DOCKETED	
Docket Number:	23-OPT-02
Project Title:	Darden Clean Energy Project
TN #:	260660
Document Title:	Supplemental Data Response Set 1 - Appendix L SUP DR WATER-1 Updated Section 513 Part 1
Description:	Includes a redline and clean version of updated Section 5.13 Water Resources, provided in response to SUP DR WATER-1 as Appendix L of Supplemental Response Set 1. (Part 1/2)
Filer:	Megan Knight
Organization:	Rincon Consultants, Inc.
Submitter Role:	Applicant Consultant
Submission Date:	12/13/2024 4:42:12 PM
Docketed Date:	12/13/2024

Appendix L - Redline and Clean - Part 1

SUP DR WATER-1 Updated Section 5.13

Appendix L - Redline

SUP DR WATER-1 Updated Section 5.13

Table of Contents

Tables

Figures

5.13 Water Resources

This section discusses the existing water resources near the Darden Clean Energy Project (Project). Section 5.13.1 describes the existing environmental conditions for water resources and~~.~~ Section 5.13.2 discusses the regulatory setting. Section 5.13.3 ~~discusses~~ characterizes potential environmental effects of project construction and operation on water resources. Section 5.13.4~~3~~ presents analysis of cumulative project effects. ~~Section 5.13.4 discusses proposed mitigation measures designed to minimize or avoid potentially significant impacts.~~ Section 5.13.5 presents applicable laws, ordinances, regulations, and standards (LORS) related to water resources. Section 5.13.6 describes permits that relate to water resources, lists contacts with relevant regulatory agencies, and presents a schedule for obtaining permits. Section 5.13.7 presents ~~R~~references used to inform this analysis ~~are presented in Section 5.13.7~~. This section was informed in part by the water supply study prepared by Rincon Consultants, Inc. for the Project (Appendix S).

5.13.1 Environmental Setting

This section characterizes the environmental setting for water resources, including the following topics required in California Energy Commission (CEC) Appendix B:

- Groundwater resources and geologic structures (Appendix B Requirement (B)(i)) – see Section 5.13.1.1, *Groundwater*, including identification of groundwater wells within 0.5 mile of the Project site under "Nearby Wells" (Appendix B Requirement (B)(v));
- Surface water bodies (Appendix B Requirement (B)(ii)) – see Section 5.13.1.2, *Surface Water*;
- Flood control facilities, existing and proposed (Appendix B Requirement (B)(iii)) – see Section 5.13.1.3, *Stormwater*;
- Water inundation zones, such as the 100-year flood plain and tsunami run-up zones (Appendix B Requirement (B)(iv)) – see Section 5.13.1.4, *Flooding and Inundation*;
- Wastewater – see Section 5.13.1.5, *Wastewater*; and
- Water Supply – see Section 5.13.1.6, *Water Supply*.

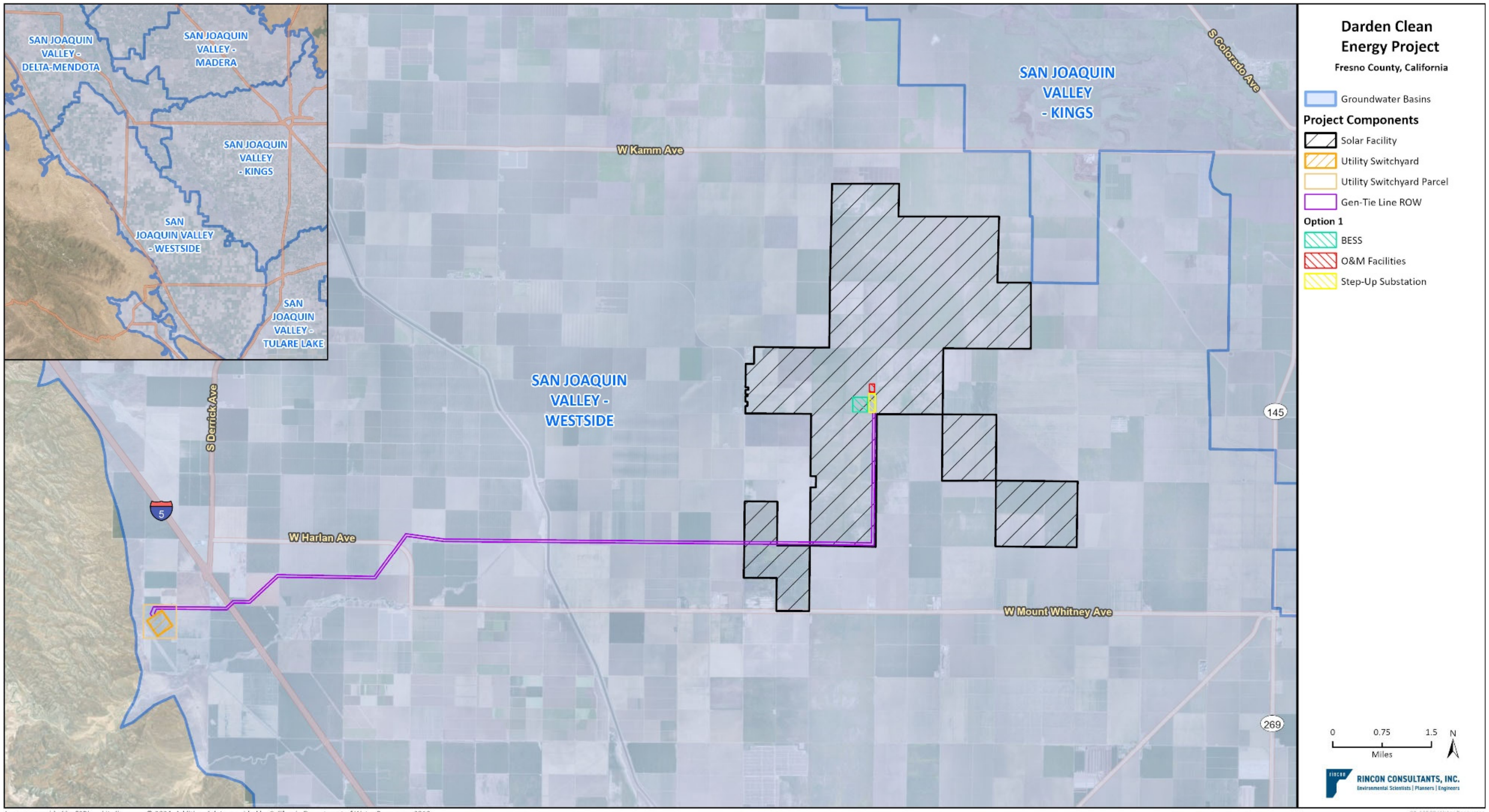
5.13.1.1 Groundwater

The Project site overlies the Westside Subbasin of the San Joaquin Valley Groundwater Basin (SJVGB). Figure 5.13-1, below, provides an overview of the Project site within the Westside Subbasin. No defined groundwater basins are west of the Westside Subbasin, which is bounded on the north, east, and south by other subbasins of the SJVGB.

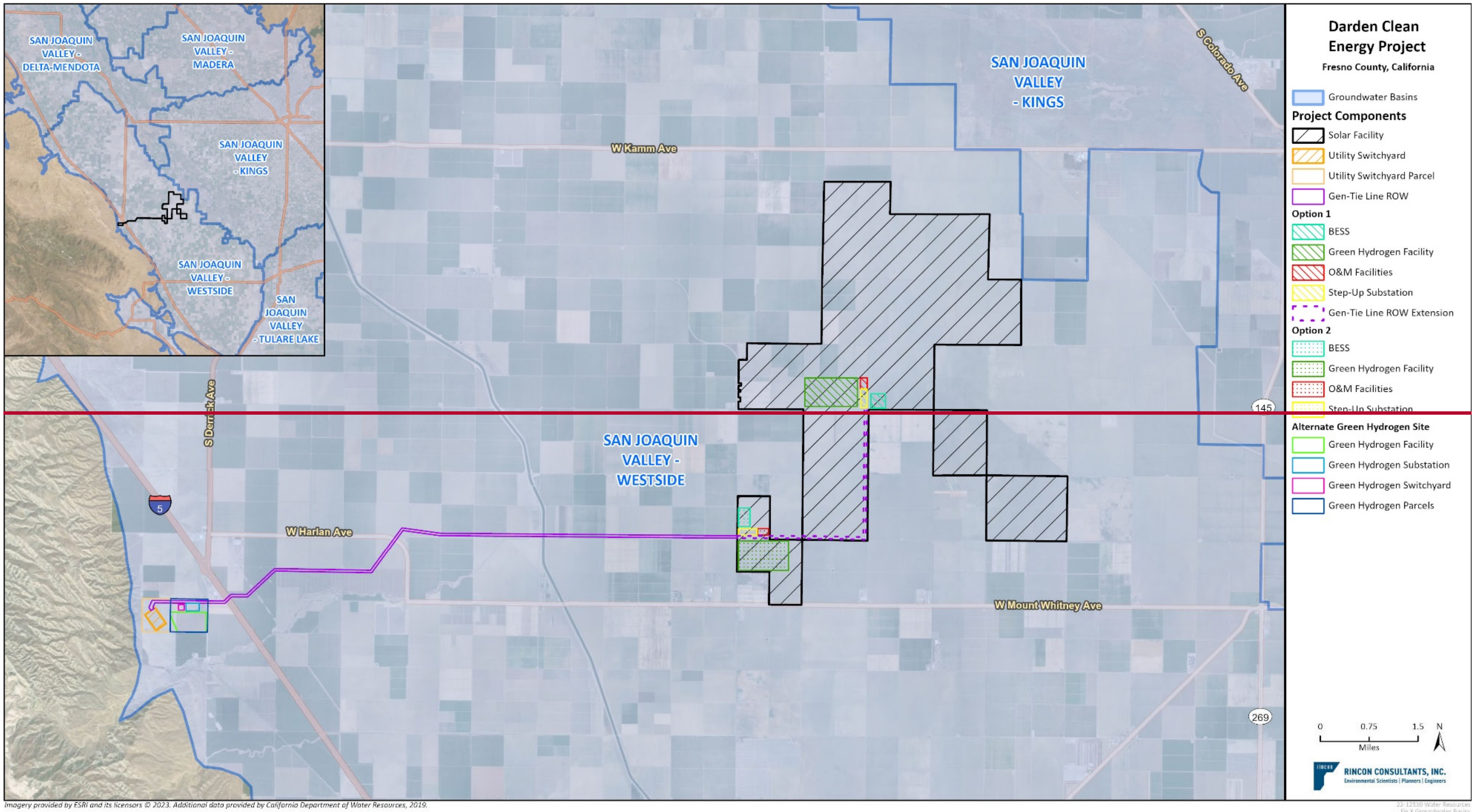
Westside Subbasin

The Westside Subbasin covers 972 square miles (622,080 acres) in the western portion of the SJVGB and is designated by DWR as Critically Overdrafted (DWR 2023). When the Sustainable Groundwater Management Act (SGMA) was established in 2014, it described critical overdraft as follows: "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." Critical overdraft results when the average annual amount of groundwater extraction exceeds the long-term average of annual water supply to the basin. The effects of overdraft include groundwater depletion, chronic lowering of groundwater levels, and regional subsidence.

Figure 5.13-1 Groundwater Basins



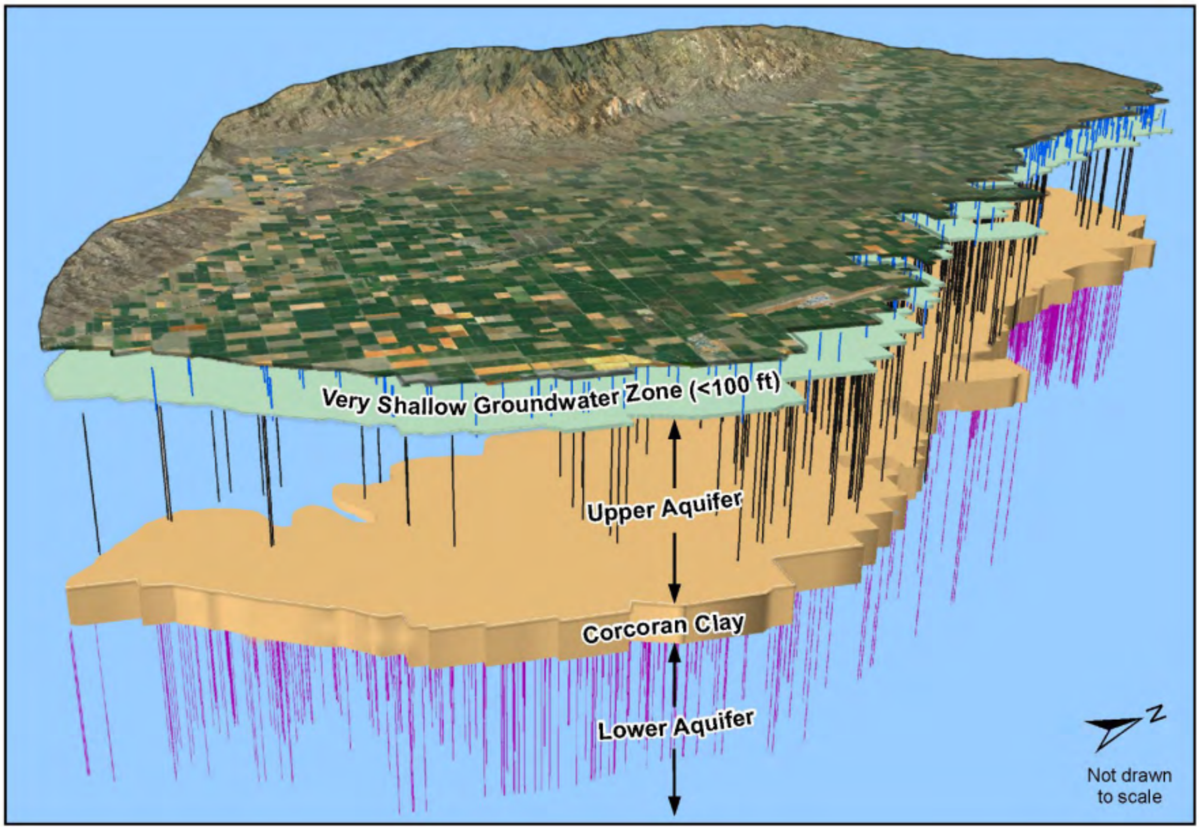
Imagery provided by ESRI and its licensors © 2024. Additional data provided by California Department of Water Resources, 2019.


Darden Clean Energy Project
Fresno County, California
Groundwater Basins
Project Components
Solar Facility
Utility Switchyard
Utility Switchyard Parcel
Gen-Tie Line ROW
Option 1
BESS
Green Hydrogen Facility
O&M Facilities
Step-Up Substation
Gen-Tie Line ROW Extension
Option 2
BESS
Green Hydrogen Facility
O&M Facilities
Step-Up Substation
Alternate Green Hydrogen Site
Green Hydrogen Facility
Green Hydrogen Substation
Green Hydrogen Switchyard
Green Hydrogen Parcels
SAN JOAQUIN VALLEY - KINGS
SAN JOAQUIN VALLEY - WESTSIDE
SAN JOAQUIN VALLEY - DELTA-MENDOTA
SAN JOAQUIN VALLEY - MADERA
SAN JOAQUIN VALLEY - TULARE LAKE
W Kamm Ave
W Harlan Ave
W Mount Whitney Ave
S Derrick Ave
S Colorado Ave
5
145
269
0
0.75
1.5
Miles
N
RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
Imagery provided by ESRI and its licensors © 2023. Additional data provided by California Department of Water Resources, 2019.

Aquifer System Overview

The reversal of overdraft to restore balanced conditions requires consideration of how water moves through the subsurface and what the barriers to movement are, so it can be anticipated how groundwater pumping in a certain area may affect other areas. In the Westside Subbasin, geologic units are deposited in four layers, identified in order of increasing depth as the Shallow Zone, Upper Aquifer, Corcoran Clay, and Lower Aquifer, as portrayed in Figure 5.13-2 and described below.

Figure 5.13-2 Westside Subbasin Cross-Section



Source: WWD GSA and County of Fresno GSA 2022a

The figure above shows the Shallow Zone occurring in the top 100 feet below the ground surface, followed by the Upper Aquifer, the Corcoran Clay layer, then the Lower Aquifer.

- **Shallow Zone.** The Shallow Zone consists of the first approximately 100 feet below the ground surface (bgs) and above the Upper Aquifer. As stated in the Westside Subbasin GSP (pages ES-3 and ES-4), the Shallow Zone is not hydrologically connected to the Upper Aquifer; therefore, it is not defined as one of the primary aquifer units in the Westside Subbasin (WWD GSA and County of Fresno GSA-Westside 2022a). The GSP further states (page ES-4), "Groundwater elevation in the upper most 100 feet are likely supported by recharge from irrigation, therefore, it is not defined as one of the primary aquifer units in the Subbasin." Groundwater modeling of the subbasin would provide clarity around the relationship between the Shallow Zone and Upper Aquifer, including the quantity of agricultural return flow to the Shallow Zone, the rate of replenishment, and whether there is any movement between the Shallow Zone and underlying aquifer layers, such as where the Corcoran Clay layer is very thin.

Most domestic wells in the Westside Subbasin are either constructed in the Upper Aquifer or extend through the Upper and Lower Aquifers, with the Shallow Zone sealed to prevent downward movement of poor-quality irrigation recharge water into the underlying aquifer layers (WWD GSA and County of Fresno GSA-Westside 2023a).

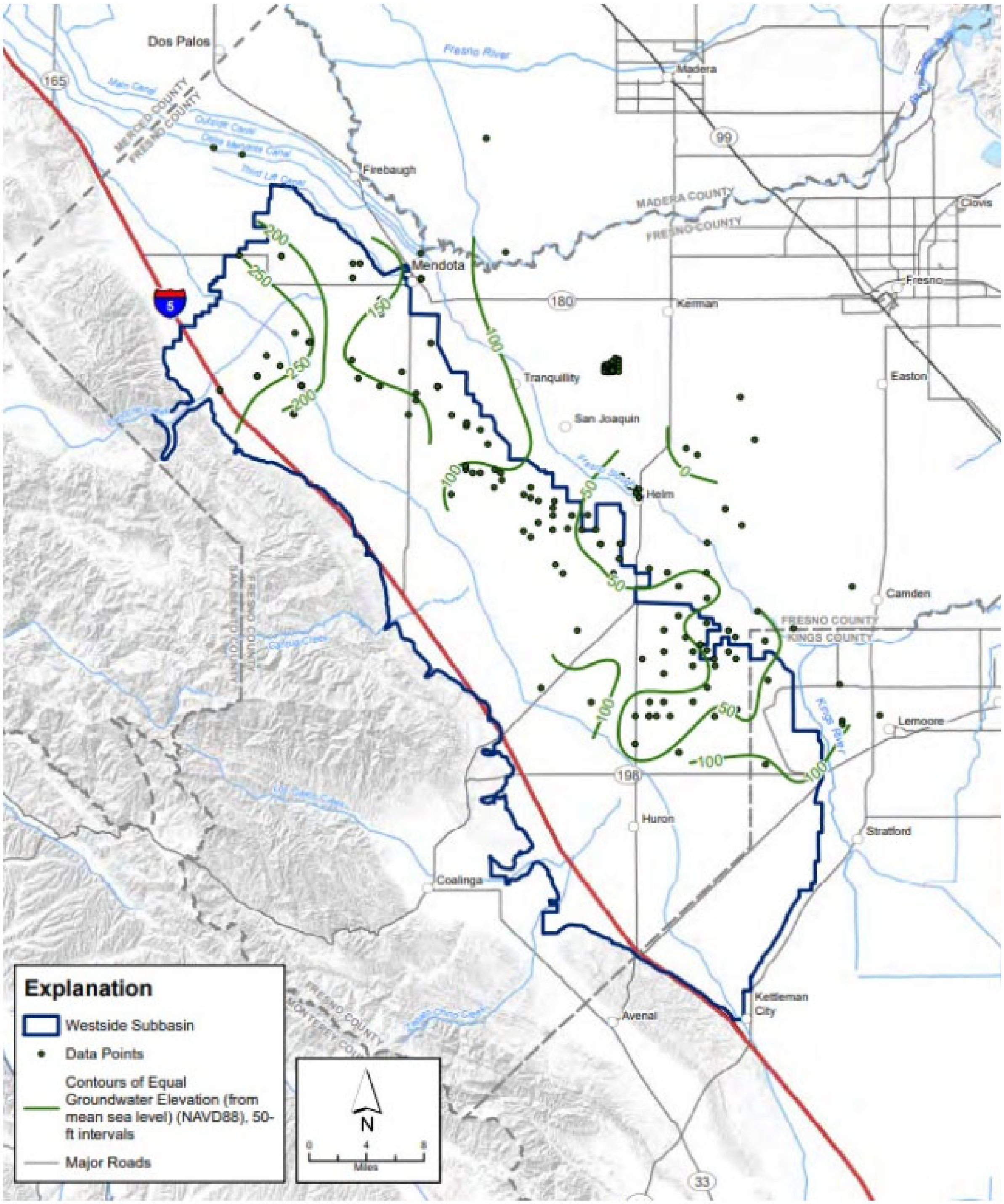
- **Upper Aquifer.** The Upper Aquifer is a defined water-bearing zone that lies below the Shallow Zone and above the Corcoran Clay of the Westside Subbasin. The Upper Aquifer consists of sedimentary deposits which are generally western-sourced, alluvial fan deposits considered part of the upper Tulare Formation, although it is difficult to separate this formation from overlying younger alluvium. The Upper Aquifer is characterized by poor water quality, which is the primary reason that groundwater pumping has historically been approximately 10 percent less in the Upper Aquifer than the Lower Aquifer (WWD GSA and County of Fresno GSA-Westside 2022a). Water quality constituents in the Upper Aquifer include total dissolved solids (TDS), boron, selenium, arsenic, and sulfate. Groundwater quality in the Upper Aquifer generally exceeds the upper limit of the secondary maximum contaminant level (MCL) for TDS of 1,000 mg/L in most areas.
- **Corcoran Clay.** The Corcoran Clay layer is an extensive geologic unit that extends throughout most of the Westside Subbasin. It is comprised of low-permeability lacustrine (lake) deposit which forms a continuous clay layer and barrier to groundwater movement. The Corcoran Clay layer divides groundwater flow into an upper semi-confined zone (Upper Aquifer), described above, and a lower confined zone (Lower Aquifer), described below (USGS 2012). The depth to the Corcoran Clay generally increases from east to west, ranging from approximately 400 feet in the east to 800 feet in the west, and ranges in thickness from less than 20 feet to 100 feet (WWD GSA and County of Fresno GSA-Westside 2002a and 2022b). Generally, the Corcoran Clay is thinner in the southern portion of the subbasin compared to the northern portion. In the southwestern part of the subbasin, the Upper Aquifer lies directly on top of the Lower Aquifer without the confining bed of the Corcoran Clay being present.
- **Lower Aquifer.** The Lower Aquifer is located below the Corcoran Clay layer, separated from the Upper Aquifer except in the southwestern portion of the subbasin, where no horizontal barrier exists between the Upper Aquifer and Lower Aquifer. Most historic pumping in the Westside Subbasin has occurred in the Lower Aquifer. Geologic deposits in this layer source from both the Sierra Nevada to the east and the Diablo Range to the west. Records of groundwater levels for the Lower Aquifer date back to the 1950s, showing the greatest drawdown occurred during the 1950s and 1960s, and after 1968 dramatic increases to the amount of Lower Aquifer storage occurred due to introduction of imported surface water via the Central Valley Project (CVP), which reduced needs to produce local groundwater (WWD GSA and County of Fresno GSA-Westside 2022a). Groundwater levels in the Lower Aquifer remained relatively stable from the 1980s through the early 2000s, but have declined considerably since 2010, likely due to drought conditions that caused reduced surface water deliveries and greater reliance on groundwater.

Figure 5.13-3a through Figure 5.13-f~~Figure 5.13-3~~, below, portray~~s the depth to~~ groundwater elevation contours across the subbasin for current conditions, dry years, and wet years, as follows:

- Current Conditions = Winter, 2014/2015; see Figures 5.13-3a and 5.13-3b
- Typical Dry Year = Summer/Fall, 2009; see Figures 5.13-3c and 5.13-3d
- Typical Wet Year = Winter/Spring, 2006/2007; see Figures 5.13-3e and 5.13-3f

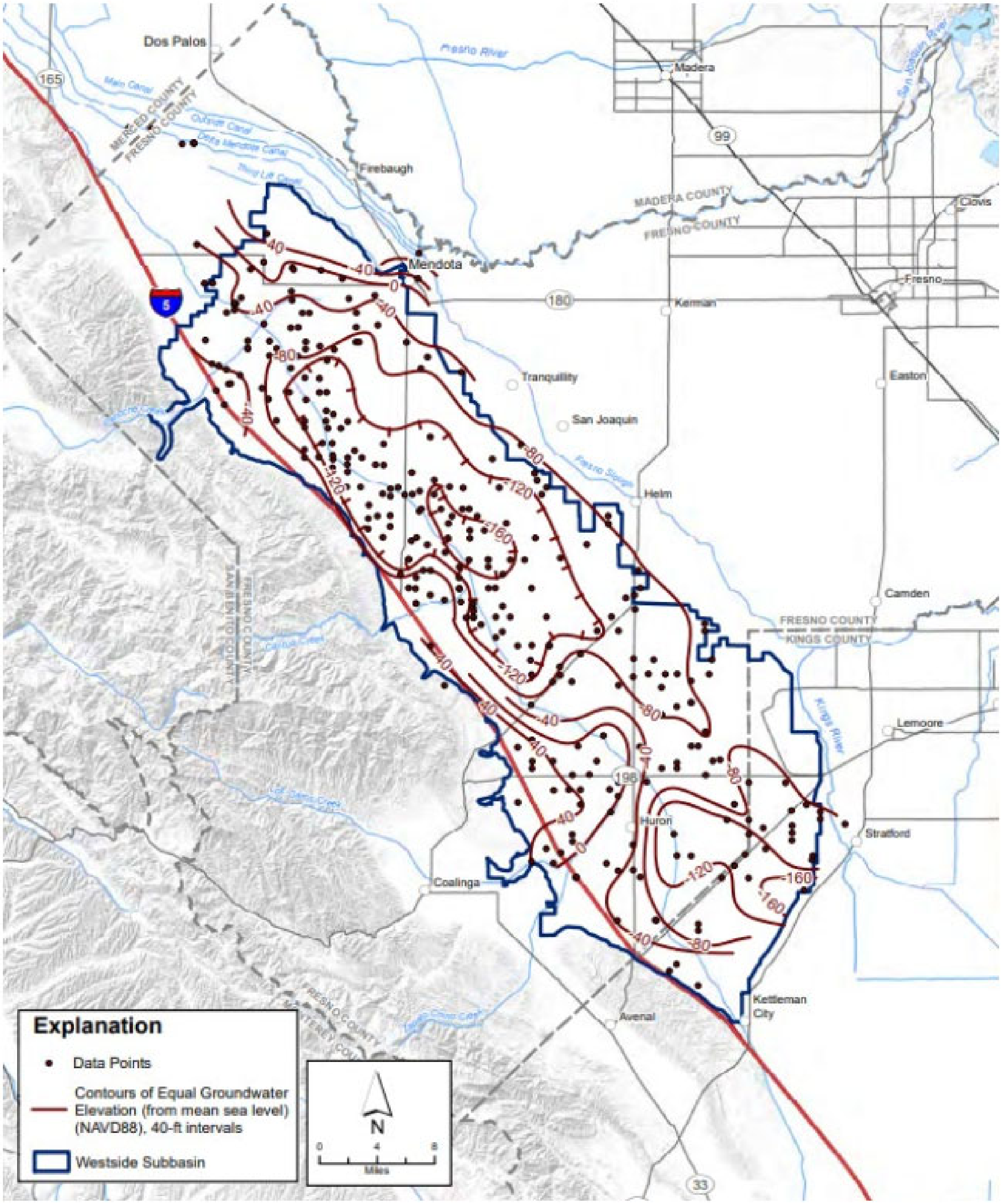
These figures indicate a trough of low groundwater elevations along a north-south orientation in the central portion of the Subbasin, where elevations are around 160 feet below mean sea level (msl).~~, showing that depth to groundwater is greatest along the foothills and decreases towards the valley floor; this is consistent with elevation changes and drainage patterns flowing towards the valley floor.~~

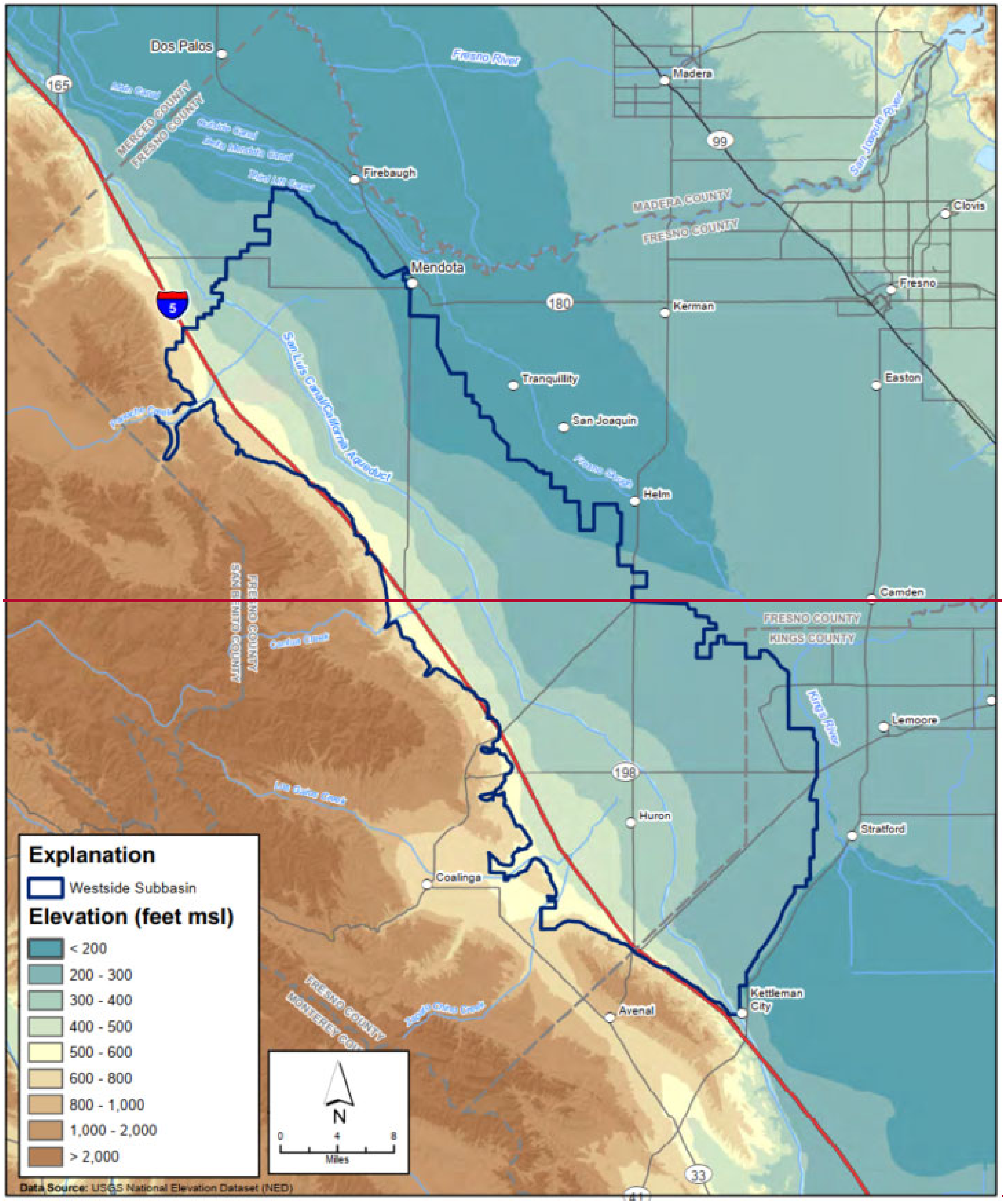
Figure 5.13-3a Groundwater Elevation Contours – Current Conditions, Upper Aquifer



Source: WWD GSA and County of Fresno GSA-Westside 2022a (pg. 177)

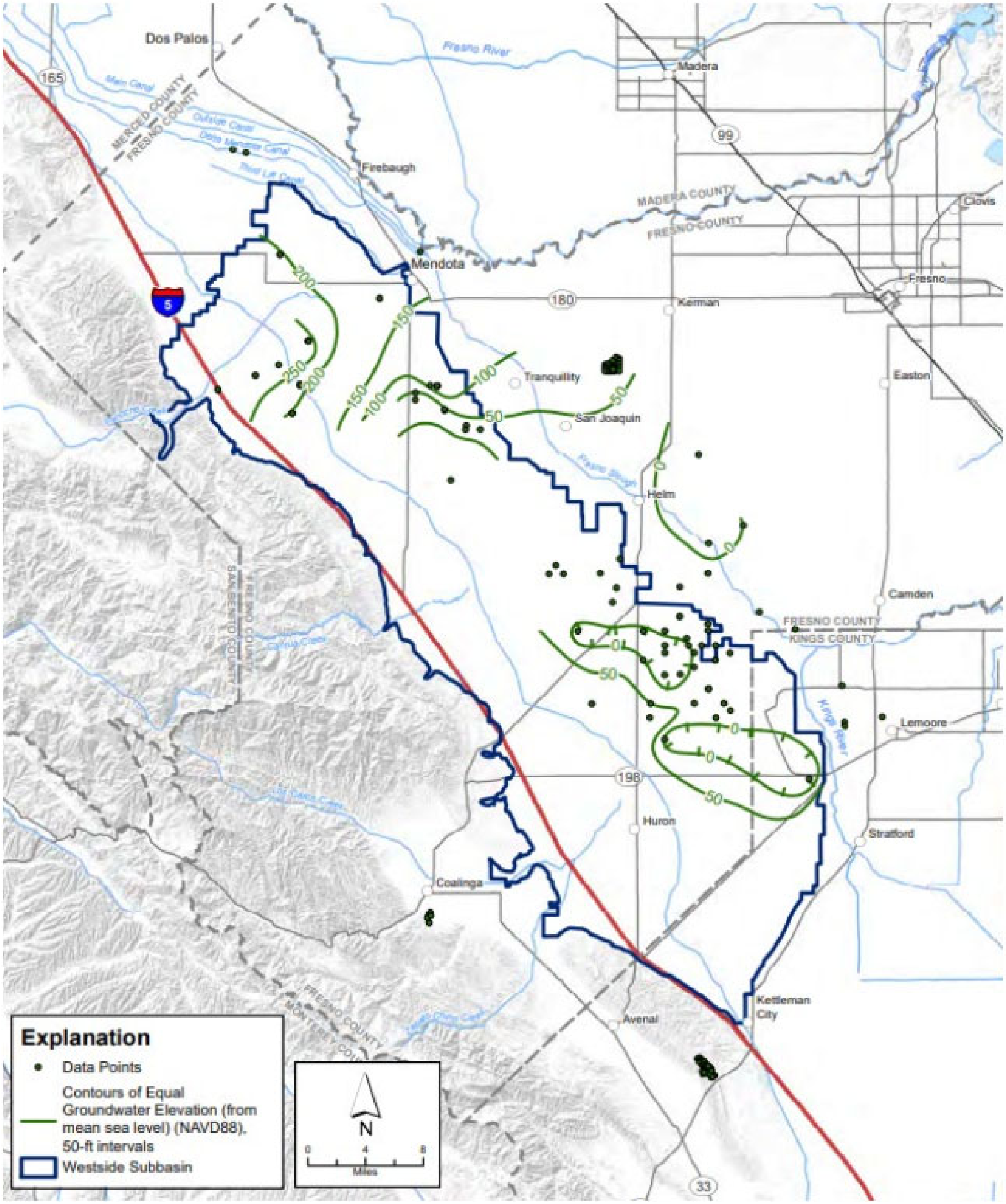
Figure 5.13-3b ~~Depth to~~ Groundwater Elevation Contours – Current Conditions, Lower Aquifer





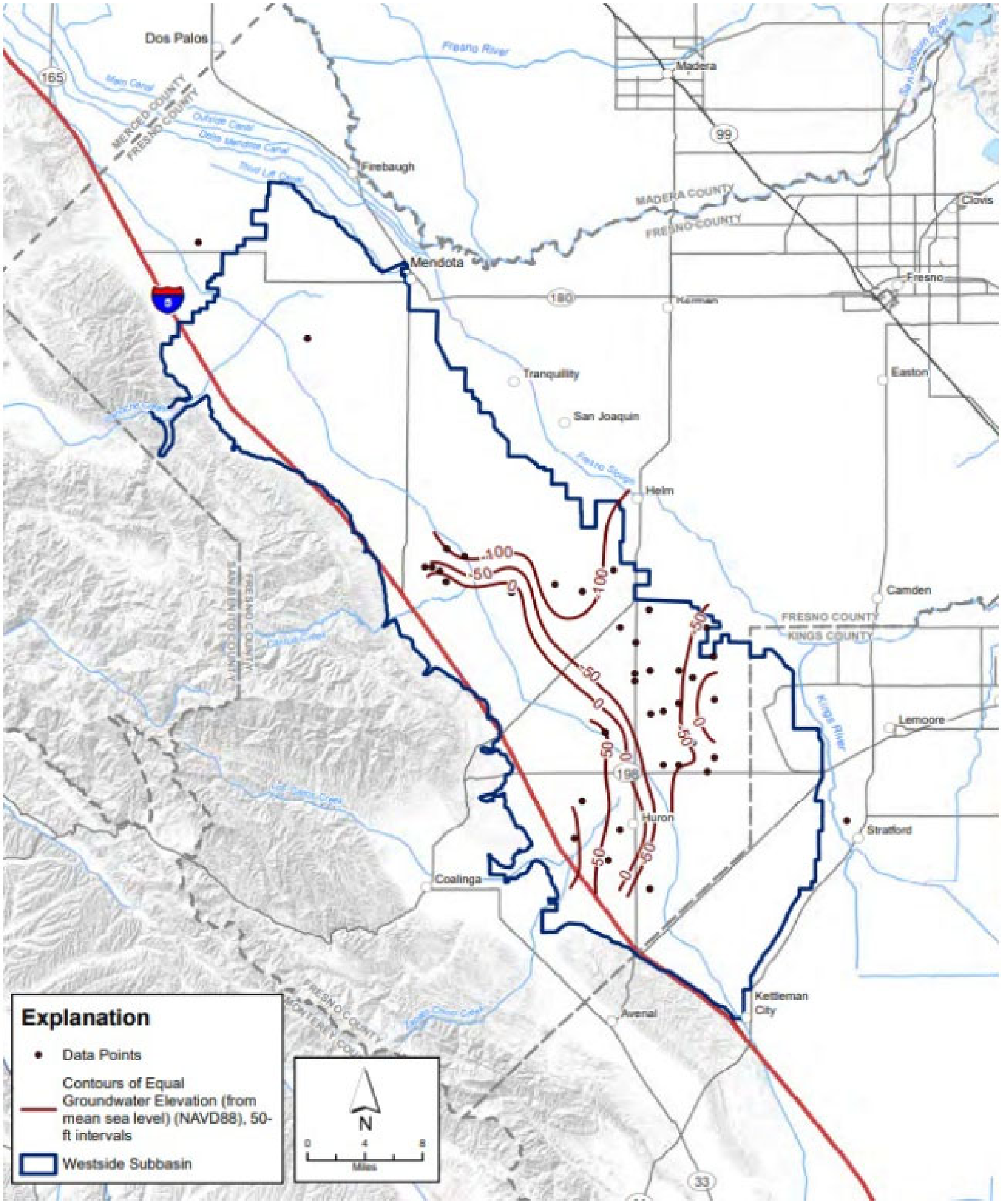
Source: WWD GSA and County of Fresno GSA-Westside 2022a (pg. 182)

Figure 5.13-3c Groundwater Elevation Contours – Typical Dry Year, Upper Aquifer



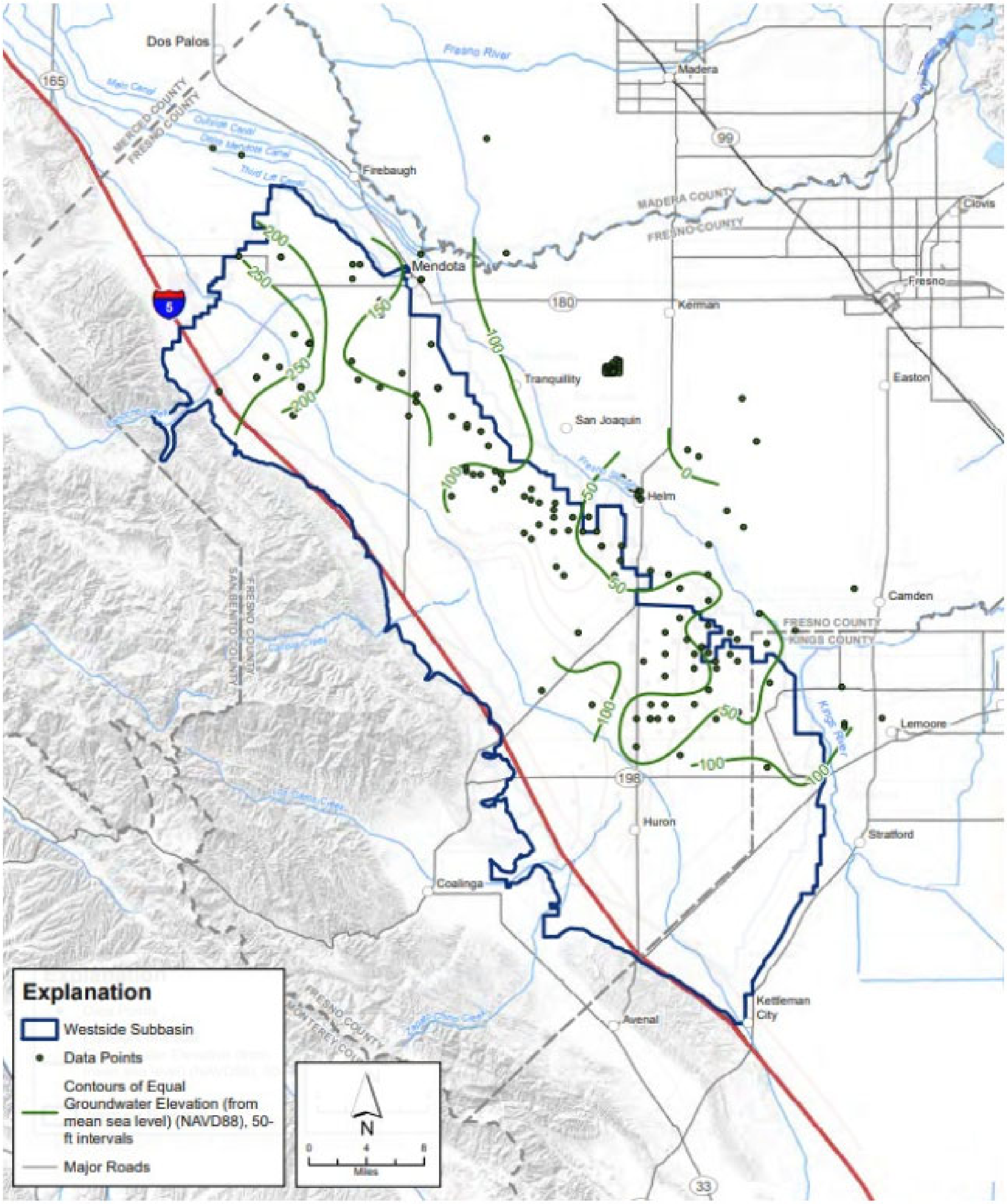
Source: WWD GSA and County of Fresno GSA-Westside 2022a (pg. 178)

Figure 5.13-3d Groundwater Elevation Contours – Typical Dry Year, Lower Aquifer



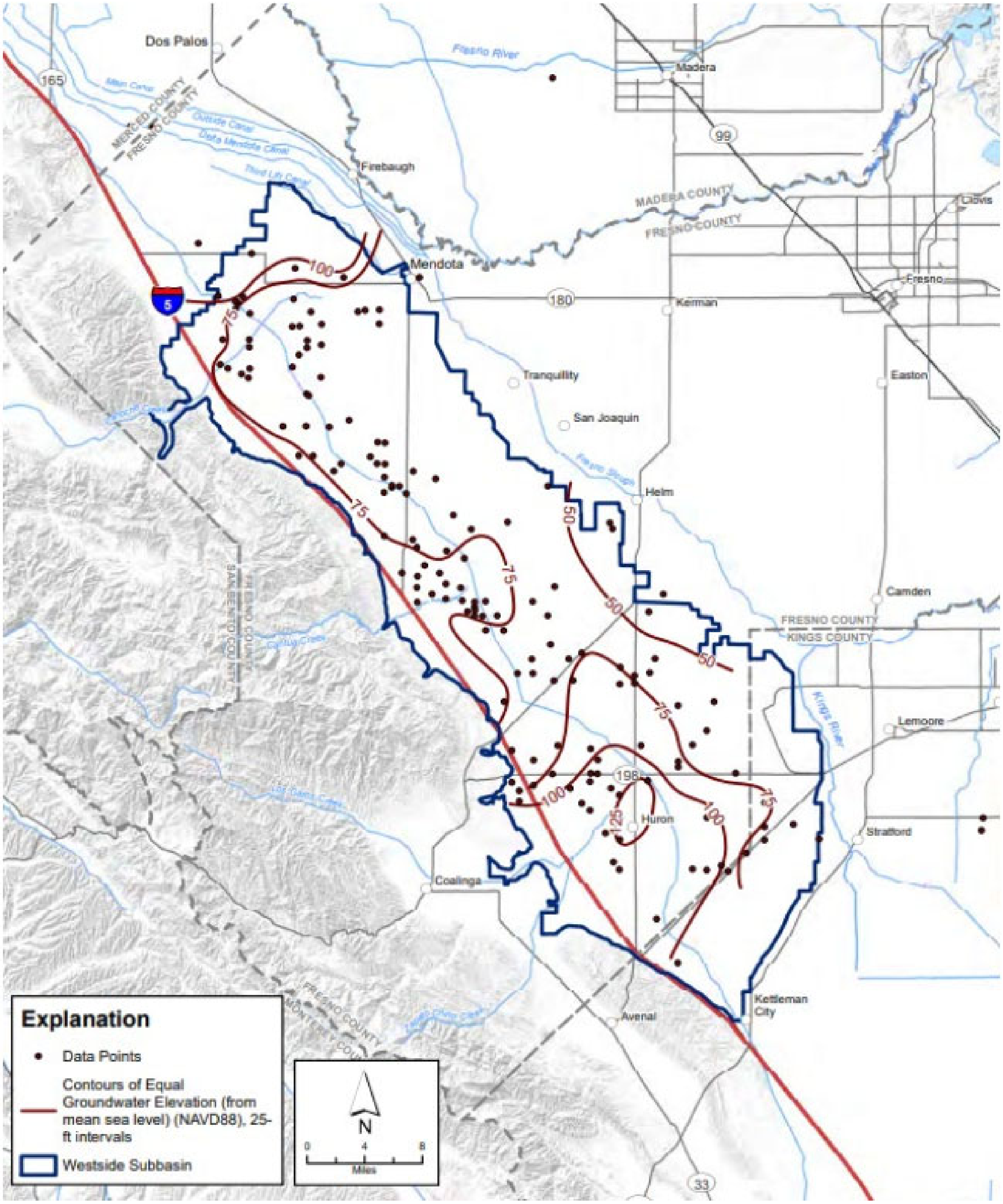
Source: WWD GSA and County of Fresno GSA-Westside 2022a (pg. 181)

Figure 5.13-3e Groundwater Elevation Contours – Typical Wet Year, Upper Aquifer



Source: WWD GSA and County of Fresno GSA-Westside 2022a (pg. 179)

Figure 5.13-3f Groundwater Elevation Contours – Typical Wet Year, Lower Aquifer



Source: WWD GSA and County of Fresno GSA-Westside 2022a (pg. 180)

As described in the Westside Subbasin GSP, the extent of data available for groundwater levels (elevation) varies across the Subbasin, impeding the characterization of flow direction in some areas. Increasing data availability suggests that flow direction within the Subbasin is influenced by groundwater production in adjacent subbasins (WWD GSA and County of Fresno GSA-Westside 2022a, pg. 2-39), as reflected in the elevation contours portrayed in Figures 5.13-3a through 5.13-3f.

The Project site is located generally in the central portion of the Subbasin; therefore, it is assumed that groundwater at the Project site is located at an elevation of 160 feet below msl. The ground surface elevation at the Project site is generally around 200 feet above msl, as shown in Google Earth. Therefore, the depth to groundwater at the Project site is approximately 360 feet. In the Lower Aquifer, the two winter/spring scenarios indicate that groundwater flow direction is eastward out of the Subbasin during wet years, with flows returning into the Subbasin during extended drought periods (WWD GSA and County of Fresno GSA-Westside 2022a, pg. 2-39).

~~As shown above, depth to groundwater decreases from the western to eastern boundary of the subbasin. The Project site is approximately centered within the subbasin, and the depth to groundwater underlying the solar facility site would be approximately 200 to 300 feet.~~

The Upper Aquifer overlies the Corcoran Clay layer; Figure 5.13-4~~, below,~~ on the following page shows the thickness of the Corcoran Clay layer (note, this is thickness of the layer, not depth to the layer).

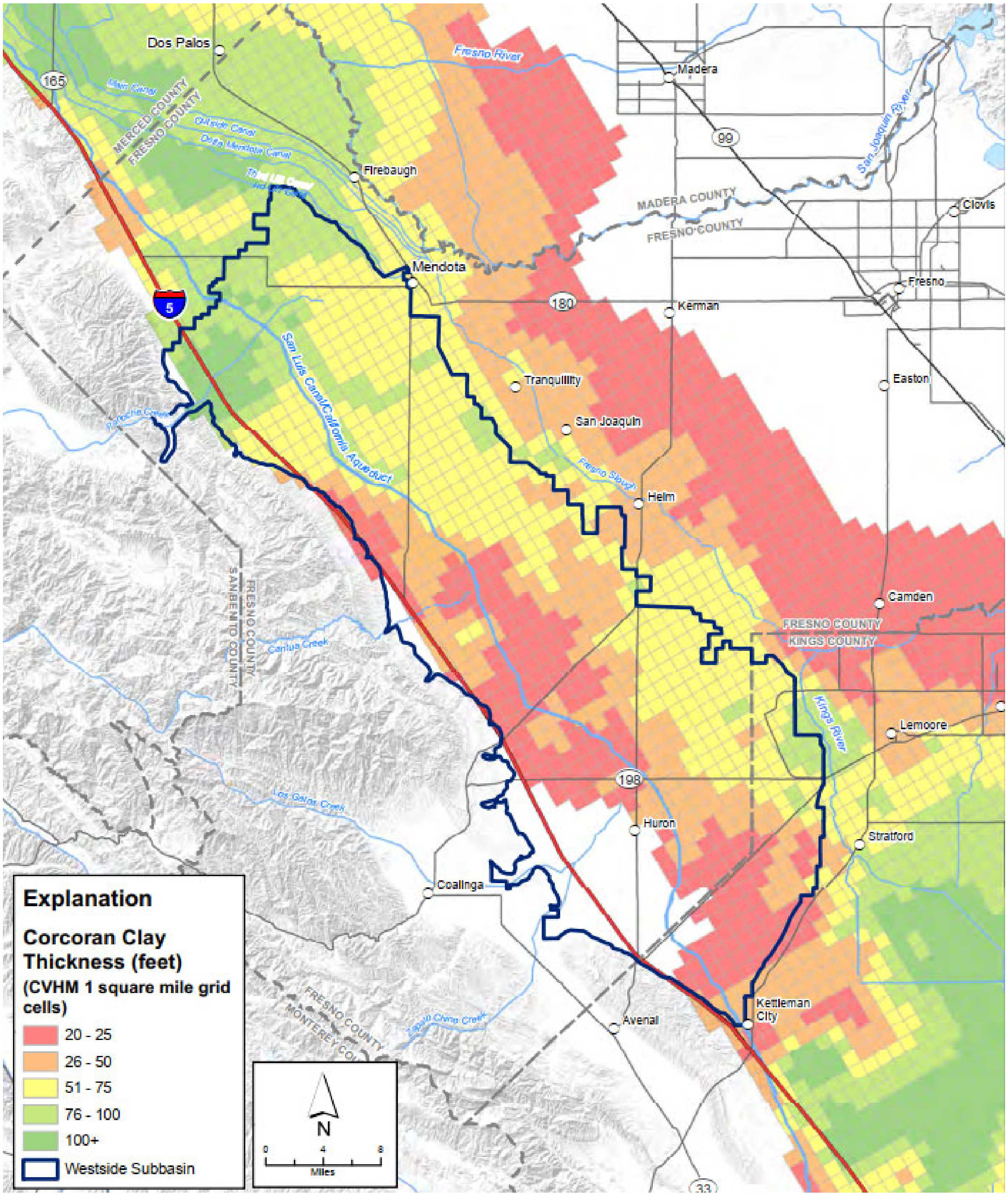
Figure 5.13-4 shows depth to the Lower Aquifer is greatest in the north-northwestern portion of the subbasin and lowest in the central-western and southern portions of the subbasin. The figure above conveys thickness, not depth to the Corcoran Clay layer; however, there is a direct correlation between the thickness of the Corcoran Clay layer and depth to the Lower Aquifer below. Where the Corcoran Clay layer is thicker, the depth to the Lower Aquifer is greater. Characteristics of the Corcoran Clay layer influence how and where groundwater occurs in the subbasin; in areas where the Corcoran Clay layer is thin or absent, there can be movement of water between the Upper Aquifer and Lower Aquifer, which affects TDS concentrations in the blending zone.

Groundwater in Storage

The amount of groundwater in storage does not represent the amount of groundwater available for use; rather, groundwater in storage can be used to measure basin balance over time. If a basin is in balanced conditions, the amount of inflow is equivalent to the amount of outflow, and the amount of water in storage would remain relatively constant over time. Quantification of the amount of inflow and outflow required to support sustainable (balanced) conditions in a basin can be used to create a water budget and identify the “sustainable yield,” or the maximum amount of water that can be withdrawn annually without causing undesirable effects such as overdraft.

A water budget for the Westside Subbasin was developed to inform the Westside Subbasin GSP required for compliance with SGMA; see below under “Sustainable Groundwater Management Act,” for further discussion of SGMA. The Westside Subbasin water budget was created using a numerical integrated groundwater flow model referred to as the Westside Groundwater Model (WSGM). The WSGM used an historical period of 1989 through 2015, with the current water budget year as 2016 and the projected water budget period spanned 2017 through 2070 (WWD 2022). The WSGM assessed three baseline scenarios, including: baseline with no climate change; 2030 climate change baseline; and 2070 climate change baseline (WWD 2022). The climate change baselines were developed by DWR as a guidance for evaluating hydrologic conditions under extreme climate conditions such as variable precipitation and increased temperatures (DWR 2018).

Figure 5.13-4 Corcoran Clay Thickness



Source: WWD GSA and County of Fresno GSA 2022a.

Results of the WSGM indicate that over the 27 years between 1989 and 2015, the amount of groundwater in storage in the Westside Subbasin declined by an average of 19,000 AFY, for a total decrease of groundwater in storage of 517,000 AF. This downward trend is consistent with the subbasin's status as Critically Overdrafted. However, the Westside Subbasin GSP states that although the subbasin is Critically Overdrafted, the total decline in storage represents less than four percent of total outflow from the basin, and less than six percent of total pumping from the basin, which suggests the budget is relatively balanced over the WSGM calibration period (WWD GSA and County of Fresno GSA-Westside 2022a). Table 5.13-1, below, provides historical and projected water budgets for the Westside Subbasin, as determined through the WSGM and presented in the GSP.

Table 5.13-1 Sustainable Yield Estimates

Use Type	Water Budget Period	Volume
Historical Groundwater Sustainable Yield	1989-2015	305,000 AFY
Projected Groundwater Sustainable Yield	2017-2070	270,000 - 294,000 AFY

Source: WWD GSA and County of Fresno GSA-Westside 2022a

The table above shows that during the historical period (1989-2015), sustainable yield for the Westside Subbasin was 305,000 AFY, meaning that up to 305,000 AFY could be withdrawn from the subbasin without causing undesirable effects such as overdraft. As discussed above, the subbasin was also consistently overdrawn by an average of 19,000 AFY over the modeled period. Therefore, sustainable yield under future conditions – to maintain basin balance – was determined to be a range of 270,000 AFY to 294,000 AFY through year 2070.

The actual sustainable yield rate for any given year depends upon the rate at which the subbasin is recovering from overdraft, as determined by groundwater inflows, pumping, replenishment, and subsequent amount of groundwater in storage. The extent of groundwater reliance (amount of pumping) during any given year depends upon hydrologic and climatic conditions, with heavier groundwater pumping occurring during years with reduced surface water availability, including imported CVP water. Table 5.13-2, below, shows changes in groundwater storage between 2016 and 2021, based on measured differences in seasonal high groundwater levels in the current and previous reporting years (WWD GSA and Fresno County GSA 2022a).

Table 5.13-2 Westside Subbasin – Change in Groundwater Storage (AF)

Aquifer	2016	2017	2018	2019	2020	2021	Total
Upper Aquifer	-23,000	21,000	32,000	-28,000	-9,000	-2,000	-9,000
Lower Aquifer	-138,000	-8,000	237,000	-55,000	78,000	-110,000	4,000
Total	-161,000	13,000	269,000	-83,000	69,000	-112,000	-5,000

Source: WWD GSA and Fresno County GSA 2022a

Data in the table above demonstrates that the actual amount of groundwater in storage in the Westside Subbasin varies every year. Overall, the change in groundwater storage was cumulatively negative (overdrafted) by 5,000 AF between 2016 and 2021; in comparison, the average rate of overdraft for the historical period of 1989 through 2015 was approximately 19,000 AFY. This difference indicates that some years and decades have more replenishment and less pumping, while the reverse is true in other years.

Groundwater Quality

The quality of surface and groundwater resources is managed by the State Water Resources Control Board (SWRCB), through its nine Regional Water Quality Control Boards (RWQCBs), with implementation of a Water Quality Control Plan (“Basin Plan”) across all hydrologic regions. The Project is located within the jurisdiction of the Central Valley Region, which implements two Basin Plans - the Sacramento and San Joaquin Rivers Basin Plan, and the Tulare Lake Basin Plan. The Project area is addressed in the Tulare Lake Basin Plan (Central Valley RWQCB 2018a).

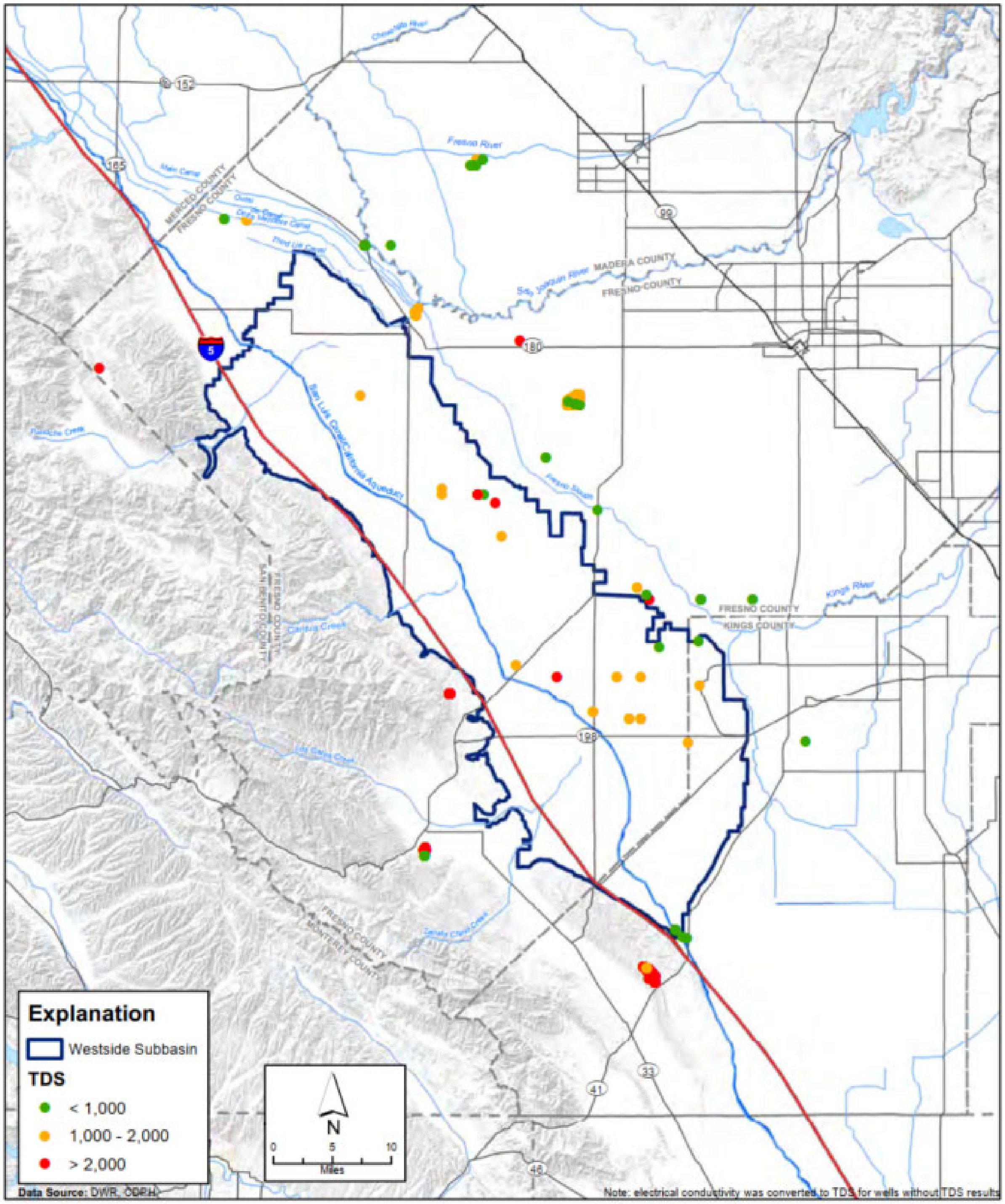
The Tulare Lake Basin Plan identifies water quality objectives for various constituents, including salinity. It also states that no proven means exist at present that would allow ongoing human activities to continue without increasing salinity concentrations; therefore, the water quality objectives for salinity focus on controlling the rate of increase (Central Valley RWQCB 2018b, Section 3.2.5). Figure 5.13-5 and Figure 5.13-6, below, portray TDS concentrations across the Upper Aquifer and the Lower Aquifer, respectively.

The figure above shows TDS concentrations in the Upper Aquifer exceed 2,000 mg/L at several locations in the central and northern portions of the subbasin. This figure also shows water quality in the Upper Aquifer exceeds the upper secondary MCL of 1,000 mg/L in most areas, except along the eastern subbasin boundary, where TDS is below 1,000 mg/L. Figure 5.13-6 shows water quality data for the Lower Aquifer, which is proposed for use under the Project.

The figure above shows that many areas of the Lower Aquifer are characterized by elevated TDS, with concentrations exceeding the secondary MCL of 1,000 mg/L across most of the subbasin. However, comparison with Upper Aquifer conditions in Figure 5.13-5 indicates that degraded water quality is less prevalent in the Lower Aquifer than in the Upper Aquifer.

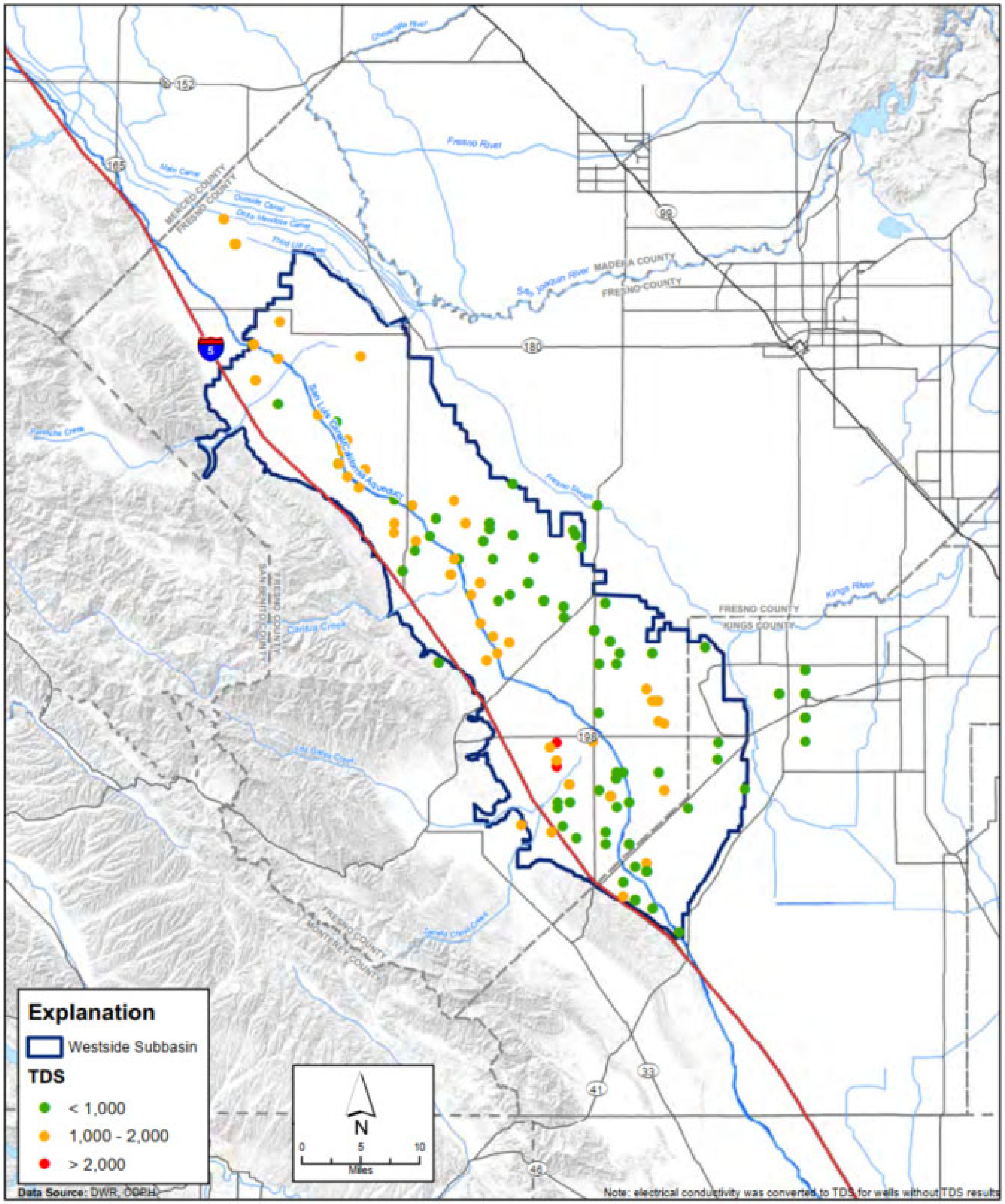
The figures above portray TDS concentration ranges at measured locations across the Upper and Lower Aquifers, respectively, for the period of 2010 through 2015, which was used to inform the recently-approved GSP for the Westside Subbasin. There is less water quality data available in recent years; however, review of available data extending to 1995 suggests an overall slight improvement in TDS concentrations in the Lower Aquifer (WWD GSA and County of Fresno GSA-Westside 2022a). The figures above are also informed by data from different monitoring wells, and the extent of data available for each aquifer varies depending upon the well locations. In general, there is a lack of water quality data for the Upper Aquifer west of the California Aqueduct, whereas most of the water quality data for the Lower Aquifer is concentrated along the California Aqueduct (this portion of the aqueduct is a joint federal/State facility called the San Luis Canal).

Figure 5.13-5 TDS Concentrations, Upper Aquifer



Source: WWD GSA and County of Fresno GSA-Westside 2022a (Figure A-3)

Figure 5.13-6 TDS Concentrations, Lower Aquifer



Source: WWD GSA and County of Fresno GSA-Westside 2022a (Figure A-6)

Sustainable Groundwater Management Act

In 2014, SGMA established a framework for local groundwater management under which the DWR assigns priority levels to groundwater basins based on existing water balance conditions. The Westside Subbasin is designated as Critically Overdrafted. The purpose of SGMA is to bring overdrafted basins into sustainable conditions by 2040, and to maintain sustainable conditions in the future. To accomplish this, groundwater basins are required to be managed by DWR-approved Groundwater Sustainability Agencies (GSAs), which are then required to develop and implement a Groundwater Sustainability Plan (GSP) for each of their respective basins.

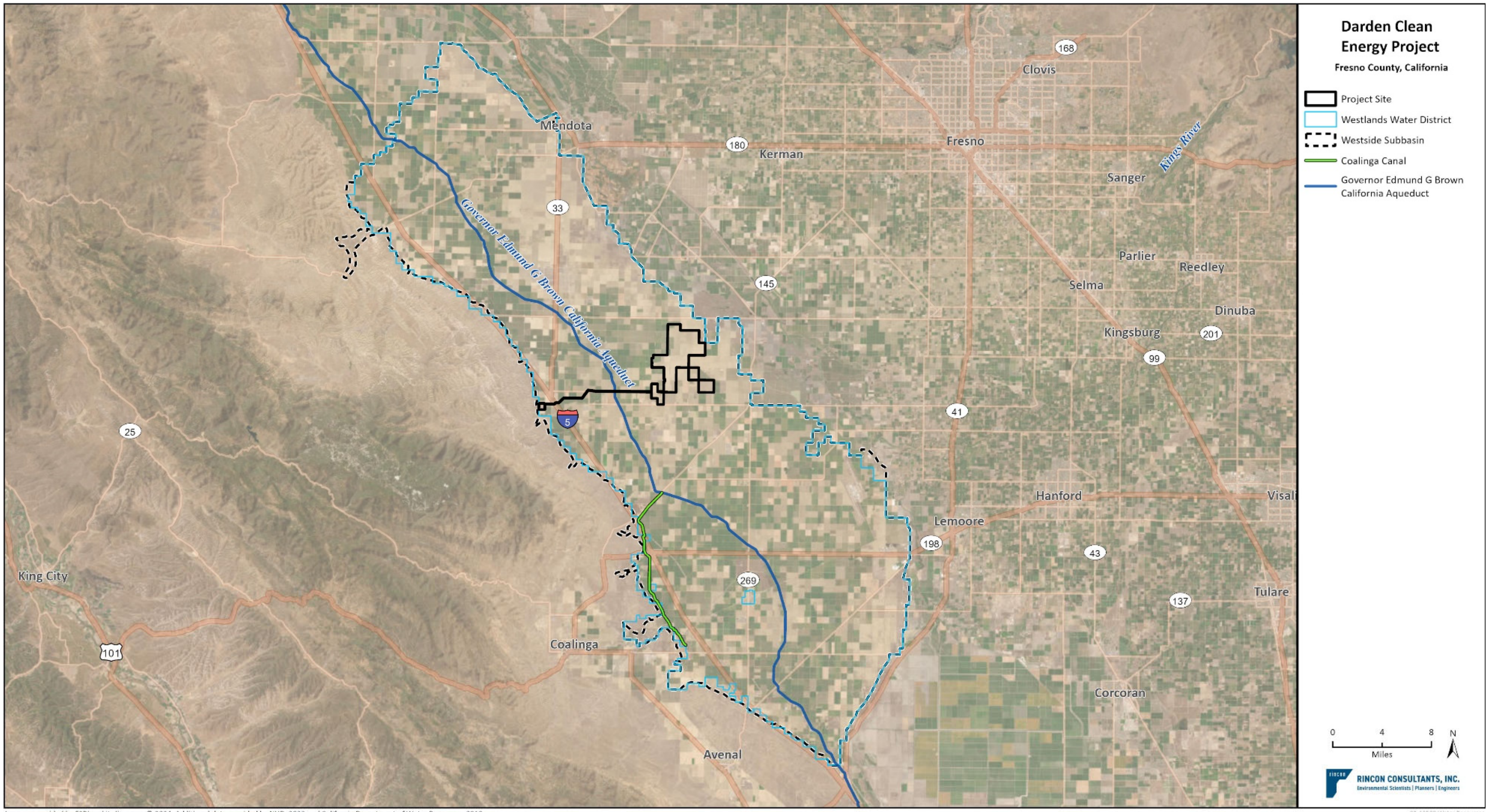
The Westside Subbasin GSP identifies a suite of actions being conducted to reverse overdraft. Among these, agricultural fallowing practices are a key strategy, involving the removal of irrigation from actively farmed parcels, to reduce the amount of groundwater pumped from the Westside Subbasin, thereby encouraging recovery from historical over-pumping of the basin.

Groundwater Sustainability Agencies

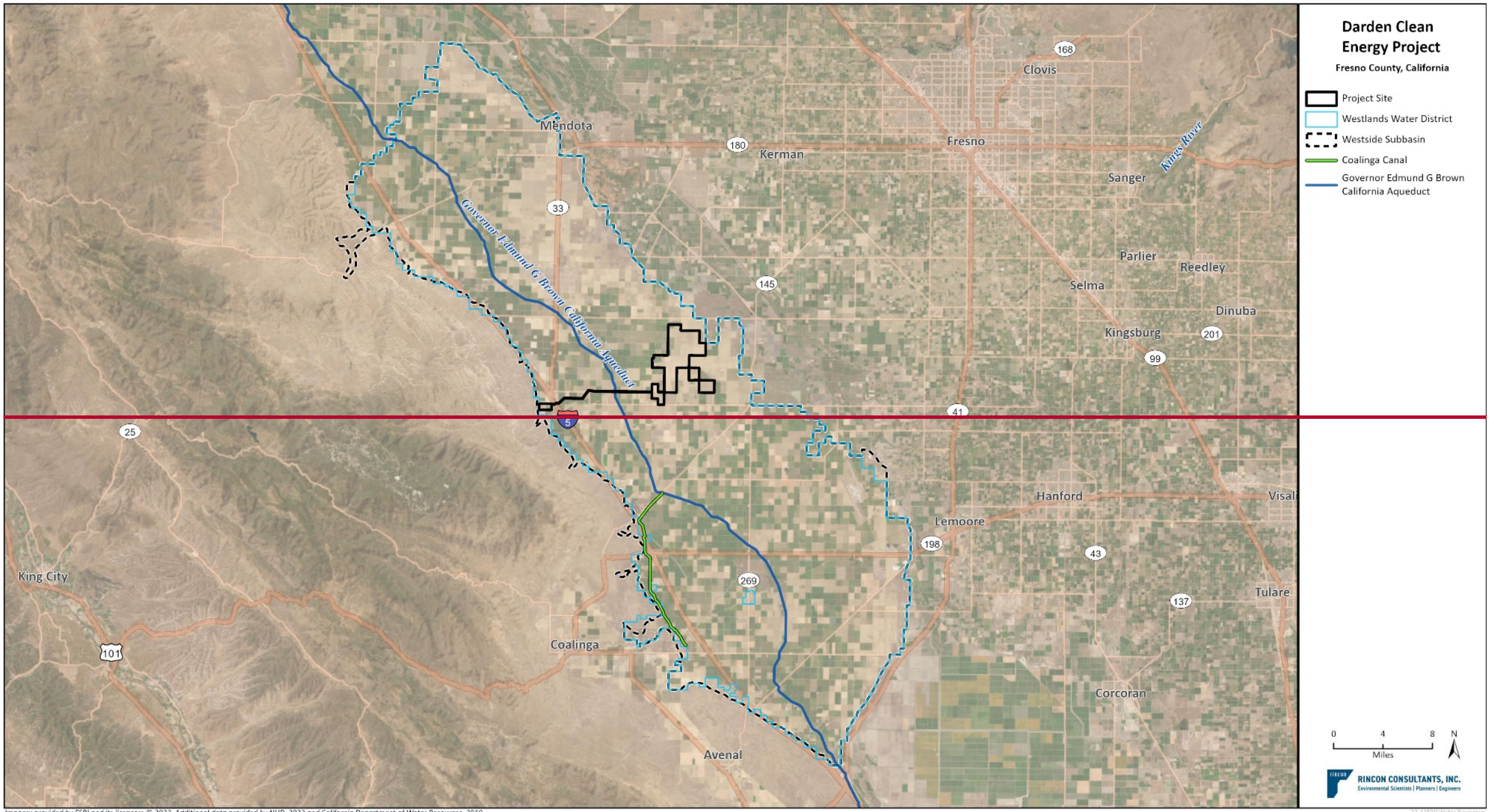
The Westside Subbasin is managed jointly by two GSAs – the WWD GSA and the County of Fresno GSA-Westside. The majority of the Westside Subbasin is within WWD’s service territory, while there are several small areas along the western and eastern edge of the subbasin that extend past WWD boundaries and fall within the jurisdiction of Fresno and Kings counties. The County of Fresno serves as the GSA for the portions of the Westside Subbasin located outside WWD’s boundaries and within Fresno County. The portion of the subbasin that underlies Kings County is within the Naval Air Station Lemoore, which is owned by the federal government and thus, is exempt from the requirements of SGMA (WWD GSA and Fresno County GSA 2022b).

The WWD GSA and the County of Fresno GSA-Westside operate collaboratively through a Memorandum of Understanding (MOU), which allows them to develop one comprehensive GSP for the subbasin. The MOU allows the WWD GSA to implement the GSP in all portions of the Westside Subbasin, including unincorporated county areas. Both the WWD GSA and the County of Fresno GSA-Westside has the authority to implement the GSP through its statutory land use and water management responsibilities pursuant to its constitutional police powers. Figure 5.13-7, below, shows the boundaries of WWD’s service area and the boundaries of the Westside Subbasin, showing the boundaries largely coincide, and the Project site is approximately centered within both.

Figure 5.13-7 Westlands Water District



Imagery provided by ESRI and its licensors © 2024. Additional data provided by NHD, 2023 and California Department of Water Resources, 2019.



Imagery provided by ESRI and its licensors © 2023. Additional data provided by NHD, 2023 and California Department of Water Resources, 2019.

In addition to WWD and the County's jurisdictions, a portion of the Westside Subbasin also underlies Kings County; however, this the Kings County portion of the subbasin is within the Naval Air Station Lemoore, which is owned by the federal government and therefore exempt from SGMA (WWD GSA and Fresno County GSA 2022b). Accordingly, Kings County is not included as a GSA for the Westside Subbasin, even though a portion of the subbasin is within Kings County.

Groundwater Sustainability Plan

The WWD GSA and the County of Fresno GSA-Westside operate collaboratively through a Memorandum of Understanding (MOU), which allows them to develop one comprehensive GSP for the subbasin. Both the WWD GSA and the County of Fresno GSA-Westside have authority to implement the GSP through their statutory land use and water management responsibilities pursuant to constitutional police powers. The MOU between the GSAs for joint management of the subbasin allows the WWD GSA to implement the GSP in all portions of the Westside Subbasin, including unincorporated county areas. This allowance does not alter the authority of the County of Fresno GSA-Westside over the subject lands; it simply provides authority to the WWD GSA.

The purpose of SGMA is to bring groundwater basins into sustainable conditions by 2040 and to maintain sustainable conditions in the future. This is accomplished through the planning and implementation of basin-specific projects and management actions (PMAs) outlined in the respective GSPs. As required by SGMA, the Westside Subbasin GSP sets forth PMAs which are designed to support the reversal of overdraft conditions. The Westside Subbasin PMAs involve management strategies including:

- Provide access to more reliable surface water supplies to existing water users, to stabilize groundwater reliance through dry years;
- Conduct conjunctive use management of surface and groundwater supplies, including through aquifer storage and recovery (ASR) to store wet weather surplus for later use as needed; and
- Control for water demands through implementation of a water supply allocation system.

The Westside Subbasin GSP was approved by DWR in 2023. Changes or progress made towards PMA implementation is documented in Annual Reports, which are also required by SGMA to be submitted to DWR for review and approval. Table 5.13-3, below, provides an overview of the PMAs for the Westside Subbasin, and the status of implementation in 2021, based upon the 2021 Annual Report for the Westside Subbasin GSP (WWD GSA and Fresno County GSA 2022b).

Table 5.13-3 Westside Subbasin – Projects and Management Actions

PMA	Overview and Status of Implementation
Project No. 1: Surface Water Imports	The primary focus of the Surface Water Imports program is to increase surface water availability and reliability and to reduce the corresponding landowner reliance on groundwater within the Subbasin by fulfilling most of the agricultural, municipal, and industrial water demands within the Subbasin. Surface water deliveries will be obtained through existing CVP contracts and through water transfer and exchange projects. Increasing the supply of surface water will allow surface water to be used in lieu of groundwater leading to increased groundwater storage and levels. The increased delivery of surface water can further conjunctive use strategies. **2021 Status:** ▪ In 2021, no water from WWD's contract entitlement amount for CVP water was available for agricultural water service contractors located south of the Delta. ▪ WWD and its water users were still able to secure 173,000 AF of surface water from the CVP and an additional 44,000 AF of surface water from other non-CVP contract sources for irrigation during the 2021 water year.
Project No. 2: Initial Allocation of Groundwater Extraction	The GSA has prepared a groundwater allocation framework to manage demand by equally distributing the total annual pumping from the Subbasin on the basis of land acreage overlying the Subbasin. The groundwater allocation program includes a "transition period" from 2022 to 2030, in which a uniform annual allocation for agricultural uses is established at 1.3 AFY per acre and then subsequently reduced each year by 0.1 AFY per acre until 2030, at which time the annual allocation will be 0.6 AFY. The groundwater will be distributed based on per-acre land ownership for all qualifying lands, or agricultural lands that have not been retired. Landowners overlying the Subbasin with the ability to make reasonable and beneficial use of groundwater on their lands will be entitled to register for a groundwater allocation based solely on overlying (developed or undeveloped) acreage and irrespective of prior use of groundwater utilization. Municipal and Industrial (M&I) groundwater users will not be regulated as part of the GSP if they are de minimus users, or those pumping two AFY or less for domestic purposes. If groundwater extraction rates exceed 2 AFY, the user(s) will be regulated under the GSP; however, M&I users are not currently subject to allocation management actions. Therefore, all overlying landowners will have equal access to available groundwater subject to the sustainability requirements of the GSP and the avoidance of undesirable results. The allocation will not constitute a determination of common law water rights; rather, the distribution will ensure there are no long-term imbalances in the Subbasin, increase pumping transparency, and provide more flexibility to water users for resources management that provides benefits not traditionally available under common law (e.g., banking of unused water, trading). **2021 Status:** ▪ An aggregate (Upper and Lower Aquifer) allocation of 1.3 AF/acre was anticipated for the initial water year (2022), to be reduced by 0.1 AF per acre until 2030, for an allocation of 0.5 AF/acre, which will be distributed by WWD based on per-acre land ownership for all qualifying lands. ▪ As of September 2021, WWD installed 359 meters, covering about 35 percent of active agricultural wells in the Subbasin.

PMA	Overview and Status of Implementation
Project No. 3: Aquifer Storage and Recovery	An aquifer storage and recovery (ASR) program involving the direct injection and subsurface storage of imported surface water into groundwater using agricultural wells has been proposed by the GSA to improve water supply reliability within the Subbasin. Landowners will voluntarily adopt the program in order to have the injected water contribute to the landowner's groundwater allocation. **2021 Status:** ▪ WWD submitted two semi-annual monitoring reports and one annual monitoring report to the SWRCB pursuant to the Agricultural ASR Project Monitoring and Reporting Plan (MRP R5-2020-0809). ▪ WWD pursued ownership and operation of an ASR facility in the former Broadview Water District (Broadview ASR Project) within the Subbasin. ▪ Non-ASR recharge projects consisting of on-farm recharge and percolation ponds through WWD's Groundwater Credit Pilot Program were added to this PMA. ▪ Twenty-five (25) recharge projects have been approved to recharge groundwater with imported surface water. The 25 projects include 15 ASR projects, eight percolation basins, and two sub-lateral/tile drain projects. ▪ Total potential recharge capacity of approved projects is 600 AF per day, which is limited primarily by the availability of water to conduct recharge with.
Project No. 4: Targeted Pumping Reductions	It is possible that the combination of other measures will not be sufficient individually or collectively to avoid significant and unreasonable land subsidence. When combined with cumulative Subbasin pumping, groundwater withdrawals near Checks 16, 17, and 20 of the San Luis Canal/California Aqueduct, may require focused management efforts. Consequently, the GSP proposes to offer or, if necessary to avoid significant and unreasonable land subsidence, to require surface water substitution to reduce groundwater pumping near the SLC. In exchange for the reduction in pumping, the GSA may provide incentives to landowners included in this program. Participating landowners may be required to bear material unmitigated impacts in accepting the substitute surface water. **2021 Status:** ▪ Targeted pumping reductions were not conducted in 2021. ▪ WWD installed 15 survey benchmarks to measure subsidence, funded by Round 3 of Proposition 68 Sustainable Groundwater Planning Grant.
Project No. 5: Percolation Basins	The GSA is proposing engaging in managed aquifer recharge through percolation basins in selected areas of the Subbasin to increase groundwater in storage. These basins would be constructed on GSA-owned land in the southwestern portion of the Westside Subbasin where the Corcoran Clay is not present. The basins would be used to store excess water and recharge the Upper Aquifer and Lower Aquifer. Currently, the GSA is investigating the feasibility of this project at potential sites located in the Subbasin. **2021 Status:** ▪ DWR awarded funding to WWD from the Prop. 68 Sustainable Groundwater Management Grant to implement the Pasajero Groundwater Recharge Project adjacent to the Los Gatos Creek, in the southern area of the Westside Subbasin. ▪ WWD conducted design of the project which will recharge up to 10,800 AFY in a wet hydrological year. Due to the abundance of low permeability materials to depths of up to 40 feet, groundwater recharge at this location requires dry wells to facilitate groundwater recharge.

Source: WWD GSA and Fresno County GSA 2022a, 2022b

Subsidence

Subsidence is a gradual lowering of the ground surface elevation. In the Project area and throughout the Central Valley, subsidence occurs primarily as a result of over-pumping the groundwater, and persistent groundwater overdraft conditions. Figure 5.13-8, below, portrays two primary subsidence bowls that have persisted in the Westside Subbasin. This figure shows the extent of subsidence areas as measured over the 46-year period between 1926 and 1972. While subsidence conditions can decrease and increase depending upon climatic conditions and pumping pressures, when they are present, they tend to be concentrated in and around the northern and southern “bowls” portrayed in the figure below.

Dry conditions beginning in the 2020 Water Year have led to renewed subsidence within most of the Subbasin. Similar pumping patterns to the 2012-2016 drought have emerged leading to a decline in water levels measured at extensometers which approach lows experienced during the 2012-2016 period (WWD GSA and County of Fresno GSA-West~~lands~~side 2022a). Subsidence conditions affect water supply availability, as pumping groundwater from a subsidence prone area would exacerbate subsidence conditions, which would be counter to objectives for sustainable management of the subbasin. Areas prone to subsidence are also priority areas for ASR projects.

As described in the Westside Subbasin GSP, the GSAs are currently implementing a subsidence monitoring network throughout the subbasin, in cooperation with other agencies including the USGS, DWR, and USBR. The monitoring network provides robust spatial coverage of subsidence conditions using enhanced monitoring in key locations along the San Luis Canal, where rates of subsidence impact the freeboard and conveyance capacity in the San Luis Canal (WWD GSA and County of Fresno GSA-Westside 2023a (pg. ES-12). Measurements taken through the existing subsidence monitoring network are taken continuously, bi-annually and annually depending on the monitoring agency (WWD GSA and County of Fresno GSA-Westside 2023a (pg. ES-12).

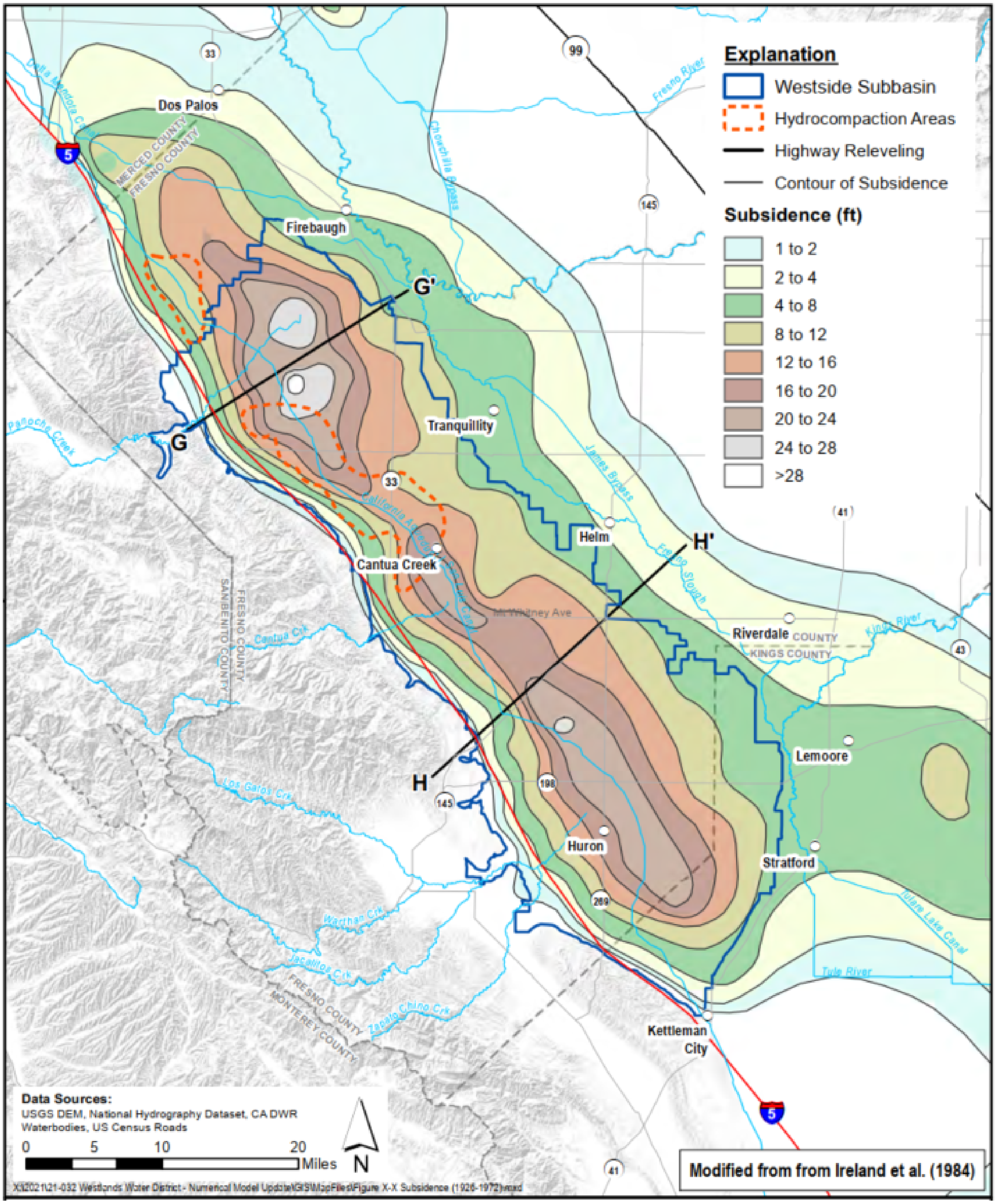
The extent of subsidence and potential efficacy of mitigation would be dependent upon both regional and site-specific information; therefore, the GSAs would continue to collect and analyze data pertinent to subsidence in the Upper Aquifer (WWD GSA and County of Fresno GSA-~~Westlands~~ Westside 2022a).

Nearby Wells

As required by Appendix B Requirement (B), Figure 5.13-9a through Figure 5.13-9h on the following pages identify existing wells within 0.5 mile of the Project site. Data from the SWRCB and USGS’s Groundwater Ambient Monitoring and Assessment (GAMA) Program was used to understand the depth and status of existing groundwater wells in the Project area. The GAMA Program provides comprehensive data on existing wells, including irrigation wells. Of the nearby domestic wells listed in GAMA, mean well completion depths range from 140 to 800 ft. Of the nearby irrigation wells, mean well completion depths range from 260 to 1,260 ft.

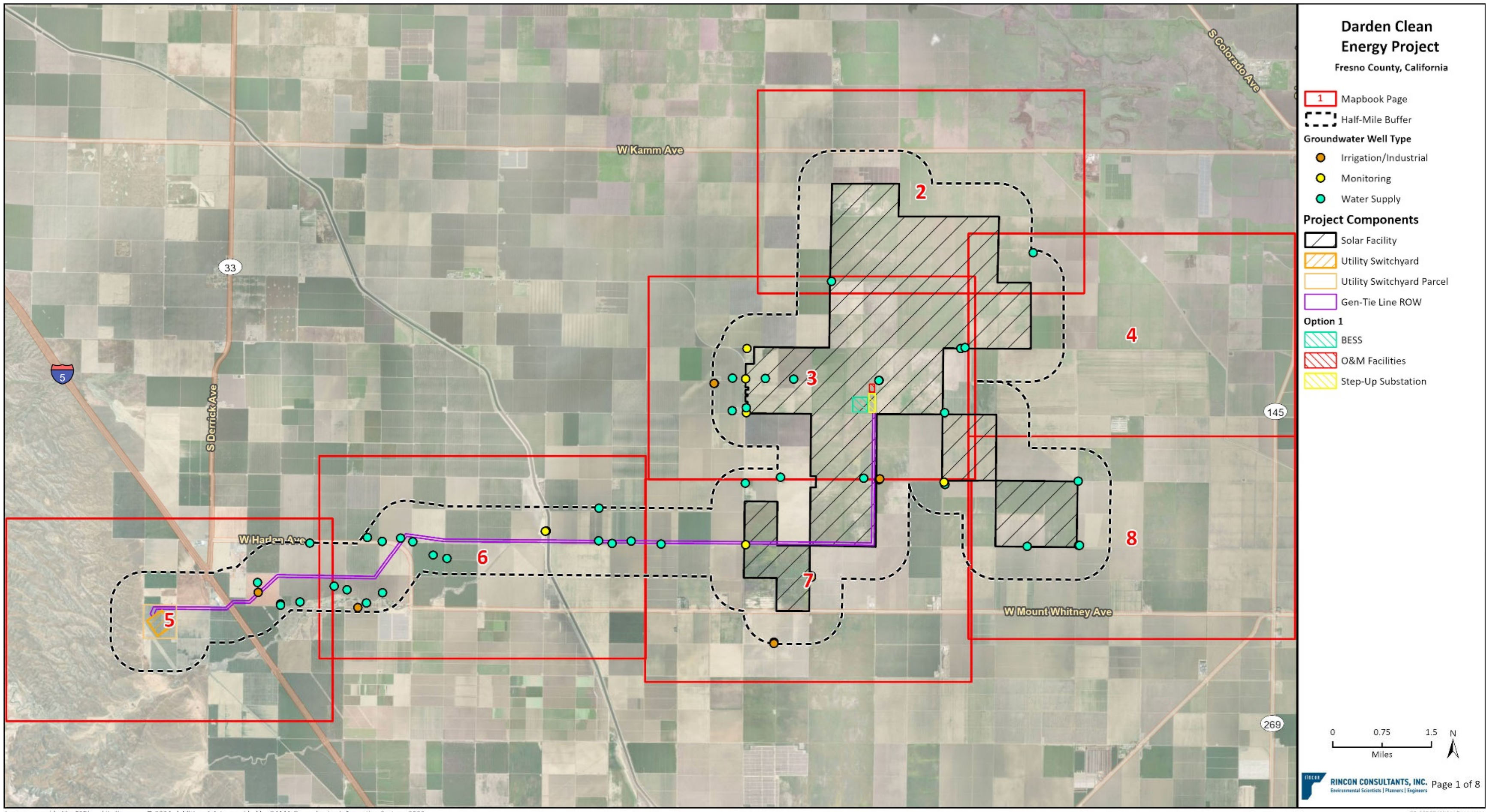
~~As shown in Figure 5.13-3, *Depth to Groundwater,* depth to groundwater is greatest along the foothills to the west of the Project site, and decreases towards the valley floor to the east of the Project site.~~

Figure 5.13-8 Land Surface Subsidence in the Westside Subbasin (1926 – 1972)



Source: WWD GSA and County of Fresno GSA-Westside~~lands~~ 2022a (Figure 2-56)

Figure 5.13-9a Groundwater Well Locations Overview



Imagery provided by ESRI and its licensors © 2024. Additional data provided by GAMA Groundwater Information System, 2023.

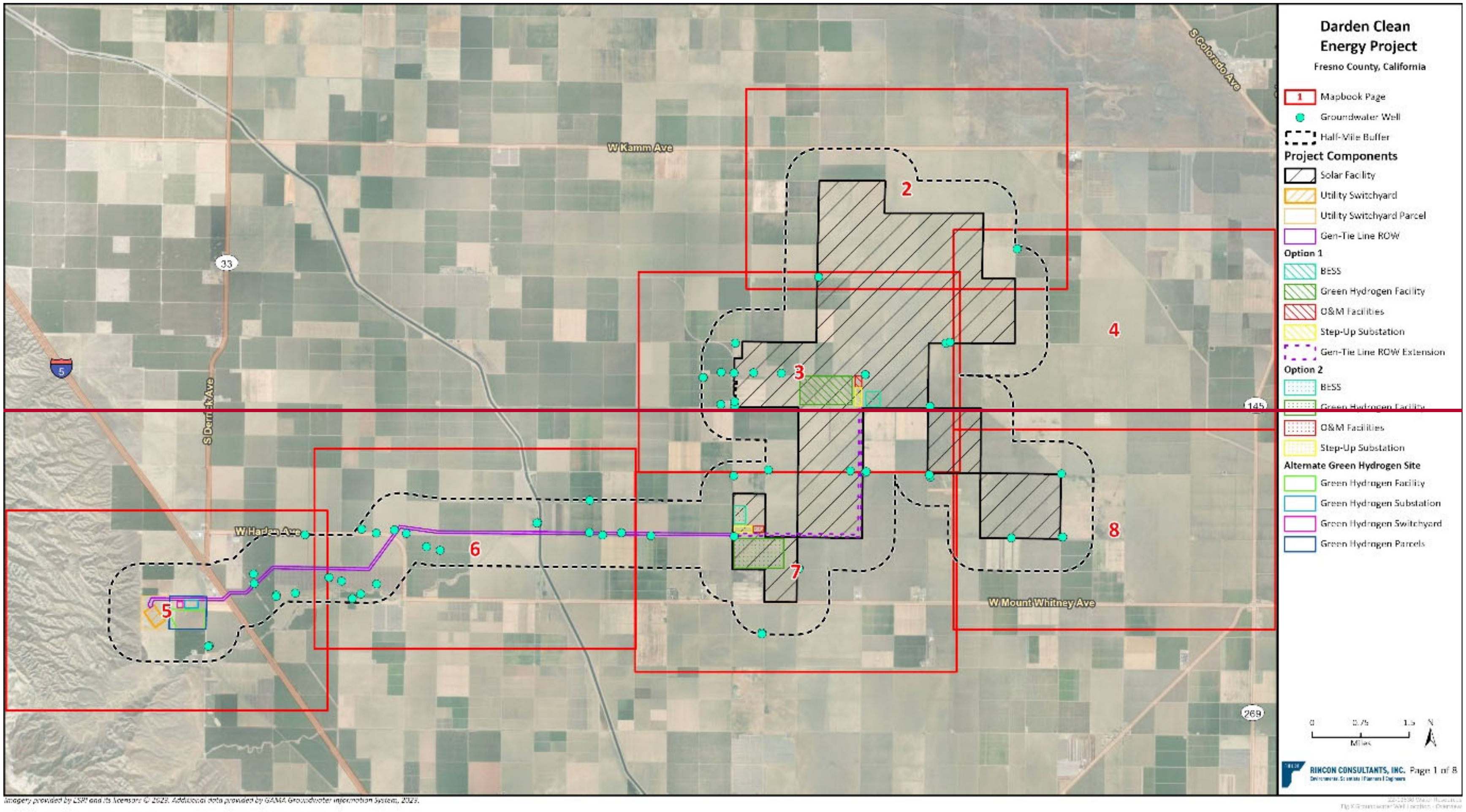
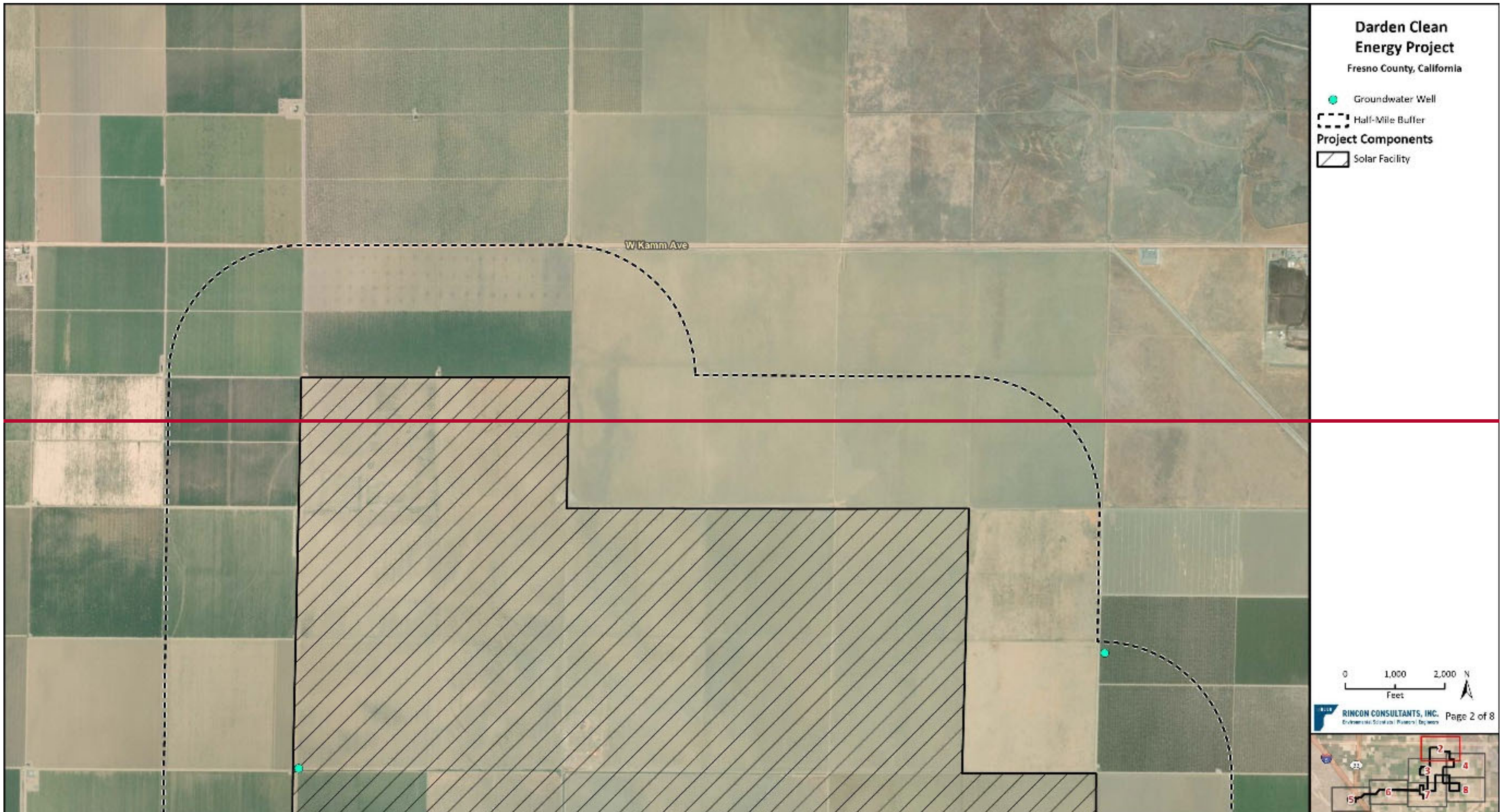

Darden Clean Energy Project
Fresno County, California
Mapbook Page
Groundwater Well
Half-Mile Buffer
Project Components
Solar Facility
Utility Switchyard
Utility Switchyard Parcel
Gen-Tie Line ROW
Option 1
BESS
Green Hydrogen Facility
O&M Facilities
Step-Up Substation
Gen-Tie Line ROW Extension
Option 2
BESS
Green Hydrogen Facility
O&M Facilities
Step-Up Substation
Alternate Green Hydrogen Site
Green Hydrogen Facility
Green Hydrogen Substation
Green Hydrogen Switchyard
Green Hydrogen Parcels
0
0.75
1.5
Miles
N
RINCON CONSULTANTS, INC.
Page 1 of 8
W Kamm Ave
S Colorado Ave
S Derrick Ave
W Harlan Ave
W Mount Whitney Ave
33
5
145
269
2
3
4
5
6
7
8
Imagery provided by ESRI and its licensors © 2023. Additional data provided by GAMA Groundwater Information System, 2023.

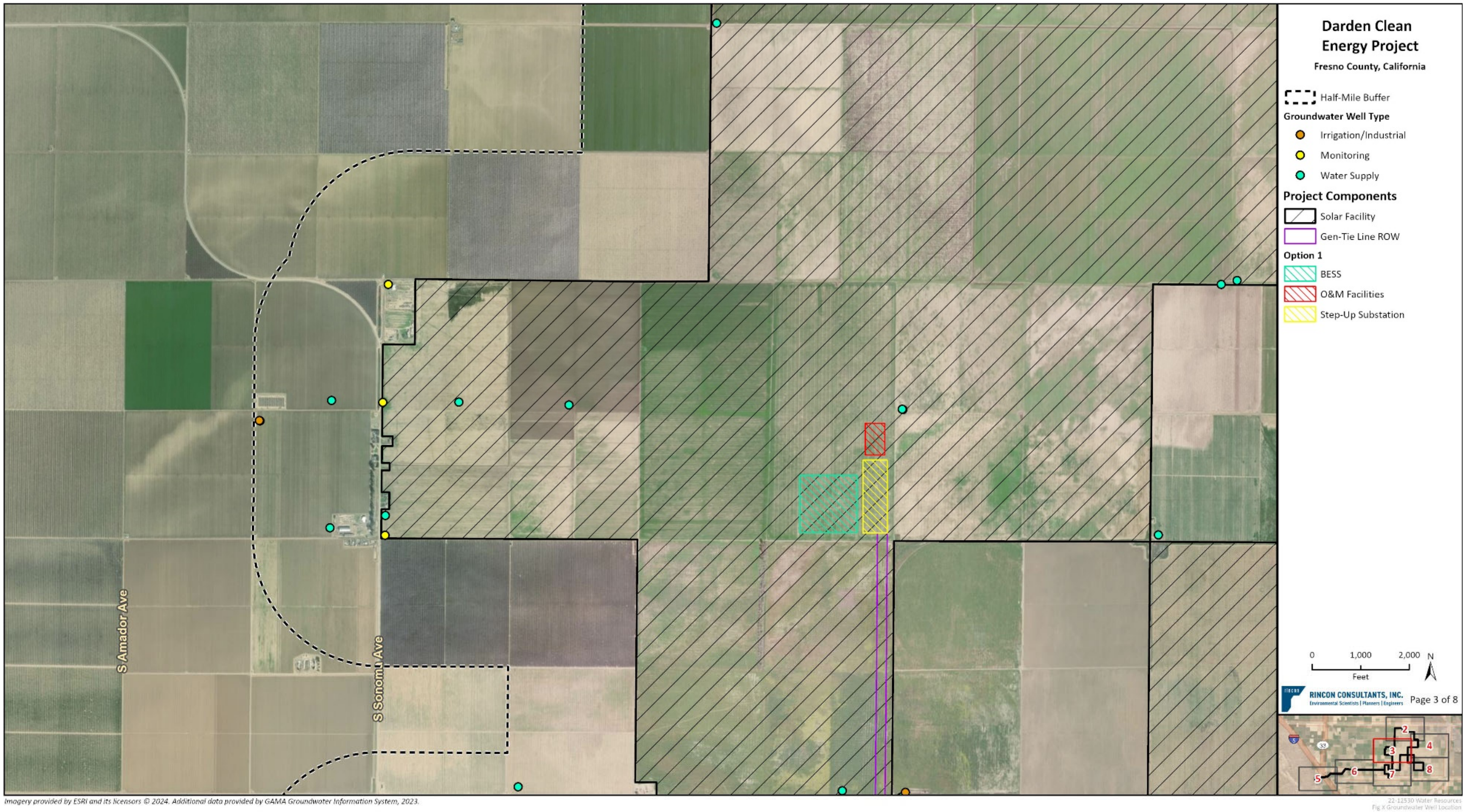
Figure 5.13-9b Groundwater Well Locations (Mapbook Page 2)

Imagery provided by ESRI and its licensors © 2024. Additional data provided by GAMA Groundwater Information System, 2023.



Imagery provided by ESRI and its licensors © 2023. Additional data provided by GAMA Groundwater Information System, 2023.

Figure 5.13-9c Groundwater Well Locations (Mapbook Page 3)

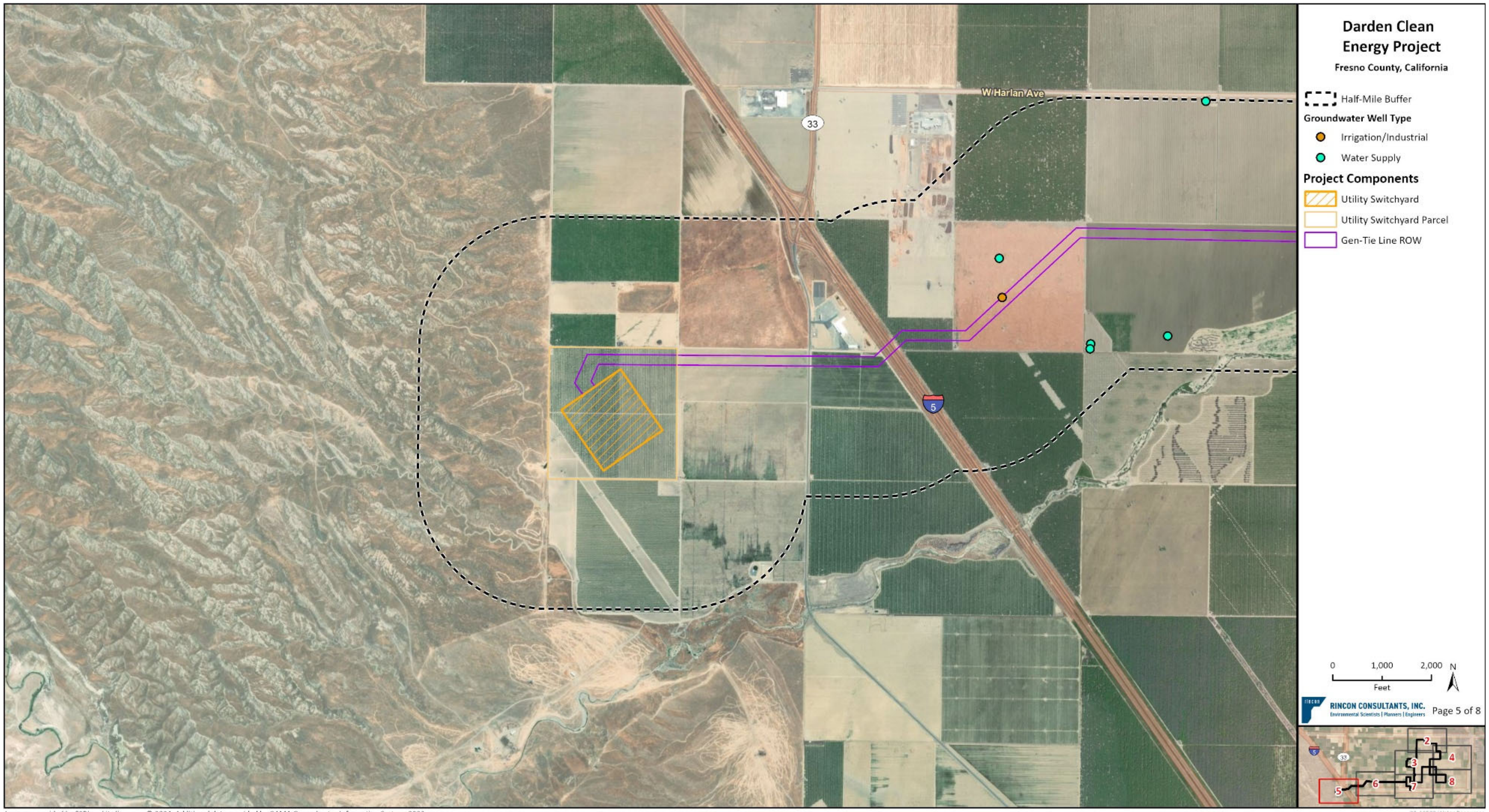



Darden Clean Energy Project
Fresno County, California
Groundwater Well
Half-Mile Buffer
Project Components
Solar Facility
Option 1
BESS
Green Hydrogen Facility
O&M Facilities
Step-Up Substation
Gen-Tie Line ROW Extension
0
1,000
2,000
Feet
N
RINCON CONSULTANTS, INC.
Page 3 of 8
S Amador Ave
S Sonoma Ave

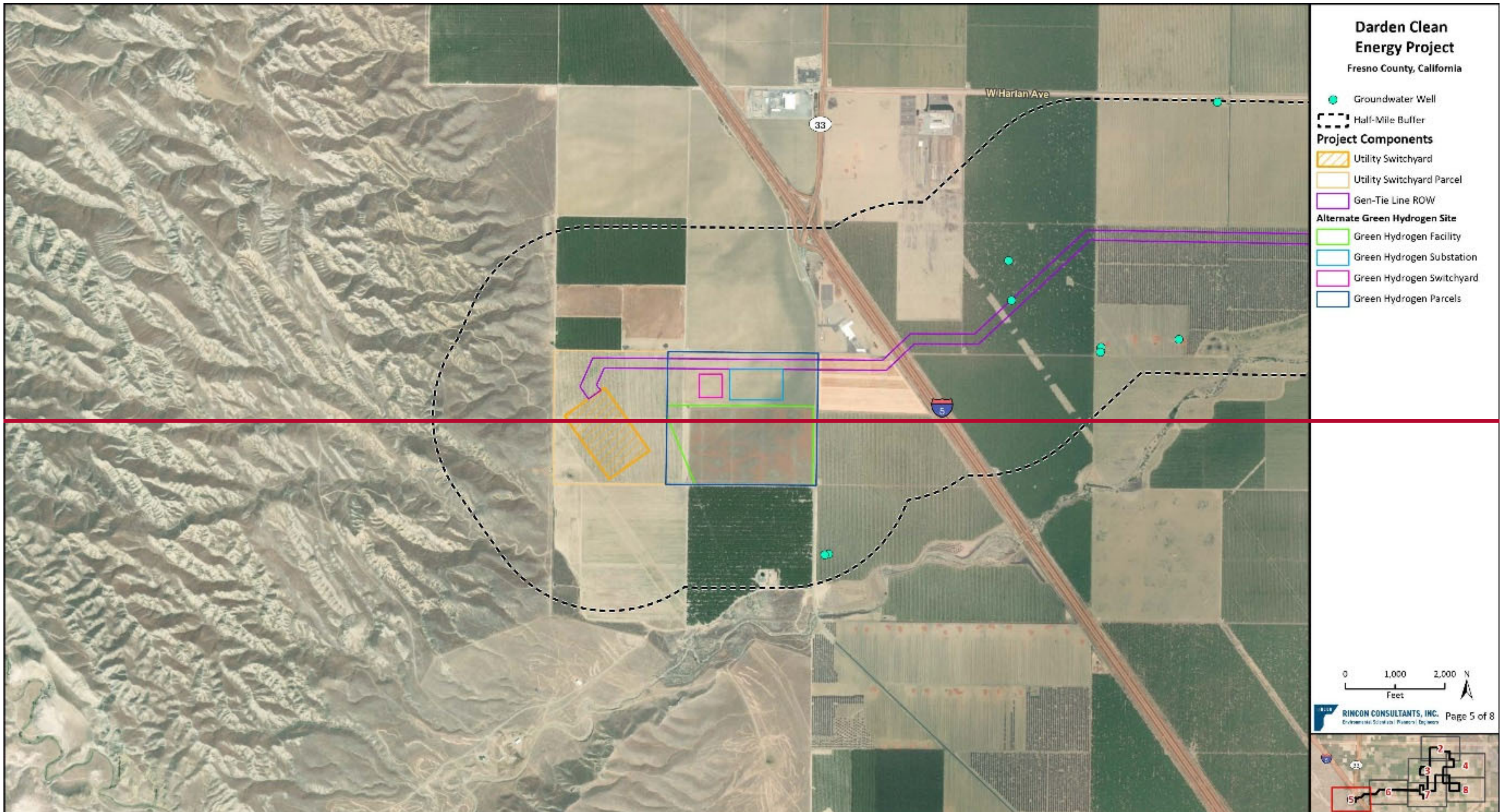
Figure 5.13-9d Groundwater Well Locations (Mapbook Page 4)


Darden Clean Energy Project
Fresno County, California
Groundwater Well
Half-Mile Buffer
Project Components
Solar Facility
145
0
1,000
2,000
Feet
N
RINCON CONSULTANTS, INC.
Page 4 of 8
2
3
4
5
6
7
8
Imagery provided by ESRI and its licensors © 2023. Additional data provided by GAMA Groundwater Information System, 2023.

Figure 5.13-9e Groundwater Well Locations (Mapbook Page 5)

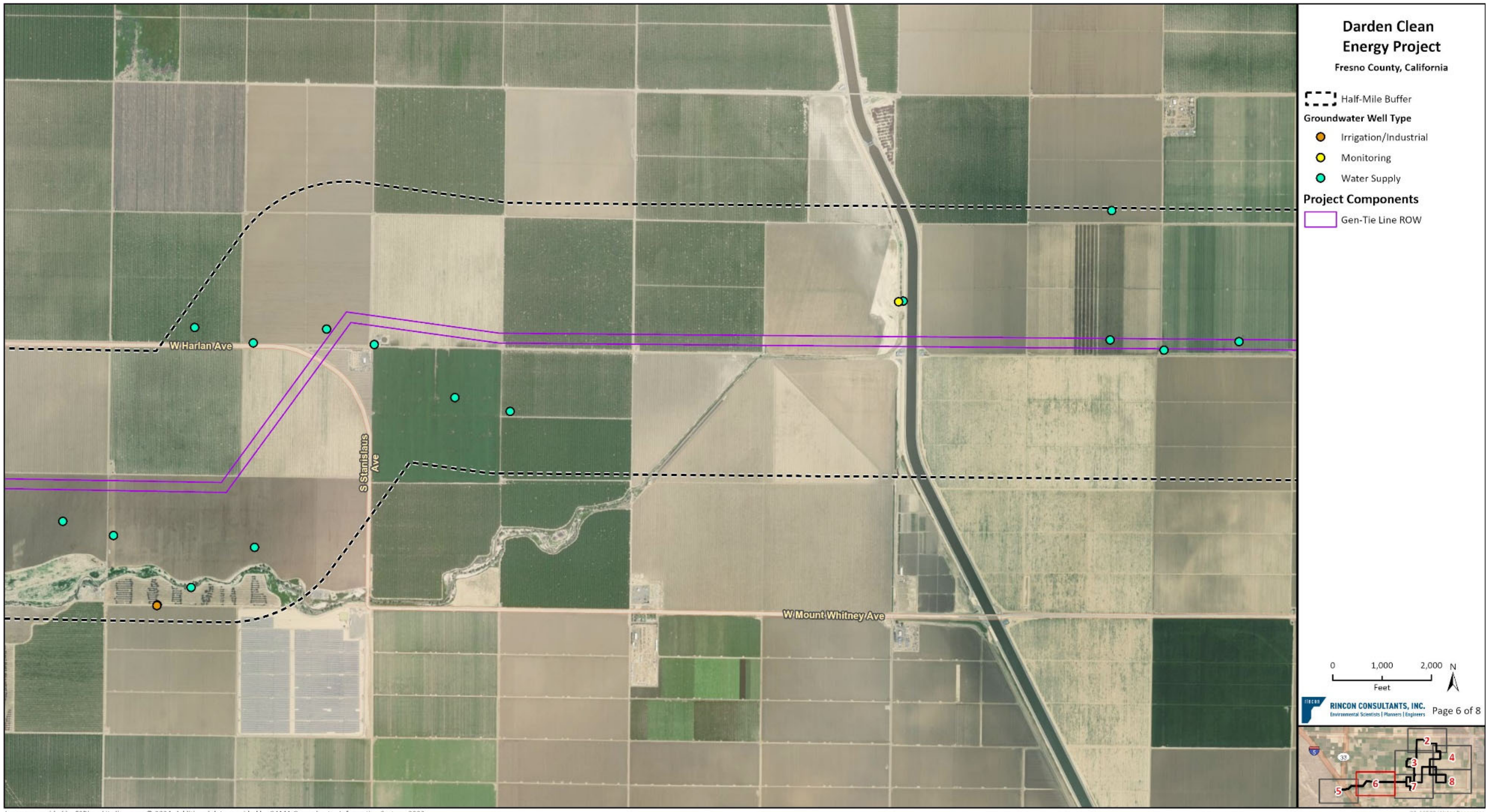


Imagery provided by ESRI and its licensors © 2024. Additional data provided by GAMA Groundwater Information System, 2023.



Imagery provided by ESRI and its licensors © 2023. Additional data provided by GAMA Groundwater Information System, 2023.

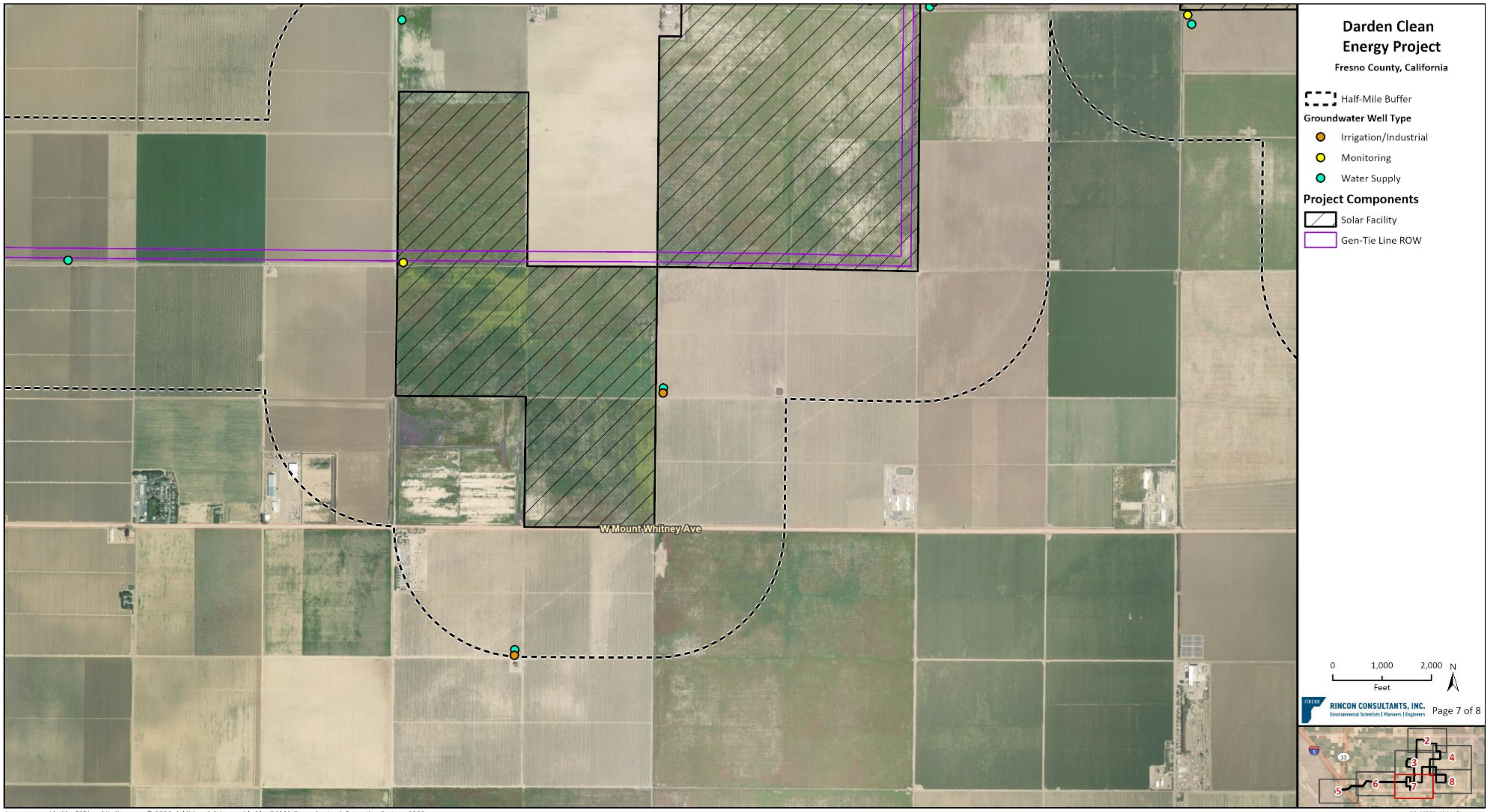
Figure 5.13-9f Groundwater Well Locations (Mapbook Page 6)



Imagery provided by ESRI and its licensors © 2024. Additional data provided by GAMA Groundwater Information System, 2023.

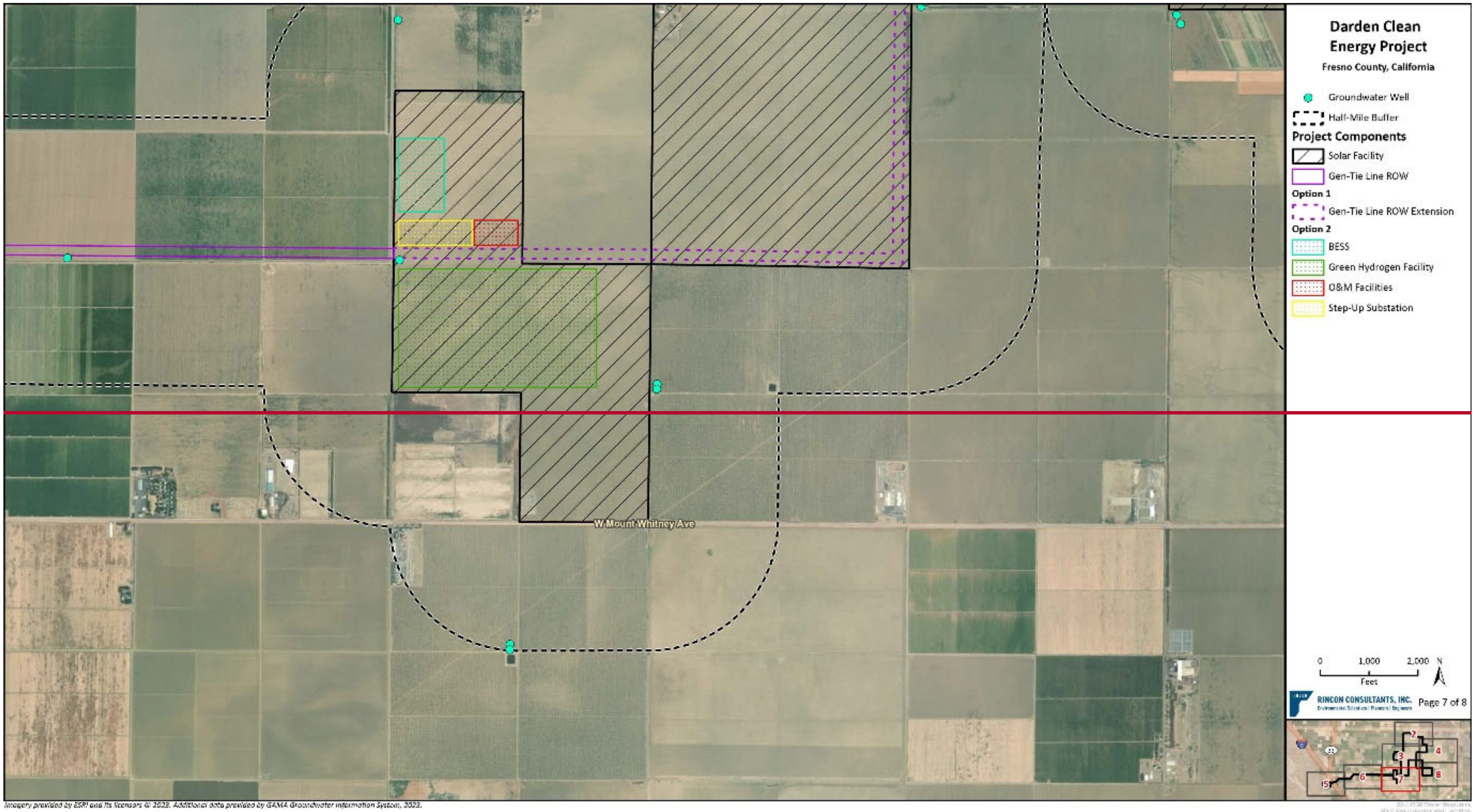
Imagery provided by ESRI and its licensors © 2023. Additional data provided by GAMA Groundwater Information System, 2023.

Figure 5.13-9g Groundwater Well Locations (Mapbook Page 7)



Imagery provided by ESRI and its licensors © 2024. Additional data provided by GAMA Groundwater Information System, 2023.

22-12530 Water Resources
Fig X Groundwater Well Location


Darden Clean Energy Project
Fresno County, California
Groundwater Well
Half-Mile Buffer
Project Components
Solar Facility
Gen-Tie Line ROW
Option 1
Gen-Tie Line ROW Extension
Option 2
BESS
Green Hydrogen Facility
O&M Facilities
Step-Up Substation
W Mount Whitney Ave
0
1,000
2,000
Feet
N
RINCON CONSULTANTS, INC.
Page 7 of 8
2
3
4
5
6
7
8