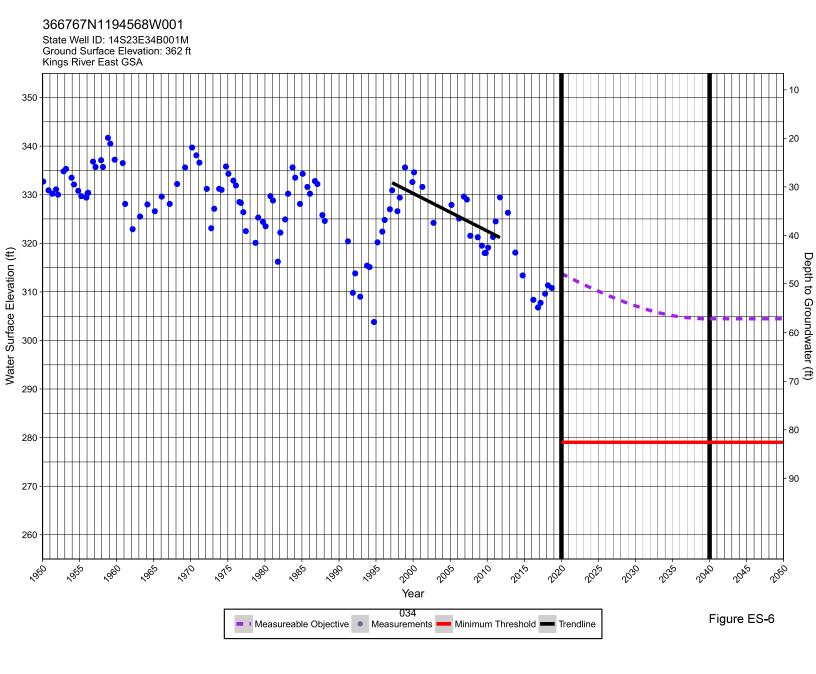
The seven (7) GSAs within the Kings Basin have been coordinating within the basin for several years on how to reach and maintain sustainability within the Basin. As described in the **Section 3** - Basin Setting, the Kings Basin includes significantly varied geologic conditions, water supplies and land uses that lead to different conditions and obligations within each GSA. The basin setting describes the trend of declining groundwater levels within the basin and this GSA. The degree of decline varies by location based primarily on land use and available surface water supplies. The Basin setting information, including historic groundwater conditions, surface supplies, groundwater flows, land use and other information were used to establish the water budget, estimates of storage change within each GSA and sustainable yield. The coordination efforts between the GSAs have resulted in agreed initial quantities of storage change, for each GSA to correct, in order to achieve sustainability. These quantities and each GSA's respective obligation will continue to be monitored, evaluated, and renegotiated at last every five years as additional information is gathered.

Each GSA in the Kings Subbasin is responsible for implementing projects and management actions required to reach sustainability and meet its initial mitigation requirements for storage change. The measures that will be implemented to ensure the Subbasin will be operated within the sustainable yield are identified in detail in **Section 6**. Collectively, these projects and programs have been identified to ensure the Subbasin reaches sustainability by 2040, but are dependent on hydrology, management, and capture of local water supplies. The projects and programs include technical data and estimates of project benefit, and the total of these benefits within the Subbasin meet the initial estimates to reach sustainability within the Subbasin.

The Kings Subbasin agreed to a phased approach of increasing mitigation to achieve sustainability. The Subbasin has set incremental targets for correcting the overdraft of 10% by 2025, 30% by 2030, 60% by 2035 and 100% by 2040. Each GSA in the Subbasin is planning to implement projects and management actions in accordance with the agreed mitigation targets. GSAs will continue to meet regularly to review data to ensure all GSAs are meeting their milestones and progress is being made toward sustainability.

Water Levels

GSAs within the Kings Basin defined the Undesirable Result for groundwater levels to be significant and unreasonable when either the water level has declined to a depth that a new productive well cannot be constructed, or when the water level has declined to a depth that water quality cannot be treated for beneficial use. Figure ES-6 shows a typical well hydrograph and incremental overdraft mitigation to reach the measurable objective and sustainability in 2040. The measurable objective will include an extension of a current hydrograph gradually stabilizing, and a minimum threshold defined as the depth of groundwater predicted if a historic 5-year drought occurred.



Storage Change

As part of the coordination of GSAs within the Kings Subbasin, a common method was utilized to estimate the change in groundwater storage for the entire Subbasin and within each GSA during the hydrologic average base period, which was identified as the 15-year period from October 1996 to September 2011, based on Kings River surface water diversion into the area. The estimated storage change within the upper, unconfined groundwater of the Kings Subbasin is calculated to be 1.8 million acre-feet (MAF) during the hydrologic average base period from spring 1997 to spring 2012, or an average of about 122,000 acre-feet per year. Storage change due to groundwater release from aquifer compaction (caused by land subsidence) was estimated to be 12,000 acre-feet per year, resulting in total overdraft of 134,000 acre-feet per year. Estimated storage change in the lower confined aquifer is not possible at this time due to limited or no data from confined wells in the area. In addition, groundwater pumped from the confined portions of the aquifer is captured as storage change in the unconfined aquifer due to vertical leakage through wells and aquitards. The goal, by 2040, is to stabilize, over the long-term, changes in groundwater storage, to prevent groundwater storage from falling below the overall storage represented by groundwater level measurable objectives, and to never allow the groundwater storage to fluctuate below the storage value represented by the groundwater minimum thresholds levels. GSAs within the Kings Basin defined the Undesirable Result for groundwater levels to be significant.

Water Quality

Groundwater quality monitoring and reporting by community water systems is a requirement of California Title 22 Code of Regulations. With the powers provided by SGMA, a GSA can only regulate and manage groundwater pumping. Groundwater pollution characterization and mitigation are typically enforced by local agencies and state level programs. The State maximum contaminant level (MCL) values, which are protective of human health for the chemicals of concern, will be relied upon as the primary criteria for defining minimum thresholds and undesirable results. Three (3) specific constituents of concern in the area will be the focus of the SGMA monitoring effort. Groundwater monitoring results from representative community and non-community wells within KREGSA's monitoring network will be reviewed annually for compliance with State MCL values and changes from historical values. The measurable objective is to maintain water quality at potable water standards, below MCLs for the chemicals of concern. In situations where monitoring network wells (either existing or future wells) have a recent history of being above MCLs for contaminants of concern, the measurable objective is for the wells to maintain stable or improving groundwater quality trends.

Land Subsidence

The measurable objective for land subsidence is no more than 4 inches per year over an area of at least 36 square miles, with maximum cumulative subsidence of no more than 2 feet between 2020 and 2040. These values are based on historical subsidence rates that have shown no negative impacts. The minimum threshold

will be 8 inches/year over an area of greater than 36 square miles, and no more than 4 feet between 2020 and 2040.

Surface Water and Groundwater Interconnection

Regional studies appear to show that the San Joaquin River is not connected to groundwater within the NKGSA, however the Kings River is likely interconnected. Existing management programs on the Kings River guarantees certain flow rates and water releases to accommodate all river losses (evaporation, seepage, riparian diversions and groundwater pumping induced seepage). Therefore, undesirable results to surface water related to groundwater pumping are not likely to occur. Regardless, the KREGSA has established a groundwater monitoring network to monitor for impacts and changes in near-river gradients, and potential impacts to downstream water users will be monitored.

Seawater Intrusion

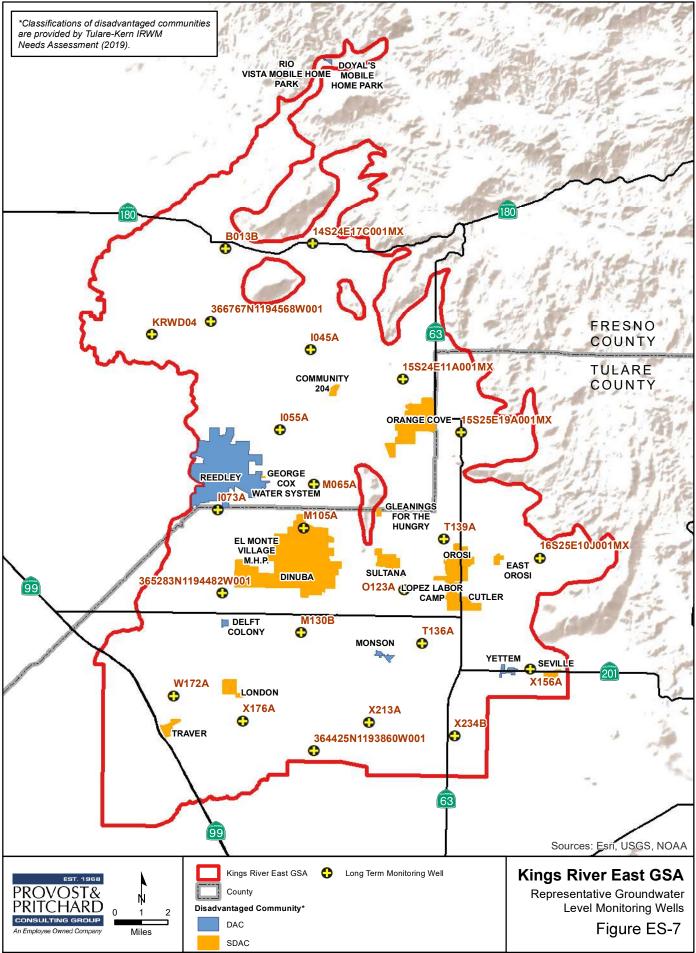
Given that KREGSA is located over one hundred (100) miles from the Pacific Ocean, seawater intrusion is not feasible and therefore not discussed in this GSP.

Section 5 Monitoring Network

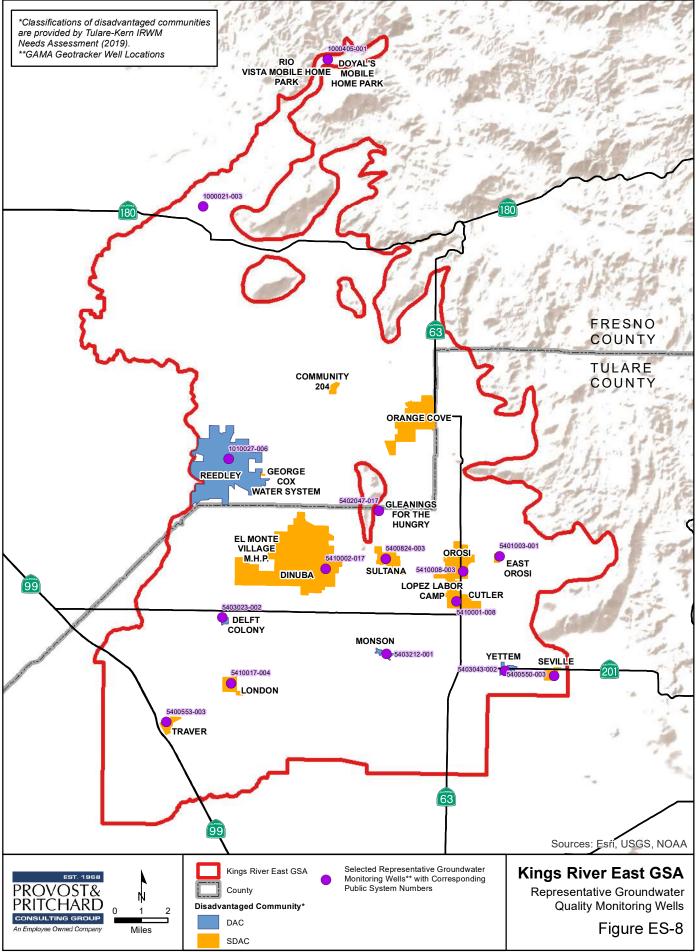
This Section describes the monitoring network being developed by the KREGSA that will be used to collect data to determine short-term, seasonal, and long-term trends in groundwater and related surface conditions. This information will yield information necessary to support: 1) the implementation of this Plan, 2) evaluation of the effectiveness of this Plan, and 3) decision making by the KREGSA board of directors. The results and data from historical monitoring efforts are discussed in **Section 3.2**. The Monitoring Network Section describes the current and proposed monitoring programs, identifies data gaps, and describes the plans to fill data gaps for each sustainability indicator. A map of the proposed representative monitoring well network that includes monitoring wells near both rivers is shown in Figure ES-7.

The KREGSA intends to expand its groundwater level network as additional well construction information is obtained for existing wells and as new dedicated monitoring wells are installed. Through public education, outreach, video logging of existing wells for reliable well construction information, and construction of dedicated monitoring wells, the KREGSA plans to fill data gaps as discussed further in Section 5.

Additionally, data from a separate network of potable water system wells will be used to evaluate changes in water quality conditions in the GSA. Figure ES-8 is a map showing these well locations.



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Section 6 Projects and Management Actions

KREGSA will reach sustainability by 2040 if groundwater outflows to GSAs in neighboring are reduced and projects are developed to mitigate present and future projected impacts. However, within the NKGSA, some agencies have a negative groundwater impact and these agencies have agreed to each initiate mitigation measures to offset negative groundwater pumping impacts. The agencies have focused on water supply augmentation projects to offset these impacts and each agency has identified projects included in Section 6. In addition, the agencies within KGEGSA may consider management actions related to demand reduction. Section 6.3 discusses a suite of potential management actions during implementation of the GSP to achieve sustainability. Some management actions, such as education and outreach, will be initiated early in the GSP implementation phase. Some other management actions are envisioned to be employed if project development is not proceeding sufficiently to achieve interim milestones. Management Actions that may be considered by KREGSA may include i) education and communication, ii) data gap mitigation, and iii) groundwater quantification.

Each of the included projects and management actions are in various stages of planning, implementation, benefit accrual, and ongoing operations and maintenance. KREGSA understands there are various levels of uncertainty with project and program implementation, and it is not unusual for project and program implementation to take longer than originally estimated. 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, various implementation timeline and benefit accrual may fluctuate over time and will be reevaluated each time this GSP is updated.

Section 7 Implementation

Although some member agencies within KREGSA commenced with implementation of sustainable management of groundwater back in 2017, for KREGSA the official start of GSP implementation will be coincident with adoption of the GSP. After GSP adoption, the KREGSA will continue its efforts to engage the public and secure necessary funding to successfully monitor and manage groundwater resources in a sustainable manner. During DWR's review of the GSP, KREGSA will NKGSA will coordinate with various stakeholders and beneficial users to improve the monitoring network, fill data gaps, and the member and participating agencies will initiate implementation of projects.

This section provides a preliminary estimate of GSP implementation costs, identifies funding plans, and includes a preliminary implementation schedule for potential projects and management actions. The schedules

and budgets presented in the GSP are purely estimates and may need to be altered or eliminated, if deemed necessary, by the KREGSA board.

Successful implementation of this GSP over the planning and implementation horizon (2020-2040) will require ongoing engagement of stakeholders and general public regarding the sustainability process, communicating statutory requirements and GSP objectives, and progress toward each identified measurable objective. KREGSA, along with the other GSAs in the Kings Subbasin, will cooperate in preparing annual reports to DWR summarizing the results of Subbasin operations including current groundwater levels, extraction volume, surface water use, total water use, groundwater storage change, and progress of GSP implementation. All GSAs in the Kings Subbasin worked cooperatively on development of a Data Management System capable of storing and evaluating groundwater related data. In addition, the KREGSA will amend its GSP at least every five (5) years. The update will include the results of Subbasin operations, progress in achieving sustainability, current groundwater conditions, status of projects or management actions, evaluation of undesirable results relating to measurable objectives and minimum thresholds, changes in monitoring networks, summary of enforcement or legal actions and agency coordination efforts with the public and DWR.