EXECUTIVE SUMMARY

ES 1. Introduction

California enacted the Sustainable Groundwater Management Act (SGMA) on September 16, 2014, establishing a statewide framework for managing groundwater sustainably in high- and medium-priority basins. SGMA requires local agencies to form Groundwater Sustainability Agencies (GSAs) and develop and implement Groundwater Sustainability Plans (GSPs) to avoid undesirable results and achieve basin sustainability goals. This GSP is for the Terra Bella Irrigation District (TBID) GSA within the Tule Subbasin (Subbasin) of the Tulare Lake Hydrologic Region.

The Tulare Lake Hydrologic Region covers approximately 17,050 square miles in the southern San Joaquin Valley, supports about 2.3 million residents, and includes approximately one-third of California's agricultural land. The region has the highest groundwater demand in California, averaging 10.7 million acre-feet per year, with approximately 92 percent used for agriculture (California Department of Water Resources, 2014, Section 7.7).

The Tule Subbasin, identified by the California Department of Water Resources (DWR) as Subbasin No. 5-22.13 in Bulletin 118, encompasses approximately 476,000 acres in Tulare County and is designated as critically over-drafted (California Department of Water Resources, 2016a).

California Water Code § 10721(v) defines sustainable groundwater management as the management and use of groundwater in a manner that can be maintained throughout the planning and implementation horizon without causing undesirable results. California Water Code § 10721(x) identifies undesirable results as one or more of the following effects caused by groundwater conditions occurring throughout the basin:

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

This GSP describes how the TBID GSA will implement SGMA within its jurisdiction, in coordination with the other Subbasin GSAs, to achieve sustainable groundwater management. The GSP addresses each applicable sustainability indicator and SGMA requirement for the TBID GSA GSP Plan Area (Plan Area), consistent with the *2024 Tule Subbasin Coordination Agreement* (2024 Coordination Agreement) (**Appendix A**).

The 2024 Coordination Agreement allows each GSA to prepare, adopt, and implement its own GSP, while supporting coordinated Subbasin-wide implementation through Tule Subbasin Technical Advisory

Committee (TAC) review before submittal to the Department of Water Resources (DWR). The TAC Chair serves as Plan Manager and DWR point of contact; however, each GSA retains authority over its respective GSP.

Consistent with California Water Code § 10727.6, the 2024 Coordination Agreement establishes the data and methodologies used for coordinated GSP implementation in the Subbasin. The agreement addresses the Basin Setting, sustainability goal, undesirable results, sustainable management criteria, monitoring network, monitoring protocols, data standards, data gaps, and the general mitigation planning approach applied across the Subbasin.

GSPs and amendments are circulated through the Tule Subbasin TAC for review and may be submitted to DWR by the Plan Manager only with written authorization from the preparing GSA. Subbasin-wide monitoring is conducted in accordance with the Tule Subbasin Monitoring Plan. Each GSA remains responsible for its monitoring data and implementation reporting, while annual reports and periodic evaluations are reviewed by the Subbasin Plan Manager for Subbasin-wide consistency and submittal to DWR.

This GSP includes the SGMA-required plan elements needed to support sustainable groundwater management in the TBID Plan Area, including the Basin Setting, sustainability goal, sustainable management criteria, monitoring network, projects and management actions, and implementation measures. These elements are coordinated with the other Tule Subbasin GSAs under the 2024 Coordination Agreement to support consistent monitoring, reporting, and progress toward sustainability.

ES 2. Summary of Plan Area and Basin Setting

The Subbasin is part of the southern San Joaquin Valley Groundwater Basin in California's Central Valley and is classified by DWR as a high-priority, critically overdrafted basin. The Subbasin is generally bounded by the Sierra Nevada foothills to the east, the Tulare County boundary to the west and south, and the Lower Tule River and Porterville Irrigation District boundaries to the north (**Figure ES-1**). As of 2026, thirteen GSAs, including the TBID GSA, share groundwater management responsibility within the Subbasin.

The TBID Plan Area covers approximately a 13,962-acre region located in the southeastern portion of the Tule Subbasin (**Figure ES-2**). The TBID service area is centered on the community of Terra Bella, located roughly 7.5 miles south of Porterville. The Plan Area is defined as the service area for the TBID. Deer Creek runs east-west through the northern part of the Plan Area. State Route 65 and the Friant-Kern Canal lie to the west. The Plan Area consists of one primary area, with smaller non-contiguous areas located to the northeast and northwest.

Groundwater within the Subbasin occurs primarily in the Upper and Lower Aquifers, which are separated regionally by the Corcoran Clay west of Highway 99. Upper Aquifer groundwater levels declined between 1987 and 2015 and have generally stabilized since that time. The Lower Aquifer has also experienced long-term groundwater-level declines, although the magnitude and extent of decline vary across the Subbasin. In the southeastern Subbasin, the Santa Margarita Formation forms a third principal aquifer beneath the Lower Aquifer and is separated from it by an aquitard composed of

Pliocene Marine Deposits. Groundwater levels in the Santa Margarita Formation have remained generally stable since approximately 2013 (**Appendix A-2**).

ES 2.1. Hydrogeologic Conceptual Model

The Subbasin's land surface is generally level and slopes gently from east to west, with the low-lying Sierra Nevada foothills forming the eastern margin. Land surface elevations range from approximately 850 feet above mean sea level (amsl) along the eastern boundary to approximately 200 feet amsl along the western boundary. The TBID Plan Area is characterized by an increasingly flat topography moving from east to west across the TBID Plan Area. In the eastern portion of the TBID Plan Area, adjacent to the foothills of the Sierra Nevada mountains, the land surface is approximately 800 feet above mean sea level (feet msl). Moving to the west, land surface elevations near the non-contiguous portion of the TBID Plan Area are approximately 400 feet. The average slope moving east to west across the TBID Plan Area is 1.8 percent.

Soils within the TBID Plan Area include naturally fertile soils like Vertisols, Mollisols, and Alfisols. Soil series that dominate TBID include Centerville and Porterville clays, San Joaquin loam, and other loam to sandy loams.

Surficial geology within the TBID Plan Area is shown on **Figure ES-3**. The TBID Plan Area is almost entirely underlain by "Continental Sedimentary Rocks" (Qpc). This unit consists of Pleistocene continental deposits, primarily semi-consolidated gravel, sand, silt, and clay forming dissected alluvial fans and terraces derived from the Sierra Nevada by erosion. To the east of the TBID Plan Area, crystalline bedrock is present at the surface. The far eastern portions of the TBID Plan Area, including the non-contiguous area, are made up of "Alluvium" (Q). This unit is Quaternary in age and is made up of unconsolidated to semi-consolidated sand, gravel, and clay, forming alluvial plains, fans, and terraces (**Appendix A-2**).

Beneath the Subbasin and the TBID Plan Area, the geologic framework includes five principal units: Unconsolidated Continental Deposits, Pliocene Marine Deposits, Santa Margarita Formation, Tertiary Sedimentary Deposits, and Granitic Crystalline Basement.

The Tule Subbasin aquifer system consists of the Upper Aquifer, Corcoran Clay, Lower Aquifer, Pliocene Marine Deposits, and Santa Margarita Formation. The TBID Plan Area includes the Upper Aquifer, Lower Aquifer, Pliocene Marine Deposits, and Santa Margarita Formation; the Corcoran Clay is not mapped within the TBID Plan Area (**Figure ES-4**). Approximate unit thicknesses and subsurface relationships are also shown on the cross-section, based on the *Tule Subbasin Setting*.

The principal water bearing aquifers consist of permeable sand and gravel layers that are interbedded with low permeability silt and clay lenses. Shallower saturated sediments are generally unconfined to semi-confined, while confined aquifers in the western region of the basin occur beneath the Corcoran Clay, west of the TBID Plan Area. The ability of aquifer sediments to transmit and store water is based on the aquifer's transmissivity, hydraulic conductivity, and storativity. Aquifer parameters were derived using short-term pump tests and long-term pump tests (24 hours or more at a constant rate).

Horizontal hydraulic conductivity for the Upper Aquifer ranges from less than 20 feet/day in the southern half of the TBID Plan Area to 60-80 feet/day along the Deer Creek along its northern boundary. These values are generally consistent with the broader Subbasin, except near Lake Success, where values range from approximately 100 to 150 feet per day. Horizontal hydraulic conductivity values in the Lower Aquifer range from less than 20 feet/day through the majority of the TBID Plan Area to as high as 40 feet/day in the northeast portion of the TBID Plan Area near the Deer Creek (**Appendix A-2**), indicating greater sediment permeability in the southern region.

In the Upper Aquifer of the TBID Plan Area, specific yield values range from approximately 0.05 to 0.25, with areas of higher specific yield occurring near Deer Creek in the northeastern portion of the TBID Plan Area and areas of low specific yield in the southern and western portions. Lower Aquifer storativity estimates were initially based on values reported by Faunt (2009) and refined through calibration of the Subbasin numerical model. Storativity values in the Lower Aquifer under confined conditions range from 8.0e-06 to 3.6e-04 (**Appendix A-2**), which are indicative of confined aquifer conditions. The storativity values tend to increase from east to west.

The Corcoran Clay is the primary regional confining unit influencing groundwater flow in the Tule Subbasin, which is only present west of Highway 99. Although the Corcoran Clay is not mapped within the TBID Plan Area, localized confining beds may be present. Mapped faults within the TBID Plan Area are not known to materially affect groundwater flow. A concealed fault has been mapped at a northwest-southeast orientation adjacent to the northeastern boundary of the TBID Plan Area (**Appendix A-2**).

Groundwater recharge occurs primarily through deep percolation of applied irrigation water, precipitation, mountain-front recharge, and streambed infiltration. As described in Section 2.1.6 of the *Tule Subbasin Setting* (**Appendix A-2**), recharge areas in the Subbasin generally occur along stream channels, unlined canals, managed recharge basins, and irrigated agricultural lands. Recharge is most effective where surface soils are permeable and subsurface restrictions are limited. The most favorable recharge areas occur around Deer Creek and the Fountain Spring Gulch.

ES 2.2. Groundwater Conditions

Historical groundwater levels from TBID monitoring wells are shown in **Figure ES-5**. Well E0037, located on the eastern side of the TBID Plan Area near the Subbasin boundary, has had stable groundwater levels of about 575 feet below ground surface (bgs) since 2019. The other three monitoring wells do not have construction data but have records dating back to the 1930s. These wells show generally stable groundwater levels across the TBID Plan Area, with levels near 450 feet bgs in the central area and about 350 feet bgs on the western side. In recent years, all four wells have shown minimal seasonal fluctuation, indicating limited groundwater pumping.

Figure ES-6 illustrates groundwater level trends across the Subbasin in wells that are perforated in the Lower Aquifer. In the northwest, groundwater levels have demonstrated a downward trend from 1999 to 2023. In the southern part of the Subbasin, groundwater levels were relatively stable between 1987 and 2007, then began to decline around 2023.

Groundwater flow patterns in the Upper Aquifer of the Subbasin have remained consistent since at least 1990. The primary regional feature is a persistent pumping depression situated in the west-central portion of the Subbasin. This feature has fundamentally altered regional hydraulics by reversing natural flow directions in the western Subbasin and inducing subsurface inflow along the southern and western boundaries. While recharge from the Tule River creates a flow divide along the northern boundary, most groundwater moves from eastern recharge areas toward this central depression. In the Lower Aquifer, the direction of groundwater flow is toward the west and southwest. While this direction of flow has remained consistent over time, groundwater pumping in the central and western portions of the Subbasin has created a cone of depression similar to the Upper Aquifer.

Figure ES-7 presents Fall Upper Aquifer conditions for water year (WY) 2022, a critically dry year. In the WY 2022 contours, groundwater flows from the eastern side of the Subbasin toward a cone of depression in the western portion of the Subbasin. Within the Upper Aquifer in the TBID Plan Area, groundwater flow is generally to the west toward the existing cone of depression. The groundwater level gradient during the fall of 2022 was approximately 33 feet/mile. **Figure ES-8** presents Fall Lower Aquifer conditions for WY 2022 across the Subbasin. Groundwater elevations are highest along the eastern boundary and lowest in the southwestern corner. Within the TBID Plan Area, groundwater elevations declined from east to west. The groundwater level gradient during the fall of 2022 was approximately 76 feet/ mile.

Land subsidence in the Subbasin is primarily linked to groundwater pumping and declining groundwater levels in areas underlain by thick fine-grained sediments, such as silt and clay. Interferometric Synthetic Aperture Radar (InSAR) data from 2015 to 2020 show that subsidence generally radiates from a cone of depression in the Lower Tule River Irrigation District (LTRID) and Pixley Irrigation District (PIXID) Plan Areas, where pumping is highest, and groundwater elevations are lowest (**Figure ES-9**). Between 2015 and 2020, within the TBID Plan Area, the greatest amount of subsidence occurred between Highway 99 and Highway 43. In the western portion of the TBID Plan Area, minor subsidence has occurred near the Friant-Kern Canal (FKC), and subsidence increased to the west (**Figure ES-10**).

The TBID Plan Area is supplied with imported surface water via the FKC, as well as the primary natural waterway within the TBID Plan Area, Deer Creek. Interconnected surface water (ISW) and groundwater-dependent ecosystems (GDEs) are likely present along Deer Creek.

Groundwater quality varies with depth across the aquifer system throughout the Subbasin. According to the 2024 Coordination Agreement, the native groundwater quality is generally considered relatively good; However, groundwater quality issues have resulted from regional point-source contamination and non-point source groundwater quality degradation. Within the TBID Plan Area, two constituents of concern (COCs) have been detected that exceed the Maximum Contaminant Levels (MCLs) for drinking water beneficial uses based on data between 2005 and 2025, which include Nitrate as nitrogen (NO_3^- as N, or Nitrate as N) and uranium (SWRCB, 2025a).

ES 2.3. Water Budget

The Subbasin and TBID Plan Area water budgets are organized into surface water system and groundwater system components.

TBID can satisfy a substantial portion of the TBID Plan Area water demand through available surface water supplies. Surface water inflows include precipitation, imported surface water applied for irrigation, discharge from wells, and surface water from local and imported sources. Deer Creek and imported water delivered through the Friant-Kern Canal are two primary contributors to surface water inflows within the TBID Plan Area. Estimated Deer Creek inflows to TBID range from approximately 2,000 to 88,400 acre-feet (AF), with an average of 18,200 acre-feet per year (AFY). TBID also holds a long-term contract for 29,000 AFY of Class 1 water from the Friant Division. Additional surface water features outside of the TBID Plan Area within the Subbasin include the Tule River and the White River.

Groundwater budget inflows include recharge from precipitation, streambed infiltration, managed recharge in groundwater storage basins, canal losses, irrigation return flows, and subsurface inflow. Groundwater budget outflows include agricultural pumping and subsurface outflow. Average annual inflows are estimated at 44,800 AFY, compared to average annual outflows of 46,600 AFY.

Prior to forming as a GSA, TBID GSA participated in a groundwater accounting and allocation program that provided a phased reduction to sustainable yield by 2035. The program allowed temporary pumping above sustainable yield through transitional pumping credits. To accelerate progress toward sustainable conditions and address subsidence, TBID adopted Resolution 2024-09-01, declined all transitional pumping credits, and elected to operate at sustainable yield beginning in Water Year (WY) 2025—ten years earlier than the prior glide path.

The sustainable yield for the TBID GSA is 0.99 AF per acre. The historical average pumping for TBID is 10,600 AFY or 0.76 AFY per acre. Although the TBID previously planned on having a glide path to achieve the sustainable yield allocation by 2035, TBID elected, through Resolution No. 2024-09-01, to disregard the glide path and achieve the sustainable yield pumping allocation in WY2025. This action also eliminated the ability of landowners within the TBID Plan Area to use transitional pumping credits in future years.

ES 3. Sustainability Management Criteria

ES 3.1. Sustainability Indicators

Pursuant to 23 CCR § 354.22, this section defines the criteria for sustainable groundwater management (SMC) in the Subbasin, including within the TBID Plan Area. These criteria include the sustainability goal and definitions of undesirable results (URs), minimum thresholds (MTs), measurable objectives (MOs), and interim milestones (IMs) for each applicable sustainability indicator (SI).

The SMC applied in this GSP are based on the Subbasin-wide framework in the 2024 Coordination Agreement (**Appendix A**), including its sustainability goal, SI characterization methods, and SMC methodologies. The TBID GSP also reviewed and adopted Tule Subbasin GSPs to synthesize representative monitoring networks and assigned SMC values.

The Subbasin Sustainability Goal is "the absence of undesirable results, accomplished by 2040 and achieved through a collaborative, Subbasin-wide program of sustainable groundwater management by the various Tule Subbasin GSAs" (**Appendix A**).

This goal will be achieved through the coordinated implementation of individual GSPs by the Tule Subbasin GSAs in collaboration with stakeholders. The GSAs intend to achieve sustainability in a way that supports the highest practicable economic, societal, environmental, cultural, and community welfare while allowing beneficial groundwater uses at the lowest reasonable cost, and to maintain sustainability after 2040. The following summarizes each SI defined by SGMA:

- Chronic Lowering of Groundwater Levels – The GSP regulations define chronic lowering of groundwater levels as “the groundwater level indicating a depletion of supply at a given location that may lead to undesirable results” (GSP Reg. § 354.28(c)(1)).
- Reduction of Groundwater Storage - The GSP regulations define reduction of groundwater storage as “a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results” (GSP Reg. § 354.28(c)(2)).
- Degraded Water Quality - The GSP regulations define degraded water quality as “the degradation of water quality that may lead to undesirable results, including the minimum threshold for water quality that shall be based on the number of individual supply wells, a volume of water, or a location of a degraded water quality plume” (GSP Reg. § 354.28(c)(4)).
- Land Subsidence - The GSP regulations define land subsidence as “the rate and extent of subsidence that substantially interferes with land uses and may lead to undesirable results” (GSP Reg. § 354.28(c)(5)).
- Depletions of Interconnected Surface Water - The GSP regulations define depletions of interconnected surface water as “the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results” (GSP Reg. § 354.28(c)(6)).
- Seawater Intrusion - The GSP regulations define seawater intrusion as “the chloride concentration isocontour, or other appropriate parameter, at which seawater intrusion into an aquifer is calculated to occur that may lead to undesirable results” (GSP Reg. § 354.28(c)(3)). Seawater intrusion is not applicable in the Subbasin.

SMC established for individual monitoring sites is summarized in the next section.

ES 3.2. Representative Monitoring Network

The Tule Subbasin Monitoring Plan (TSMP) was developed as a coordinated effort and is adopted by the TBID GSA. The monitoring plan describes the monitoring network designed to collect data such as surface water flow, surface water quality, groundwater levels, groundwater quality, and land surface elevation.

The monitoring network objective is to ensure that the data collected is sufficient in quantity, distribution, frequency, and accuracy to provide meaningful results for demonstrating progress toward achieving the Subbasin’s sustainability goal. The following sections describe the representative monitoring network for each sustainability indicator.

ES 3.2.1. Groundwater Monitoring Network

The groundwater level monitoring network must demonstrate occurrence, flow direction, and hydraulic gradients between principal aquifers and surface water features. Groundwater level monitoring networks were developed for the Upper Aquifer, Lower Aquifer, and Santa Margarita Formation.

Representative monitoring site (RMS) wells were strategically selected from the monitoring network to assess progress towards achieving groundwater level sustainability in the Subbasin. Groundwater-level RMS must have documented construction, be located within a designated management area to ensure adequate spatial coverage, and, ideally, have perforations exclusively within a single hydrogeologic unit. Additionally, these wells must meet the specific historical record criteria and be equipped with pressure transducers to record automated daily water level measurements.

The Subbasin GSAs selected a subset (30) of these wells as RMSs for the Upper Aquifer. Upper Aquifer RMS well locations are shown in **Figure ES-11**. Within the TBID Plan Area, there are currently no Upper Aquifer RMS wells. The Lower Aquifer monitoring network is presented in **Figure ES-12**. This network consists of 34 RMS wells, also including six composite wells. The three RMS monitoring sites within the Santa Margarita formation are included in **Figure ES-13**. Within the TBID Plan Area, there is a lack of aquifer-specific monitoring wells, which is identified as a data gap, discussed further in **Section 4.8** of this GSP. Within the TBID Plan Area, there is one composite RMS Monitoring Well. Information for which, including SMC, is included in **Table ES-1.**

Decrease in Groundwater Storage Monitoring Network

The monitoring network established for groundwater levels is adopted as a proxy to monitor changes in groundwater storage. As such, all wells selected for monitoring changes in groundwater storage will be the same as those used for groundwater level monitoring.

ES 3.2.3. Subsidence Monitoring Network

Land subsidence has been monitored throughout the Subbasin based on InSAR, survey benchmark, global positioning system (GPS) station, and extensometer data. A combination of these sources has provided data that allowed for an analysis of historical and current subsidence, which can be compared and correlated to groundwater pumping and groundwater levels. The US Geological Survey (USGS) collected and analyzed land subsidence measurements in the 1950s and 1960s (Lofgren and Klausing, 1969), which were used to conclude that lowered groundwater levels caused by groundwater pumping in areas where significant amounts of clay and silt are present in the subsurface. RMS and SMC information are presented in **Table ES-2**.

Table ES-1. Summary of Groundwater Level SMC for TBID RMS Wells

GSA	CASGEM SWN	Short SWN	Master Well ID	Well Name/ Well Log	IM (ft amsl)			MO (ft amsl)	MT (ft amsl)	Aquifer	X-Coordinate (ft)	Y-Coordinate (ft)
					2025	2030	2035					
TBID GSA	N/A	23S/28E-04K01	Tule_E0037_RMS		TBD	TBD	TBD	TBD	TBD	C	6573260	1865680

Source: Thomas Harder & Co, 2026 – The IMs are sourced from the WY 2025 Annual Report

C = Well Perforated in Composite Aquifer

CASGEM = California Statewide Groundwater Elevation Monitoring; SWN = state well number; IM = interim milestones; MO = measurable objectives; MT = minimum threshold; N/A = not applicable; TBD = to be determined; amsl = above mean sea level; ft = feet

Table ES-2. Summary of Land Subsidence SMCs for the TBID RMS Network

GSA	RMS Data Source	RMS ID	Status	Allowable Land Subsidence		Interim Milestone		Measurable Objective (ft)	Minimum Threshold (ft)
				Between 2024 and 2040 (ft)	Average Annual (ft)	2030 (ft)	2035 (ft)		
Terra Bella ID GSA	InSAR	TB0092_InSAR	Active	0.6	0	0.3	0.1	0	1.3

Sources:

Thomas Harder & Co, 2026; Measurable Objective and Minimum Threshold data provided in the Tule Subbasin 2024/2025 Annual Report.

*Thomas Harder & Co, 2025; "Allowable Subsidence Between 2024 and 2040" data provided in the Tule Subbasin 2023/2024 Annual Report, Amended June 2025. "Average Annual Allowable Land Subsidence" and IMs were calculated using these values and the following methods described in **Chapter 4** of this GSP.*

IM = interim milestones; MO = measurable objectives; MT = minimum threshold; ft = feet

ES 3.2.4. Groundwater Quality Monitoring Network

GSAs utilize a unified dataset to streamline monitoring within the Subbasin. By aligning their efforts, they collectively satisfy the requirements of the Irrigated Lands Program, the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) Nitrate Control Program, and SGMA. This coordination ensures a consistent approach to both immediate and long-term groundwater management solutions at the local level.

RMS sites were derived from existing monitoring programs in the Subbasin and based on an analysis of beneficial uses and users. The RMS wells consist of privately owned domestic and agricultural wells within the subbasin. The following criteria were used to select specific wells as RMS:

1. Located near (preferably upgradient of) drinking water wells
2. Located in regions with known historical COC exceedances or contamination plumes
3. Representative of groundwater quality in a single aquifer
4. Can be accessed and are capable of collecting representative samples at semi-annual intervals or better.

Annual water quality monitoring of wells within the Subbasin will include laboratory analyses for nitrate as N only. Measurements of the following parameters will be collected from well discharge prior to sampling: temperature, pH, dissolved oxygen (DO), and electrical conductivity (EC).

Groundwater samples from wells within the Groundwater Quality Monitoring Network will be analyzed for an expanded list of analytes in addition to nitrate as N every five years, rather than on an annual basis. The additional analytes will include total dissolved solids (TDS), as well as major cations and anions. RMS and SMC information for the TBID composite RMS well are presented in **Table ES-3**.

Table ES-3. Groundwater Quality SMCs for TBID RMS Lower Aquifer Wells

GSA	PSAG	Master Well ID	Constituent of Concern	IMs & MO	MT
TBID GSA	SVJ_Tule18	Tule_E0037_RMS	DBCP (µg/L)	0.15	0.2
			Arsenic (µg/L)	7.5	10
			1,2,3 - TCP (µg/L)	0.0038	0.005
			Hexavalent Chromium (µg/L)	7.5	10
			Nitrate as N (mg/L)	7.5	10
			Total Dissolved Solids (mg/L)[3]	562.5	750
			Uranium (pCi/L)	15	20
	SVJ_Tule18	Tule_E0034_RMS[5]	DBCP (µg/L)	0.15	0.2
			Arsenic (µg/L)	7.5	10
			1,2,3 - TCP (µg/L)	0.0038	0.005
			Hexavalent Chromium (µg/L)	7.5	10
			Nitrate as N (mg/L)	7.5	10
			Total Dissolved Solids (mg/L)[3]	562.5	750
			Uranium (pCi/L)	15	20

1 TSMW-4D is listed as TSMW-4L in Attachment 5, Table 10, of the 2024 Coordination Agreement (**Appendix A-5**).

2 Values were found to have inconsistent decimal digits between the 2022 and 2024 Tule Subbasin Coordination Agreement and GSA GSPs. Values have been corrected to appropriate decimal values based on the California State Resources Control Board's MCLs, Detection Limit for Purposes of Reports (DLRs), and Public Health Goals (PHGs) for Regulated Drinking Water Contaminants (SWRCB, 2025b).

3 Total Dissolved Solids MTs, MOs, and IMs were not established for each RMS well (Attachment 5, Tables 9 and 10, of the 2024 Coordination Agreement); Therefore, it is assumed that the MT is based on the Agricultural Water Quality Objective 9WQO) by default, and the MOs/IMs are 75 percent of the MT, as suggested in Section 8 of Attachment 5 from the 2024 Coordination Agreement (**Appendix A-5**).

PSAG = Public Supply Assessment Grid; IM = interim milestones; MO = measurable objectives; MT = minimum threshold; mg/L = miligrams per liter; µg/L = micrograms per liter; pCi/L = picocuries per liter; 1,2,3-TCP = 1,2,3, trichloropropane; DBCP = dibromo-3-chloropropane

ES 4. Monitoring Network

The TBID GSA has adopted the Tule Subbasin Monitoring Plan (TSMP) (**Appendix A-1**) to provide a coordinated and comprehensive framework for monitoring groundwater and related sustainability indicators throughout the Subbasin. The monitoring network is designed to collect reliable data on groundwater levels, groundwater quality, land subsidence, and interconnected surface water systems to evaluate progress toward achieving the sustainability goals established under the Sustainable Groundwater Management Act (SGMA). Monitoring data are used to assess current basin conditions, track progress toward measurable objectives and interim milestones, support annual reporting requirements, and inform future management decisions and potential modifications to Projects and Management Actions.

Within the TBID Plan Area, groundwater level monitoring relies primarily on composite wells because aquifer-specific monitoring wells are currently limited. Groundwater levels are measured semi-annually using standardized field procedures and automated monitoring equipment at representative monitoring sites. Groundwater quality monitoring is coordinated with existing regional programs and includes annual sampling for nitrate and field parameters, with a broader suite of constituents analyzed on a five-year cycle. In addition, the monitoring program incorporates land subsidence measurements through benchmark surveys, satellite-based InSAR analyses, and regional extensometer data, while interconnected surface water conditions are monitored through stream gages, shallow groundwater wells, and groundwater-surface water modeling.

Several data gaps have been identified that will be addressed during GSP implementation. The most significant need within the TBID Plan Area is the development of aquifer-specific monitoring wells for the Upper and Lower Aquifers to improve spatial coverage and understanding of groundwater conditions. Additional needs include improved groundwater quality monitoring locations, expanded aquifer testing to refine hydrogeologic parameters, enhanced monitoring of land subsidence in areas lacking extensometer coverage, and additional monitoring wells near interconnected surface water features. As new data become available, the monitoring network will continue to be refined and expanded to improve the evaluation of groundwater sustainability and support adaptive management across the Tule Subbasin.

ES 5. Overview of Projects and Management Actions

To achieve the Subbasin sustainability goal by 2040 and avoid undesirable results through 2070 as required by SGMA, projects and management actions (PMAs) are being or will be developed and implemented by the TBID GSA. Projects generally refer to structural programs, whereas management actions are typically nonstructural programs or policies that are intended to incentivize reductions in groundwater pumping. The projects and management actions developed for the GSP are aimed at preventing and managing chronic lowering of groundwater levels, and significant and unreasonable reduction of groundwater storage, land subsidence, and degradation of groundwater quality. The GSP's objective is to reduce potential socioeconomic impacts while improving groundwater conditions and avoiding undesirable results typically associated with the lack of sustainable management and groundwater overdraft. A summary of the individual PMAs is provided below.

ES 5.1. PMA No. 1 – FKC Land Subsidence Monitoring Plan

The FKC Land Subsidence Monitoring Plan is a coordinated, subbasin-wide monitoring program implemented by participating GSAs to track land subsidence conditions, particularly in areas affecting the FKC. The program uses a standardized monitoring approach and an enhanced network, including GPS, extensometers, InSAR, and groundwater level monitoring, to evaluate subsidence and aquifer conditions.

ES 5.2. PMA No. 2 – FKC Land Subsidence Management Plan

The FKC Land Subsidence Management Plan is a coordinated, subbasin-wide management framework implemented by participating GSAs to address pumping-induced land subsidence, particularly along the Friant-Kern Canal. The plan establishes a tiered management approach within defined management zones, using measured subsidence conditions to guide implementation of actions and mitigation strategies, including supply development, recharge, and land management programs.

ES 5.3. PMA No. 3 – Southern Land Subsidence Study

The Southern Land Subsidence Study evaluates the spatial correlation between groundwater pumping and land subsidence along a 12-mile-wide corridor of critical pipeline infrastructure. The findings will quantify cross-boundary impacts from various GSAs to inform potential pumping restrictions and the refinement of sustainable management criteria.

ES 5.4. PMA No. 4 – FKC Land Subsidence Mitigation Plan

The FKC Land Subsidence Mitigation Plan PMA consists of a coordinated effort by participating GSAs to address subsidence impacts to the Friant-Kern Canal through the creation of a mitigation plan. This PMA will likely include financial contributions toward canal restoration and capacity recovery projects led by the Friant Water Authority to mitigate subsidence-related damages.

ES 5.5. PMA No. 5 – Tule Subbasin Drinking Water Well Mitigation Plan

The Tule Subbasin Drinking Water Well Mitigation Plan is a coordinated, subbasin-wide framework implemented by participating GSAs to identify and mitigate impacts to beneficial uses and users of groundwater resulting from groundwater management activities. The plan establishes a formal, data-driven claims process and funding mechanism to evaluate impacts to wells and water systems, supported by technical evaluation and coordinated implementation among GSAs, and to implement appropriate mitigation measures during the transition to sustainable groundwater conditions.

ES 5.6. PMA No. 6 – Monitoring Network Data Gap Filling

The TBID GSA is proposing to construct a single multi-completion monitoring well to fill water level, groundwater quality, and interconnected surface water monitoring data gaps for the TBID Plan Area and the Subbasin. The additional monitoring data will be used to refine the Subbasin GSAs’ understanding of critical head and groundwater management actions that contribute to subsidence, as well as improve the hydrogeologic conceptual model.

ES 5.7. PMA No. 7 – Groundwater Accounting and Allocation

The Groundwater Accounting and Allocation PMA is a framework implemented to track and manage groundwater use and establish allowable extraction limits based on the Tule Subbasin Sustainable Yield. The program utilizes an online accounting system (BasinSafe) to maintain parcel-level accounts, track water use, and support compliance with allocations through integration with metering, reporting, and financial mechanisms.

ES 5.8. PMA No. 8 – Well Registration

The Well Registration PMA is a program implemented to identify and maintain a comprehensive inventory of groundwater wells within the GSA's jurisdiction. The program requires registration of wells and submittal of ownership, location, operational, and well construction information, including updates for new wells and changes in ownership or operation, to support accurate groundwater use and management records.

ES 5.9. PMA No. 9 – Well Metering Policy

The Well Metering Policy PMA establishes requirements for measuring and reporting groundwater extraction from wells within the GSA's jurisdiction. The program requires the installation of flow meters meeting specified accuracy and installation standards, and monthly reporting of groundwater use to support accurate tracking of pumping. This PMA provides the primary data source for quantifying groundwater use and supports implementation of groundwater accounting, allocation, and management programs.

ES 5.10. PMA No. 10 – Well Permit Application Review

The Well Permit Application Review PMA establishes a process for the TBID GSA to review proposed new wells in coordination with Tulare County to assess potential impacts to groundwater conditions and nearby beneficial uses and users. Through this process, the TBID GSA provides technical input on well siting, construction, and operation to support groundwater sustainability. While the TBID GSA does not approve or deny permits, this PMA supports the development of wells in a manner consistent with sustainability objectives and helps reduce the risk of undesirable results.

ES 5.11. PMA No. 11 – Fees and Incentives

The Fees and Incentives PMA utilizes financial mechanisms, assessments, and enforcement tools to promote efficient water use and ensure compliance with groundwater management requirements and allocation limits. By combining penalties for overdraft with incentive-based credits for conservation and recharge activities, this framework functions as a demand management tool that supports the sustainable yield objectives of the TBID GSP.

ES 5.12. PMA No. 12 – Managed Aquifer Recharge

The Managed Aquifer Recharge PMA consists of recharge activities implemented by the TBID using Deer Creek surface water to increase groundwater storage and improve groundwater conditions within the TBID Plan Area. Recharge is conducted in the western-most non-contiguous portion of the TBID Plan Area and is tracked through the TBID GSA’s accounting system to support monitoring and sustainable groundwater management objectives.

ES 5.13. PMA No. 13 – Class 1/Class 2 Surface Water Exchange

The Class 1/Class 2 Surface Water Exchange is a drought-resiliency measure that allows TBID and LTRID to exchange Central Valley Project (CVP) water under specified allocation conditions. When Class 1 allocations fall below the 60 percent threshold identified in the exchange arrangement, TBID may receive supplemental surface water supplies that help offset groundwater pumping demand within the TBID Plan Area.

ES 5.14. PMA No. 14 – Sustainability Forecast Analysis

The TBID GSA will conduct an annual Sustainability Forecast Analysis to identify RMS at risk of future MT exceedances, estimate the groundwater benefit needed to avoid undesirable results, and evaluate whether modifications to existing PMAs or implementation of additional PMAs should be considered.

ES 6. Plan Implementation

GSP implementation includes both Subbasin-wide components and TBID GSA-specific responsibilities. Under the 2024 Coordination Agreement, the Tule Subbasin TAC facilitates coordination of shared Subbasin-wide efforts, including development, implementation, and maintenance of common components by the participating GSAs. These coordinated components include, but are not limited to, sustainable management criteria (SMCs) and the Subbasin Monitoring Plan. TBID GSA remains responsible for developing, implementing, and administering the components of this GSP that apply specifically within its jurisdiction.

Following GSP adoption, the GSA must prepare and submit an Annual Report to DWR each year in accordance with GSP Regulations § 356.2. Annual Reports summarize groundwater conditions and management activities from the prior water year, including groundwater elevations, groundwater extraction, surface water supplies, changes in groundwater storage, and water use.

The GSA will also prepare periodic evaluations every five years to assess progress toward GSP implementation and achievement of SMCs. These evaluations will be submitted to DWR for review and made publicly available through the SGMA website. Periodic evaluations will include updated groundwater conditions, PMA implementation status, basin evaluation findings, monitoring network updates, and any proposed plan amendments.

Annual GSP implementation costs are expected to vary over time based on the timing and scope of PMA implementation, evolving data needs, and updates to data management and groundwater modeling systems. Costs may also be affected by changing management priorities, increased reporting needs during five-year milestone evaluations, professional services, and unforeseen equipment repair or replacement. Current cost estimates for GSP implementation and PMAs are included in **Tables ES-4** and **ES-5**, but cost estimates will be reviewed and updated, as appropriate, during each milestone review period.

Implementation of this GSP and ongoing SGMA compliance require the TBID GSA to secure sufficient funding for groundwater management activities. Funding is expected to come from locally imposed fees and, where available, state or federal grants. SGMA authorizes GSAs to impose fees to recover the reasonable costs of groundwater management and GSP implementation, including administrative, monitoring, reporting, and project-related expenses (Water Code §§ 10730, 10730.2(a)). SGMA also authorizes civil penalties for unauthorized groundwater extraction and violations of adopted rules and regulations, and revenues from such penalties may be used to support SGMA compliance and GSP implementation (Water Code § 10732).

ES 7. Overview of Governance

In adopting SGMA, the Legislature made clear that nothing in SGMA "determines or alters surface water rights or groundwater rights under common law or any provision of law that determines or grants surface water rights" (Water Code § 10720.5(a)). In other words, the Legislature intended that actions undertaken in accordance with SGMA respect common law water rights. This GSP establishes the objective of maximizing the beneficial use of water within the Tule Subbasin, without causing undesirable results. The powers of the GSA are set forth in SGMA. This GSP meets the requirements of SGMA and vests the management authority in the GSA. Authorities include Powers of the Board, Rules and Regulations, Committees, Specific Powers, Variances, and Appeals.

Table ES-4. Estimated GSP Costs

Element	Description	Responsible Party	Estimated Cost
Annual Administration	Plan manager/point-of-contact coordination and facilitation of the Tule Subbasin TAC meeting. TBID GSP Administration.	Tule Subbasin TAC and TBID GSA	Subbasin: $340,000
			TBID GSA: $10,200
GSP Development	Actual cost for developing this GSP.	TBID GSA	$300,000
Model Updates and Extensions	Used to estimate the groundwater storage change and subsurface inflow/outflow values for water budgets in the Tule Subbasin.	Tule Subbasin TAC	Subbasin: $81,000
			TBID GSA: $2,430
Data Management System	Developed to collect SGMA-related data and improve the efficiency and accuracy of reporting requirements.	Tule Subbasin TAC	Subbasin: $58,000
			TBID GSA: $1,740
Monitoring	Coordinated land surface, water quality, and water level data collection.	Tule Subbasin TAC and TBID GSA	Subbasin: $577,000
			TBID GSA: $17,310

Element	Description	Responsible Party	Estimated Cost
Drinking Water Well Mitigation Program	Partnership with Self-Help Enterprises for groundwater level-impacted drinking water wells and Tule Basin Water Foundation for groundwater quality-impacted drinking water wells.	Tule Subbasin TAC (Mitigation Plan coordination) and TBID GSA (mitigation funding)	Subbasin: $2,500,000
			TBID GSA: $10,000
Friant-Kern Canal Mitigation Program	Coordinated effort with Friant Water Authority to define and mitigate impacts to the Friant-Kern Canal.	Tule Subbasin TAC (Mitigation Plan coordination) and TBID GSA (mitigation funding)	Plan Development - Subbasin: $200,000
			Plan Development – TBID GSA: $5,000
			Plan Implementation: TBD
Annual Report	Ongoing costs to conduct Annual Reporting.	Tule Subbasin TAC and TBID GSA	Subbasin: $100,000
			TBID GSA: $3,000
Periodic Evaluation and 5-year GSP Update	Review Annual Report data and current groundwater conditions, evaluate the GSP, and adjust as needed to ensure interim milestones continue to be met.	Tule Subbasin TAC and TBID GSA	Subbasin: $745,000
			TBID GSA: $22,350
Implementation of all planned Projects and Management Actions	Implementing demand reduction and supply.	TBID GSA	Variable ongoing and one-time costs (See **Table ES-5**)

TAC = Technical Advisory Committee; SGMA = Sustainable Groundwater Management Act; TBID = Terra Bella Irrigation District; GSA = Groundwater Sustainability Agency; NA = not available; TBD = to be determined

Table ES-5. Estimated PMA Costs

PMA Name	One-Time Cost (TBID GSA)	Ongoing Cost (Per Year)
FKC Land Subsidence Monitoring Plan	NA	Benchmark Survey Subbasin: $87,750; TBID GSA: $2,500
FKC Land Subsidence Management Plan	Plan Development: $5,000	Variable
Southern Land Subsidence Study	$8,400	NA
FKC Land Subsidence Mitigation Plan	Plan Development: $5,000	TBD
Tule Subbasin Drinking Water Well Mitigation Plan	NA	Subbasin: $2.5M TBID GSA: $10,000
Monitoring Network Data Gap Filling	$422,000	Monitoring Costs: $5,000
Groundwater Accounting and Allocation	NA	$10,000
Well Registration	$35,000	$2,500
Well Metering Policy	$82,500	$10,000
Well Permit Application Review	NA	$2,500
Fees and Incentives	NA	$7,500
Managed Aquifer Recharge	NA	Variable (Cost of Surface Water)
Class 1/Class 2 Surface Water Exchange	NA	Variable (Cost of Surface Water)
Sustainability Forecast Analysis	$20,000	$0-15,000

FKC = Friant-Kern Canal; TBID = Terra Bella Irrigation District; GSA = Groundwater Sustainability Agency; NA = not available; M=million; TBD = to be determined

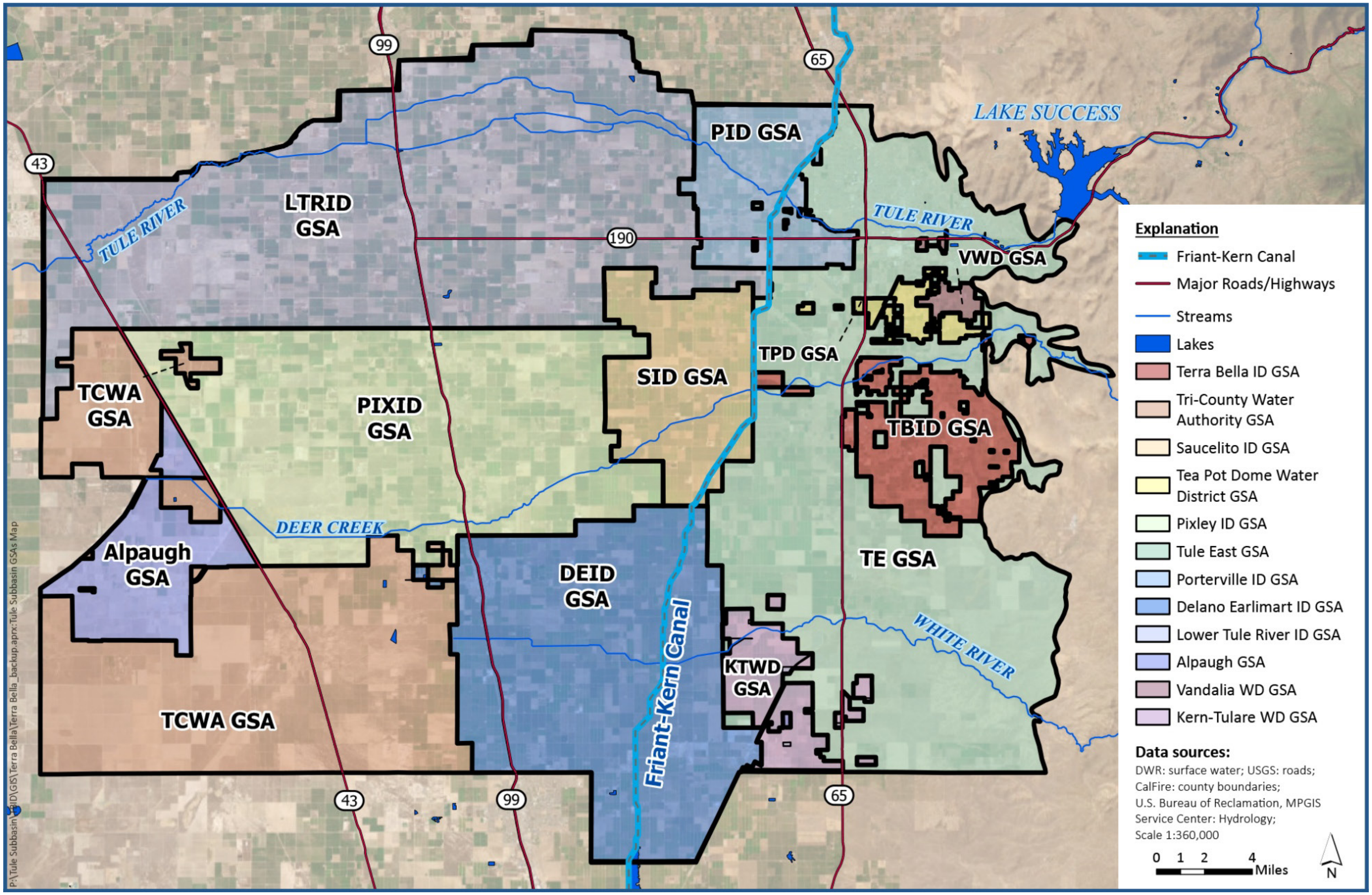

Figure ES-1. Tule Subbasin GSAs Location Map

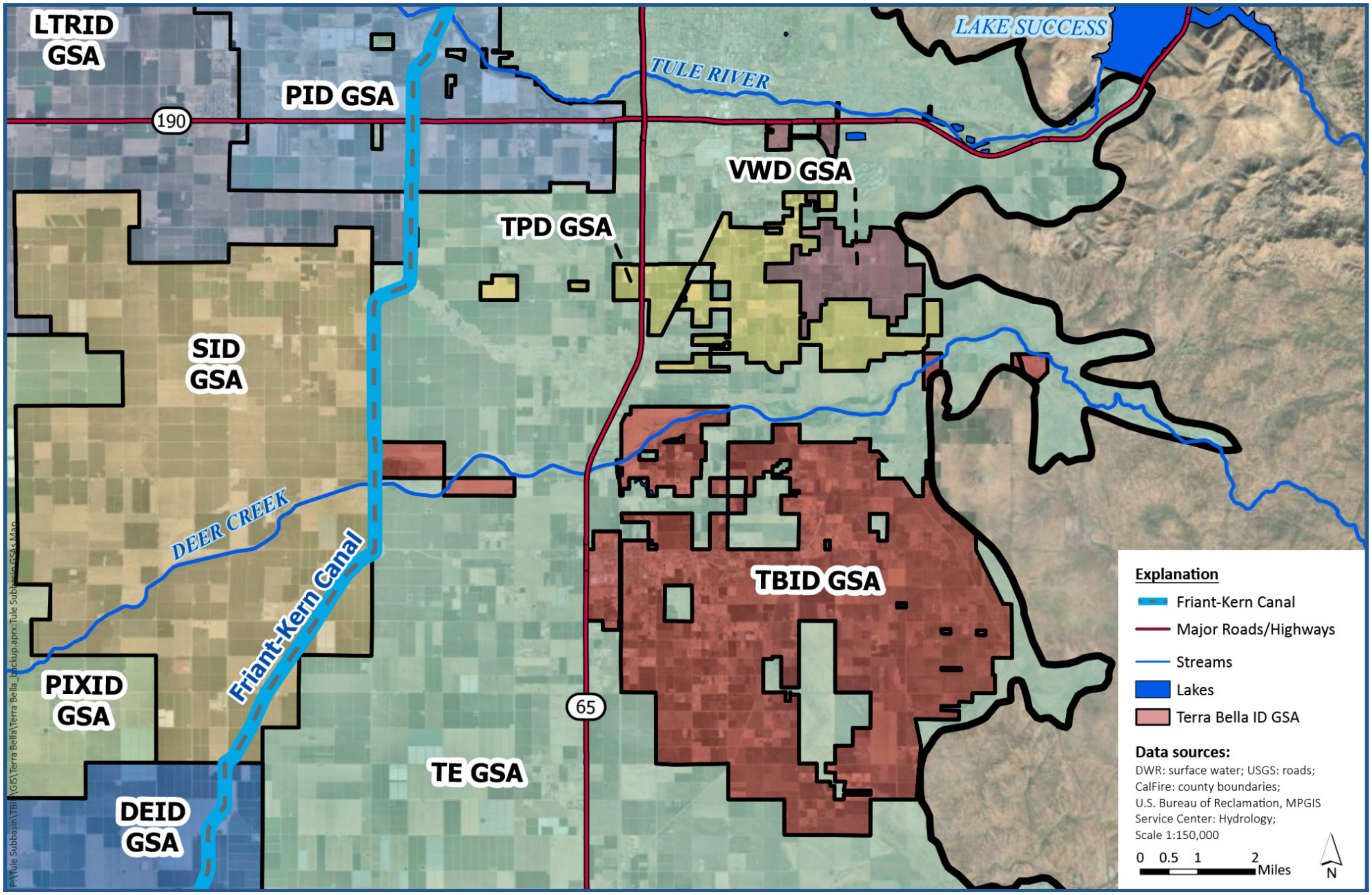

Figure ES-2. TBID GSA Location Map

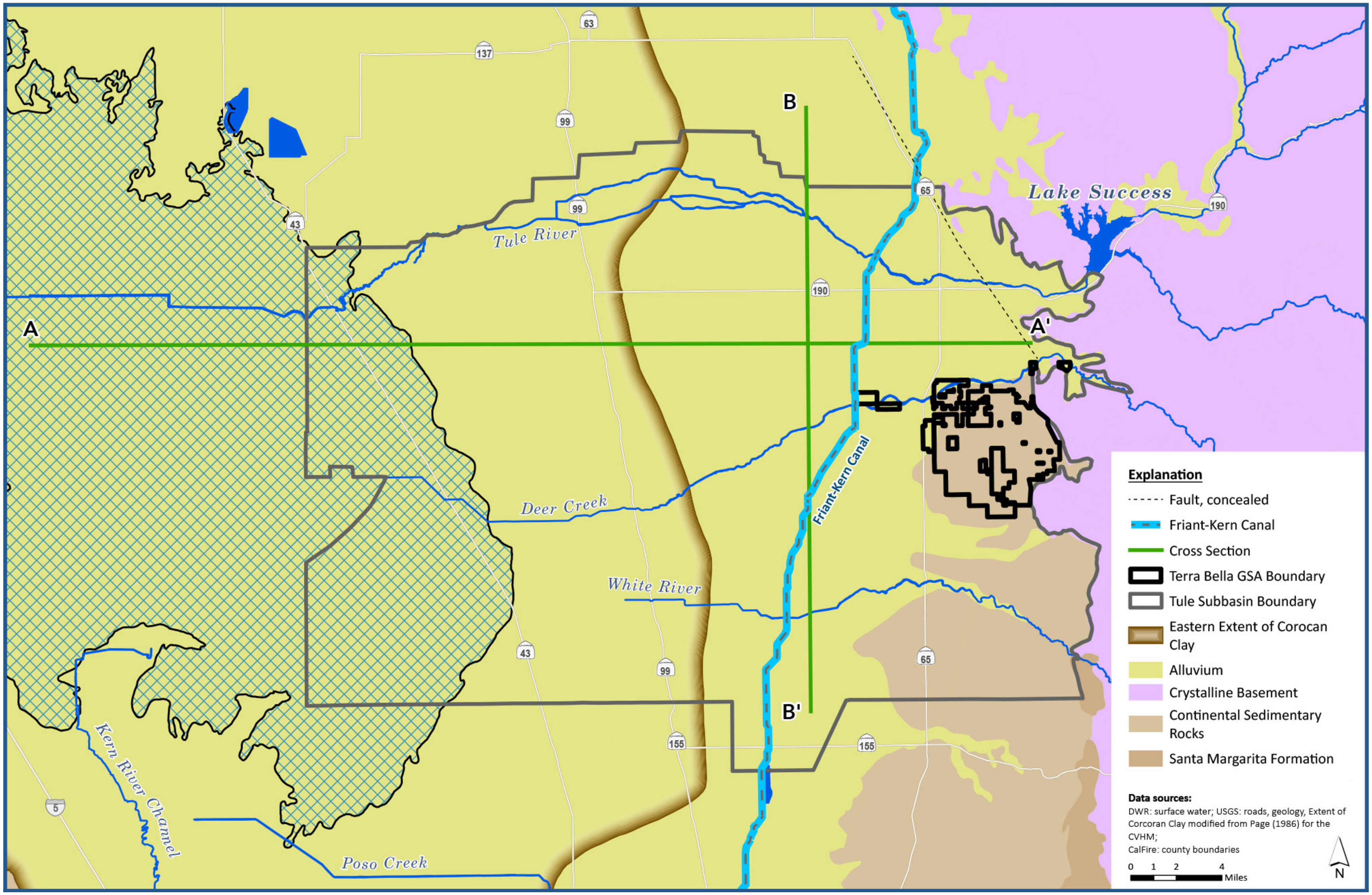

Figure ES-3 Surficial Geology and Cross-section Locations

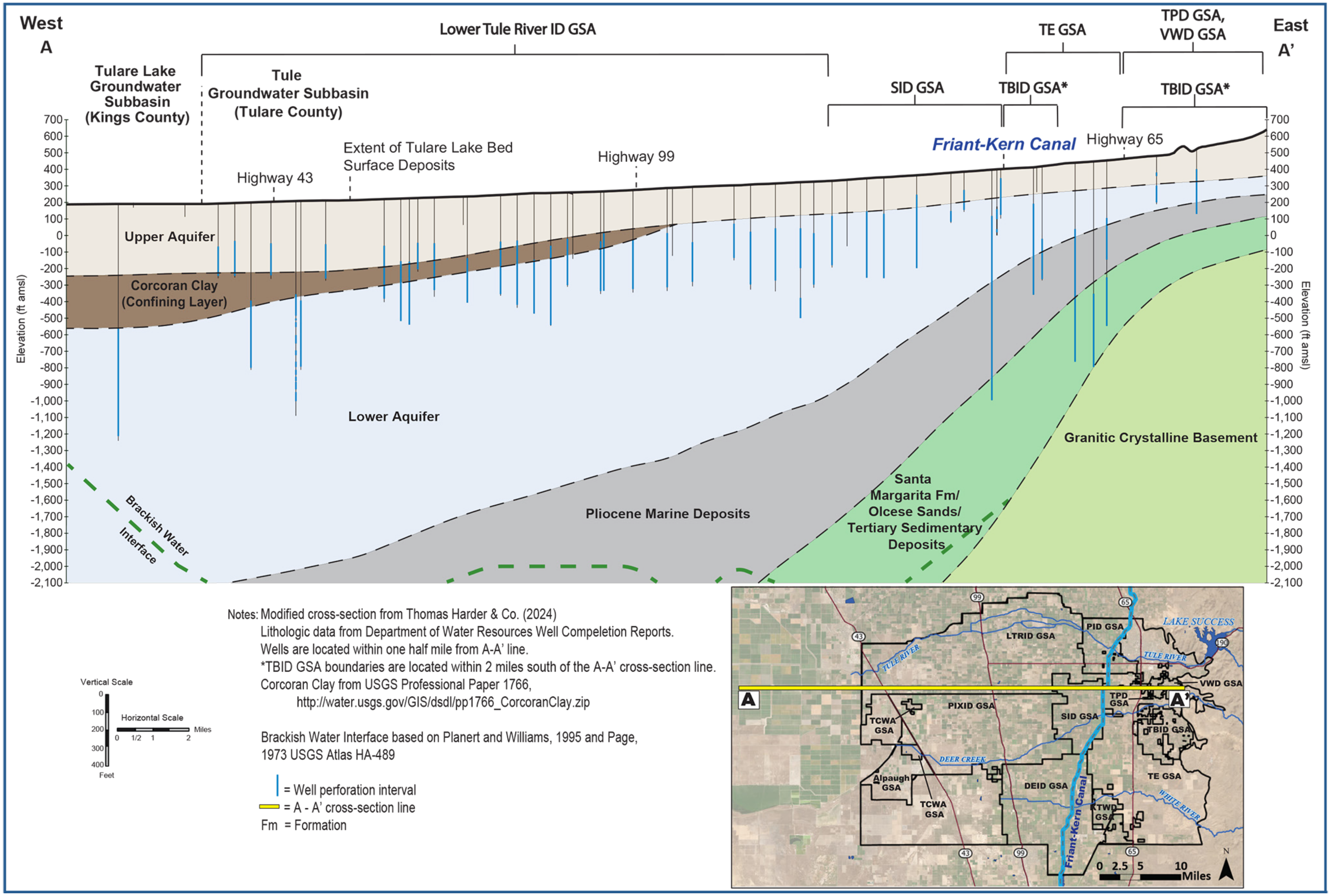

Figure ES-4. Geologic Cross-section: A-A'

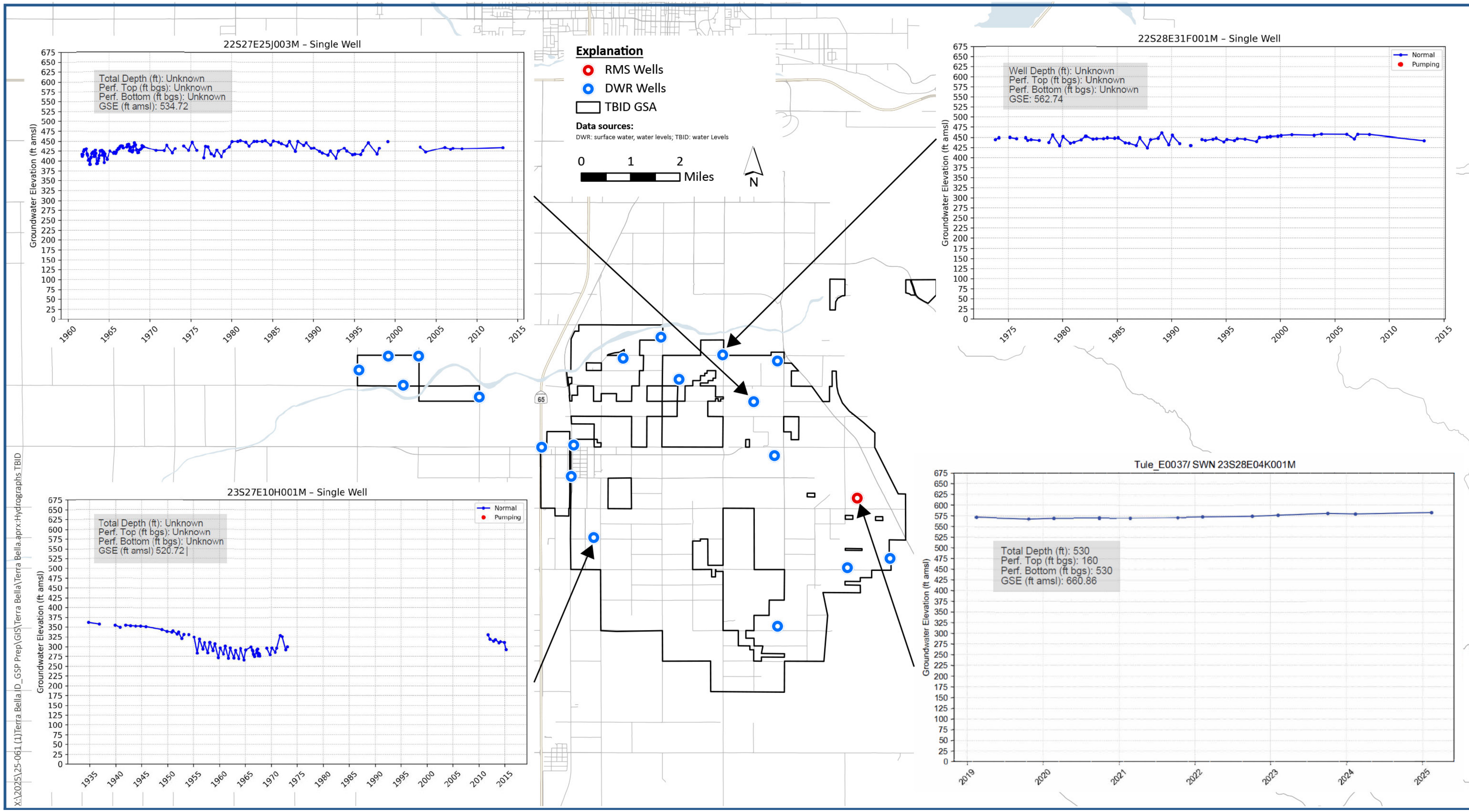

Figure ES-5. TBID Hydrographs (RMS Wells)

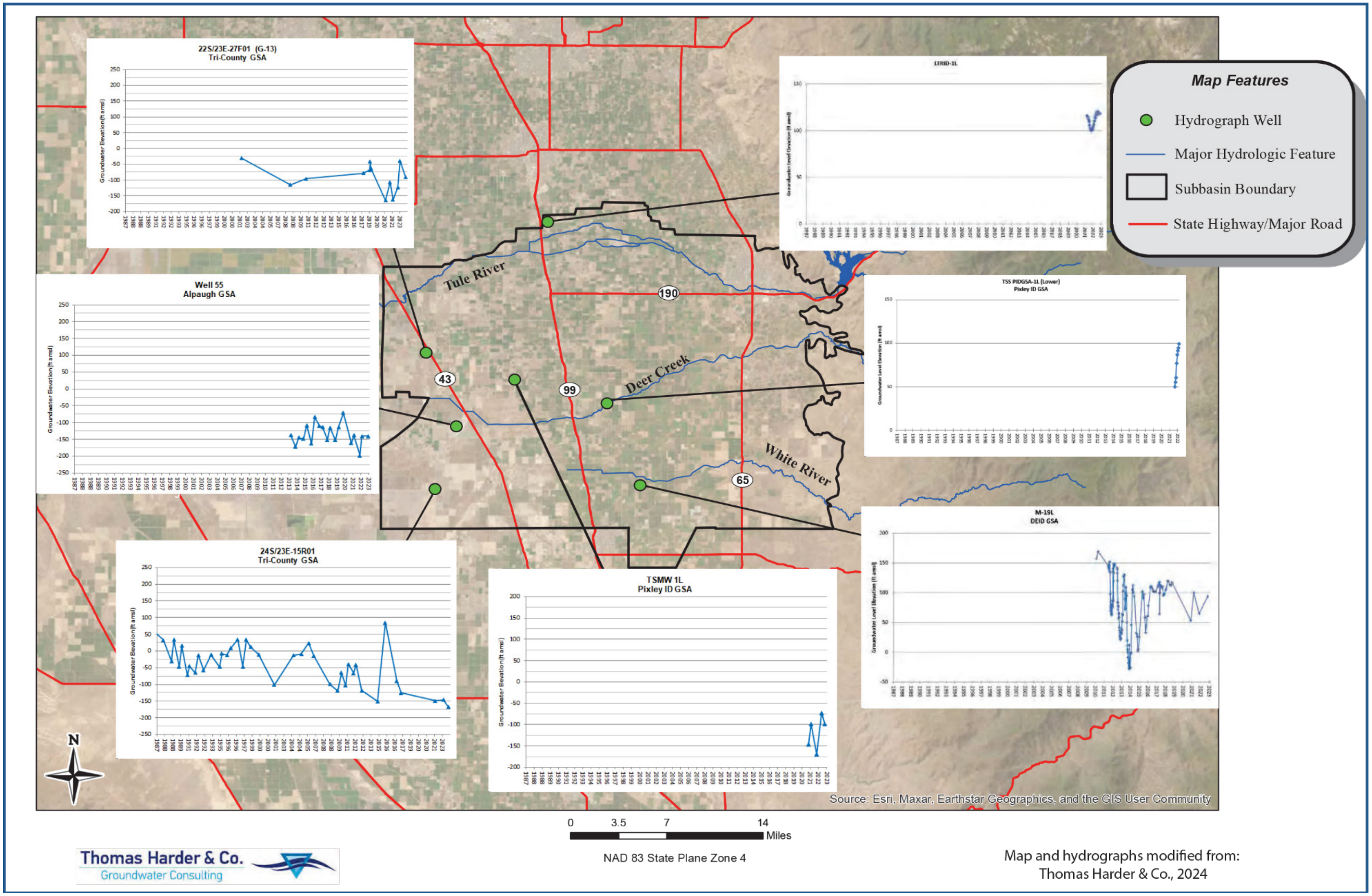

Figure ES-6. Tule Subbasin Lower Aquifer Hydrographs

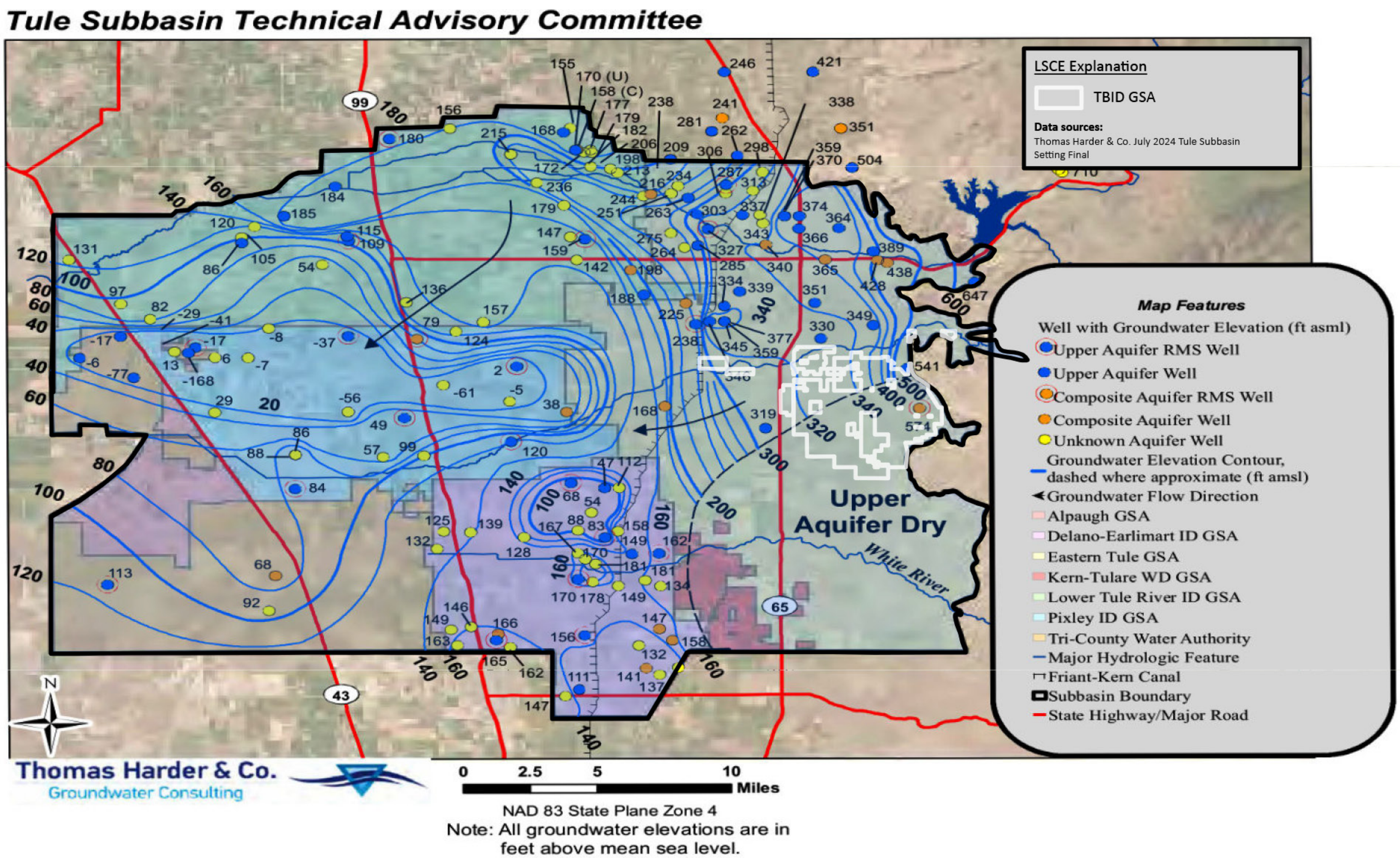

Figure ES-7. Fall 2022 Upper Aquifer Groundwater Elevation Contours

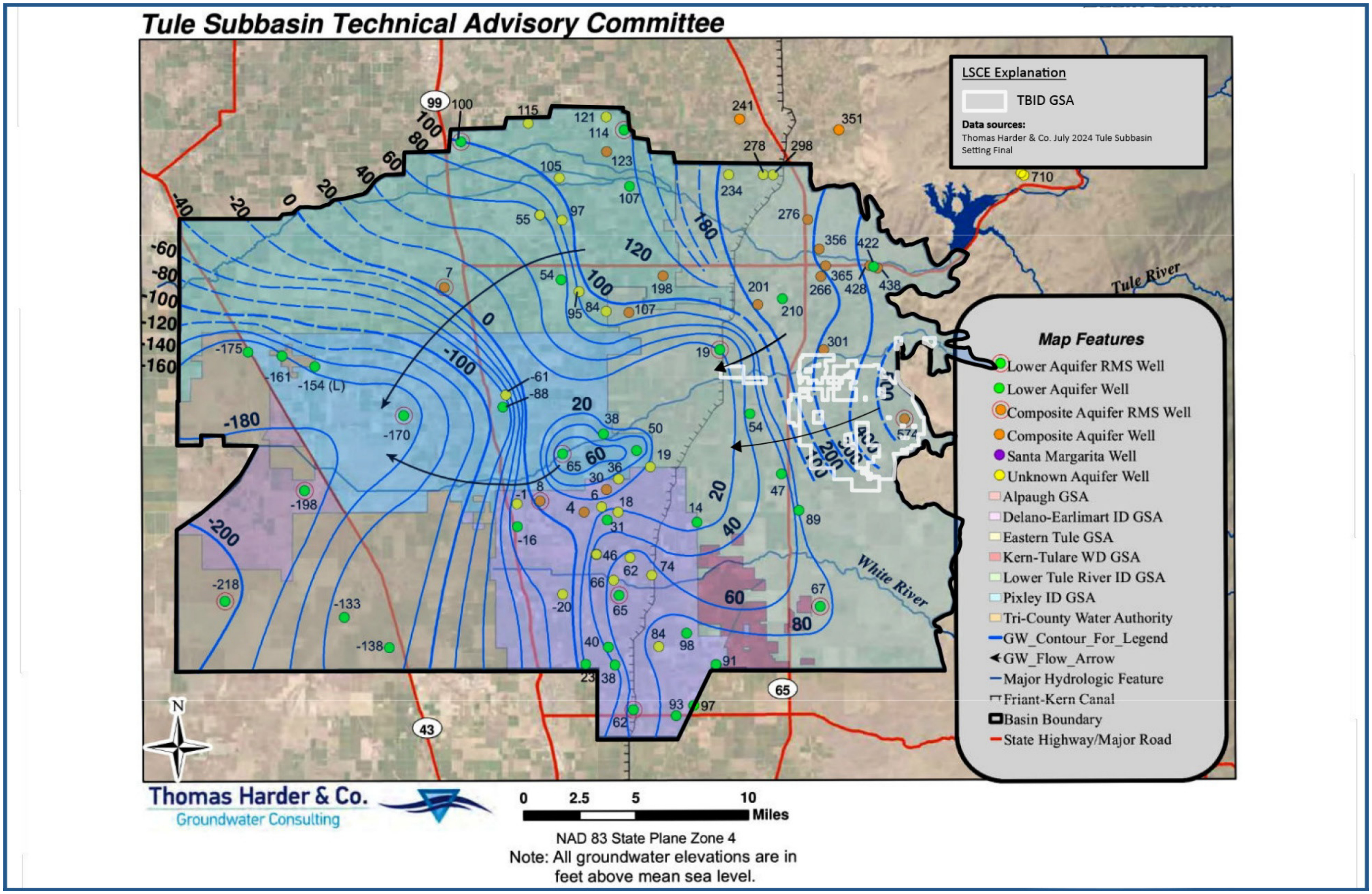

Figure ES-8. Fall 2022 Lower Aquifer Groundwater Elevation Contours

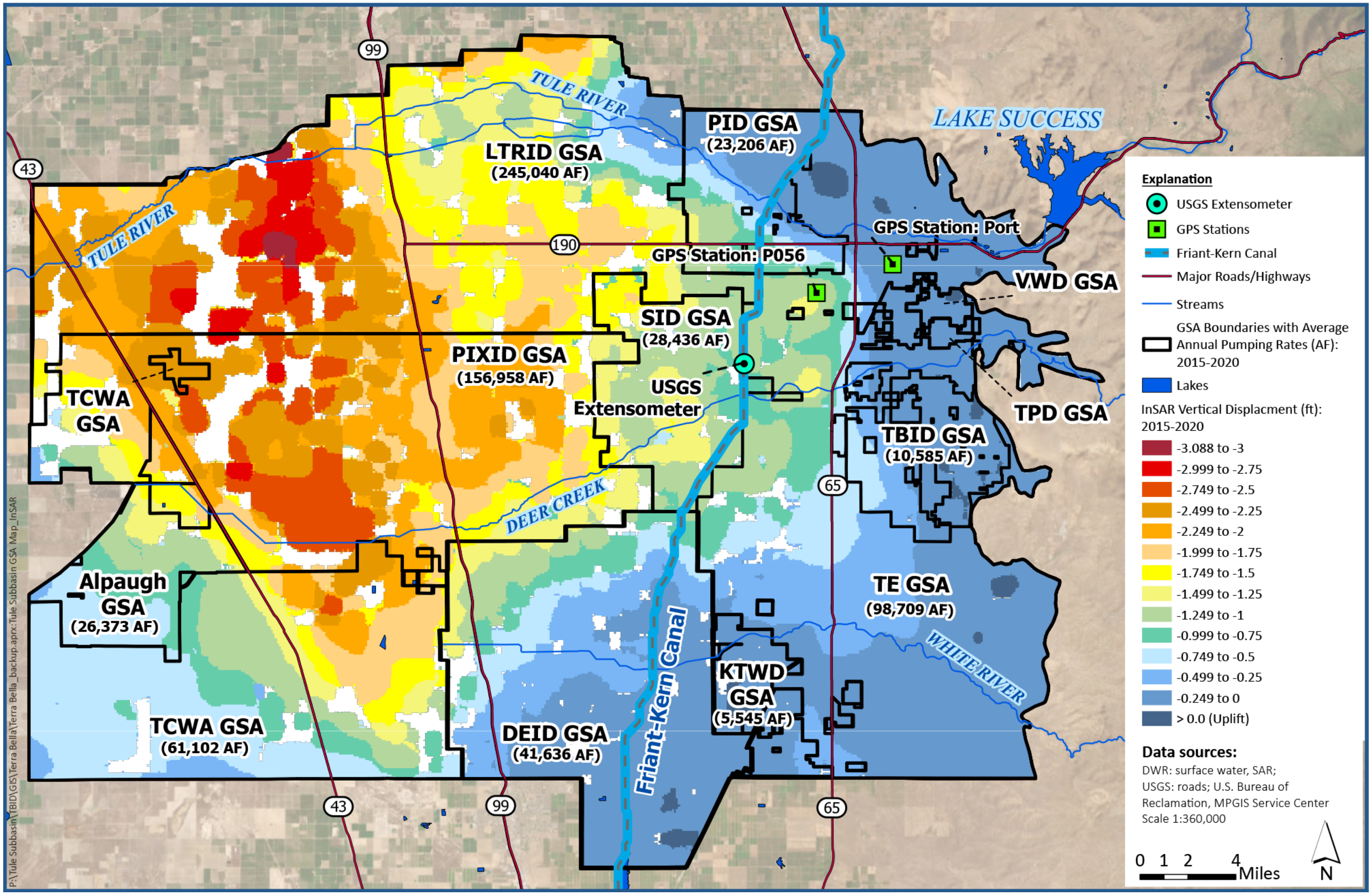

Figure ES-9. Cumulative Land Subsidence from January 2015 to January 2020

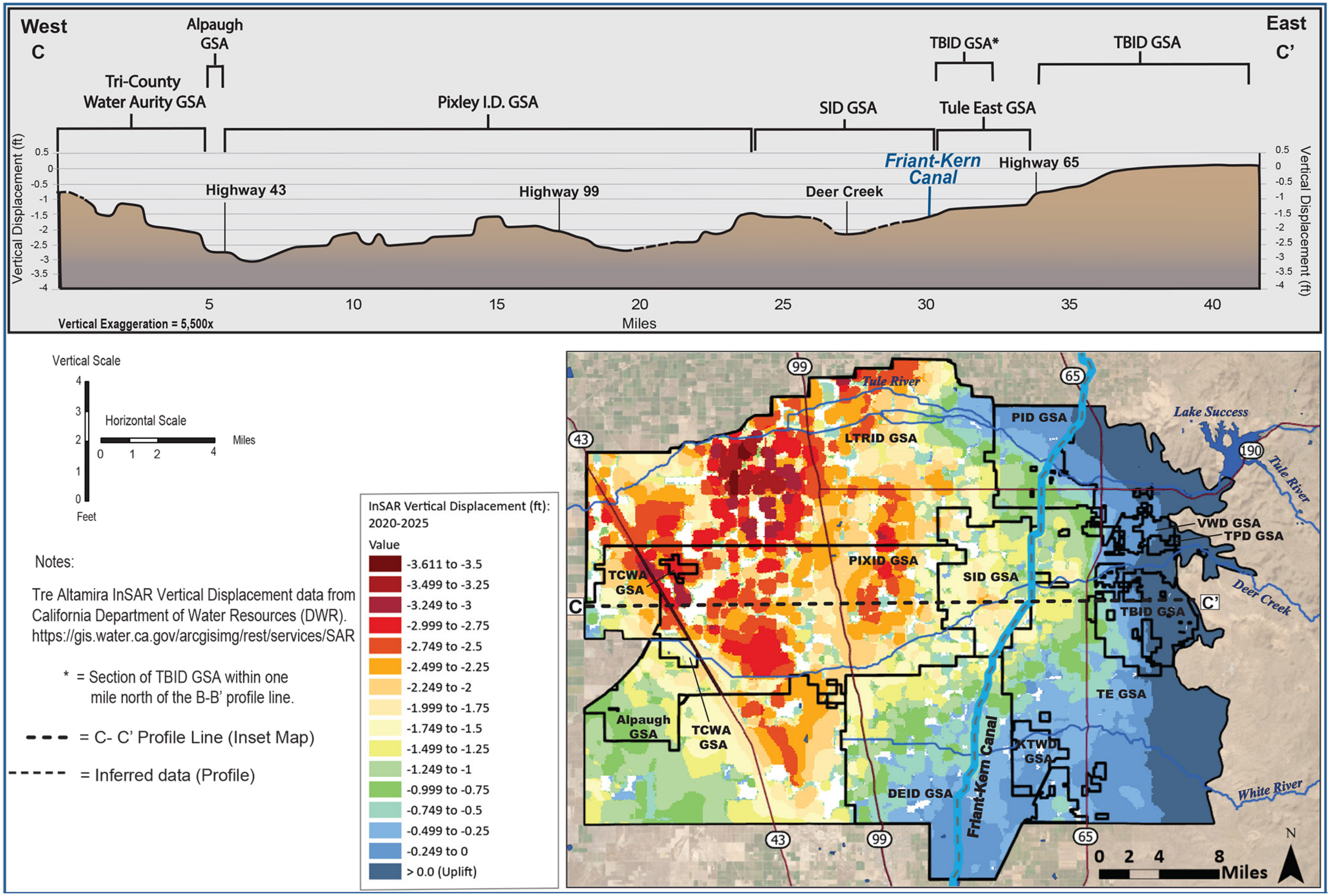

Figure ES-10. Land Subsidence Profile (January 2020 - January 2025)

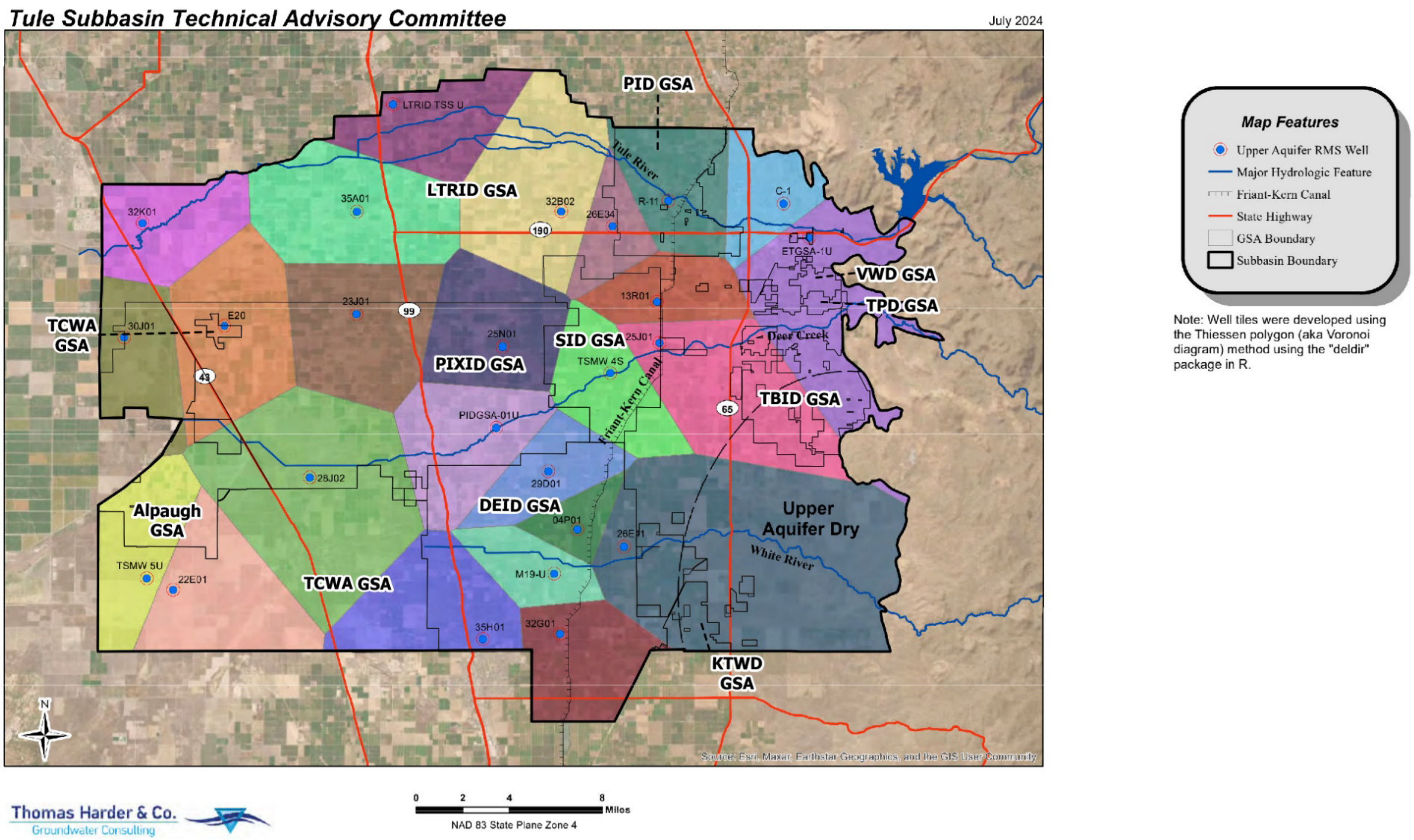

Figure ES-11. Upper Aquifer Groundwater Level RMS Well Tiles

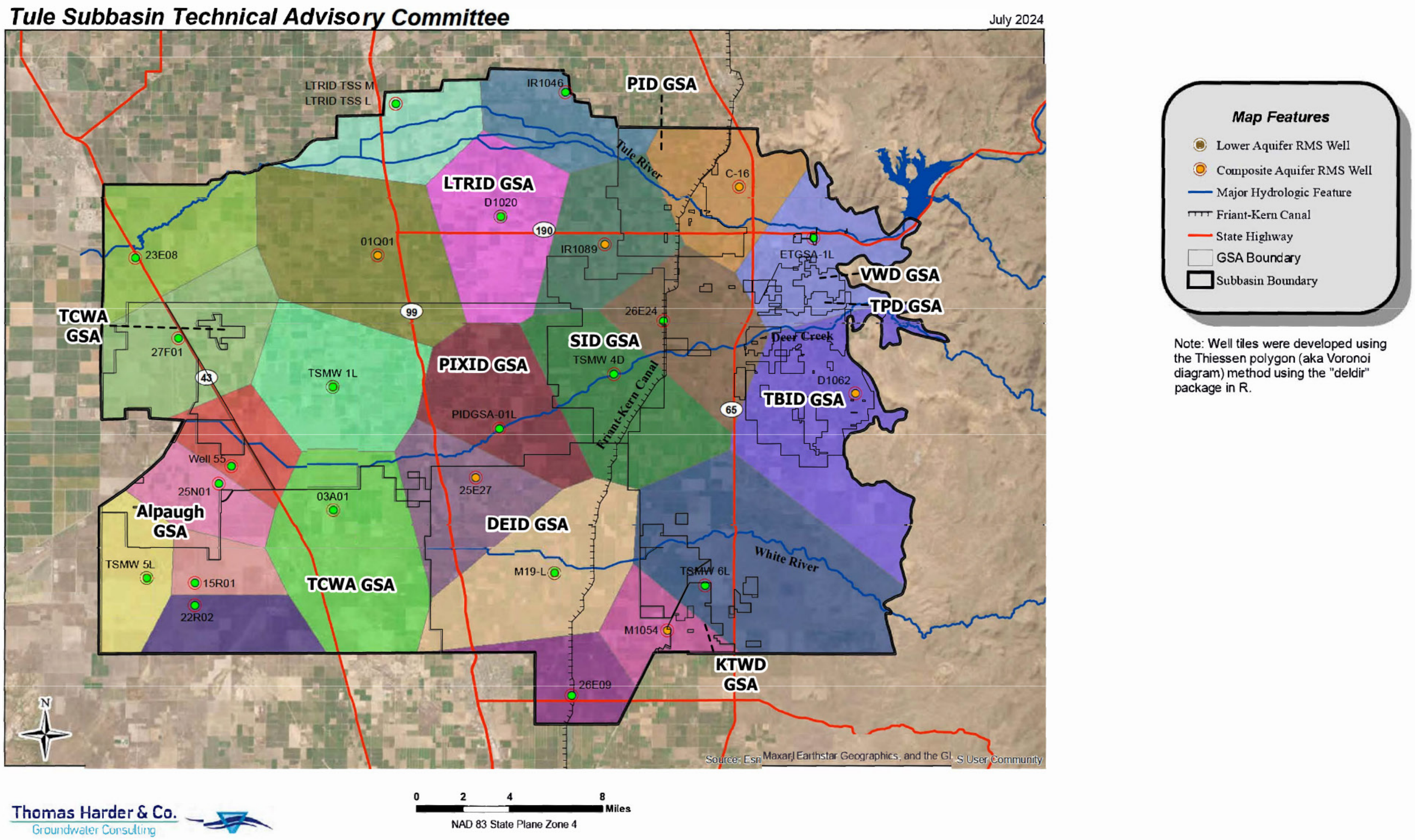

Figure ES-12. Lower Aquifer Groundwater Level RMS Well Tiles

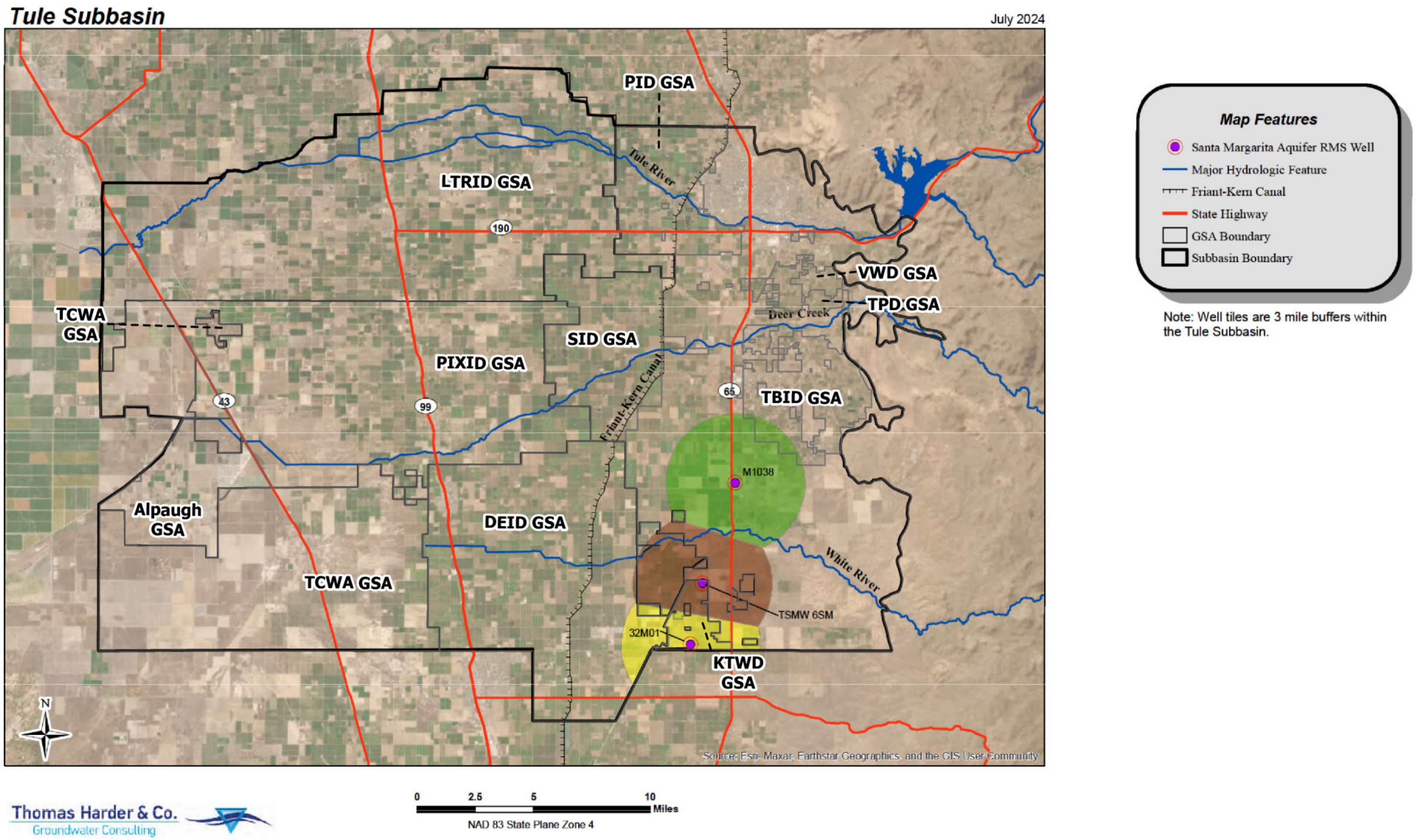

Figure ES-13. Santa Margarita Aquifer Groundwater Level RMS Well Tiles