Appendix A-1

Tule Subbasin Coordination Agreement
Attachment 1: Tule Subbasin Monitoring Plan v. 3 Draft-Final

TULE SUBBASIN COORDINATION AGREEMENT ATTACHMENT 1

Tule Subbasin Monitoring Plan v. 3 Draft-Final

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Prepared for

Tule Subbasin Technical Advisory Committee

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Acronyms

GSP	Groundwater Sustainability Plan
SGMA	Sustainable Groundwater Management Act, California's framework for the recovery and ongoing management of groundwater basins. SGMA empowers local agencies to form Groundwater Sustainability Agencies (GSAs) to manage basins sustainably and requires those GSAs to adopt Groundwater Sustainability Plans (GSPs) for crucial groundwater basins in California.
DWR	Department of Water Resources
GSA	Groundwater Sustainability Agency
TAC	Technical Advisory Committee
TSMP	Tule Subbasin Monitoring Plan
DO	Dissolved Oxygen
EC	Electrical Conductivity
TDS	Total Dissolved Solids
QAPP	Quality Assurance Project Plan
USGS	United States Geological Society
USBR	United States Bureau of Reclamation
GPS	Global Positioning System
NGS	National Geodetic Survey
TRA	Tule River Association
ACOE	Army Core of Engineers
ILRP	Irrigated Lands Regulatory Program
DMS	Data Management System, an application with a database back-end that will track and manage the data of the end users as well as provide administrative
SQL	structured query language
End User/User	Person who will use the product, but not a member of staff, administration, or development team.
UI	User Interface, the part of the application that end users and staff interact with.

1.0 Background

This monitoring plan has been prepared to describe the monitoring features and monitoring methodologies to be used to collect the data to be included in Tule Subbasin Groundwater Sustainability Plans (GSPs) and annual reports, as required by the Sustainable Groundwater Management Act (SGMA). This plan is for the Tule Subbasin (see Figure A1-1), as described in California Department of Water Resources (DWR) Bulletin 118.[1] The Tule Subbasin is subdivided into seven Groundwater Sustainability Agencies (GSAs), each with their own GSP.

As required by Section 10727.2 of the Water Code, each GSP must include:

(d) Components relating to the following, as applicable to the basin:

(1) The monitoring and management of groundwater levels within the basin.

(2) The monitoring and management of groundwater quality, groundwater quality degradation, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin.

(3) Mitigation of overdraft.

(4) How recharge areas identified in the plan substantially contribute to the replenishment of the basin.

(5) A description of surface water supply used or available for use for groundwater recharge or in-lieu use.

(e) A summary of the type of monitoring sites, type of measurements, and the frequency of monitoring for each location monitoring groundwater levels, groundwater quality, subsidence, streamflow, precipitation, evaporation, and tidal influence. The plan shall include a summary of monitoring information such as well depth, screened intervals, and aquifer zones monitored, and a summary of the type of well relied on for the information, including public, irrigation, domestic, industrial, and monitoring wells.

(f) Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence, for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect

[1] DWR, 2016. Final 2016 Bulletin 118 Groundwater Basin Boundaries shapefile. http://www.water.ca.gov/groundwater/sgma/basin_boundaries.cfm

groundwater levels or quality or are caused by groundwater extraction in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management.

The Tule Subbasin Technical Advisory Committee (TAC) has determined that a single monitoring plan that includes the entire Tule Subbasin is necessary in order to identify the types of data to be collected throughout the subbasin, the minimum number of monitoring features from which to collect data, and the monitoring protocols to be followed by each GSA, in order to ensure that the same methodologies are followed as required by California Water Code Section 10727.6 of SGMA. This Tule Subbasin Monitoring Plan (TSMP) serves that purpose.

1.1 Plan Objectives 354.34 (b)

The TSMP has been prepared to meet the following subbasin-wide objectives:

- To ensure that the data collected within the basin are in sufficient quantities, areal distribution, frequency and accuracy to provide meaningful results for demonstrating progress toward achieving measurable objectives of each GSA and the sustainability goal of the subbasin as a whole.
- To monitor impacts to the beneficial uses and users of groundwater.
- To monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
- Enable the quantification of annual changes in water budget components.
- To identify data gaps and monitoring features to address the data gaps.
- To provide a standard methodology for the collection of surface water, groundwater, and land surface subsidence data within the Tule Subbasin.
- To provide for a central, secure monitoring database available to the GSAs for their use in preparing their respective groundwater sustainability plans and annual reports.

The TSMP is both flexible and iterative, allowing for the addition or subtraction of monitoring features, as necessary, and to accommodate changes in monitoring frequency and alternative methodologies, as appropriate.

1.2 Area Encompassed by the Monitoring Plan

The area addressed by this plan is the Tule Subbasin, as defined by the latest version of DWR Bulletin 118 as shown on Figure A1-1. The Tule Subbasin area is 744 square miles (475,895 acres). The Tule Subbasin has been subdivided into the following seven GSAs (see Figure A1-1):

- Eastern Tule GSA

- Kern-Tulare Water District GSA
- Lower Tule River Irrigation District GSA
- Pixley Irrigation District GSA
- Delano-Earlimart GSA
- Tri-County Water Authority (TCWA)
- Alpaugh GSA

1.3 Monitoring Plan Organization

The monitoring plan addresses the following types of data:

- Surface Water Data
- Groundwater Data
- Land Elevation and Subsidence Data

Each data type will be addressed in its own section that includes a description of the monitoring features for collecting data, the data collection protocols, and the monitoring frequency.

The final section of the monitoring plan describes the data management program that includes a description of the database management platform, criteria for data QA/QC, file storage, security and access, database maintenance and documentation.

2.0 Monitoring Networks 354.34

This monitoring plan presents the minimum groundwater monitoring network to be relied on by the Tule Subbasin GSAs to prepare their annual reports. Data to be collected from the monitoring network will include surface water flow, surface water quality, groundwater levels, groundwater quality and land elevation data. Groundwater levels and quality data will be collected from a network of monitoring wells spaced throughout the Tule Subbasin. The monitoring well network includes existing monitoring wells, existing domestic and agricultural wells, and new wells to be added. As some of the existing wells require further investigation prior to formal inclusion in the monitoring network, and the exact locations of new monitoring wells are yet to be determined, it will be necessary to modify the monitoring network over time to add/remove monitoring features and adjust locations.

2.1 Chronic Lowering of Groundwater Levels 354.34 (c) (1)

As there are significant differences in hydraulic head and aquifer characteristics with depth in the Tule Subbasin, monitoring wells have been identified to enable the collection of data from each of the significant subsurface hydrogeologic units in the area. These units include (in order from shallowest to deepest):

- The Upper Aquifer
- The Lower Aquifer
- The Santa Margarita Formation

The depths of each of these units follow the hydrogeological conceptual model of the Tule Subbasin outlined in the Subbasin Setting and incorporated into the Tule Subbasin Groundwater Flow Model.[2] The Upper Aquifer is generally located above the Corcoran Clay in the western part of the subbasin and above other confining beds in the eastern part of the subbasin. The Upper Aquifer is generally unconfined to semi-confined. The Upper Aquifer varies in depth from approximately 400 ft below ground surface (ft bgs) in the western portion of the basin to less than 100 ft bgs in the northeastern portion. The Lower Aquifer is below the Corcoran Clay and extends to depths ranging from approximately 2,200 ft bgs in the western portion of the Tule Subbasin to 400 ft bgs near State Route 99. The Santa Margarita Formation occurs at depths ranging from 700 to 2,000 ft bgs in the southeastern portion of the Tule Subbasin.

Monitoring wells are identified with perforations exclusively in the Upper Aquifer, Lower Aquifer, or Santa Margarita Formation. Individual wells perforated across multiple aquifer layers (i.e.

[2] TH&Co, 2020. Groundwater Flow Model of the Tule Subbasin. Prepared for the Tule Subbasin MOU Group. Dated January 2020.

"composite wells") will only be relied upon in the monitoring plan if no other wells are available for monitoring in the area. Over time, wells in the monitoring network that are perforated across multiple aquifers will be replaced with nested or cluster wells with perforations specific to the Upper, Lower, or Santa Margarita Formation aquifers.

2.1.1 Monitoring Features

2.1.1.1 Upper Aquifer Monitoring Wells

Upper aquifer monitoring wells are shown on Figure A1-2. A total of 121 monitoring wells have been identified for monitoring the Upper Aquifer (see Appendix A). Of these wells, 25 have been designated as RMS wells (see Table A1-1). The Upper Aquifer monitoring wells are further described below.

Existing Upper Aquifer Monitoring Wells with Historical Records

Of the 121 wells identified for monitoring the Upper Aquifer, 25 have historical groundwater level records and meet the minimum criteria specified in Section 3.2.1.1 of the Coordination Agreement. Groundwater level hydrographs for these wells are provided in Appendix B.

Existing Upper Aquifer Monitoring Wells – No Historical Records (to be Investigated)

There are numerous existing wells with documented total depth and perforation interval(s) within the Upper Aquifer that could be incorporated into the monitoring network but require further investigation. These wells have no historical groundwater level records and owner permission for access the wells has not been pursued. However, if access is approved by the owner and the wells are demonstrated to meet the minimum criteria for monitoring wells, they may be incorporated into the monitoring plan. Many of these existing Upper Aquifer wells, to be confirmed through further investigation, have been identified for consideration in the monitoring plan (see Figure A1-2; Table A1-1). In addition, 27 wells that are part of the water quality monitoring network are included in the groundwater level monitoring network. These wells have been selected to help fill aerial coverage data gaps for monitoring Upper Aquifer groundwater levels.

Potential existing Upper Aquifer wells for which access has been denied or, upon investigation, do not otherwise meet the minimum criteria specified in Section 3.2.1.1 of the Coordination Agreement, will be removed and replaced with an alternate existing well with documented total depth and perforation interval located in the same area. If no other wells exist in the area, a new Upper Aquifer monitoring well may be constructed in the area.

2.1.1.2 Lower Aquifer Monitoring Wells

Lower Aquifer monitoring wells are shown on Figure A1-2. A total of 144 monitoring wells have been identified for monitoring the Lower Aquifer (see Appendix A). For the purpose of this TSMP, an additional 49 composite wells and Santa Margarita Aquifer wells are included with the Lower Aquifer wells. Of the Lower Aquifer, composite, and Santa Margarita Aquifer wells, 30 have been designated as RMS wells (see Table A1-2). These wells are further described below.

Existing Lower Aquifer Monitoring Wells with Historical Records

Of the 144 existing wells identified for monitoring the Lower Aquifer, 21 are existing wells with historical groundwater level records and meet the minimum criteria specified in Section 3.2.1.1 of the Coordination Agreement. Groundwater level hydrographs for these wells are provided in Appendix C. Groundwater level hydrographs for six composite and three Santa Margarita Aquifer wells are provided in Appendices D and E, respectively.

Existing Lower Aquifer Monitoring Wells – No Historical Records (to be Investigated)

There are numerous existing wells with documented total depth and perforation interval(s) within the Lower Aquifer that could be incorporated into the monitoring network but require further investigation. It is anticipated that this work to investigating existing wells that are monitored will be started in water year 2024/25. These wells have no historical groundwater level records and owner permission to access the wells has not been pursued. However, if access is approved by the owner and the wells are demonstrated to meet the minimum criteria for monitoring wells, they may be incorporated into the monitoring plan. Many of these existing Lower Aquifer wells, to be confirmed through further investigation, have been identified for consideration in the monitoring plan (see Figure A1-2; Table A1-2). In addition, 21 wells that are part of the water quality monitoring network are included in the groundwater level monitoring network. These wells have been selected to help fill aerial coverage data gaps for monitoring Lower Aquifer groundwater levels.

Potential existing Lower Aquifer wells for which access is denied or, upon investigation, do not otherwise meet the minimum criteria specified in Section 3.2.1.1 of the Coordination Agreement, will be removed and replaced with an alternate existing well with documented total depth and perforation interval located in the same area. If no other wells exist in the area, a new Lower Aquifer well will be constructed in the area.

2.1.2 Monitoring Procedure

Groundwater level measurements shall be collected from each well using either a steel tape, a calibrated well sounder, or a pressure transducer. Where possible, groundwater level

measurements shall be collected with a steel tape or an electrical groundwater level sounder calibrated to the nearest 0.01 ft. For pre-existing wells with limited access, a calibrated steel tape and chalk or acoustic sounder may be used. All equipment must be in good working condition. No damaged or uncalibrated electrical sounding tape shall be used. All new monitoring wells shall be equipped with calibrated pressure transducers and corrected for barometric pressure with a vented cable or separate barometric pressure transducer.

Groundwater level measurements must be representative of static (i.e. non-pumping) groundwater level conditions. To ensure measurement of static groundwater levels in active pumping wells, the field technician collecting the data must verify that the pump has been off for at least 24 hours prior to collecting the data.

2.1.2.1 Manual Groundwater Level Measurements

The following monitoring procedure shall be used to obtain manual groundwater level measurements in the field:

- Upon arrival at each site, the field technician shall note the well name, time of day, and date on the standard groundwater level data form (see Appendix F).
- For groundwater level measurements taken with chalk and steel tape, the field technician shall use the groundwater level data form provided in Appendix G.
- The field technician shall document the duration since last pumping of the well occurred and document if any nearby pumping is known.
- All monitoring equipment shall be cleaned prior to lowering it into the well(s) using the following decontamination procedure:
    - Wash equipment with an Alconox solution which is followed by a deionized water rinse.
    - Triple rinse equipment with deionized water.
    - Place equipment on clean surface such as teflon or polyethylene sheet to air dry.
- To measure the depth to groundwater with a steel tape or an electrical sounder or meter, slowly lower the steel tape or water level electrical tape into the designated sounding port for production wells and into the main well for monitoring wells. Steel tapes and electrical tapes are lowered to the water surface, as determined by the audio signal, meter, or technician. Depths to groundwater are measured relative to the dedicated reference point at the top of the casing or sounding tube. Depth to groundwater shall be immediately recorded on the standard groundwater level data form (see Appendix F). Depths to groundwater shall be compared to previous measurements in the field and re-measured if significantly different.
- For wells with limited access (such as agricultural wells or domestic wells equipped with a pump), a steel tape and chalk may be used. For this method, chalk is applied to a 1- to

3-foot section of the steel tape prior to lowering in the well. The steel tape is lowered to a depth at least 1-ft below the static groundwater level and a whole number on the calibrated tape is matched to the reference point at the surface. Both the foot mark held at the reference point and the groundwater level observed on the chalk shall be recorded on the standard field forms (see Appendix G). The difference between the two is the depth to groundwater.

- When finished sounding the groundwater level, all downhole equipment shall be removed, and where existing, the well cap shall be replaced, and the riser locked.
- Prior to leaving the monitoring well site, the field technician shall note any physical changes in the concrete well pad and riser pipe, such as erosion, cracks or damage. All changes shall be recorded on the standard field forms provided in Appendices F and G.

2.1.2.2 Automatic Groundwater Level Measurements Using Transducers

Transducers shall be installed in all new monitoring wells and existing monitoring wells identified as representative monitoring sites. Transducers shall be installed below the groundwater level with enough submergence to accommodate anticipated groundwater level fluctuations. The following additional monitoring procedures shall be used for transducers:

- Transducers shall be corrected for barometric pressure with a vented cable or separate barometric pressure transducer.
- Desiccants in transducers with a vented cable shall be replaced in accordance with the manufacturer's specifications.
- Before removing a transducer that will be reinstalled at the same depth, place an identifying mark on the cable (colored electrical tape or other identifying mark) to ensure that pressure transducers are installed to the same depth during reinstallation.

2.1.3 Frequency of Measurement

Groundwater level measurements from existing domestic and irrigation wells shown on Figure A1-2 will be collected semi-annually in the Spring (primarily February but also March or April) and in the Fall (primarily October but also September and November). To the extent possible, groundwater level monitoring events will be coordinated between GSAs so that measurements are taken at the time of greatest recovery and maximum depth.

Groundwater level measurements from all new monitoring wells and wells designated as representative monitoring sites will be collected using pressure transducers permanently installed in the wells and set to collect one measurement per day. Pressure transducers will be downloaded on a semi-annual basis. During each download session, the field technician will also obtain a manual groundwater level measurement in order to verify transducer readings and ensure that the instruments are working properly.

2.2 Reduction in Groundwater Storage § 354.34 (c) (2)

Changes in groundwater storage within the Tule Subbasin will be estimated using either of the methods identified in Section 3.6 of the Tule Subbasin Coordination Agreement. Groundwater level data to be relied on for the change in groundwater storage estimates will be collected as described in Section 2.1 of this TSMP.

2.3 Seawater Intrusion § 354.34 (c) (3)

Seawater intrusion cannot occur in the Tule Subbasin due to its location with respect to the Pacific Ocean. The Tule Subbasin is approximately 110 miles inland of the Pacific Ocean and is separated from the ocean by approximately 90 miles of sedimentary rocks that make up the Coast Ranges. These sedimentary rocks effectively separate the Pacific Ocean hydraulically from the aquifer system in the San Joaquin Valley. Further, the Coast Ranges are dissected by multiple northwest trending faults, the largest of which is the San Andreas Fault. These faults form groundwater flow barriers, which further act to separate the San Joaquin Valley aquifers from the Pacific Ocean. Accordingly, groundwater pumping in the Tule Subbasin cannot induce seawater intrusion. As such, monitoring for seawater intrusion is not necessary and is not included in this monitoring plan.

2.4 Degraded Water Quality § 354.34 (c) (4)

The monitoring and characterization of groundwater quality conditions has historically been conducted and reported by other public agencies and/or non-profits to meet requirements of other regulatory programs, which focus on the prevention of degradation of groundwater quality. The existing groundwater quality monitoring programs that the Tule Subbasin GSAs coordinate with are described in **Error! Reference source not found.** and support beneficial uses and users within the Subbasin for the Upper Aquifer (Figure A1-13) and the Lower Aquifer (Figure A1-14).

To prevent duplication of efforts and competing datasets for the ILRP, CV-Salts Nitrate Control Program, and SGMA GSAs, the Tule Subbasin utilizes a single group to manage the monitoring efforts within the Subbasin for collectively meeting the various requirements of these programs being implemented at the local level. This level of coordination between these agencies and groups ensures that the efforts performed under each program help provide a cohesive response to providing short term and long-term solutions to groundwater management.

The groundwater quality monitoring network described in the 2022 GSPs relied on monitoring features included in the Tule Basin Water Quality Coalition's (TBWQC) groundwater quality trend monitoring program. The monitoring network and sampling schedule requirements fall under ILRP General Order R5-2013-0120-09. The GSAs have also relied upon publicly available dataset from SDWIS to characterize and monitor groundwater quality of public water systems.

In addition to the existing monitoring programs, The Tule Subbasin GSA's analyze groundwater quality samples collected from a network of Representative Monitoring Sites (RMS) in the Upper Aquifer (Figures A1-15 and A1-17 and Table A1-5) and Lower Aquifer ((Figures A1-16 and A1-18 and Table A1-6). These RMS are strategically placed wells monitored annually during the summertime when groundwater pumps are running to determine trending of groundwater quality conditions within the Tule Subbasin. The RMS well network is comprised of privately owned domestic and agricultural wells throughout the subbasin. In the 2022 revision of the Coordination Agreement, it was proposed that RMS quality wells be designated for Agricultural or Domestic use depending on the dominate surrounding land use. This approach is being modified so that all current and future RMS locations will be monitored for all regulatory drinking water standards COCs. Current gaps in the RMS well network have been identified for future additions to the network (Figure N/A).

Groundwater samples shall be collected and analyzed annually, during summer months, from the wells shown on Figures A1-17 and A1-18 consistent with the Draft Tule Basin Water Quality Coalition Surface Water and Groundwater Monitoring Plan and Quality Assurance Program Plan (Appendix H). The groundwater sampling protocols described herein will ensure that:

- Groundwater quality data are collected from the correct location
- Groundwater quality data are accurate and reproducible
- Groundwater quality data represent conditions that inform appropriate basin management decisions
- All salient information is recorded to normalize, if necessary, and compare data
- Data are handled in a way that ensures data integrity

2.4.1 Groundwater Quality Constituents to be Analyzed

Annual water quality monitoring of the wells shown on Figures A1-17 and A1-18 will include laboratory analysis for nitrate as N only (see Table A1-3). Prior to collecting the samples in the field, the field technician will collect measurements of temperature, pH, dissolved oxygen (DO) and electrical conductivity (EC) from the well discharge, as described in Section 2.4.2 herein.

Every five years, samples from the wells shown on Figure A1-3 will be analyzed for an expanded list of analytes. In addition to nitrate, samples will be analyzed for total dissolved solids (TDS) and major cations and anions (see Table A1-3). Prior to collecting the samples in the field, the field technician shall collect measurements of temperature, pH, DO and EC from the well discharge, as described in Section 2.4.2 herein.

2.4.2 Groundwater Quality Samples from Existing Domestic Water Supply or Irrigation Wells

The field technician shall document all groundwater sampling activities on the standard groundwater sampling form (see Appendix I). Domestic water supply and irrigation wells that are active (i.e. that have pumped in the last 24 hours) shall be pumped for a minimum of 10 minutes and shall meet the field parameter requirements below before sampling. Domestic and irrigation wells that are inactive (i.e. have not pumped in the last 24 hours) shall be sampled after purging the well for a period of time adequate to remove at least three well volumes removed prior to sampling and shall meet the field parameter requirements below (see Appendix I).

During pumping and prior to sample collection, the field technician shall obtain field measurements of temperature, pH, DO and EC from water collected from the sample port. Meters for measuring pH, DO and EC shall be field calibrated in accordance with manufacturer's specifications at the beginning of each sampling day. Samples will be collected when: (1) a minimum of four sets of parameter readings have been obtained; and (2) the temperature, pH, and EC reach relatively constant values.

All samples shall be collected from the discharge point nearest the well head and placed in laboratory-prepared sample containers. The technician collecting the sample shall wear new latex or neoprene gloves while collecting the sample. Sample containers shall be labeled before or immediately after sampling with self-adhesive tags having the following information written in waterproof ink:

- Project number
- Sample I.D. number
- Sample location
- Date and time sample was collected
- Initials of sample collector

2.4.3 Groundwater Quality Samples from Monitoring Wells

All groundwater samples from monitoring wells will be collected consistent with procedures described in the United States Environmental Protection Agency's (USEPA's) Low-flow (Minimal Drawdown) Groundwater Sampling Procedures.[6] Low-flow purging can be conducted using either portable or dedicated (leave in well) pump systems. A submersible pump, diaphragm pump, or positive displacement pump, which may contain a bladder, may be used for evacuating

[6] Puls, R.W., and Barcelona, M.J., 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. EPA document 540/S-95-504.

(purging) the monitoring well casing and collecting the samples. The pump-intake should be set in the middle or slightly above the middle of the screened interval in the well and documented in the field notes. Other equipment necessary for collecting groundwater samples using the low-flow sampling method include:

- A water level measurement device, or water level sounder
- In-line flow through cell to monitor water quality parameters
- Field forms for documenting water quality parameters measured at each monitoring well
- Chain of custody forms
- Laboratory prepared sample containers from a State-certified laboratory with the appropriate labels for the analytes being measured
- Gloves
- Cleaning supplies for decontaminating
- Tubing for the pump

All samples shall be collected from a discharge port at the wellhead and placed in laboratory-prepared sample containers. For dissolved trace metal analyses, samples will be collected in unpreserved bottles, then filtered through a 0.45-micron filter and acidified prior to analysis in accordance with the laboratory's instructions. The technician collecting the sample shall wear new latex or neoprene gloves while collecting the sample. Sample containers shall be labeled before or immediately after sampling with self-adhesive tags having the following information written in waterproof ink:

- Project number
- Sample I.D. number
- Sample location
- Date and time sample was collected
- Initials of sample collector

2.4.4 Well Sampling Records

Data collected during groundwater sampling will be recorded on the standard forms provided in Appendix I. Information and data to be recorded shall include:

- Sample I.D.
- Duplicate I.D., if applicable
- Date and time sampled
- Name of sample collector
- Well designation (State well numbering system for water supply wells)
- Owner's name, or other common designation

- Well diameter
- Depth to water on day sampled
- Casing volume on day sampled
- Method of purging (bailing, pumping, etc.)
- Extraordinary circumstances (if any)
- Field measurements temperature (0º C), pH, specific electrical conductivity (at 25ºC µs/cm), and dissolved oxygen (mg/l)
- Number and type of sample container(s)
- Times corresponding to water quality measurements
- Pumping rate at time of sampling

In addition to the standard forms for collecting data, the field technician shall keep a daily field record for each day of fieldwork. Following review by the project manager, the original records shall be kept in the project file.

2.4.5 Handling, Storage and Transportation of Samples

Upon collection and labeling, all samples shall be placed immediately into a clean chest/cooler with ice in order to keep samples cool. Exposure to dust, direct sunlight, high temperature, adverse weather conditions, and possible contamination shall be avoided.

All samples will be transported to a State-certified analytical laboratory within 24 hours of collection. Samples shall be transported under chain-of-custody procedures, which document the transfer of custody of samples from the field to the laboratory. Each sample sent to the laboratory for analysis shall be recorded on a Chain-of-Custody Record, which includes instructions to the laboratory for analytical services.

Information contained on the triplicate Chain-of-Custody Record shall include:

- Project number
- Signature of sampler(s)
- Date and time sampled
- Sample I.D.
- Number of sample containers
- Sample matrix (water)
- Analyses required
- Remarks, including preservatives, special conditions, or specific quality control measures
- Turnaround time and person to receive laboratory report
- Method of shipment to the laboratory
- Release signature of sampler(s), and signatures of all people assuming custody

- Condition of samples when received by laboratory

Blank spaces on the Chain-of-Custody Record will be crossed out between the last sample listed and the signatures at the bottom of the sheet.

The field sampler shall sign the Chain-of-Custody Record and record the time and date at the time of transfer to the laboratory or to an intermediate person. A set of signatures is required for each relinquished/reserved transfer, including intermediate transfers. The original imprint of the Chain-of-Custody Record will accompany the sample containers. A duplicate copy shall be placed in the project file.

If the samples are to be shipped to the laboratory, the original Chain-of-Custody will be sealed inside a plastic bag within the ice chest, and the chest shall be sealed with custody tape which has been signed and dated by the last person listed on the Chain-of-Custody. U. S. Department of Transportation shipping requirements shall be followed and the sample shipping receipt retained in the project file as part of the permanent chain-of-custody document. The shipping company (e.g. Federal Express, UPS, DHL) will not sign the chain-of-custody forms as a receiver, instead the laboratory shall sign as a receiver when the samples are received.

2.4.6 Quality Control Samples

Quality control samples shall consist of duplicates and blanks. At least one duplicate sample shall be collected during each day of sampling. The duplicate sample shall be collected from the same well as the original and immediately after the original sample. At least one blank sample shall be included with each batch of samples delivered to the laboratory. Blank samples shall consist of laboratory prepared deionized water that is containerized at the laboratory and delivered with the sample containers. Duplicate and blank samples will be analyzed by the laboratory, as specified in the project Quality Assurance Project Plan (QAPP)[7] or by the project manager (see Appendix H).

2.4.7 Frequency of Measurement

Groundwater quality samples will be collected from the wells shown on Figures A1-3 and A1-18 on an annual basis, during the summer, and analyzed as described in Section 2.4.1 herein.

[7] Tule Basin Water Quality Coalition, 2017. Groundwater Trend Monitoring Workplan. January 6, 2017.

2.5 Land Subsidence 354.34 (c) (5)

Land surface subsidence has been observed in multiple areas within the Tule Subbasin. Based on United States Geological Survey (USGS) measurements and analysis of land subsidence that occurred in the area in the 1950s and 1960s,[8] it has been determined that the land subsidence is associated with lowered groundwater levels due to groundwater pumping in areas where the subsurface contains a significant amount of clay and silt. Recent land subsidence in the Tule Subbasin has resulted in lowered flow capacity in the Friant-Kern Canal. Subsidence has also been observed from satellite data in the western portion of the subbasin.

2.5.1 Monitoring Features

Monitoring of changes in land surface elevation related to groundwater withdrawal will be conducted through surveyed benchmarks, data collected from extensometers, and satellite data.

2.5.1.1 Surveyed Benchmarks

A total of 99 benchmark stations have been established to monitor changes in land elevation across the subbasin using GPS measurements (see Figure A1-4). Each survey station is a benchmark labeled with the station identification. Of these, 61 have been designated as RMSs. An additional 33 benchmark stations established by the Friant Water Authority (FWA) and an additional 38 benchmark stations established by the ETGSA Land Subsidence Monitoring Plan are included in the monitoring network. In addition to the existing benchmark network, more benchmarks may be established in the subbasin in the future.

2.5.1.2 Satellite Data (InSAR)

Changes in land surface elevation over time can be observed on a regional scale using satellite data. The data is generated using interferometric synthetic aperture radar (InSAR). Eighty-four InSAR monitoring points based on measured satellite data are shown between benchmarks stations to illustrate the amount of land surface elevation changes between 2015 to 2023 (see Figure A1-4). InSAR data is available and will be obtained from the CDWR on a quarterly basis.

2.5.1.3 Extensometers

The USGS collects data on aquifer system compaction, which causes land subsidence, from one existing extensometer near Porterville (22S/27E-30D2; see Figure A1-4). This station is located adjacent to the Friant-Kern Canal approximately one mile north of the Deer Creek crossing and

[8] Lofgren, B.E., and Klausing, R.L., 1969. Land Subsidence Due to Ground-Water Withdrawal, Tulare-Wasco Area of California. USGS Professional Paper 437-B.

collects aquifer compaction of sediments from the land surface to a depth of 1,180 ft. Data from this extensometer can be accessed via the USGS website.

In addition to the existing extensometer, additional extensometers may be established at strategic locations of the subbasin in the future.

2.5.2 Monitoring Procedure

2.5.2.1 Surveyed Benchmarks

The benchmark station GS network will be established and monitored in accordance with National Geodetic Survey (NGS) Guidelines for Establishing GPS-Derived Ellipsoid Heights (National Oceanographic and Atmospheric Administration and Guidelines for Establishing GPS-Derived Orthometric Heights.[9] All GPS-derived elevations will be constrained to an established NGS benchmark located on Lake Success Dam (KT 200). All land surface elevation readings will be to an accuracy of 0.1 feet relative to NAVD88.

Land surface elevations from the Porterville GPS Station will be downloaded from the UNAVCO website as needed.

2.5.2.2 Extensometers

The USGS extensometer is equipped with a continuous monitoring device to record aquifer system compaction. Aquifer system compaction data will be downloaded from the USGS website for analysis as data updates are available.

2.5.2.3 Satellite Data (InSAR)

InSAR data will be obtained from the Jet Propulsion Laboratory, USGS, or European Space Agency for processing. The data will be analyzed and interpreted by an outside professional (Neva Ridge Technologies, Inc. or approved equal) in order to develop maps showing regional land surface changes.

[9] NOAA, 1997.

2.5.3 Frequency of Measurement

2.5.3.1 Global Positioning Surveys

GPS surveys of the stations shown on Figure A1-4 will be conducted on an annual basis correlated to groundwater quality sampling events. GPS surveys of stations located within the Friant-Kern Canal Monitoring Zone will be conducted on a quarterly basis.

2.5.3.2 Extensometers

Aquifer system compaction is measured on a continuous basis at the USGS extensometer. Aquifer system compaction data will be downloaded from the USGS website for analysis as data updates are available.

2.5.3.3 Satellite Data (InSAR)

InSAR data will be obtained and analyzed on a quarterly basis.

2.6 Depletions of Interconnected Surface Water 354.34 (c) (6)

Surface water flow in the Tule River and Deer Creek ultimately flow into the historical Tulare Lake but only during periods of prolonged above-normal precipitation. Surface water flow in the White River does not reach the Tulare Lakebed. Surface water flow in the Tule River, including flow beyond the Tule Subbasin, is monitored and managed by the Tule River Association (TRA). Surface water flow in the Deer Creek and White River are monitored by the USGS and USBR. The current monitoring features, monitoring procedures, and monitoring frequency for surface water in the Tule Subbasin follows the features, procedures, and frequency already in place by these organizations. It is noted that additional monitoring features are identified in Section 4.1.

2.6.1 Monitoring Features

A primary source of water to the Tule Subbasin is surface water runoff originating in the Sierra Nevada Mountains. The primary rivers/streams contributing surface water to the subbasin include the Tule River, Deer Creek, and White River (see Figure A1-7). Each of these rivers/streams contain existing surface water monitoring stations for the collection of both stream flow and surface water quality. The following summarizes the key monitoring features and locations in the subbasin.

2.6.1.1 Tule River

Stream flow in the portion of the Tule River that is within the Tule Subbasin is determined by controlled releases from Lake Success, measured by the Army Corps of Engineers (ACOE). Stream flow entering Lake Success is measured and distributed to various water rights holders as

allocated at Success Dam in accordance with the Tule River Water Diversion Schedule and Storage Agreement.[10] The accounting of surface water flow, storage, streambed losses, and diversions is documented for each water year in the TRA annual reports from 1962 through 2017.

Tule River Stream Flow – Main Channel

Stream flow in the Tule River is measured by the ACOE below Success Dam, at Rockford Station downstream of Porterville, and at Turnbull Weir by the TRA (see Figure A1-5). In addition, releases of imported Central Valley Project water into the Tule River and Porter Slough from the Friant-Kern Canal are conducted at two locations, which are measured via weir structures managed by the USBR. Details regarding the location and construction of each stream flow gage are provided in Table A1-4.

Tule River Diversions - Structures and Headgates

Between Lake Success Dam and the Turnbull Weir, water is diverted from the Tule River to various water right holders. Diversion locations are shown on Figure A1-5 and described as follows:

Pioneer Water Company:

> The headgate is a portion of the Success Reservoir outlet works and consists of a 42-inch gated conduit. The gaging station is a standard 5-foot concrete Parshall flume located 100 feet downstream of the reservoir outlet works at a point approximately 2,100 feet south and 1,400 feet east of the northwest corner of Section 35, Township 21 South, Range 28 East, M.D.B.&M., being in the southeast quarter of the northeast quarter of said Section 35.

Porter Slough at Headgate

> The Porter Slough Headgate diverts water from the main channel of the Tule River to the Porter Slough, an ancestral branch of the Tule River that extends from the headgate to the LTRID No. 4 Canal (see Figure A1-5). The headgate is located in the southeast quarter of the northeast quarter of Section 4, Township 22 South, Range 28 East, M.D.B.&M. Five bays of flashboards control the diversions from the Tule River in Porter Slough.

[10] TRA, 1966. Tule River Diversion Schedule and Storage Agreement. Dated February 1, 1966; revised June 16, 1966.

Flows at the headgate of Porter Slough are computed by the addition of 5 cubic-feet per second to the daily mean flows measured at the Porter Slough at Porterville (B Lane) gaging station.

Porter Slough at Porterville

The gaging station is a rated section of the natural channel situated approximately 2,900 feet west and 1,100 feet north of the southeast corner of Section 32, Township 21 South, Range 28 East, M.D.B.&M. and 1.4 miles below the Porter Slough headgate in the Boydston Weir.

Porter Slough Ditch Company

The headgate is located in the Porter Slough check structure at Putnam Street being approximately 2,500 feet west and 1,500 feet north of the Southeast corner of Section 26, Township 21 South, Range 27 East, M.D.B.&M., being in the northwest quarter of the southeast quarter of said Section 26. The gaging station is a rated section 150 feet below the headgate.

Porter Slough Below Avenue 192

Porter Slough terminates with discharge through a concrete check structure into the No. 4 Canal of LTRID located near the center of Section 11, Township 21 South, Range 26 East, M.D.B.&M., one-half mile easterly of Tulare County Road 192. A daily weir measurement is used for recording the flow of Porter Slough Below 192.

Downstream of Avenue 192, the Porter Slough discharges into a series of unlined canals that deliver water to farmers in the LTRID.

Campbell and Moreland Ditch Company:

The headgate is located near the South end of Boydston Weir at a point approximately 600 feet west and 1,700 feet south of the northeast corner of Section 4, Township 22 South, Range 28 East, M.D.B.&M., being in the southeast quarter of the northeast quarter of said Section 4. The gaging station is a rated concrete lined canal section 2,600 feet below the headgate.

Vandalia Ditch Company:

The headgate is located in the south end of Vandalia Weir at a point approximately 1,160 feet west and 170 feet north of the southeast corner of Section 32, Township 21 South, Range 28 East, M.D.B.&M., being in the southeast quarter of the southeast quarter of said Section 32. The gaging station is a rated section 1,000 feet below the headgate.

Hubbs & Miner Ditch Company:

The canal diverts along the North levee of the Tule River at a point approximately 2,600 feet west and 2,100 feet north of the southeast corner of Section 35, Township 21 South, Range 27 East, M.D.B.&M., being in the northwest quarter of the southeast quarter of said Section 35. The gaging station is a rated section 3,100 feet below the canal diversion and 85 feet downstream of the river bypass headgate structure.

Poplar Irrigation Company:

The canal diverts along the south levee of the Tule River at a point approximately 740 feet west and 1,000 feet north of the southeast corner of Section 36, Township 21 South, Range 27 East, M.D.B.&M., being in the southeast quarter of the southeast quarter of said Section 36. The gaging station is a rated section 3,400 feet below the canal diversion and 325 feet downstream of the river bypass headgate structure.

Woods-Central Ditch Company:

The headgate structure is located in the South bank of the Tule River at a point approximately 2,300 feet west and 2,200 feet north of the southeast corner of Section 30, Township 21 South, Range 27 East, M.D.B.&M., being in the northwest quarter of the southeast quarter of said Section 30. The gaging station is a rated section 150 feet below the River diversion.

2.6.1.2 Deer Creek

Deer Creek is a natural drainage that originates in the Sierra Nevada Mountains, flowing in a westerly direction north of Terra Bella and between Pixley and Earlimart (see Figure A1-5). The Deer Creek channel extends to the Homeland Canal, although surface water flow rarely reaches that location.

Deer Creek Stream Flow

Stream flow in Deer Creek is measured at the United States Geological Survey (USGS) gage at Fountain Springs (five miles east of, and outside of, the Tule Subbasin boundary), Trenton Weir, and at the point where Deer Creek outlets to the Homeland Canal (see Figure A1-5). Details regarding the location and construction of each stream flow gage are provided in Table A-4 and summarized below.

Friant-Kern Canal Discharges into Deer Creek

Friant-Kern Canal water is also discharged into Deer Creek approximately five miles upstream of Trenton Weir and measured by the USBR (see Figure A1-5).

2.6.1.3 White River

The White River drains out of the Sierra Nevada Mountains east of the community of Richgrove in the southern portion of the Tule Subbasin (see Figure A1-5). The White River channel extends as far as State Highway 99 but does not reach the historical Tulare Lake bed. Streamflow in this river is currently monitored manually at Road 208 by the Tule Basin Water Quality Coalition and the Delano-Earlimart Irrigation District.

2.6.2 Monitoring Procedure

2.6.2.1 Surface Water Flow Measurements

With the exception of the White River Turnbull Weir at Road 208, Porter Slough at 192, and Deer Creek outlet to Homeland Canal, all gaging stations and diversion structures on the Tule River and Deer Creek are equipped with water stage recorders that collect water stage readings automatically every 15 minutes. The gage on the Tule River Below Success Dam is operated and managed by the ACOE. The Trenton Weir on Deer Creek is operated and managed by the ACOE. All other gages (with the exceptions noted) report data electronically in real time to the TRA/LTRID.

Stream flow at the Turnbull Weir is measured manually when flow passes the gage. Manual measurements involve recording the reading on the staff gage in the river and conducting current meter measurements for verifying the rating curve and table. Current meter measurements will be collected within the rated section of the natural channel under laminar flow conditions. The required frequency of manual measurements at the Turnbull Weir is addressed in Section 2.6.3. Staff gage and current meter readings are recorded immediately after completion of the measurement and any significant shifts are verified immediately by re-measurement. All readings are recorded on standard forms that include the time the measurement began, the time the measurement was completed, the staff gage height in feet to the nearest hundredth, and any other pertinent data with respect to channel conditions, growth, etc.

For water stage recorders, should the flow double within any 24-hour period, the bi-hourly gage heights shall be converted to second-foot flows and the mean daily flow computed from the second-foot quantities rather than utilizing the normal procedure of obtaining a mean daily gage height and the gage height to a second-foot flow. In the final review of gage sheets, shifts shall be prorated through the period during which the change occurred as determined from the current meter measurements, unless the Hydrographer determines a specific reason for the shift to occur at a definite time.

2.6.2.2 Surface Water Quality Measurements

Surface water quality samples have historically been collected and analyzed from the Tule River, Deer Creek and White River by the Tule Basin Water Quality Coalition surface water quality program. Surface water quality monitoring stations are shown on Figure A1-5.

Surface Water Quality Monitoring Locations – Tule River

Porter Slough at Road 192

Surface water quality samples are collected from Porter Slough upstream of the discharge into the LTRID canal (see Figure A1-5). This surface water monitoring site is located approximately eight miles northwest of Porterville, California.

Tule River at Road 144

Surface water quality samples are collected from the North Fork of the Tule River at Road 144, approximately 3.5 miles northwest of Woodville, California.

Tule River at Road 92

Surface water quality samples are collected from the Tule River at Road 92, approximately four miles northwest of Tipton, California.

Surface Water Quality Monitoring Locations – Deer Creek

Surface water samples are collected from the following locations in Deer Creek:

Deer Creek at Road 248

Located approximately 2.5 miles northeast of Terra Bella in the foothills of the Sierra Nevada Mountains.

Deer Creek at Road 176

Located at Trenton Weir.

Deer Creek at Road 120

Located approximately six miles southeast of Pixley, California at the Road 120 bridge.

Surface Water Quality Monitoring Locations – White River

Surface water quality samples are collected from the White River at Road 208 when flow occurs.

2.6.2.3 Surface Water Quality Constituents

Each surface water quality sample is analyzed by a State certified analytical laboratory for the constituents listed in Table A1-7. In general, these constituents include electrical conductivity (EC), pH, dissolved oxygen (DO), E. Coli bacteria, total organic carbon (TOC), total suspended solids (TSS), total dissolved solids (TDS), turbidity, selected metals, hardness, ammonia, nitrate as N, orthophosphate, and phosphorus.

2.6.3 Frequency of Measurement

2.6.3.1 Stream Flow

Stream flows at gaged stations and diversion points are measured on a continuous basis and electronically transmitted to the TRA/LTRID.

For stream flows at locations with no established gage within the Tule River and Deer Creek systems (e.g. Turnbull Weir and Porter Slough at 192), a current meter measurement is made at least once every two weeks when flows occur. An initial current meter measurement is made as soon as flow is detected and a final current meter measurement is made just prior to discontinuance of flow. Current meter measurements are made when a major change in the stage of flow occurs whether the flow is an increase or a decrease.

For the White River, there are currently no active gages, which has been identified as a data gap (see Section 4.1.3). The White River at Road 208 station operated by the USGS has been inactive since 2005.

2.6.3.2 Surface Water Quality

Surface water quality samples are collected from all of the surface water quality monitoring locations shown on Figure A1-5 on a monthly basis when flow occurs.

2.6.4 Stream Gage Calibration and Maintenance

Manual readings are conducted at each active gaging station at least once per month in order to assess the accuracy of the gage reading to the rating curve. Adjustments are made as necessary.

All gaging stations undergo maintenance at least once per year to clean and backwash inlet pipes, clean and adjust recorder and appurtenances, check and repair time clocks, and repaint the station enclosures, as needed. If the time is off more than one-half hour, or the pen is off more than 0.05 feet, the recorder is reset to correct readings, the pen shall conform to the tape, and the drum shall be rolled for restarting the operation on a new coordinate with revised gage heights denoted.

Gage sheets are reduced as readily as possible after removal from the recorder withadditional notations made for assistance in subsequent reviews. Such notations includeestimated flows should the recorder provide an incomplete recording due to fouling, clock malfunction or if growth is observed in the channel.

3.0 Representative Monitoring §354.36

3.1.1 Groundwater Levels

A subset of groundwater level monitoring features in the monitoring plan have been identified as representative monitoring sites to be relied on for the purpose of assessing progress with respect to groundwater level sustainability in the subbasin. The representative groundwater level monitoring sites are shown on Figure A1-2. At least one representative groundwater level monitoring site has been identified within each management area. Where possible based on available wells, representative monitoring sites have been chosen with perforations exclusively in either the Upper, Lower, or Santa Margarita Aquifer. To provide adequate spatial coverage of the subbasin, some representative monitoring sites include perforations across multiple aquifers until new monitoring features can be constructed. Tiles around each RMS, by aquifer, have been developed to show the areas closest area to each RMS well (see Figures A1-6a, A1-6b and A1-6c). Representative groundwater level monitoring wells will be equipped with pressure transducers to measure groundwater levels on a daily basis.

3.1.2 Reduction of Groundwater Storage

Changes in groundwater storage within the Tule Subbasin will be estimated using either of the methods identified in Section 3.6 of the Tule Subbasin Coordination Agreement. Groundwater level data to be relied on for the change in groundwater storage estimates will be collected as described in Section 2.1 of this TSMP from the monitoring network shown on Figure A1-2. As such, there are no single representative monitoring sites for evaluating progress with respect to groundwater sustainability as it relates to changes in groundwater storage in the subbasin.

3.1.3 Seawater Intrusion

Seawater intrusion cannot occur in the Tule Subbasin due to its location with respect to the Pacific Ocean (see Section 2.3 herein). As such, representative monitoring sites for evaluating progress with respect to groundwater sustainability as it relates to seawater intrusion are not needed.

3.1.4 Degraded Groundwater Quality

The groundwater quality monitoring network was developed based on an analysis of beneficial uses and users (e.g. municipal and domestic supply, agricultural irrigation, and industrial water supply) and known groundwater quality conditions as described in Attachment 5 of the

Coordination Agreement.[11] The following criteria was used as a basis for selecting RMS groundwater quality wells:

1. Located near (preferably up-gradient) of drinking water wells
2. Located in regions with known historical COC exceedances or contaminated plumes
3. Must represent groundwater quality conditions in a single aquifer (no composite wells), relative to criteria 1 and 2
4. Ability to access and collect representative samples at a minimum semi-annually, to capture seasonal trends

Many of the current RMS network wells are privately owned domestic or agricultural wells. A subset of groundwater quality monitoring features in the monitoring plan that have been identified as representative monitoring sites to be relied on for the purpose of assessing progress with respect to groundwater quality sustainability in the subbasin are shown on Figure A1-3.

3.1.5 Land Subsidence

Representative monitoring sites for land subsidence within the Tule Subbasin consist of the network of GPS benchmark stations and InSAR monitoring points shown on Figure A1-4. Land subsidence within the Land Subsidence Enhanced Monitoring and Management Zones of the Friant-Kern Canal is monitored in accordance with the ETGSA Land Subsidence Monitoring Plan.[12]

3.1.6 Interconnected Surface Water

Evaluation of groundwater levels in the upper reaches of the Tule River and Deer Creek suggest that groundwater is at least periodically interconnected with surface water in these areas. This is supported by the presence of groundwater dependent ecosystems in these areas. At the time of publishing this version of the TSMP, the CDWR Best Management Practice (BMP) for establishing monitoring for depletions of interconnected surface water has not made available. Once the BMP is available, the Tule Subbasin will evaluate the suggested best practices and revisit interconnected surface water identification and monitoring.

Until the CDWR BMP for interconnected surface water is available, the Tule Subbasin has identified an interim monitoring network that includes a combination of surface water flow monitoring and groundwater level monitoring (see Figure A1-7). Stream flow and channel losses

[11] 4Creeks, 2024. Addressing SWRCB Staffs Degraded Groundwater Quality Sustainable Management Criteria Deficiencies. Dated July 6, 2024.
[12] TH&Co, 2021. Eastern Tule Groundwater Sustainability Agency Land Subsidence Monitoring Plan. Dated September 2021.

in the Tule River will continue to be monitored based on gaged flow below Success Dam and at Rockford Station downstream of Porterville. Stream flow will also continue to be monitored at the gage in Deer Creek at Road 272. Existing monitoring wells that will be used to inform the presence/absence of interconnected surface water are shown on Figure A1-7. None of these wells is ideally located or constructed for this purpose. However, until additional monitoring wells are constructed (see Section 4.1.4 herein), these wells were be monitored and reported in the interim for this purpose.

4.0 Assessment and Improvement of Monitoring Network §354.38

The TSMP is both flexible and iterative, allowing for the addition or subtraction of monitoring features, as necessary, and to accommodate changes in monitoring frequency and alternative methodologies, as appropriate.

4.1 Data Gaps §354.38 (b)

4.1.1 Groundwater Monitoring Data Gaps

Despite the number of existing monitoring wells that have been identified within the Tule Subbasin, there remain data gaps that, if addressed, would improve the ability to monitor groundwater level changes and flow patterns specific to the Upper and Lower aquifers. The current data gaps relate primarily to spatial coverage of monitoring features necessary to prepare complete groundwater level contour maps specific to the Upper and Lower aquifers in the subbasin.

In addition to groundwater level data gaps, there is a lack of aquifer parameter data, as obtained from controlled pumping tests of wells. The groundwater flow model has been developed based predominantly on short-term pumping tests, which enable the development of estimates of aquifer transmissivity. However, these tests are not as representative as long-term pumping tests (24-hr tests or longer). Further, pumping tests where groundwater level interference is measured in nearby monitoring wells are limited. These tests enable the estimation of aquifer storage properties. During the construction of new monitoring features, it is anticipated that long-term pumping tests will be conducted to obtain aquifer parameter data specific to both the Upper and Lower aquifers. Further, pumping tests will be planned, where feasible, on existing high-capacity groundwater production wells. The details for these tests will be included in the Projects and Management Actions sections of the individual GSA's GSPs.

Recommended Monitoring Features and Testing to Address Data Gaps §354.38 (d)

Identification of new monitoring well locations is an ongoing effort in the Tule Subbasin. Potential areas for new wells to address groundwater level data gaps are shown on Figure A1-8. The new monitoring wells, combined with existing monitoring wells, will improve the Tule Subbasin TAC's ability to develop detailed and representative groundwater contour maps and provide a better network of calibration targets for the subbasin-wide groundwater model. It is further anticipated that many of the new monitoring wells will eventually replace currently assigned representative monitoring sites.

Proposed New Upper Aquifer Monitoring Wells

General areas for future monitoring wells are identified on Figure A1-8. The depths and perforation intervals of new Upper Aquifer monitoring wells will vary depending on location within the subbasin. In general, Upper Aquifer monitoring wells will be perforated from approximately 10 ft below the then current static groundwater level to the bottom of the Upper Aquifer, as defined by the Tule Subbasin conceptual model[13] and confirmed with site-specific lithologic and geophysical logs. New Upper Aquifer wells constructed on the west side of the subbasin will be the deepest and new Upper Aquifer wells constructed on the east side of the subbasin will be shallowest. It is noted that the depths presented herein are for planning purposes. The final well construction details will be refined in the field during drilling once site-specific data have been obtained and reviewed. As such, the final well depths and perforation intervals may be adjusted for site specific conditions.

A conceptual well design drawing for new Upper Aquifer monitoring wells is shown on Figure A1-9. In general, new monitoring wells shall be constructed of 5-inch diameter Schedule 80 PVC blank and slotted casing. A filter pack for the new wells will be placed in the annular borehole space opposite the perforations from the total borehole depth to at least 10 feet above the top of perforations. The upper portion of the annular space shall be backfilled with a seal consisting of bentonite or other approved sealing material. The surface completion for each new monitoring well will include a steel above-ground riser equipped with a protective locking cap for keeping the wellhead secure. The above-ground riser will be surrounded by cement-filled steel bollards for further protection.

At some locations, the well will be completed as a nested well with two 5-inch diameter casings within the same borehole. One casing will be constructed in the Upper Aquifer and the other casing will be constructed in the Lower Aquifer (see Figure A1-10). A bentonite seal will be placed in the annular space between the two perforation intervals to ensure that the data collected from each casing will be specific to the aquifer in which it is perforated.

A dedicated reference point shall be established and marked on the top of each monitoring well casing. All groundwater level measurements shall be obtained relative to the reference point. The elevation of the reference point shall be surveyed to an accuracy of 0.1 foot relative to mean sea level (NAVD88) by a California licensed land surveyor. The location of each well will be surveyed to an accuracy of 1 foot.

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[13] TH&Co, 2017a. Hydrogeological Conceptual Model and Water Budget for the Tule Subbasin. Prepared for the Tule Subbasin MOU Group. Dated August 1, 2017.

Proposed New Lower Aquifer Monitoring Wells

New monitoring wells are planned to be constructed in the Lower Aquifer (see Figure A1-8). New Lower Aquifer monitoring wells will be drilled in areas where there are no existing wells for monitoring in order to fill data gaps. General areas for future monitoring wells are identified on Figure A1-8.

The depths and perforation intervals of the Lower Aquifer monitoring wells will vary depending on location within the subbasin. In general, Lower Aquifer monitoring wells will be perforated below the Corcoran Clay, where it has been mapped and confirmed with site-specific lithologic and geophysical logs, or at depths where the aquifer is assumed to be confined, as defined by the Tule Subbasin conceptual model.[14] New Lower Aquifer monitoring wells will be constructed with total depths ranging from 250 to 1,600 ft bgs, with the deepest wells in the western part of the subbasin and shallowest wells on the east side of the subbasin. It is noted that the depths presented herein are for planning purposes. The final well construction details will be refined in the field during drilling once site-specific data have been obtained and reviewed. As such, the final well depths and perforation intervals may be adjusted for site specific conditions.

A conceptual well design drawing for new Lower Aquifer monitoring wells is shown on Figure A1-11. In general, new monitoring wells shall be constructed of 5-inch diameter PVC blank and slotted casing. A dedicated reference point shall be established and marked on the top of each monitoring well casing. All groundwater level measurements shall be obtained relative to the reference point. The elevation of the reference point shall be surveyed to an accuracy of 0.1 foot relative to mean sea level (NAVD88) by a California licensed land surveyor. The location of each well will be surveyed to an accuracy of 1 foot.

In order to address the aquifer parameter data gaps, it is recommended to conduct controlled, long-term pumping tests in selected wells within the subbasin. Tests should be conducted in wells perforated exclusively in the Upper Aquifer and exclusively in the Lower Aquifer. Pumping wells will be selected near proposed monitoring wells in order to enable pumping interference measurements during the test. Each test will consist of a 24-hr constant rate pumping test.

[14] TH&Co, 2017a. Hydrogeological Conceptual Model and Water Budget for the Tule Subbasin. Prepared for the Tule Subbasin MOU Group. Dated August 1, 2017.

Proposed New Santa Margarita Aquifer Monitoring Wells

Currently, no new dedicated monitoring wells are proposed in the Santa Margarita Aquifer. However, wells perforated in the Santa Margarita Aquifer and monitored, for example by KTWD, may be added to the monitoring network. Equally, if the final location of proposed monitoring wells is within the area of the Santa Margarita Aquifer (e.g. TSMW-8, TSMW-9, or TSMW-14, see Figure A1-8), consideration for completing a monitoring well in that aquifer will be given.

At least one long-term (i.e. 24-hour) pumping test has been completed in the Santa Margarita Aquifer. The test was conducted with a private agricultural well and groundwater levels in the nearby clustered TSMW-6L and TSMW-6SM wells were also monitored. It is recommended to conduct additional long-term pumping tests in wells perforated exclusively in the Santa Margarita Aquifer.

4.1.2 Groundwater Quality Monitoring Data Gaps

As discussed in Section 2.4, the current groundwater quality RMS network was derived from existing monitoring programs in the Tule Subbasin. As such, the requirements of these programs in terms of monitoring features and frequency guided the implementation of the Tule Subbasin SGMA groundwater quality monitoring network. Shortcoming of the existing monitoring programs is discussed below and the Tule Subbasin GSAs have identified a plan to address data gaps to improve the groundwater quality monitoring program.

Many of the current RMS network wells are privately owned domestic or agricultural wells. The GSAs are not responsible for maintenance and upkeep of wells and therefore cannot guarantee that samples can be collected during monitoring events. Groundwater quality samples are not able to be collected from agricultural wells if the pump is not operating and actively pumping water to the measuring point. Monitoring wells must also be purged prior to sampling for an accurate analysis of groundwater quality from the subbasin. Agricultural wells do not typically run when surface water supplies are available to meet crop demands during wet years or in winter or spring seasons. This prevents the current RMS network from being monitored on a semi-annual or quarterly basis to capture short-term seasonal trends. Additionally, static groundwater levels cannot be collected from wells if the pump has not been shut-off for at least 24 hours for collecting accurate groundwater level measurements. Groundwater levels are measured in the Spring and Fall when groundwater pumps are not running. This means that groundwater elevation is more difficult to correlate with groundwater quality data.

The GSAs are working to refine and improve groundwater quality RMS well network to additional dedicated monitoring sites that are representative of groundwater conditions and beneficial users, and allow for adequate monitoring frequency to detect short-term and seasonal trends. As conditions change and new information and data becomes available the Tule Subbasin GSAs will

adaptively refine the groundwater quality monitoring network to ensure it provides adequate coverage of groundwater quality characterization of the subbasin.

To commence these efforts, areas in the Tule Subbasin are being identified as designated data gaps and will be prioritized for future groundwater quality RMS locations. Initial efforts will include re-evaluating monitoring sites from existing groundwater quality programs for adequacy to be utilized as a groundwater quality RMS well. When existing monitoring features are not found to be adequate, the Tule Subbasin GSAs will coordinate with landowners to get permission to utilize domestic wells as dedicated monitoring sites.

4.1.3 Land Surface Elevation and Subsidence Monitoring Data Gaps

InSAR data that cover the entire Tule Subbasin have been historically available and indicate areas where land subsidence has been occurring. Confirmation of these data with more conventional land based survey methods such as GPS is ongoing. The USGS has refurbished one extensometer, which is located approximately one mile north of Deer Creek along the Friant-Kern Canal and is included in this plan. However, characteristics of aquifer system compaction in the northwestern portion of the subbasin, which is hydrogeologically different than the area where the existing extensometer is located, is unknown and represents a data gap. At least one new extensometer is recommended for the vicinity of the Homeland Canal at Highway 43 in the northwest portion of the subbasin. This instrument will provide the most accurate assessment of aquifer system compaction in the area of greatest subsidence in the subbasin.

4.1.4 Surface Water Monitoring Data Gaps

The following surface water monitoring data gaps have been identified for the Tule Subbasin:

- Tule River near Porterville - Channel infiltration losses in the upper portion of the Tule River are currently calculated between the gage below Success Dam and the gage at the Rockford Station, which is a 10-mile stretch of the river. It appears that more of the infiltration losses occur in the upper portion of the channel reach than in the lower. An intermediate gage between the Poplar diversion and Woods Central would be beneficial to understand the volume of infiltration losses above and below this point.

- Tule River at McCarthy Check - Channel infiltration losses between the Rockford Station and the Turnbull Weir are not well documented. An additional gage at the McCarthy Check at Road 96 (see Figure A1-5) would provide additional information on the channel losses upstream of this point and between McCarthy Check and Turnbull Weir.

- Deer Creek at Friant-Kern Canal – While the releases of imported water from the Friant-Kern Canal to the Deer Creek channel are well documented, the channel infiltration losses

between the Friant-Kern Canal and the Trenton Weir are not. An additional gage immediately upstream of the Friant-Kern Canal would enable the measurement of flows attributed to both imported water and natural stream flow as well as a better estimate of channel losses between these two points.

- Deer Creek at Homeland Canal – Stream flows at the downstream end of Deer Creek periodically reaches, and are discharged to, the Homeland Canal (see Figure A1-5). The nature and historical records of this discharge are not available and present a data gap for the surface water budget of the subbasin. Further, a gage record at this location would provide information on streambed infiltration during periods of time when surface water in Deer Creek reaches Homeland Canal.

- White River – Historical stream flow in the White River has been measured by the USGS at the gage near Ducor (see Figure A1-5). However, this gage is no longer active leaving a data gap for the volume of surface water entering the subbasin from this river (current estimates of flow into the subbasin are based on correlations with flows of Deer Creek). Further, there are no established gages downstream of this point.

Recommended Surface Water Monitoring Features to Fill the Data Gaps §354.38 (d)

The following surface water monitoring features are recommended to address the surface water data gaps:

- Tule River – Establish a rated section of channel, concrete weir structure and water stage recorder at an appropriate location between the Poplar diversion and the Rockford Station gage; and establish a rated section of channel, concrete weir structure and water stage recorder at the McCarthy Check.

- Deer Creek – Establish a stream gage immediately upstream of the Friant-Kern Canal to enable the portion of flow in the channel attributed to native stream flow and the portion attributed to imported Central Valley Project releases. Investigate the discharge structure at the Deer Creek inlet to Homeland Canal and develop a gaging station.

- White River – Refurbish and reinstate the USGS gage immediately east of the Tule Subbasin boundary near Ducor. Also, Establish a rated section of channel, concrete weir structure and water stage recorder at Road 208 (if this has not already occurred).

4.1.5 Interconnected Surface Water Data Gaps

The understanding of potential depletions of interconnected surface water in the Tule Subbasin is a data gap. To supplement the stream gages and interim monitoring wells described in Section

3.1.6, additional monitoring well locations have been preliminarily identified along the Tule River, Deer Creek and White River to enable the collection of groundwater level data to inform interconnected surface water conditions (see Figure A1-12). A total of 16 new monitoring well sites have preliminarily been identified (eight along the Tule River, six along Deer Creek, and two along the White River). The number and location of these new features may change depending on BMP guidance forthcoming from the CDWR.

5.0 Tule Subbasin Data Management System

Efficient data management will be a critical aspect of the Coordination Agreement in order to ensure that each GSA can access the data needed to prepare their respective annual reports in a timely manner and to ensure that the Tule Subbasin TAC can meet deadlines for submittal of the coordinated reports. Data to be managed will include:

A. Historical data used as a basis for the Water Budget of the Tule Subbasin.
B. Data to be collected in accordance with the Tule Subbasin Monitoring Plan.

Both historical and future data collected as part of this TSMP will be stored in a single comprehensive electronic database. This section satisfies § 352.6 of SGMA Regulations, which requires the Subbasin (via each agency) to develop and maintain a data management system (DMS) that is capable of storing and reporting information relevant to the development and implementation of the plan and monitoring of the basin. The following table outlines the sections of the Tule Subbasin DMS as they relate to the various components of the SGMA Regulations.

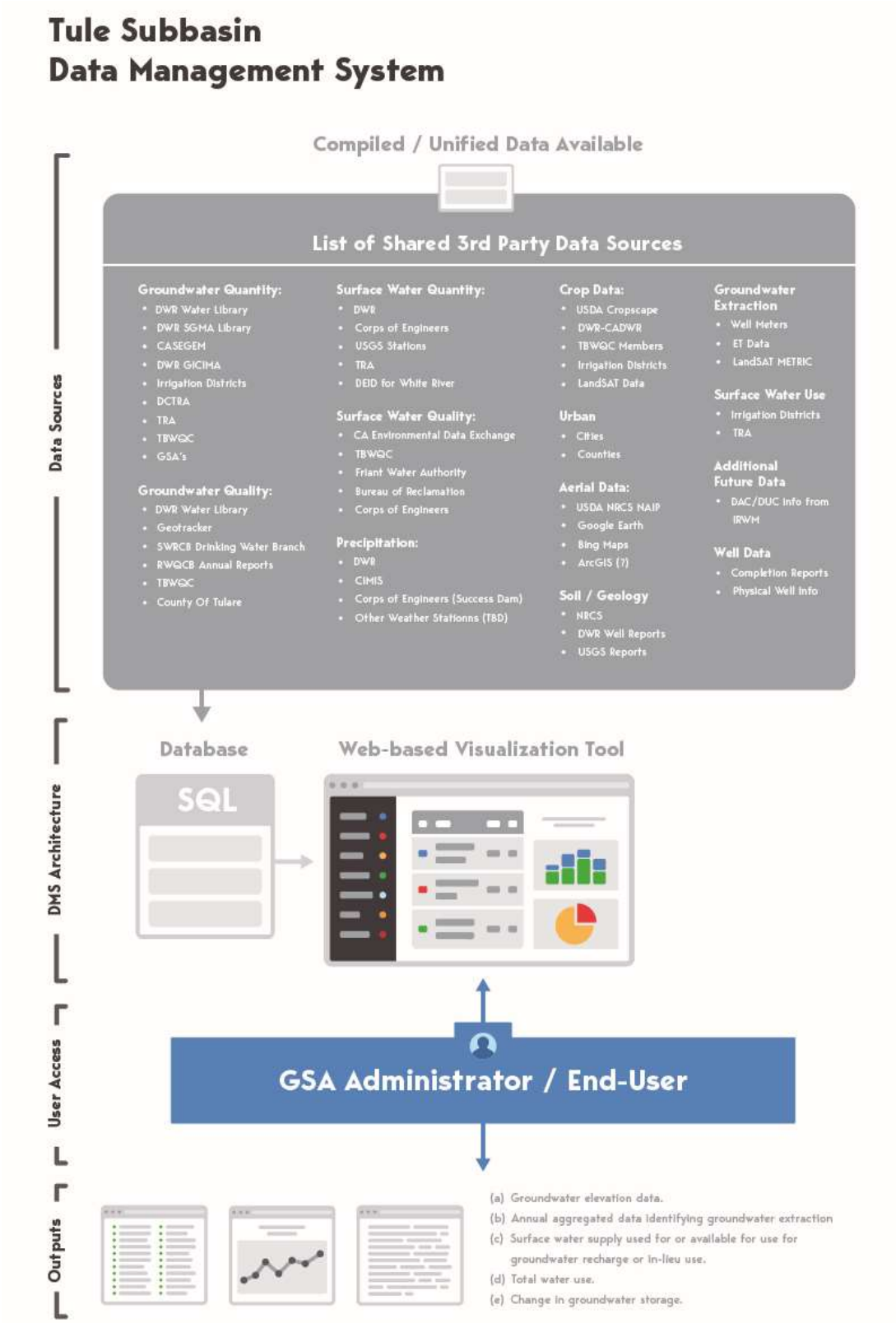
Table A1-8 – Tule Subbasin DMS SGMA Requirements

Tule Subbasin DMS SGMA Requirements		
SGMA Regulation Section No.	Coordination Agreement Corresponding Section	Description
§ 352.4	Section 5.2	Data and Reporting Standards
§ 352.6	Section 5	Data Management System
§ 353.4	Section 5.2.4.2	Reporting Provisions
§ 354.4	Section 5.2.4.2	Reporting Monitoring Data to the Department
§ 356.2	Section 5.2.4.2	Annual Reports

5.1 Overview of Tule Subbasin Data Management System

The Data Management System will allow users to view program data in comparison with all publicly available data from federal, state, and local jurisdictions to make the most informed decisions. Users will be able to submit, query, view, and analyze data as needed. The Tule Subbasin Data Management System (DMS) is comprised of two separate coordinated systems that include a SQL server and a web-based visualization platform. SQL will function as the storage and retrieval system to display the data in the web-based visualization platform. Users will have access to data sets through the web-based platform, to export data, import data, and view data in a dashboard format. An overview of the DMS is shown below on Figure A1-14.

Figure A1-14: Data Management System Overview



5.2 Functionality of the Data Management System

The DMS will be comprised of various tools designed to assist GSAs in the development and implementation of their groundwater sustainability plans. At its Core, the DMS is a data storage system which grants users access to interact and upload data required to comply with SGMA regulations. Guiding the implementation of the DMS are the rules laid out in the following sections.

5.2.1 User and Data Access Permissions

User data access and permissions will be based on the predetermined user type and data source by the system administrator. User types include:

- System Admin - Users with this permission can perform all administrative functions.
- SGMA End-User - Users with this permission can perform all APN / Parcel Level functions and have access to Basin Level and GSA Level Public Data.
- End User Delegate - Users with this permission can perform all APN / Parcel Level functions and have access to Basin Level and GSA Level Public Data.
- GSA Staff - Users with this permission can perform all Farm Level and GSA Level functions and have access to Basin Level Public Data.
- GSA Manager - Users with this permission can perform all APN / Parcel Level and GSA Level functions and have access to Basin Level Public Data.
- Public User - Users may view published data but cannot import or edit information

Data viewing and access will be limited on geographic extent based on the user, such as a landowner will only be able to view data for land he/she owns or an administrator of the GSA can view data for the GSA he/she represents. Data from private or user sources will be protected in the system while publicly available data will be available basin wide. Data Source types include:

- Public - Federal, State, or local published data
- Private - District or agency specific data
- Shared - SGMA data available for all users of DMS excluding public users
- User - user specific data
- DMS - Data available from other programs (IRLP)
- Published - Data from SGMA/GSA sources available for public consumption

5.2.2 Data Entry and Validation

To encourage agency and user participation in the DMS, data entry and import tools are easy-to-use, accessible via web-based interface, and help maintain data consistency and standardization. The DMS allows GSA Administrators and Users to enter data either manually via easy-to-use interfaces, or through an import tool utilizing standardized Microsoft Excel templates, ensuring data may be entered into the DMS consistently. The data imported will require validation by the managing GSAs Administrators or Users using several quality control checks prior to final import into the DMS. All data included in the system will comply with data standards laid out in § 352.4 of the SGMA Act.

5.2.2.1 Data Collection

The Tule Subbasin DMS is populated with data from various sources including public, private, contributing DMSs, and user data. Data collected in accordance with the Tule Subbasin Monitoring Plan as well as data regarding key water management areas, include:

- Precipitation
- Evapotranspiration
- Surface water flow
- Groundwater levels
- Groundwater quality
- Groundwater extraction
- Imported water deliveries
- Managed recharge
- Land surface elevation
- Land Subsidence measurements

5.2.2.2 Monitoring Data Entry (QA / QC)

For the purposes of this plan, quality assurance (QA) is defined as the integrated program designed to assure reliability of monitoring and measurement data. Quality control (QC) is defined as the routine application of specified procedures to obtain prescribed standards of performance in the monitoring and measurement process.

Different monitoring protocols exist for the various data types stored in the DMS. Public sources included in the DMS as published from the source and referenced as such. User entry and private sourced data will be closely monitored for formatting and accuracy, in addition requiring chain of custody and acknowledgement of following protocols defined in the Monitoring Plan. These sources will be required to submit through pre-established forms to maintain the validity of the DMS.

5.2.2.3 Data Validation

Data Validation is required for non-public sources and will be performed in the following ways:

- **Standardized Form Input:** meant to comply with what is required by law
- **Using known possible values for a dataset:** This would represent a baseline range of what can be typed into an input. Ex: Parcels Assessed Acreage vs Irrigated Acreage
- **Data/Field Normalization:** Establishing unit consistency between datasets. The DMS will keep a normalized value behind the scenes for each variation of a reported unit. Regular Expressions on inputs to control the type/format of information being submitted to the DMS.
- **Outlier filtering:** Outlier filtering when interacting with publicly available data or data that has been mass imported. Using Statistical Analysis methods, any statistical outliers will be filtered out of reports unless the end user opts to have them included.

5.2.3 Visualizations and Analysis

The DMS will host a robust visualization and analysis component to allow end users the ability to view and provide context to the data. This can be performed in Map and Tabular views, as shown in Figure A1-15.

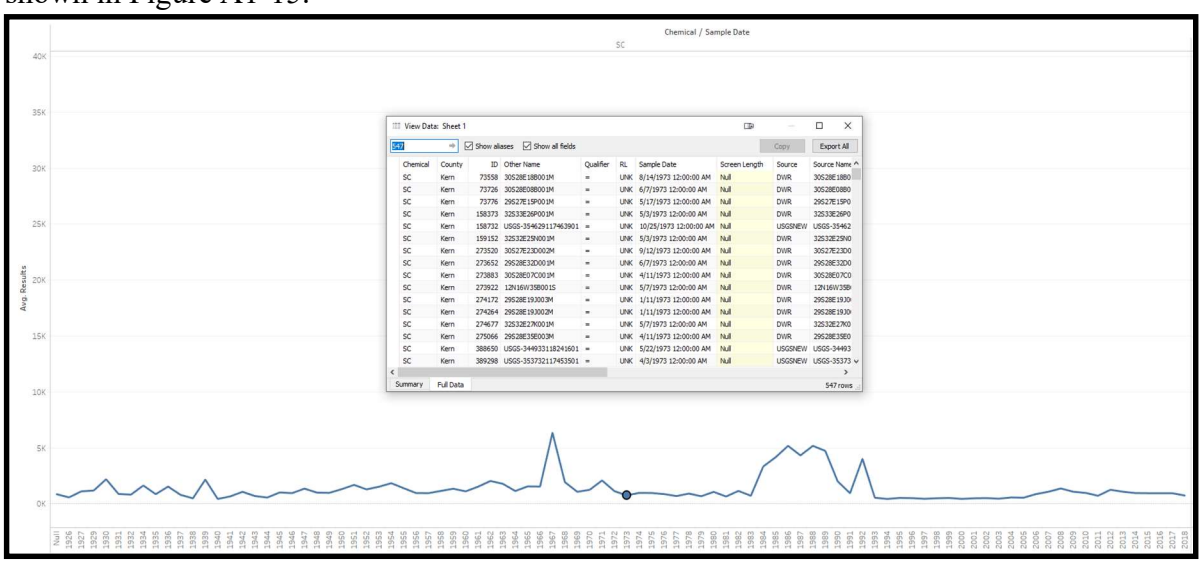


Figure A1-15: DMS Data Visualization Example - Average Specific Conductivity by Year within the Tule Sub Basin.

5.2.3.1 Map View

Map view in the DMS will allow users to visualize data that has spatial characteristics (wells, stream gages, precipitation stations, etc). **Figure A1-16** is an example of well data in the DMS. In

map view users can scroll around the selected source data and click on the sites to bring up site specific information.

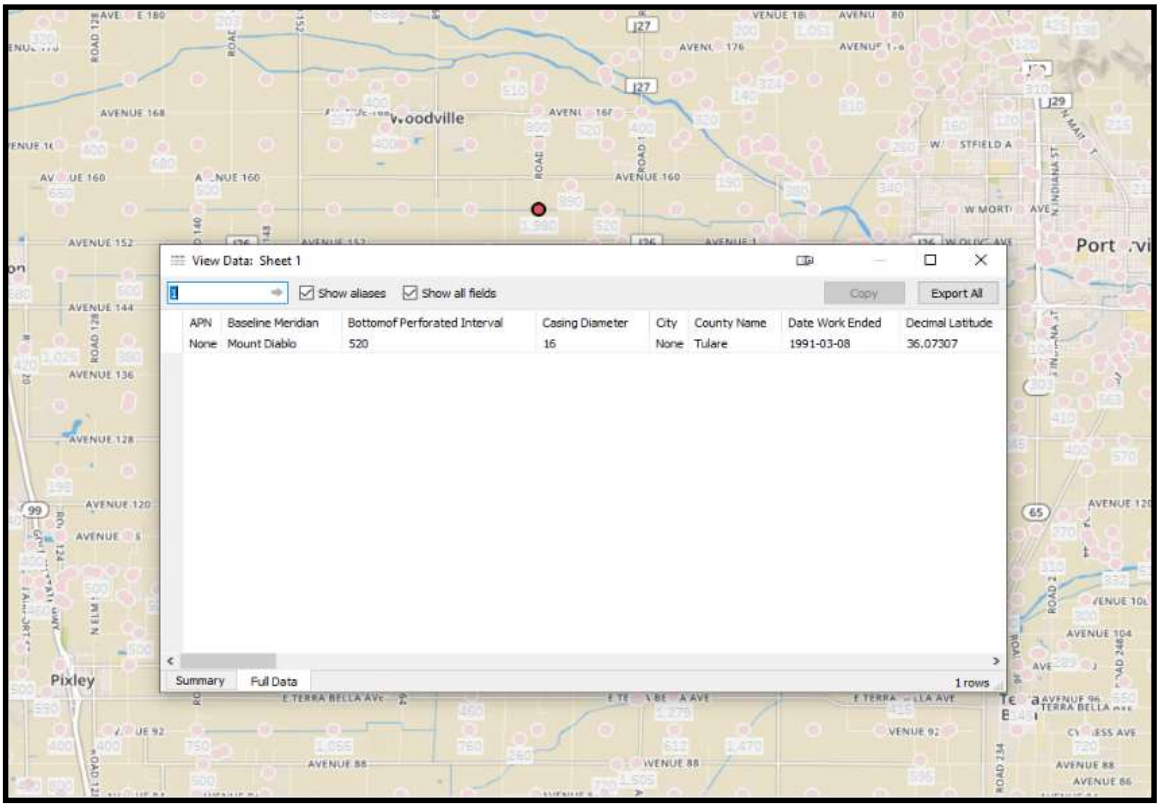


Figure A1-16: DMS Map View Example - Total Completed Well Depth Map

5.2.3.2 List View

List view presents all the data of a given dataset in tabular form. It will allow users to see all the data in the chosen data set and their attributes. Data is able to be filtered for specific attributes, geographic extent, and various other criteria.

5.2.4 Query and Reporting

Data in the DMS can be queried and reported using various filtering and querying tools. The options are dependent on the source of the data. Reports can be prepared from the queried DMS for various formats based on the submitting agency.

5.2.4.1 Ad-hoc Query

As a relational database the DMS will have the ability to be queried by users with designed limitations for various end users (see section 5.2.1). Putting these limitations aside, any data included in the DMS can be queried based on the attributes which adhere to the data source

(i.e data type, data source, parameters, geographic location, etc.). See **Figures A1-17 and A1-18** for querying examples.

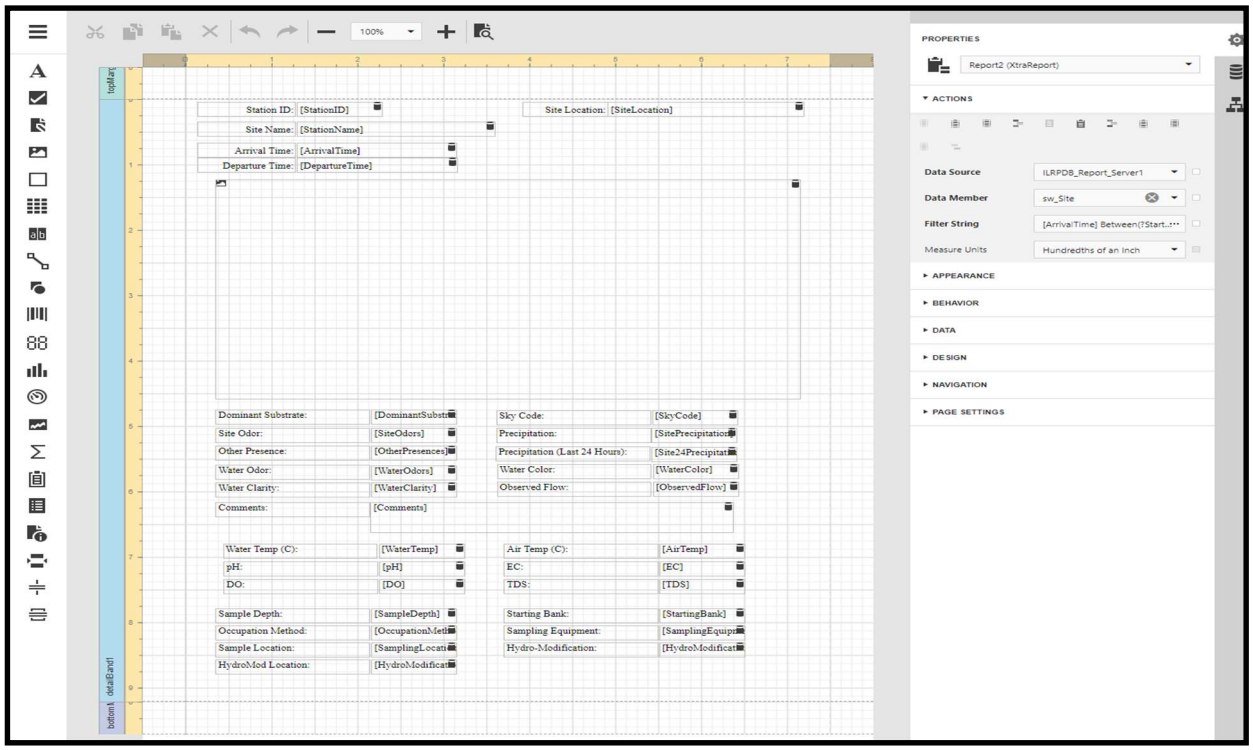


Figure A1-17: Ad Hoc Report Builder Designer View

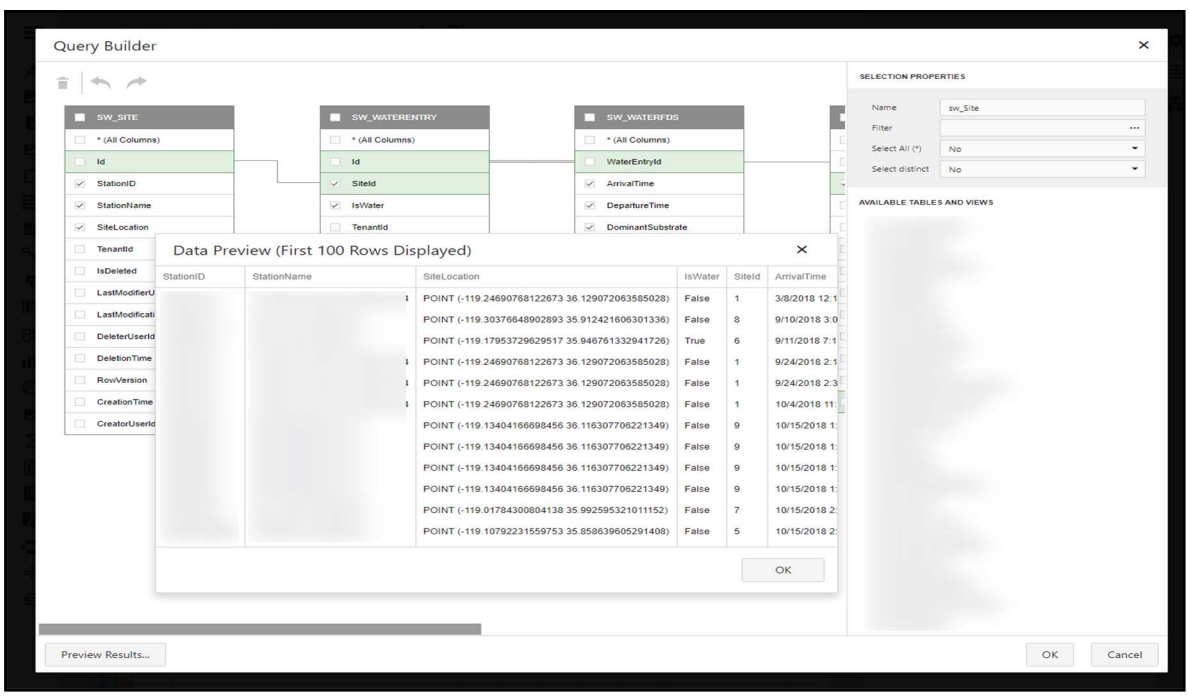


Figure A1-18: Redacted Ad Hoc Query Builder Example

5.2.4.2 Standard Reports

Standard report chart and table formats such as those included in the annual and 5-year reports can be generated utilizing the DMS. Additional reporting requirements can be created by end users. In order to provide end users with flexibility in reporting, the tools are intended to be self-serviced by the end-users. End-users will be able to create their own reports using data they have permission to access.

If commonality is discovered between participating agencies, a Standardized report can be created and shared with all agencies that as required. All generated reports and reporting tools will be built to comply with § 352.4 of the SGMA Act.

5.3 Data Included in the Data Management System

Table A1-9: Summary of Data included in DMS identifies the specific data type, the source of the data, and entry of the data in to the DMS.

Table A1-9: Summary of Data

Data Type	Source Name		Entry Type
Groundwater Quantity/Levels	DWR Water Library		Public Source
	DWR GICIMA		Public Source
	CASGEM		Public Source
	Irrigation Districts		Private Source
	DCTRA		Private Source
	TRA		Private Source
	TBWQC		DMS Transfer
	GSA'S		
	>	LTRID GSA	User Entry
	>	Pixley GSA	User Entry
	>	ET GSA	User Entry
	>	DEID GSA	User Entry
	>	Tri- County GSA	User Entry
	>	Tulare County GSA	User Entry

	>	KTWD GSA	User Entry
	>	Alpaugh GSA	User Entry
Groundwater Quality	DWR Water Library		Public Source
	GAMA Geotracker		Public Source
	SCWRB Drinking Water Branch		Public Source
	RWQCB Annual Reports		Public Source
	TBWQC		Public Source
	County of Tulare		Public Source
Surface Water Quantity	Army Corps of Engineers		Public Source
	USGS Gaging Stations		Public Source
	Bureau of Reclamation		Public Source
	Tule River Authority		Private Source
	DWR - CDEC Stations		Public Source
Surface Water Quality	CA Environmental Data Exchange		Public Source
	TBWQC		DMS Transfer
	Friant Water Authority		Public Source
	Corps of Engineers		Public Source
Precipitation	DWR		Public Source
	CIMIS		Public Source
	Corps of Engineers		Public Source
	TBD		N/A
Crop Data	USDA Cropscape		Public Source
	DWR-CADWR		Public Source
	TBWQC Members		DMS Transfer
	Irrigation Districts		Public Source
	FMMP		Public Source
	LandSAT		Public Source
	Cities		Public Source

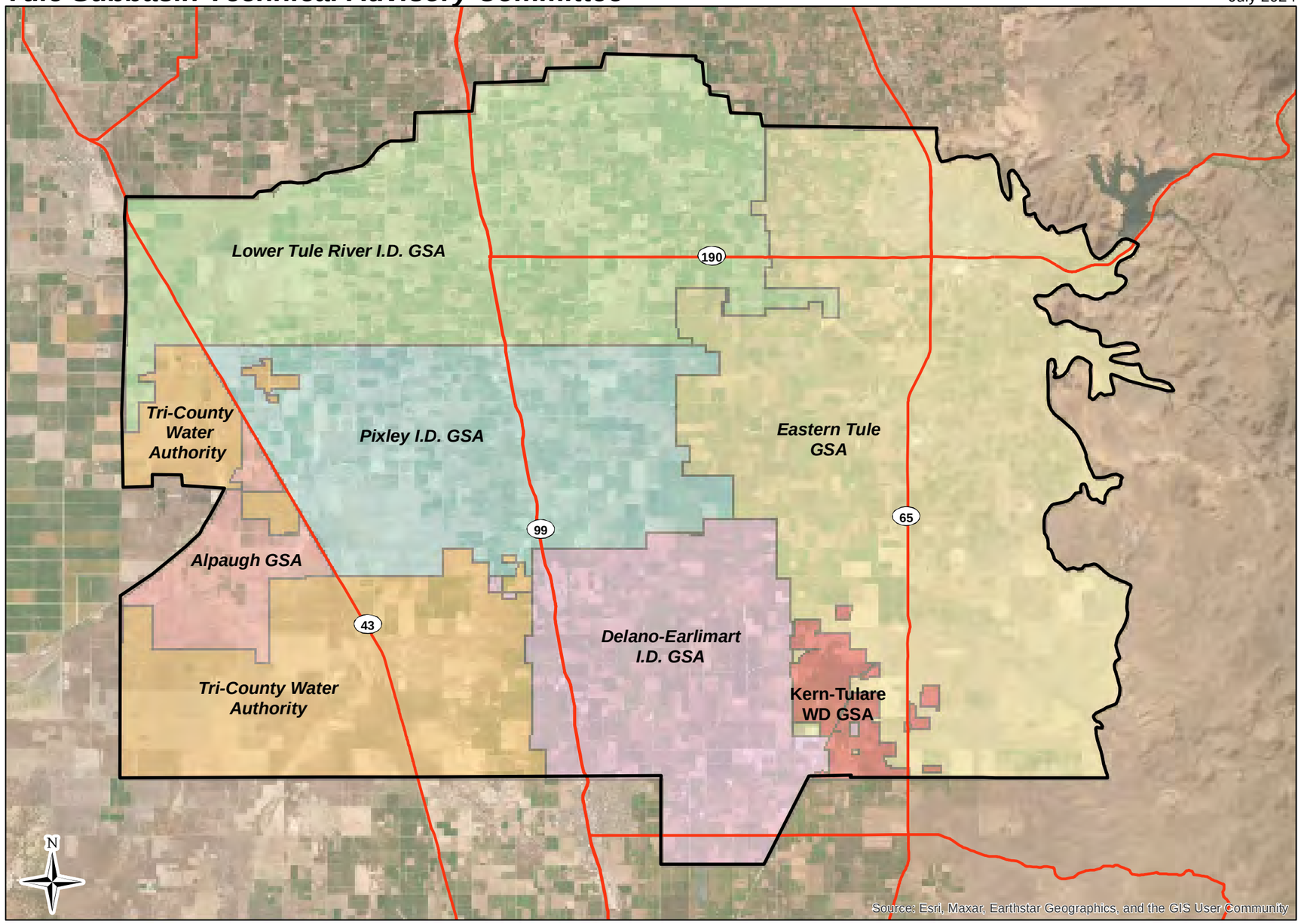
Urban	Counties	Public Source
Soil/Geology	NRCS	Public Source
	DWR Well Reports	Public Source
	USGS Reports	Public Source
Subsidence	USGS	Public Source
	TBWQC	Public Source
	UNAVCO	Public Source
Groundwater Extraction	Well Meters	TBD
	ET Data	DMS Transfer
	LanSAT Metric	DMS Transfer
Surface Water Use	Irrigation Districts	Private Source
	TRA	Private Source
Future Sources	DAC/DUC IRWM Info	Private Source
Well Data	Well Completion Reports	Annually
	Physical Well Info	TBD

Figures

Tule Subbasin Technical Advisory Committee

July 2024

Tule Subbasin Monitoring Plan



0 2.25 4.5 9 Miles

NAD 83 State Plane Zone 4

Map Features

- Alpaugh GSA
- Delano-Earlimart ID GSA
- Eastern Tule GSA
- Kern-Tulare WD GSA
- Lower Tule River ID GSA
- Pixley ID GSA
- Tri-County Water Authority
- Subbasin Boundary
- State Highway

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Area Map
Figure A1-1

Tule Subbasin Technical Advisory Committee

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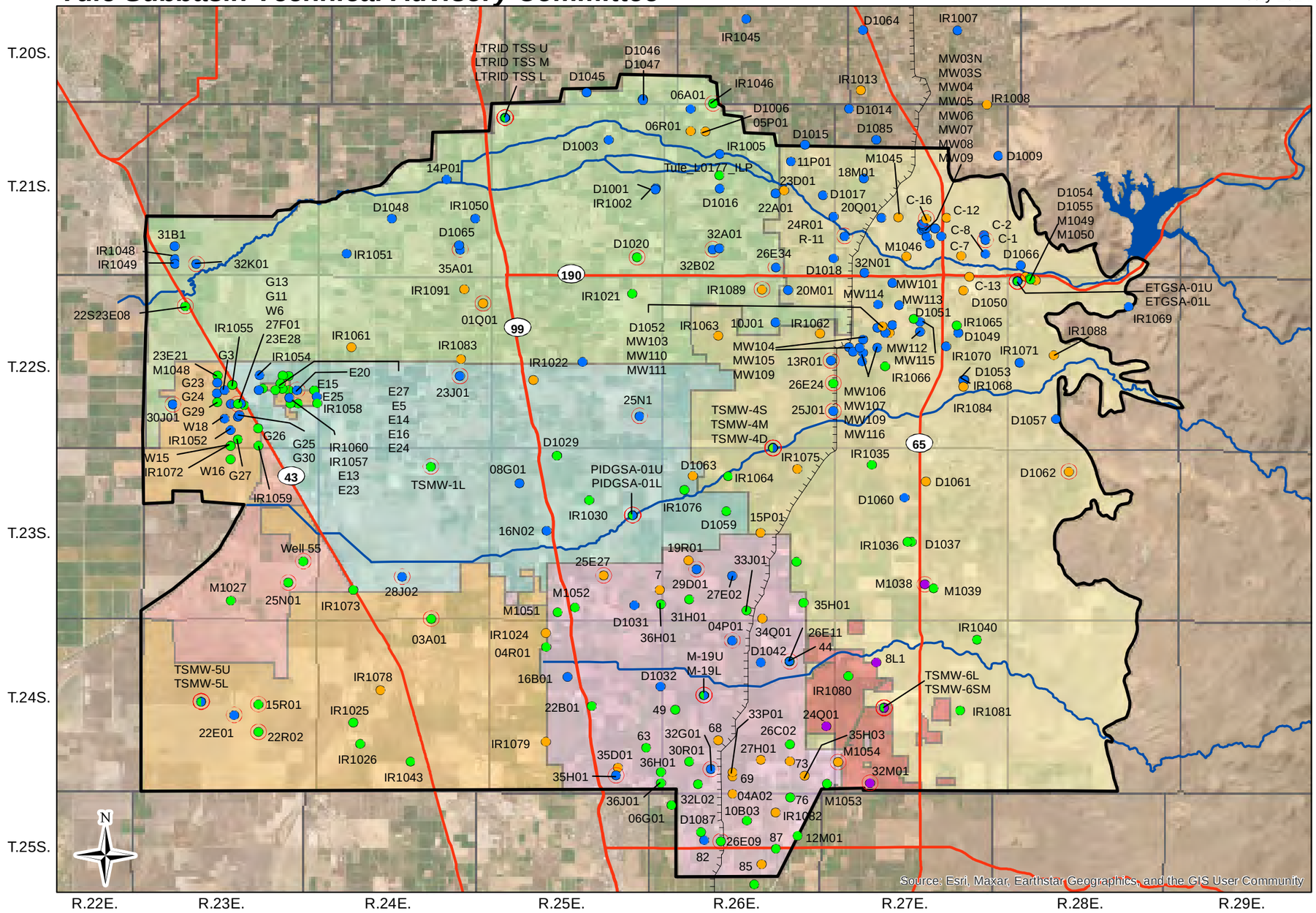
Tule Subbasin Monitoring Plan



Map Features

- Upper Aquifer Well
- Upper Aquifer RMS Well
- Lower Aquifer Well
- Lower Aquifer RMS Well
- Composite Aquifer Well
- Composite Aquifer RMS Well
- Santa Margarita Aquifer Well
- Santa Margarita Aquifer RMS Well
- Major Hydrologic Feature
- Friant-Kern Canal
- Alpaugh GSA
- Delano-Earlimart ID GSA
- Eastern Tule GSA
- Kern-Tulare WD GSA
- Lower Tule River ID GSA
- Pixley ID GSA
- Tri-County Water Authority
- Subbasin Boundary
- State Highway

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Groundwater Level Monitoring Network

Figure A1-2

Tule Subbasin Technical Advisory Committee

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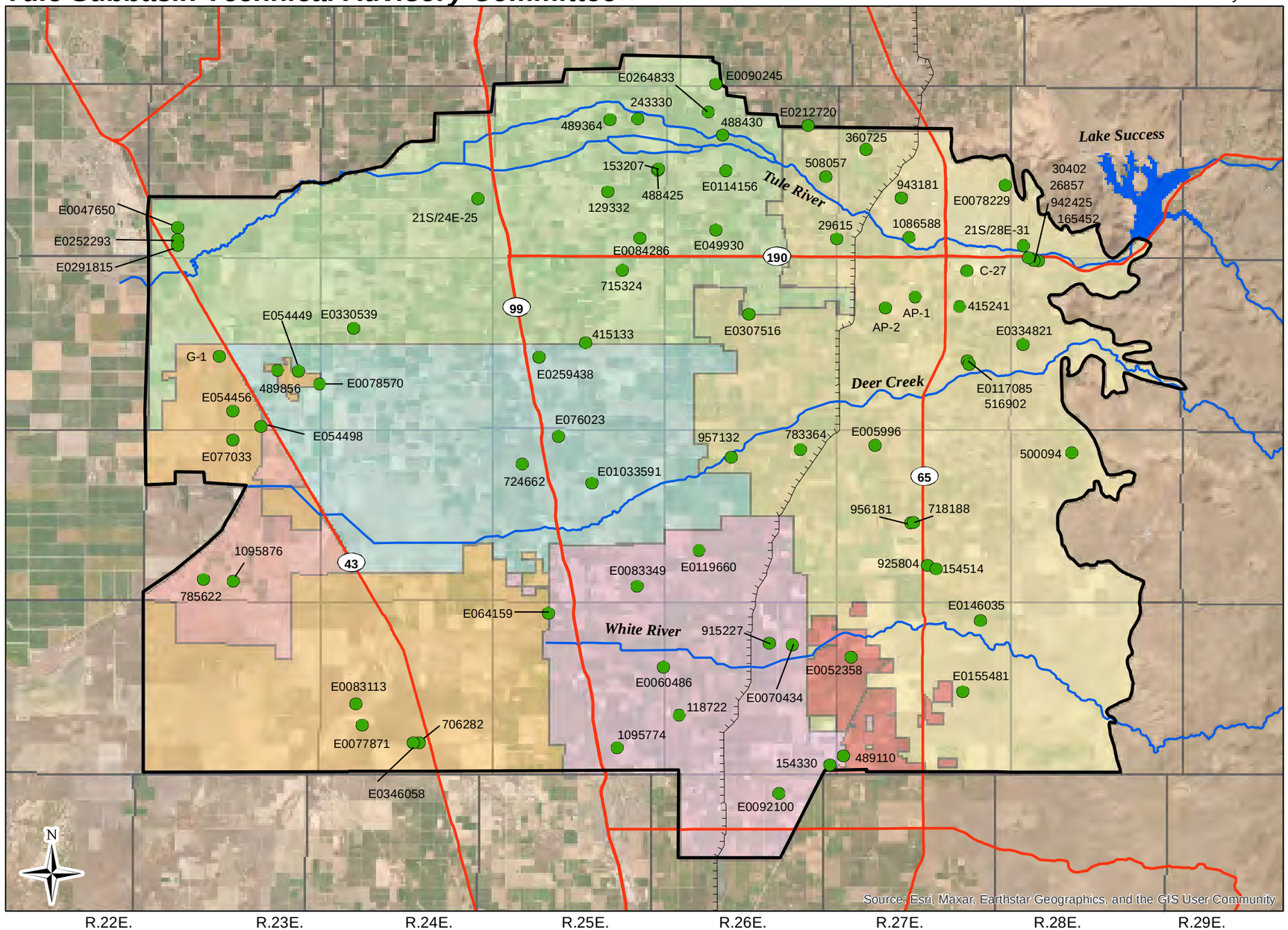
Tule Subbasin Monitoring Plan



0 2.5 5 10 Miles

NAD 83 State Plane Zone 4

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Map Features

- Groundwater Quality Well
- Major Hydrologic Feature
- Friant-Kern Canal
- Alpaugh GSA
- Delano-Earlimart ID GSA
- Eastern Tule GSA
- Kern-Tulare WD GSA
- Lower Tule River ID GSA
- Pixley ID GSA
- Tri-County Water Authority
- Subbasin Boundary
- State Highway/Major Road

Well Location data from:
Tule Basin Water Quality Coalition, 2017

DRAFT-FINAL

Groundwater Quality Monitoring Network

Figure A1-3

Tule Subbasin Technical Advisory Committee

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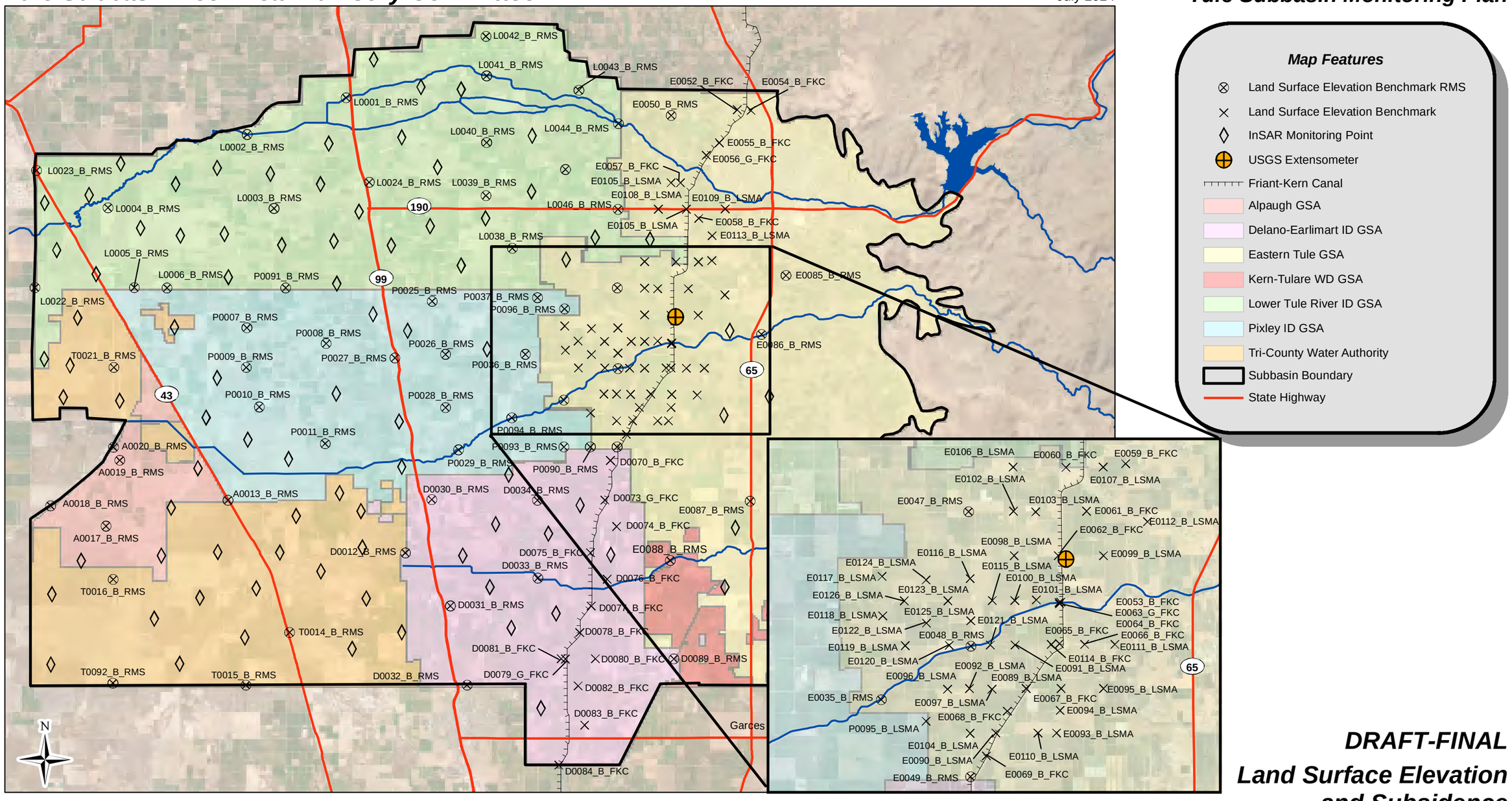
Tule Subbasin Monitoring Plan



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Land Surface Elevation and Subsidence Monitoring Network

Figure A1-4

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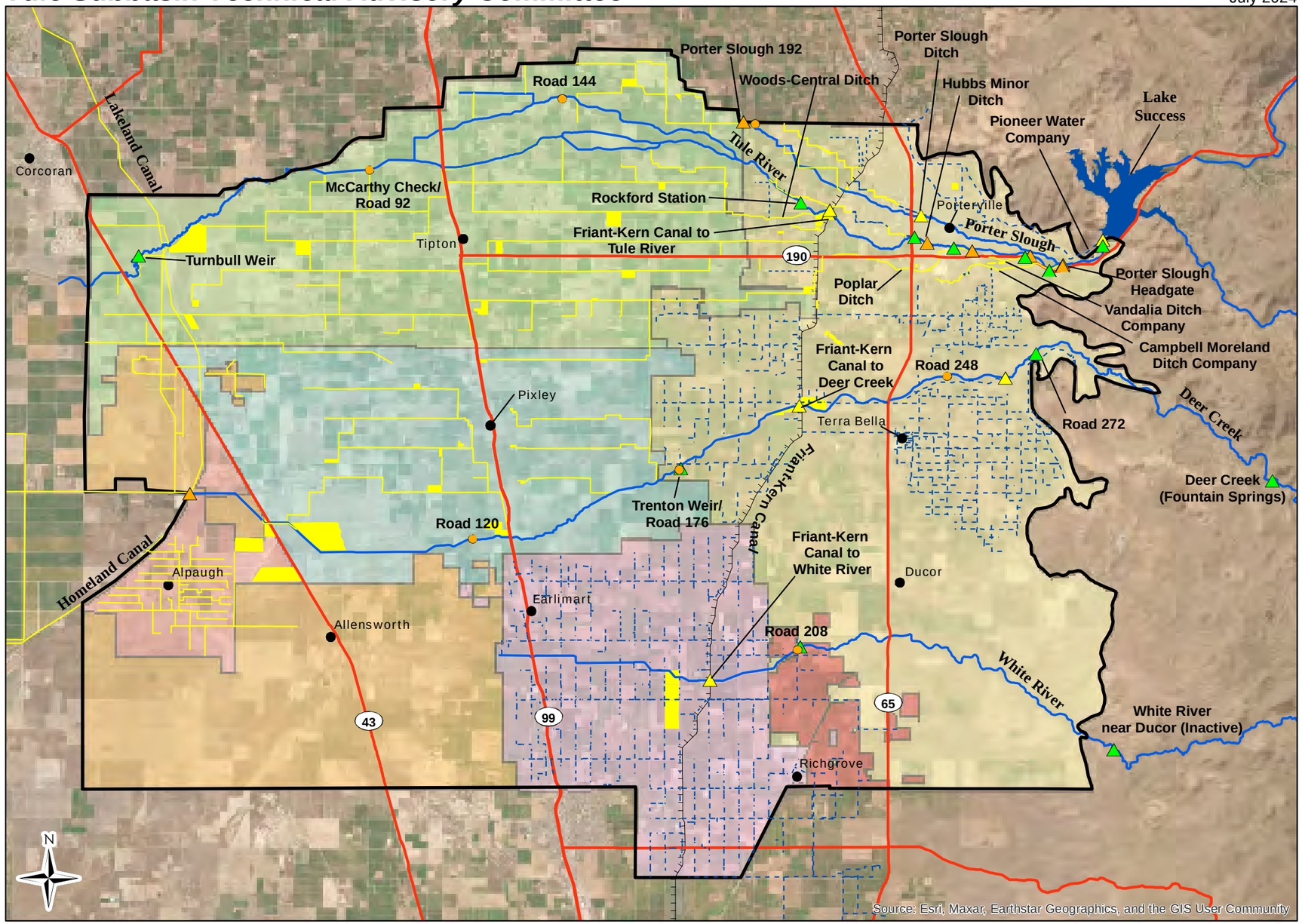
Tule Subbasin Monitoring Plan



0 2 4 8 Miles

NAD 83 State Plane Zone 4

Map Features

- Diversion Headgate
- Diversion Gage
- Instream Gage
- Surface Water Sampling Site
- City or Community
- Canal
- Pipe
- Major Hydrologic Feature
- Friant-Kern Canal
- Recharge Basin
- Alpaugh GSA
- Delano-Earlimart ID GSA
- Eastern Tule GSA
- Kern-Tulare WD GSA
- Lower Tule River ID GSA
- Pixley ID GSA
- Tri-County Water Authority
- Subbasin Boundary
- Freeway/State Highway

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Surface Water Monitoring Features

Figure A1-5

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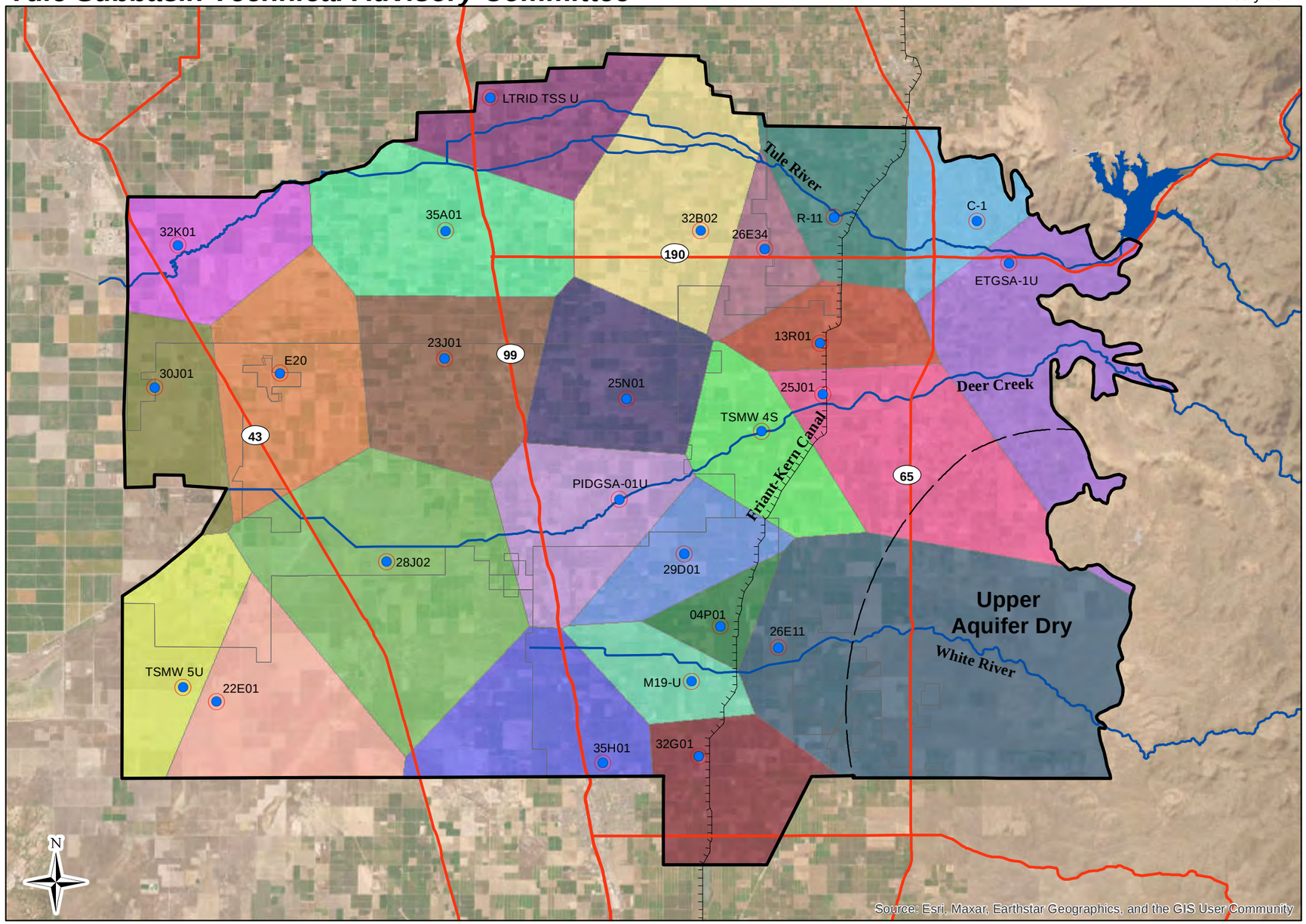
Tule Subbasin Monitoring Plan



Map Features

- Upper Aquifer RMS Well
- Major Hydrologic Feature
- Friant-Kern Canal
- State Highway
- GSA Boundary
- Subbasin Boundary

Note: Well tiles were developed using the Thiessen polygon (aka Voronoi diagram) method using the "deldir" package in R.

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0 2 4 8 Miles

NAD 83 State Plane Zone 4

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Upper Aquifer Groundwater Level RMS Well Tiles

Figure A1-6a

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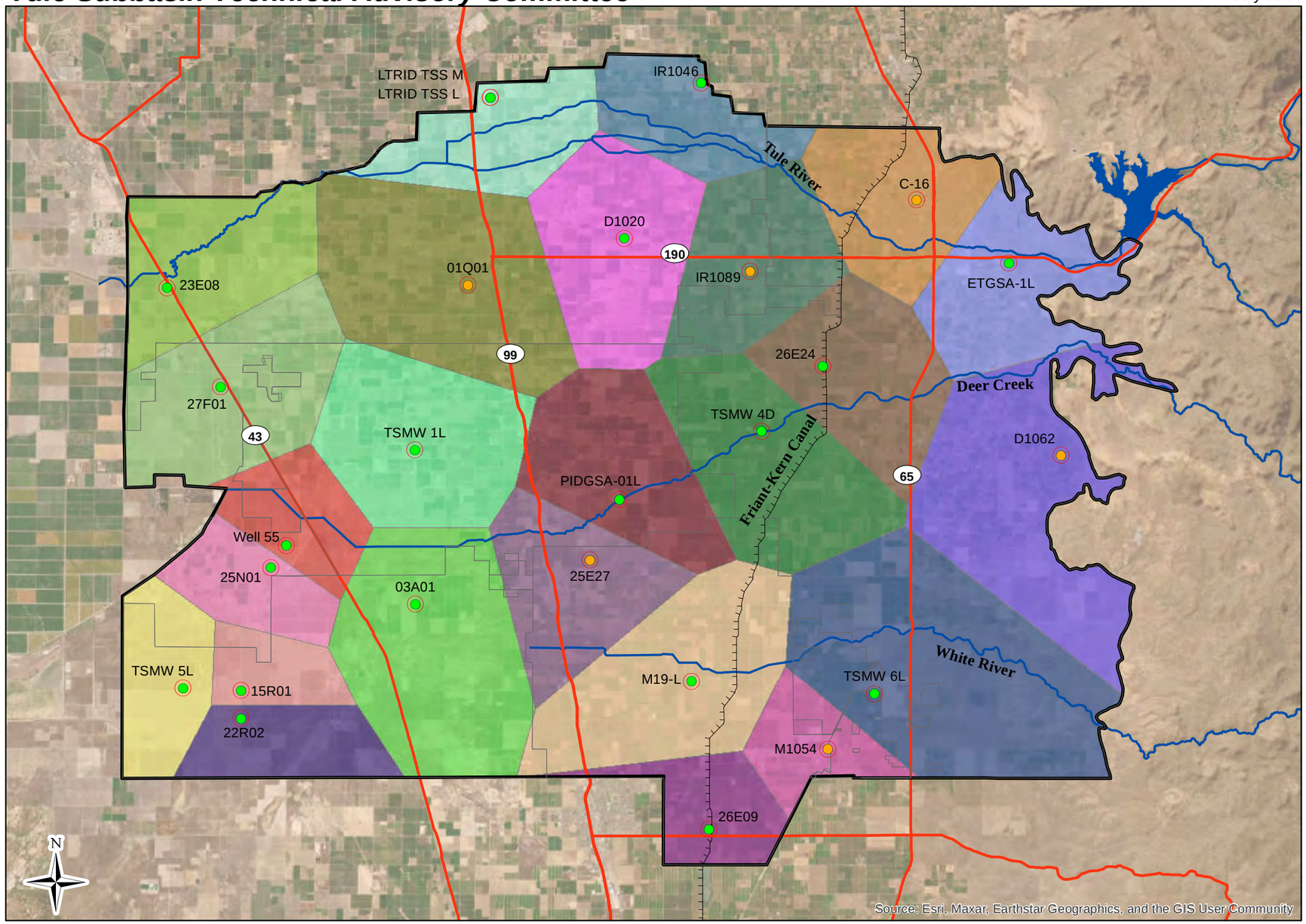
Tule Subbasin Monitoring Plan



Map Features

- Lower Aquifer RMS Well
- Composite Aquifer RMS Well
- Major Hydrologic Feature
- Friant-Kern Canal
- State Highway
- GSA Boundary
- Subbasin Boundary

Note: Well tiles were developed using the Thiessen polygon (aka Voronoi diagram) method using the "deldir" package in R.

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0 2 4 8 Miles

NAD 83 State Plane Zone 4

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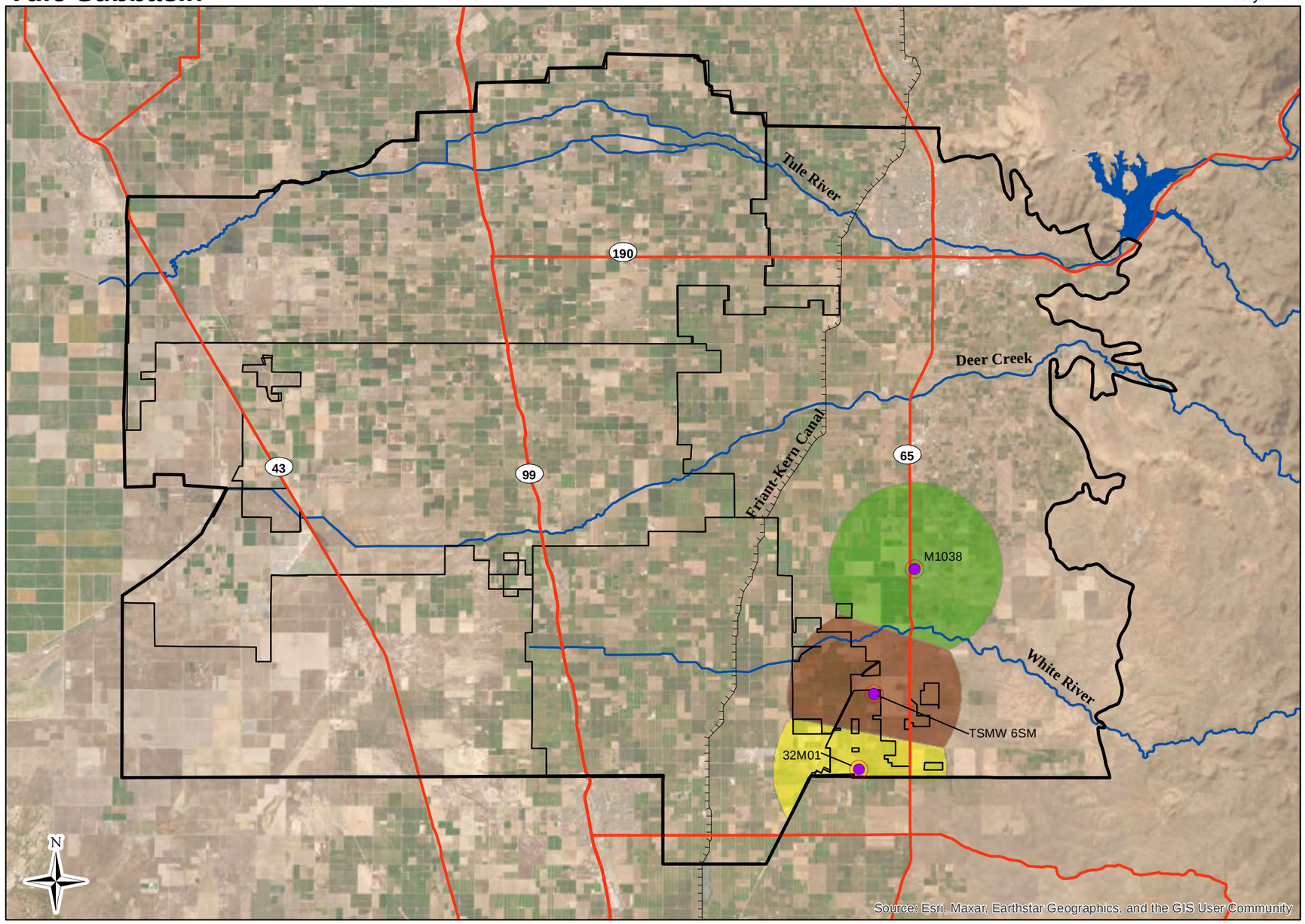
Lower Aquifer Groundwater Level RMS Well Tiles

Figure A1-6b

Tule Subbasin

July 2024



0 2.5 5 10 Miles

NAD 83 State Plane Zone 4

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Tule Subbasin Monitoring Plan

Map Features

- Santa Margarita Aquifer RMS Well
- Major Hydrologic Feature
- Friant-Kern Canal
- State Highway
- GSA Boundary
- Subbasin Boundary

Note: Well tiles are 3 mile buffers within the Tule Subbasin.

DRAFT-FINAL

Santa Margarita Aquifer Groundwater Level RMS Well Tiles

Figure A1-6c

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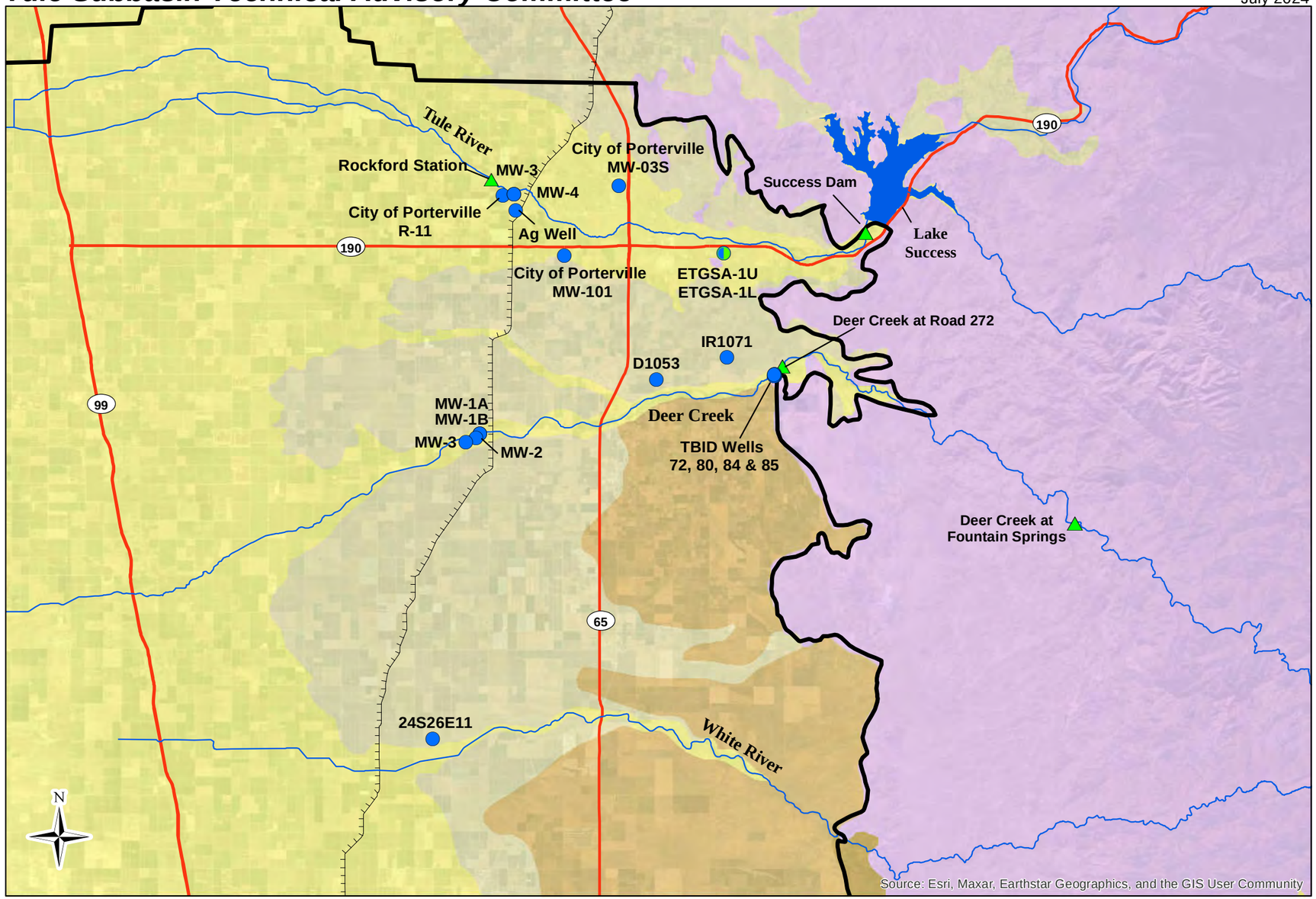
Tule Subbasin Monitoring Plan



0 1.5 3 6 Miles

NAD 83 State Plane Zone 4

Map Features

- Instream Gage
- Upper Aquifer Well
- Lower Aquifer Well
- Major Hydrologic Feature
- Friant-Kern Canal
- Younger Alluvium
- Older Alluvium
- Continental Sedimentary Rocks
- Santa Margarita Formation
- Crystalline Basement
- Subbasin Boundary
- State Highway/Major Road

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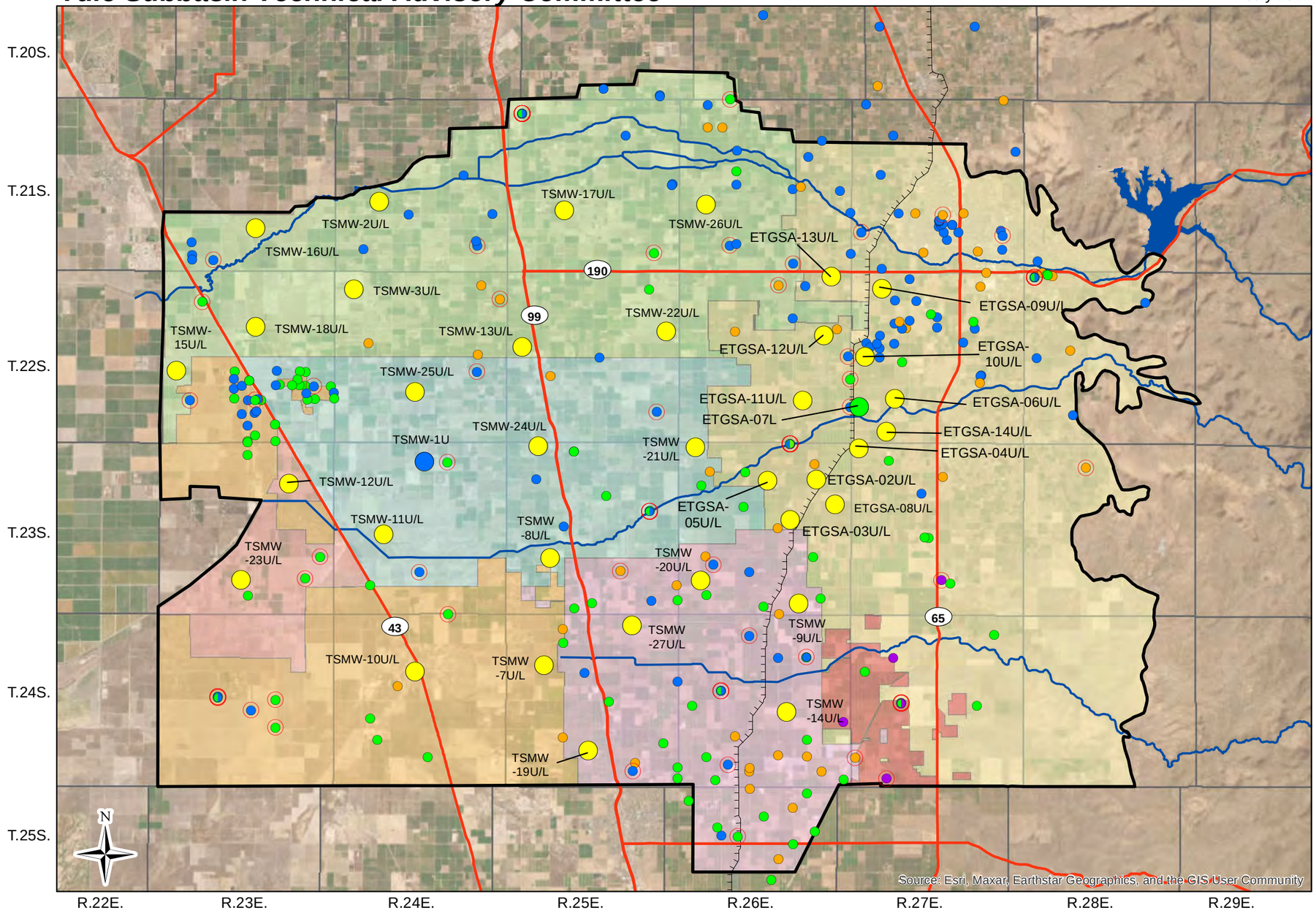
Preliminary Interconnected Surface Water Monitoring Network

Figure A1-7

Tule Subbasin Technical Advisory Committee

July 2024

Tule Subbasin Monitoring Plan



Map Features

- Proposed Upper Aquifer Well
- Proposed Lower Aquifer Well
- Proposed Nested Well
- Upper Aquifer Well
- Upper Aquifer RMS Well
- Lower Aquifer Well
- Lower Aquifer RMS Well
- Composite Aquifer Well
- Composite Aquifer RMS Well
- Santa Margarita Aquifer Well
- Santa Margarita Aquifer RMS Well
- Major Hydrologic Feature
- Friant-Kern Canal
- Alpaugh GSA
- Delano-Earlimart ID GSA
- Eastern Tule GSA
- Kern-Tulare WD GSA
- Lower Tule River ID GSA
- Pixley ID GSA
- Tri-County Water Authority
- Subbasin Boundary
- State Highway

0 2 4 8 Miles

NAD 83 State Plane Zone 4

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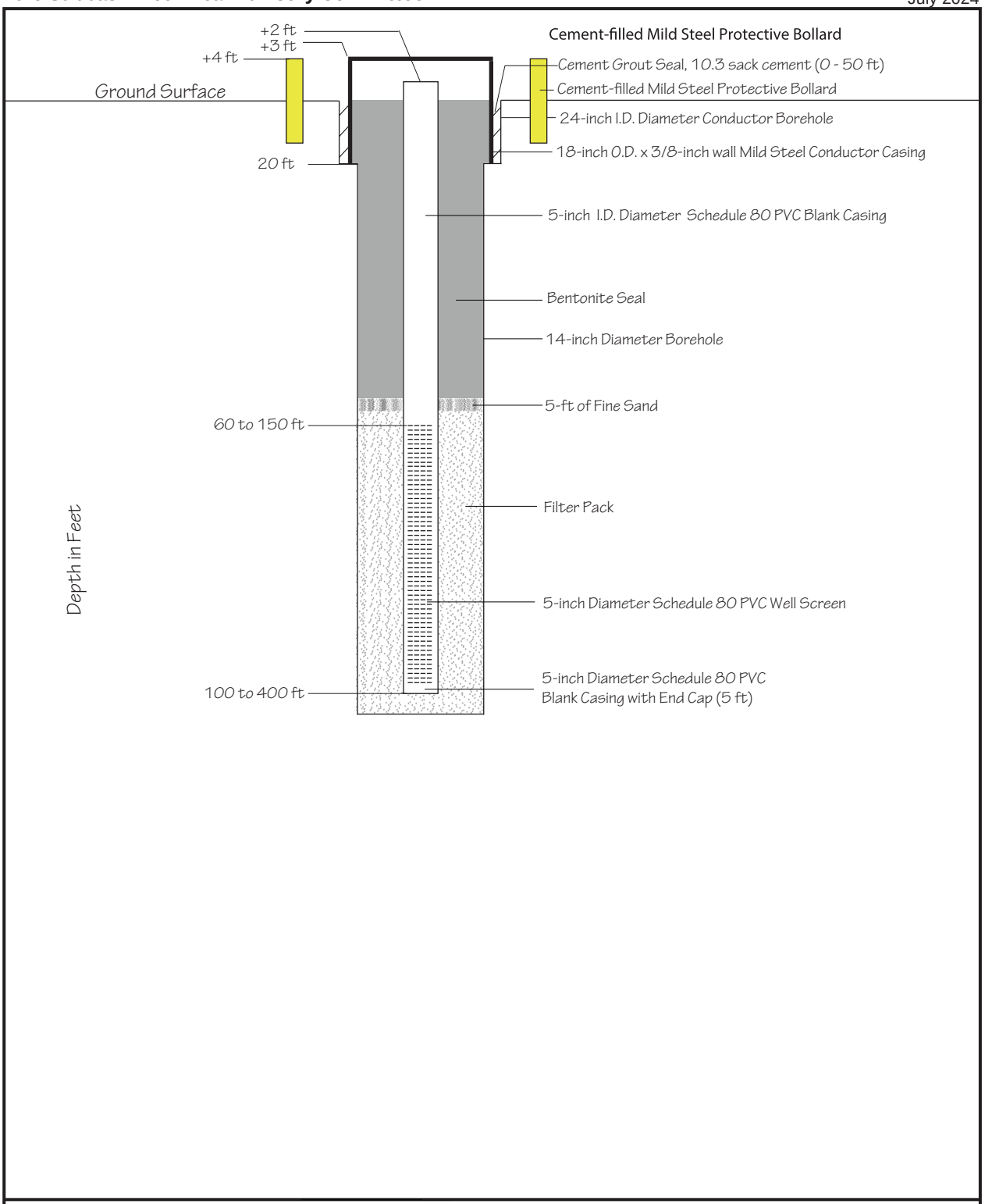
Proposed Groundwater Level Monitoring Wells to Fill Data Gaps

Figure A1-8



Notes:
1. Not to Scale.
2. Centralizers to be placed every 60 ft in screened sections only.
3. Casing may include at least one compression section.

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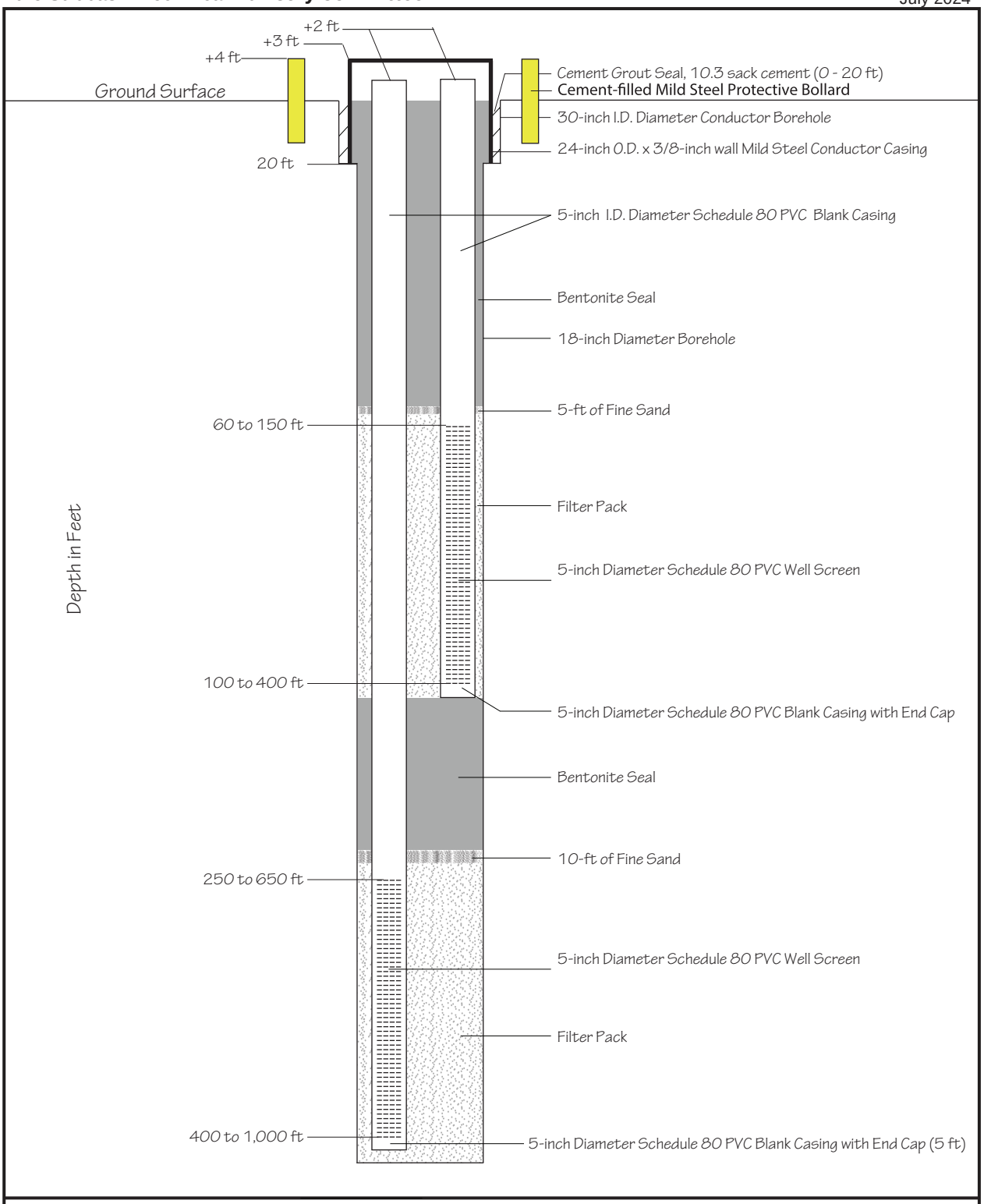
Figure A1-9
Conceptual Upper Aquifer Well Construction Diagram



Notes:
1. Not to Scale.
2. Centralizers to be placed every 60 ft in screened sections only.
3. Casing may include at least one compression section.

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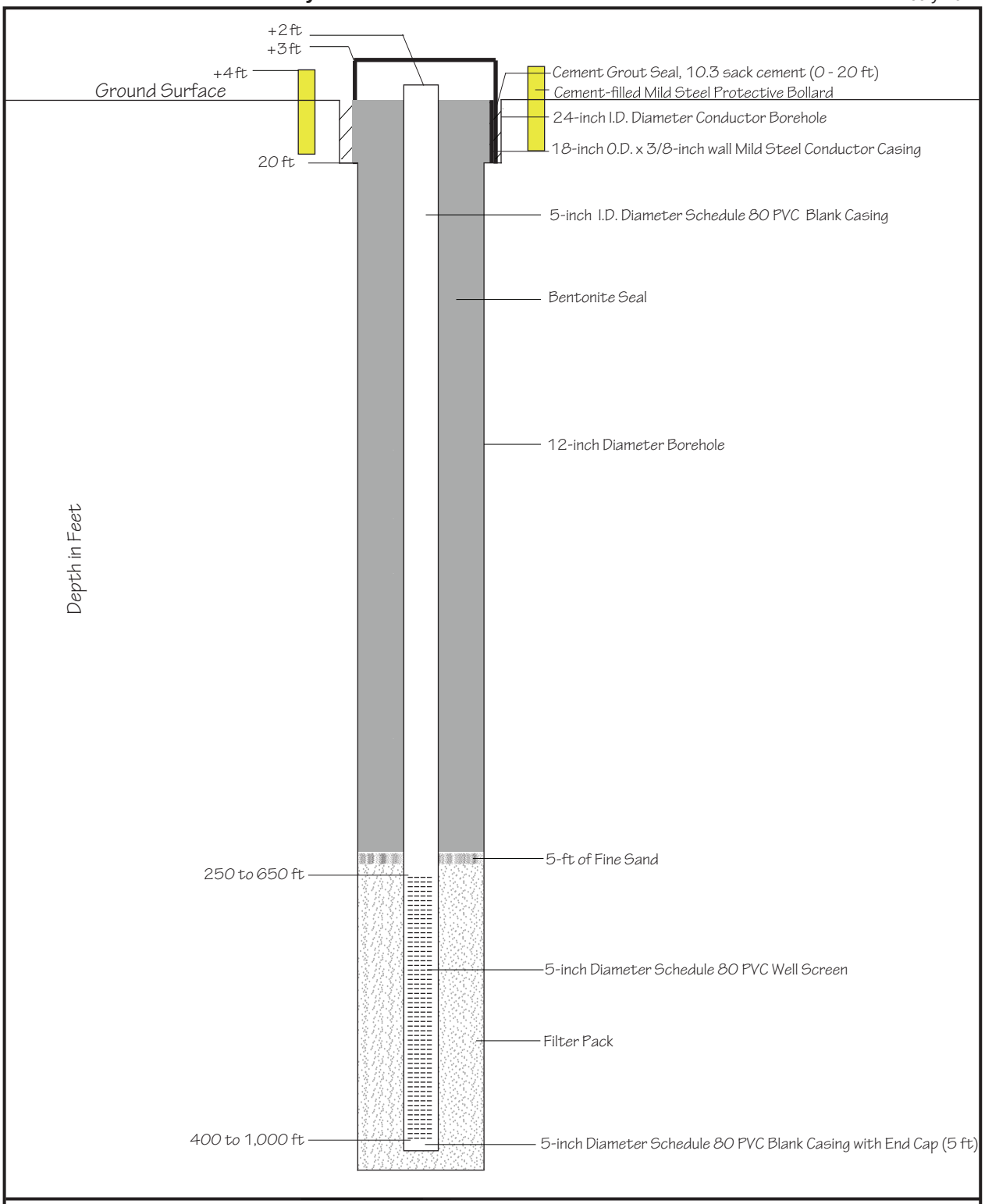
Figure A1-10
Conceptual Nested Well Construction Diagram



Notes:
1. Not to Scale.
2. Centralizers to be placed every 60 ft in screened sections only.
3. Casing may include at least one compression section.

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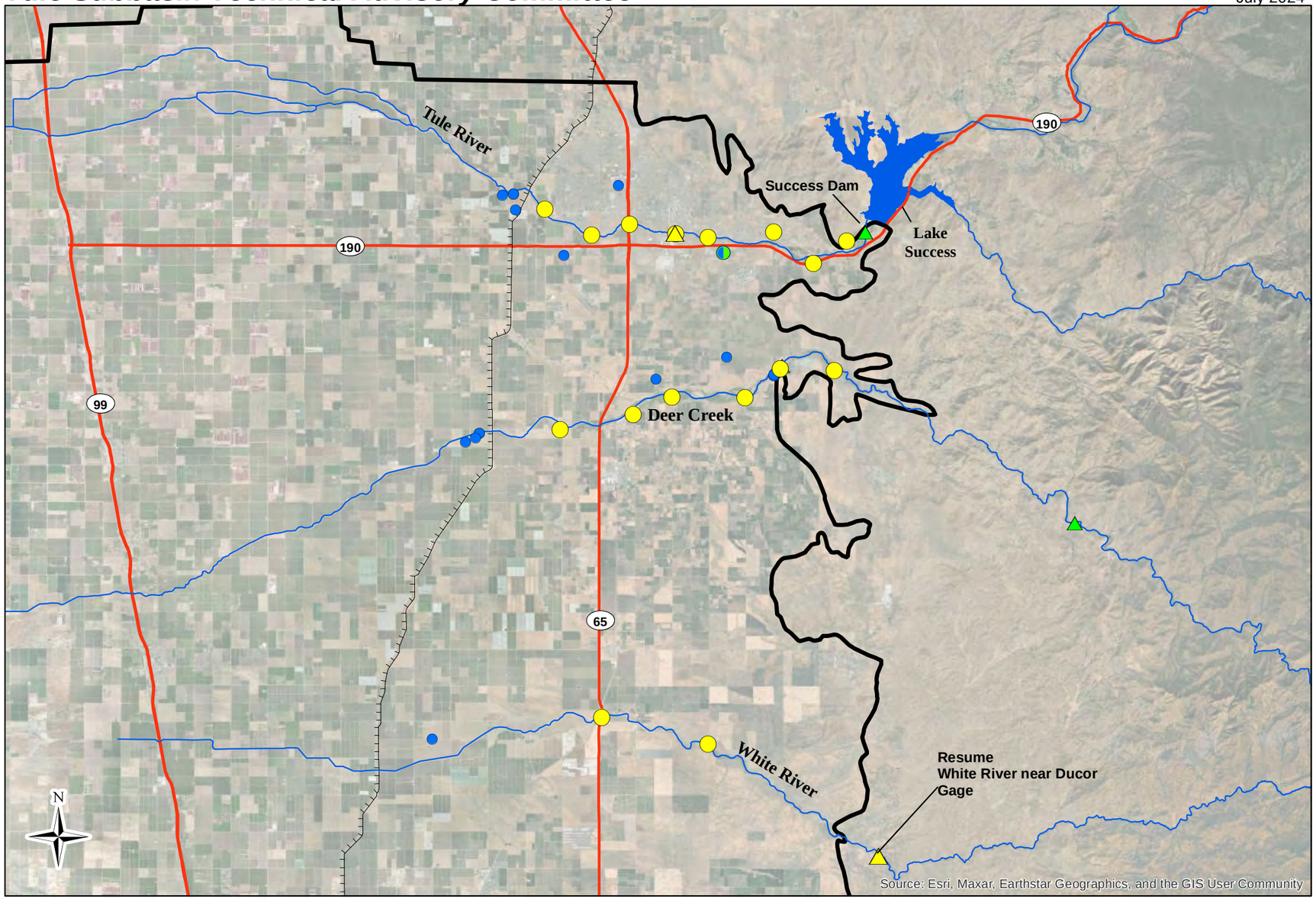
Figure A1-11
Conceptual Lower Aquifer Well Construction Diagram

Tule Subbasin Technical Advisory Committee

July 2024

Tule Subbasin Monitoring Plan



0 2 4 8 Miles

NAD 83 State Plane Zone 4

Map Features

- Proposed Monitoring Well
- Proposed Gage
- Existing Nested Well
- Existing Instream Gage
- Existing Upper Aquifer Well
- Major Hydrologic Feature
- Friant-Kern Canal
- Subbasin Boundary
- State Highway/Major Road

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Proposed Monitoring Wells and Gages for Interconnected Surface Water Monitoring Network Data Gaps

Figure A1-12

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Tule Subbasin

Sustainable Groundwater Management Act

Upper Aquifer Public and Domestic Wells

Legend

- Public and Domestic Upper Aquifer WCRs
- Tule Subbasin Boundary
- County Boundary
- Lake Success
- Friant-Kern Canal
- Waterways
- Major Roads
- Roads

Sections Symbolized by Number of Upper Aquifer Public/Domestic Wells

- 0 - 1
- 1 - 5
- 5 - 10
- 10 - 20
- 20+

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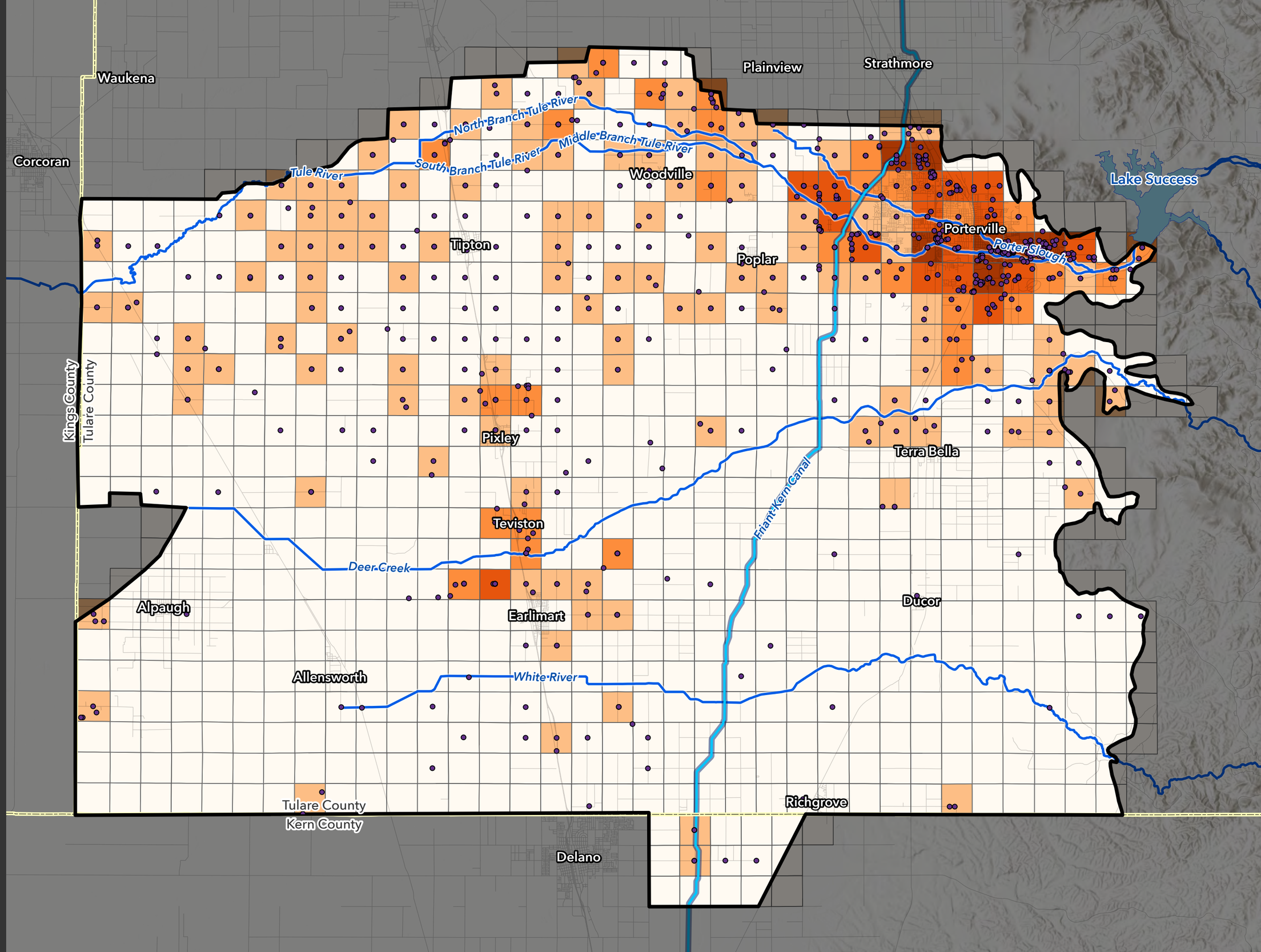
Figure A1-13

Data based on GAMA Groundwater Information System (https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/), June 11, 2024.



Tule Subbasin

Sustainable Groundwater Management Act

Lower Aquifer Public, Domestic, and Irrigation Wells

Legend

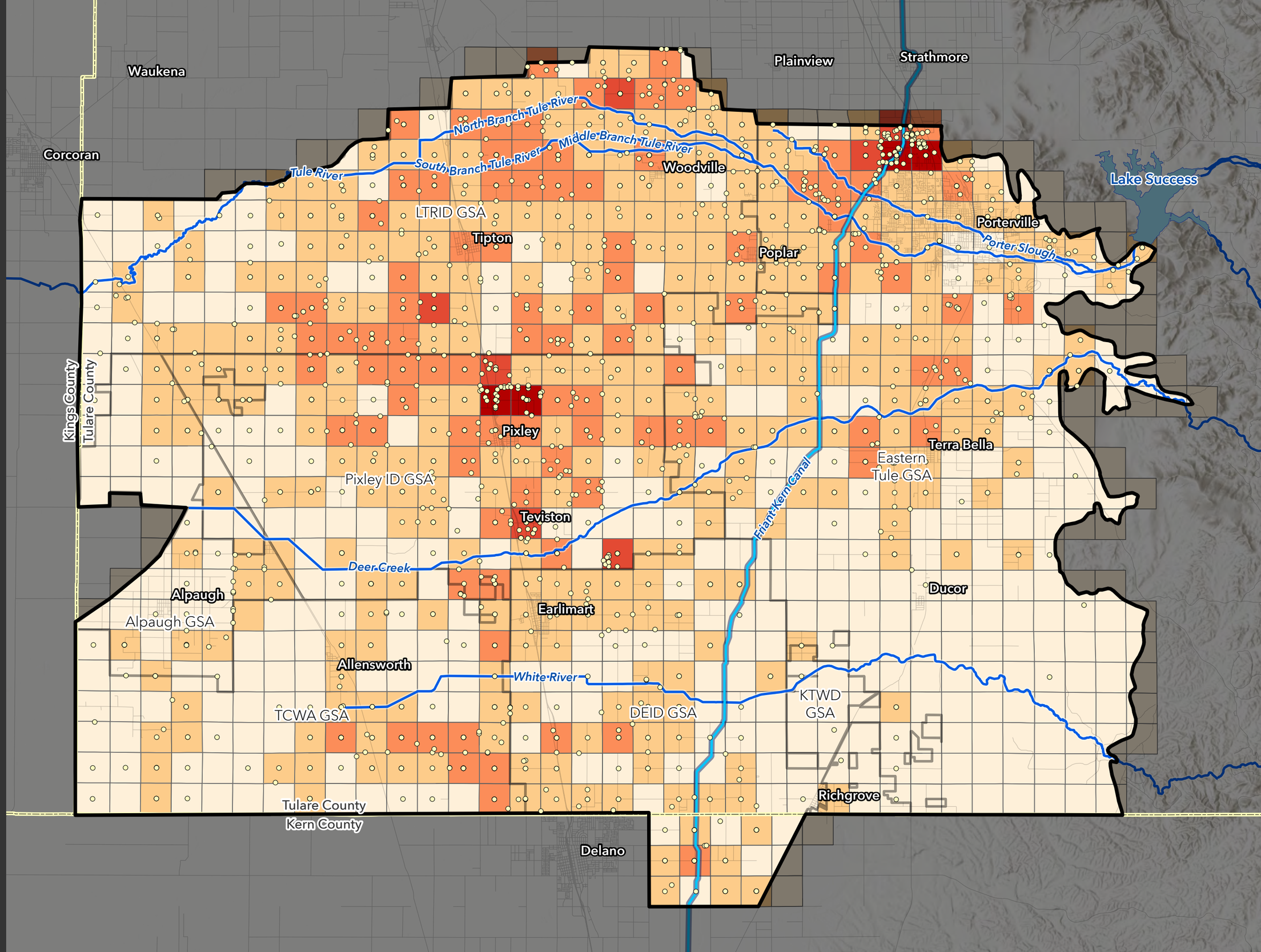
- Public, Domestic, and Irrigation Lower Aquifer WCRs
- Tule Subbasin Boundary
- County Boundary
- Lake Success
- Friant-Kern Canal
- Waterways
- Major Roads
- Roads

Sections Symbolized by Number of Lower Aquifer Public, Domestic, and Irrigation Wells

- 0 -1
- 1 - 5
- 5 - 10
- 10 - 20
- 20+

DRAFT-FINAL
Figure A1-14

Data based on State of California Well Completion Report Database.



Tule Subbasin

Sustainable Groundwater Management Act

Upper Aquifer Public and Domestic Wells With RMSs

Legend

- RMS Privately-Owned Domestic and Irrigation Wells
- RMS Dedicated Monitoring Wells
- Public and Domestic Upper Aquifer WCRs
- Tule Subbasin Boundary
- County Boundary
- Lake Success
- Friant-Kern Canal
- Waterways
- Major Roads
- Roads

Sections Symbolized by Number of Upper Aquifer Public/Domestic Wells

- 0 - 1
- 1 - 5
- 5 - 10
- 10 - 20
- 20+

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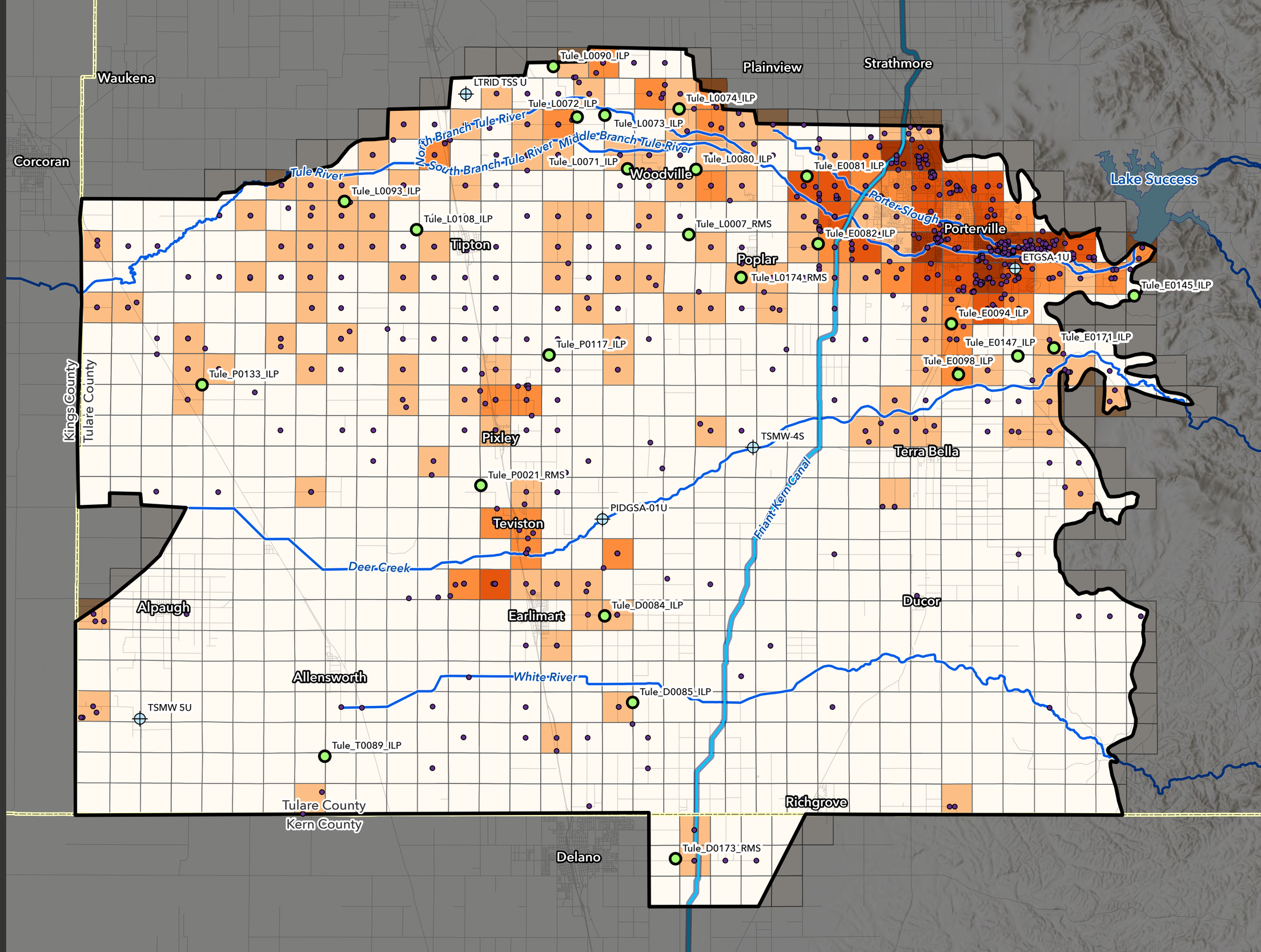
Figure A1-15

Data based on State of California Well Completion Report Database.



N

0 1.75 3.5 Miles

Tule Subbasin
Sustainable Groundwater Management Act

Lower Aquifer Public, Domestic, and Irrigation Wells with RMSs

Legend

- RMS Privately-Owned Domestic and Irrigation Wells
- RMS Dedicated Monitoring Wells
- Public, Domestic, and Irrigation Lower Aquifer WCRs
- Tule Subbasin Boundary
- County Boundary
- Lake Success
- Friant-Kern Canal
- Waterways
- Major Roads
- Roads

Sections Symbolized by Number of Lower Aquifer Public, Domestic, and Irrigation Wells

- 0 -1
- 1 - 5
- 5 - 10
- 10 - 20
- 20+

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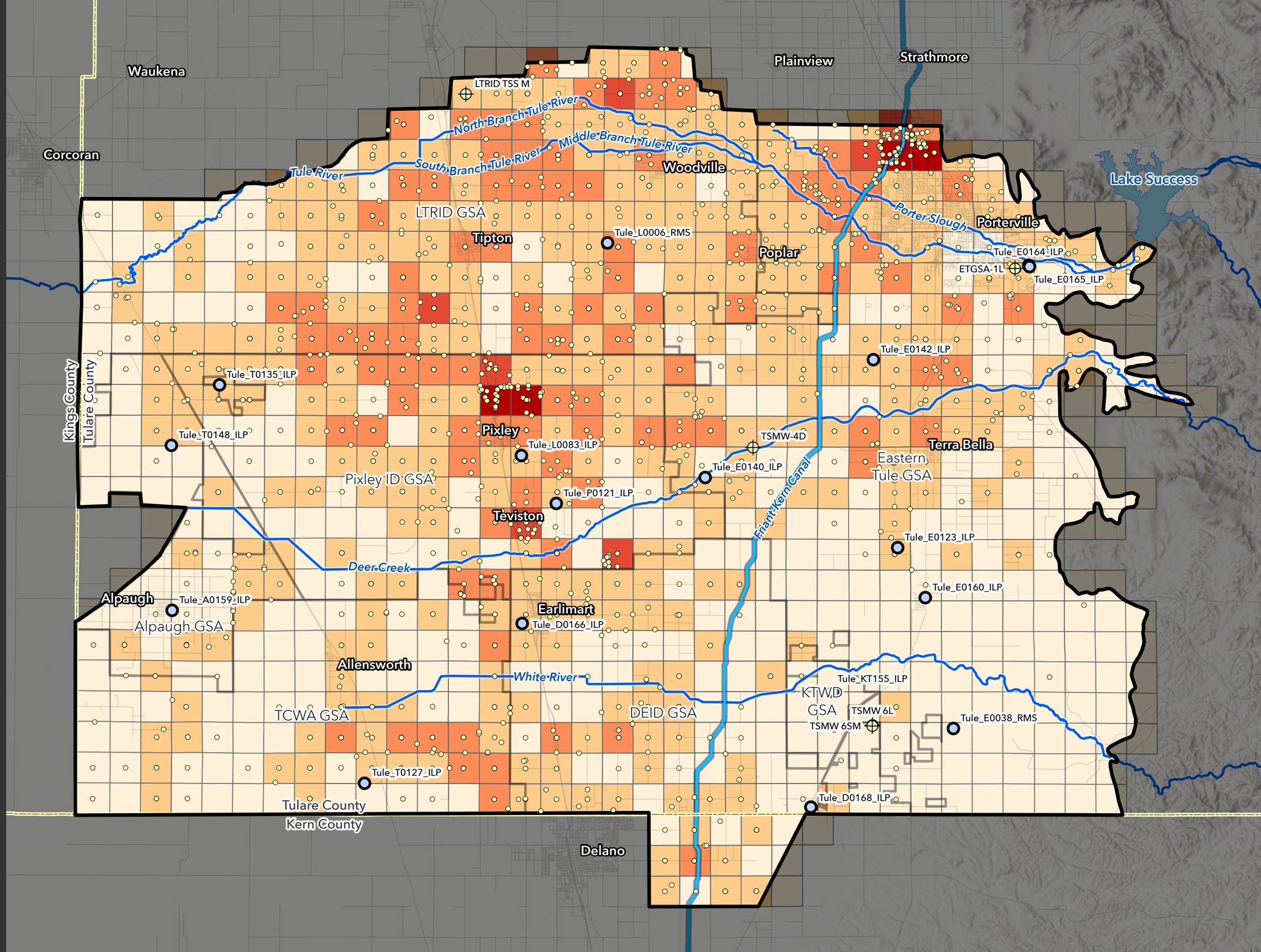
Figure A1-16

Data based on State of California Well Completion Report Database.



Tule Subbasin
Sustainable Groundwater Management Act

RMS Groundwater Quality Monitoring Network - Upper Aquifer

Legend

- Public Supply Wells
- Composite Public Supply Wells

RMS Quality Monitoring Network - Upper Aquifer

- RMS Privately-Owned Domestic and Irrigation Wells
- RMS Dedicated Monitoring Wells
- Public Water System Boundaries
- GSA Boundaries
- Tule Subbasin Boundary
- County Boundary
- Lake Success
- Friant-Kern Canal
- Waterways
- Major Roads
- Roads

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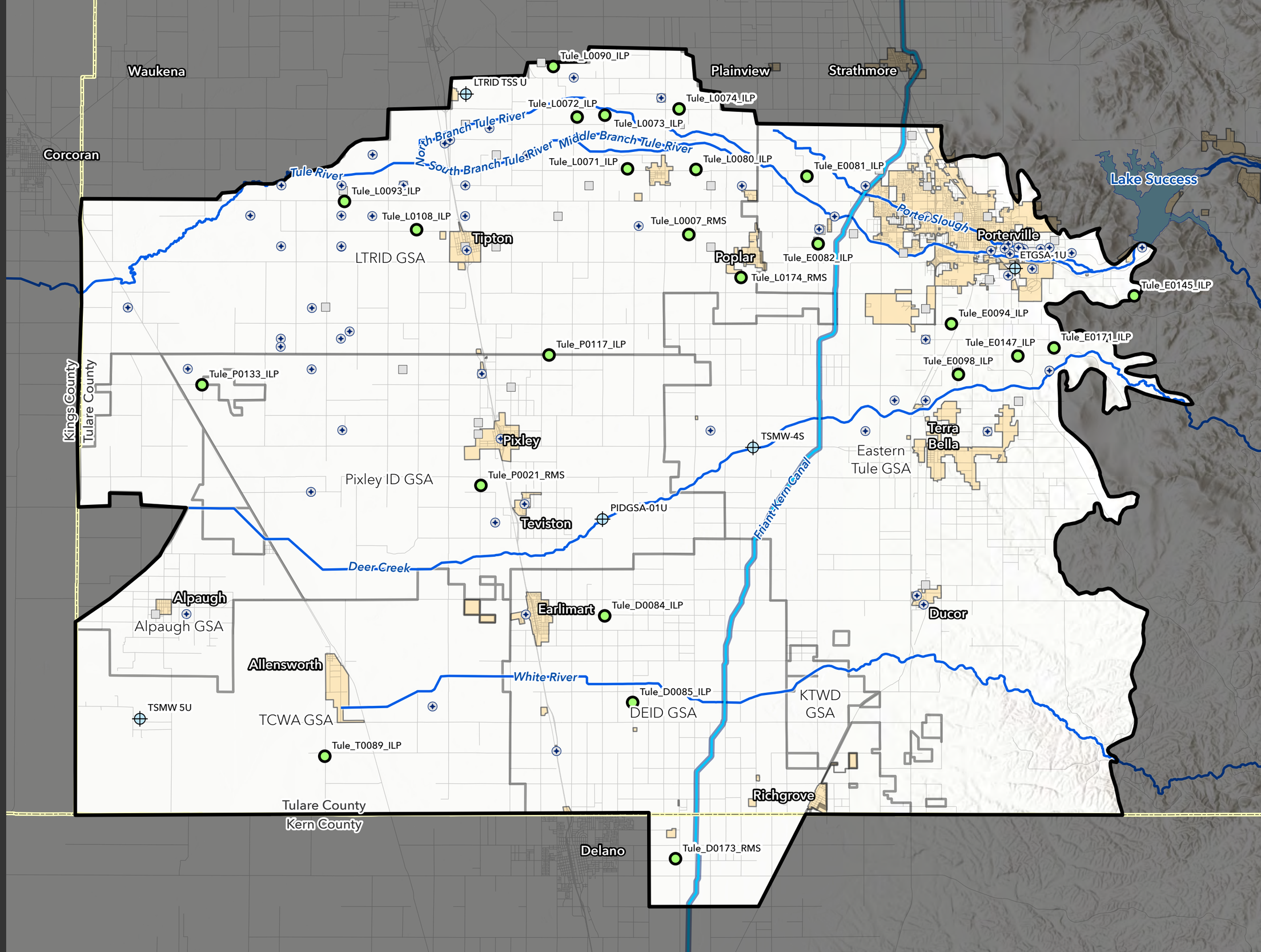
Figure A1-17

Public Supply Wells based on State of California Well Completion Report database. Public Water System Boundaries courtesy of Division of Drinking Water.



N

0 1.75 3.5 Miles

Tule Subbasin
Sustainable Groundwater Management Act

RMS Groundwater Quality Monitoring Network - Lower Aquifer

Legend

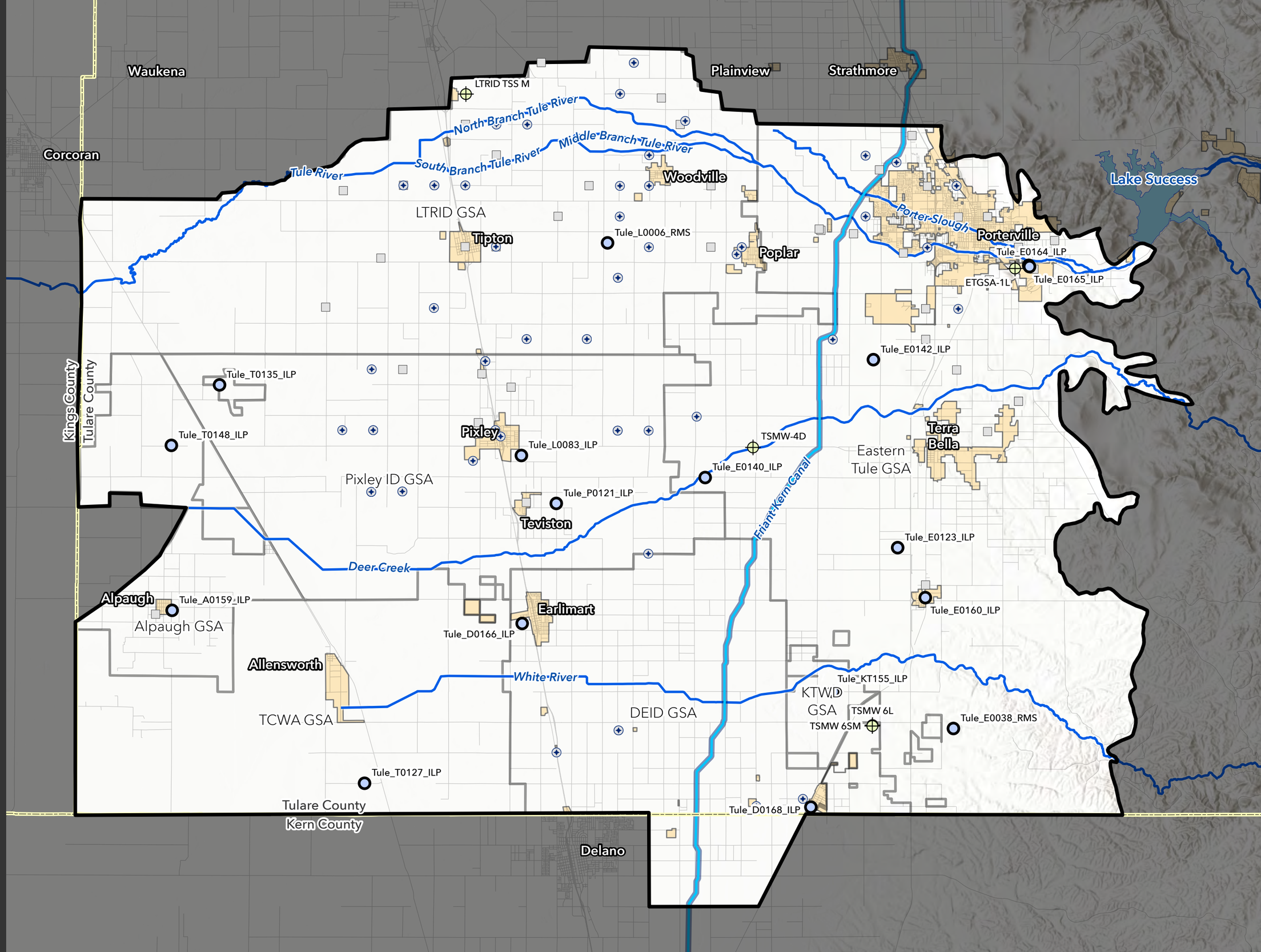
- Public Supply Wells
- Composite Public Supply Wells

RMS Quality Monitoring Network - Lower Aquifer

- Privately-Owned Domestic and Irrigation Wells
- Dedicated Monitoring Wells
- Public Water System Boundaries
- GSA Boundaries
- Tule Subbasin Boundary
- County Boundary
- Lake Success
- Friant-Kern Canal
- Waterways
- Major Roads
- Roads

DRAFT-FINAL
Figure A1-18

Public Supply Wells based on State of California Well Completion Report database. Public Water System Boundaries courtesy of Division of Drinking Water.



N

0 1.75 3.5 Miles

Tables

Summary of Existing Upper Aquifer Groundwater Level RMS Wells

GSA Name	CASGEM State Well Number	Short State Well Number	Master Well ID	Well Name/ Well Log	Owner	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perforations (ft bgs)	Bottom of Perforations (ft bgs)	Aquifer[1]	Groundwater Level Record	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Delano-Earlimart ID GSA	23S26E29D001M	23S/26E-29D01	Tule_D0045_RMS	E0119660	Parvinder Hundal	310	298	160	300	U	2019 - Present	6504545	1847738
	24S25E35H001M	24S/25E-35H01	Tule_D0047_RMS	1095774	Jonathan Martin	360	340	160	320	U	2019 - Present	6489468	1811332
	24S26E04P001M	24S/26E-04P01	Tule_D0048_RMS	P-24	N/A[4]	402	393	216	393	U	1979 - Present	6511204	1834634
	N/A	N/A	Tule_D0055_RMS	M-19U	DEID	810	350	200	350	U	2010 - Present	6500623	1828030
	24S26E32G001M	24S/26E-32G01	Tule_D0050_RMS	67	N/A	470	470	23	461	U	1986 - Present	6507272	1810870
	N/A	24S26E11	Tule_D0049_RMS	36201	N/A	399	399	301	399	U	2003 - Present	6521732	1830686
Eastern Tule GSA	N/A	21S/27E-23	Tule_E0027_RMS	C-1	N/A	220	220	160	220	U	1982 - Present	6557877	1908424
	N/A	21S/27E-30	Tule_E0028_RMS	R-11	City of Porterville	216	216	0	216	U	1984 - Present	6531870	1909109
	22S26E13R001M	22S/26E-13R01	Tule_E0029_RMS	243293	Saucelito Irrigation District	385	380	240	380	U	1959 - Present	6529364	1886159
	N/A	N/A	N/A	ETGSA-01U	Tule Subbasin TAC	52	52	27	47	U	2022 - Present	6563733	1900793
	N/A	N/A	N/A	TSMW-4S	Tule Subbasin TAC	1,420	255	190	250	U	2023 - Present	6518754	1870002
	22S26E25J001M	22S/26E-25J01	Tule_E0040_RMS	N/A	Saucelito Irrigation District	N/A	N/A	N/A	N/A	U	1945 - Present	6529609	1876738
Lower Tule River ID GSA	21S23E32K001M	21S/23E-32K01	Tule_L0003_RMS	32K1	N/A	N/A	406	104	402	U	1973 - Present	6412096	1903994
	21S26E32B002M	21S/26E-32B02	Tule_L0007_RMS	E049930	Leal Joseph	327	280	200	260	U	2019 - Present	6507613	1906655
	N/A	21S/26E-34	Tule_L0009_RMS	27803	N/A	400	400	120	400	U	2020 - Present	6519268	1903301
	22S23E30J001M	22S/23E-30J01	Tule_L0011_RMS	Angiola #1	N/A	460	450	240	450	U	1998 - Present	6408171	1878179
	N/A	N/A	Tule_L0015_RMS	LTRID TSS U	N/A	1,560	290	150	280	U	2022 - Present	6469280	1930941
	21S24E35A001M	21S/24E-35A01	Tule_L0004_RMS	35A1	N/A	315	328	245	302	U	1986 - Present	6461001	1906318
Pixley ID GSA	22S24E23J001M	22S/24E-23J01	Tule_P0016_RMS	22/24-23J1	N/A	N/A	400	N/A	N/A	U	1947 - Present	6460931	1883356
	22S25E25N001M	22S/25E-25N01	Tule_P0017_RMS	N/A	N/A	N/A	437	N/A	N/A	U	1959 - Present	6494108	1875965
	23S24E28J002M	23S/24E-28J02	Tule_P0020_RMS	28J2	N/A	N/A	N/A	200	500	U	1953 - Present	6450366	1846351
	N/A	N/A	Tule_P0024_RMS	PIDGSA TSS U	Tule Subbasin TAC	1,020	280	180	280	U	2022 - Present	6492780	1857678
Tri-County Water Authority	22S23E25C001M	22S/23E-25CO1	Tule_T0058_RMS	E20	Angiola Water District - Mark Grewal	N/A	N/A	240	480	U	2008 - Present	6430891	1880679
	24S23E22E001M	24S/23E-22E01	Tule_T0061_RMS	N/A	N/A	N/A	N/A	400	1,000	U	2000 - Present	6430891	1880679
	N/A	N/A	Tule_T0064_RMS	TSMW-5U	Tule Subbasin TAC	310	285	170	280	U	2021 - Present	6413217	1823385

Notes:

[1] U = Well Perforated in Upper Aquifer

[2] X-Coordinates in State Plane Zone 4 (feet)

[3] Y-Coordinates in State Plane Zone 4 (feet)

[4] N/A = Not Available

Summary of Existing Lower Aquifer Groundwater Level RMS Wells

GSA Name	CASGEM State Well Number	Short State Well Number	Master Well ID	Well Name/ Well Log	Owner	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perforations (ft bgs)	Bottom of Perforations (ft bgs)	Aquifer[1]	Groundwater Level Record	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Alpaugh GSA	23S23E25N001M	23S/23E-25N01	Tule_A0056_RMS	25N01	4Creeks	N/A[4]	N/A	702	1,504	L	1987 - Present	6429320	1845090
	N/A	24S/23E-23	Tule_A0057_RMS	Well 55	Alpaugh Irrigation District	N/A	1459	707	1,459	L	1984 - Present	6432067	1849112
Delano-Earlimart ID GSA	25S26E09C001M	25S/26E-09C01	Tule_D0053_RMS	N/A	N/A	N/A	N/A	450	1,002	L	2021 - Present	6509076	1797597
	N/A	24S/26E-17	Tule_D0054_RMS	M19-L	DEID	810	805	705	805	L	2010 - Present	6500623	1828030
	N/A	23S/25E-27	Tule_D0043_RMS	N/A	N/A	N/A	800	300	800	C	2020 - Present	6487400	1846610
	N/A	24S/27E-31	Tule_D0051_RMS	M1054	Richgrove CSD - Ben	N/A	800	300	800	C	2019 - Present	6530710	1812190
Eastern Tule GSA	N/A	22S/26E-24	Tule_E0030_RMS	N/A	N/A	1,270	1,240	670	1,220	L	2020 - Present	6529809	1881991
	N/A	N/A	N/A	TSMW-4M	Tule Subbasin TAC	1,420	875	630	870	L	2023 - Present	6518680	1870002
	N/A	21S/27E-27	Tule_E0035_RMS	C-16	City of Porterville	N/A	560	240	548	C	1988 - Present	6546910	1912290
	23S28E04K001M	23S/28E-04	Tule_E0037_RMS	D1062	Mike Riley	N/A	N/A	160	530	C	2020 - Present	6573260	1865680
	N/A	23S/27E-27	Tule_E0036_RMS	M1038	Ducor CSD	N/A	1,405	1,035	1,038	SM	2018 - Present	6546660	1844920
	N/A	N/A	N/A	ETGSA-01L	Tule Subbasin TAC	162	140	120	140	L	2022 - Present	6563730	1900746
	N/A	N/A	N/A	TSMW 4D	Tule Subbasin TAC	1,420	1,360	1,050	1,350	L	2023 - Present	6518680	1870060
Kern-Tulare GSA	24S27E32M001M	24S/27E-32	Tule_KT0039_RMS	N/A	N/A	N/A	1,800	1,002	1,800	SM	2013 - Present	6536530	1808340
	N/A	N/A	Tule_KT042_RMS	TSMW 6SM	Tule Subbasin TAC	2,000	1,600	1,950	2,020	SM	2020 - Present	6539196	1822172
	N/A	N/A	Tule_KT041_RMS	TSMW-6L	Tule Subbasin TAC	610	605	350	600	L	2021 - Present	6539196	1822172
Lower Tule River ID GSA	N/A	20S/26E-32	Tule_L0001_RMS	N/A	Cindy Huerta	680	680	320	680	L	2019 - Present	6507628	1933560
	N/A	21S/25E-36	Tule_L0006_RMS	N/A	Doug Van Beek	640	640	320	640	L	2019 - Present	6493618	1905179
	N/A	N/A	Tule_L0013_RMS	LTRID TSS L	N/A	1,560	1,480	1,100	1,470	L	2022 - Present	6469280	1930941
	N/A	N/A	Tule_L0014_RMS	LTRID TSS M	N/A	1,560	815	500	805	L	2022 - Present	6469280	1930941
	N/A	22S/23E-08	Tule_L0010_RMS	E0094101	N/A	N/A	1,000	660	1,000	L	2020 - Present	6410339	1896242
	22S24E01Q001M	22S/24E-01	Tule_L0012_RMS	N/A	N/A	N/A	700	480	700	C	1986 - Present	6465170	1896730
	N/A	22S/26E-03	Tule_L0174_RMS	IR1089	N/A	N/A	400	140	400	C	2022 - Present	6516600	1899270
Pixley ID GSA	N/A	N/A	Tule_P0023_RMS	TSMW-1L	Tule Subbasin TAC	1,050	1,005	550	1,000	L	2022 - Present	6455530	1866658
	N/A	N/A	Tule_P0025_RMS	PIDGSA-01L	Tule Subbasin TAC	1,020	1,015	400	1,005	L	2022 - Present	6492772	1857660
Tri-County Water Authority	24S24E03A001M	24S/24E-03A01	Tule_T0046_RMS	N/A	N/A	1,602	1,602	804	1,602	L	1961 - Present	6455570	1838610
	22S23E27F001M	22S/23E-27F01	Tule_T0059_RMS	G13	Angiola W.D.	N/A	1,604	782	1,604	L	2002 - Present	6420049	1878149
	24S23E15R001M	24S/23E-15R01	Tule_T0060_RMS	N/A	N/A	1,150	1,150	600	1,150	L	1970 - Present	6423853	1823274
	N/A	N/A	Tule_T0065_RMS	TSMW-5L	Tule Subbasin TAC	1,010	955	670	950	L	2021 - Present	6413230	1823472
	24S23E22R002M	24S/23E-22R02	Tule_T0062_RMS	22R02	N/A	1,205	1,200	500	1,200	L	1986 - Present	6423826	1817704

Notes:

[1] L = Well Perforated in Lower Aquifer
C = Well Perforated in Composite Aquifer
SM = Well Perforated in Santa Margarita Aquifer

[2] X-Coordinates in State Plane Zone 4 (feet)
[3] Y-Coordinates in State Plane Zone 4 (feet)
[4] N/A = Not Available

Groundwater Quality Monitoring Constituents

Field Analysis	
Constituent	**Units**
Electrical Conductivity (EC)	µmhos/cm[1] (at 25˚C)
pH	Standard Unit
Dissolved Oxygen (DO)	mg/L
Temperature	˚C[2]

Laboratory Analysis		
Type	**Constituent**	**Units**
Elemental	Arsenic	µg/L[3]
	Uranium	µg/L
	Hexavalent Chromium	µg/L
Cations	Calcium	mg/L[4]
	Magnesium	mg/L
	Potassium	mg/L
	Sodium	mg/L
Anions	Sulfate	mg/L
	Chloride	mg/L
	Perchlorate	µg/L
	Carbonate/Bicarbonate	mg/L
	Nitrate as N	mg/L
Nitrogen Cycle	Nitrite as N	mg/L
	Total Kjeldahl Nitrogen (TKN)	mg/L
	Ammonia	mg/L
Additional Considerations	Total Dissolved Solids	mg/L
	Tetrachloroethene (PCE)	µg/L
	Dibromo-3-chloropropane(DBCP)	µg/L
	1,2,3-Trichloropropane (TCP)	ng/L[5]
	Per-and polyfluoroalkyl Substances (PFAS)	ng/L

Notes:

[1] µmhos/cm = micromhos per centimeter
[2] ˚C = Degrees Celsius
[3] µg/L = Micrograms per liter; equivalent to parts per billion (ppb)
[4] mg/L = milligrams per liter; equivalent to parts per million (ppm)
[5] ng/L = nanograms per liter; equivalent to parts per trillion (ppt)

Table A1-4
DRAFT-FINAL

Stream Gages in the Tule Subbasin

River	Stream Gage Name	Location (Latitude, Longitude)	Period of Record	Gage Type	Comments
Tule River	Success Dam	36.056389, -118.922778	October 1953 to Present	Water stage recorder	The discharge at this station is controlled by the release from Success Reservoir. The recorder is operated and maintained by the U.S. Army Corps of Engineers.
	Rockford Station	36.077778, -119.106111	February 1957 to Present	Concrete weir equipped with a water stage recorder	The recorder is operated and maintained by the Tule River Association.
	Turnbull Weir	36.051111, -119.5	1942 to Present	Rated section of the natural channel equipped with a staff gage	Records currently maintained by the TRA with the assistance of Downstream Kaweah and Tule Rivers Association. Manual measurements of stream velocity and stage are conducted by LTRID.
	Friant-Kern Canal Discharge into the Tule River	36.073611, -119.0875	June 1950 to Present	Modified 20 ft parshall flume	Records are furnished by the U.S. Bureau of Reclamation.
	Friant-Kern Canal Discharge into the Porter Slough	36.083333, -119.080556	June 1950 to Present	15 ft rectangular weir	Records are furnished by the U.S. Bureau of Reclamation.
Deer Creek	Deer Creek at Fountain Springs	35.941667, -118.821944	1968 to Present	Water stage recorder	Gage operated, managed and data collected by the USGS.
	Deer Creek at Road 272	36.003611, -118.964167	March 2023 to Present	N/A	Gage operated, managed and data collected by the USGS.
	Deer Creek at Trenton Weir	35.946111, -119.181111	N/A[1]	Concrete weir equipped with a water stage recorder	Records currently maintained by the U.S. Army Corps of Engineers.
	Deer Creek at Homeland Canal	35.9344, -119.474	N/A	N/A	N/A

Stream Gages in the Tule Subbasin

River	Stream Gage Name	Location (Latitude, Longitude)	Period of Record	Gage Type	Comments
White River	Road 208	35.858889, -119.107778	N/A	N/A	Streamflow in this river is currently monitored manually at Road 208 by the Tule Basin Water Quality Coalition and Delano-Earlimart Irrigation

Notes:

[1] N/A = Not Available

Summary of Existing Upper Aquifer Groundwater Quality RMS Wells

GSA Name	Master Well ID	ILRP Well ID	SGMA Well ID	Township-Range-Section	WCR[1]	Top Perf	Bottom Perf	Well Depth	Aquifer	Lat	Long
Delano-Earlimart ID GSA	Tule_D0084_ILP	D1031	NULL	23S/25E-36	E0083349	265	305	305	Upper	35.88429	-119.23127
	Tule_D0085_ILP	D1032	NULL	24S/25E-13	E0060486	120	220	300	Upper	35.84343	-119.21494
	Tule_D0173_RMS	D1087	25S26E08…	25S/26E-8	99904	400	600	600	Upper	35.76965	-119.18989
Eastern Tule GSA	NULL	NULL	ETGSA-1U	22S/28E-06	WCR2022-006225	28	48	55	Upper	36.04856	-118.99301
	NULL	NULL	TSMW-4S	23S/26E-03	6848	--	--	--	Upper	35.96406	-119.14526
	Tule_E0081_ILP	D1017	NULL	21S/26E-24	508057	140	300	300	Upper	36.09212	-119.11417
	Tule_E0082_ILP	D1018	NULL	21S/26E-36	29615	--	--	152	Upper	36.06022	-119.10760
	Tule_E0094_ILP	D1049	NULL	22S/27E-11	E0053801	120	220	300	Upper	36.02248	-119.03005
	Tule_E0098_ILP	D1053	NULL	22S/27E-23	E0117085	140	300	300	Upper	35.99859	-119.02597
	Tule_E0145_ILP	IR1069	NULL	22S/28E-11	E0125774	82	222	222	Upper	36.03568	-118.92373
	Tule_E0147_ILP	IR1071	NULL	22S/28E-19	E0334821	190	510	510	Upper	36.00732	-118.99141
	Tule_E0171_ILP	IR1088	NULL	22S/28E-17	E0312858	200	400	400	Upper	36.01113	-118.97039
Kern-Tulare WD GSA	Tule_K0170_ILP	D1085	NULL	21S/27E-08	258420	116	160	170	Upper	36.12027	-119.08108
Lower Tule River ID GSA	Tule_L0007_RMS	D1019	21S26E32B002M	21S/26E-32	E049930	200	260	280	Upper	36.06452	-119.18288
	Tule_L0015_RMS	NULL	LTRID TSS U	21S/25E-06	--	150	280	290	Upper	36.13070	-119.31281
	Tule_L0071_ILP	D1001	NULL	21S/25E-13	153207	--	--	124	Upper	36.09550	-119.21861
	Tule_L0072_ILP	D1003	NULL	21S/25E-11	489364	--	--	252	Upper	36.11991	-119.24802
	Tule_L0073_ILP	D1004	NULL	21S/25E-11	E0094768	340	400	400	Upper	36.12083	-119.23187
	Tule_L0074_ILP	D1006	NULL	21S/26E-05	E0264833	160	360	500	Upper	36.12386	-119.18867
	Tule_L0080_ILP	D1016	NULL	21S/26E-16	E0114156	184	220	262	Upper	36.09528	-119.17877
	Tule_L0090_ILP	D1045	NULL	20S/25E-33	E0000637	220	380	400	Upper	36.14377	-119.26197
	Tule_L0093_ILP	D1048	NULL	21S/24E-28	773622	--	--	154	Upper	36.07969	-119.38330
	Tule_L0108_ILP	D1065	NULL	21S/24E-26	773615	146	186	188	Upper	36.06646	-119.34128
	Tule_L0174_RMS	IR1089	22S26E03	22S/26E-03	259289	140	400	400	Upper	36.04429	-119.15243
Pixley ID GSA	Tule_P0021_RMS	D1028	23S25E08G001M	23S/25E-08	724662	320	420	420	Upper	35.94577	-119.30339
	Tule_P0024_RMS	NULL	PIDGSA-01U	23S/25E-14	--	400	1005	1020	Upper	35.92990	-119.23266
	Tule_P0117_ILP	IR1022	NULL	22S/25E-22	415133	270	510	510	Upper	36.00747	-119.26400
	Tule_P0133_ILP	IR1053	NULL	22S/23E-27	E000731	280	480	480	Upper	35.99277	-119.46570
Tri-County Water Authority	Tule_T0064_RMS	NULL	TSMW 5U	24S/23E-17	--	170	280	310	Upper	35.83486	-119.50078
	Tule_T0089_ILP	D1044	NULL	24S/24E-29	--	--	--	--	Upper	35.81756	-119.39344

Notes:

[1]WCR = Well Completion Report number from the Department of Water Resources.

Summary of Existing Lower Aquifer Groundwater Quality RMS Wells

GSA Name	Master Well ID	ILRP Well ID	SGMA Well ID	Township-Range-Section	WCR	Top Perf (ft bgs)	Bottom Perf (ft bgs)	Well Depth (ft bgs)	Aquifer	Lat	Long
Alpaugh GSA	Tule_A0159_ILP	M1027	NULL	23S/23E-34	1095876	1,025	1,210	1,230	Lower	35.88614	-119.48243
Delano-Earlimart ID GSA	Tule_D0166_ILP	M1051	NULL	23S/25E-33	0944088	340	810	820	Lower	35.88061	-119.27917
	Tule_D0168_ILP	M1053	NULL	24S/26E-36	154330	550	800	820	Lower	35.79413	-119.11145
Eastern Tule GSA	ETGSA-1L	NULL	ETGSA-1L	22S/28E-06	6229	120	140	140	Lower	36.04856	-118.99301
	TSMW-4D	NULL	TSMW-4D	23S/26E-03	6848	1,050	1,350	1,360	Lower	35.96406	-119.14526
	Tule_E0038_RMS	IR1081	24S27E23	24S/27E-23	E0155481	1,090	1,500	1,500	Lower	35.83131	-119.02881
	Tule_E0123_ILP	IR1036	NULL	23S/27E-21	956181	340	700	770	Lower	35.91673	-119.06122
	Tule_E0140_ILP	IR1064	NULL	23S/26E-09	0957132	400	1,000	1,000	Lower	35.94974	-119.17309
	Tule_E0142_ILP	IR1066	NULL	22S/27E-20	E0253846	220	420	720	Lower	36.00553	-119.07539
	Tule_E0160_ILP	M1039	NULL	23S/27E-27	154514	1,136	1,336	1,341	Lower	35.89313	-119.04515
	Tule_E0164_ILP	M1049	NULL	22S/28E-06	942425	180	450	460	Lower	36.05012	-118.98510
	Tule_E0165_ILP	M1050	NULL	22S/28E-06	165452	160	340	395	Lower	36.04951	-118.98461
Kern-Tulare WD GSA	Tule_KT041_RMS	NULL	TSMW 6L	24S/27E-20	--	350	600	610	Lower	35.83284	-119.07576
	Tule_KT042_RMS	NULL	TSMW 6SM	24S/27E-20	--	1,600	1,950	2,020	Lower	35.83256	-119.07578
	Tule_KT155_ILP	IR1080	NULL	24S/27E-18	E0052358	1,281	1,860	1,870	Lower	35.84861	-119.09830
Lower Tule River ID GSA	Tule_L0006_RMS	D1020	21S25E36	21S/25E-36	E0084286	320	640	650	Lower	36.06050	-119.23013
	Tule_L0014_RMS	NULL	LTRID TSS M	21S/25E-06	--	500	805	815	Lower	36.13070	-119.31281
	Tule_L0083_ILP	D1029	NULL	23S/25E-04	E0076023	415	495	495	Lower	35.95996	-119.27992
Pixley ID GSA	Tule_P0121_ILP	IR1030	NULL	23S/25E-10	E0252295	320	800	800	Lower	35.93736	-119.25956
Tri-County Water Authority	Tule_T0127_ILP	IR1043	NULL	24S/24E-27	E0346058	440	970	1,260	Lower	35.80486	-119.37032
	Tule_T0135_ILP	IR1056	NULL	22S/23E-26	489856	580	930	930	Lower	35.99276	-119.45551
	Tule_T0148_ILP	IR1072	NULL	23S/23E-33	E077033	870	990	1,312	Lower	35.96408	-119.48334

Notes:

[1]WCR = Well Completion Report number from the Department of Water Resources.

Surface Water Quality Constituents for Analysis

Constituent	Units	Trigger Limit	Tule River Poplar Avenue (2004 - 2005)	Deer Creek Road 248 (2010 - 2013)	White River Road 208 (2011)
Electrical Conductivity	µS/cm[1]	*1,000*	67.7 - 157.8	148 - 284	272 - 304
pH	n/a[2]	*6.5 - 8.3*	7.02 - 8.94	7.7 - 8.9	8.18 - 9.03
Total Dissolved Oxygen	mg/L[3]	*min. 7.0*	6.3 - 9.4	7.0 - 11.1	8.94 - 10.64
E. Coli	MPN[4]/100 mL	*235*	n/a	81.3 - 2,419	980.40
Total Organic Carbon	mg/L	*n/a*	0.58 - 6.77	1.65 - 7.2	6.2 - 8.7
Hardness (as $CaCO_3$)	n/a	*n/a*	22.4 - 66.6	51.5 - 95.5	97.8 - 109.0
Total Suspended Solids	mg/L	*n/a*	n/a	4.75 - 574	73.3 - 91.0
Total Dissolved Solids	mg/L	*450*	50 - 120	99 - 398	180 - 211
Turbidity	NTU[5]	*n/a*	4.4 - 35	1.58 - 12.0	55.8 - 86.9
Arsenic	µg/L[6]	*10*	1.47 - 2.37	1.71 - 2.36	n/a
Boron	µg/L	*700*	19 - 38	28.6 - 93.7	n/a
Cadmium (Total)	µg/L	*5*	0.011 - 0.050	0.03 - 0.2	n/a
Copper (Total)	µg/L	*1300*	3.54 - 5.93	1.58 - 3.82	n/a
Lead (Total)	µg/L	*15*	0.23 - 0.81	0.32 - 5.43	n/a
Molybdenum (Total)	µg/L	*10 / 35*	n/a	0.0044 - 0.0082	n/a
Nickel (Total)	µg/L	*100*	0.47 - 2.23	0.51 - 3.84	n/a
Selenium (Total)	µg/L	*50*	0.36	1.0 - 2.0	n/a
Zinc (Total)	µg/L	*n/a*	2.54 - 6.19	4.86 - 34.5	n/a
Phosphorus as P	mg/L	*n/a*	21.1 - 64.1	0.01 - 0.014	0.06 - 0.34
Ammonia	mg/L	*1.50*	0.07	0.05 - 0.028	0.069 - 0.20
Nitrate as N	mg/L	*10*	0.07 - 0.30	0.03 - 1.00	0.70 - 2.90
Orthophosphate as P	mg/L	*n/a*	0.01 - 0.16	0.03 - 0.022	0.23 - 0.84
Phosphorus as P	mg/L	*n/a*	21.1 - 64.1	0.01 - 0.014	0.06 - 0.34

Notes:

[1] µS/cm = microsiemen per centimeter
[2] n/a = Not Available
[3] mg/L = milligrams per liter
[4] MPN = Most Probable Number
[5] NTU = Nephelometric Turbidity Unit
[6] µg/L = micrograms per liter

Appendices

Appendix A

Summary of Groundwater Level Monitoring Network Wells

Summary of Groundwater Level Monitoring Network Wells

GSA Name	CASGEM State Well Number	Short State Well Number	ILRP_ID	Master Well ID	Well Name/ Well Log	Owner	RMS	Reference Point Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perfs (ft bgs)	Bottom of Perfs (ft bgs)	Aquifer[1]	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Alpaugh GSA	23S23E25N001M	23S/23E-25N01	N/A[4]	Tule_A0056_RMS	25N01	4Creeks	Yes	211	210	N/A	N/A	702	1504	L	6429260	1845240
	N/A	24S/23E-23	N/A	Tule_A0057_RMS	Well 55	Alpaugh	Yes	200	199	N/A	1459	707	1459	L	6432070	1849220
	N/A	N/A	IR1073	Tule_A0149_ILP	N/A	Alpaugh ID	No	197	200	N/A	N/A	N/A	N/A	L	6441270	1843920
	N/A	N/A	M1027	Tule_A0159_ILP	N/A	Alpaugh ID	No	204	202	N/A	N/A	N/A	N/A	L	6418750	1842030
Delano-Earlimart ID GSA	23S26E28H001M	23S/26E-28H01	N/A	N/A	N/A	N/A	No	379	379	300	300	190	300	U	6511140	1846470
	24S25E16B001M	24S/25E-16B01	N/A	N/A	N/A	N/A	No	287	287	300	285	120	285	U	6480770	1827830
	25S26E09N001M	25S/26E-09N01	N/A	N/A	N/A	N/A	No	381	381	N/A	351	276	351	U	6506000	1797780
	23S26E29D001M	23S/26E-29D01	D1058	Tule_D0045_RMS	E0119660	Parvinder Hundal	Yes	345	343	310	298	160	300	U	6504550	1847740
	24S25E35H001M	24S/25E-35H01	D1034	Tule_D0047_RMS	1095774	Jonathan Martin	Yes	321	320	360	340	160	320	U	6489730	1809700
	24S26E04P001M	24S/26E-04P01	N/A	Tule_D0048_RMS	P-24	N/A	Yes	390	390	402	393	216	393	U	6511170	1834580
	N/A	24S/26E-11	N/A	Tule_D0049_RMS	36201	N/A	Yes	438	437	399	399	301	399	U	6521730	1830690
	24S26E32G001M	24S/26E-32G01	N/A	Tule_D0050_RMS	67	N/A	Yes	400	398	470	470	23	461	U	6507230	1810860
	N/A	M19-U	N/A	Tule_D0055_RMS	M-19U	DEID	Yes	373	373	810	350	200	350	U	6505920	1824480
	N/A	23S/25E-36	D1031	Tule_D0084_ILP	E0083349	Jose Valencia	No	314	313	N/A	N/A	N/A	N/A	U	6493150	1841080
	24S25E013D001M	24S/25E-013D01	D1032	Tule_D0085_ILP	E0060486	Jim Cesare	No	343	342	N/A	N/A	N/A	N/A	U	6497960	1826190
	N/A	N/A	D1042	Tule_D0088_RMS	N/A	N/A	No	411	411	N/A	N/A	N/A	N/A	U	6516490	1830580
	23S25E36H001M	23S/25E-36H01	N/A	N/A	E0196006	N/A	No	332	332	605	600	360	600	L	6497980	1841250
	23S26E31H001M	23S/26E-31H01	N/A	N/A	N/A	N/A	No	351	351	1012	N/A	N/A	N/A	L	6503220	1842160
	23S26E35H001M	23S/26E-35H01	N/A	N/A	N/A	N/A	No	439	439	1370	1370	375	1370	L	6524300	1841590
	23S26E33J001M	23S/26E-33J01	N/A	N/A	N/A	N/A	No	397	397	495	N/A	N/A	N/A	L	6513800	1840110
	N/A	N/A	N/A	N/A	N/A	N/A	No	353	353	N/A	N/A	N/A	N/A	L	6500670	1821790
	24S25E22B001M	24S/25E-22B01	N/A	N/A	N/A	N/A	No	301	301	602	602	422	602	L	6485290	1822560
	24S25E25P001M	24S/25E-25P01	N/A	N/A	N/A	N/A	No	339	339	1011	N/A	N/A	N/A	L	6495330	1814890
	24S25E36H001M	24S/25E-36H01	N/A	N/A	N/A	N/A	No	357	357	725	725	N/A	N/A	L	6497990	1810370
	24S25E36J001M	24S/25E-36J01	N/A	N/A	N/A	N/A	No	360	360	1415	1398	437	1398	L	6497980	1808320
	24S26E30R001M	24S/26E-30R01	N/A	N/A	N/A	N/A	No	381	381	1239	N/A	N/A	N/A	L	6503280	1812290
	24S26E26F001M	24S/26E-26F01	N/A	N/A	N/A	N/A	No	458	458	1402	1400	550	1400	L	6521800	1815490
	25S26E02H001M	25S/26E-02H01	N/A	N/A	N/A	N/A	No	479	479	1002	1002	N/A	N/A	L	6521830	1805630
	24S26E32L002M	24S/26E-32L02	N/A	N/A	N/A	N/A	No	396	396	400	400	N/A	N/A	L	6504860	1808060
	25S26E06G001M	25S/26E-06G01	N/A	N/A	N/A	N/A	No	368	368	N/A	1200	N/A	N/A	L	6499960	1804270
	25S26E10B003M	25S/26E-10B03	N/A	N/A	N/A	N/A	No	431	431	960	N/A	N/A	N/A	L	6513870	1801390
	25S26E14B001M	25S/26E-14B01	N/A	N/A	N/A	N/A	No	465	465	1355	1355	N/A	N/A	L	6519250	1796230
	25S26E12M001M	25S/26E-12M01	N/A	N/A	N/A	N/A	No	494	494	1396	N/A	N/A	N/A	L	6523270	1798610
	25S26E09C001M	25S/26E-09C01	N/A	Tule_D0053_RMS	N/A	N/A	Yes	399	398	N/A	N/A	450	1002	L	6509080	1797600
	N/A	N/A	N/A	Tule_D0054_RMS	M19-L	DEID	Yes	373	373	810	805	705	805	L	6505920	1824480
	N/A	23S25E33	M1051	Tule_D0166_ILP	N/A	Earlimart PUD	No	275	271	N/A	N/A	N/A	N/A	L	6478960	1839770

Summary of Groundwater Level Monitoring Network Wells

GSA Name	CASGEM State Well Number	Short State Well Number	ILRP_ID	Master Well ID	Well Name/ Well Log	Owner	RMS	Reference Point Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perfs (ft bgs)	Bottom of Perfs (ft bgs)	Aquifer[1]	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Delano-Earlimart ID GSA	N/A	23S25E33	M1052	Tule_D0167_ILP	N/A	N/A	No	278	277	N/A	N/A	N/A	N/A	L	6482150	1840670
	N/A	24S26E36	M1053	Tule_D0168_ILP	N/A	Richgrove CSD	No	512	511	N/A	N/A	N/A	N/A	L	6528610	1808190
	N/A	25S/26E-08	D1087	Tule_D0173_RMS	N/A	N/A	No	382	381	N/A	N/A	N/A	N/A	L	6505330	1799310
	24S26E11D001M	24S/26E-11D01	N/A	N/A	N/A	N/A	No	438	438	861	N/A	N/A	N/A	L	6521730	1830690
	25S26E22G001M	25S/26E-22G01	N/A	N/A	N/A	N/A	No	431	431	1250	N/A	550	1250	L	6515260	1789630
	23S25E25R001M	23S/25E-25R01	N/A	N/A	7	N/A	No	325	325	450	450	246	450	C	6497810	1843970
	23S26E19R001M	23S/26E-19R01	N/A	N/A	11	N/A	No	343	342	1270	1260	212	1260	C	6503070	1849310
	23S26E15P001M	23S/26E-15P01	N/A	N/A	17	Cecil Steele	No	392	392	1000	N/A	250	1000	C	6516400	1854500
	23S26E34Q001M	23S/26E-34Q01	N/A	N/A	23	N/A	No	411	411	372	372	20	372	C	6516680	1838680
	24S25E35D001M	24S/25E-35D01	N/A	N/A	59	N/A	No	323	323	1200	1200	294	1200	C	6490080	1811210
	24S26E29H001M	24S/26E-29H01	N/A	N/A	68	N/A	No	394	394	501	501	135	501	C	6508570	1816160
	24S26E28P001M	24S/26E-28P01	N/A	N/A	70	N/A	No	421	421	N/A	N/A	N/A	N/A	C	6511210	1809590
	24S26E33P001M	24S/26E-33P01	N/A	N/A	69	N/A	No	419	419	741	741	270	741	C	6511240	1810290
	24S26E27H001M	24S/26E-27H01	N/A	N/A	72	N/A	No	443	443	500	500	200	500	C	6516480	1812610
	24S26E26C002M	24S/26E-26C02	N/A	N/A	73	N/A	No	468	468	900	900	350	900	C	6521820	1812370
	24S26E35H003M	24S/26E-35H03	N/A	N/A	75	N/A	No	490	490	N/A	N/A	N/A	N/A	C	6524450	1809650
	25S26E04A002M	25S/26E-04A02	N/A	N/A	78	N/A	No	423	423	1452	1452	346	1452	C	6511250	1806410
	25S26E15R001M	25S/26E-15R01	N/A	N/A	85	N/A	No	441	441	453	444	200	444	C	6516540	1793440
	N/A	23S/25E-27	N/A	Tule_D0043_RMS	E0174371	N/A	Yes	287	286	810	800	300	800	C	6487400	1846610
	N/A	24S/27E-31	M1054	Tule_D0051_RMS	489110	Richgrove CSD	Yes	495	495	N/A	800	300	800	C	6530710	1812190
	N/A	24S/25E-05	IR1024	Tule_D0118_ILP	E064159	Aldo Risi	No	267	266	610	600	280	600	C	6476800	1835920
	N/A	24S/25E-29	IR1079	Tule_D0154_ILP	943139	Jeff Rasmussen	No	276	275	895	892	284	892	C	6476800	1815940
	N/A	25S/26E-02	IR1082	Tule_D0156_ILP	E0092100	Harjinder Gil	No	465	463	840	840	300	840	C	6519190	1802890
Eastern Tule GSA	21S27E20M001M	21S/27E-20M01	#13 henderson	N/A	N/A	N/A	No	405	405	N/A	N/A	N/A	N/A	U	6521470	1899190
	N/A	N/A	C17	N/A	C-17	City of Porterville	No	N/A	438	700	325	100	300	U	6547610	1907720
	N/A	N/A	N/A	N/A	N/A	N/A	No	456	455	N/A	N/A	N/A	N/A	U	6557590	1909320
	N/A	N/A	C20	N/A	C-20	City of Porterville	No	N/A	432	540	404	125	379	U	6546150	1910150
	21S27E36F001M	21S/27E-36F01	C8	N/A	C-8	City of Porterville	No	465	464	435	435	79	435	U	6557840	1905880
	21S27E20Q001M	21S/27E-20Q01	202	N/A	N/A	Porterville ID	No	410	410	180	174	150	168	U	6538680	1912510
	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A	437	N/A	N/A	N/A	N/A	U	6547030	1909040
	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A	441	N/A	N/A	N/A	N/A	U	6549740	1909120
	21S26E24R001M	21S/26E-24R01	N/A	N/A	Lucky 70	N/A	No	396	394	218	N/A	N/A	N/A	U	6529830	1912720
	N/A	N/A	N/A	N/A	MW03N	N/A	No	439	439	N/A	N/A	46	66	U	6548580	1910470
	N/A	N/A	N/A	N/A	MW03S	N/A	No	439	439	N/A	N/A	67	87	U	6548580	1910470
	N/A	N/A	N/A	N/A	MW04	N/A	No	434	434	N/A	N/A	70	90	U	6546250	1911060
	N/A	N/A	N/A	N/A	MW05	N/A	No	439	439	N/A	N/A	60	80	U	6546560	1910410

Summary of Groundwater Level Monitoring Network Wells

GSA Name	CASGEM State Well Number	Short State Well Number	ILRP_ID	Master Well ID	Well Name/ Well Log	Owner	RMS	Reference Point Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perfs (ft bgs)	Bottom of Perfs (ft bgs)	Aquifer[1]	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Eastern Tule GSA	N/A	N/A	N/A	N/A	MW06	N/A	No	435	435	N/A	N/A	61	81	U	6546890	1910640
	N/A	N/A	N/A	N/A	MW07	N/A	No	433	433	N/A	N/A	51	71	U	6546250	1911040
	N/A	N/A	N/A	N/A	MW08	N/A	No	433	433	N/A	N/A	70	90	U	6546100	1911240
	N/A	N/A	N/A	N/A	MW09	N/A	No	435	435	N/A	N/A	51	71	U	6546240	1911290
	N/A	N/A	N/A	N/A	MW101	N/A	No	423	423	N/A	N/A	40	60	U	6540720	1900470
	N/A	N/A	N/A	N/A	MW103	N/A	No	426	426	N/A	N/A	80	100	U	6537990	1892250
	N/A	N/A	N/A	N/A	MW104	N/A	No	414	414	N/A	N/A	70	90	U	6535260	1890100
	N/A	N/A	N/A	N/A	MW105	N/A	No	410	410	N/A	N/A	59	79	U	6532740	1888610
	N/A	N/A	N/A	N/A	MW106	N/A	No	414	414	N/A	N/A	70	90	U	6535210	1885990
	N/A	N/A	N/A	N/A	MW107	N/A	No	409	409	N/A	N/A	60	80	U	6535220	1887690
	N/A	N/A	N/A	N/A	MW108	N/A	No	412	412	N/A	N/A	50	70	U	6533440	1887840
	N/A	N/A	N/A	N/A	MW109	N/A	No	406	406	N/A	N/A	60	80	U	6534670	1888510
	N/A	N/A	N/A	N/A	MW110	N/A	No	429	429	N/A	N/A	50	70	U	6539380	1891300
	N/A	N/A	N/A	N/A	MW111	N/A	No	432	432	N/A	N/A	95	115	U	6540700	1892740
	N/A	N/A	N/A	N/A	MW112	N/A	No	447	447	N/A	N/A	84	104	U	6545830	1891520
	N/A	N/A	N/A	N/A	MW113	N/A	No	432	432	N/A	N/A	85	105	U	6541940	1896430
	N/A	N/A	N/A	N/A	MW114	N/A	No	422	422	N/A	N/A	87	107	U	6538060	1896550
	N/A	N/A	N/A	N/A	MW115	N/A	No	447	447	N/A	N/A	89	109	U	6545810	1893390
	N/A	N/A	N/A	N/A	MW116	N/A	No	424	424	N/A	N/A	112	132	U	6537920	1888550
	21S26E11P001M	21S/26E-11P01	189	N/A	#1 parks ranch	N/A	No	368	368	N/A	N/A	N/A	N/A	U	6522030	1922960
	21S27E32N001M	21S/27E-32N01	193	N/A	#19 saak	N/A	No	412	411	95	N/A	N/A	N/A	U	6535590	1902370
	21S27E18M001M	21S/27E-18M01	D1011	Tule_E0026_RMS	360725	David Fenn	No	395	395	N/A	N/A	150	300	U	6535440	1919750
	N/A	21S/27E-23	N/A	Tule_E0027_RMS	C-1	N/A	Yes	457	457	220	220	160	220	U	6557880	1908420
	N/A	21S/27E-30	N/A	Tule_E0028_RMS	R-11	City of Porterville	Yes	403	400	216	216	N/A	216	U	6531870	1909110
	22S26E13R010M	22S/26E-13R010	N/A	Tule_E0029_RMS	243293	Saucelito ID	Yes	396	395	385	380	240	380	U	6529360	1886160
	22S26E25J001M	22S/26E-25J01	N/A	Tule_E0040_RMS	25j hyder	Saucelito ID	Yes	254	252	N/A	N/A	N/A	N/A	U	6529800	1876860
	N/A	21S/26E-24	D1017	Tule_E0081_ILP	508057	Christian Crouzet	No	384	382	N/A	N/A	N/A	N/A	U	6527930	1916670
	N/A	21S/26E-36	D1018	Tule_E0082_ILP	29615	David Gill	No	395	394	N/A	N/A	N/A	N/A	U	6529860	1905060
	N/A	22S/27E-11	D1049	Tule_E0094_ILP	E0053801	Khalid Arain	No	474	473	N/A	N/A	N/A	N/A	U	6552780	1891300
	N/A	22S/27E-23	D1053	Tule_E0098_ILP	E0214187	John Corkins	No	486	485	N/A	N/A	N/A	N/A	U	6553980	1882600
	N/A	22S/28E-29	D1057	Tule_E0102_ILP	E0078689	Michael Hernandez	No	649	647	N/A	N/A	N/A	N/A	U	6570890	1875390
	N/A	23S/27E-09	D1060	Tule_E0104_ILP	48307	Roger Everett	No	477	476	N/A	N/A	N/A	N/A	U	6542940	1860940
	N/A	N/A	D1066	Tule_E0109_ILP	N/A	N/A	No	479	478	N/A	N/A	N/A	N/A	U	6564340	1903730
	N/A	22S/27E-23	IR1068	Tule_E0144_ILP	E0214187	John Corkins	No	487	486	N/A	N/A	N/A	N/A	U	6553810	1882550
	N/A	22S/28E-11	IR1069	Tule_E0145_ILP	E0125774	Jason Willard	No	738	736	N/A	N/A	N/A	N/A	U	6584220	1896110
	N/A	N/A	IR1070	Tule_E0146_ILP	N/A	N/A	No	479	478	N/A	N/A	N/A	N/A	U	6550590	1888780

Summary of Groundwater Level Monitoring Network Wells

GSA Name	CASGEM State Well Number	Short State Well Number	ILRP_ID	Master Well ID	Well Name/ Well Log	Owner	RMS	Reference Point Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perfs (ft bgs)	Bottom of Perfs (ft bgs)	Aquifer[1]	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Eastern Tule GSA	N/A	22S/28E-19	IR1071	Tule_E0147_ILP	E0334821	Dyson Schneider	No	561	560	N/A	N/A	N/A	N/A	U	6564210	1885780
	N/A	ETGSA-1U	N/A	N/A	N/A	N/A	Yes	478	0	N/A	N/A	N/A	N/A	U	6563730	1900790
	N/A	TSMW 4S	N/A	N/A	N/A	N/A	Yes	369	0	N/A	N/A	N/A	N/A	U	6518680	1870060
	N/A	22S/26E-24	N/A	Tule_E0030_RMS	N/A	N/A	Yes	397	397	1,270	1,240	670	1,220	L	6529810	1881990
	N/A	24S/27E-23	IR1081	Tule_E0038_RMS	N/A	N/A	No	654	652	N/A	N/A	1,090	1,500	L	6553130	1821710
	N/A	23S/27E-21	D1037	Tule_E0087_ILP	N/A	Ramon Carranza	No	501	500	N/A	N/A	N/A	N/A	L	6544250	1852770
	N/A	22S27E09	D1051	Tule_E0096_ILP	AP-1	City of Porterville	No	447	446	N/A	N/A	N/A	N/A	L	6544630	1893860
	N/A	N/A	IR1035	Tule_E0122_RMS	N/A	N/A	No	433	433	N/A	N/A	N/A	N/A	L	6536880	1866980
	N/A	N/A	IR1036	Tule_E0123_ILP	956181	Perry Lau	No	499	498	N/A	N/A	N/A	N/A	L	6543540	1852810
	N/A	24S27E01	IR1040	Tule_E0124_ILP	E0146035	Dyson Schneider	No	579	577	N/A	N/A	N/A	N/A	L	6556350	1834770
	N/A	N/A	IR1064	Tule_E0140_ILP	N/A	N/A	No	344	343	N/A	N/A	N/A	N/A	L	6510430	1864870
	N/A	22S27E11	IR1065	Tule_E0141_RMS	415241	N/A	No	471	470	N/A	N/A	N/A	N/A	L	6552540	1892600
	N/A	N/A	IR1066	Tule_E0142_ILP	N/A	N/A	No	416	415	N/A	N/A	N/A	N/A	L	6539370	1885140
	N/A	24S27E18	IR1080	Tule_E0155_ILP	E0052358	N/A	No	478	477	N/A	N/A	N/A	N/A	L	6532530	1828020
	N/A	23S27E27	M1039	Tule_E0160_ILP	154514	Ducor CSD	No	543	542	N/A	N/A	N/A	N/A	L	6548290	1844210
	N/A	N/A	M1049	Tule_E0164_ILP	942425	DDS	No	486	485	N/A	N/A	N/A	N/A	L	6566070	1901360
	N/A	22S28E08	M1050	Tule_E0165_ILP	165452	DDS	No	486	485	N/A	N/A	N/A	N/A	L	6566220	1901140
	23S26E23R001M	23S/26E-23R01	N/A	N/A	N/A	N/A	No	418	417	N/A	N/A	N/A	N/A	L	6522980	1849120
	N/A	ETGSA-1L	N/A	N/A	ETGSA 01L	N/A	Yes	478	476	162	140	120	140	L	6563730	1900790
	N/A	TSMW 4M	N/A	N/A	TSMW 4M	N/A	No	369	367	N/A	875	630	870	L	6518680	1870060
	N/A	TSMW 4D	N/A	N/A	TSMW 4D	N/A	Yes	369	367	N/A	1,360	1,050	1,350	L	6518680	1870060
	N/A	23S/27E-27	M1038	Tule_E0036_RMS	M1038	Ducor CSD	Yes	539	538	1,425	1,405	1,035	1,038	SM	6546660	1844920
	N/A	TSMW 4SM	N/A	N/A	N/A	N/A	Yes	369	0	N/A	N/A	N/A	N/A	SM	6518680	1870060
	N/A	N/A	N/A	N/A	N/A	N/A	No	439	438	N/A	N/A	N/A	N/A	C	6550710	1912480
	N/A	N/A	N/A	N/A	N/A	N/A	No	454	453	N/A	N/A	N/A	N/A	C	6554900	1901620
	N/A	22S/27E-08	N/A	N/A	C-32	City of Porterville	No	N/A	425	820	780	240	760	C	6540120	1891350
	21S27E35F001M	21S/27E-35F01	C7	N/A	C-7	City of Porterville	No	446	446	593	587	160	593	C	6553350	1905540
	21S26E23D001M	21S/26E-23D01	185	N/A	N/A	N/A	No	371	370	710	N/A	N/A	N/A	C	6520680	1917540
	N/A	21S/27E-27	N/A	Tule_E0035_RMS	C-16	City of Porterville	Yes	432	431	560	548	240	548	C	6546910	1912290
	23S28E04K001M	23S/28E-04K01	D1062	Tule_E0037_RMS	500094	Mike Riley	Yes	662	661	N/A	N/A	160	530	C	6573260	1865680
	N/A	22S/27E-02	D1050	Tule_E0095_ILP	C-27	City of Porterville	No	457	456	N/A	N/A	N/A	N/A	C	6553770	1899080
	N/A	N/A	D1052	Tule_E0097_ILP	AP-2	City of Porterville	No	424	423	N/A	N/A	N/A	N/A	C	6538850	1892590
	N/A	22S/28E-05	D1054	Tule_E0099_ILP	26857	DDS	No	490	489	N/A	N/A	N/A	N/A	C	6567080	1900990
	N/A	22S/28E-06	D1055	Tule_E0100_ILP	30402	DDS	No	484	483	N/A	N/A	N/A	N/A	C	6565210	1901580
	N/A	N/A	D1061	Tule_E0105_ILP	N/A	N/A	No	491	490	N/A	N/A	N/A	N/A	C	6546860	1863910
	N/A	22S/26E-13	IR1062	Tule_E0138_ILP	E0307516	Bert Berra	No	388	388	N/A	N/A	N/A	N/A	C	6527340	1891170

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Eastern Tule GSA	N/A	22S/26E-17	IR1063	Tule_E0139_ILP	373266	Roby Batth	No	338	337	N/A	N/A	N/A	N/A	C	6508550	1890720
	N/A	N/A	IR1075	Tule_E0151_ILP	N/A	N/A	No	385	384	N/A	N/A	N/A	N/A	C	6523210	1866260
	N/A	22S/27E-23	IR1084	Tule_E0158_ILP	516902	John Corkins	No	485	484	N/A	N/A	N/A	N/A	C	6553760	1881350
	N/A	21S/27E-21	M1045	Tule_E0161_ILP	943181	City of Porterville	No	421	420	N/A	N/A	N/A	N/A	C	6541830	1912590
	N/A	21S/27E-21	M1046	Tule_E0162_ILP	1086588	City of Porterville	No	429	428	N/A	N/A	N/A	N/A	C	6543250	1905330
	N/A	N/A	IR1088	Tule_E0171_ILP	N/A	N/A	No	594	593	N/A	N/A	N/A	N/A	C	6570420	1887170
Kern-Tulare GSA	N/A	TSMW 6L	N/A	Tule_KT041_RMS	TSMW-6L	Tule Subbasin TAC	Yes	519	518	610	605	350	600	L	6539210	1822270
	24S27E32M001M	24S/27E-32M01	N/A	Tule_KT0039_RMS	N/A	N/A	Yes	536	536	N/A	1,800	1,002	1,800	SM	6536530	1808340
	N/A	TSMW 6SM	N/A	Tule_KT042_RMS	TSMW 6SM	Tule Subbasin TAC	Yes	517	515	2,000	1,600	1,950	2,020	SM	6539200	1822170
	N/A	21S/27E-12	D1009	Tule_K0075_ILP	243056	Dominic Pitigliano	No	698	697	N/A	N/A	N/A	N/A	U	6560270	1923930
	N/A	21S/27E-06	D1014	Tule_K0078_ILP	516921	Salud Tapia	No	377	376	N/A	N/A	N/A	N/A	U	6532740	1932670
	N/A	21S/26E-11	D1015	Tule_K0079_ILP	E0212720	Jeff Beck	No	369	368	N/A	N/A	N/A	N/A	U	6524550	1925970
	N/A	20S/27E-19	D1064	Tule_K0107_ILP	503656	John Holworthy	No	384	383	N/A	N/A	N/A	N/A	U	6535230	1947100
	N/A	20S/27E-22	IR1007	Tule_K0113_ILP	349117	Guy Wollenman	No	460	459	N/A	N/A	N/A	N/A	U	6552770	1947040
	N/A	20S/26E-21	IR1045	Tule_K0128_ILP	957243	Ron Shock	No	332	330	N/A	N/A	N/A	N/A	U	6513720	1949170
	N/A	N/A	D1085	Tule_K0170_ILP	N/A	N/A	No	395	394	N/A	N/A	N/A	N/A	U	6537720	1926910
	N/A	20S/27E-35	IR1008	Tule_K0114_ILP	E0159252	David Tomlinson	No	453	452	N/A	N/A	N/A	N/A	C	6558090	1933420
	N/A	N/A	IR1013	Tule_K0115_ILP	N/A	N/A	No	381	379	N/A	N/A	N/A	N/A	C	6534820	1936000
	24S26E24Q1M	24S/26E-24Q1	N/A	N/A	N/A	N/A	No	492	492	N/A	N/A	N/A	N/A	SM	6528460	1818790
	24S27E08L001M	24S/27E-08L01	N/A	N/A	N/A	N/A	No	517	504	N/A	1,747	522	1,747	SM	6537760	1830620
Lower Tule River ID GSA	21S26E06A001M	21S/26E-06A01	N/A	N/A	N/A	S.A Knapp	No	328	326	202	N/A	N/A	N/A	U	6503520	1932570
	22S26E10J001M	22S/26E-10J01	N/A	N/A	10J1	Charley Soak	No	373	373	351	351	N/A	N/A	U	6519180	1893210
	21S24E14P001M	21S/24E-14P01	N/A	N/A	14P1	De Campus	No	249	248	623	551	160	551	U	6458530	1919560
	21S26E22A001M	21S/26E-22A01	N/A	N/A	22A1	N/A	No	369	368	174	N/A	118	162	U	6519210	1917010
	N/A	21S/23E-31	IR1047	Tule_L0002_RMS	E0047650	Tim Cooper	No	192	190	N/A	N/A	N/A	N/A	U	6408330	1907220
	21S23E32K001M	21S/23E-32K01	N/A	Tule_L0003_RMS	32K1	N/A	Yes	190	190	N/A	406	104	402	U	6412360	1903980
	21S24E35A01M	21S/24E-35A01	N/A	Tule_L0004_RMS	35A1	N/A	Yes	244	243	315	328	245	302	U	6461050	1906560
	21S26E32B002M	21S/26E-32B02	D1019	Tule_L0007_RMS	E049930	Leal Joseph	Yes	341	340	327	280	200	260	U	6507610	1906660
	21S26E32A001M	21S/26E-32A01	N/A	Tule_L0008_RMS	32A1	Homer Smartt	No	348	347	267	N/A	153	261	U	6508780	1906870
	N/A	21S/26E-34	N/A	Tule_L0009_RMS	27803	N/A	Yes	378	377	400	400	120	400	U	6519270	1903300
	22S23E30J001M	22S/23E-30J01	N/A	Tule_L0011_RMS	Angiola #1	N/A	Yes	180	180	460	450	240	450	U	6408060	1878090
	N/A	LTRID TSS U	N/A	Tule_L0015_RMS	LTRID TSS U	N/A	Yes	263	262	1,560	290	150	280	U	6469280	1930940
	N/A	21S/25E-13	D1001	Tule_L0071_ILP	153207	Jim Costa	No	319	317	N/A	N/A	N/A	N/A	U	6497080	1917950
	N/A	21S/25E-11	D1003	Tule_L0072_ILP	489364	Rob Nagel	No	298	295	N/A	N/A	N/A	N/A	U	6488410	1926860
	N/A	21S/26E-16	D1016	Tule_L0080_ILP	E0114156	Anil Kumar	No	345	344	N/A	N/A	N/A	N/A	U	6508850	1917850
	N/A	20S/25E-33	D1045	Tule_L0090_ILP	E0000637	Cindy Huerta	No	295	294	N/A	N/A	N/A	N/A	U	6484320	1935560

Summary of Groundwater Level Monitoring Network Wells

GSA Name	CASGEM State Well Number	Short State Well Number	ILRP_ID	Master Well ID	Well Name/ Well Log	Owner	RMS	Reference Point Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perfs (ft bgs)	Bottom of Perfs (ft bgs)	Aquifer[1]	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Lower Tule River ID GSA	N/A	20S/25E-35	D1046	Tule_L0091_RMS	48963	Cindy Huerta	No	308	308	N/A	N/A	N/A	N/A	U	6494690	1934370
	N/A	20S/25E-35	D1047	Tule_L0092_ILP	286242	Cindy Huerta	No	308	308	N/A	N/A	N/A	N/A	U	6494650	1934190
	N/A	21S/24E-28	D1048	Tule_L0093_ILP	773622	Allison Steltzner	No	299	228	N/A	N/A	N/A	N/A	U	6448400	1912350
	N/A	21S/24E-26	D1065	Tule_L0108_ILP	773615	Armando Leal	No	240	239	N/A	N/A	N/A	N/A	U	6460800	1907490
	N/A	N/A	IR1002	Tule_L0111_RMS	N/A	N/A	No	317	315	N/A	N/A	N/A	N/A	U	6496930	1917740
	N/A	21S/26E-08	IR1005	Tule_L0112_RMS	488430	Dominic Pitigliano	No	343	342	N/A	N/A	N/A	N/A	U	6508890	1924200
	N/A	21S/23E-31	IR1048	Tule_L0129_ILP	E0252293	Tim Cooper	No	190	189	N/A	N/A	N/A	N/A	U	6408470	1904890
	N/A	21S/23E-31	IR1049	Tule_L0130_ILP	E0291815	Tim Cooper	No	189	188	N/A	N/A	N/A	N/A	U	6408460	1904010
	N/A	21S/24E-25	IR1050	Tule_L0131_ILP	N/A	Armando Leal	No	246	244	N/A	N/A	N/A	N/A	U	6463830	1912410
	N/A	N/A	IR1051	Tule_L0132_ILP	N/A	N/A	No	223	222	N/A	N/A	N/A	N/A	U	6440040	1905970
	N/A	20S26E-32	IR1046	Tule_L0001_RMS	E0090245	Cindy Huerta	Yes	330	329	680	680	320	680	L	6507630	1933580
	N/A	21S/25E-36	D1020	Tule_L0006_RMS	N/A	Doug Van Beek	Yes	313	310	640	640	320	640	L	6493640	1905220
	N/A	22S/23E-08	N/A	Tule_L0010_RMS	E0094101	N/A	Yes	187	185	N/A	1,000	660	1,000	L	6410340	1896240
	N/A	LTRID TSS L	N/A	Tule_L0013_RMS	LTRID TSS L	N/A	Yes	263	262	1,560	1,480	1,100	1,470	L	6469280	1930940
	N/A	LTRID TSS M	N/A	Tule_L0014_RMS	LTRID TSS M	N/A	Yes	263	262	1,560	815	500	805	L	6469280	1930940
	N/A	N/A	D1029	Tule_L0083_ILP	E076023	Claudio Basei	No	263	262	N/A	N/A	N/A	N/A	L	6478820	1868660
	N/A	N/A	IR1021	Tule_L0116_ILP	715324	Nikki Galvan	No	308	307	N/A	N/A	N/A	N/A	L	6492700	1898470
	N/A	N/A	N/A	Tule_L0177_ILP	N/A	N/A	No	341	340	N/A	N/A	N/A	N/A	L	6508810	1920290
	21S26E05P001M	21S/26E-05P01	N/A	N/A	05P1	N/A	No	337	336	720	N/A	N/A	N/A	C	6506190	1928390
	21S26E06R001M	21S/26E-06R01	N/A	N/A	06R1	Sheldon Rising	No	329	328	>698	N/A	N/A	N/A	C	6503510	1928470
	22S24E01Q001M	22S/24E-01Q01	N/A	Tule_L0012_RMS	01Q1	N/A	Yes	253	251	720	700	480	700	C	6465170	1896730
	N/A	22S/24E-17	IR1061	Tule_L0137_ILP	E0330539	Bill Hesse	No	208	207	N/A	N/A	N/A	N/A	C	6440910	1888590
	N/A	22S/24E-14	IR1083	Tule_L0157_ILP	560270	Daryl Barsoom	No	239	238	N/A	N/A	N/A	N/A	C	6461110	1886490
	N/A	22S/26E-03	IR1089	Tule_L0174_RMS	IR1089	N/A	Yes	364	364	N/A	400	140	400	C	6516600	1899270
	N/A	22S/24E-01	IR1091	Tule_L0176_RMS	N/A	N/A	No	251	250	N/A	N/A	N/A	N/A	C	6461770	1899310
Pixley ID GSA	22S24E23J001M	22S/24E-23J01	N/A	Tule_P0016_RMS	22/24-23J1	N/A	Yes	239	235	N/A	400	N/A	N/A	U	6460930	1883360
	22S25E25N001M	22S/25E-25N01	N/A	Tule_P0017_RMS	N/A	N/A	Yes	307	306	N/A	437	N/A	N/A	U	6494110	1875970
	23S24E28J002M	23S/24E-28J02	N/A	Tule_P0020_RMS	28J2	N/A	Yes	204	203	N/A	N/A	200	500	U	6450370	1846350
	23S25E08G001M	23S/25E-08G01	D1028	Tule_P0021_RMS	724662	Harvinder S. Toor	No	248	247	N/A	N/A	320	420	U	6471860	1863520
	N/A	23S/25E-17	N/A	Tule_P0022_RMS	N/A	N/A	No	252	251	N/A	N/A	N/A	N/A	U	6476970	1854790
	N/A	PIDGSA-01U	N/A	Tule_P0024_RMS	PIDGSA TSS U	Tule Subbasin TAC	Yes	298	297	1,020	280	180	280	U	6492780	1857680
	N/A	22S/25E-22	IR1022	Tule_P0117_ILP	415133	Mel Cardoza	No	276	275	N/A	N/A	N/A	N/A	U	6483580	1885940
	N/A	22S/23E-22	IR1053	Tule_P0133_ILP	E000731	Ron Fanucchi	No	186	185	N/A	N/A	N/A	N/A	U	6423890	1880820
	N/A	22S/23E-22	IR1054	Tule_P0134_ILP	290327	Ron Fanucchi	No	187	186	N/A	N/A	N/A	N/A	U	6424030	1883490
	N/A	TSMW 1L	N/A	Tule_P0023_RMS	TSMW-1L	Tule Subbasin TAC	Yes	223	222	1,050	1,005	550	1,000	L	6455520	1866660
	N/A	PIDGSA-01L	N/A	Tule_P0025_RMS	PIDGSA-01L	Tule Subbasin TAC	Yes	298	297	1,020	1,015	400	1,005	L	6492780	1857680

Summary of Groundwater Level Monitoring Network Wells

GSA Name	CASGEM State Well Number	Short State Well Number	ILRP_ID	Master Well ID	Well Name/ Well Log	Owner	RMS	Reference Point Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perfs (ft bgs)	Bottom of Perfs (ft bgs)	Aquifer[1]	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Pixley ID GSA	N/A	N/A	D1059	Tule_P0103_ILP	E0072752	Lance Mouw	No	351	350	N/A	N/A	N/A	N/A	L	6510120	1858430
	N/A	23S25E10	IR1030	Tule_P0121_ILP	E01033591	Aldo Risi	No	274	272	N/A	N/A	N/A	N/A	L	6484820	1860420
	N/A	N/A	IR1076	Tule_P0152_ILP	N/A	N/A	No	323	323	N/A	N/A	N/A	N/A	L	6502390	1862340
	N/A	22S/25E-30	IR1023	Tule_P0018_RMS	E0259438	George Rispens	No	261	260	N/A	N/A	340	840	C	6474480	1882570
	N/A	23S/26E-08	D1063	Tule_P0106_ILP	1091925	Lance Mouw	No	329	329	N/A	N/A	N/A	N/A	C	6503920	1864910
Tri-County Water Authority	N/A	22S/23E-25	N/A	N/A	E25	Angiola W.D.	No	N/A	197	N/A	N/A	N/A	N/A	U	6434580	1879530
	N/A	22S/23E-28	N/A	N/A	G23	Angiola W.D.	No	N/A	200	438	430	210	420	U	6416160	1882060
	N/A	22S/23E-28	N/A	N/A	G24	Angiola W.D.	No	N/A	198	435	430	210	420	U	6416140	1880170
	N/A	22S/23E-25	N/A	N/A	G25	Angiola W.D.	No	N/A	200	460	460	210	450	U	6419990	1875800
	N/A	22S/23E-28A1	N/A	N/A	G3	Angiola W.D.	No	N/A	198	N/A	520	200	500	U	6417590	1880760
	N/A	22S/23E-27	N/A	N/A	G30	Angiola W.D.	No	N/A	200	N/A	N/A	N/A	N/A	U	6420250	1876130
	N/A	22S/23E-28J1	N/A	N/A	G5	Angiola W.D.	No	N/A	203	N/A	504	200	504	U	6418760	1878170
	N/A	22S/23E-33	N/A	N/A	W18	Angiola W.D.	No	N/A	199	N/A	N/A	N/A	N/A	U	6417590	1875510
	N/A	22S/23E-27F1	N/A	N/A	W6	Angiola W.D.	No	N/A	203	478	468	258	468	U	6420550	1878270
	22S23E25C001M	22S/23E-25C01	IR1060	Tule_T0058_RMS	E20	Anigola W.D.	Yes	195	194	N/A	N/A	240	480	U	6430890	1880680
	24S23E22E001M	24S/23E-22E01	N/A	Tule_T0061_RMS	N/A	N/A	Yes	211	210	N/A	N/A	400	1000	U	6419300	1820860
	N/A	TSMW 5U	N/A	Tule_T0064_RMS	TSMW-5U	Tule Subbasin TAC	Yes	200	198	310	285	170	280	U	6413220	1823390
	N/A	22S/23E-33	IR1052	Tule_T0066_ILP	E054456	Anigola W.D.	No	183	182	N/A	N/A	N/A	N/A	U	6418670	1873390
	N/A	22S/23E-26	IR1057	Tule_T0069_ILP	E062799	Anigola W.D.	No	194	193	N/A	N/A	N/A	N/A	U	6429500	1879340
	N/A	22S/23E-25F1	N/A	N/A	N/A	Anigola W.D.	No	N/A	217	N/A	1,798	598	1,798	L	6431100	1878270
	N/A	22S/23E-23J1	N/A	N/A	N/A	Anigola W.D.	No	N/A	216	N/A	1,788	597	1,788	L	6429360	1883350
	N/A	22S/23E-25	N/A	N/A	E15	Anigola W.D.	No	N/A	223	1,000	969	500	930	L	6434040	1880680
	N/A	22S/23E-26	N/A	N/A	E16	Anigola W.D.	No	N/A	213	980	960	500	940	L	6429300	1880750
	N/A	N/A	N/A	N/A	E23	Anigola W.D.	No	N/A	214	1,220	1,202	602	1,202	L	6429640	1878240
	N/A	N/A	N/A	N/A	E4	Anigola W.D.	No	N/A	210	N/A	1,236	N/A	N/A	L	6428190	1880920
	N/A	22S/23E-23	N/A	N/A	E26	Anigola W.D.	No	N/A	188	N/A	N/A	N/A	N/A	L	6424630	1881020
	N/A	22S/23E-23	N/A	N/A	E27	Anigola W.D.	No	N/A	213	N/A	N/A	N/A	N/A	L	6428310	1883430
	N/A	22S/23E-23	N/A	N/A	E5	Anigola W.D.	No	N/A	211	N/A	1,447	N/A	N/A	L	6427880	1882010
	N/A	22S/23E-27	N/A	N/A	G11	Anigola W.D.	No	N/A	203	N/A	1,541	N/A	N/A	L	6421170	1878030
	N/A	22S/23E-21	N/A	N/A	G18	Anigola W.D.	No	N/A	205	980	940	620	940	L	6416270	1883410
	N/A	22S/23E-34	N/A	N/A	G26	Anigola W.D.	No	N/A	203	1,160	1,120	680	1,100	L	6423690	1873680
	N/A	22S/23E-34	N/A	N/A	G27	Anigola W.D.	No	N/A	199	1,160	1,120	760	1,100	L	6420010	1871630
	N/A	22S/23E-28	N/A	N/A	G29	Anigola W.D.	No	N/A	198	1,010	992	632	992	L	6416210	1878490
	N/A	N/A	N/A	N/A	W15	Anigola W.D.	No	N/A	198	1,160	1,140	830	1,130	L	6418620	1870510
	N/A	N/A	N/A	N/A	W16	Anigola W.D.	No	N/A	198	1,332	1,312	870	990	L	6418610	1867980
	24S24E03A001M	24S/24E-03A01	N/A	Tule_T0046_RMS	N/A	N/A	Yes	206	205	1,602	1,602	804	1,602	L	6455610	1838580

Summary of Groundwater Level Monitoring Network Wells

GSA Name	CASGEM State Well Number	Short State Well Number	ILRP_ID	Master Well ID	Well Name/ Well Log	Owner	RMS	Reference Point Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Borehole Depth (ft bgs)	Casing Depth (ft bgs)	Top of Perfs (ft bgs)	Bottom of Perfs (ft bgs)	Aquifer[1]	X-Coordinate[2] (ft)	Y-Coordinate[3] (ft)
Tri-County Water Authority	22S23E27F001M	22S/23E-27F01	N/A	Tule_T0059_RMS	G13	Angiola W.D.	Yes	201	200	N/A	1,604	782	1,604	L	6420050	1878150
	24S23E15R001M	24S/23E-15R01	N/A	Tule_T0060_RMS	N/A	N/A	Yes	211	210	1,150	1,150	600	1,150	L	6423800	1822840
	24S23E22R002M	24S/23E-22R02	N/A	Tule_T0062_RMS	22R02	N/A	Yes	213	212	1,205	1,200	500	1,200	L	6423800	1817750
	24S24E04R001M	24S/24E-04R01	N/A	Tule_T0063_RMS	N/A	N/A	No	272	271	N/A	N/A	800	1,600	L	6476850	1833420
	N/A	TSMW 5L	N/A	Tule_T0065_RMS	TSMW-5L	Tule Subbasin TAC	Yes	199	197	1,010	955	670	950	L	6413220	1823290
	N/A	N/A	IR1058	Tule_T0068_ILP	E0078570	Angiola W.D.	No	198	197	N/A	N/A	N/A	N/A	L	6434660	1878340
	N/A	22S23E22	IR1055	Tule_T0070_ILP	E072308	Angiola W.D.	No	188	187	N/A	N/A	N/A	N/A	L	6418970	1881710
	N/A	24S24E20	IR1025	Tule_T0119_ILP	E0083113	Samantha Lopes	No	208	206	N/A	N/A	N/A	N/A	L	6441270	1819420
	N/A	24S24E29	IR1026	Tule_T0120_ILP	E0077871	Samantha Lopes	No	211	210	N/A	N/A	N/A	N/A	L	6442560	1815500
	N/A	N/A	IR1043	Tule_T0127_ILP	N/A	N/A	No	222	220	N/A	N/A	N/A	N/A	L	6451850	1812290
	N/A	N/A	IR1056	Tule_T0135_ILP	489856	Angiola W.D.	No	187	186	N/A	N/A	N/A	N/A	L	6426910	1880800
	N/A	22S23E34	IR1059	Tule_T0136_ILP	E054498	Angiola W.D.	No	181	179	N/A	N/A	N/A	N/A	L	6423820	1870500
	N/A	23S23E04	IR1072	Tule_T0148_ILP	E077033	Angiola W.D.	No	180	180	N/A	N/A	N/A	N/A	L	6418620	1870400
	N/A	N/A	N/A	N/A	W17	Angiola W.D.	No	N/A	202	1,090	1,050	670	1,030	L	6418970	1881710
	N/A	24S/24E-16	IR1078	Tule_T0153_ILP	942276	Dennis Hutson	No	206	206	N/A	N/A	N/A	N/A	C	6446360	1825380

Notes:

[1] U = Well Perforated in Upper Aquifer
L = Well Perforated in Lower Aquifer
SM = Well Perforated in Santa Margari
C = Well Perforated in Composite Aquifer

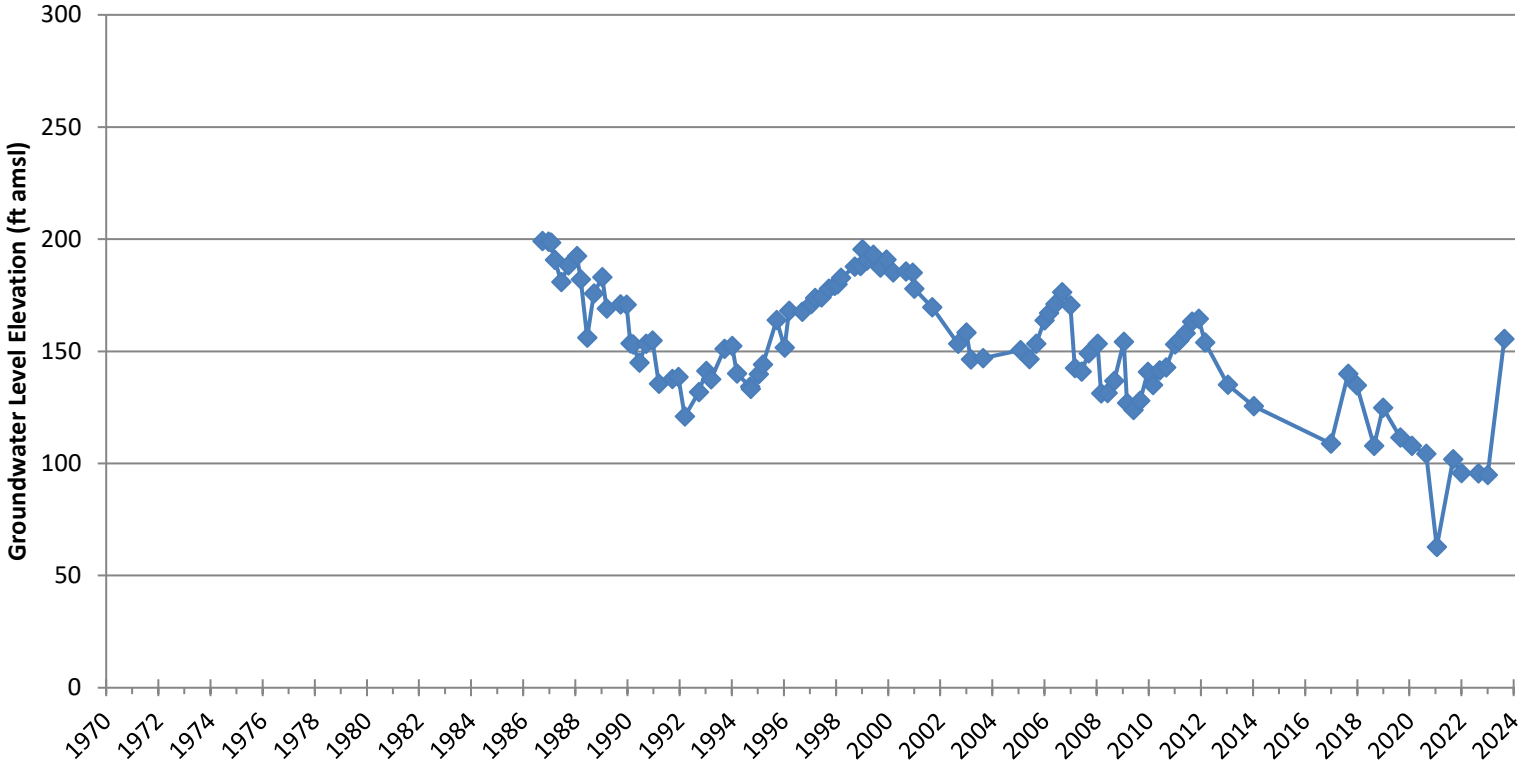
[2] X-Coordinates in State Plane Zone 4 (feet)
[3] Y-Coordinates in State Plane Zone 4 (feet)
[4] N/A = Not Available

Appendix B

Driller's Logs and Hydrographs for Upper Aquifer Wells

Groundwater Hydrographs - Upper

21S/23E-32K001M



21/23-32K1 TOP 21/23-32K1

Well Log #2

J.W. Guiberson & Co. Corcoran, Calif

W.H. Lambert - Driller
Phone 346R2 - Corcoran, Cal.

Top	109'	Plain.
	5'	Perf & screen.
	6'	Plain.
	14'	Perf & screen.
	21	Plain.
	6'	Perf & screen.
	11'	Plain.
	14'	Perf & screen.
	3'	Plain.
	6'	Perf. & screen.
	22'	Plain.
	10'	Perf. & screen.
	25'	Plain.
	10'	Perf & screen.
	5'	Plain.
	11'	Perf & screen.
	3'	Plain.
	12'	Perf & screen.
	8'	Plain.
	6'	Perf & screen.
	2'	Plain.
	8'	Perf & screen.
	11'	Plain.
	14'	Perf & screen.
	2'	Plain.
	8'	Perf & screen.
	28'	Plain
	10'	Perf & screen
	5'	Plain.
	7'	Perf & screen.
Bottom	4'	Plain

Plain Pipe - 265'
Perf. & screen = 141'
Total Ft. = 406'

Section 32-21-23
Southeast well
March 4 - 1937

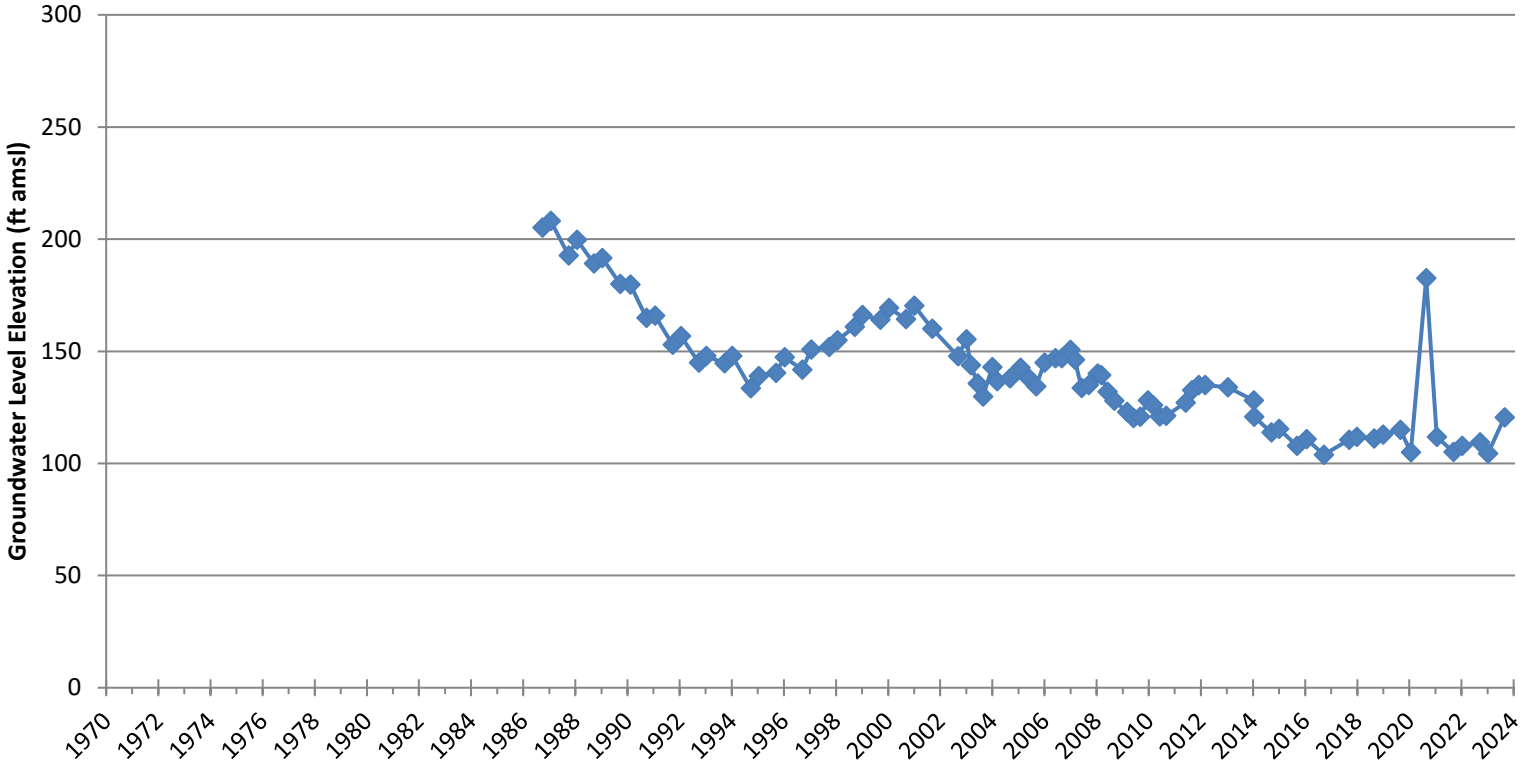
DESCRIPTION:

JOB NO.	CONSOLIDATED PIPE CO. BAKERSFIELD ENGINEERING DEPARTMENT	DATE
NUMBER REQUIRED		SALESMAN

BOISEY PORTABLE MICROFILMED

Groundwater Hydrographs - Upper

21S/24E-35A01M



9-063
(December 1940)

21/24-35A

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

No. 21/24-35M1

OTHER NOS. 21-24-35A (USBR)

WELL LOG

State California County _____ Subarea _____

Owner _____

Location .01 mi east and .49 mi N of SW cor

Drilled by _____ Address _____

Date _____ Casing diam. _____ Land-surf. alt. _____

Source of data _____

(Enter type of well, perforations, yield, and drawdown at end of log)

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Soil with 1' hard pan layer at 8'-9'.	0	9
	Sand, Brown.	9	39
	Clay and silt.	39	40
	Sand with clay.	40	110
	Clay with sand streaks, brown.	110	165
	Sand.	165	180
	Clay with sand streaks, brown.	180	230
	Sandy clay, blue.	230	248
	Clay, blue, sticky.	248	270
	Clay, brown, sticky.	270	289
	Sandy clay, blue.	289	309
	Sand, coarse.	309	325
	Sandy clay, blue.	325	331
	Sand, coarse.	331	340
	Sandy clay, brown.	340	368
	Coarse sand with streaks of blue clay.	368	395
	Clay, blue.	395	407

RECORD BY _____ DATE _____ SHEET 1 OF 3

U. S. GOVERNMENT PRINTING OFFICE 16—61587-1

21/24-35A1

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DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

SHEET 1

524
Tulare

Do Not Fill In
State Well No. 21/24E-34A1
Other Well No.
Region

Lodi 257

PEG

21/24-35A1 (G.S.)

WATER WELL DRILLERS REPORT

Dec. 21, 1950

(Sections 7076, 7077, 7078, Water Code)

(1) **Driller:**
Name: Knapp & Graham
Address: 463 W. Tyler, Calif.
License No. 4956 Classification C-57

(2) **Proposed use or uses** *(check)*:
Domestic ☐ Irrigation ☑ Domestic and Irrigation ☐ Other
Municipal ☐ Industrial ☐ Test well ☐

(3) **Equipment used** *(check)*:
Rotary ☐ Cable ☑ Dug well ☐ Other

Owner:
Name: Ray Donaldson
Address: P.O. Box 306, Tipton, Calif.

(4) **Type of work** *(check)*:
New well ☑ Reconditioning of well ☐
Deepening existing well ☐

(5) **Well log:**
Total depth of well 315 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From Ground Surface			
0 ft.	to 4 ft.	Soil	
4 "	" 23 "	Yellow clay	
23 "	" 26 "	Sand med.	
26 "	" 63 "	Sandy clay	
63 "	" 104 "	Pack sand	
104 "	" 106 "	Med. sand	
106 "	" 134 "	Sandy clay	
134 "	" 139 "	Pack sand	
139 "	" 154 "	Sandy clay	
154 "	" 168 "	Coarse sand	
168 "	" 204 "	Sandy clay	
204 "	" 213 "	Blue clay	
213 "	" 246 "	Blue sandy clay	
246 "	" 268 "	Blue sand med.	
268 "	" 279 "	Sticky blue clay	
279 "	" 302 "	Coarse blue sand	
302 "	" 315 "	Sticky blue clay	
315 "	" ? "	Black clay	

If additional space is required, continue on DWR Form No. 246—Supplement, and attach to respective report copies.

(6) **Casing left in well:**

LENGTH FT.	DIAMETER INCHES	SINGLE, DOUBLE, WELDED, OTHER	LBS. PER FOOT OR GAGE OF CASING	SEATING BELOW GROUND SURFACE FT.
928	12	✓	10 ga.	315
			(.134)	

Type and size of shoe or well ring 12"x8"x5/8" steel
Welded joints ☑ Yes ☐ No

CONFIDENTIAL

D.W.R. FORM NO. 246

23871 3-50 40M QUIN SPO

DUPLICATE
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

21/24-35A1
RAY DONALDSON
21/24-35A1 (G.S.)

SHEET 7 624 Tulare

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

Approx 11 Sec of Tulare Cal.

Do Not Fill In
State Well No. ~~21/24E-34A1~~
Other Well No.
Region 5

ORIGINAL

(7) Perforations:
Type of perforator used SEE 3
Perforated 245 ft. to 302 ft. Hole size 11" x 3/16" No. of holes 1140
" " " "

21/24-35M

DUPLICATE

File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

PEC

21/24-35M1 (GS)

SHEET 3

Tulare

Do Not Fill In
State Well No.
Other Well No.
Region

LSD Elev 257

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

Jan. 17, 1957

(1) **Driller:**
Name: Knapp + Graham
Address: 1635 West Inyo, Tulare Calif
License No. 69956 Classification C57

(2) **Proposed use or uses** *(check)*:
Domestic ☐ Municipal ☐
Irrigation ☐ Industrial ☐
Domestic and Irrigation ☑ Test well ☐
Other

(3) **Equipment used** *(check)*:
Rotary ☐
Cable ☑
Dug well ☐
Other

Owner:
Name: Ray Donaldson
Address: P.O. Bx. 306, Tipton Calif.

(4) **Type of work** *(check)*:
New well ☐ Reconditioning of well ☐
Deepening existing well ☑

(5) **Well log:**
Total depth of well 395 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From Ground Surface		
ft.	to ft.	
		(Deeping 12" Well 315 to 395 ft.)
315	320	Blue Sandy Clay
320	366	Blue Fine Sand
366	387	Coarse Blue Sand
387	399	Blue Clay
399	?	Blue Sandy Clay

If additional space is required, continue on DWR Form No. 246—Supplement, and attach to respective report copies.

(6) **Casing left in well:**

LENGTH FT.	DIAMETER INCHES	SINGLE, DOUBLE, WELDED, OTHER	LBS. PER FOOT OR GAGE OF CASING	SEATING BELOW GROUND SURFACE, FT.
404	10	✓	12 92	404
			.105	

Type and size of shoe or well ring 10"x4"x½" Steel Welded joints—☑ Yes ☐ No

4450 feet north, 150 feet west of SE corner of section 35 (USGS)

D.W.R. FORM NO. 246

23971-5-50 40M SUIN SPC

ZONE 1

DUPLICATE
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

21/24-35A1

SHEET 4 21 Tulare

21/24-35A1 (G.S.)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

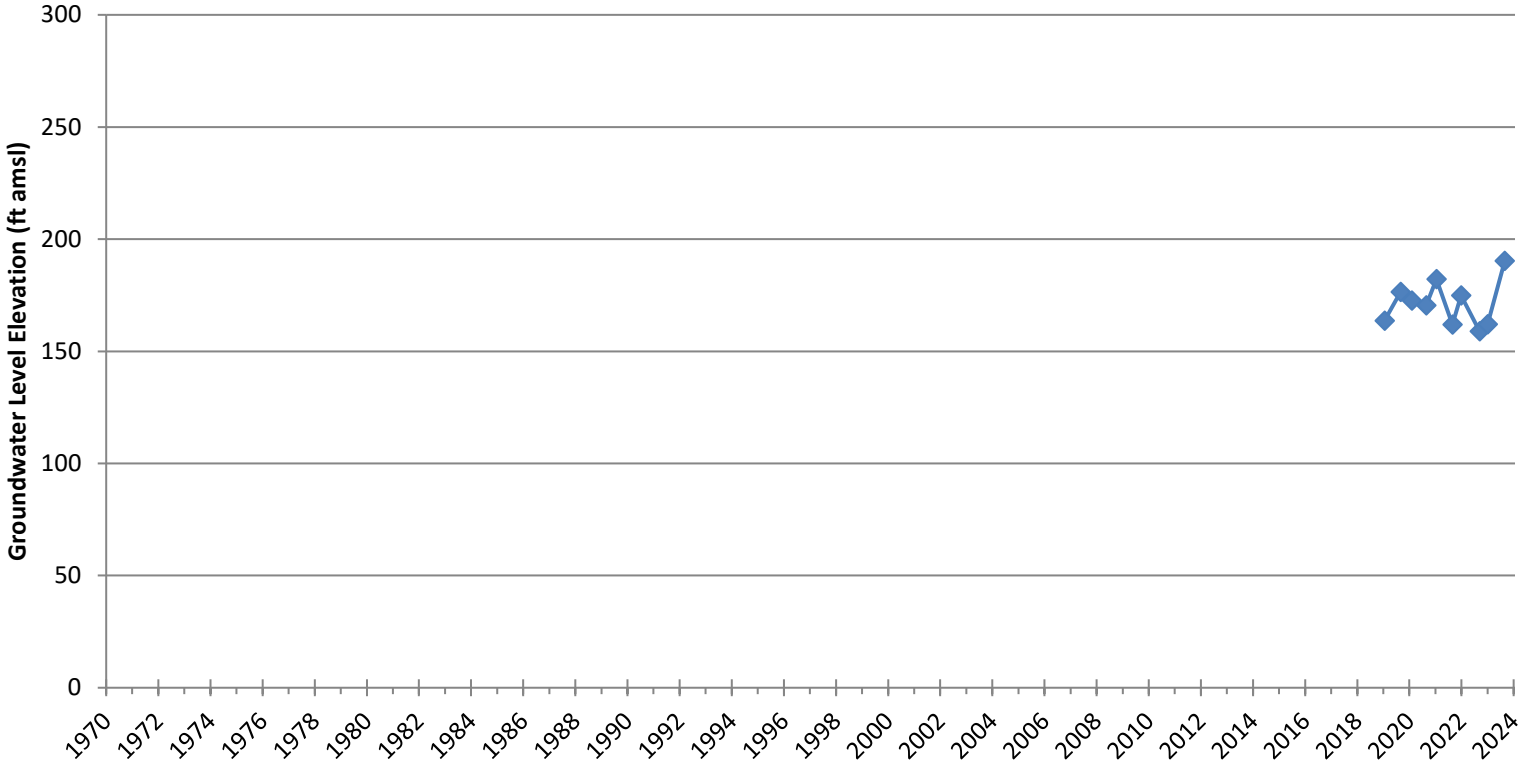
RAX DONALDSON
approx 10 mi S. of Tulare

Do Not Fill In
State Well No.
Other Well No.
Region

(7) Perforations:
Type of perforator used Clean Cut Factory
Perforated 315 ft. to 397 ft. Hole size 12"x18" No. of holes 3280
" " " "

Groundwater Hydrographs - Upper

21S/26E-32B002M



ORIGINAL
File with DWR

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e049930

DWR USE ONLY — DO NOT FILL IN: 21S/26E-32

STATE WELL NO./ STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Owner's Well No. LEAL JOSEPH

Date Work Began 9/21/2005, Ended 9/21/2005

Local Permit Agency TULARE

Permit No. 05-0391 Permit Date 9/21/2005

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD REVERSE FLUID NATURAL

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	3	TOP SOIL
3	15	CLAY
15	30	SAND
30	35	CLAY
35	42	SAND & GRAVEL
42	49	CLAY
49	52	SAND
52	58	CLAY
58	69	SAND & GRAVEL
69	78	GRAVEL & SMALL ROCKS
78	106	SAND & GRAVEL
106	121	CLAY
121	123	SAND
123	153	CLAY
153	157	SAND
157	197	CLAY
197	209	SAND & GRAVEL
209	212	CLAY
212	219	SAND
219	227	CLAY
227	236	SAND
236	255	CLAY
255	258	SAND
258	327	CLAY

TOTAL DEPTH OF BORING 327 (Feet)

TOTAL DEPTH OF COMPLETED WELL 280 (Feet)

WELL OWNER

Name JOSEPH LEAL

Mailing Address 5630 W. GROVE CT.

VISALIA (CITY) CA (STATE) 93291 (ZIP)

WELL LOCATION

Address 17437 AVE 152

City PORTERVILLE CA

County TULARE

APN Book ___ Page ___ Parcel 236-230-04

Township 21 S Range 26 E Section 32

Latitude ___ DEG. ___ MIN. ___ SEC. ___ DEG. ___ MIN. ___ SEC.

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. **PLEASE BE ACCURATE & COMPLETE.**

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE 1

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	200	22	✓				STEEL	8 5/8	3/16	
200	260	22		✓			LOUVER	8 5/8	3/16	.060
260	280	22	✓				STEEL	8 5/8	3/16	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	20	✓			
20	327			✓	1/4 X #2

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME GRABOW WELL DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

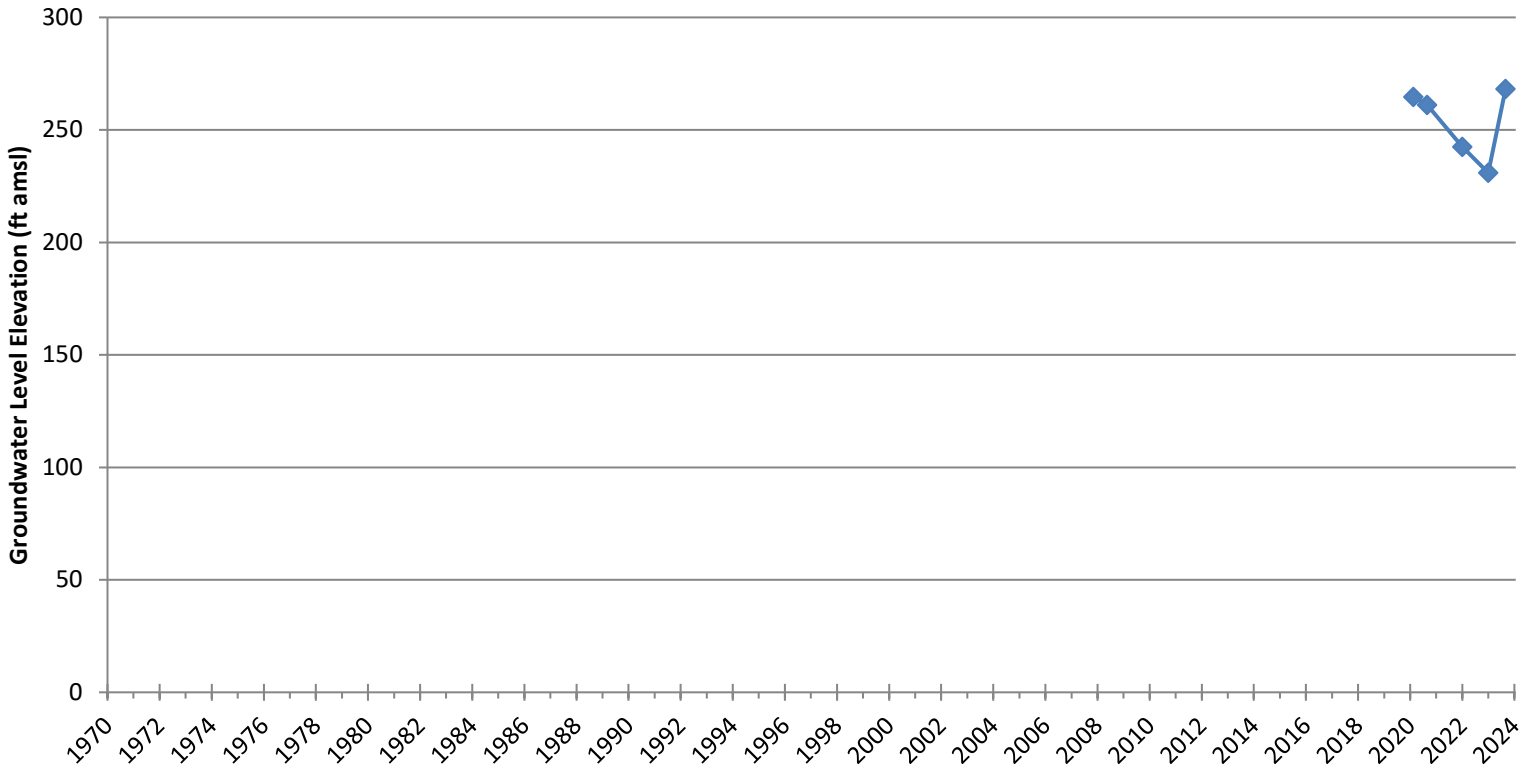
12522 - 9TH AVE. (ADDRESS) HANFORD (CITY) CA (STATE) 93230 (ZIP)

Signed ___ (WELL DRILLER/AUTHORIZED REPRESENTATIVE) 10/04/05 (DATE SIGNED) 288489 (C-57 LICENSE NUMBER)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Groundwater Hydrographs - Upper

21S/26E-34



21/26-34

-34

ORIGINAL
File with DWR

WATER WELL DRILLERS REPORT

(Sections 7079, 7080, 7081, 7082, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Do Not Fill In.

№ 27803

State Well No.
Other Well No. 21S/26E-34

(1) OWNER:

Name Poplar Community Services District
Address
Poplar, Calif.

(2) LOCATION OF WELL:

County Tulare Owner's number, if any
Township, Range, and Section
Distance from cities, roads, railroads, etc. In Poplar, Calif.
See Enclosed Map

(3) TYPE OF WORK (check):

New Well ☑ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☑
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☑
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL: SINGLE ☑ DOUBLE ☐ OTHER:

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	400	12" I.D.	1/4"	19	54	400
0	54	20" I.D.	1/4	26	0	54

If gravel packed

Size of shoe or well ring:
Size of gravel: 1/4"
Describe joint Welded

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen 5/32" Louvre

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
120	400			5/32" X 2 1/2"

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☑ No ☐ To what depth 54 ft.
Were any strata sealed against pollution? Yes ☑ No ☐ 51 If yes, note depth of strata
From 0 ft. to 51 ft. Sand + Gravel
From 51 ft. to 54 ft. Clay
Method of sealing Cement from bottom up.

(9) WATER LEVELS:

Depth at which water was first found, if known ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing ft.

(10) WELL TESTS:

Was pump test made? Yes ☑ No ☐ If yes, by whom? Bakersfield Pump Co.
Yield: 600 gal./min. with 11 ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☑
Was electric log made of well? Yes ☐ No ☑ If yes, attach copy

(11) WELL LOG:

Total depth ft. Depth of completed well ft.
Formation: *Describe by color, character, size of material, and structure*

ft. to ft.	
0 - 51	Sand + Gravel
51 - 57	Clay
57 - 76	Sand + Gravel
76 - 103	Sand
103 - 143	Sand + Gravel
143 - 243	Clay + Streaks of sand
243 - 314	Hard sandy clay
314 - 317	Sand
317 - 342	Clay
342 - 347	Sand
347 - 362	Clay
362 - 365	Sand - Coarse
365 - 400	Sandy clay

CONFIDENTIAL
Water Code Sec. 7080

Work started 3-15 1966, Completed 4-19 1966

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Ed Owens Drilling Co.
(Person, firm, or corporation) (Typed or printed)

Address 322 E. North Ave.
Porterville, Calif. 93257

[SIGNED] E. E. Owens
(Well Driller)

License No. 125654 Dated 5-6, 1966

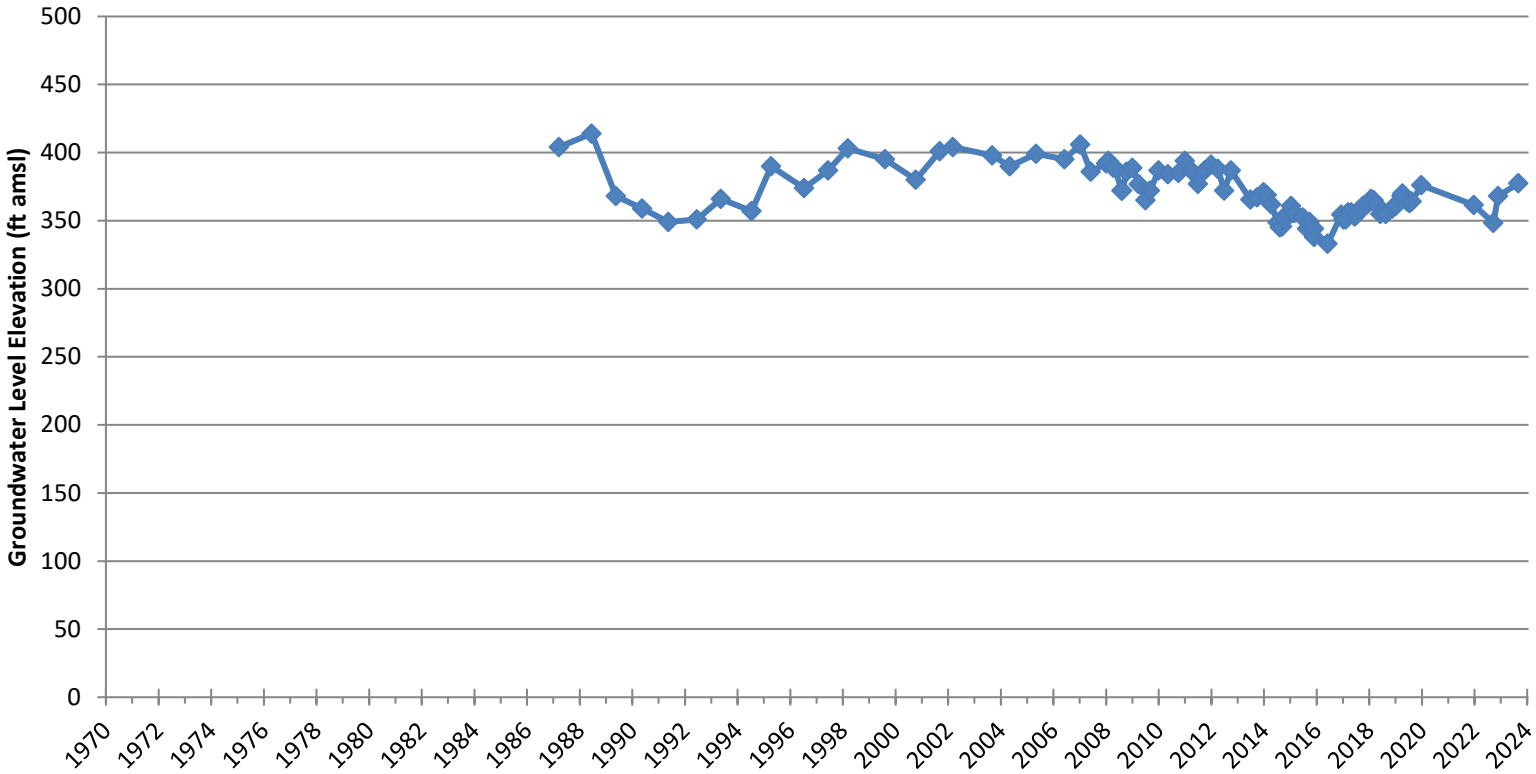
SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-65)

56391-950 10-65 50M TRIP ① △ OSP

Groundwater Hydrographs - Upper

21S/27E-23



State of California

Well Completion Report

Form DWR 188 Auto-Completed 1/23/2023

WCR2022-013687

Owner's Well Number: | Date Work Began: 11/16/2020 | Date Work Ended: 12/11/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 2000459 | Permit Date: 11/12/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXXX State: XX Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Water Supply Domestic

Well Location

Address:

City: Zip: County: Tulare

Latitude: 36 Deg. 5 Min. 0.9168 Sec. N

Longitude: -119 Deg. 1 Min. 29.1108 Sec. W

Dec. Lat.: 36.083588 Dec. Long.: -119.024753

Vertical Datum: NGVD29 Horizontal Datum: WGS84

Location Accuracy: Location Determination Method:

APN: 247-090-025

Township: 21 S

Range: 27 E

Section: 23

Baseline Meridian: Mount Diablo

Ground Surface Elevation: 127

Elevation Accuracy: 1 Ft

Elevation Determination Method: GPS

Borehole Information

Orientation: Vertical Specify:

Drilling Method: Direct Rotary Drilling Fluid: Bentonite

Total Depth of Boring: 220 Feet

Total Depth of Completed Well: 220 Feet

Water Level and Yield of Completed Well

Depth to first water: 80 (Feet below surface)

Depth to Static Water Level: 85 (Feet) Date Measured: 02/05/2021

Estimated Yield*: 30 (GPM) Test Type: Air Lift

Test Length: 8 (Hours) Total Drawdown: 12 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	20	dark brown adobe clay mixed with rocks
20	60	light brown clay with rocks
60	100	red sticky clay with cobbles
100	140	light brown sand mix with rocks
140	180	dark brown clay mix with rocks
180	220	light brown sand mix with rocks

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	160	Blank	Low Carbon Steel	Grade: ASTM A53	0.188	6			
1	160	220	Screen	Low Carbon Steel	Grade: ASTM A53	0.188	6	Torched Slots	0.125	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	50	Cement	10.3 Sack Mix		
50	220	Other Fill	See description.		gravel pack

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	220	10

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: SAMUEL'S DRILLING
Person, Firm or Corporation

854 LYBARGER AVE (Address) | PORTERVILLE (City) | CA (State) | 93257 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 11/20/2022 (Date Signed) | 960958 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

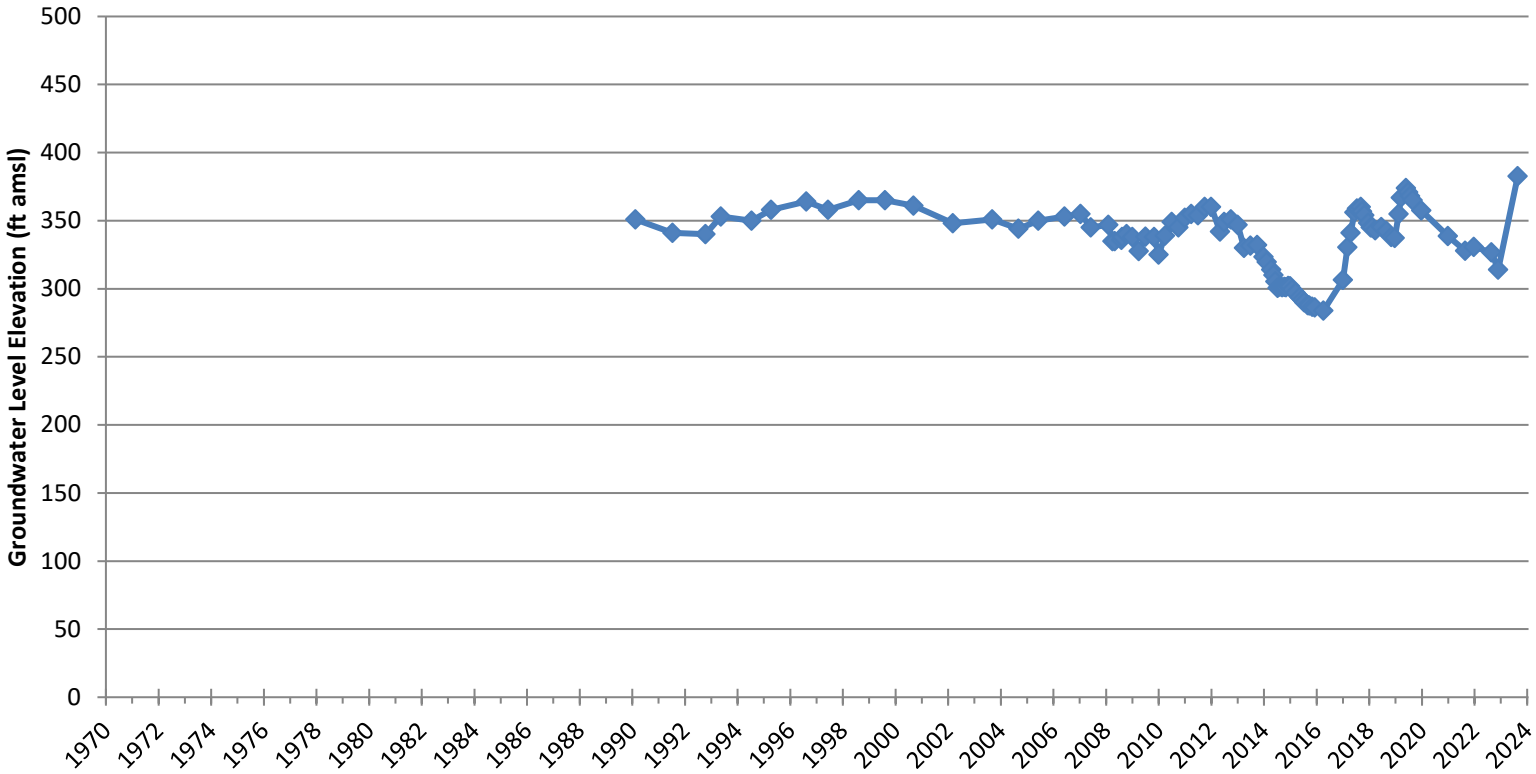
W — Longitude Deg/Min/Sec

TRS:

APN:

Groundwater Hydrographs - Upper

21S/27E-30



TRIPLICATE
Retain this copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

R#11

R-11

Do Not Fill In
№ 67312

Other Well No. R-11

(1) OWNER:

Name R ROWLAND WATER COMPANY
Address 1563 West Olive Ave
Porterville, California

(2) LOCATION OF WELL:

County Tulare Owner's number, if any
Township, Range, and Section 5 miles west of Porterville
Distance from cities, roads, railroads, etc. on Olive, ¼ North on Cedar,
on last st in back of Rowland Tract.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☒
Other ☐

(6) CASING INSTALLED:

STEEL: X OTHER:
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall
0	84	14	10
0	212	10	10

If gravel packed

Diameter of Bore	From ft.	To ft.

Size of bottom or well ring: 3/4x4x14 Size of gravel: 3/4x4x10
Describe joint Plain End

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen None

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 84 ft.
Were any strata sealed against pollution? Yes ☒ No ☐ If yes, note depth of strata
31 ft. to 36 ft. Fine Sand
56 ft. to 79 ft. Cobbers & Sand
Method of sealing Grout

(9) WATER LEVELS:

Depth at which water was first found, if known 32 ft.
Standing level before perforating, if known 32 ft.
Standing level after perforating and developing 32 ft.

(10) WELL TESTS:

Was pump test made? Yes ☒ No ☐ If yes, by whom? By Owner
gal./min. with ft. drawdown after hrs.
Quality of water Was a chemical analysis made? Yes ☐ No ☒
Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG:

Total depth 216 ft. Depth of completed well 216 ft.
Formation: Describe by color, character, size of material, and structure

ft. to	ft.	
0	31	Sandy Loam
31	36	Fine Sand
36	43	Very soft Silt
43	48	Very Fine Sand
48	56	Very Soft Silt
56	65	Cobbers & Sand
65	70	Cobbers
70	79	Cobbers & Sand
79	101	Brown Clay
101	114	Fine Sand
114	120	Med Sand & Gravel
120	131	Coarse Sand & Cobbers
131	178	Brown Clay
178	180	Tight Dark Sand
180	216	Tough Brown Clay
216	220	Coarse Sand & Sh. Rocks

Well Log
Lot 40 Tr. 213

R#11

Work started 1/24 19 72 Completed 2/7 19 72

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME ROGER L. NATION
(Person, firm, or corporation) (Typed or printed)

Address 26521 South Mooney
Visalia, California

[SIGNED] Roger L. Nation
(Well Driller)

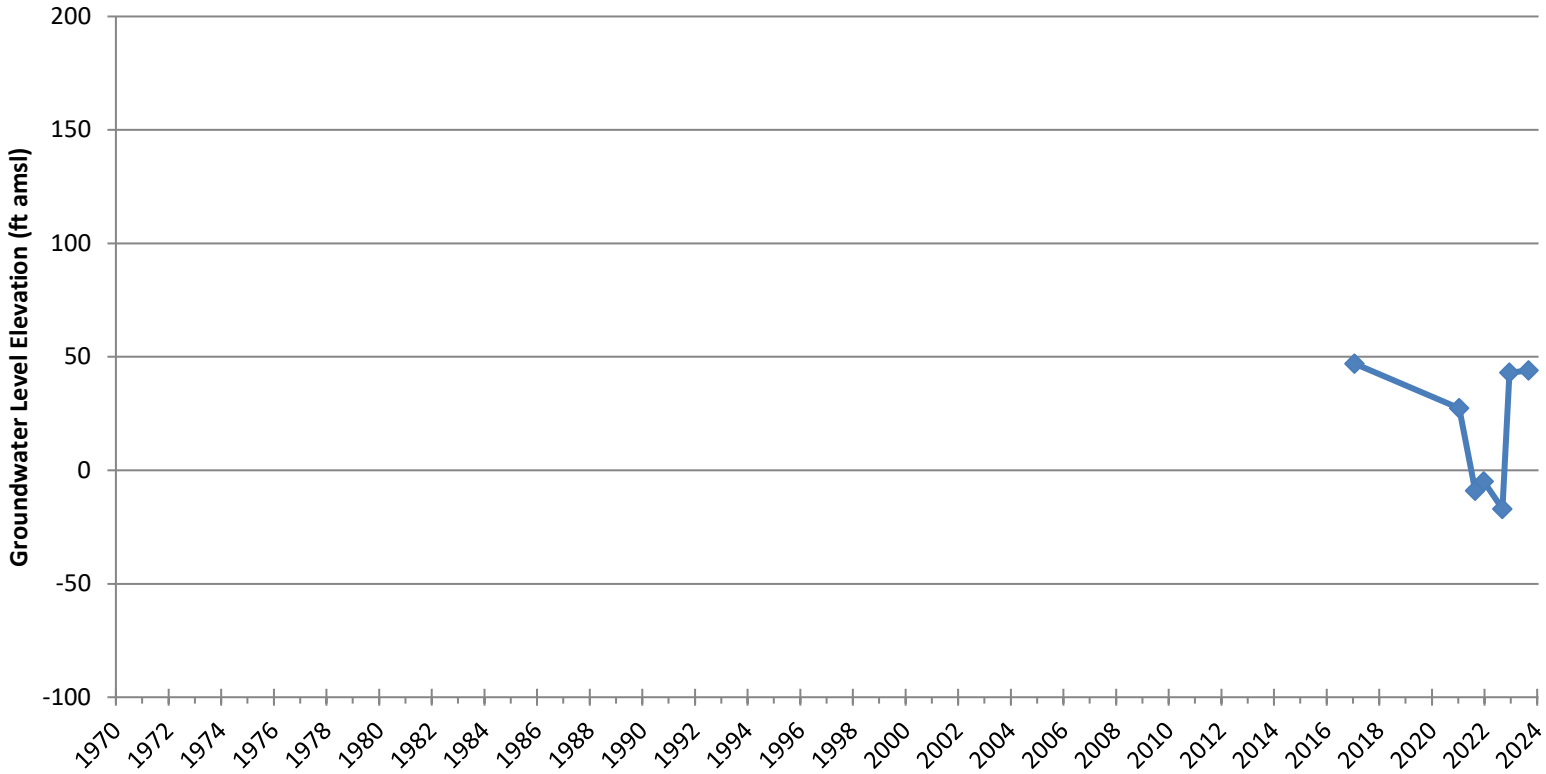
License No. 259884 Dated 2/9, 19 72

SKETCH LOCATION OF WELL ON REVERSE SIDE

R 188 (REV. 9-68) 25170-950 9-68 50M TRIP ΔD OBP

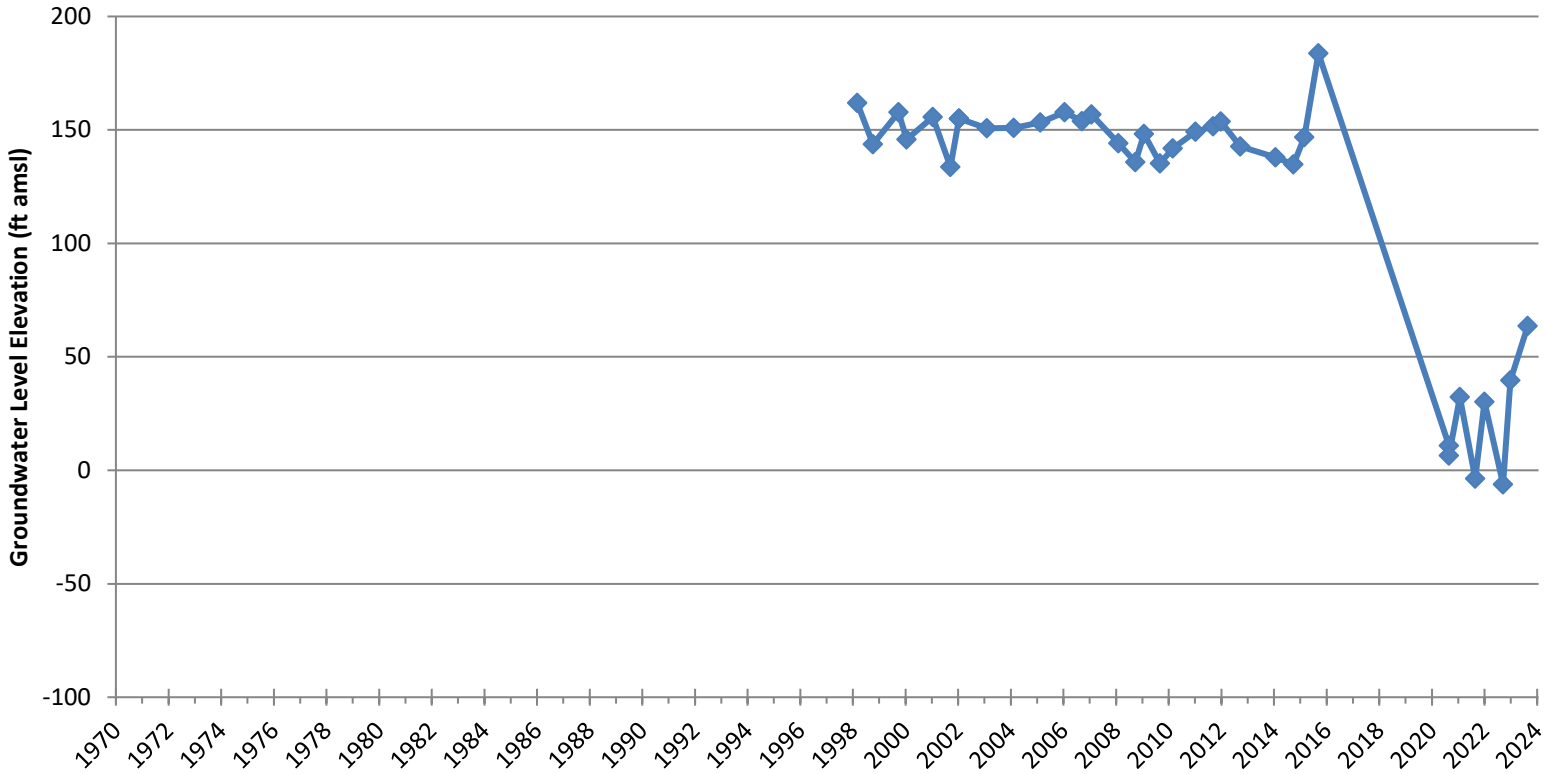
Groundwater Hydrographs - Upper

22S/23E-25C001M



Groundwater Hydrographs - Upper

22S/23E-30J001M



ORIGINAL
File with DWR

22/23-30

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

Page ____ of ____

Owner's Well No. Angiola #1

No. 396637

Date Work Began 3-25-92, Ended 3-25-92

Local Permit Agency Tulare

Permit No. 63779 Permit Date 3-23-92

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION - Describe material, grain size, color, etc.		
0	5	Top Soil	433-437	sand
5	24	clay	437-439	clay
24	26	sand	439-444	sand
26	44	clay	444-450	clay
44	49	sand		
49	86	clay		
86	104	sand		
104	140	clay		
140	144	sand		
144	186	clay		
186	192	sand		
192	200	clay		
200	208	sand		
208	218	clay		
218	224	sand		
224	280	clay		
280	284	sand		
284	288	clay		
288	309	sand		
309	315	clay		
315	330	sand		
330	334	clay		
334	339	sand		
339	344	clay		
344	351	sand		
351	354	clay		
354	373	sand		
373	377	clay		
377	419	sand		
419	433	clay		

UNCONFINED

TOTAL DEPTH OF BORING 460 (Feet)

TOTAL DEPTH OF COMPLETED WELL 450 (Feet)

WELL OWNER

Name Sunny Quillin

Mailing Address 12667 Rd. 96

Tipton, CA 93272

CITY STATE ZIP

WELL LOCATION

Address ½ mi S. of Ave. 112 & 50 ft. W. of Rd 24

City Corcoran

County Tulare

APN Book Echoe Page 78 Parcel 291-130-01

or Township 22S Range 23E Section 30

or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

X Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	240	30	X				steel	15.5	1/4	
240	450	30		X			louver	15.5	1/4	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	20	X			
20	450				5/16x4

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 9th Ave. Hanford, CA 93230
ADDRESS CITY STATE ZIP

Signed Dean E. Grabow
WELL DRILLER/AUTHORIZED REPRESENTATIVE

3-29-92
DATE SIGNED

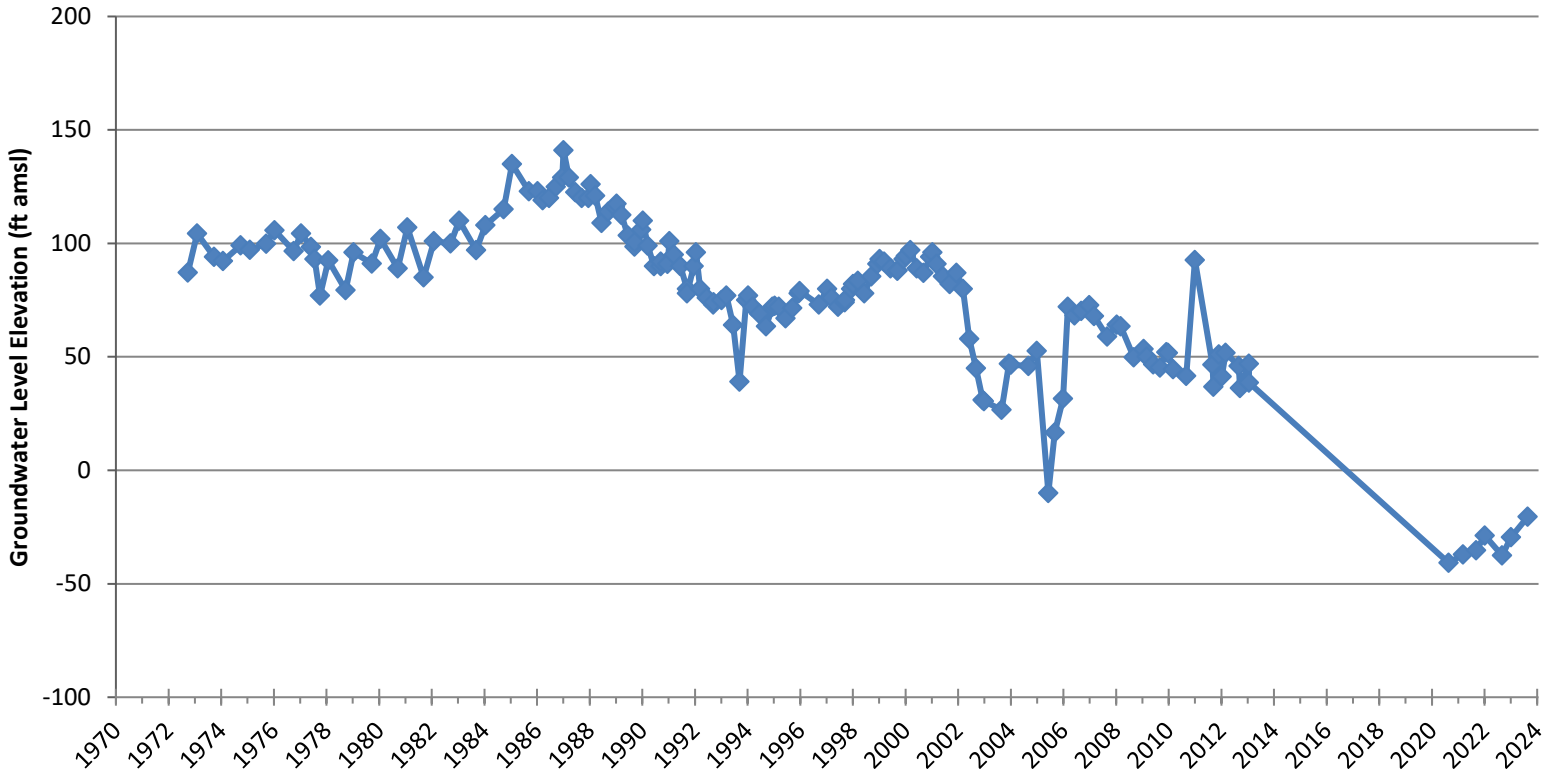
288489
C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Groundwater Hydrographs - Upper

22S/24E-23J001M



MSD Elev. 22/24-23 J1

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF RECLAMATION - REGION II

WELL LOG

22/24-23 J1

County [illegible] Owner Ben Coleman U.S.B.R. No. [illegible]
Dist. Use Local No.
Quad. [illegible] Driller Date [illegible]
Location [illegible]

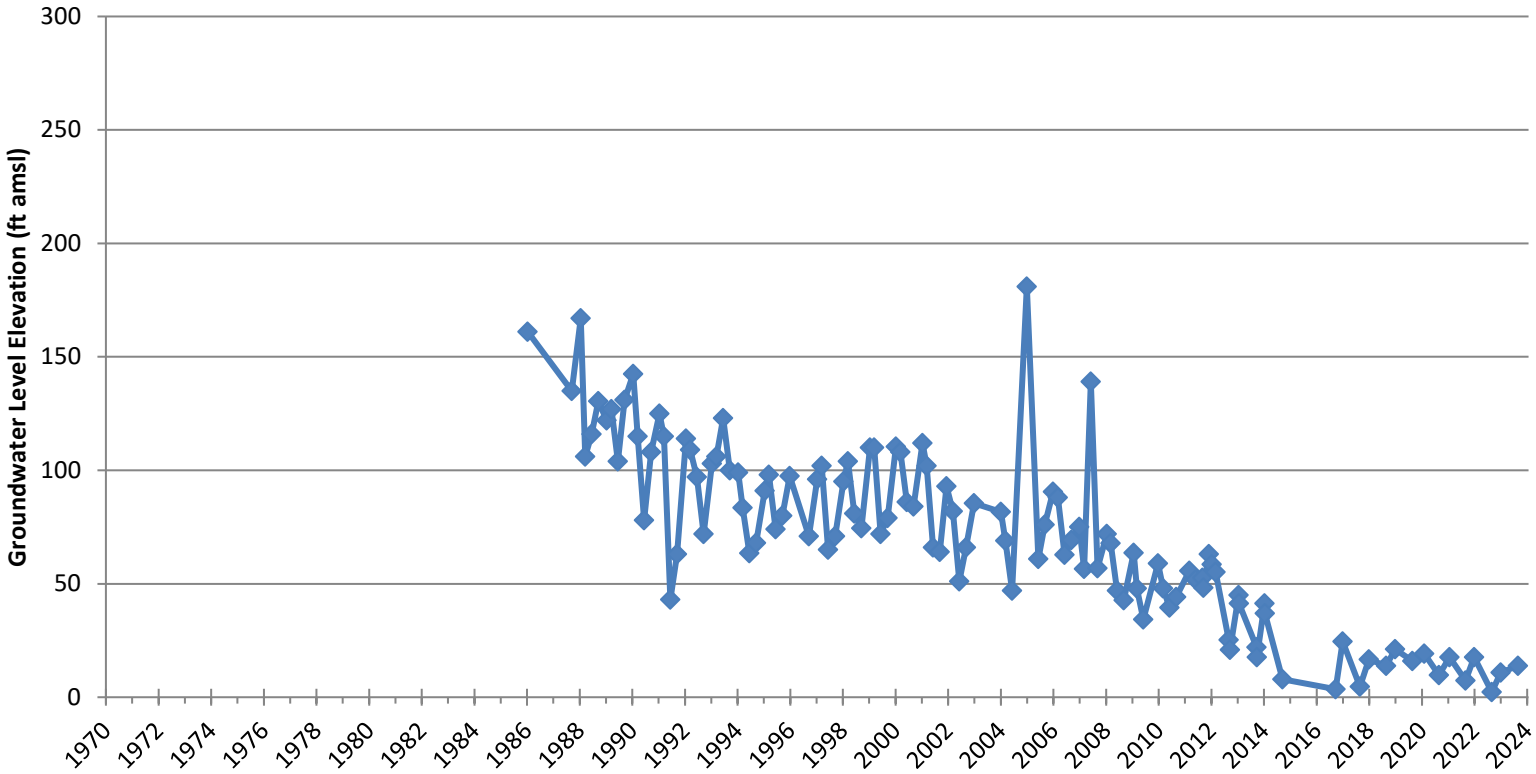
Surf. Elev. [illegible] Groundwater Elev. [illegible] Date [illegible]
Depth 400 Groundwater Elev. Date
Yield Aquifers [illegible]
Drawdown Artesian head Date
Casing Sand-Gravel

Source of data [illegible] Type drill [illegible] Diam. hole [illegible]

Depth	Elev.	Thick	Description
0	1352	F2	[illegible]
2	1355	4 1/2 61	[illegible]
63	1294	2 SF 2	[illegible]
65	1292	1 F 18	[illegible]
83	1274	2 G 7	[illegible]
90	1267	F 6	[illegible]
96	1261	1/2 G 22	[illegible]
117	[illegible]	2 G 9	[illegible]
126	[illegible]	1 G 9	[illegible]
135	1222	5 F 5	[illegible]
140	[illegible]	G 26	[illegible]
166	[illegible]	G 20	[illegible]
186	[illegible]	F 21	[illegible]
204	[illegible]	[illegible]	[illegible]
208	[illegible]	[illegible]	[illegible]
213	[illegible]	[illegible]	[illegible]
220	[illegible]	[illegible]	[illegible]
227	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
242	[illegible]	[illegible]	[illegible]

Groundwater Hydrographs - Upper

22S/25E-25N001M



LSD Elev. [illegible] **22/25-25**

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF RECLAMATION - REGION II

WELL LOG

[illegible]-25N1

County Tulare | Owner Gordon Bros | U.S.B.R. No. 22-25-25
Dist. | Use Irrigation | Local No.
Quad. Squalite School | Driller [illegible] & Graham | Date March 25, 1947
Location 22-25-25 (0.25 - 0.07)

Surf. Elev. 315 | Groundwater Elev. | Date
Depth 437 | Groundwater Elev. | Date
Yield | Aquifers
Drawdown | Artesian head | Date
Casing | % Sand-Gravel

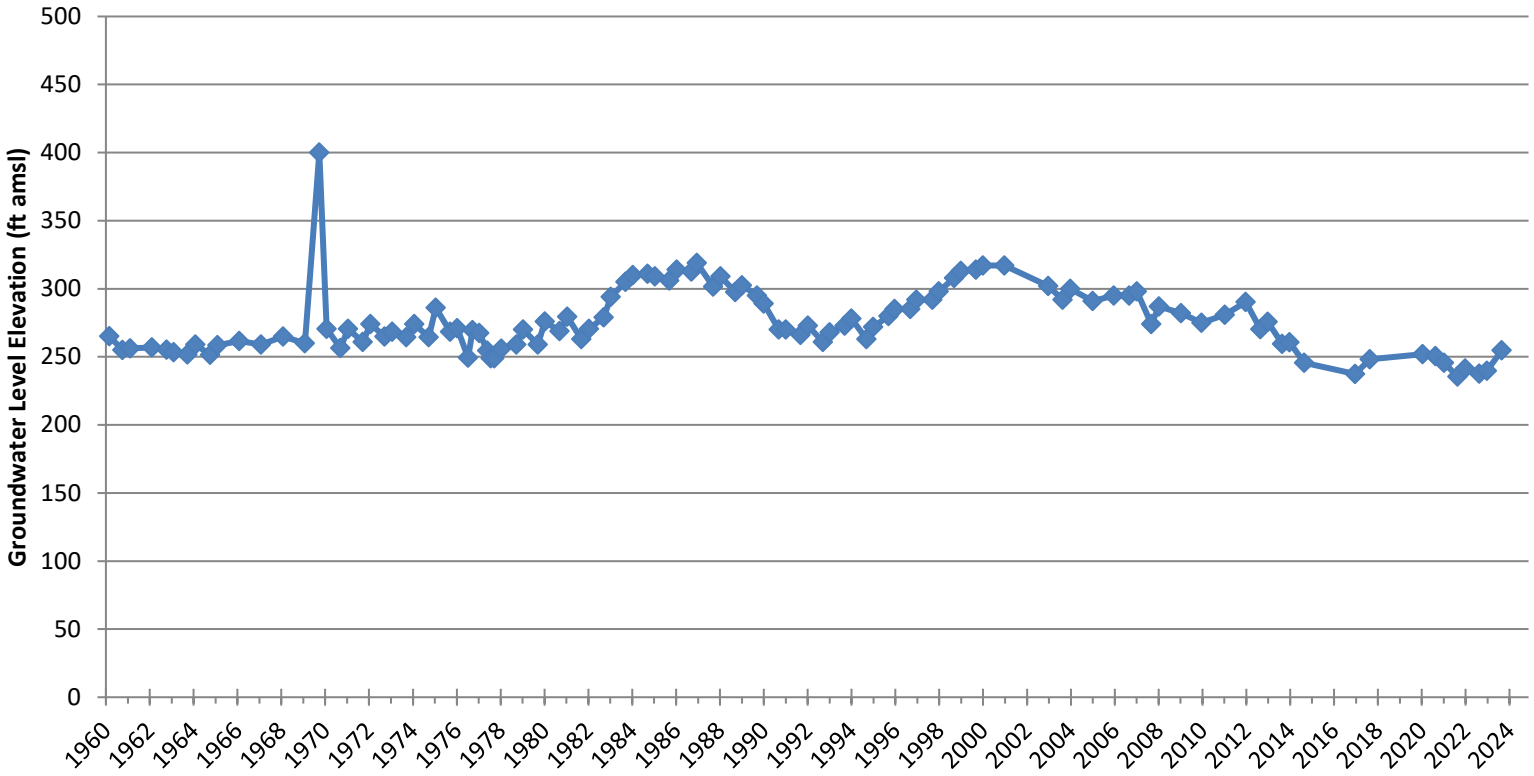
Source of data Anderson | Type drill Cable-Tools | Diam. hole 12"

Depth	Elev.	Thick	Description
0	315 4 cy	14	(Sandy loam - light brown, fine grained very sandy loam, relatively permeable)
14	301 6 G	6	(Sand and gravel - light brown, poorly sorted, subrounded, 0.75 mm to 1.00 mm in diameter, loose quartz sand and subrounded quartz gravel up to 2.5 mm)
20	295 20/6 cy	36	(Sand, gravel and silt, brown, subrounded, 0.75 mm to 1.00 mm in diameter, quartz sand, subrounded gravel up to 3.0 mm, and some silt)
56	259 44/6 cy	64	(Same as above)
120	195 14 cy	14	[illegible] clay
134	181 26 cy	26	(Sandy loam - [illegible] brown hard, sandy loam, relatively impermeable)
160	155 40 cy	70	(Sandy loam, brown, soft, sandy loam, very permeable)
230	85	15	(Sandy clay, brown, hard, sandy clay, relatively impermeable)
245	70	3	(Silt - brown, very soft, silt, relatively impermeable)
248	67	156	(Sandy loam - brown, compact, very sandy loam, relatively impermeable)
404	-89	4	Sand - [illegible], subrounded, 0.50 mm to [illegible] mm, soft, [illegible] (Sand [illegible] silt)
408	-93	3	(Sand [illegible], subangular to subrounded, 0.50 mm to [illegible] mm in diameter, [illegible])
411	-96	26	(Sandy clay - brown, hard, sandy clay, relatively impermeable)
437	-122		(Sand - [illegible], subangular to subrounded, 0.50 mm to [illegible] mm in diameter, [illegible]) Bottom of well

50	100	200
[illegible]		
34	50	100
40	50	100

Groundwater Hydrographs - Upper

22S/26E-13R001M



ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 243293

State Well No. 22/26-13

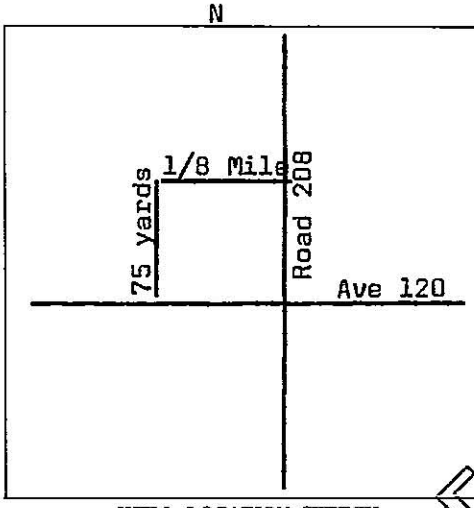
Other Well No.

Notice of Intent No.

Local Permit No. or Date

(1) OWNER: Name Saucelito Irrigation Dist.
Address 20712 Ave. 120
City Porterville, Calif. Zip 93257

(2) LOCATION OF WELL (See instructions):
County Tulare Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. 1/8 Mile West of Road 208 and 75 Yards North of Ave. 120



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 x 2
Diameter of bore 20"
Packed from 20 to 385 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	380	8 5/8"	10
		00	

(8) PERFORATIONS: louver
Type of perforation or size of screen

From ft.	To ft.	Slot size
240	300	3/32
360	380	3/32

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 385 ft. Depth of completed well 380 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	2	top soil
2	3	hard pan
3	19	coarse sand
19	22	brown clay
22	28	sand & gravel
28	46	sandy brown clay
46	48	b gravel
48	50	brown clay
50	52	coarse sand & clay
52	56	coarse sand & gravel
56	63	coarse sand
63	70	coarse sand & gravel
70	87	sandy brown clay
87	109	coarse sand
109	117	brown clay
117	125	sand & brown clay
125	131	coarse sand
131	133	brown clay
133	135	sandy brown clay
135	139	coarse sand
139	160	brown clay
160	164	coarse sand
164	176	brwon clay
176	183	coarse sand
183	196	sand & clay
196	200	brown clay
200	203	coarse sand
203	215	gravel
215	219	brown clay
219	224	coarse sand
224	253	brown clay
253	261	coarse sand
261	280	brown clay
280	298	coarse sand
298	303	brwon clay
303	305	coarse sand & clay
305	311	brown clay
311	314	coarse sand & clay

OUTSIDE CORC. CLAY AREA

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME (Person, firm, or corporation) (Typed or printed)

Address

City Zip

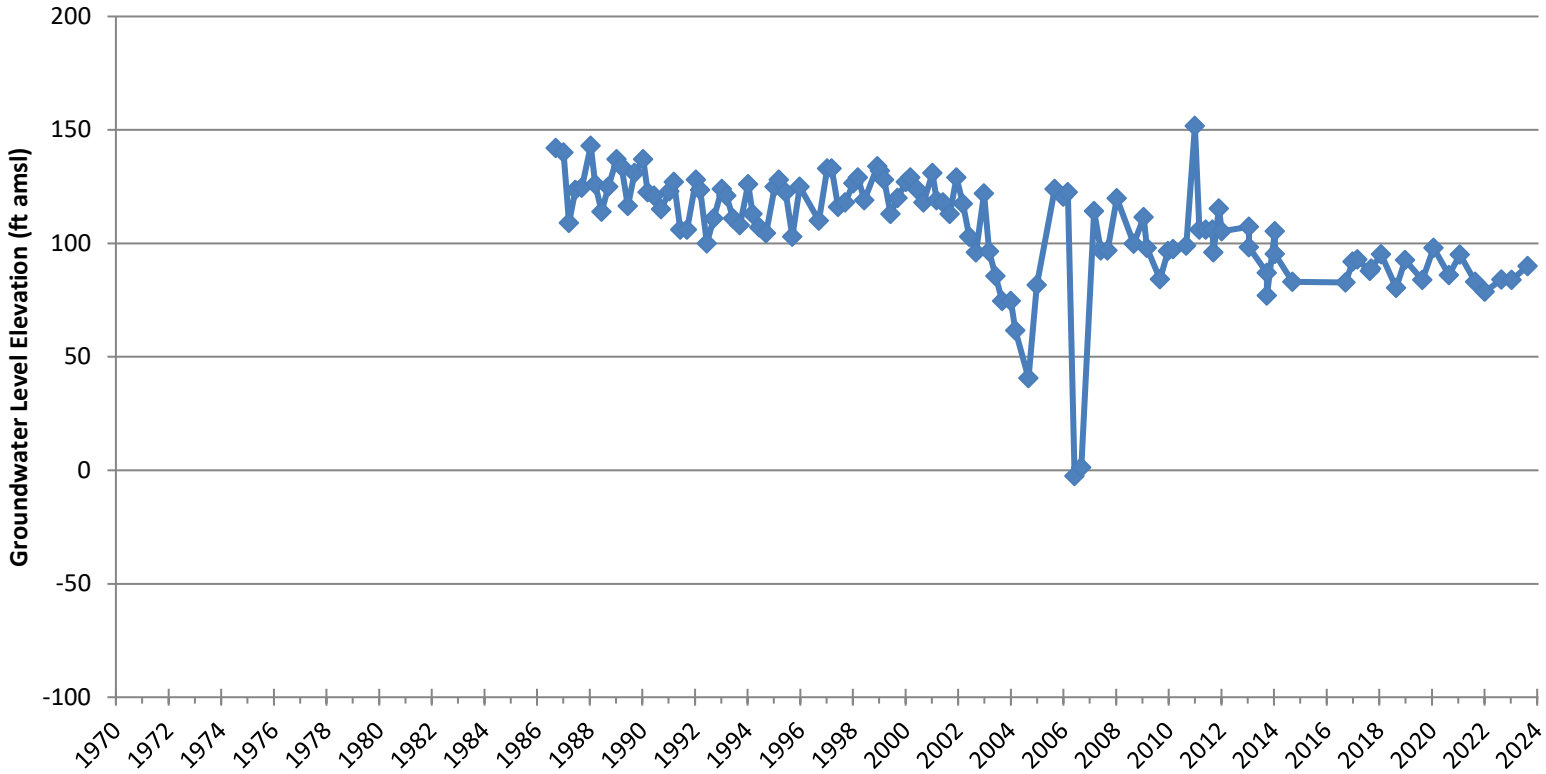
License No. Date of this report

UNOFFICIAL DOCUMENT
NOT FOR PUBLIC USE
WATER SUPPLY

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

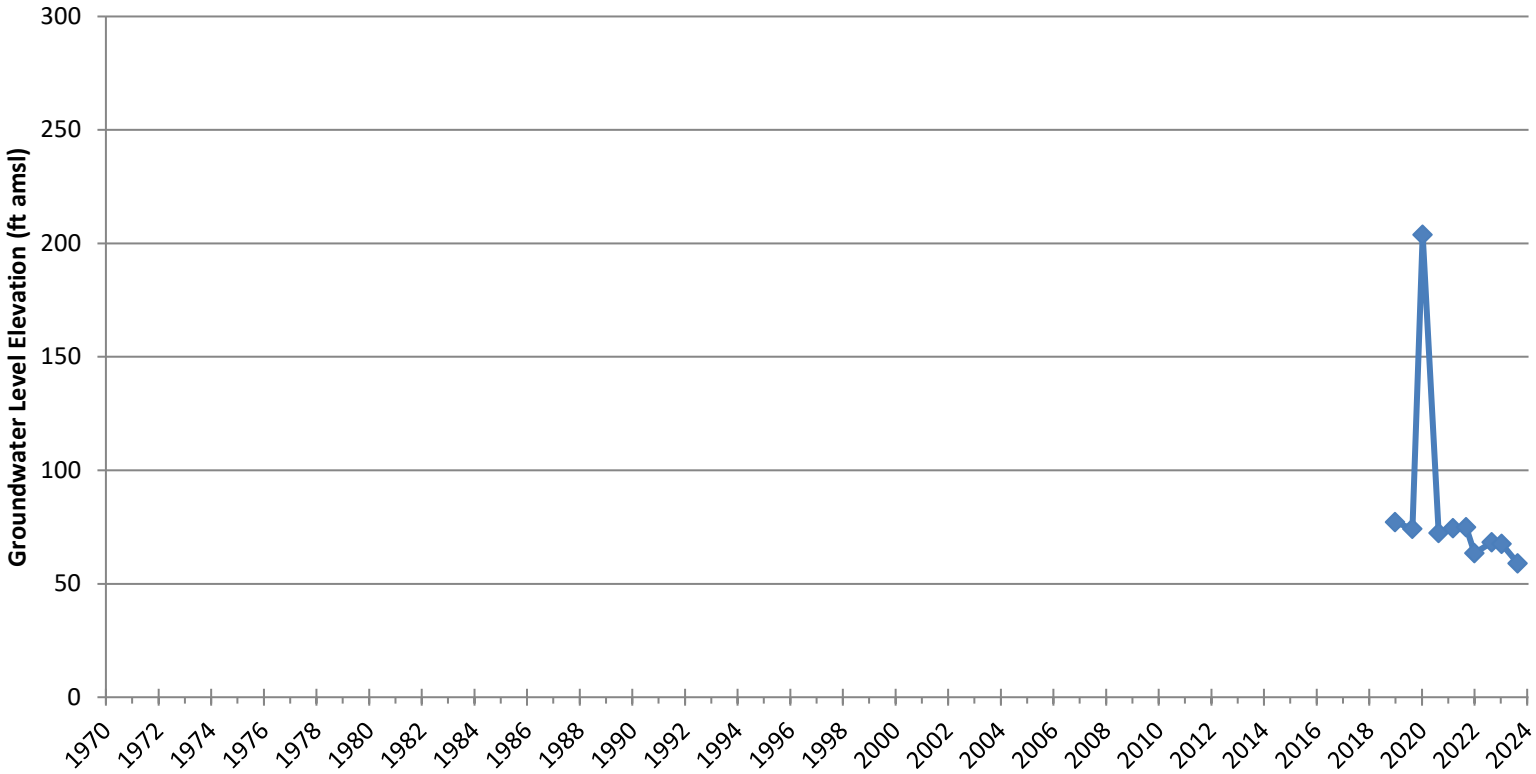
Groundwater Hydrographs - Upper

23S/24E-28J002M



Groundwater Hydrographs - Upper

23S/26E-29D001M



*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

Page 1 of 1

Owner's Well Number 1

Date Work Began 12-9-10 Date Work Ended 1-10-11

Local Permit Agency TCEH

Permit Number 102450 Permit Date 12-6-10

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0119660

DWR Use Only – Do Not Fill In

23S26E29

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ● Vertical ○ Horizontal ○ Angle Specify

Drilling Method Rotary Drilling Fluid Mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	4	Top soil
4	8	Hardpan
8	23	Clay
23	101	sandy clay
101	119	Clay
119	164	sandy clay
164	178	sand
178	211	sandy clay
211	216	sand
216	241	sandy clay
241	243	sand
243	277	sandy clay
277	283	sand
283	291	sandy clay
291	310	Clay

Total Depth of Boring 310 Feet

Total Depth of Completed Well 298 Feet

Nan

Mail

City

Well Location

Address 6196 Rd 168

City Earlimart County Tulare

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

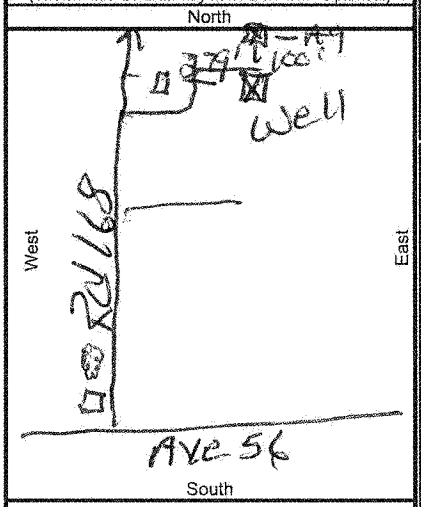
Datum ___ Decimal Lat. ___ Decimal Long. ___

APN Book 319 Page 050 Parcel 038

Township 23 Range 26 Section 29

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

● New Well

○ Modification/Repair

○ Deepen

○ Other ___

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☒ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other ___

Water Level and Yield of Completed Well

Depth to first water 211 (Feet below surface)

Depth to Static Water Level 211 (Feet) Date Measured 1-10-11

Estimated Yield* 30+ (GPM) Test Type Bailer

Test Length 6 (Hours) Total Drawdown N/A (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	160	12 1/4	Rotary	PVC	Sdr 21	6 5/8	—	—
160	300	12 1/4	"	"	" "	" "	Factory	.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	32	Bentonite	3/8 holeplug
32	310	Gravel	3/8 minus

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other ___

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Lenny's Drilling & Pumps

*Person, Firm or Corporation

P.O. Box 120 Strathmore CA 93267

Address City State Zip

Signed Lenny R Cordon 1-22-11 662109

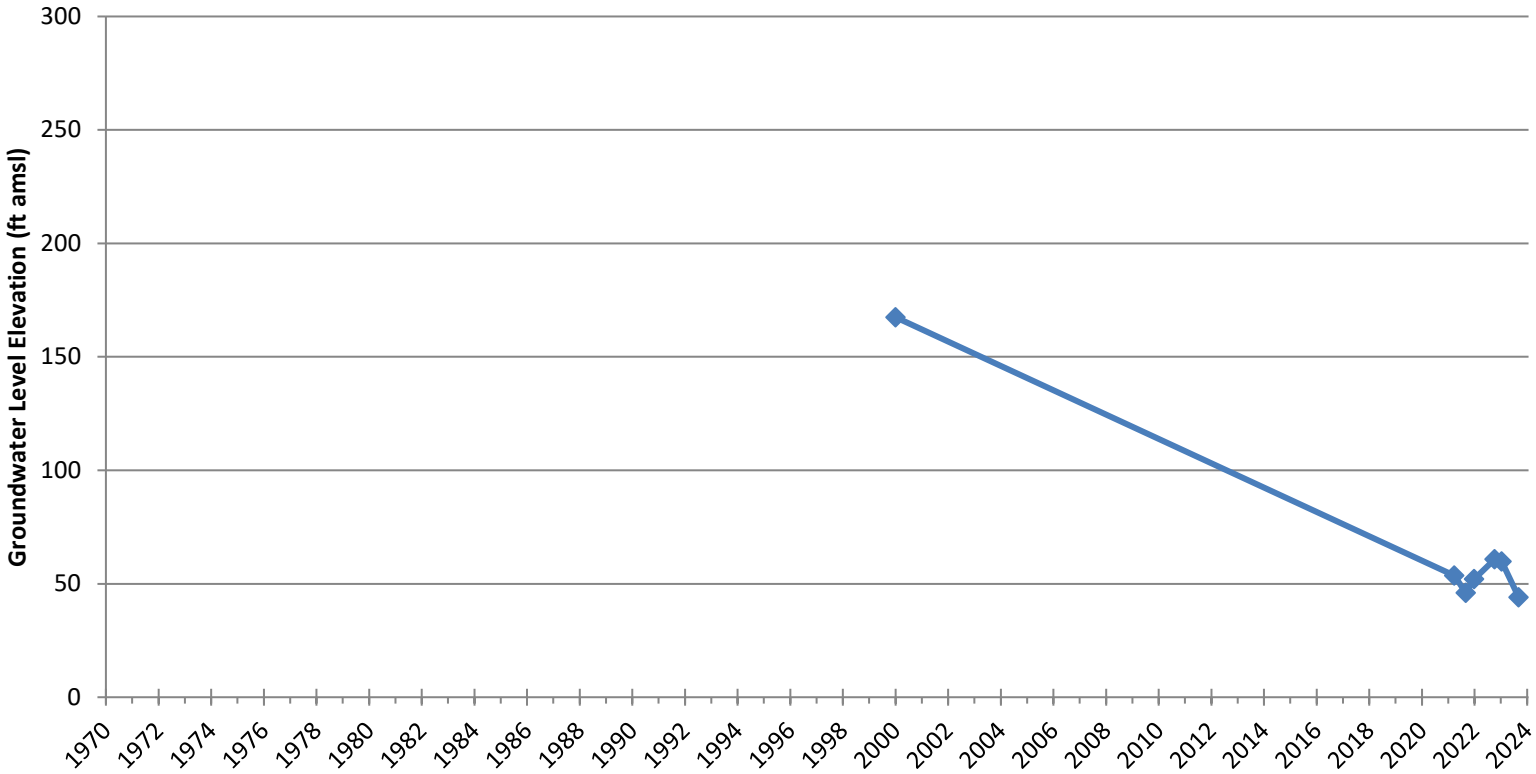
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

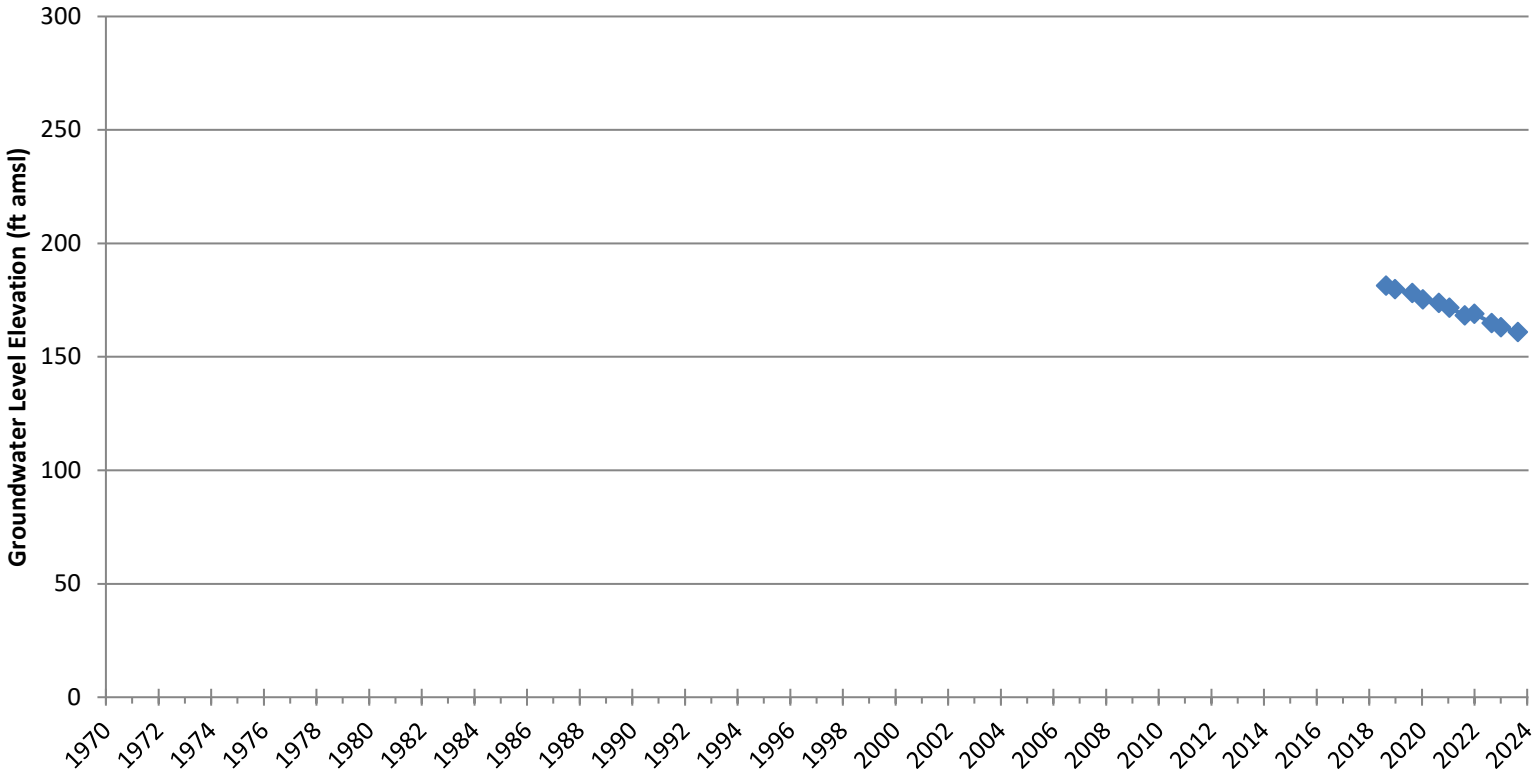
Groundwater Hydrographs - Upper

24S/23E-22E001M



Groundwater Hydrographs - Upper

24S/25E-35H001M



ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. 1

Date Work Began 6-27-05, Ended 7-4-05

Local Permit Agency TCEH

Permit No. 23748 Permit Date 2-22-05

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 1095774

DWR USE ONLY — DO NOT FILL IN
24S/25E-35
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID mud

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	18	Sand + clay
18	27	Sand
27	84	Sandy clay
84	103	Sand medium (H20)
103	136	Sandy clay
136	149	Sand coarse (H20)
149	173	sandy clay
173	246	Sand medium (H20)
246	250	Clay
250	273	Sand coarse (H20)
273	298	Sandy clay
298	301	Clay
301	314	Sand, medium (H20)
314	360	Clay

TOTAL DEPTH OF BORING 360 (Feet)

TOTAL DEPTH OF COMPLETED WELL 340 (Feet)

WELL LOCATION

Address

City SAME

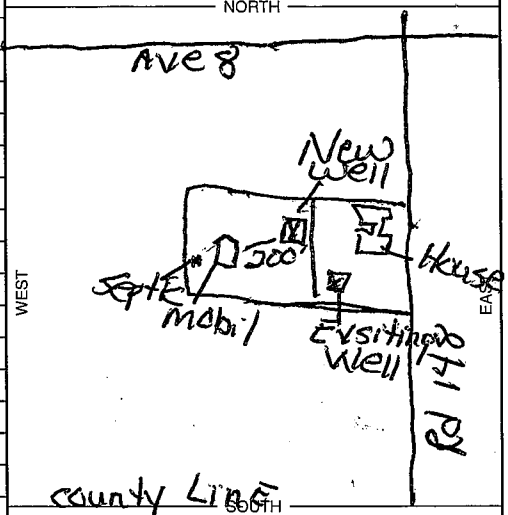
County Tulare

APN Book 336 Page 110 Parcel 006

Township 24 Range 25 Section 35

Lat ___ N (DEG. MIN. SEC.) Long ___ W (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 83 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 83 (Ft.) & DATE MEASURED 7-4-05

ESTIMATED YIELD * 100+ (GPM) & TEST TYPE Airlift

TEST LENGTH 5 (Hrs.) TOTAL DRAWDOWN NA (Ft.)

** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	160	16	✓				PVC	8	SDR21	—
160	320	16		✓			PVC	8	SDR21	32 slot
320	340	16	✓				PVC	8	SDR21	—

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE: CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	36	✓			
36	360			✓	3/8 minus

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

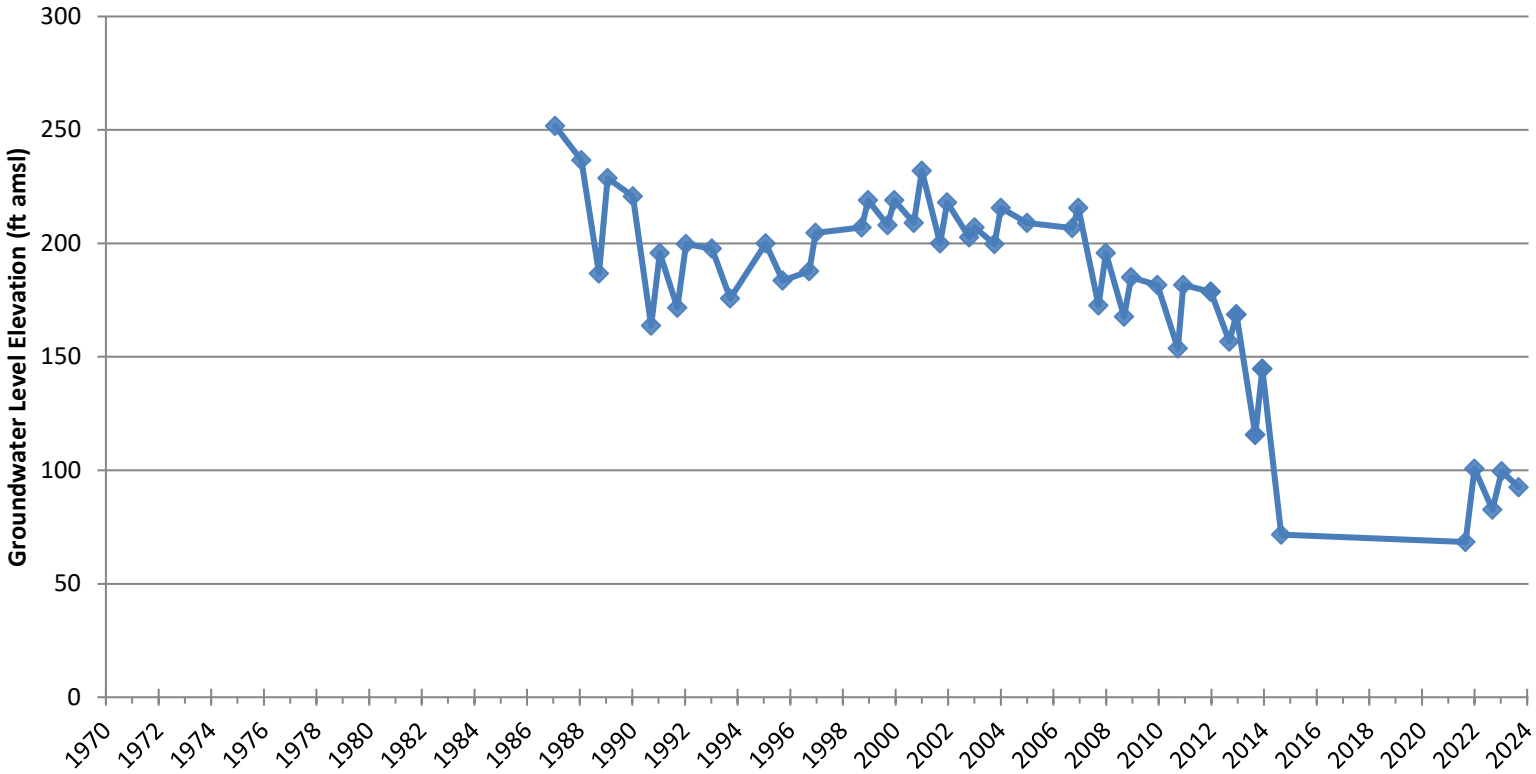
NAME Disgo Drilling + Pumps (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 1410 Tomah CITY Porterville STATE Ca. ZIP 93257

Signed Lenny R Cordon C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED 7-4-05 C-57 LICENSE NUMBER 662109

Groundwater Hydrographs - Upper

24S/26E-04P001M



LSD Elev 390 24/26-4P1 24/26E-1

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF RECLAMATION - REGION II

WELL LOG

24/26-4P1

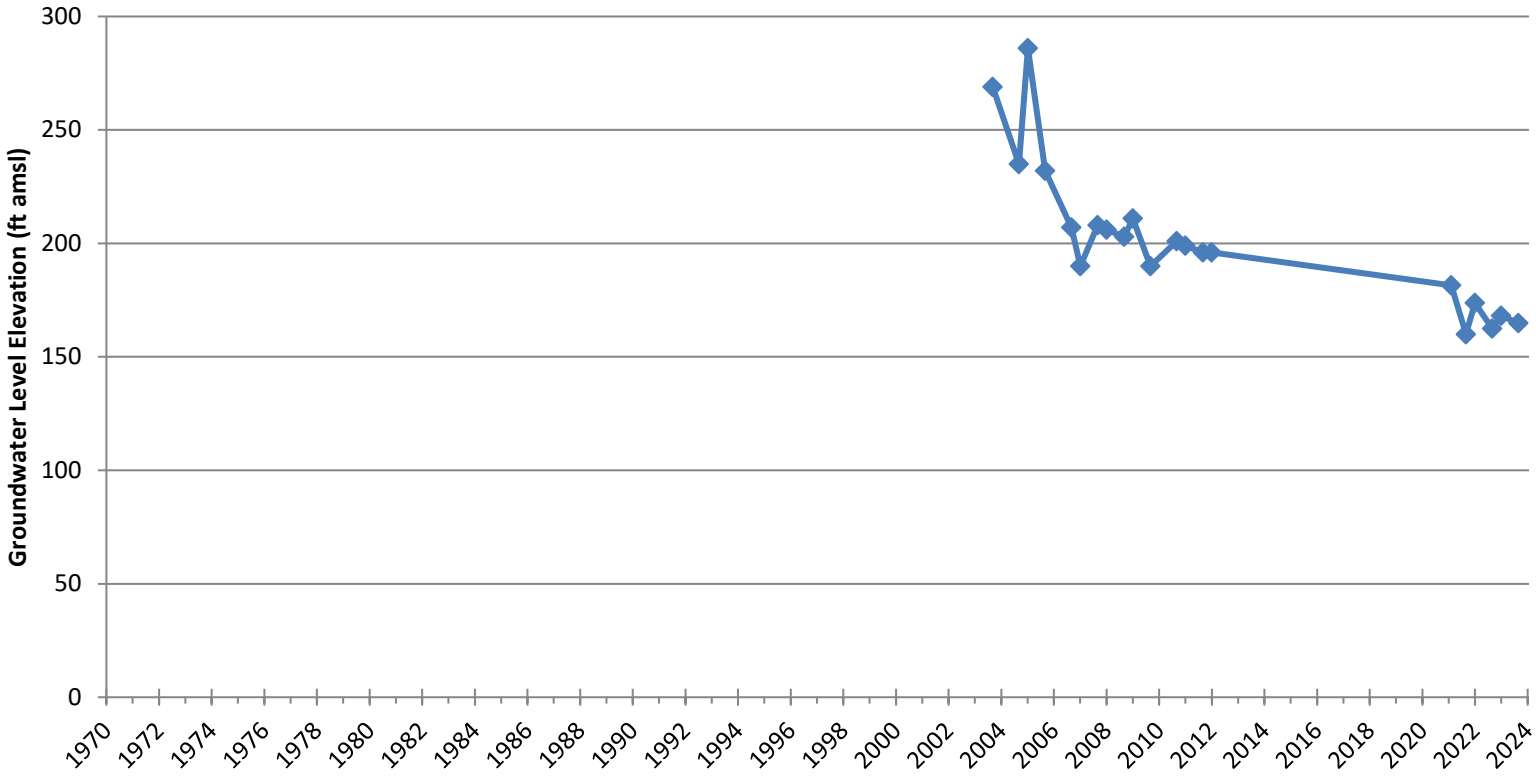
County Tulare | Owner L.W. Thompson | U.S.B.R. No. 24-26-4
Dist. Delano-Earlimart | Use Irrigation | Local No.
Quad. Delano | Driller Whitten Bros. | Date 4-4-40
Location 24-26-4 (0.49-0.27)

Surf. Elev. 388 | Groundwater Elev. (180' depth) | Date 4-4-40
Depth 402 | Groundwater Elev. | Date
Yield | Aquifers
Drawdown | Artesian head | Date
Casing Star perf. 216' to 393' | % Sand-Gravel 38%
Sand Gr. 16.1%
Source of data Whitten Bros. | Type drill cable-tool | Diam. hole 14"

Depth	Elev.	Thick	Description
0	388	16	top soil
16	372	27	sand
43	345	173	sandy clay
216	172	6	sand
222	166	4	sandyclay
226	162	7	sand
233	155	18	sandy clay
251	137	4	sand
255	133	18	sandy clay
273	115	6	sand
279	109	51	sandy clay
330	58	15	sandy
345	43	57	clay
402	-14		bottom of hole

Groundwater Hydrographs - Upper

24S/26E-11



24/26-11

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No. 5
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

LOCATION NOT VERIFIED
Do Not Fill In
№ 36201
State Well No.
Other Well No. 24/26E-11

(1) OWNER

Name
Address

(2) LOCATION OF WELL:

County Tulare Owner's number, if any—
R. F. D. or Street No.
So. ½-Sec. 11
Twnshp. 24S
Rnge. 26E

(3) TYPE OF WORK (*check*):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	399	8"	12 ga.

If gravel packed

Diameter of Bore	from ft.	to ft.
0	399	

Type and size of shoe or well ring
Size of gravel:
Describe joint

(7) PERFORATIONS:

Type of perforator used Machine
Size of perforations 1" in., length, by 1/8" in.

From ft.	to ft.	Perf. per row	Rows per ft.
301	399		

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 50' ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata

From ft.	to ft.
0	50

Method of Sealing Cement

(9) WATER LEVELS:

Depth at which water was first found ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:

Total depth 399 ft. Depth of completed well 399 ft.
Formation: *Describe by color, character, size of material, and structure.*

From ft.	to ft.	Formation
0	10	Top Soil
10	15	Sand
15	110	Sandy Clay
110	116	Sand
116	230	Sandy Clay
230	236	Sand
236	267	Sandy Clay
267	274	Sand
274	323	Sandy Clay
323	330	Sand
330	369	Sandy Clay
369	373	Sand
373	399	Clay

CONFIDENTIAL
Section 7076.1, Water Code

Work started 9/29/56 Completed 10/6/56

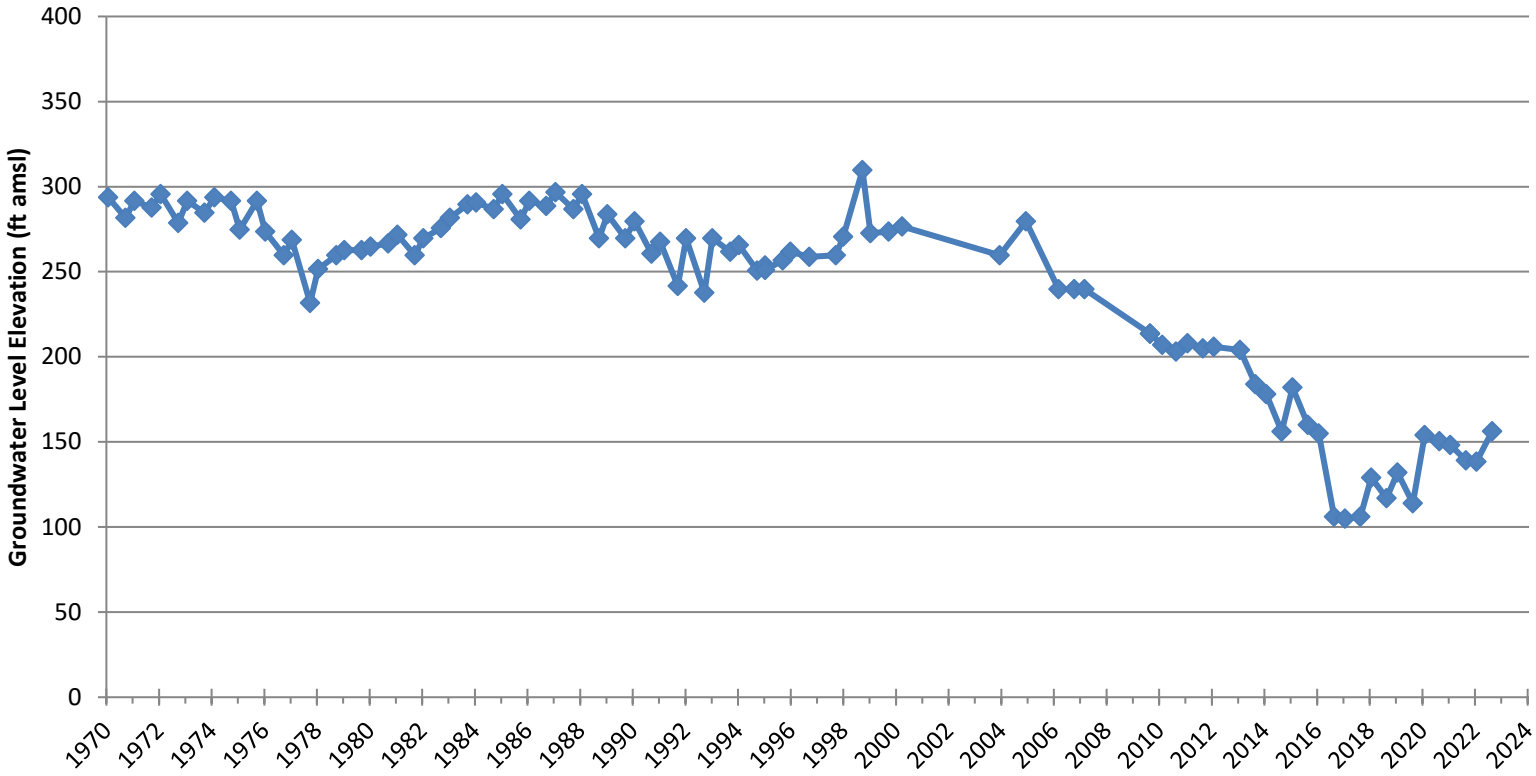
WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Whitten Pumps Inc.
(Person, firm, or corporation) (Typed or printed)
Address 1744 High St.
Delano

[SIGNED] [signature]
Well Driller
License No. 148282 Dated 12/29/56

Groundwater Hydrographs - Upper

24S/26E-32G001M



24/26-32G1

24/26-32G1

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF RECLAMATION
WELL LOG

County Tulare | Owner | U.S.B.R. No. 24-26-32 E
Dist. Delano-Earlimart | Use | Local No. 4A-1
Quad. Delano | Driller H. Bambridge | Date 4-11-57
Location Center of NW quarter of Section 32.

Surf. Elev. 693 | Groundwater elev. | Date
Depth 470 | Groundwater elev. | Date
Yield | Aquifers
Drawdown | Artesian head | Date
Casing | % Sand-gravel

Source of data | Type drill cable tool | Diam. hole 16"

Depth	Elev.	Thick.	Description
0	693	135	top soil and (sand and clay)
135	558	5	water sand
140	553	35	clay
175	518	16	good water sand
191	502	17	clay
208	485	9	water sand
217	676	31	clay
248	645	12	water sand
260	633	49	clay
309	584	7	water sand
316	577	20	clay and silt
336	557	12	lime stone
348	545	8	water sand
356	537	22	clay
378	515	7	water sand
385	508	85	clay and sand
470	423		bottom of hole

24/26-32G1

24/26-32G1

WELL 4-A # 2.

LOCATION Center of the North-west quarter of Section 32.

DRILLED Completed April 16th., 1927...Started March 17/27.

DRILLED BY H. G. Bainbridge.

LOG:

	Top Soil -(Sand and Clay)	135'
135 to 140	Water Sand	5'
140 " 175	Clay	35'
175 " 191	Good Water Gravel	16'
191 " 208	Clay	17'
208 " 217	Water Sand	9'
217 " 248	Clay	31'
248 " 260	Water Sand	12'
260 " 309	Clay	49'
309 " 316	Water Sand	7'
316 " 336	Clay and Silt	20'
336 " 348	Lime Stone	12'
348 " 356	Water Sand	8'
356 " 378	Clay	22'
378 " 385	Water Sand	7'
385 " 470	Clay and Shale	85'

16" Casing Landed at 338'
12" " " " 470' (Showing 14' lap).

CASING USED:

16" 1 to 23' Solid Starter.
315' Perforated.

12" 1 to 20' Solid Starter.
126' Perforated.

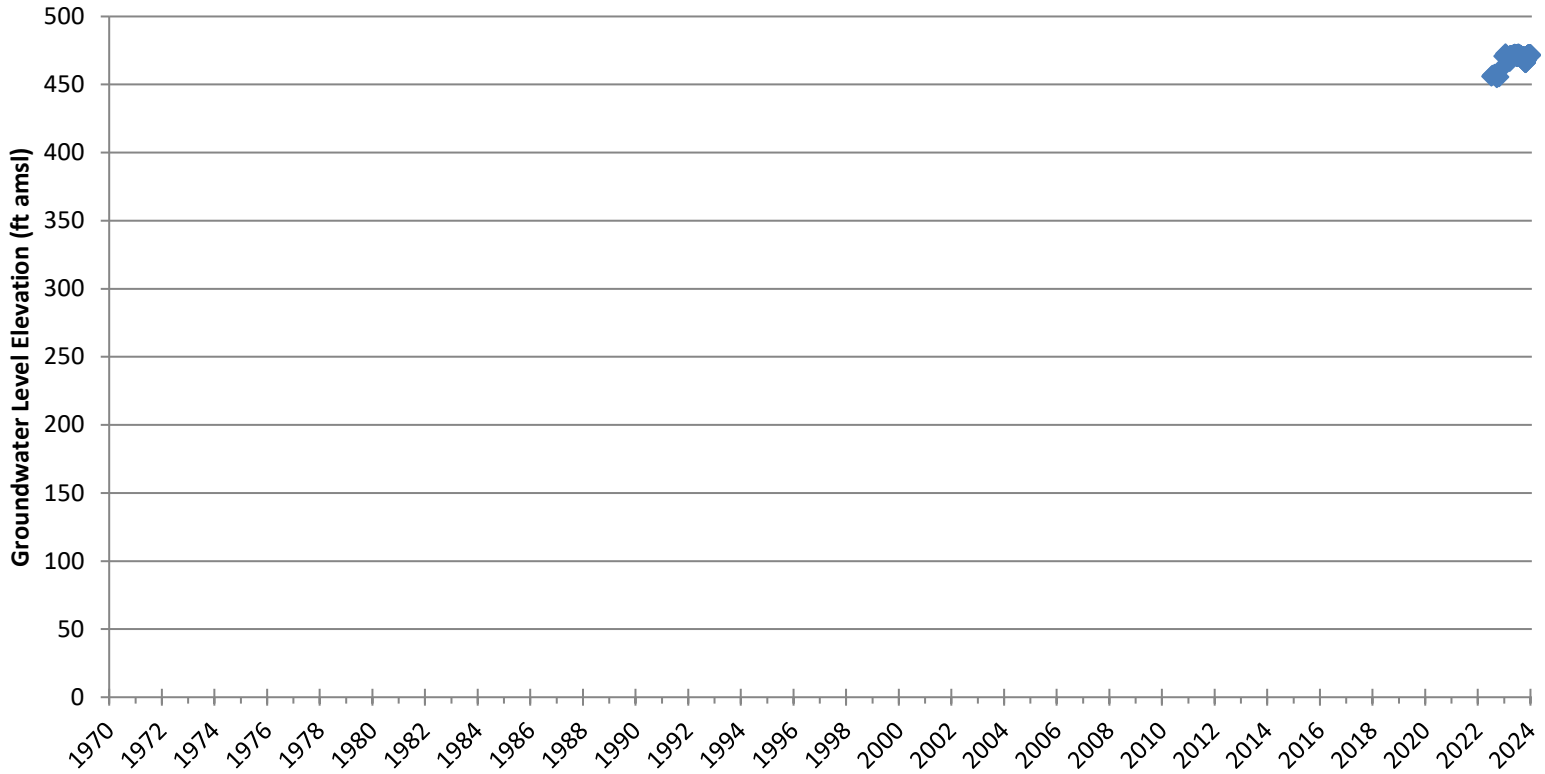
ROLSEY PORTABLE MICROFILMER

ROLSEY PORTABLE MICROFILMER

TOP

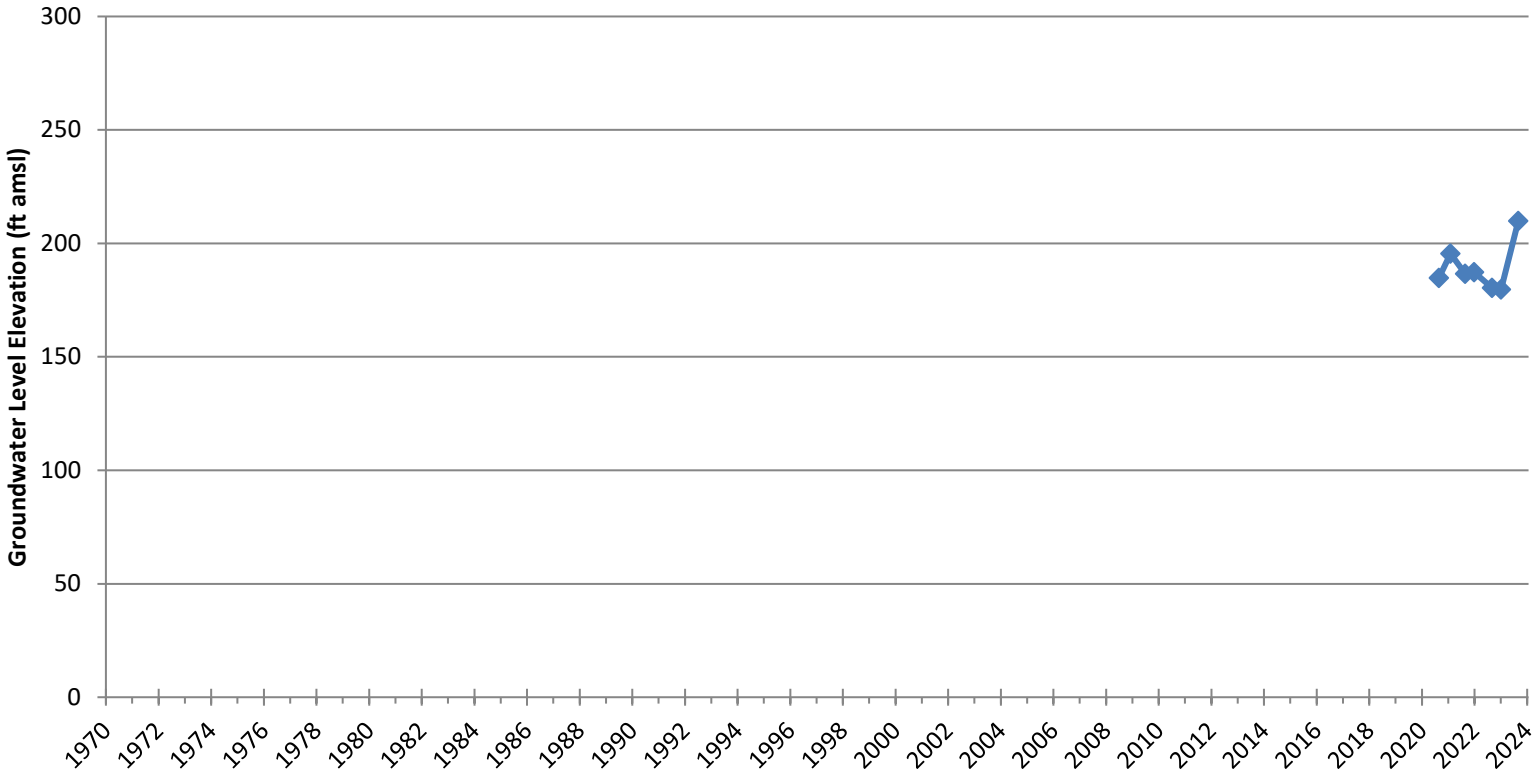
Groundwater Hydrographs - Upper

ETGSA-1U



Groundwater Hydrographs - Upper

LTRID TSS U



State of California

Well Completion Report

Form DWR 188 Complete 12/13/2022

WCR2022-006981

Owner's Well Number: LTRID-01 | Date Work Began: 10/29/2020 | Date Work Ended: 11/11/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 2000408 | Permit Date: 10/14/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXXX | State: XX | Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 36 Deg. 7 Min. 50.5919 Sec. N | Longitude: -119 Deg. 18 Min. 46.2239 Sec. W

Dec. Lat.: 36.13072 | Dec. Long.: -119.31284

Vertical Datum: NAVD88 | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 232*010*022

Township: 21 S

Range: 25 E

Section: 06

Baseline Meridian: Mount Diablo

Ground Surface Elevation: 252

Elevation Accuracy: 10 Ft

Elevation Determination Method: GPS

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Direct Rotary | Drilling Fluid: Bentonite

Total Depth of Boring: 1560 Feet

Total Depth of Completed Well: 1480 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: (Feet) | Date Measured:

Estimated Yield*: (GPM) | Test Type:

Test Length: (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - USCS/ASTM D2488

Depth from Surface Feet to Feet		Soil Class	Soil Color	Soil Description
0	20	(ML) Sandy silt	10YR6/3	Some medium sand, sub-angular, cemented silt layers.
20	30	(SM) Silty sand	2YR5/6	lenses of fine sand and cemented silt.
30	90	(SW-SM) Well-graded sand with silt	10YR5/3	Some cemented silt layers, trace clay.
90	120	(CL) Sandy lean clay	10YR5/3	medium plasticity, fine to coarse sand.
120	140	(SW-SC) Well-graded sand with clay	Gley 1 3/10Y	Fine sand and clay.
140	180	(SP) Poorly graded sand	Gley 1 4/GY	Med-coarse, angular to sub-angular, some clay lenses, trace silt.
180	350	(SW-SC) Well-graded sand with clay	Gley 1 3/10GY	Medium to coarse sand, angular to sub-angular coarse sand.
350	400	(SM) Silty sand	10GY5/1	Medium dense, medium-coarse sand, angular, with some clay.
400	440	(SW-SM) Well-graded sand with silt	5B4/1	Medium dense, angular quarts grains, sime mica, trace clay.
440	530	(ML) Silt with sand	5BG4/1	Stiff, angular sand, trace clay, few interbeds of medium-coarse sand.
530	540	(SW) Well-graded sand	5B6/1	Angular, some mica, trace silt.
540	630	(ML) Silt with sand	10BG4/1	Very stiff-stiff, trace clay, few interbedded sand layers.
630	850	(SW-SC) Well-graded sand with clay	Gley 1 5/10GY	Medium-coarse sand, few clay interbeds, some silt.
850	1000	(ML) Silt with sand	10GY4/1	very stiff, med-low plasticity, some coarse sand.

1000	1040	(ML) Silt with sand	10GY5/1	Medium dense, sub-angular quarts grains, moderate plasticity.
1040	1160	(CL) Lean clay with sand	Gley 1 4/5	medium plasticity, tough.
1160	1270	(SP-SC) Poorly graded sand with clay	Gley 2 4/1	hard, med plasticity, interbedded fine-med sand lenses, subrounded.
1270	1350	(SP) Poorly graded sand	5Y 6/3	Fine to medium sand, sub-angular, some silt and clay.
1350	1360	(CH) Fat clay with sand	Gley 2 4/1	Some Sand
1360	1370	(SW) Well-graded sand	5Y6/1	Very fine to coarse grained, angular.
1370	1400	(CH) Fat clay with sand	5Y6/3	Very stiff to hard, trace coarse sand.
1400	1410	(SM) Silty sand	10Y4/1	Very fine to med grained, trace clay.
1410	1560	(CL) Sandy lean clay	Gley 1 4/10GY	Medium plasticity, tough, dry.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	1100	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
1	1100	1470	Screen	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875	Milled Slots	0.02	
1	1470	1480	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
2	0	610	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
2	610	805	Screen	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875	Milled Slots	0.02	
2	805	815	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
3	0	150	No Casing Installed	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
3	150	280	Screen	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875	Milled Slots	0.02	
3	280	290	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	20	Cement	Portland Cement/Neat Cement		
20	45	Bentonite	Non Hydrated Bentonite		Chips
45	297	Filter Pack	8 x 20	#3	
297	511	Bentonite	Non Hydrated Bentonite		Chips
511	820	Filter Pack	8 x 20	#3	
820	871	Bentonite	Non Hydrated Bentonite		Chips
871	1560	Filter Pack	8 x 20	#3	

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	310	14.75
310	1560	12.25

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: CASCADE DRILLING LP (Person, Firm or Corporation)

PO BOX 1184 (Address) | Woodinville (City) | WA (State) | 90872 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 06/22/2022 (Date Signed) | 1058336 (C-57 License Number)

Attachments

27486_ELOG-VIEW_andWellDesign.pdf - Geophysical Log

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

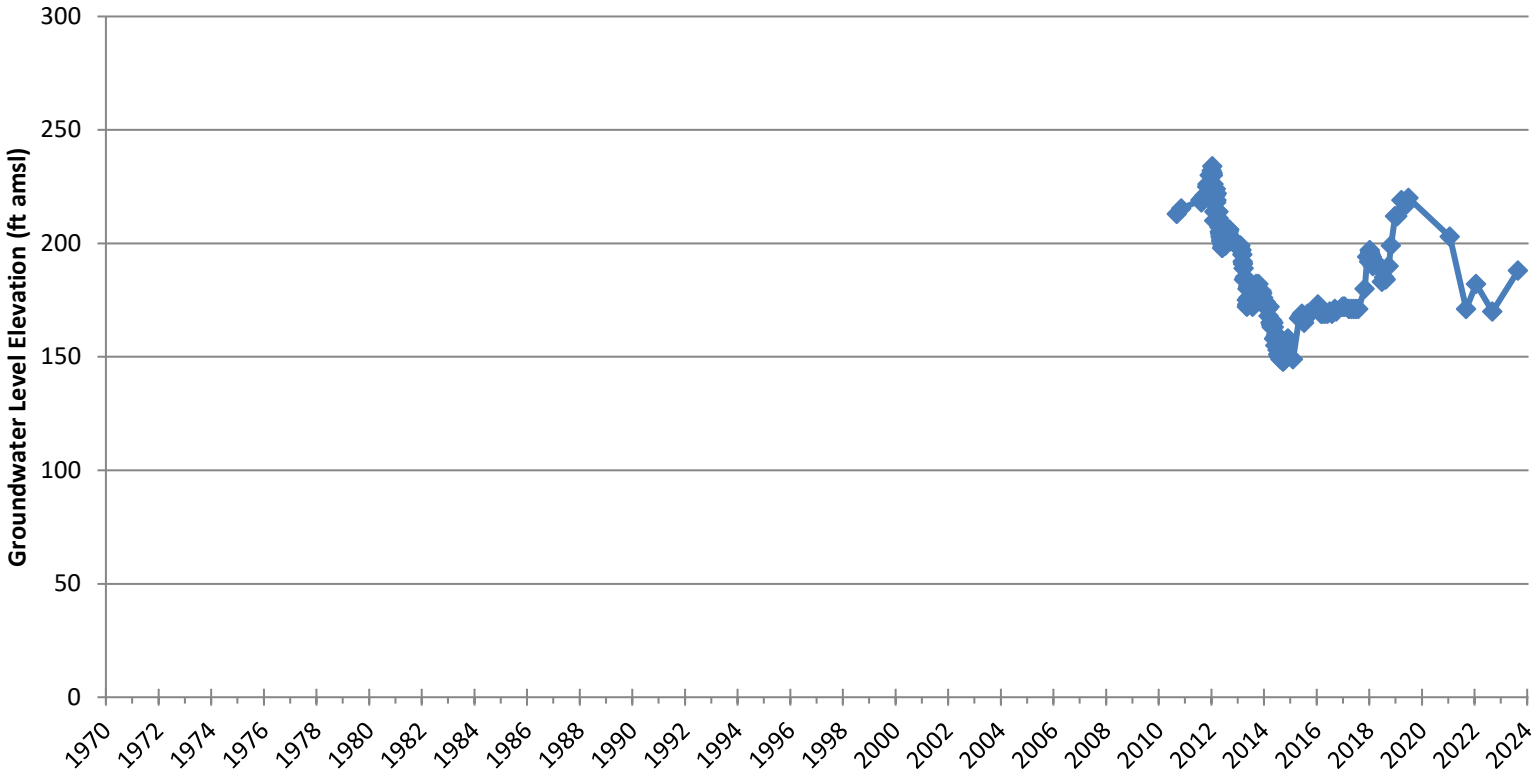
W — Longitude Deg/Min/Sec

TRS:

APN:

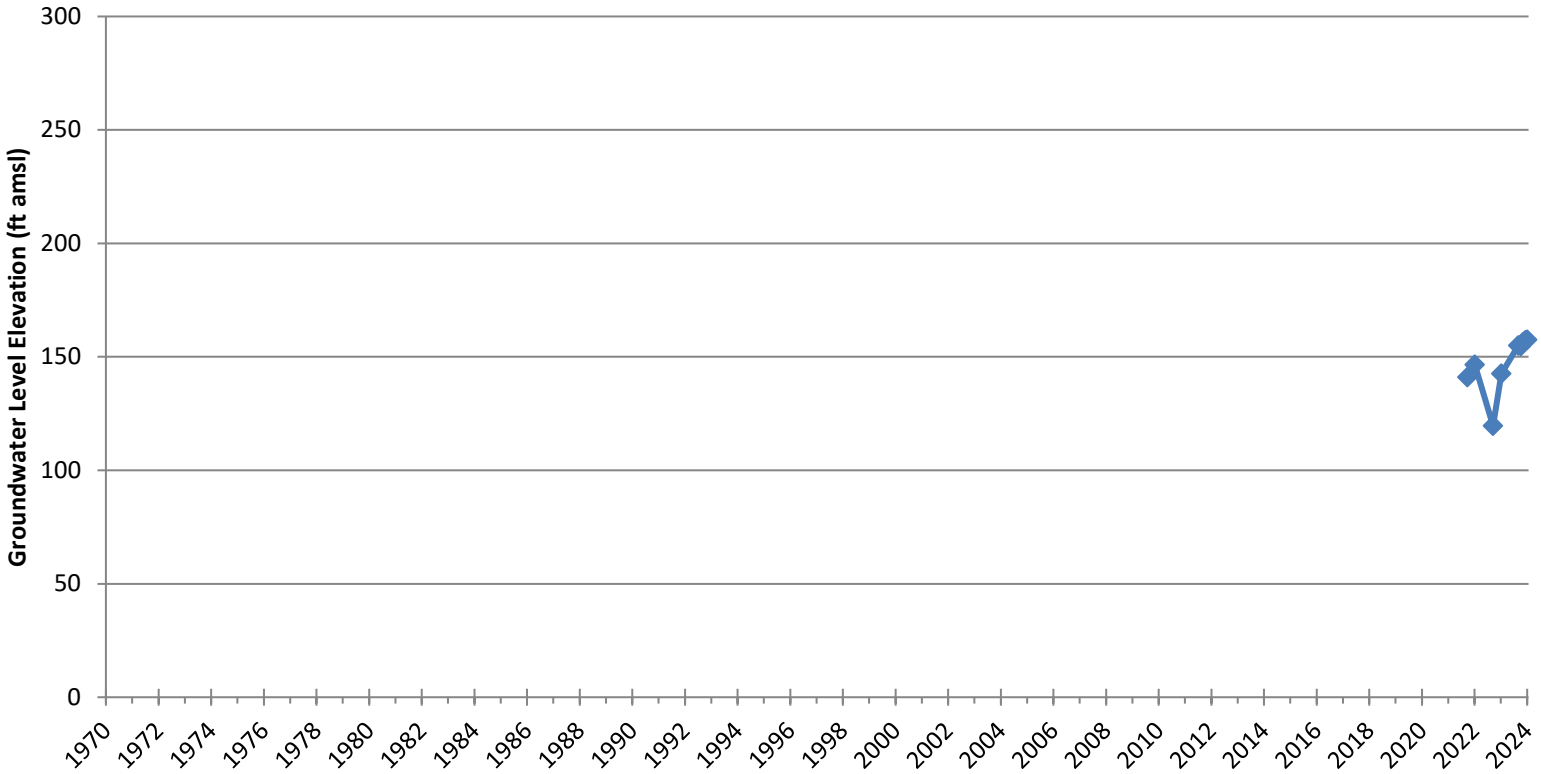
Groundwater Hydrographs - Upper

M19-U



Groundwater Hydrographs - Upper

PIDGSA-01U



State of California

Well Completion Report

Form DWR 188 Complete 12/29/2020

WCR2020-016331

Owner's Well Number: PIDGSA-01 | Date Work Began: 10/27/2020 | Date Work Ended: 11/15/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: WELL2000383 | Permit Date: 10/20/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXXX | State: XX | Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 35 Deg. 55 Min. 47.4347 Sec. N | Longitude: -119 Deg. 13 Min. 57.6516 Sec. W

Dec. Lat.: 35.929843 | Dec. Long.: -119.232681

Vertical Datum: NGVD29 | Horizontal Datum: WGS84

Location Accuracy: 5 Ft | Location Determination Method: GPS

APN: 318-280-020

Township:

Range:

Section:

Baseline Meridian:

Ground Surface Elevation: 297

Elevation Accuracy: 1 Ft

Elevation Determination Method: GPS

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Direct Rotary | Drilling Fluid: Bentonite

Total Depth of Boring: 1015 Feet

Total Depth of Completed Well: 1015 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: (Feet) | Date Measured:

Estimated Yield*: (GPM) | Test Type:

Test Length: (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	1015	400-1015

Geologic Log - USCS/ASTM D2488

Depth from Surface Feet to Feet		Soil Class	Soil Color	Soil Description
0	1015	(ML) Sandy silt	BROWN	SILTY SAND

Geologic Log - Lite

Depth from Surface Feet to Feet		Material Type	Material Color	Material Texture	Material Description
0	270	Clay	Brown	Fine	

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	1015	Blank	PVC	OD: 4.500 in. | Thickness: 0.337 in.	0.337	4.5	Saw Cut	0.02	SCH80
2	180	270	Blank	PVC	OD: 4.500 in. | Thickness: 0.337 in.	0.337	4.5	Saw Cut	0.02	SCH80

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
50	1015	Filter Pack	Other Gravel Pack	#3	MONTEREY
0	20	Cement	Portland Cement/Neat Cement		
20	50	Bentonite	Non Hydrated Bentonite		

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	1015	10

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: GREGG DRILLING LLC, Randy Dockery
Person, Firm or Corporation

2726 WALNUT AVENUE (Address) | SIGNAL HILL (City) | CA (State) | 90755 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 11/24/2020 (Date Signed) | 1044456 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

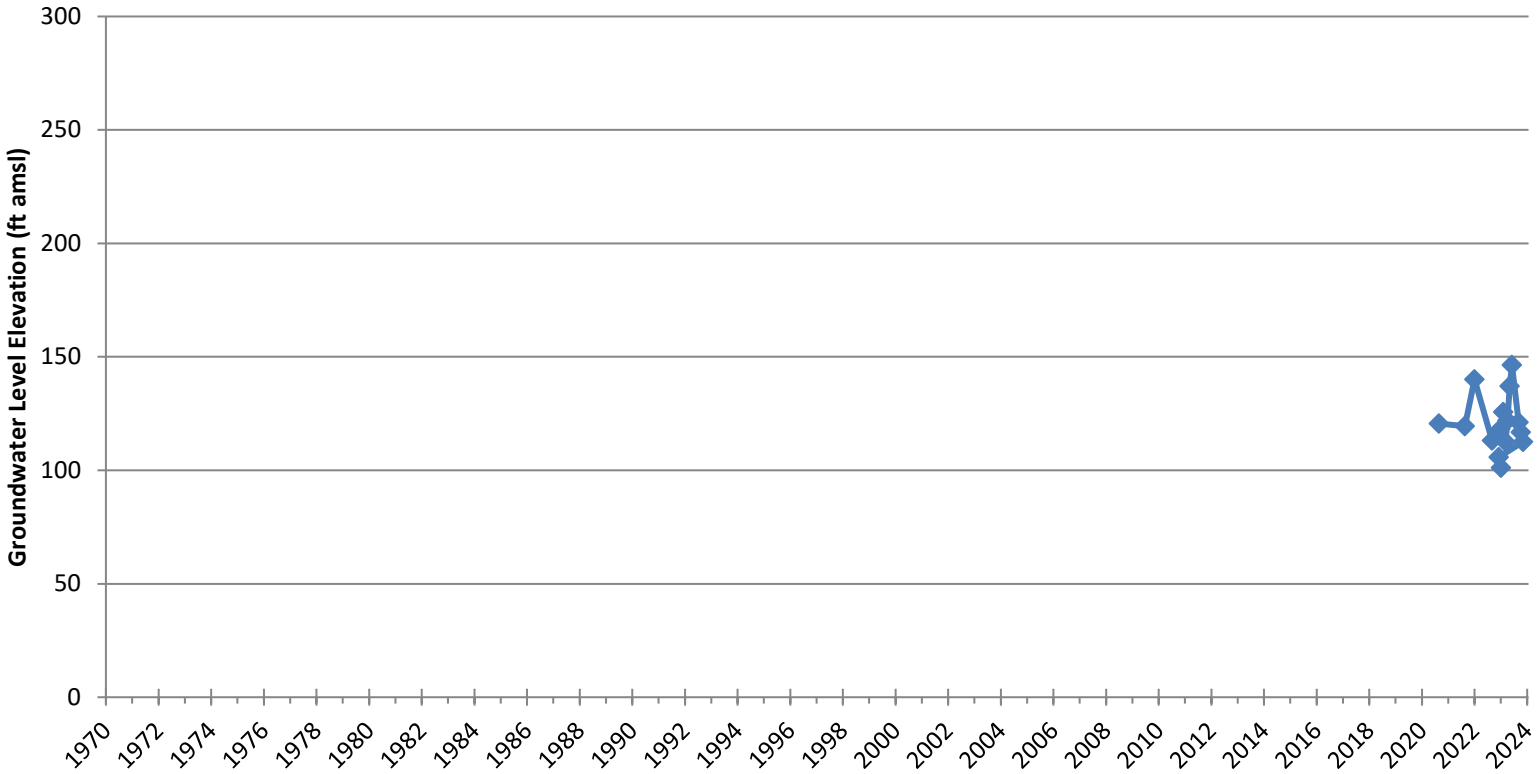
Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

APN:

Groundwater Hydrographs - Upper

TSMW-5U



State of California

Well Completion Report

Form DWR 188 Submitted 1/7/2021
WCR2021-000187

Owner's Well Number: TSMW-5U | Date Work Began: 03/03/2020 | Date Work Ended: 06/20/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 2000067 | Permit Date: 02/19/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: ANGIOLA WATER DISTRICT,

Mailing Address: 944 WHITLEY AVE A

City: CORCORAN | State: CA | Zip: 93212

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 35 Deg. 50 Min. 4.1999 Sec. N | Longitude: -119 Deg. 30 Min. 3.24 Sec. W

Dec. Lat.: 35.8345 | Dec. Long.: -119.5009

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 330-070-053

Township:

Range:

Section:

Baseline Meridian:

Ground Surface Elevation:

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Reverse Circulation | Drilling Fluid: Water

Total Depth of Boring: 310 Feet

Total Depth of Completed Well: 285 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: 72.5 (Feet) | Date Measured: 05/13/2020

Estimated Yield*: 50 (GPM) | Test Type: Pump

Test Length: 16.5 (Hours) | Total Drawdown: 8.33 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	20	LEAN CLAY
20	30	SILT
30	40	POORLY GRADED SAND
40	50	SANDY LEAN CLAY
50	80	LEAN CLAY
80	100	POORLY GRADED SAND
100	120	SILT
120	150	LEAN CLAY
150	160	LEAN CLAY WITH SAND
160	180	LEAN CLAY
180	220	POORLY GRADED SAND
220	240	LEAN CLAY
240	250	LEAN CLAY WITH SAND
250	260	POORLY GRADED SAND
260	270	CLAYEY SAND

270	310	LEAN CLAY

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	30	Conductor or Fill Pipe	Low Carbon Steel	Grade: ASTM A53	0.375	20			
2	0	110	Blank	Low Carbon Steel	Grade: ASTM A53	0.375	5			casing has 2' stick up above ground
2	110	130	Blank	Low Carbon Steel	Grade: ASTM A53	0.375	5			compression section
2	130	170	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			SCH 80 PVC
2	170	280	Screen	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563	Milled Slots	0.02	SCH 80 PVC
2	280	285	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			blank casing with end cap

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	30	Cement	Portland Cement/Neat Cement		11 sack cement
0	95	Cement	Portland Cement/Neat Cement		11 sack cement
95	100	Other Fill	See description.		Fine #60 sand
100	310	Filter Pack	Other Gravel Pack	#3	Monterey #3

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	30	36
30	310	15

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: NOR - CAL PUMP & WELL DRILLING INC
Person, Firm or Corporation

1325 BARRY ROAD (Address) | YUBA CITY (City) | CA (State) | 95993 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 01/07/2021 (Date Signed) | 908591 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

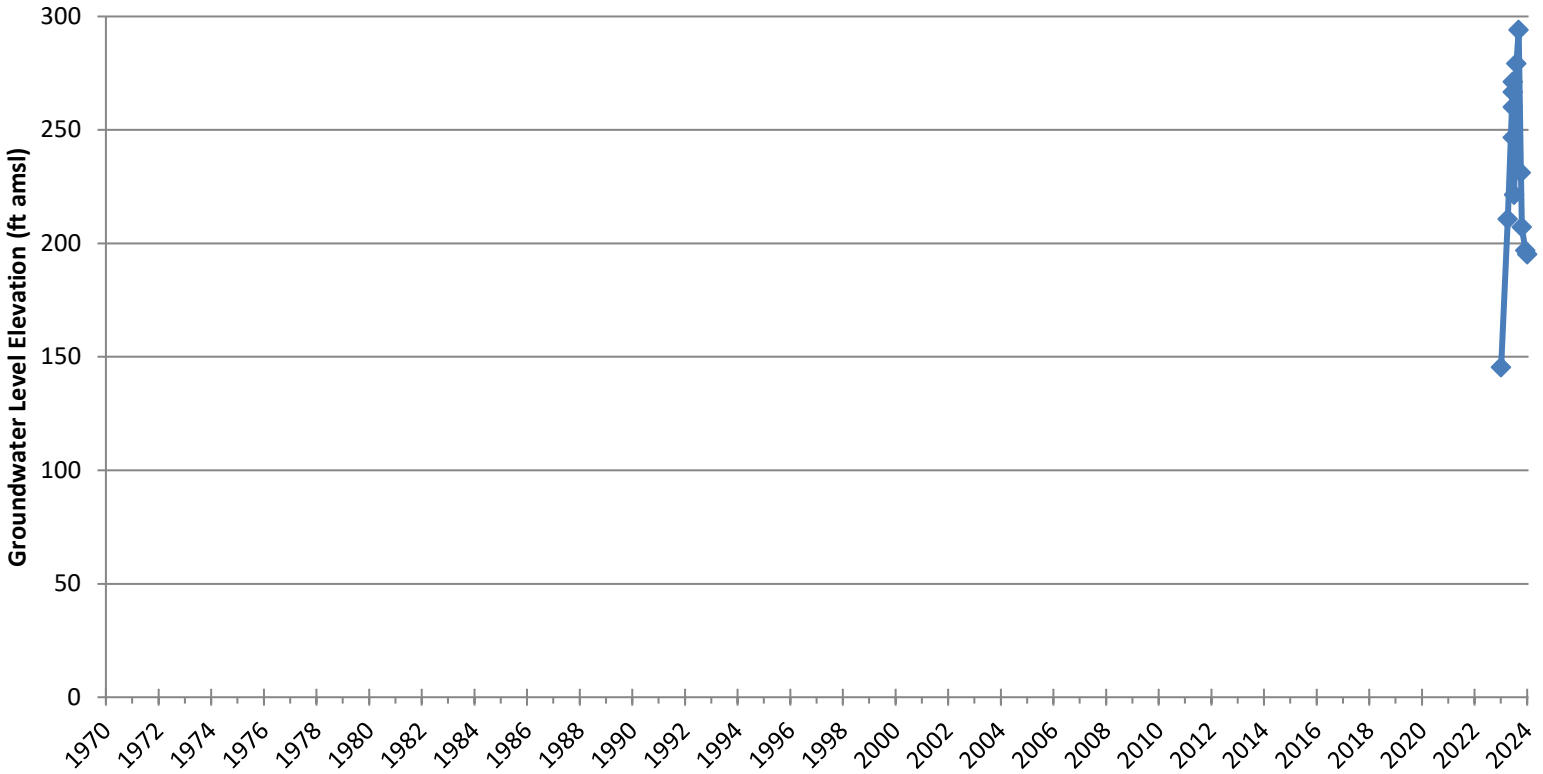
Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

APN:

Groundwater Hydrographs - Upper

TSMW-4S



State of California

Well Completion Report

Form DWR 188 Submitted 6/16/2023

WCR2023-006848

Owner's Well Number: TSMW-4 | Date Work Began: | Date Work Ended: 02/18/2023

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: WELL2200811 | Permit Date: 11/07/2022

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: LOWER TULE IRRIGATION DISTRICT,

Mailing Address: 357 E Olive Ave

City: Tipton | State: CA | Zip: 93272

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address: 0 N/Ave 56 & W/Rd 192 - 73' N & 51

City: Terra Bella | Zip: 93270 | County: Tulare

Latitude: 35 Deg. 57 Min. 50.4 Sec. N | Longitude: -119 Deg. 8 Min. 43.08 Sec. W

Dec. Lat.: 35.964 | Dec. Long.: -119.1453

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 319-020-012

Township: 23 S

Range: 26 E

Section: 03

Baseline Meridian: Mount Diablo

Ground Surface Elevation: 368

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Reverse Circulation | Drilling Fluid: Water

Total Depth of Boring: 1420 Feet

Total Depth of Completed Well: 1360 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: 294 (Feet) | Date Measured:

Estimated Yield*: (GPM) | Test Type:

Test Length: (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

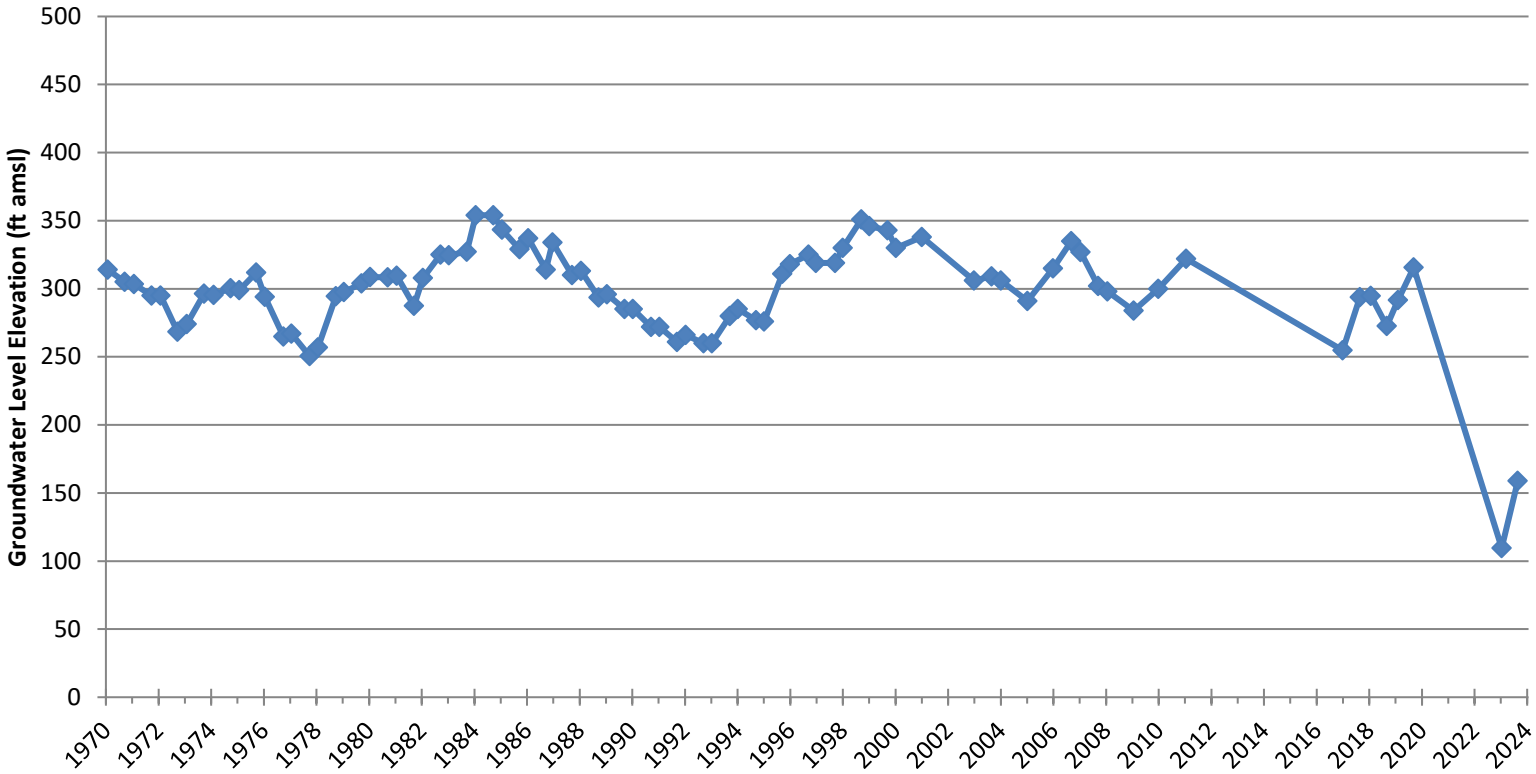
Depth from Surface Feet to Feet		Description
0	10	CLAYEY SAND: Fine-grained sand, medium-grained sand, subrounded, 15 percent clay. Quartz, feldspar, and mica.
10	30	CLAYEY SAND: Fine-grained sand, subrounded, 15 percent clay. Quartz, feldspar, and mica.
30	40	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, some fine-grained sand, rounded to subangular, 15 to 20 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
40	60	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, rounded to subangular, 5 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
60	70	CLAYEY SAND: Fine-grained sand, some medium-grained sand, rounded, 15 to 20 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
70	80	CLAYEY SAND: Fine-grained sand, some medium-grained sand, rounded, 20 to 25 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
80	90	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, some fine-grained sand, rounded to subangular, 15 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
90	100	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, fine gravel up to 15 mm, rounded to subrounded, 10 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
100	110	POORLY GRADED SAND WITH GRAVEL: Coarse-grained sand, with medium-grained sand, some fine-grained sand, rounded to subangular, less than 5 percent clay, gravel up to 27 mm. Quartz, mica, feldspar, biotite, and plagioclase.

110	120	POORLY GRADED SAND WITH GRAVEL: Coarse-grained sand, with medium-grained sand, some gravel up to 5 mm, subrounded to subangular, 5 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
120	130	CLAYEY SAND WITH GRAVEL: Coarse-grained sand, with medium-grained sand, some fine-grained sand, some gravel up to 15 mm, subrounded to angular, 15 percent clay. Quartz, plagioclase, biotite, and feldspar.
130	140	POORLY GRADED SAND WITH CLAY: Coarse-grained sand, with medium-grained sand, fine-grained sand, trace gravel up to 18 mm, rounded to subangular, 10 percent clay. Quartz, plagioclase, feldspar, and biotite.
140	150	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, trace gravel up to 19 mm, less than 5 percent clay, subangular. Quartz, plagioclase, feldspar, and biotite.
150	160	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, some fine-grained sand, 25 to 30 percent clay, rounded to subangular. Feldspar, biotite, and plagioclase.
160	170	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 45 to 50 percent clay, round to subangular. Plagioclase, quartz, and feldspar.
170	180	CLAYEY SAND: Coarse-grained sand, with fine-grained sand, medium-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, quartz, and feldspar.
180	190	CLAYEY SAND: Coarse-grained sand, with fine-grained sand, medium-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, quartz, and feldspar.
190	200	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, some fine-grained sand, rounded to subangular, 40 to 45 percent clay. Feldspars.
200	210	POORLY GRADED SAND WITH CLAY: Coarse-grained sand, with medium-grained sand, trace gravel up to 19 mm, subrounded to subangular, 10 percent clay. Quartz, feldspar, biotite, mica, and plagioclase.
210	220	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, some fine-grained sand, 15 percent clay, rounded to subangular. Quartz, feldspar, plagioclase, and biotite.
220	230	POORLY GRADED SAND WITH CLAY: Coarse-grained sand, with medium-grained sand, some fine-grained, trace gravel up to 13 mm, subrounded to subangular, 10 to 15 percent clay. Quartz, feldspar, biotite, and plagioclase.
230	240	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, less than 5 percent clay, rounded to subangular. Quartz, plagioclase, feldspar, biotite, and mica.
240	250	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, 10 to 15 percent clay, trace gravel up to 14 mm. Quartz, feldspar, plagioclase, biotite, and mica.
250	260	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, 20 to 25 percent clay, rounded. Plagioclase, quartz, feldspar, biotite, and mica.
260	270	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, 15 to 20 percent clay, rounded to subangular. Plagioclase, quartz, feldspar, and biotite.
270	280	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 20 to 25 percent clay, rounded to subangular. Plagioclase, and feldspar.
280	290	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, feldspar, and quartz.
290	300	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 20 to 25 percent clay, rounded to subangular. Plagioclase, feldspar, and quartz.
300	310	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 35 to 40 percent clay, rounded to subangular. Plagioclase, feldspar, and quartz.
310	320	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 35 to 40 percent clay, trace gravel up to 21 mm, rounded to subangular. Plagioclase, feldspar, quartz, and biotite.
320	340	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, with fine-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, quartz, feldspar, and biotite.
340	350	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, trace gravel up to 21 mm, 45 to 50 percent clay, subangular. Quartz, plagioclase, biotite, hornblende, and feldspar.
350	360	CLAY SAND: Medium-grained sand, some coarse-grained sand, subangular, 40 to 45 percent clay. Feldspar, quartz, plagioclase, and biotite.
360	370	CLAY WITH SAND: 55 to 60 percent clay, 35 to 40 percent medium-grained sand, trace coarse-grained sand. CLAY: Medium plasticity, slow dilatancy, medium dry strength.
370	380	CLAY WITH SAND: 55 to 60 percent clay, 35 to 40 percent fine-grained sand, with medium-grained sand. CLAY: Medium plasticity, slow dilatancy, medium dry strength.
380	390	CLAYEY SAND: Medium-grained sand, with fine-grained sand, coarse-grained sand, rounded to subangular, 45 to 50 percent clay. Quartz, plagioclase, feldspar, and biotite.
390	400	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, rounded to subangular, 40 to 45 percent clay. Quartz, plagioclase, feldspar, and biotite.
400	410	CLAY WITH SAND: 70 to 75 percent clay, 25 to 30 percent fine-grained sand, some medium-grained sand. CLAY: High plasticity, slow dilatancy, high dry strength.

410	430	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, rounded to subangular, 40 to 45 percent clay. Quartz, plagioclase, feldspar, and biotite.
430	440	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, rounded to subangular, 35 to 40 percent clay. Quartz, plagioclase, feldspar, and biotite.
440	450	CLAY WITH SAND: 75 percent clay, 25 percent fine-grained sand. CLAY: High plasticity, slow dilatancy, high dry strength.
450	460	CLAYEY SAND: Fine-grained sand, with medium-grained sand, rounded to subrounded, 45 to 50 percent clay. Quartz, plagioclase, feldspar, and biotite.
460	470	CLAY WITH SAND: 70 percent clay, 30 percent fine-grained sand, trace medium-grained sand. CLAY: high Plasticity, slow dilatancy, medium dry strength.
470	480	CLAYEY SAND: medium-grained sand, with fine-grained sand, some coarse-grained sand, rounded to subangular, 40 to 45 percent clay. Quartz, plagioclase, feldspar, and biotite.
480	490	CLAY SAND: Coarse-grained sand, with medium-grained sand, subrounded to angular, 25 to 30 percent clay. Quartz, plagioclase, feldspar, biotite, mica, and hornblende.
490	500	CLAYEY SAND: Coarse-grained sand with medium-grained sand, subrounded to subangular, 35 to 40 percent clay. Quartz, plagioclase, feldspar, and biotite.
500	510	CLAYEY SAND: Fine-grained sand with medium-grained sand, rounded to subangular, 45 to 50 percent clay. Quartz, plagioclase, feldspar, and biotite.
510	570	LEAN CLAY: 80 percent clay, 20 percent fine- to- medium-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
570	590	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand, with medium-grained sand. CLAY: Plasticity medium, dry strength, medium, dilatancy none.
590	600	LEAN CLAY: 80 percent clay, 20 percent fine- to medium-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
600	610	CLAYEY SAND: Fine- grained sand, with medium-grained sand, subrounded, 40 percent clay. Quartz, feldspar, and mafic.
610	620	CLAYEY SAND: Fine- grained sand, with medium-grained sand, subrounded, 45 percent clay. Quartz, feldspar, and mafic.
620	660	LEAN CLAY WITH SAND: 60 percent clay, 40 percent fine-grained sand, with medium-grained sand. CLAY: Plasticity low, dry strength low, dilatancy none.
660	670	CLAYEY SAND: Fine-grained sand, with medium-grained sand, subangular to subrounded, 40 percent clay. Quartz, feldspar, mica, and mafics.
670	690	LEAN CLAY: 80 percent clay, 20 percent fine- to medium-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
690	700	CLAYEY SAND: Fine-grained sand, trace medium-grained sand, subangular, 40 percent clay. Quartz, feldspar, mica, and mafics.
700	710	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
710	740	LEAN CLAY: 85 percent clay, 15 percent fine-graded sand. CLAY: Plasticity high, dry strength high, dilatancy none.
740	750	CLAYEY SAND: Fine-grained sand, with medium-grained sand, angular, 40 percent clay. Quartz, feldspar, mica, and mafics.
750	760	CLAYEY SAND: Fine-grained sand, with medium-grained sand, angular, 40 percent clay. Quartz, feldspar, and mafics.
760	770	CLAYEY SAND: Medium-grained sand, with fine-grained sand, trace coarse-grained sand, angular, 15 percent clay. Quartz, feldspar, mica, and mafics.
770	780	CLAYEY SAND: Medium-grained sand, with fine-grained sand, some coarse-grained sand, angular, 20 percent clay. Quartz, feldspar, mica, and mafics.
780	790	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
790	800	CLAYEY SAND: Medium-grained sand, with fine-grained sand, some coarse-grained sand, angular, 30 percent clay. Quartz, feldspar, mica, and mafics.
800	810	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
810	820	LEAN CLAY: 85 percent clay, 15 percent fine sand. CLAY: Plasticity high, dry strength high, dilatancy none.
820	830	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
830	840	LEAN CLAY: 85 percent clay, 15 percent fine sand. CLAY: Plasticity high, dry strength high, dilatancy none.
840	880	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
880	900	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none. Clay as balls.
900	910	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.

Groundwater Hydrographs - Upper

22S/26E-25J001M



910	920	LEAN CLAY: 75 percent clay, 25 percent fine to medium-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
920	930	LEAN CLAY: 60 percent clay, 40 percent medium- to fine-grained sand. CLAY: Plasticity low, dry strength low, dilatancy none.
930	940	LEAN CLAY: 80 percent clay, 20 percent fine sand. CLAY: Plasticity high, dry strength, high, dilatancy none. Clay as balls.
940	960	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
960	980	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
980	990	LEAN CLAY: 85 percent clay, 15 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
990	1000	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
1000	1020	LEAN CLAY: 85 percent clay, 15 percent fine sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1020	1040	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1040	1050	LEAN CLAY: 85 percent clay, 15 percent fine- to medium- grained sand. CLAY: Plasticity medium, dry strength high, dilatancy none.
1050	1070	SANDY LEAN CLAY: 55 percent clay, 45 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
1070	1080	CLAYEY SAND: Fine- grained sand, some medium-grained sand, 45 percent clay, subangular, quartz, feldspar, mica, and mafics.
1080	1090	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1090	1100	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1100	1140	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
1140	1150	LEAN CLAY: 60 percent clay, 40 percent fine- to medium- grained sand. Clay: Plasticity medium, dry strength medium, dilatancy none.
1150	1160	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1160	1180	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1180	1230	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1230	1240	LEAN CLAY: 70 percent clay, 30 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1240	1260	SANDY LEAN CLAY: 60 percent clay, 40 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1260	1270	LEAN CLAY: 70 percent clay, 30 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1270	1310	LEAN CLAY: 75 percent clay, 25 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1310	1320	LEAN CLAY: 85 percent clay, 15 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1320	1340	LEAN CLAY: 90 percent clay, 10 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1340	1350	LEAN CLAY: 85 percent clay, 15 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1350	1360	LEAN CLAY: 90 percent clay, 10 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1360	1370	LEAN CLAY: 75 percent clay, 25 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1370	1400	LEAN CLAY: 85 percent clay, 15 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1400	1420	LEAN CLAY: 90 percent clay, 10 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	35	Conductor or Fill Pipe	Mild Steel	Grade: ASTM A53	0.375	20			Conductor
2	0	1050	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC
2	1050	1350	Screen	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5	Milled Slots	0.02	Sch 80 PVC
2	1350	1360	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC w/ End Cap
3	0	630	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC
3	630	870	Screen	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5	Milled Slots	0.02	Sch 80 PVC
3	870	875	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC w/ End Cap
4	0	190	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC
4	190	250	Screen	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5	Milled Slots	0.02	Sch 80 PVC
4	250	255	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC w/ End Cap

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	45	Bentonite	Other Bentonite		Bentonite Annular Seal
45	300	Filter Pack	Other Gravel Pack		Monterey #3
300	400	Bentonite	Other Bentonite		Bentonite Annular Seal
400	880	Filter Pack	Other Gravel Pack		Monterey #3
880	980	Bentonite	Other Bentonite		Bentonite Annular Seal
980	1420	Filter Pack	Other Gravel Pack		Monterey #3

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	35	30
35	1420	15

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: NOR - CAL PUMP & WELL DRILLING INC (Person, Firm or Corporation)

Address	City	State	Zip
1325 BARRY ROAD	YUBA CITY	CA	95993

Signed (C-57 Licensed Water Well Contractor)	Date Signed	C-57 License Number
electronic signature received	06/16/2023	908591

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

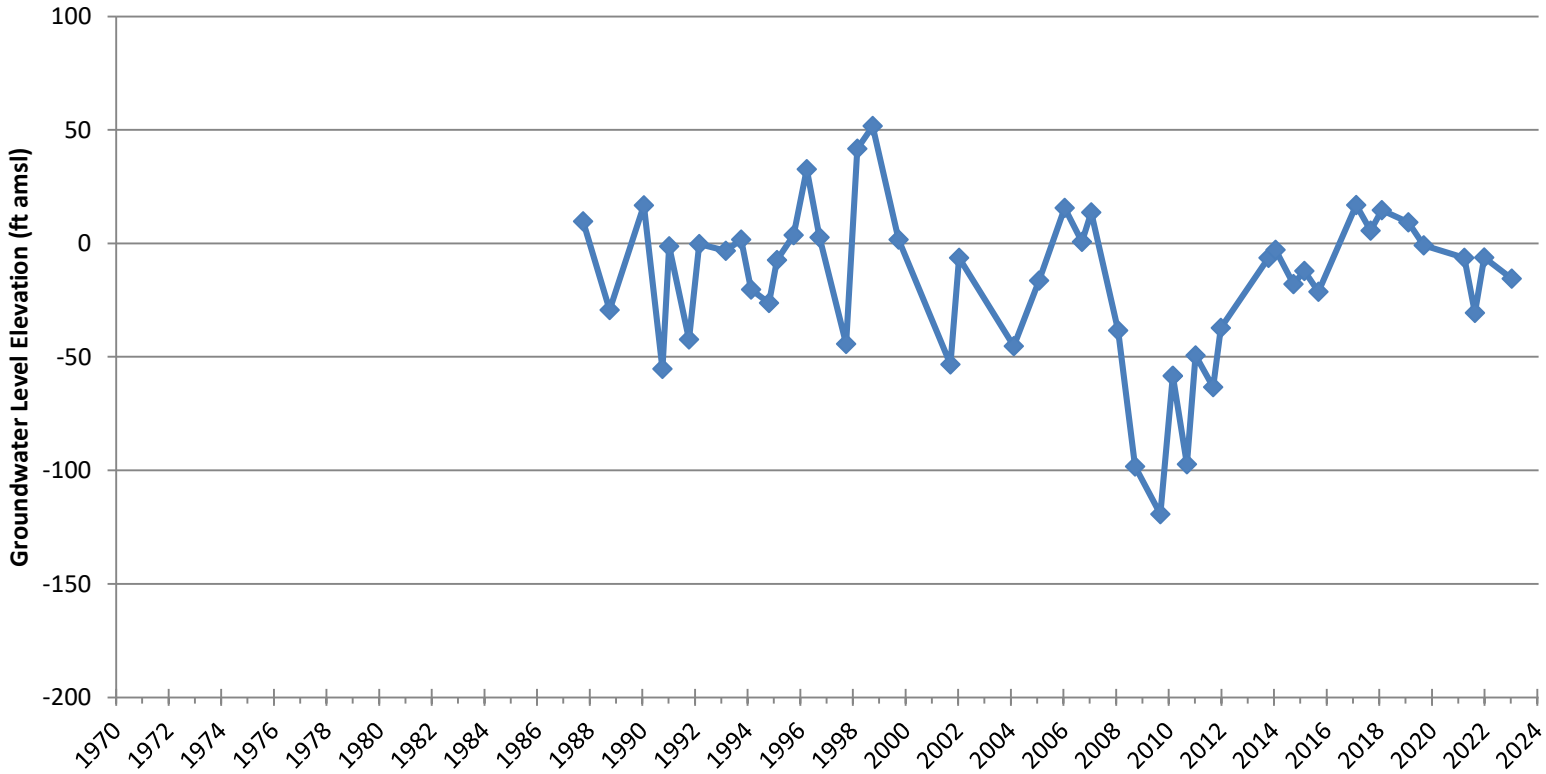
APN:

Appendix C

Driller's Logs and Hydrographs for Lower Aquifer Wells

Groundwater Hydrographs - Lower

23S/23E-25N01



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Page 2 of 2

WR

Intent No. 159673

Permit No. or Date

Do not fill in

No. 23698 Y2

State Well No. / 7

Other Well No. 23/23-25

(1) OWNER: Name Alpaugh Irrigation District

Address

City Zip

(2) LOCATION OF WELL (See instructions):

County Owner's Well Number

Well address if different from above

Township Range Section

Distance from cities, roads, railroads, fences, etc.

(3) TYPE OF WORK:

New Well ☐ Deepening ☐

Reconstruction ☐

Reconditioning ☐

Horizontal Well ☐

Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☐

Irrigation ☐

Industrial ☐

Test Well ☐

Stock ☐

Municipal ☐

Other ☐

WELL LOCATION SKETCH

(5) EQUIPMENT:

Rotary ☐ Reverse ☐

Cable ☐ Air ☐

Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☐ No ☐ Size

Diameter of bore

Packed from to ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.

Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.

Method of sealing

(10) WATER LEVELS:

Depth of first water, if known ft.

Standing level after well completion ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☐ If yes, by whom?

Type of test Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ft. At end of test ft.

Discharge gal/min after hours Water temperature

Chemical analysis made? Yes ☐ No ☐ If yes, by whom?

Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
880	890	Sandy blue clay
890	900	60% sand 40% blue clay
900	910	Hard blue clay
910	920	80% blue clay 20% sand
920	960	80% sand 20% blue clay
960	970	Blue clay-little sand
970	1000	Soft blue clay
1000	1010	90% sand 10% clay
1010	1020	90% clay 10% sand
1020	1070	95% clay 5% sand
1070	1090	Corey clay
1090	1110	Sand, some clay
1110	1120	Grey clay
1120	1130	70% sand 30% blue clay
1130	1140	100% sand
1140	1160	80% sand 20% blue clay
1160	1180	100% blue clay
1180	1200	100% fine sand
1200	1210	100% blue clay @ 1205
1210	1240	90% sand 10% clay
1240	1250	90% fine sand 10% clay
1250	1270	Blue clay
1270	1280	Soft blue clay
1280	1310	Sticky blue clay
1310	1330	Sticky grey clay
1330	1350	Sticky blue clay
1350	1360	Hard grey clay
1360	1380	Grey clay
1380	1390	Soft blue clay
1390	1400	100% sand
1400	1410	80% grey clay 20% sand
1410	1430	100% grey clay
1430	1440	100% sand
1440	1450	100% fine sand
1450	1460	90% sand 10% clay
1460	1470	Blue clay-little sand-fine sand @1
1470	1500	95% very fine sand 5% blue clay
1500	1550	Sticky blue clay

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME (Person, firm, or corporation) (Typed or printed)

Address

City Zip

License No. Date of this report

COPY NOT FOR PUBLIC DISTRIBUTION
WATER CONTROL

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in 2/2

No. 23697

State Well No. 23/23-25

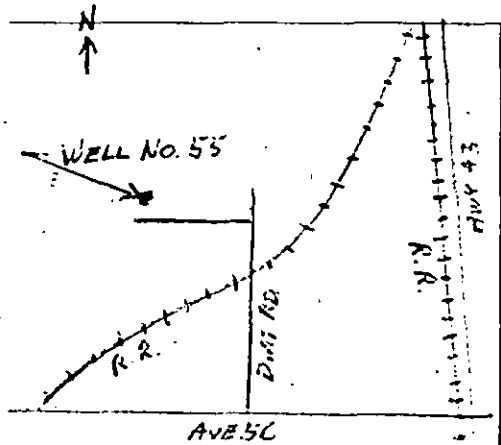
Other Well No. 55 AID

Notice of Intent No. 159673

Local Permit No. or Date 11-02-81

(1) OWNER: Name Alpaugh Irrigation District
Address 5458 Road 38
City Alpaugh, California Zip 93301

(2) LOCATION OF WELL (See instructions):
County Tulare Owner's Well Number 55
Well address if different from above Alpaugh I.D. well field
Township 23S Range ~~24E~~ 23E Section ~~30~~ 25H
Distance from cities, roads, railroads, fences, etc.
1 mi. east of the intersection of Hwy 43 &
Ave. 56 & ½ mi. north of Ave. 56



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: Yes ☒ No ☐ Size Coalinga Birdseye
Diameter of bore 28"
Packed from 580 to 1550 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	680	16	¼			
702	1504	12	5/16	702	1504	3/32

(8) PERFORATIONS:
Type of perforation or size of screen

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 30 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 580 ft.
Method of sealing Neat cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 220 Appx. ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Layne-Western
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test 198 ft. At end of test 209 ft.
Discharge 1600 gal/min after 6 hours Water temperature 80°F.
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1550 ft. Depth of completed well 1504 ft.

From ft.	to ft.	Formation (Describe by color, character, size or material)
30	50	Soft brn, sandy clay
50	60	Fine sand
60	80	Soft brn. clay
80	100	Brn. sticky clay
100	110	Sticky blue clay
110	120	Brn. clay
120	130	95% blue clay 5% brn. clay
130	140	100% blue clay
140	150	100% gray clay
150	160	Brown clay
160	180	Gray clay
180	200	Soft blue clay
200	210	Gray clay
210	220	Brown clay
220	230	95% gray 5% brown clay
230	240	50% gray 50% brown clay
240	290	100% clay brown & gray
290	300	100% sand
300	380	100% clay blue & gray
380	390	Blue clay
390	410	Brown clay
410	460	Blue clay
460	500	Brown clay
500	510	Grey clay
510	530	Blue clay
530	540	Corey clay
540	550	60% blue 40% brown clay
550	560	Blue & gray clay
560	590	70% blue 30% brown clay
590	620	100% Blue & gray clay
620	640	100% blue shale
640	680	Blue clay
680	690	50% blue clay 50% sand & shale
690	740	100% blue clay
740	750	60% hard blue clay 40% sand
750	860	Blue clay
860	870	80% blue clay 20% sand
870	880	60% blue clay 40% sand

Work started 11-26 1981 Completed 12-3 1981

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

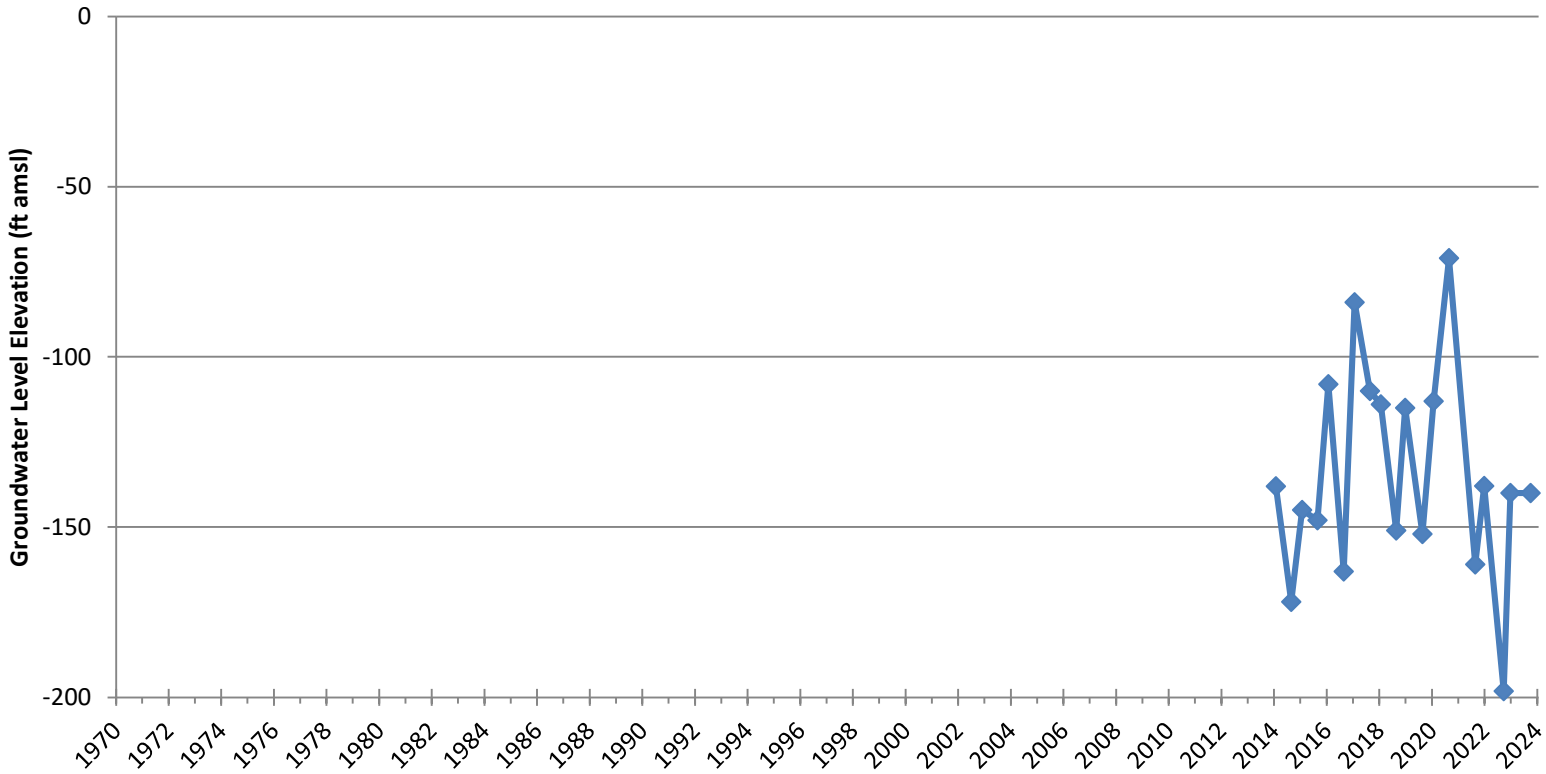
SIGNED [signature] (Well Driller)

NAME Layne-Western Company, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 1600 E. California
City Bakersfield, California Zip 93385
License No. 407409 Date of this report 12-18-81

UNOFFICIAL COPY
NOT FOR PUBLIC USE
WATER CODE 13752

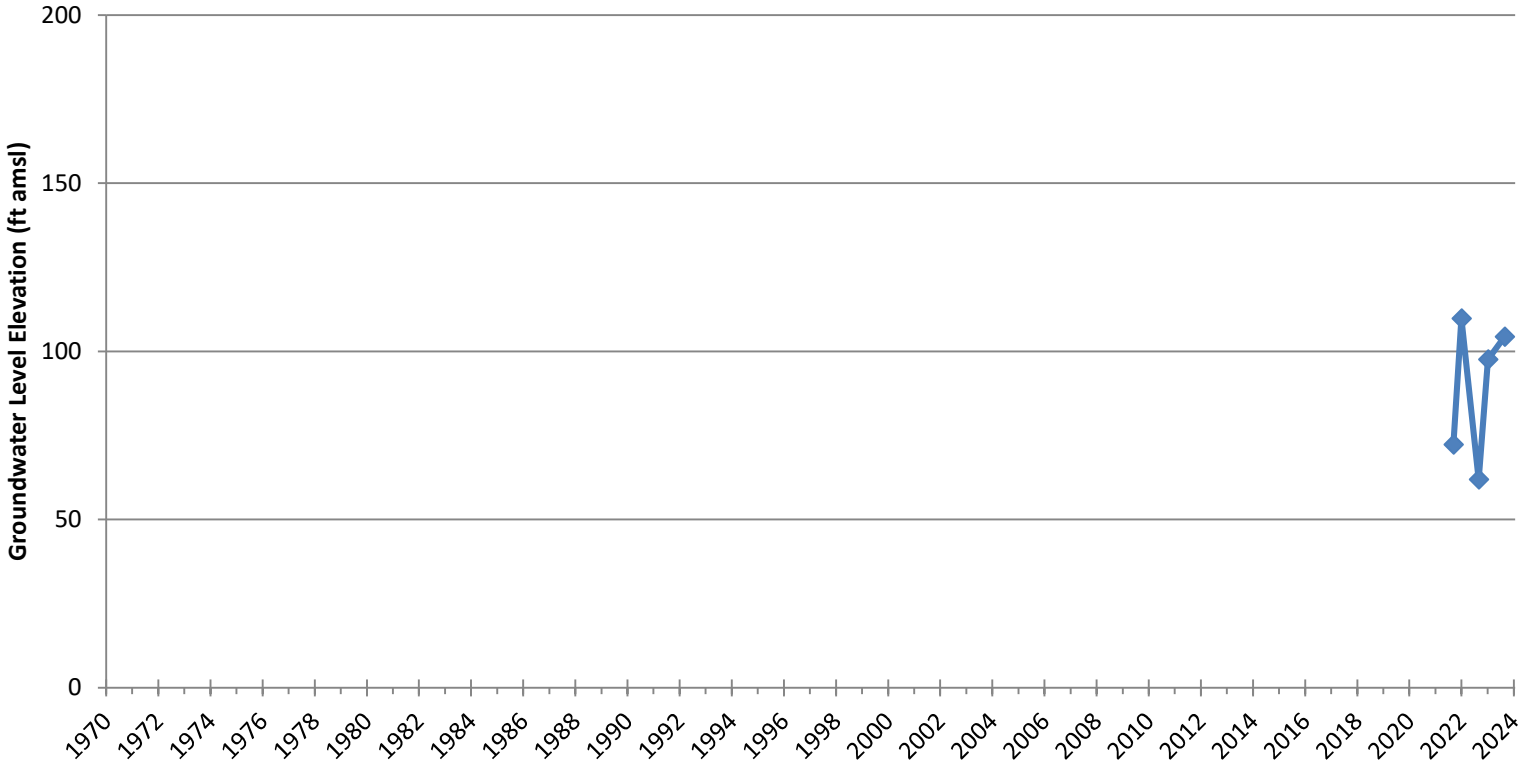
Groundwater Hydrographs - Lower

24S/23E-23



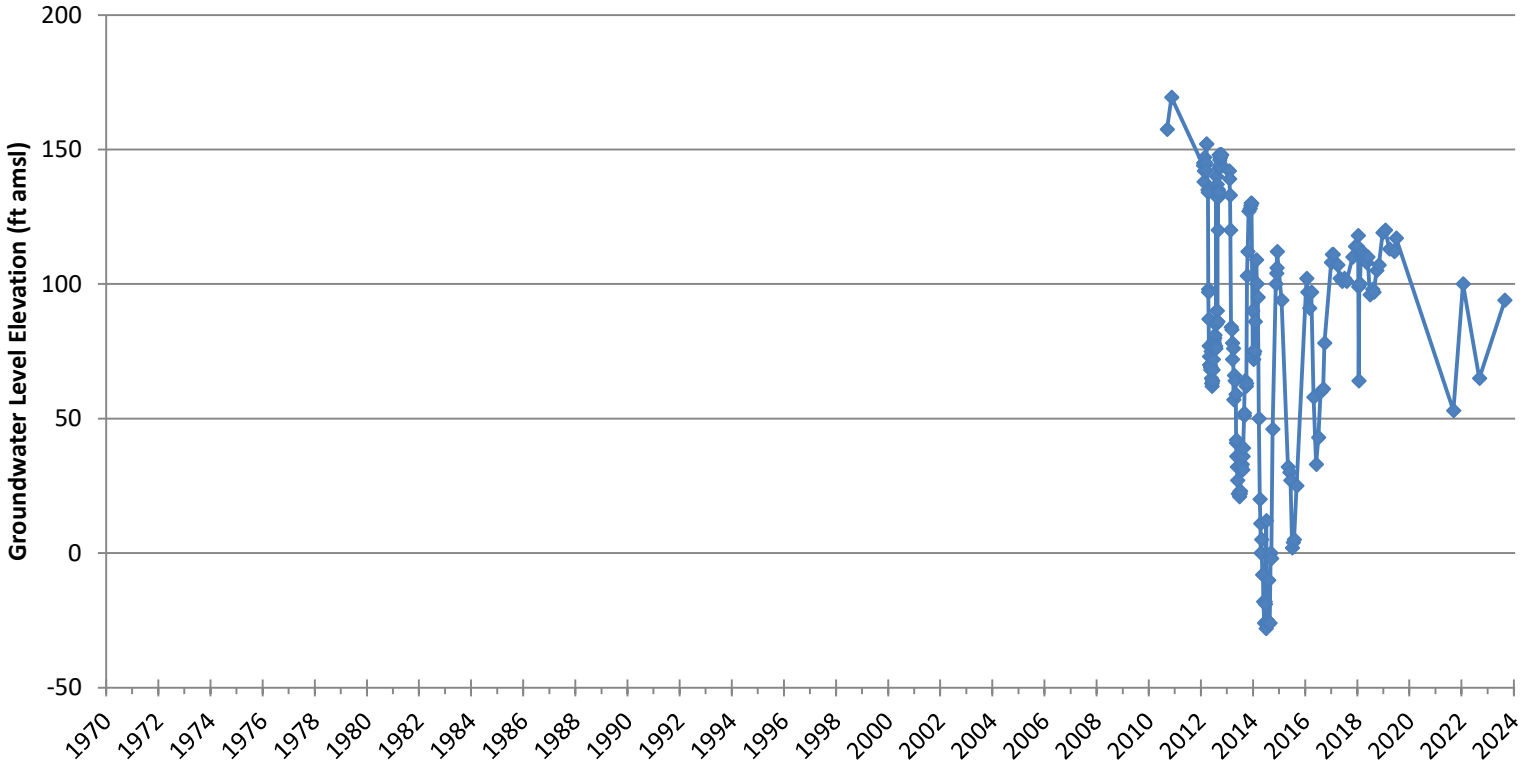
Groundwater Hydrographs - Lower

25S/26E-09C01



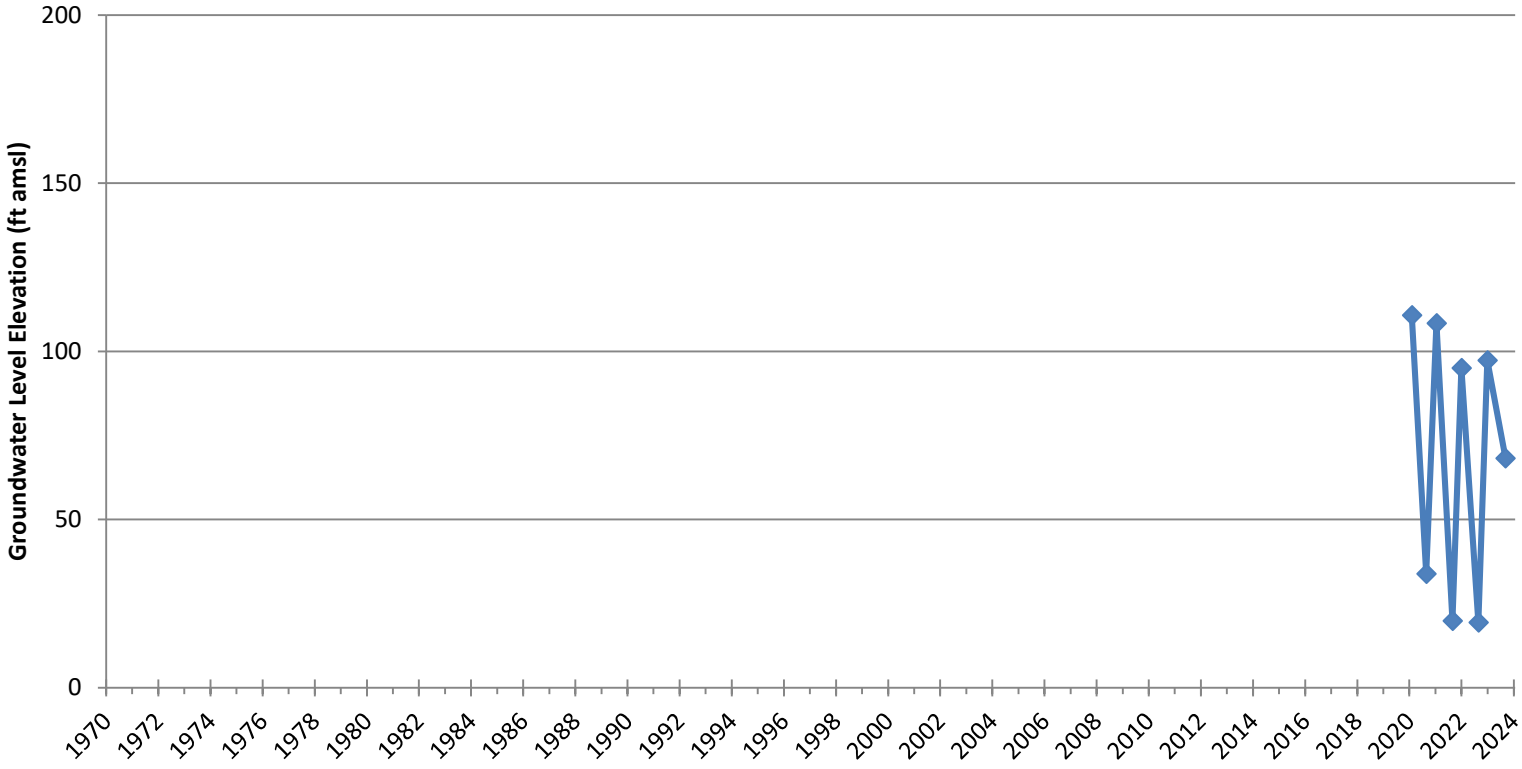
Groundwater Hydrographs - Lower

M-19L



Groundwater Hydrographs - Lower

22S/26E-24



*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0094537

Page 1 of 4

Owner's Well Number #2

Date Work Began 03/28/2009 Date Work Ended 5/20/2009

Local Permit Agency Tulare County Environmental Health Services

Permit Number 09-138 Permit Date 3/16/09

DWR Use Only – Do Not Fill In

225/26E-24

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Rotary Drilling Fluid Polybore

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
40	110	Sand Gravel
110	150	Sand
150	190	Sand Gravel Clay
190	240	Sand Clay
240	290	Sand
290	360	Sand Clay
360	400	Clay
400	1,120	Sand Clay
1120	1,270	Clay

Total Depth of Boring 1270 Feet

Total Depth of Completed Well 1240 Feet

Well Owner

Nan

Mail

City

Well Location

Address 1/4 Mile North of Ave 112 / 50' West of Rd. 208

City Pixley County Tulare

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

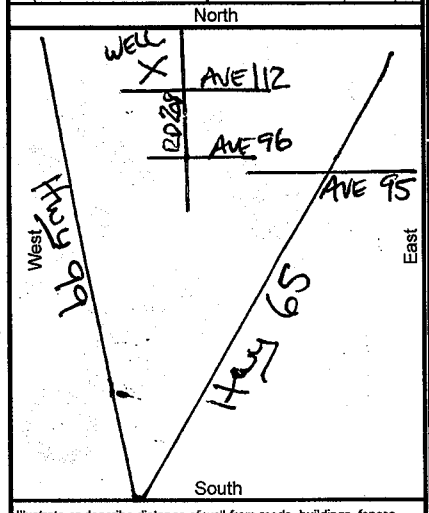
Datum Decimal Lat. Decimal Long.

APN Book 302 Page 280 Parcel 013

Township 22S Range 26E Section 24 S

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply

☐ Domestic ☐ Public

☑ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water 270 (Feet below surface)

Depth to Static Water Level 270 (Feet) Date Measured 05/06/2009

Estimated Yield * 2,600 (GPM) Test Type Constant Rate

Test Length 12.0 (Hours) Total Drawdown 190 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	40	42	Conductor	A53 Grade B	.375	30		
0	670	26	Blank	A53 Grade B	.312	16		
670	700	26	Ful Flo	Ful Flo A139	.312	16	Louver	0.080
700	800	26	Standard Flo	SF A139	.312	16	Louver	
800	820	26	Ful Flo	Ful flo A139	.312	16	Louver	0.080
820	840	26	Standard Flo	SF A139	.312	16	Louver	

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	40	Cement	Annular Seal
0	1,270	Filter Pack	4x16 SRI

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Bakersfield Well & Pump Co.

Person, Firm or Corporation

7212 Fruitvale Ave. Bakersfield CA 93308

Address City State Zip

Signed 7/13/2009 440537

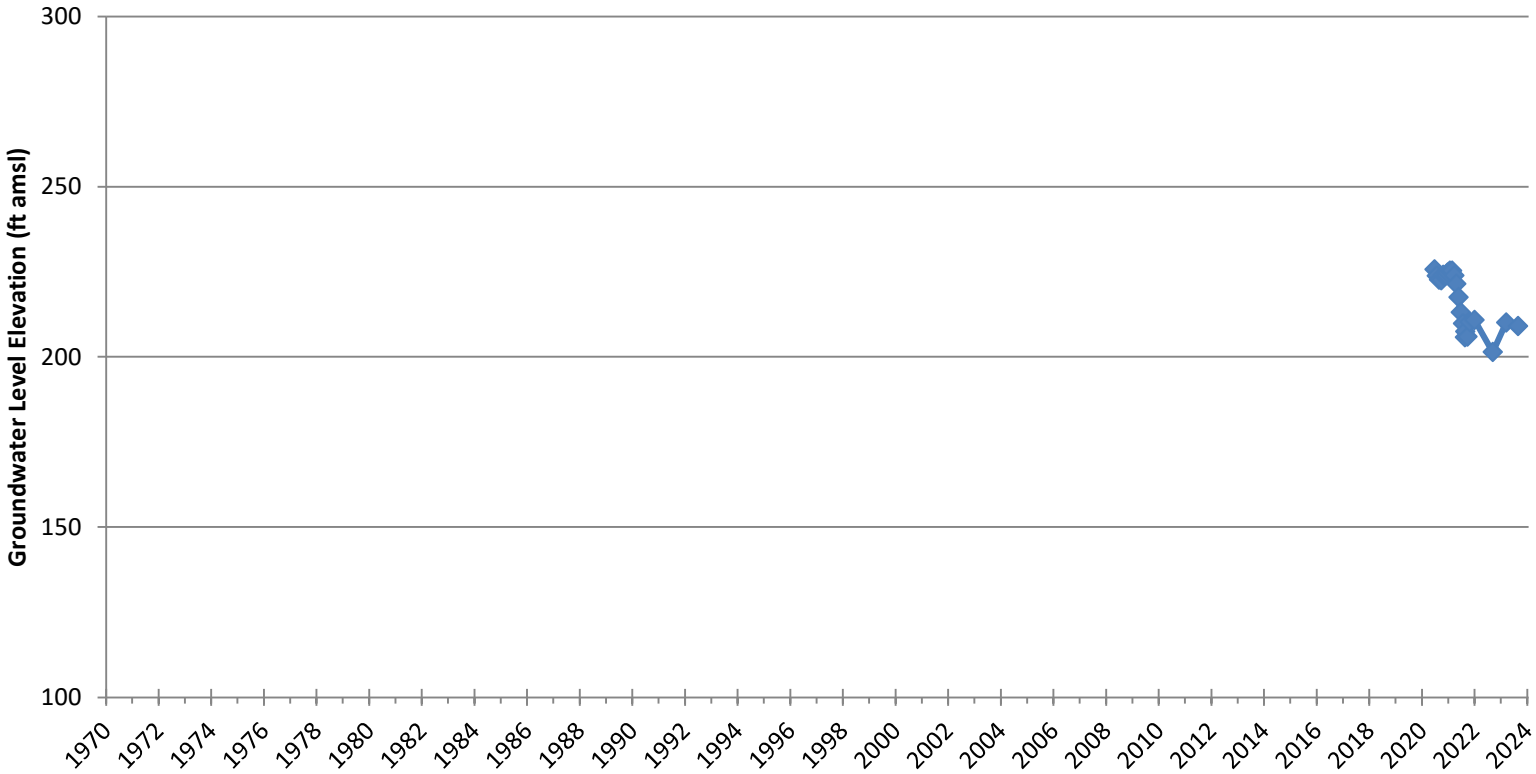
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Groundwater Hydrographs - Lower

TSMW-6L



State of California

Well Completion Report

Form DWR 188 Submitted 1/7/2021

WCR2021-000189

Owner's Well Number: TSMW-6L | Date Work Began: 03/05/2020 | Date Work Ended: 06/20/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 2000070 | Permit Date: 02/24/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: KERN-TULARE WATER DISTRICT,

Mailing Address: 881 W Morton Ave

City: Porterville | State: CA | Zip: 93257

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 35 Deg. 49 Min. 58.44 Sec. N | Longitude: -119 Deg. 4 Min. 32.8799 Sec. W

Dec. Lat.: 35.8329 | Dec. Long.: -119.0758

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 339-120-019

Township:

Range:

Section:

Baseline Meridian:

Ground Surface Elevation:

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Reverse Circulation | Drilling Fluid: Water

Total Depth of Boring: 610 Feet

Total Depth of Completed Well: 605 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: 297.83 (Feet) | Date Measured: 06/13/2020

Estimated Yield*: 14 (GPM) | Test Type: Pump

Test Length: 16 (Hours) | Total Drawdown: 23.5 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	10	POORLY GRADED SAND WITH SILT
10	20	POORLY GRADED SAND
20	30	POORLY GRADED SAND WITH SILT
30	100	POORLY GRADED SAND
100	110	LEAN CLAY WITH SAND
110	120	CLAYEY SAND
120	130	POORLY GRADED SAND
130	140	POORLY GRADED SAND WITH CLAY
140	150	LEAN CLAY WITH SAND
150	170	CLAYEY SAND
170	180	LEAN CLAY WITH SAND
180	190	POORLY GRADED SAND WITH CLAY
190	220	CLAYEY SAND
220	250	LEAN CLAY WITH SAND
250	260	CLAYEY SAND

260	270	LEAN CLAY WITH SAND
270	280	CLAYEY SAND
280	290	LEAN CLAY
290	330	LEAN CLAY WITH SAND
330	340	LEAN CLAY
340	350	LEAN CLAY WITH SAND
350	360	LEAN CLAY
360	370	CLAYEY SAND
370	380	LEAN CLAY WITH SAND
380	390	LEAN CLAY
390	420	LEAN CLAY WITH SAND
420	430	CLAYEY SAND
430	450	LEAN CLAY WITH SAND
450	460	CLAYEY SAND
460	510	LEAN CLAY WITH SAND
510	550	CLAYEY SAND
550	560	LEAN CLAY WITH SAND
560	580	CLAYEY SAND
580	610	LEAN CLAY

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	30	Conductor or Fill Pipe	Low Carbon Steel	Grade: ASTM A53	0.375	20			MILD STEEL CONDUCTOR CASING
2	0	350	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			SCH 80 PVC
2	350	600	Screen	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563	Milled Slots	0.02	SCH 80 PVC
2	600	605	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			BLANK CASING WITH END CAP

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	30	Cement	Portland Cement/Neat Cement		
0	295	Bentonite	Low Solids		
295	300	Other Fill	See description.	#60	FINE #60 SAND
300	610	Filter Pack	Other Gravel Pack	#3	Monterey #3

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	30	36
30	610	15

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: NOR - CAL PUMP & WELL DRILLING INC
Person, Firm or Corporation

Address	City	State	Zip
1325 BARRY ROAD	YUBA CITY	CA	95993

Signed: *electronic signature received*

C-57 Licensed Water Well Contractor	Date Signed	C-57 License Number
electronic signature received	01/07/2021	908591

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

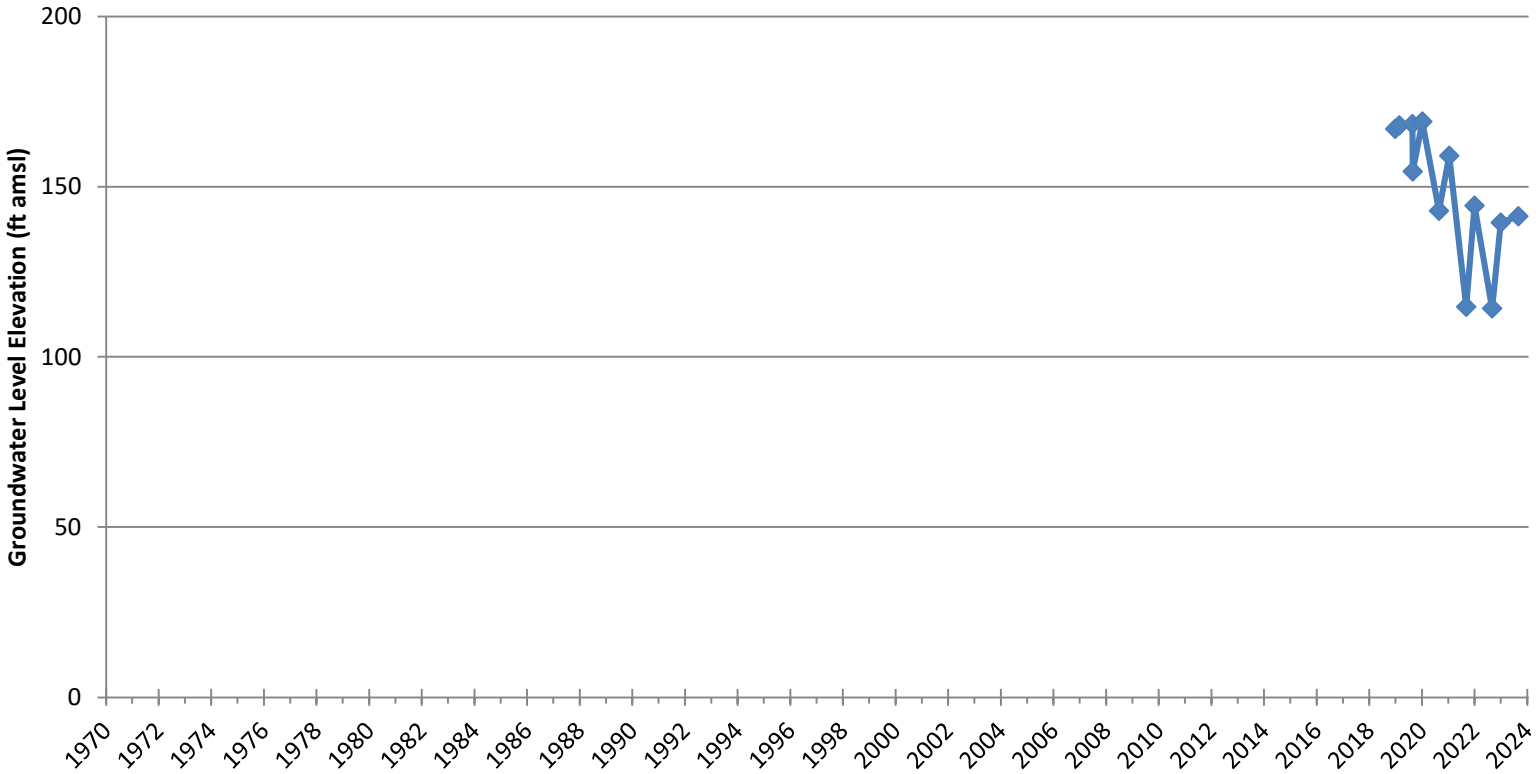
Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

APN:

Groundwater Hydrographs - Lower

20S/26E-32



DWR -

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0090245

Page _____ of _____

Owner's Well Number -

Date Work Began 5-27-09 Date Work Ended 5-28-09.

Local Permit Agency Tulare

Permit Number 09-0328 Permit Date 5-28-09.

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 20S / 26E - 32

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify _____

Drilling Method _____ Drilling Fluid _____

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	60	sand and clay
60	80	sand
80	100	sand and compress fine sand
100	120	fine sand rocks and sand
120	140	compress fine sand and sand
140	160	sand
160	180	clay
180	200	clay and sand
200	220	blue clay
220	260	sand
260	340	blue clay and gravel
340	380	blue clay and sand
380	400	blue clay gravel and sand
400	420	sand and gravel
420	440	gravel sand and blue clay
440	460	fine sand compess sand and sand
460	480	blue clay
480	580	compress fine sand
580	600	compress fine sand and gravel
600	660	sand and compress sand
660	680	sand and clay

Total Depth of Boring 680 Feet

Total Depth of Completed Well 680 Feet

Well Owner

Name Wm Vanderpol (Brad)

Mailing Address 15434 Ave 192

City Tulare State CA Zip 93274

Well Location

Address Ave 192

City _____ County Tulare

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

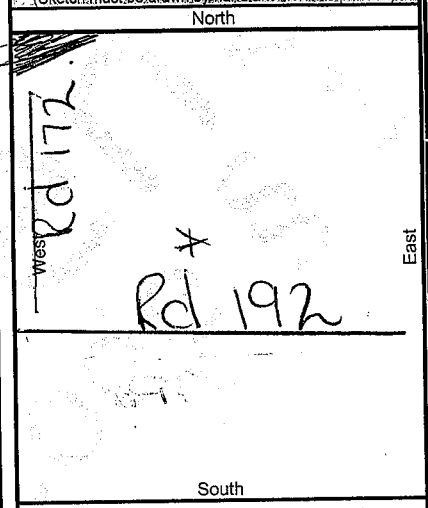
Datum _____ Decimal Lat. _____ Decimal Long. _____

APN Book 198 Page 030 Parcel 007.

Township _____ Range _____ Section _____

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other _____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other _____

Water Level and Yield of Completed Well

Depth to first water _____ (Feet below surface)

Depth to Static Water Level _____ (Feet) Date Measured _____

Estimated Yield * _____ (GPM) Test Type _____

Test Length _____ (Hours) Total Drawdown _____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	320	28	Blank	steel	1/4	15 1/2		
320	680	28	Screen	steel	1/4	15 1/2		0.080

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	
50	680	Fill	1/4

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other _____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Arthur & Orum Well DRilling Inc.
Person, Firm or Corporation

14870 S East Fresno CA 93725
Address City State Zip

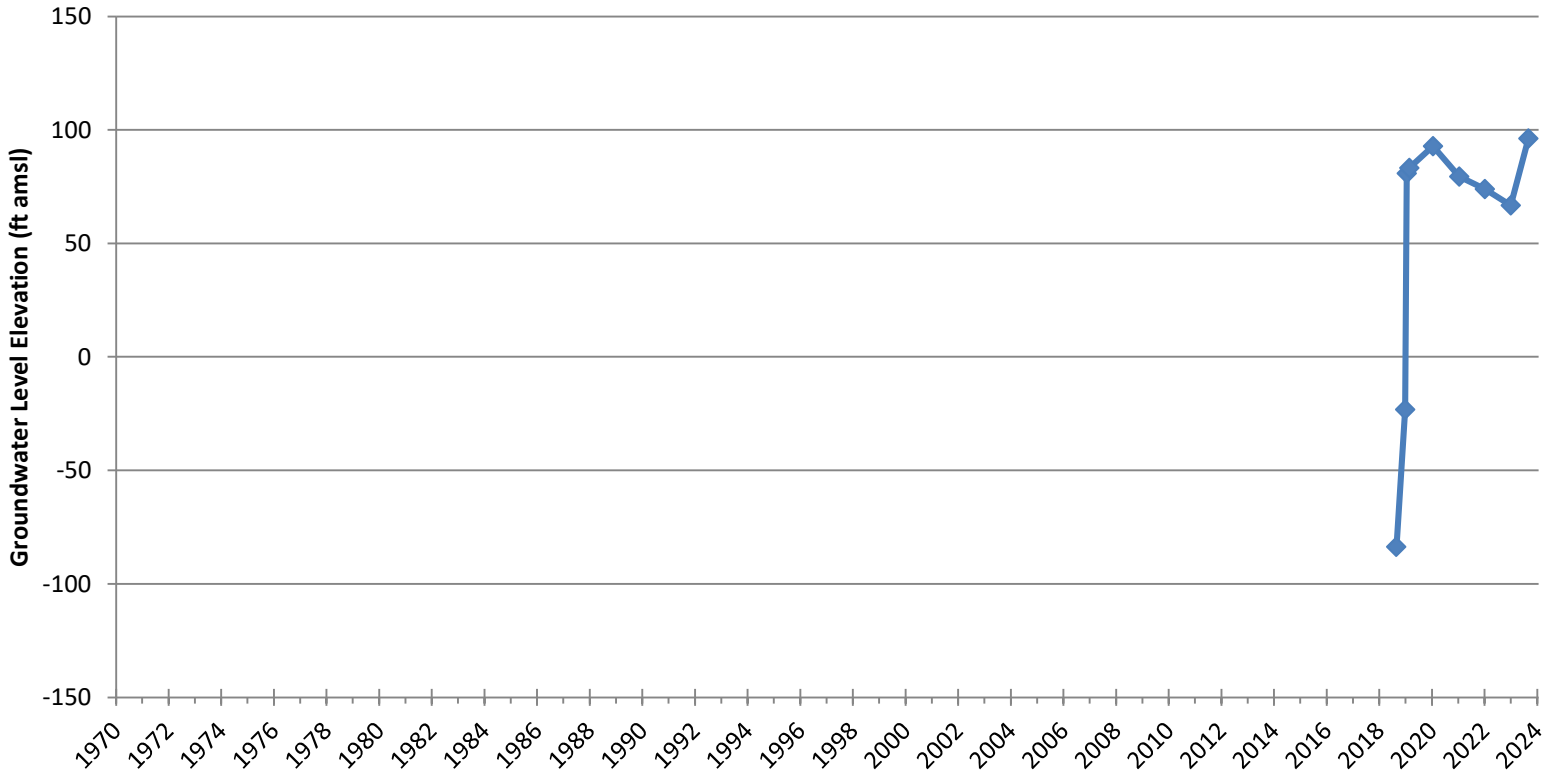
Signed [signature] 05/27/2009 361319
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Groundwater Hydrographs - Lower

21S/25E-36



ORIGINAL
File with DWR

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 003200

DWR USE ONLY — DO NOT FILL IN
21S/25E-36
STATE WELL NO./ STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

1/2

Owner's Well No. RD 152 DAIRY

Date Work Began 4/21/2003, Ended 4/22/2003

Local Permit Agency TULARE

Permit No. 76373 Permit Date 1/22/2003

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD REVERSE FLUID NATURAL

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	3	TOP SOIL
3	15	CLAY & HARD PAN
15	19	SAND
19	26	CLAY & HARD PAN
26	48	SAND & GRAVEL
48	61	CLAY
61	66	SAND & GRAVEL
66	78	HARD CLAY
78	86	SAND & GRAVEL
86	90	CLAY
90	106	SAND, GRAVEL & ROCKS
106	117	CLAY
117	120	SAND
120	136	CLAY
136	140	SAND
140	162	CLAY
162	178	SAND, GRAVEL & ROCKS
178	187	CLAY
187	191	SAND
191	238	CLAY W/ HARD LAYERS
238	243	SAND & SANDSTONE
243	266	CLAY W/ HARD LAYERS
266	269	SAND & SANDSTONE
269	290	CLAY
290	293	SAND
293	308	CLAY
308	311	SAND
311	321	CLAY
321	324	SAND
324	373	CLAY

TOTAL DEPTH OF BORING 640 (Feet)

TOTAL DEPTH OF COMPLETED WELL 640 (Feet)

WELL OWNER

Name VAN BEEK BROS. DAIRY

Mailing Address 14808 RD 152

TIPTON CA 93272
CITY STATE ZIP

WELL LOCATION

Address 14808 RD 152

City TIPTON CA

County TULARE

APN Book ___ Page ___ Parcel 232-160-06

Township 21 S Range 25 E Section 36

Latitude ___ DEG. ___ MIN. ___ SEC. ___ DEG. ___ MIN. ___ SEC.

LOCATION SKETCH

NORTH

Rd 152 / 190

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if **necessary. PLEASE BE ACCURATE & COMPLETE.**

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
✓ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	320	30	✓				STEEL	16	1/4	
320	640	30		✓			LOUVER	16	1/4	.090

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	✓			
50	640			✓	1/4 X #2

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME GRABOW WELL DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 - 9TH AVE. HANFORD CA 93230
ADDRESS CITY STATE ZIP

Signed ___ 04/29/03 288489
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 003200

DWR USE ONLY — DO NOT FILL IN
21/5/25E-36
STATE WELL NO./ STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. RD 152 DAIRY

Date Work Began 4/21/2003, Ended 4/22/2003

Local Permit Agency TULARE

Permit No. 76373 Permit Date 1/22/2003

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD REVERSE FLUID NATURAL

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
373	378	SAND
378	380	CLAY
380	386	SAND
386	395	CLAY
395	406	SAND
406	424	CLAY
424	427	SAND
427	454	CLAY W/ HARD LAYERS
454	462	SAND
462	469	CLAY
469	474	SAND
474	484	CLAY
484	490	SAND
490	503	CLAY
503	508	SAND
508	566	CLAY W/ HARD LAYERS
566	570	SAND
571	585	CLAY
585	597	SAND
597	607	CLAY
607	622	SAND & GRAVEL
622	633	CLAY
633	638	SAND
638	640	CLAY

TOTAL DEPTH OF BORING 640 (Feet)

TOTAL DEPTH OF COMPLETED WELL 640 (Feet)

WELL OWNER

Name VAN BEEK BROS. DAIRY

Mailing Address 14808 RD 152

TIPTON CA 93272
CITY STATE ZIP

WELL LOCATION

Address 14808 RD 152

City TIPTON CA

County TULARE

APN Book ___ Page ___ Parcel 232-160-06

Township 21 S Range 25 E Section 36

Latitude ___ DEG. MIN. SEC. ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if **necessary. PLEASE BE ACCURATE & COMPLETE.**

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
✓ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	320	30	✓				STEEL	16	1/4	
320	640	30		✓			LOUVER	16	1/4	.090

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	✓			
50	640			✓	1/4 X #2

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME GRABOW WELL DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 - 9TH AVE. HANFORD CA 93230
ADDRESS CITY STATE ZIP

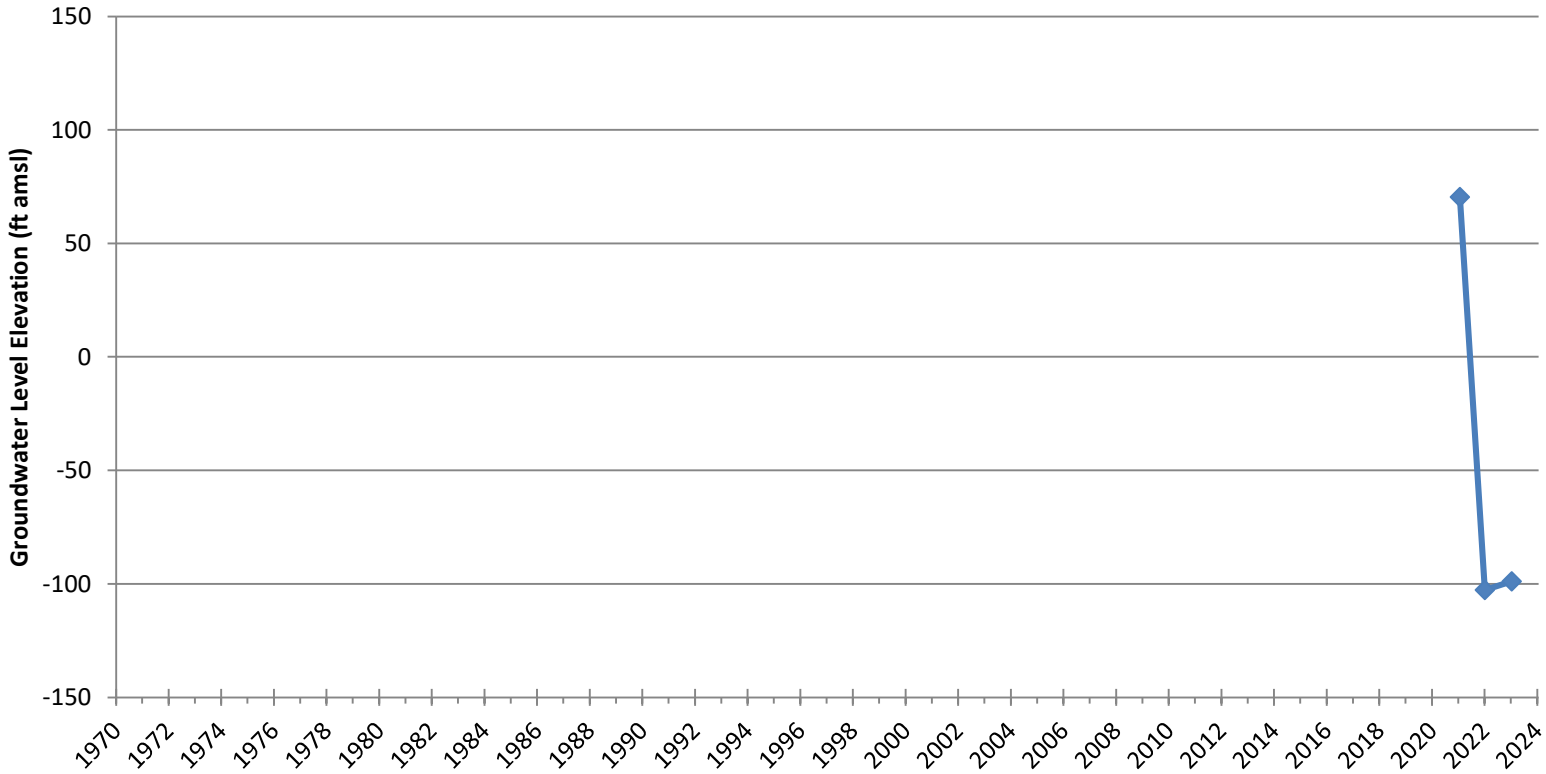
Signed ___ 04/29/03 288489
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

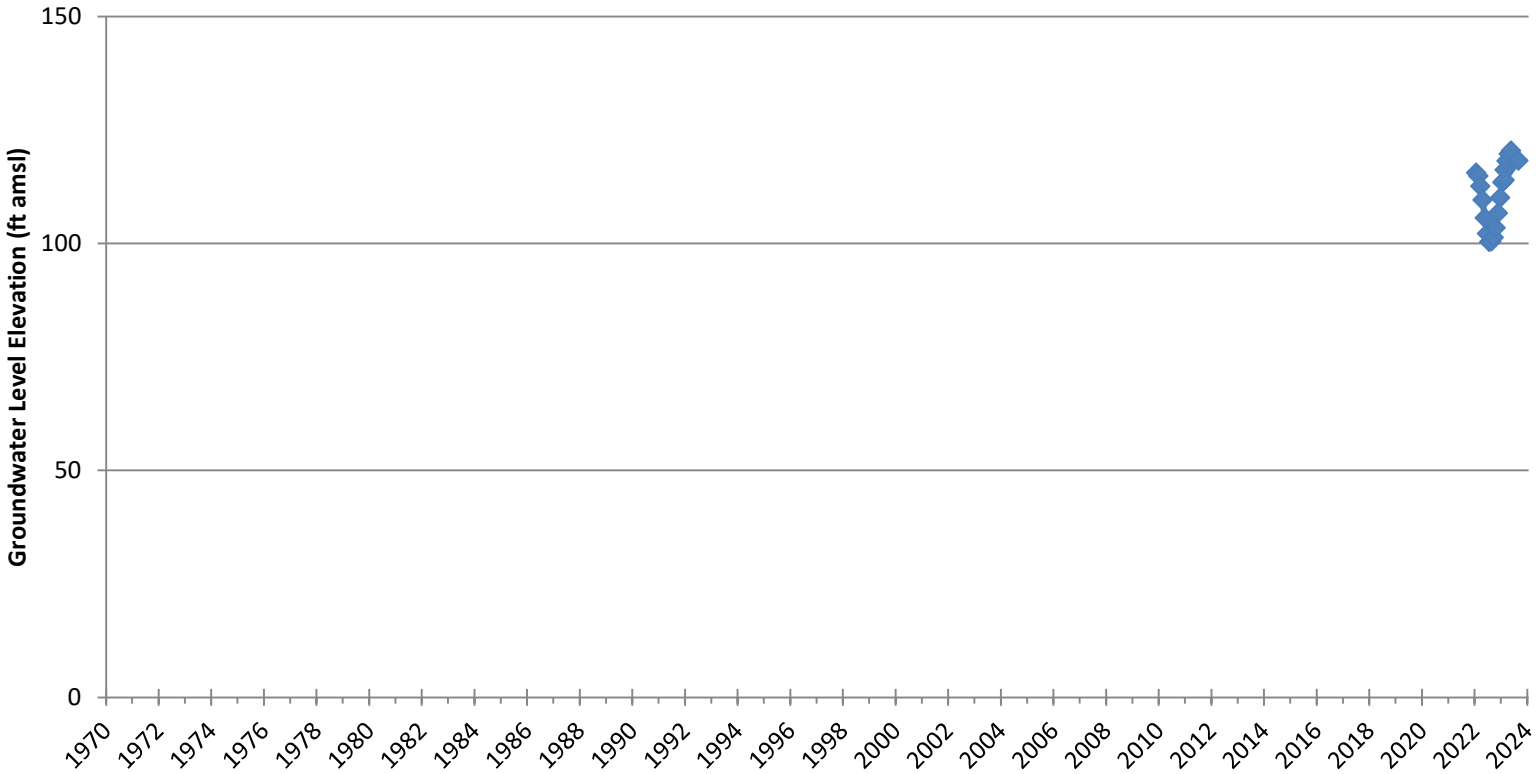
Groundwater Hydrographs - Lower

22S/23E-08



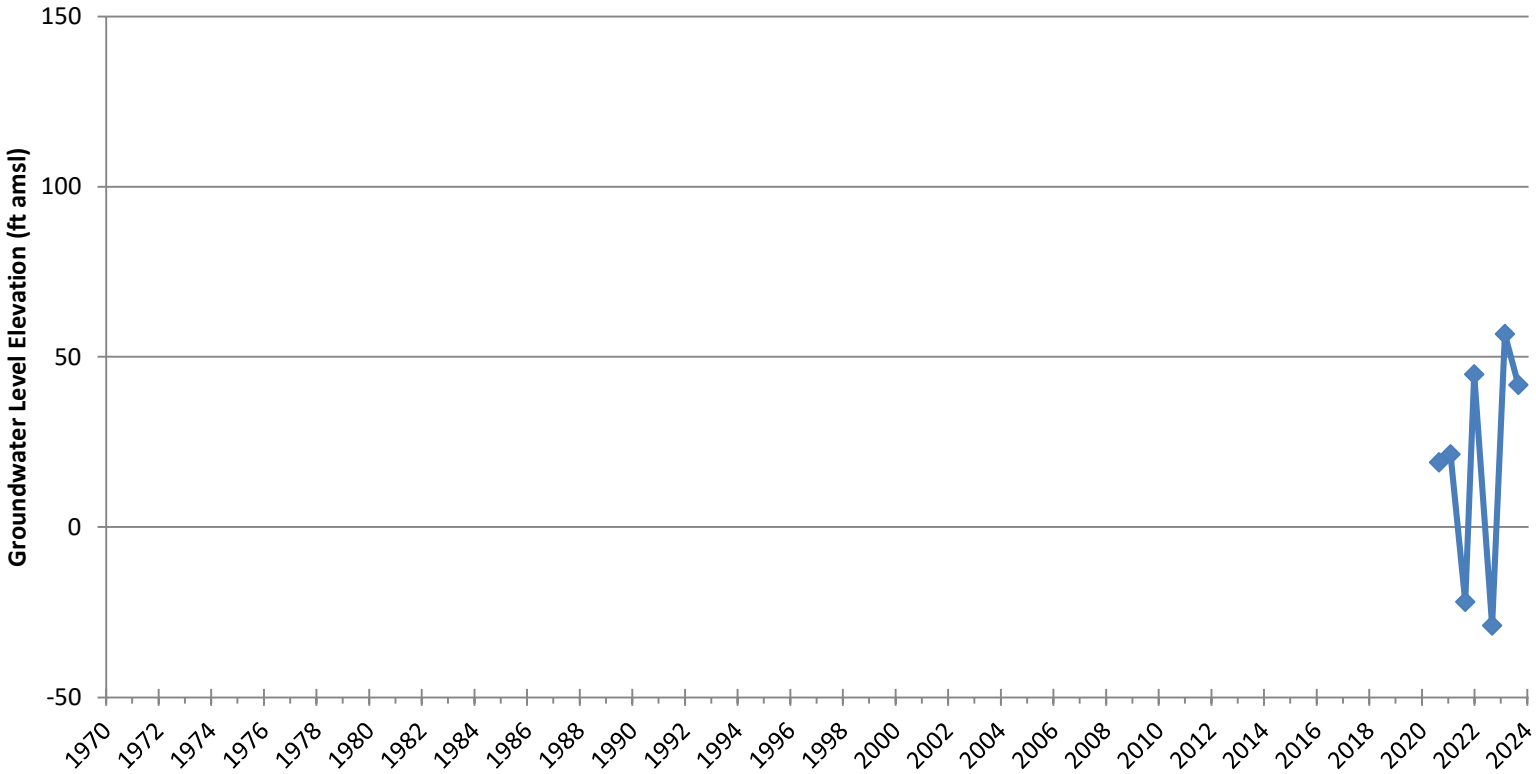
Groundwater Hydrographs - Lower

LTRID-1L



Groundwater Hydrographs - Lower

LTRID-1M



State of California

Well Completion Report

Form DWR 188 Complete 12/13/2022

WCR2022-006981

Owner's Well Number: LTRID-01 | Date Work Began: 10/29/2020 | Date Work Ended: 11/11/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 2000408 | Permit Date: 10/14/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXXX | State: XX | Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 36 Deg. 7 Min. 50.5919 Sec. N | Longitude: -119 Deg. 18 Min. 46.2239 Sec. W

Dec. Lat.: 36.13072 | Dec. Long.: -119.31284

Vertical Datum: NAVD88 | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 232*010*022

Township: 21 S

Range: 25 E

Section: 06

Baseline Meridian: Mount Diablo

Ground Surface Elevation: 252

Elevation Accuracy: 10 Ft

Elevation Determination Method: GPS

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Direct Rotary | Drilling Fluid: Bentonite

Total Depth of Boring: 1560 Feet

Total Depth of Completed Well: 1480 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: (Feet) | Date Measured:

Estimated Yield*: (GPM) | Test Type:

Test Length: (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - USCS/ASTM D2488

Depth from Surface Feet to Feet		Soil Class	Soil Color	Soil Description
0	20	(ML) Sandy silt	10YR6/3	Some medium sand, sub-angular, cemented silt layers.
20	30	(SM) Silty sand	2YR5/6	lenses of fine sand and cemented silt.
30	90	(SW-SM) Well-graded sand with silt	10YR5/3	Some cemented silt layers, trace clay.
90	120	(CL) Sandy lean clay	10YR5/3	medium plasticity, fine to coarse sand.
120	140	(SW-SC) Well-graded sand with clay	Gley 1 3/10Y	Fine sand and clay.
140	180	(SP) Poorly graded sand	Gley 1 4/GY	Med-coarse, angular to sub-angular, some clay lenses, trace silt.
180	350	(SW-SC) Well-graded sand with clay	Gley 1 3/10GY	Medium to coarse sand, angular to sub-angular coarse sand.
350	400	(SM) Silty sand	10GY5/1	Medium dense, medium-coarse sand, angular, with some clay.
400	440	(SW-SM) Well-graded sand with silt	5B4/1	Medium dense, angular quarts grains, sime mica, trace clay.
440	530	(ML) Silt with sand	5BG4/1	Stiff, angular sand, trace clay, few interbeds of medium-coarse sand.
530	540	(SW) Well-graded sand	5B6/1	Angular, some mica, trace silt.
540	630	(ML) Silt with sand	10BG4/1	Very stiff-stiff, trace clay, few interbedded sand layers.
630	850	(SW-SC) Well-graded sand with clay	Gley 1 5/10GY	Medium-coarse sand, few clay interbeds, some silt.
850	1000	(ML) Silt with sand	10GY4/1	very stiff, med-low plasticity, some coarse sand.

1000	1040	(ML) Silt with sand	10GY5/1	Medium dense, sub-angular quarts grains, moderate plasticity.
1040	1160	(CL) Lean clay with sand	Gley 1 4/5	medium plasticity, tough.
1160	1270	(SP-SC) Poorly graded sand with clay	Gley 2 4/1	hard, med plasticity, interbedded fine-med sand lenses, subrounded.
1270	1350	(SP) Poorly graded sand	5Y 6/3	Fine to medium sand, sub-angular, some silt and clay.
1350	1360	(CH) Fat clay with sand	Gley 2 4/1	Some Sand
1360	1370	(SW) Well-graded sand	5Y6/1	Very fine to coarse grained, angular.
1370	1400	(CH) Fat clay with sand	5Y6/3	Very stiff to hard, trace coarse sand.
1400	1410	(SM) Silty sand	10Y4/1	Very fine to med grained, trace clay.
1410	1560	(CL) Sandy lean clay	Gley 1 4/10GY	Medium plasticity, tough, dry.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	1100	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
1	1100	1470	Screen	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875	Milled Slots	0.02	
1	1470	1480	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
2	0	610	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
2	610	805	Screen	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875	Milled Slots	0.02	
2	805	815	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
3	0	150	No Casing Installed	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			
3	150	280	Screen	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875	Milled Slots	0.02	
3	280	290	Blank	PVC	OD: 2.875 in. | SDR: SCH 80 | Thickness: 0.276 in.	0.276	2.875			

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	20	Cement	Portland Cement/Neat Cement		
20	45	Bentonite	Non Hydrated Bentonite		Chips
45	297	Filter Pack	8 x 20	#3	
297	511	Bentonite	Non Hydrated Bentonite		Chips
511	820	Filter Pack	8 x 20	#3	
820	871	Bentonite	Non Hydrated Bentonite		Chips
871	1560	Filter Pack	8 x 20	#3	

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	310	14.75
310	1560	12.25

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: CASCADE DRILLING LP (Person, Firm or Corporation)

PO BOX 1184 (Address) | Woodinville (City) | WA (State) | 90872 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 06/22/2022 (Date Signed) | 1058336 (C-57 License Number)

Attachments

27486_ELOG-VIEW_andWellDesign.pdf - Geophysical Log

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

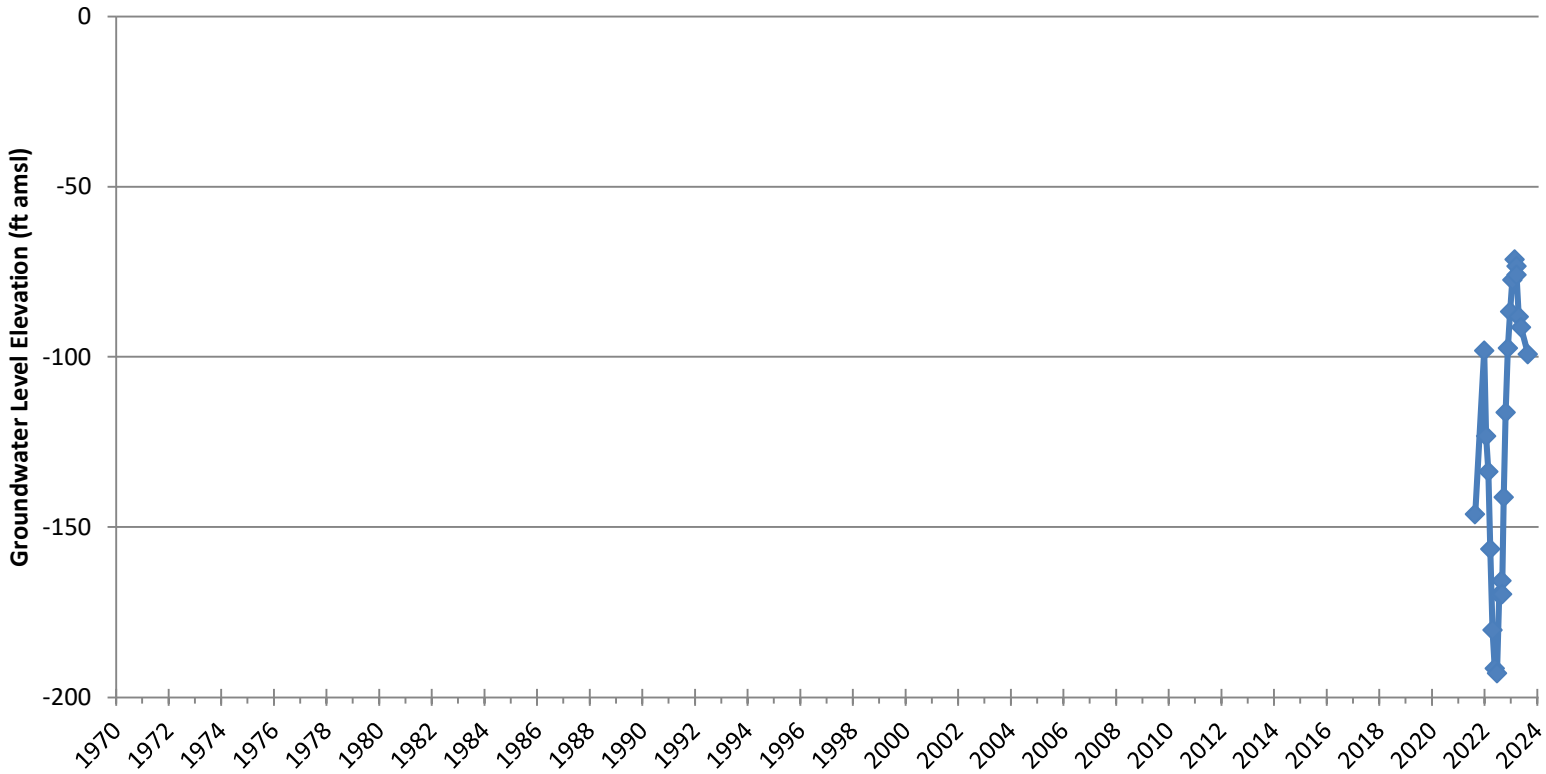
W — Longitude Deg/Min/Sec

TRS:

APN:

Groundwater Hydrographs - Lower

TSMW-1L



State of California

Well Completion Report

Form DWR 188 Complete 7/16/2021

WCR2021-008772

Owner's Well Number: | Date Work Began: | Date Work Ended: 03/31/2021

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 2100088 | Permit Date: 02/17/2021

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXXX State: XX Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address: 0 1678' N/Ave 88 & 243' W/Rd 96

City: Pixley Zip: 93256 County: Tulare

Latitude: 35 Deg. 57 Min. 15.0444 Sec. N

Longitude: -119 Deg. 21 Min. 30.9419 Sec. W

Dec. Lat.: 35.954179 Dec. Long.: -119.358595

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 313-150-024

Township: 23 S

Range: 24 E

Section: 03

Baseline Meridian: Mount Diablo

Ground Surface Elevation:

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical Specify:

Drilling Method: Reverse Circulation Drilling Fluid: Water

Total Depth of Boring: 1050 Feet

Total Depth of Completed Well: 1005 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: (Feet) Date Measured:

Estimated Yield*: (GPM) Test Type:

Test Length: (Hours) Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	10	silty sand
10	20	silt with sand
20	30	silty sand
30	60	clayey sand
60	80	sandy lean clay
80	90	lean clay
90	120	sandy lean clay
120	130	clayey sand
130	180	lean clay
180	220	clayey sand
220	230	lean clay
230	240	clayey sand
240	250	sandy lean clay
250	260	lean clay
260	270	poorly graded sand with clay

270	280	lean clay with sand
280	340	lean clay
340	350	poorly graded sand with clay
350	360	clayey sand
360	380	lean clay
380	390	clayey sand
390	420	lean clay with sand
420	470	lean clay
470	480	poorly graded sand with clay
480	610	lean clay
610	620	clayey sand
620	630	lean clay
630	640	poorly graded sand with clay
640	650	lean clay with sand
650	660	lean clay
660	670	lean clay with sand
670	680	poorly graded sand with clay
680	690	lean clay with sand
690	700	poorly graded sand with clkay
700	710	lean clay with sand
710	800	lean clay
800	810	clayey sand
810	820	poorly graded sand with clay
820	830	clayey sand
830	840	lean clay
840	890	clayey sand
890	900	lean clay
900	930	clayey sand
930	940	lean clay
940	970	clayey sand
970	990	lean clay
990	1040	clayey sand
1040	1050	poorly graded sand with clay

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	20	Conductor or Fill Pipe	Mild Steel	N/A	0.375	20			ASTM A139 Grade B Conductor
2	0	510	Blank	Low Carbon Steel	Grade: ASTM A53	0.25	5			
2	510	530	Other: Compression Section	Low Carbon Steel	Grade: ASTM A53	0.25	5			Compression Section
2	530	550	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			Sch 80
2	550	1000	Screen	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563	Milled Slots	0.02	Sch 80
2	1000	1005	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			Sch 80 w/ end cap

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	495	Cement	10.3 Sack Mix		
495	500	Other Fill	See description.		Fine #60 Sand
500	1010	Filter Pack	Other Gravel Pack		Monterey #3

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	20	26
20	1050	12

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: NOR - CAL PUMP & WELL DRILLING INC
Person, Firm or Corporation

1325 BARRY ROAD (Address) | YUBA CITY (City) | CA (State) | 95993 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 07/15/2021 (Date Signed) | 908591 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

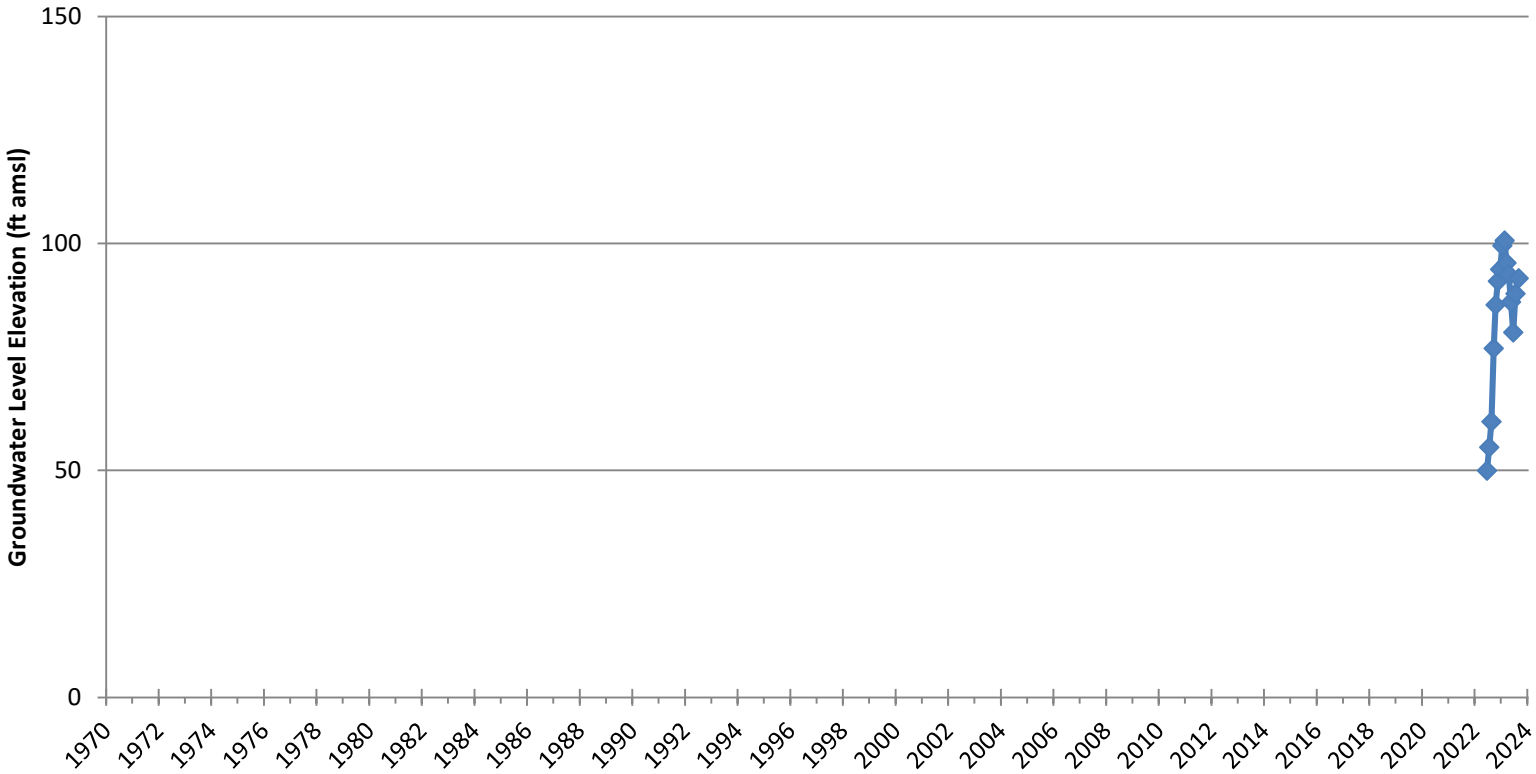
Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

APN:

Groundwater Hydrographs - Lower

PIDGSA-1L



State of California

Well Completion Report

Form DWR 188 Complete 12/29/2020

WCR2020-016331

Owner's Well Number: PIDGSA-01 | Date Work Began: 10/27/2020 | Date Work Ended: 11/15/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: WELL2000383 | Permit Date: 10/20/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXXX | State: XX | Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 35 Deg. 55 Min. 47.4347 Sec. N | Longitude: -119 Deg. 13 Min. 57.6516 Sec. W

Dec. Lat.: 35.929843 | Dec. Long.: -119.232681

Vertical Datum: NGVD29 | Horizontal Datum: WGS84

Location Accuracy: 5 Ft | Location Determination Method: GPS

APN: 318-280-020

Township:

Range:

Section:

Baseline Meridian:

Ground Surface Elevation: 297

Elevation Accuracy: 1 Ft

Elevation Determination Method: GPS

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Direct Rotary | Drilling Fluid: Bentonite

Total Depth of Boring: 1015 Feet

Total Depth of Completed Well: 1015 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: (Feet) | Date Measured:

Estimated Yield*: (GPM) | Test Type:

Test Length: (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	1015	400-1015

Geologic Log - USCS/ASTM D2488

Depth from Surface Feet to Feet		Soil Class	Soil Color	Soil Description
0	1015	(ML) Sandy silt	BROWN	SILTY SAND

Geologic Log - Lite

Depth from Surface Feet to Feet		Material Type	Material Color	Material Texture	Material Description
0	270	Clay	Brown	Fine	

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	1015	Blank	PVC	OD: 4.500 in. | Thickness: 0.337 in.	0.337	4.5	Saw Cut	0.02	SCH80
2	180	270	Blank	PVC	OD: 4.500 in. | Thickness: 0.337 in.	0.337	4.5	Saw Cut	0.02	SCH80

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
50	1015	Filter Pack	Other Gravel Pack	#3	MONTEREY
0	20	Cement	Portland Cement/Neat Cement		
20	50	Bentonite	Non Hydrated Bentonite		

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	1015	10

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: GREGG DRILLING LLC, Randy Dockery
Person, Firm or Corporation

2726 WALNUT AVENUE (Address) | SIGNAL HILL (City) | CA (State) | 90755 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 11/24/2020 (Date Signed) | 1044456 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

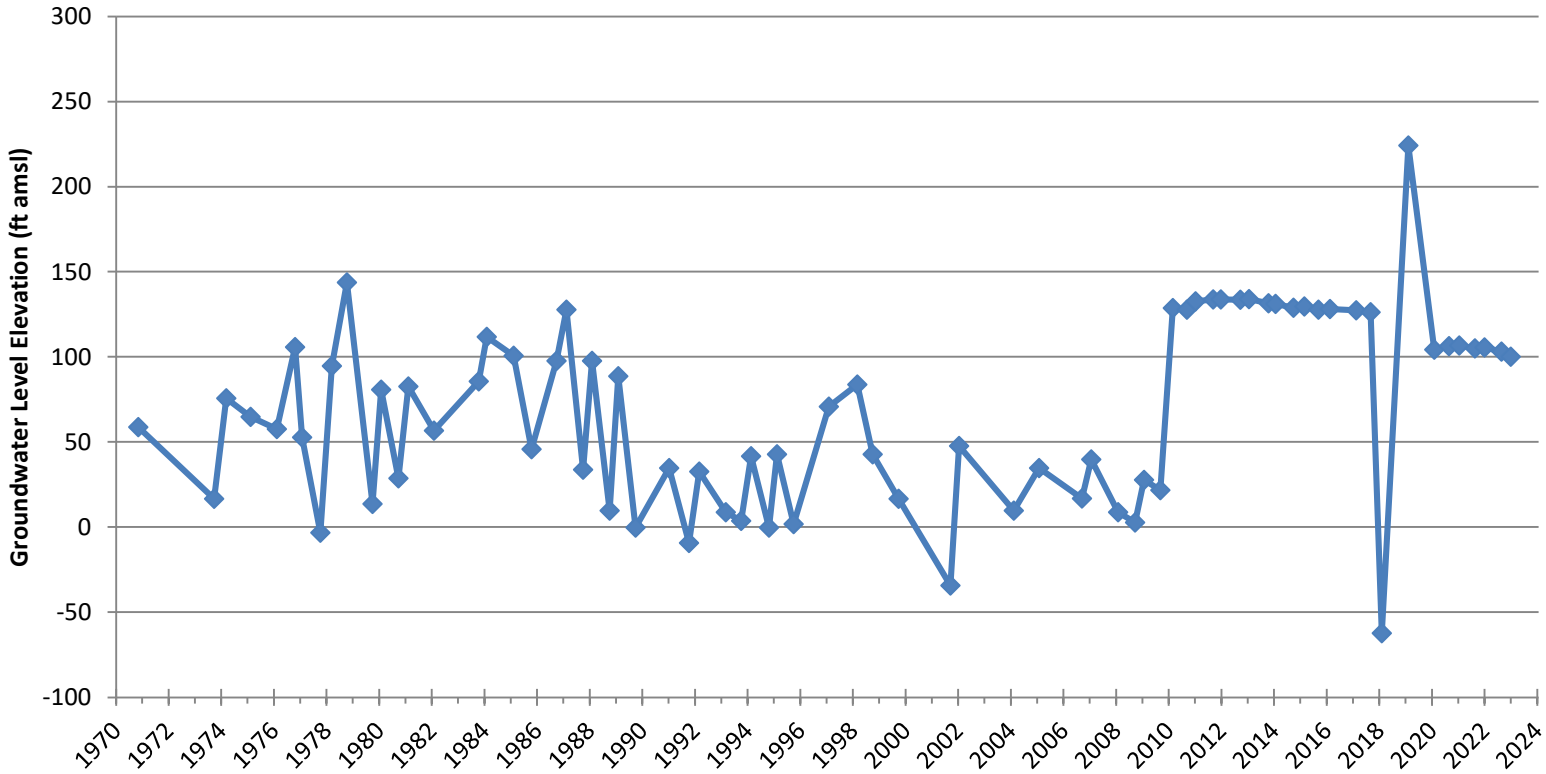
Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

APN:

Groundwater Hydrographs - Lower

24S/24E-03A01



24/24-3A1

DUPLICATE

File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No. 5 (Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

2406

LOCATION NOT CHECKED

Do Not Fill In

No. 63263

State Well No. 3A1

Other Well No. 24s/24e-3

(1) OWNER:

Name

Address

(2) LOCATION OF WELL:

County Tulare Owner's number, if any—

R. F. D. or Street No.

Southwest corner of intersection of Ave. 48 and Rd. 92.

(3) TYPE OF WORK (*check*):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☐ Industrial ☐ Municipal ☐

Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒

Cable ☐

Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
600 ft.	16"	1/4	Single
1,002 ft.	14"	1/4	Single

If gravel packed

Diameter of Bore	from ft.	to ft.
28"	Top to ~~both~~ Bottom	

Type and size of shoe or well ring

Size of gravel: 3/8

Describe joint: Butt Welded

(7) PERFORATIONS:

Type of perforator used: Machine

Size of perforations: 1/8 in., length, by 1 cc in.

From ft.	to ft.	Perf. per row	Rows per ft.
804 ft.	to 1,602 ft.	4	18

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.

Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft. to ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found: Unknown ft.

Standing level before perforating ft.

Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☒ No If yes, by whom?

Yield: gal./min. with ft. draw down after hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Total depth 1,602 ft. Depth of completed well 1,602 ft.

36 Labucco

Formation: *Describe by color, character, size of material, and structure.*

From ft.	to ft.	Formation
0	35	Sandy Clay
35	153	Sandy
153	188	Clay
188	235	Hard Sand
235	270	Clay
270	273	Sand
273	315	Sandy Clay
315	338	Hard Shale
338	430	Sandy Clay
430	436	Sand
436	458	Sandy Clay
458	582	Clay
582	643	Blue Clay
643	710	Sandy Clay
710	730	Sand
730	745	Sandy Clay
745	792	Shale
792	892	Clay
892	906	Sand
906	945	Sandy Clay
945	960	Blue Clay
960	963	Sand
963	1036	Hard Shale
1036	1070	Clay
1070	1096	Shale
1096	1125	Clay
1125	1140	Sand
1140	1170	Shale
1170	1200	Clay
1200	1247	Sandy Clay
1247	1257	Hard Shale
1257	1260	Sand
1260	1390	Shale
1390	1405	Sand
1405	1425	Sandy Clay
1425	1488	Shale
1488	1502	Clay
1502	1575	Shale
1575	1590	Sand
1590	1602	Collard Shale

Section 7076 Water Code

Work started 6/7/60, 19 Completed 6/24/60, 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Whitten Pumps, Inc. (Person, firm, or corporation) (*Typed or printed*)

Address 1744 High St.

Delano, Calif.

[SIGNED] Donald E. Whitten (Well Driller)

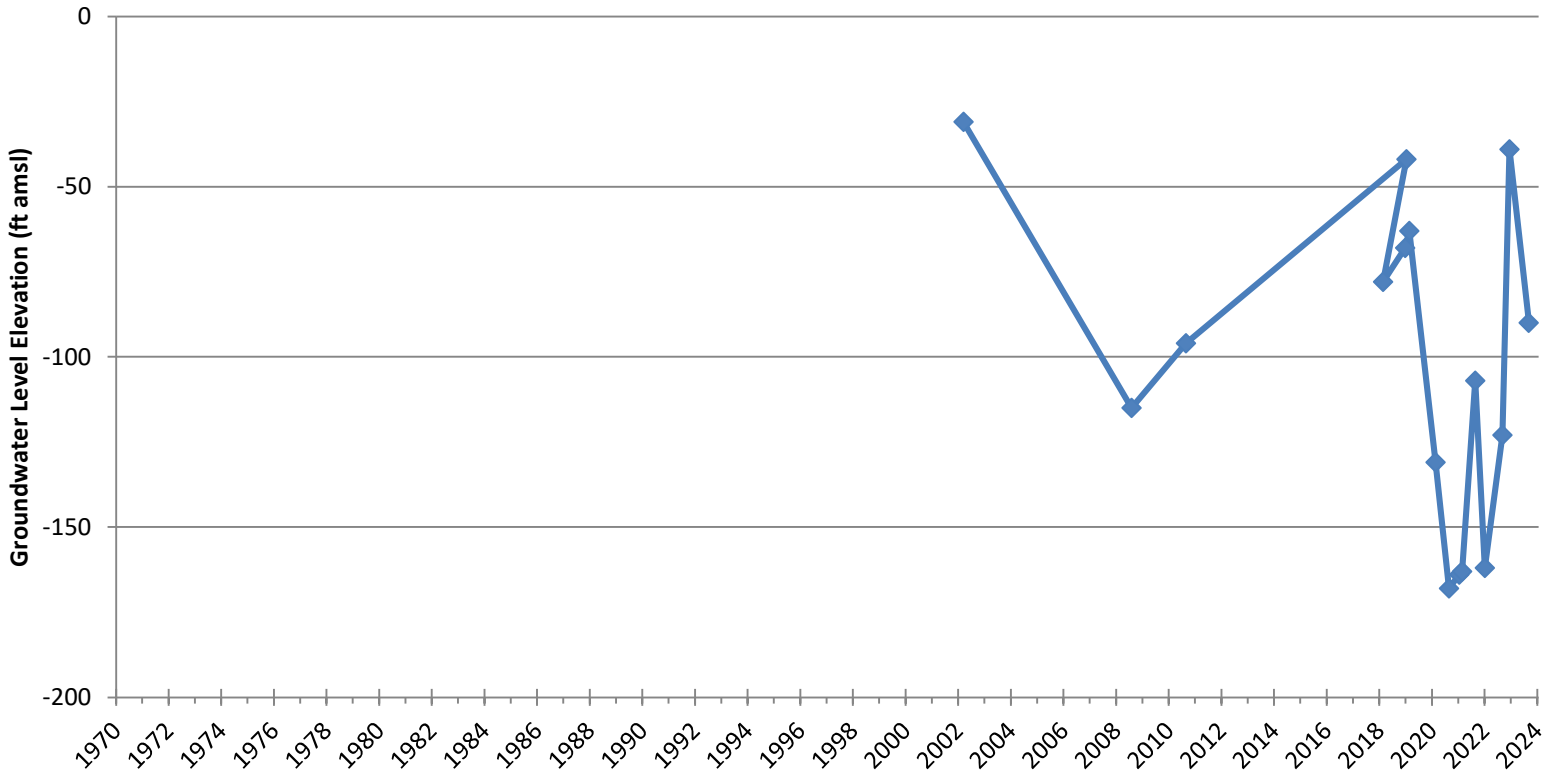
License No. 148282 Dated 11-1-, 19 60

STORS 6-67, 30M QUIN △ SPO

DWR 188 (REV. 3-34)

Groundwater Hydrographs - Lower

22S/23E-27F001M



22/23-27

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No._____
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

LOCATION NOT CHECKED

Do Not Fill In
№ 66960

State Well No._____
Other Well No. 22s/23e-27

(2) LOCATION OF WELL:

County Tulare Owner's number, if any—
R. F. D. or Street No. Angiola area

(3) TYPE OF WORK (*check*):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft. to ft.	Diam.	Gage or Wall
800' 16"	5/16"	wall

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring
Size of gravel: 620
Describe joint 140 ton

(7) PERFORATIONS:

Type of perforator used
Size of perforations in., length, by in.

From ft. to ft.	Perf. per row	Rows per ft.
808' 16" 5/16" wall		

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft. to ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 180 ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No
Was electric log made of well? ☒ Yes ☐ No

(11) WELL LOG:

Total depth ft. Depth of completed well ft.
Formation: *Describe by color, character, size of material, and structure.*

ft. to ft.	Formation
1 - 3	Top soil
3 - 15	Sandy clay
15 - 28	Sand
28 - 40	Clay
40 - 48	Sand
48 - 85	Sandy clay
85 - 140	Sand
140 - 170	Sand & clay strks.
170 - 240	Coarse sand
240 - 260	Coarse sand, shale strks
260 - 350	" " , clay
350 - 410	Sandy clay, sand strks
410 - 480	Sand, blue clay strks
480 - 600	Blue clay
600 - 670	" " , sand strks
670 - 795	" " , shale strks
795 - 855	Sand & shale
855 - 915	Blue clay, sand strks
915 - 1000	Sand & clay
1000 - 1130	" , shale strks
1130 - 1185	Shale & clay
1185 - 1245	Sand & shale strks
1245 - 1443	Sand
1443 - 1620	Sand & shale
1620 - 1630	Shale

Top 112

CONFIDENTIAL Section 7076.1, Water Code

Work started Mar. 24 19 61. Completed April 13 19 61

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Knapp & Graham, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 1155 W. Inyo St.
Tulare, Calif.

[SIGNED] [signature]
Well Driller

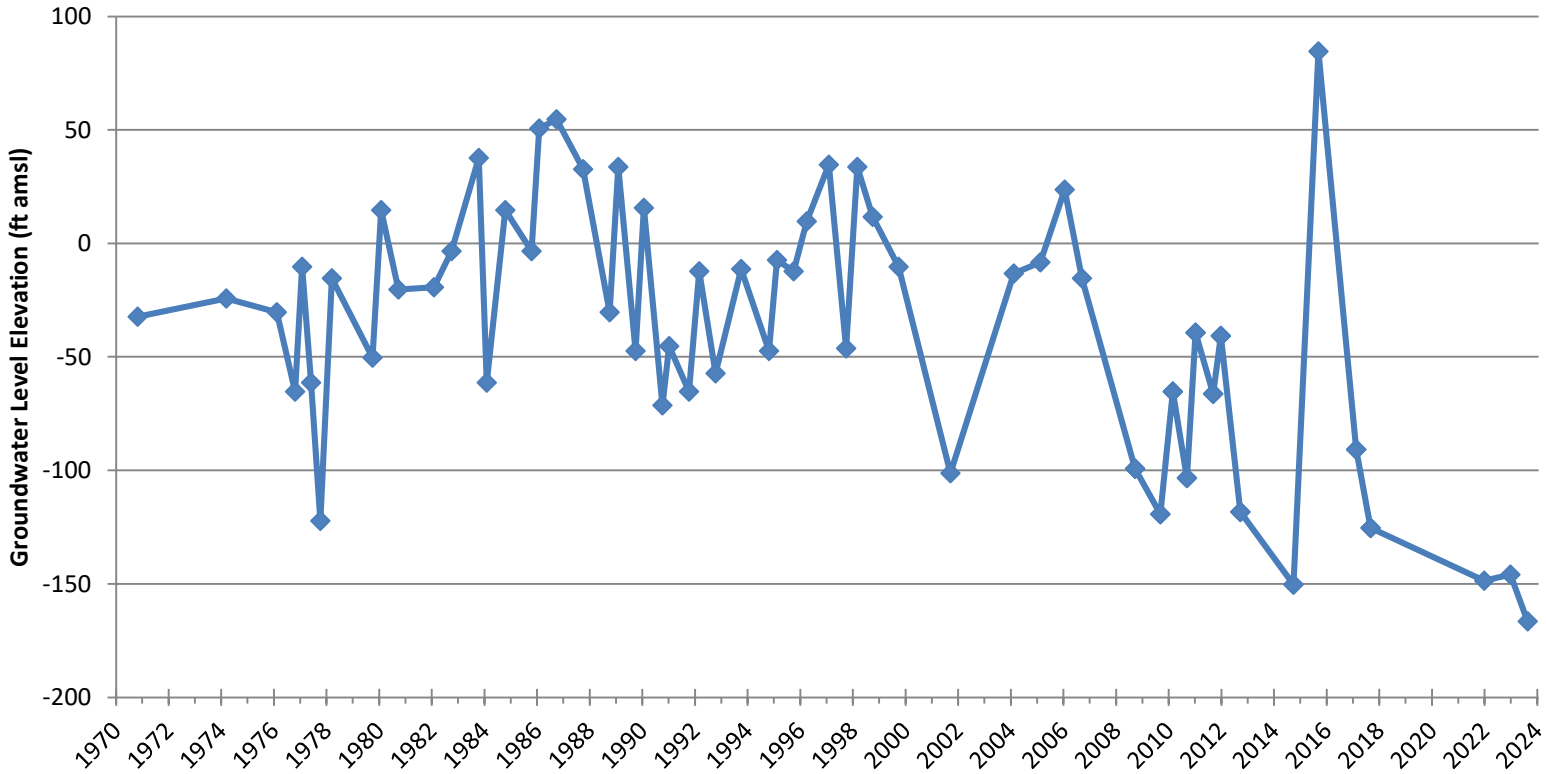
License No. 193493 Dated April 14, 19 61

57028 5-57 50M QUIN △ SPO

DWR 188 (REV. 3-54)

Groundwater Hydrographs - Lower

24S/23E-15R01



24/23-15

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.....
(Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7076, 7077, 7078, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA

Do Not Fill In
№ 118739
State Well No. 15R1
Other Well No. 24S/23E-15

(1) OWNER:
Name
Address

(2) LOCATION OF WELL:
County Tulare Owner's number, if any— #44
R. F. D. or Street No. SE corner of Section 15, T24S, R23E.
475'N & 100'W/o SE Cor.

(3) TYPE OF WORK (*check*):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	500	16"	1/4
500	1150	14"	1/4
14" to 16" slip jt.			

If gravel packed

Diameter of Bore	from ft.	to ft.
25 1/2		
top to bottom		

Type and size of shoe or well ring
Size of gravel: 1/4"
Describe joint collar with fillet weld

(7) PERFORATIONS:
Type of perforator used machine
Size of perforations .100 x 2" in., length, by 6cc in.

From ft.	to ft.	Perf. per row	Rows per ft.
600	1150	2	14

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 300' ft.
Were any strata sealed against pollution? ☒ Yes ☐ No If yes, note depth of strata
From 0 ft. to 300 ft.
Method of Sealing cement

(9) WATER LEVELS:
Depth at which water was first found unknown ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No
Was electric log made of well? ☒ Yes ☐ No

(11) WELL LOG:
Total depth 1150 ft. Depth of completed well 1150 ft.
Formation: *Describe by color, character, size of material, and structure.*

ft. to	ft.	
0	11	top soil
11	221	clay
221	310	blue clay
310	566	sandy clay
566	910	sandy clay
910	1060	clay
1060	1150	sand

DTW = 247' 10/70 TS+JD

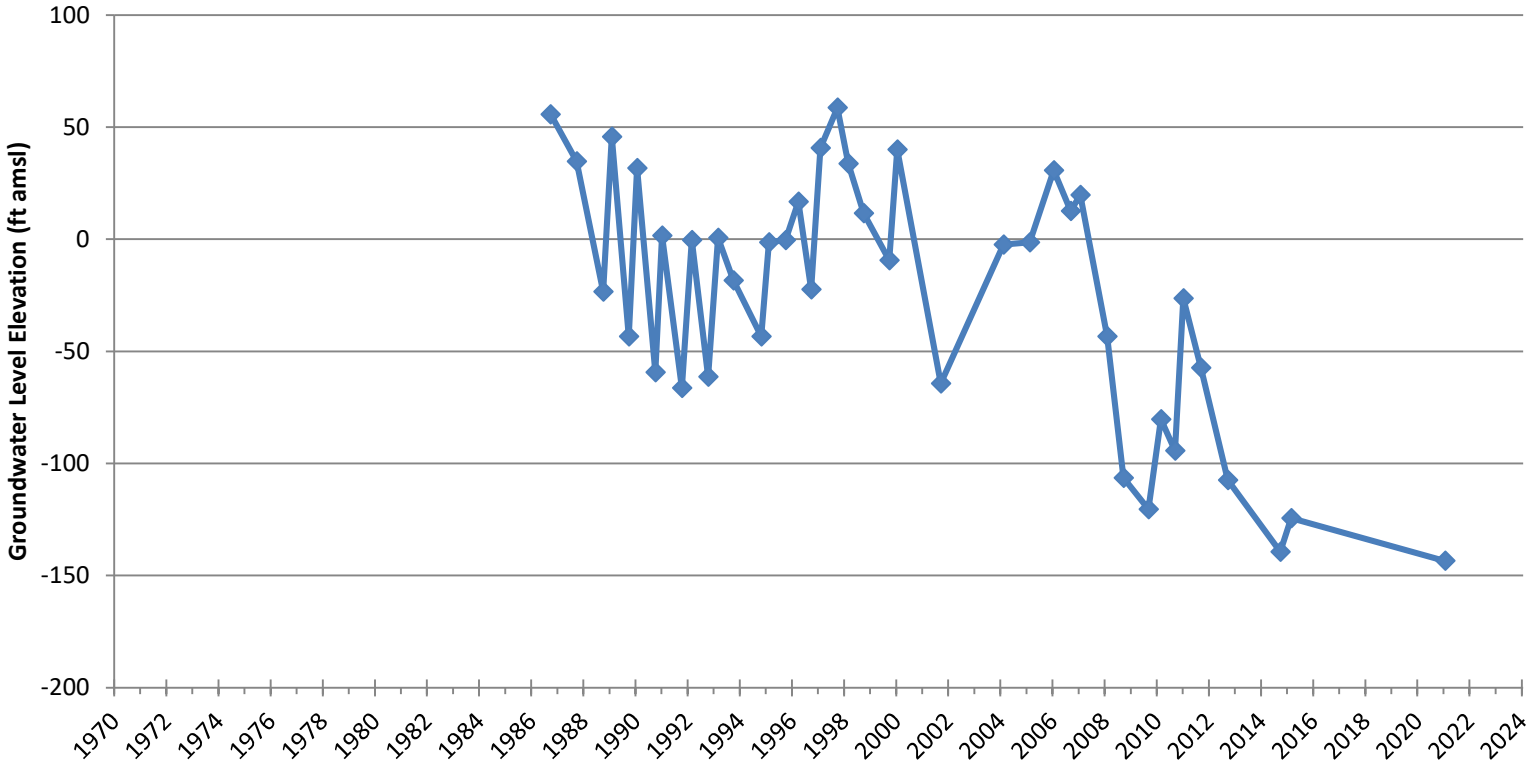
CONFIDENTIAL
Water Code Sec. 13752.

Work started 5/11/68 19, Completed 5/27/68 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME Whitten Pumps, Inc.
(Person, firm, or corporation) (*Typed or printed*)
Address 1744 Inyo Street
Delano, Calif. 93215
[SIGNED] [signature]
Well Driller
License No. 148282 Dated 9/24/68, 19

Groundwater Hydrographs - Lower

24S/23E-22R02



24/23-22R2

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA

Do Not Fill In
No. 116291

State Well No. / 22R2
Other Well No. 24S/23E-22

(1) OWNER:

Name Alpaugh Irrigation District
Address P. O. Box 127
Alpaugh, California

(2) LOCATION OF WELL:

County Tulare Owner's number, if any—
R. F. D. or Street No.
Southeast corner sec 22 ~~BM~~ ~~29~~
township 24S Range 23E

220'N & 75'N/O SE Cor.

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	500	16	1/4
500	1200	14	1/4
16" OD to 14" OD			
Transition Joint Slip jt.			

Type and size of shoe or well ring
Describe joint collared W/ fillet weld

If gravel packed
Diameter of Bore 25½ from ft. to ft.
top to bottom
Size of gravel:

(7) PERFORATIONS:

Type of perforator used machine
Size of perforations .100 x 2 in., length, by 6cc in.
From 500 to 1200 ft. 2 Perf. per row 14 Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found unknown ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No
Was electric log made of well? ☒ Yes ☐ No

(11) WELL LOG:

Total depth 1205 ft. Depth of completed well 1205 ft.
Formation: *Describe by color, character, size of material, and structure.*

From ft.	to ft.	Formation
0	4	top soil
4	35	sandy clay
35	78	sandy clay
78	121	sandy clay
121	329	sandy clay
329	540	sandy clay
540	664	blue clay
664	874	clay hard
874	900	sandy clay
900	904	sand
904	934	clay
934	1058	shale & clay
1058	1146	hard shale
1146	1205	blue sand

DTW = 244' 10/30/70 75+50

CONFIDENTIAL
Water Code Sec. 13752

Work started 10/31/66 19 . Completed 11/14/66 19

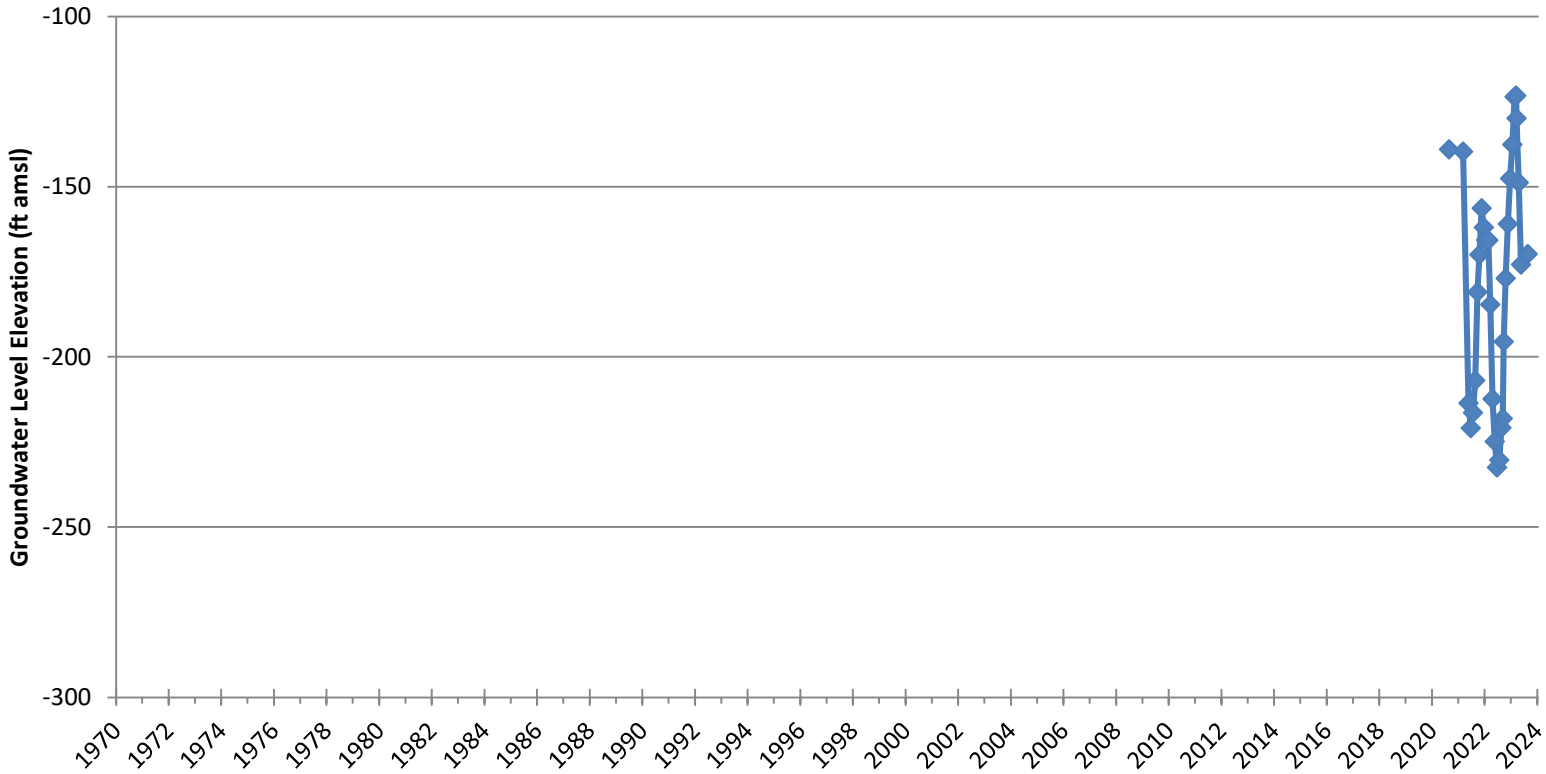
WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Whitten Pumps, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 1744 Inyo Street
Delano, California
[SIGNED] [signature]
Well Driller
License No. 148282 Dated 4/22/67, 19

Groundwater Hydrographs - Lower

TSMW-5L



State of California

Well Completion Report

Form DWR 188 Submitted 1/7/2021
WCR2021-000186

Owner's Well Number: TSMW-5L | Date Work Began: 03/03/2020 | Date Work Ended: 06/20/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 200067 | Permit Date: 02/19/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: ANGIOLA WATER DISTRICT,

Mailing Address: 944 Whitley Ave A

City: Corcoran | State: CA | Zip: 93212

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 35 Deg. 50 Min. 5.28 Sec. N | Longitude: -119 Deg. 30 Min. 2.16 Sec. W

Dec. Lat.: 35.8348 | Dec. Long.: -119.5006

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 330-070-053

Township:

Range:

Section:

Baseline Meridian:

Ground Surface Elevation:

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Reverse Circulation | Drilling Fluid: Water

Total Depth of Boring: 1010 Feet

Total Depth of Completed Well: 955 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: 307 (Feet) | Date Measured: 05/20/2020

Estimated Yield*: 30 (GPM) | Test Type: Pump

Test Length: 16 (Hours) | Total Drawdown: 1.4 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	10	lean clay
10	30	silty sand
30	60	lean clay
60	70	poorly graded sand
70	80	lean clay
80	100	poorly graded sand
100	120	lean clay
120	130	poorly graded sand
130	140	clayey sand
140	210	lean clay with sand
210	220	poorly graded sand with clay
220	360	lean clay
360	370	clayey sand
370	390	poorly graded sand
390	400	lean clay

400	410	lean clay with sand
410	420	lean clay
420	430	lean clay with sand
430	440	clayey sand
440	600	lean clay
600	640	clayey sand
640	650	lean clay with sand
650	670	lean clay
670	680	lean clay with sand
680	690	poorly graded sand with clay
690	700	lean clay with sand
700	720	poorly graded sand
720	730	lean clay with sand
730	790	lean clay
790	800	clayey sand
800	820	lean clay with sand
820	830	lean clay
830	840	clayey sand
840	850	poorly graded sand with clay
850	870	clayey sand
870	900	lean clay
900	910	clayey sand
910	940	lean clay
940	950	clayey sand
950	960	lean clay with sand
960	1010	lean clay

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	30	Conductor or Fill Pipe	Low Carbon Steel	Grade: ASTM A53	0.375	20			Mild Steel Conductor Casing
2	0	510	Blank	Low Carbon Steel	Grade: ASTM A53	0.375	5			Mild Steel Blank Casing has 2' stick up above grade
2	510	530	Blank	Low Carbon Steel	Grade: ASTM A53	0.375	5			Mild Steel Compression section
2	530	670	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			SCH 80 PVC
2	670	950	Screen	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563	Milled Slots	0.02	Sch 80 PVC Well Screen
2	950	955	Blank	PVC	OD: 5.563 in. | Thickness: 0.375 in.	0.375	5.563			Blank casing with end cap

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	495	Cement	Portland Cement/Neat Cement		
495	500	Filter Pack	Other Gravel Pack	#60	Fine #60 Sand
500	1010	Filter Pack	Other Gravel Pack	#3	CEMEX Monterey #3

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	30	36
30	1010	15

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: NOR - CAL PUMP & WELL DRILLING INC
Person, Firm or Corporation

Address	City	State	Zip
1325 BARRY ROAD	YUBA CITY	CA	95993

Signed: *electronic signature received*

C-57 Licensed Water Well Contractor	Date Signed	C-57 License Number
electronic signature received	01/07/2021	908591

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

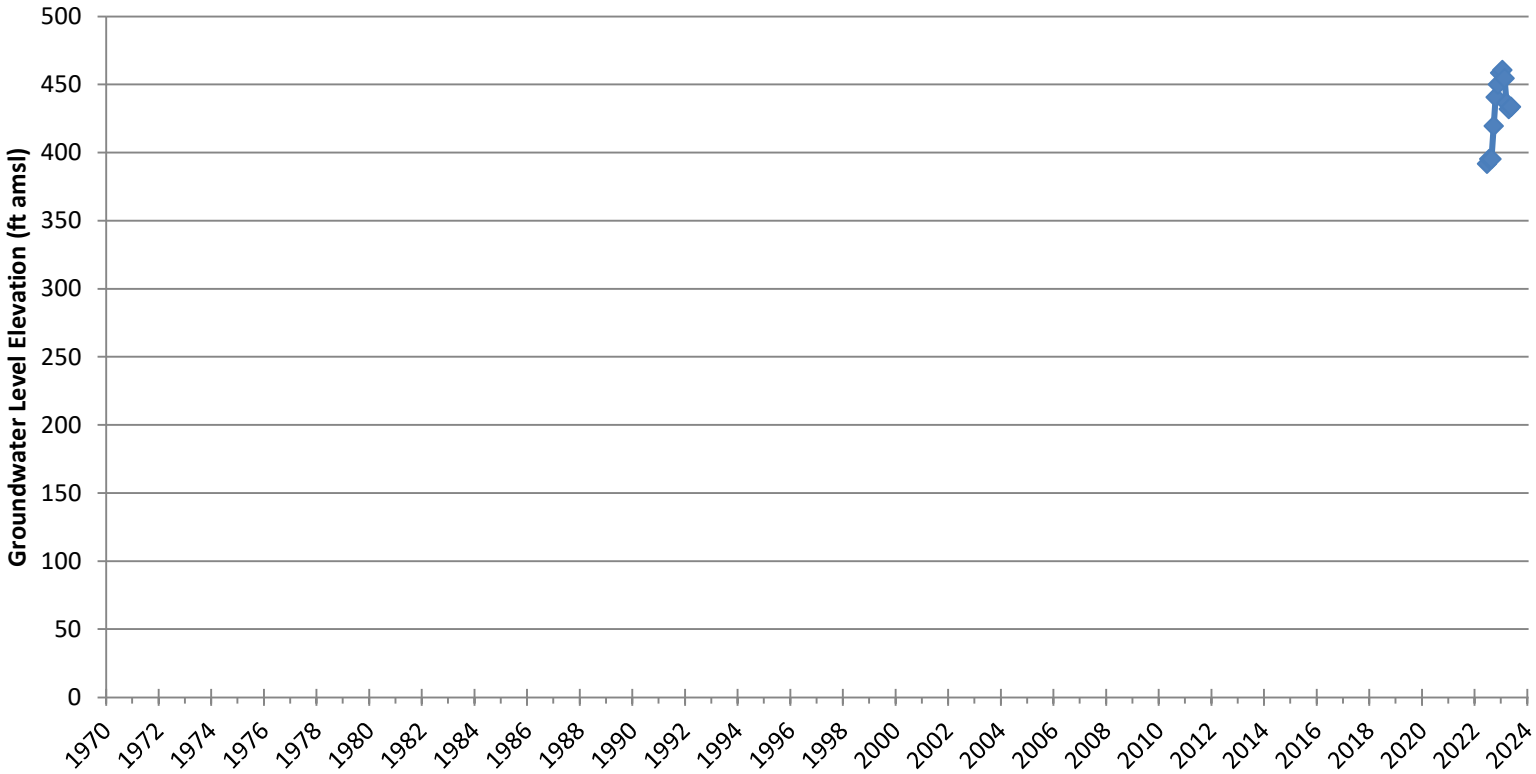
Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

APN:

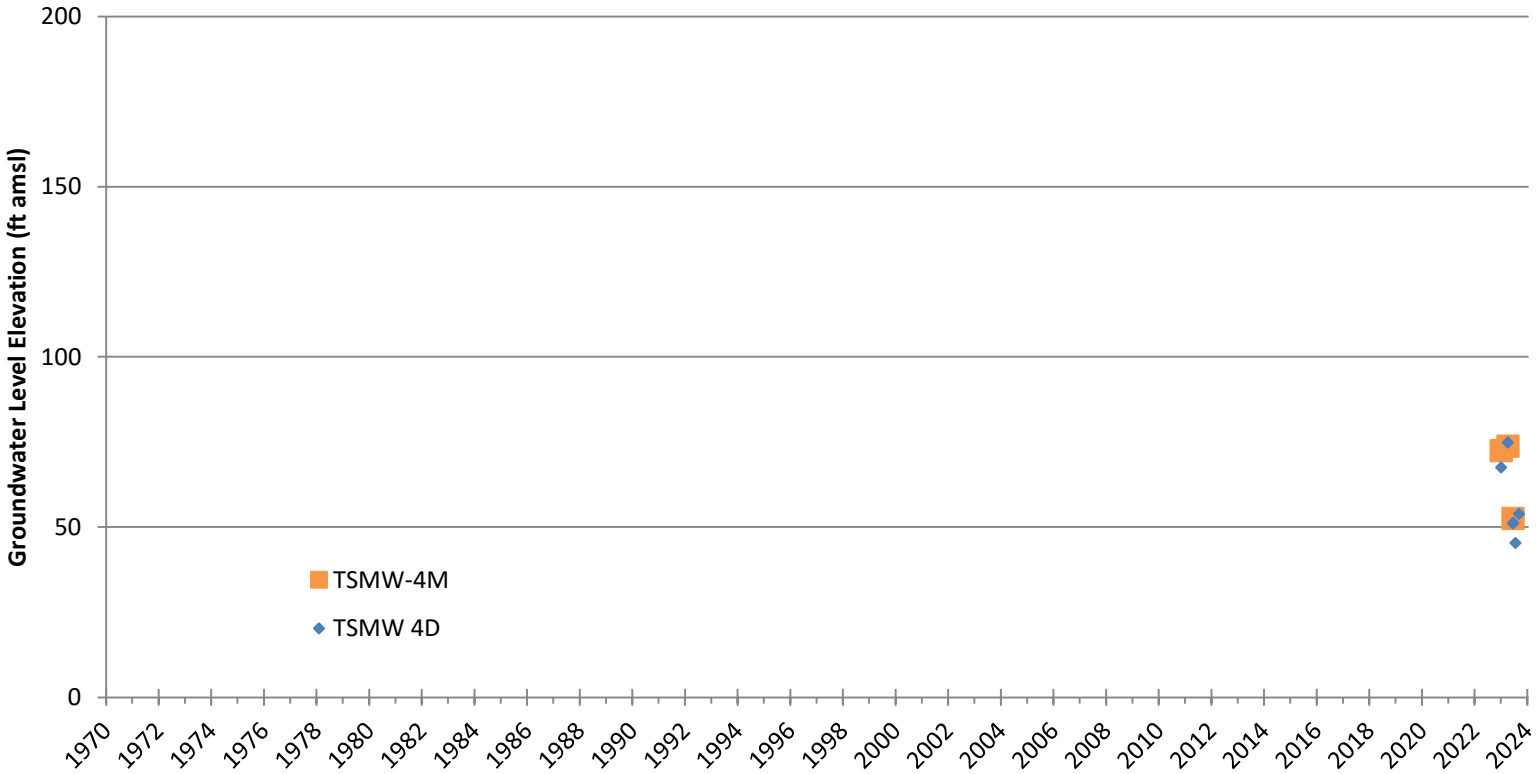
Groundwater Hydrographs - Lower

ETGSA-1L



Groundwater Hydrographs - Lower

TSMW-4M and TSMW-4D



State of California

Well Completion Report

Form DWR 188 Submitted 6/16/2023

WCR2023-006848

Owner's Well Number: TSMW-4 | Date Work Began: | Date Work Ended: 02/18/2023

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: WELL2200811 | Permit Date: 11/07/2022

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: LOWER TULE IRRIGATION DISTRICT,

Mailing Address: 357 E Olive Ave

City: Tipton | State: CA | Zip: 93272

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address: 0 N/Ave 56 & W/Rd 192 - 73' N & 51

City: Terra Bella | Zip: 93270 | County: Tulare

Latitude: 35 Deg. 57 Min. 50.4 Sec. N | Longitude: -119 Deg. 8 Min. 43.08 Sec. W

Dec. Lat.: 35.964 | Dec. Long.: -119.1453

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 319-020-012

Township: 23 S

Range: 26 E

Section: 03

Baseline Meridian: Mount Diablo

Ground Surface Elevation: 368

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Reverse Circulation | Drilling Fluid: Water

Total Depth of Boring: 1420 Feet

Total Depth of Completed Well: 1360 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: 294 (Feet) | Date Measured:

Estimated Yield*: (GPM) | Test Type:

Test Length: (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	10	CLAYEY SAND: Fine-grained sand, medium-grained sand, subrounded, 15 percent clay. Quartz, feldspar, and mica.
10	30	CLAYEY SAND: Fine-grained sand, subrounded, 15 percent clay. Quartz, feldspar, and mica.
30	40	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, some fine-grained sand, rounded to subangular, 15 to 20 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
40	60	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, rounded to subangular, 5 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
60	70	CLAYEY SAND: Fine-grained sand, some medium-grained sand, rounded, 15 to 20 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
70	80	CLAYEY SAND: Fine-grained sand, some medium-grained sand, rounded, 20 to 25 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
80	90	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, some fine-grained sand, rounded to subangular, 15 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
90	100	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, fine gravel up to 15 mm, rounded to subrounded, 10 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
100	110	POORLY GRADED SAND WITH GRAVEL: Coarse-grained sand, with medium-grained sand, some fine-grained sand, rounded to subangular, less than 5 percent clay, gravel up to 27 mm. Quartz, mica, feldspar, biotite, and plagioclase.

110	120	POORLY GRADED SAND WITH GRAVEL: Coarse-grained sand, with medium-grained sand, some gravel up to 5 mm, subrounded to subangular, 5 percent clay. Quartz, mica, feldspar, biotite, and plagioclase.
120	130	CLAYEY SAND WITH GRAVEL: Coarse-grained sand, with medium-grained sand, some fine-grained sand, some gravel up to 15 mm, subrounded to angular, 15 percent clay. Quartz, plagioclase, biotite, and feldspar.
130	140	POORLY GRADED SAND WITH CLAY: Coarse-grained sand, with medium-grained sand, fine-grained sand, trace gravel up to 18 mm, rounded to subangular, 10 percent clay. Quartz, plagioclase, feldspar, and biotite.
140	150	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, trace gravel up to 19 mm, less than 5 percent clay, subangular. Quartz, plagioclase, feldspar, and biotite.
150	160	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, some fine-grained sand, 25 to 30 percent clay, rounded to subangular. Feldspar, biotite, and plagioclase.
160	170	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 45 to 50 percent clay, round to subangular. Plagioclase, quartz, and feldspar.
170	180	CLAYEY SAND: Coarse-grained sand, with fine-grained sand, medium-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, quartz, and feldspar.
180	190	CLAYEY SAND: Coarse-grained sand, with fine-grained sand, medium-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, quartz, and feldspar.
190	200	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, some fine-grained sand, rounded to subangular, 40 to 45 percent clay. Feldspars.
200	210	POORLY GRADED SAND WITH CLAY: Coarse-grained sand, with medium-grained sand, trace gravel up to 19 mm, subrounded to subangular, 10 percent clay. Quartz, feldspar, biotite, mica, and plagioclase.
210	220	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, some fine-grained sand, 15 percent clay, rounded to subangular. Quartz, feldspar, plagioclase, and biotite.
220	230	POORLY GRADED SAND WITH CLAY: Coarse-grained sand, with medium-grained sand, some fine-grained, trace gravel up to 13 mm, subrounded to subangular, 10 to 15 percent clay. Quartz, feldspar, biotite, and plagioclase.
230	240	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, less than 5 percent clay, rounded to subangular. Quartz, plagioclase, feldspar, biotite, and mica.
240	250	POORLY GRADED SAND: Coarse-grained sand, with medium-grained sand, some finegrained sand, 10 to 15 percent clay, trace gravel up to 14 mm. Quartz, feldspar, plagioclase, biotite, and mica.
250	260	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, 20 to 25 percent clay, rounded. Plagioclase, quartz, feldspar, biotite, and mica.
260	270	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, 15 to 20 percent clay, rounded to subangular. Plagioclase, quartz, feldspar, and biotite.
270	280	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 20 to 25 percent clay, rounded to subangular. Plagioclase, and feldspar.
280	290	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, feldspar, and quartz.
290	300	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 20 to 25 percent clay, rounded to subangular. Plagioclase, feldspar, and quartz.
300	310	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 35 to 40 percent clay, rounded to subangular. Plagioclase, feldspar, and quartz.
310	320	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, 35 to 40 percent clay, trace gravel up to 21 mm, rounded to subangular. Plagioclase, feldspar, quartz, and biotite.
320	340	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, with fine-grained sand, 30 to 35 percent clay, rounded to subangular. Plagioclase, quartz, feldspar, and biotite.
340	350	CLAYEY SAND: Coarse-grained sand, with medium-grained sand, trace gravel up to 21 mm, 45 to 50 percent clay, subangular. Quartz, plagioclase, biotite, hornblende, and feldspar.
350	360	CLAY SAND: Medium-grained sand, some coarse-grained sand, subangular, 40 to 45 percent clay. Feldspar, quartz, plagioclase, and biotite.
360	370	CLAY WITH SAND: 55 to 60 percent clay, 35 to 40 percent medium-grained sand, trace coarse-grained sand. CLAY: Medium plasticity, slow dilatancy, medium dry strength.
370	380	CLAY WITH SAND: 55 to 60 percent clay, 35 to 40 percent fine-grained sand, with medium-grained sand. CLAY: Medium plasticity, slow dilatancy, medium dry strength.
380	390	CLAYEY SAND: Medium-grained sand, with fine-grained sand, coarse-grained sand, rounded to subangular, 45 to 50 percent clay. Quartz, plagioclase, feldspar, and biotite.
390	400	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, rounded to subangular, 40 to 45 percent clay. Quartz, plagioclase, feldspar, and biotite.
400	410	CLAY WITH SAND: 70 to 75 percent clay, 25 to 30 percent fine-grained sand, some medium-grained sand. CLAY: High plasticity, slow dilatancy, high dry strength.

410	430	CLAYEY SAND: Medium-grained sand, with coarse-grained sand, rounded to subangular, 40 to 45 percent clay. Quartz, plagioclase, feldspar, and biotite.
430	440	CLAYEY SAND: Fine-grained sand, with medium-grained sand, some coarse-grained sand, rounded to subangular, 35 to 40 percent clay. Quartz, plagioclase, feldspar, and biotite.
440	450	CLAY WITH SAND: 75 percent clay, 25 percent fine-grained sand. CLAY: High plasticity, slow dilatancy, high dry strength.
450	460	CLAYEY SAND: Fine-grained sand, with medium-grained sand, rounded to subrounded, 45 to 50 percent clay. Quartz, plagioclase, feldspar, and biotite.
460	470	CLAY WITH SAND: 70 percent clay, 30 percent fine-grained sand, trace medium-grained sand. CLAY: high Plasticity, slow dilatancy, medium dry strength.
470	480	CLAYEY SAND: medium-grained sand, with fine-grained sand, some coarse-grained sand, rounded to subangular, 40 to 45 percent clay. Quartz, plagioclase, feldspar, and biotite.
480	490	CLAY SAND: Coarse-grained sand, with medium-grained sand, subrounded to angular, 25 to 30 percent clay. Quartz, plagioclase, feldspar, biotite, mica, and hornblende.
490	500	CLAYEY SAND: Coarse-grained sand with medium-grained sand, subrounded to subangular, 35 to 40 percent clay. Quartz, plagioclase, feldspar, and biotite.
500	510	CLAYEY SAND: Fine-grained sand with medium-grained sand, rounded to subangular, 45 to 50 percent clay. Quartz, plagioclase, feldspar, and biotite.
510	570	LEAN CLAY: 80 percent clay, 20 percent fine- to- medium-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
570	590	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand, with medium-grained sand. CLAY: Plasticity medium, dry strength, medium, dilatancy none.
590	600	LEAN CLAY: 80 percent clay, 20 percent fine- to medium-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
600	610	CLAYEY SAND: Fine- grained sand, with medium-grained sand, subrounded, 40 percent clay. Quartz, feldspar, and mafic.
610	620	CLAYEY SAND: Fine- grained sand, with medium-grained sand, subrounded, 45 percent clay. Quartz, feldspar, and mafic.
620	660	LEAN CLAY WITH SAND: 60 percent clay, 40 percent fine-grained sand, with medium-grained sand. CLAY: Plasticity low, dry strength low, dilatancy none.
660	670	CLAYEY SAND: Fine-grained sand, with medium-grained sand, subangular to subrounded, 40 percent clay. Quartz, feldspar, mica, and mafics.
670	690	LEAN CLAY: 80 percent clay, 20 percent fine- to medium-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
690	700	CLAYEY SAND: Fine-grained sand, trace medium-grained sand, subangular, 40 percent clay. Quartz, feldspar, mica, and mafics.
700	710	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
710	740	LEAN CLAY: 85 percent clay, 15 percent fine-graded sand. CLAY: Plasticity high, dry strength high, dilatancy none.
740	750	CLAYEY SAND: Fine-grained sand, with medium-grained sand, angular, 40 percent clay. Quartz, feldspar, mica, and mafics.
750	760	CLAYEY SAND: Fine-grained sand, with medium-grained sand, angular, 40 percent clay. Quartz, feldspar, and mafics.
760	770	CLAYEY SAND: Medium-grained sand, with fine-grained sand, trace coarse-grained sand, angular, 15 percent clay. Quartz, feldspar, mica, and mafics.
770	780	CLAYEY SAND: Medium-grained sand, with fine-grained sand, some coarse-grained sand, angular, 20 percent clay. Quartz, feldspar, mica, and mafics.
780	790	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
790	800	CLAYEY SAND: Medium-grained sand, with fine-grained sand, some coarse-grained sand, angular, 30 percent clay. Quartz, feldspar, mica, and mafics.
800	810	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
810	820	LEAN CLAY: 85 percent clay, 15 percent fine sand. CLAY: Plasticity high, dry strength high, dilatancy none.
820	830	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
830	840	LEAN CLAY: 85 percent clay, 15 percent fine sand. CLAY: Plasticity high, dry strength high, dilatancy none.
840	880	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
880	900	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none. Clay as balls.
900	910	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.

910	920	LEAN CLAY: 75 percent clay, 25 percent fine to medium-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
920	930	LEAN CLAY: 60 percent clay, 40 percent medium- to fine-grained sand. CLAY: Plasticity low, dry strength low, dilatancy none.
930	940	LEAN CLAY: 80 percent clay, 20 percent fine sand. CLAY: Plasticity high, dry strength, high, dilatancy none. Clay as balls.
940	960	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
960	980	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
980	990	LEAN CLAY: 85 percent clay, 15 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
990	1000	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
1000	1020	LEAN CLAY: 85 percent clay, 15 percent fine sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1020	1040	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1040	1050	LEAN CLAY: 85 percent clay, 15 percent fine- to medium- grained sand. CLAY: Plasticity medium, dry strength high, dilatancy none.
1050	1070	SANDY LEAN CLAY: 55 percent clay, 45 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
1070	1080	CLAYEY SAND: Fine- grained sand, some medium-grained sand, 45 percent clay, subangular, quartz, feldspar, mica, and mafics.
1080	1090	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1090	1100	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1100	1140	LEAN CLAY: 75 percent clay, 25 percent fine-grained sand. CLAY: Plasticity medium, dry strength medium, dilatancy none.
1140	1150	LEAN CLAY: 60 percent clay, 40 percent fine- to medium- grained sand. Clay: Plasticity medium, dry strength medium, dilatancy none.
1150	1160	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1160	1180	LEAN CLAY: 90 percent clay, 10 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1180	1230	LEAN CLAY: 80 percent clay, 20 percent fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1230	1240	LEAN CLAY: 70 percent clay, 30 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1240	1260	SANDY LEAN CLAY: 60 percent clay, 40 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1260	1270	LEAN CLAY: 70 percent clay, 30 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1270	1310	LEAN CLAY: 75 percent clay, 25 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1310	1320	LEAN CLAY: 85 percent clay, 15 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1320	1340	LEAN CLAY: 90 percent clay, 10 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1340	1350	LEAN CLAY: 85 percent clay, 15 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.
1350	1360	LEAN CLAY: 90 percent clay, 10 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1360	1370	LEAN CLAY: 75 percent clay, 25 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1370	1400	LEAN CLAY: 85 percent clay, 15 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none. Clay as balls.
1400	1420	LEAN CLAY: 90 percent clay, 10 percent medium- to fine-grained sand. CLAY: Plasticity high, dry strength high, dilatancy none.

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	35	Conductor or Fill Pipe	Mild Steel	Grade: ASTM A53	0.375	20			Conductor
2	0	1050	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC
2	1050	1350	Screen	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5	Milled Slots	0.02	Sch 80 PVC
2	1350	1360	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC w/ End Cap
3	0	630	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC
3	630	870	Screen	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5	Milled Slots	0.02	Sch 80 PVC
3	870	875	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC w/ End Cap
4	0	190	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC
4	190	250	Screen	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5	Milled Slots	0.02	Sch 80 PVC
4	250	255	Blank	PVC	OD: 3.500 in. | Thickness: 0.300 in.	0.3	3.5			Sch 80 PVC w/ End Cap

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	45	Bentonite	Other Bentonite		Bentonite Annular Seal
45	300	Filter Pack	Other Gravel Pack		Monterey #3
300	400	Bentonite	Other Bentonite		Bentonite Annular Seal
400	880	Filter Pack	Other Gravel Pack		Monterey #3
880	980	Bentonite	Other Bentonite		Bentonite Annular Seal
980	1420	Filter Pack	Other Gravel Pack		Monterey #3

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	35	30
35	1420	15

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: NOR - CAL PUMP & WELL DRILLING INC (Person, Firm or Corporation)

Address	City	State	Zip
1325 BARRY ROAD	YUBA CITY	CA	95993

Signed (C-57 Licensed Water Well Contractor)	Date Signed	C-57 License Number
electronic signature received	06/16/2023	908591

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W

Latitude Deg/Min/Sec **Longitude Deg/Min/Sec**

TRS:

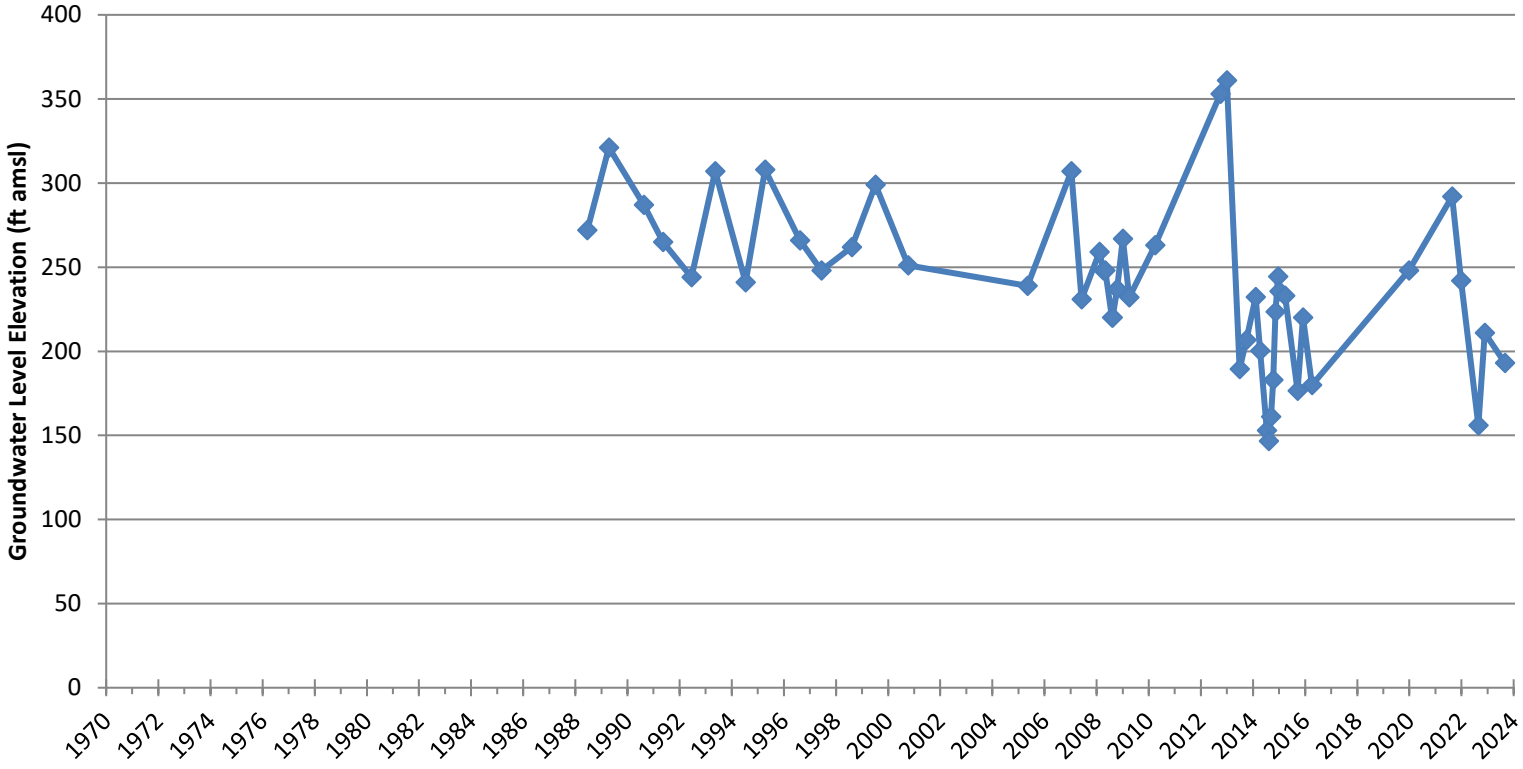
APN:

Appendix D

Driller's Logs and Hydrographs for Composite Aquifer Wells

Groundwater Hydrographs - Composite

21S/27E-27



ORIGINAL
File with DWR 21/27-27

Page ____ of ____
Owner's Well No. ____

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 498597

Date Work Began 11/12/92, Ended 11/26/92
Local Permit Agency Tulare County Envinomental Health
Permit No. 75867 Permit Date 11/11/92

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER 66 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	2	SANDY Soil
2	8	Hard pan
8	36	SANDY Soil
36	48	SAND + Boulders
48	72	Red CLAY
72	79	Fine SAND
79	86	CLAY + Gravel
86	91	SAND + Gravel in coming water
91	103	CLAY + Gravel
103	115	Joint CLAY some SAND
115	140	TAN SANDY CLAY
140	149	SAND + Gravel
149	185	TAN SANDY CLAY
185	200	[redacted] CLAY + Gravel

OUTSIDE CORC. CLAY AREA

TOTAL DEPTH OF BORING 200 (Feet)
TOTAL DEPTH OF COMPLETED WELL 200 (Feet)

WELL OWNER
Name George O Keller Hals
Mailing Address 1106 West Henderson
Porterville CA 93257
CITY STATE ZIP

WELL LOCATION
Address 1106 West Henderson
City Porterville
County Tulare
APN Book 246 Page 111 Parcel 45
or Township ____ Range ____ Section ____
or Latitude ____ DEG. ____ MIN. ____ SEC. NORTH Longitude ____ DEG. ____ MIN. ____ SEC. WEST

LOCATION SKETCH
NORTH
West Henderson (st)
1/2 mile
WEST
EAST
porterville
Hwy 65
SOUTH
Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)
___ MONITORING
WATER SUPPLY
✓ Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD CABLE Tool FLUID water

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH OF STATIC WATER LEVEL 66 (Ft.) & DATE MEASURED 11/26/92
ESTIMATED YIELD* 105 (GPM) & TEST TYPE pump
TEST LENGTH 1 1/2 (Hrs.) TOTAL DRAWDOWN 5 (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	110		✓				Steel	8	188	0
110	200			✓			Steel	8	188	1/8

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE: CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	100	✓			

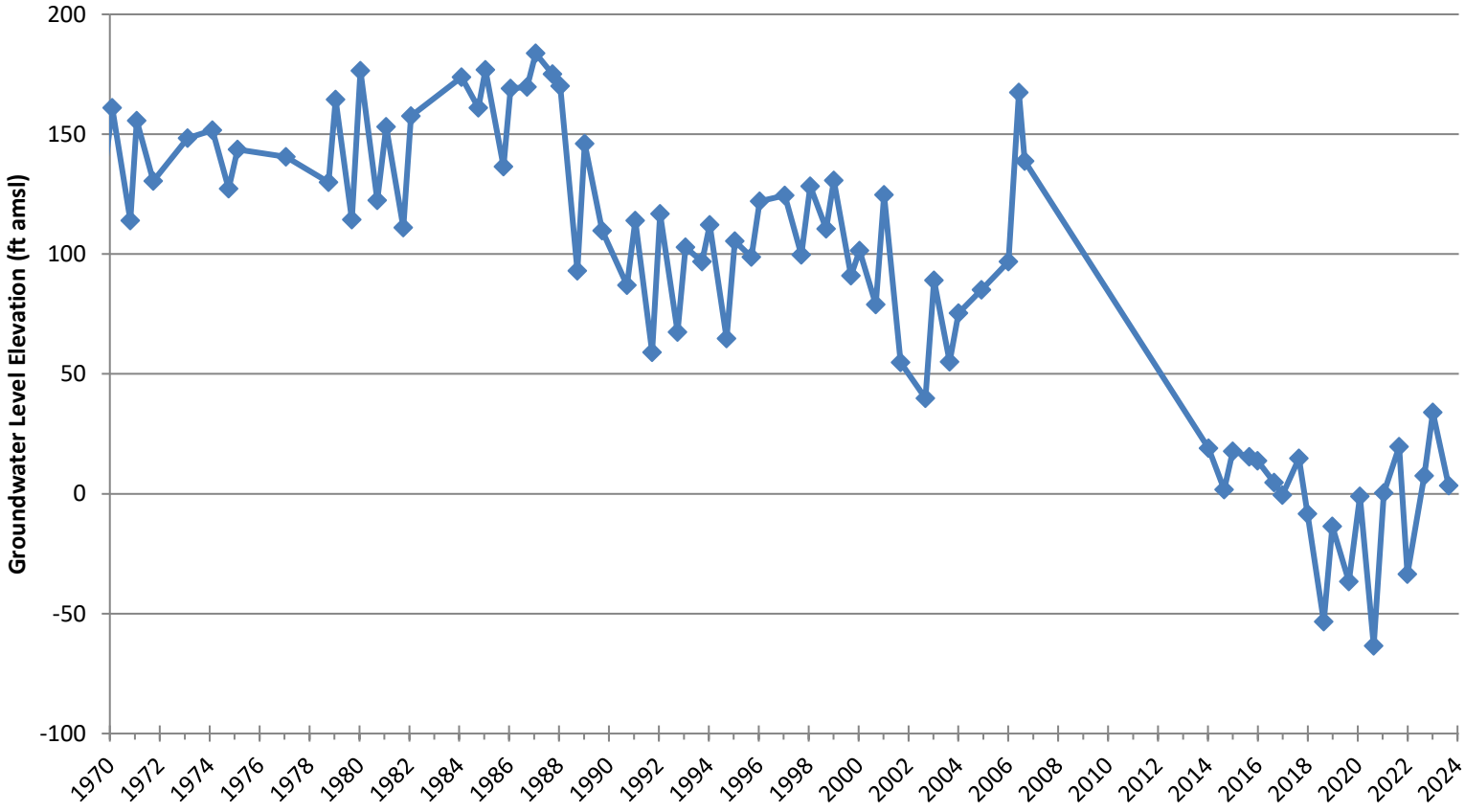
ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ____
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME Bobby Paist
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
489 South Conner Porterville CA 93257
ADDRESS CITY STATE ZIP
Signed Bobby Paist
WELL DRILLER/AUTHORIZED REPRESENTATIVE
11/30/92 DATE SIGNED
648164 C-57 LICENSE NUMBER

DWR 188 REV. 7-90
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Groundwater Hydrographs - Composite

22S/24E-01Q001M



22/24-1Q1

LOCATION NOT CHECKED

ORIGINAL - File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No._____ (Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In

№ 66984

State Well No._____

Other Well No. 22/24-1Q1

(1) OWNER:

Name Mrs. C. P. Mauser

Address 447 E/ Poplar Rd.
Porterville, Calif.

(2) LOCATION OF WELL:

County Tulare Owner's number, if any—

R. F. D. or Street No.

(3) TYPE OF WORK (*check*):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft. to	ft.	Diam.	Gage or Wall
480'		3/16"	Wall

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring

Size of gravel: 6-20

Describe joint 78 ton

(7) PERFORATIONS:

Type of perforator used

Size of perforations in., length, by in.

From ft. to	ft.	Perf. per row	Rows per ft.
480	700		
220'	perforated		

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.

Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft. to ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 90 ft.

Standing level before perforating ft.

Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☒ No If yes, by whom?

Yield: gal./min. with ft. draw down after hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Total depth 720 ft. Depth of completed well 700 ft.

Formation: *Describe by color, character, size of material, and structure.*

ft. to	ft.	
0	50	Sandy clay
50	140	Sand, clay strks.
140	152	Clay
152	230	Sand, clay strks.
230	245	Clay
245	320	Sand
320	328	Clay
328	420	Sand, clay strks.
420	440	Clay
440	550	Sand
550	572	Hard sand
572	720	Sand, clay strks.

RECEIVED
Section 7076.1, Water Code

Work started Jan. 23 1961. Completed Feb. 7 1961

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Knapp & Graham, Inc.
(Person, firm, or corporation) (Typed or printed)

Address 1155 W. Inyo St.
Tulare, Calif.

[SIGNED] Jules M. Melillo
Well Driller

License No. 193493 Dated Feb. 8, 1961

57025 6-57 50M QUIN △ SPO

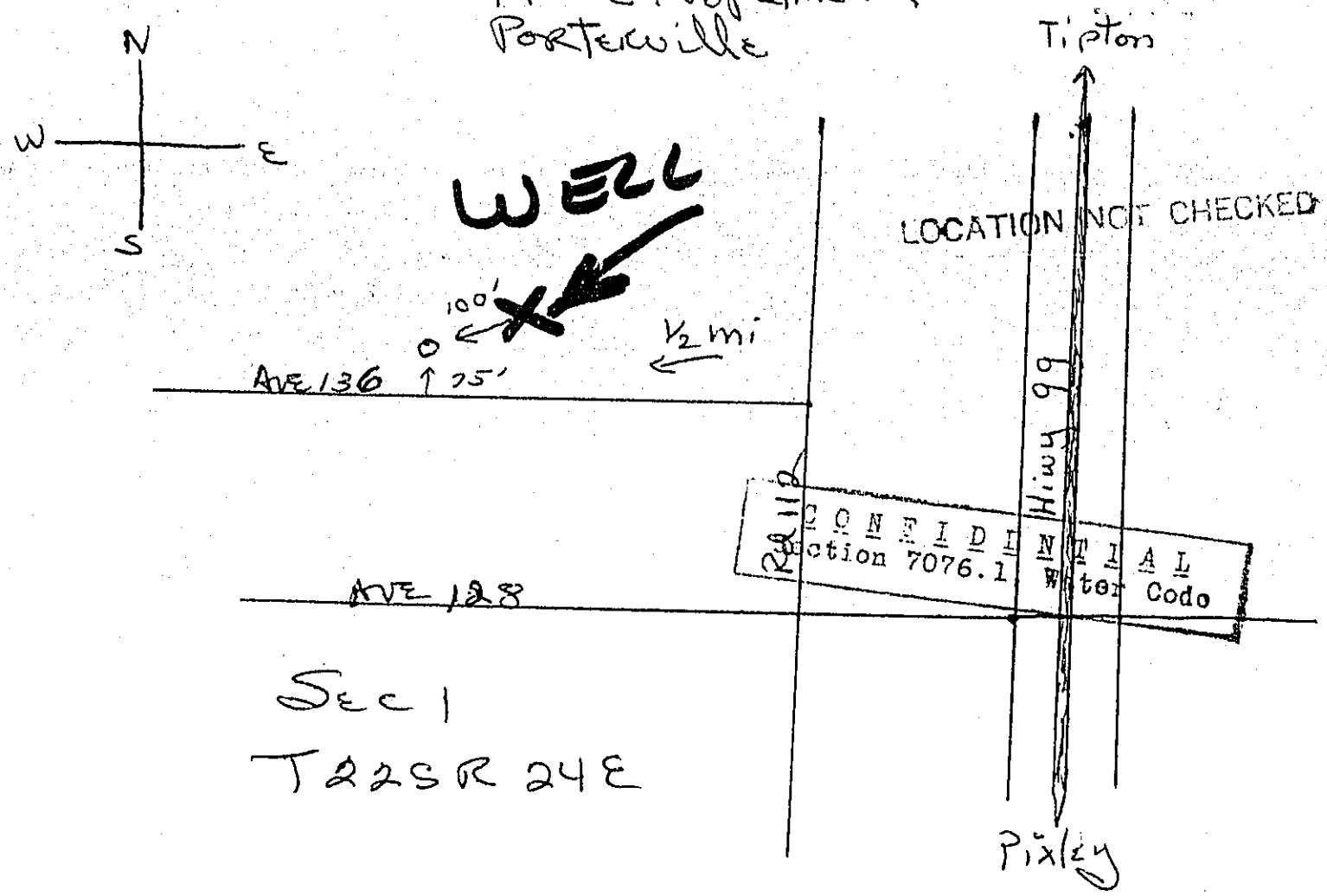
DWR 188 (REV. 3-54)

22/24-1Q1

LOCATION OF WELL

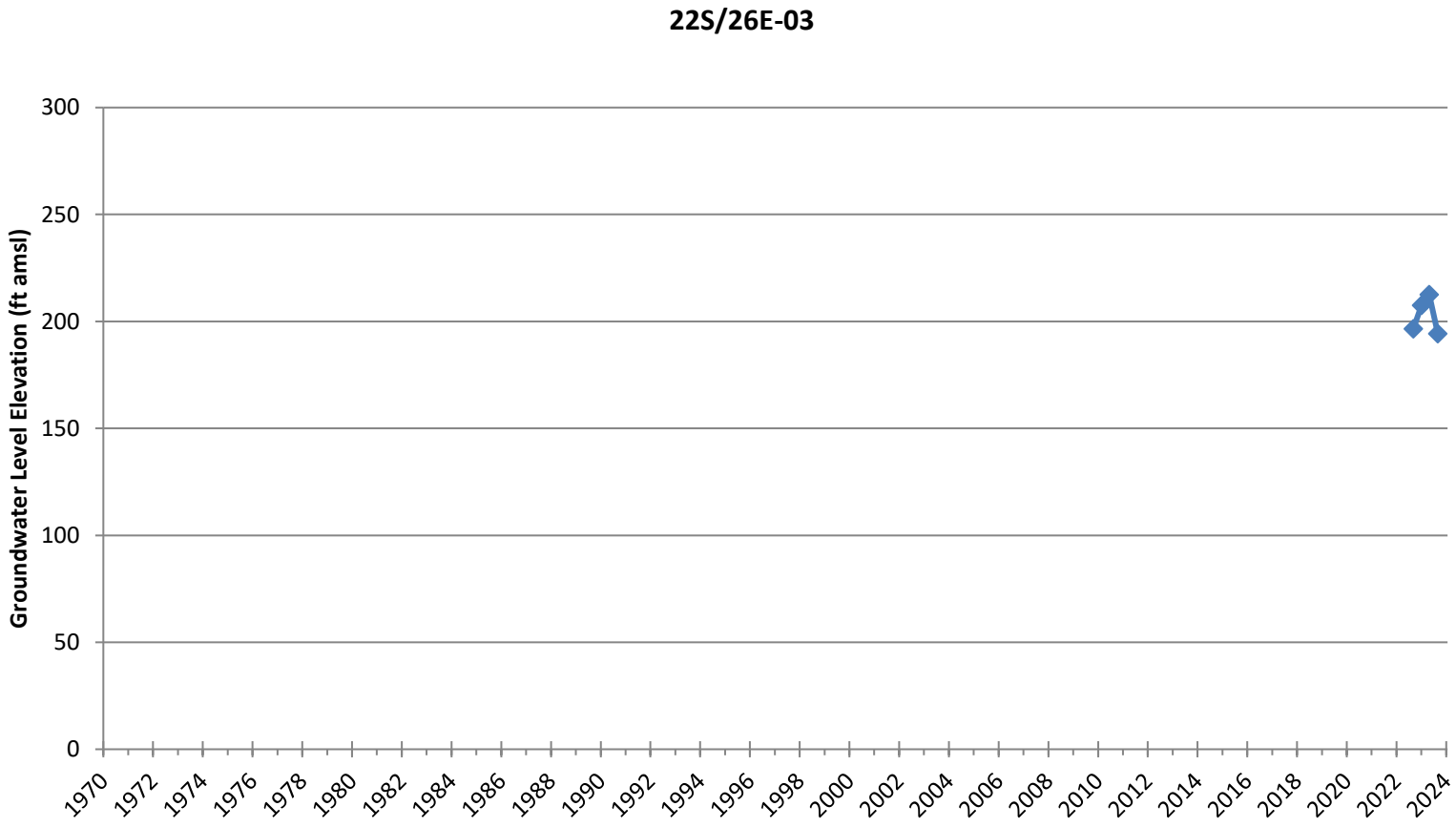
LOG # 66984

MRS. C. P. MAUSER
447 E. POPLAR RD
PORTERVILLE



SEC 1
T22S R24E

Groundwater Hydrographs - Composite



ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 286921
State Well No. 22/26-3
Other Well No.

Notice of Intent No.
Local Permit No. or Date

(1) OWNER: Name G.S. Gill
Address 3292 N. Canyon Road
City Provo, Utah ZIP 84604

(2) LOCATION OF WELL (See instructions):
County Tulare Owner's Well Number
Well address if different from above
Township 22S Range 26E Section 3
Distance from cities, roads, railroads, fences, etc. 1/8 Mile North of Ave. 136 and 200 Ft West of Rd. 192.

Rd 192
200'
AVE 136
1/8 mi

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 1/4"
Diameter of bore 24"
Packed from 0 to 604 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	604	14" O.D.	1/4"

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
120	604	.100x2½" 18-Row

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 604 ft. Completed depth 604 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	77	Sandy Clay
77	120	Sand
120	154	Clay
154	178	Sand
178	272	Sandy Clay
272	301	Sand
301	458	Sandy Clay
458	490	Sand
490	499	Clay
499	533	Sand
533	538	Clay
538	550	Sand
550	561	Sandy Clay
561	580	Sand
580	591	Clay
591	604	Sand

Work started 1-25 19 90 Completed 2-06 19 90

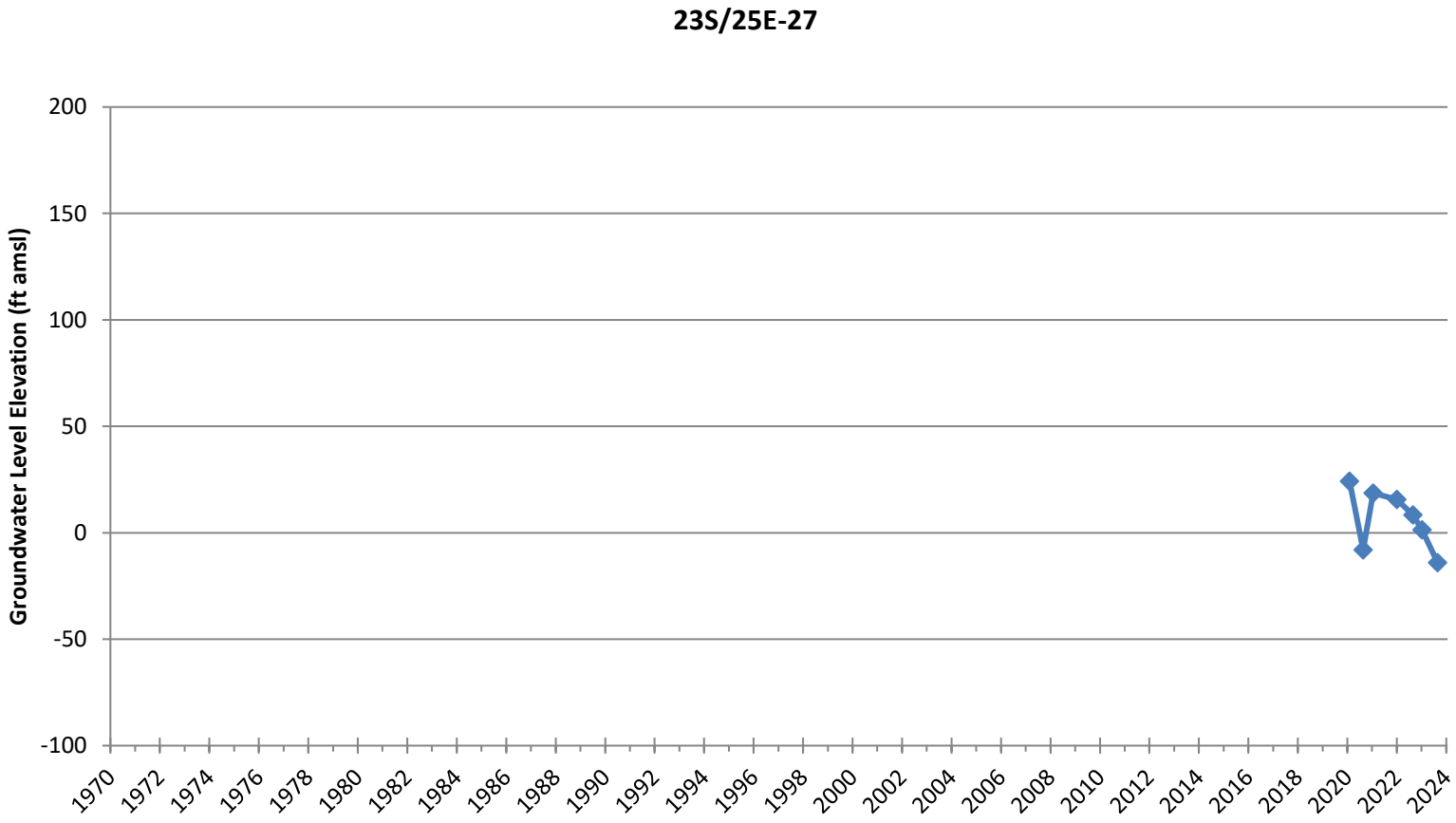
WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed (Well Driller)
NAME Whitten Pumps, Inc. (Person, firm, or corporation) (Typed or printed)
Address Rt. 1 Box 1101
City Delano, Ca ZIP 93215
License No. 148282 Date of this report 3/13/90

ONLY FOR PUBLIC USE
NOT FOR PUBLIC USE
WATER CODE SEC. 13752
OUTSIDE CORC. CLAY AREA

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR 188 (REV. 12-86) 86 96355

Groundwater Hydrographs - Composite



*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0174371

Page 1 of 2

Owner's Well Number

Date Work Began 04/01/2013 Date Work Ended 4/10/2013

Local Permit Agency Tulare County Environemental Health

Permit Number 13-0141 Permit Date 3/21/13

DWR Use Only – Do Not Fill In

235/25E 27 1/1

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Fresh Water

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	30	Conductor
30	40	Clay & Sand
40	60	Coarse Sand
60	80	Clay & Sand
80	110	Coarse Sand
110	120	Clay
120	130	Sand & Gravel
130	160	Clay
160	170	Coarse Sand
170	200	Clay
200	210	Sand
210	230	Clay
230	240	Sand
240	270	Clay
270	320	Sand & Clay
320	330	Clay
330	340	Clay & Sand
340	360	Clay
360	370	Coarse Sand
370	420	Clay
420	440	Clay & Sand
440	450	Clay
450	460	Coarse Sand
460	470	Clay
470	490	Sand & Gravel
490	510	Clay
510	520	Gravel
520	550	Clay & Sand
550	580	Sand & Gravel
580	590	Clay

Total Depth of Boring 810 Feet

Total Depth of Completed Well 800 Feet

Well Owner

Well Location

Address West Side of Road 144, 1/2 Mile N. Of Ave 56

City Earlimart County Tulare

Latitude ___ Deg. ___ Min. ___ Sec. N Longitude ___ Deg. ___ Min. ___ Sec. W

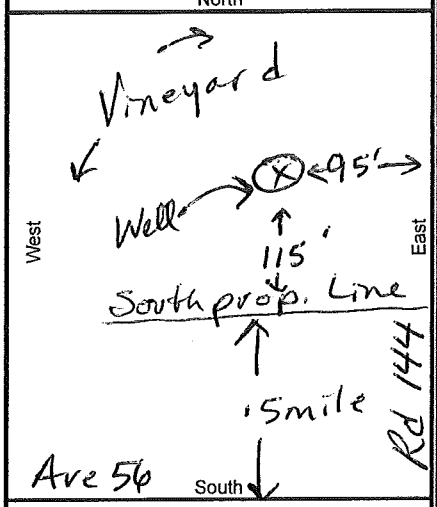
Datum ___ Decimal Lat. ___ Decimal Long. ___

APN Book 318 Page 110 Parcel 010

Township 23 Range 25 Section 27

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

- ⦿ New Well
- ○ Modification/Repair
  - ○ Deepen
  - ○ Other
- ○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

- ⦿ Water Supply
  - ☐ Domestic ☐ Public
  - ☑ Irrigation ☐ Industrial
- ○ Cathodic Protection
- ○ Dewatering
- ○ Heat Exchange
- ○ Injection
- ○ Monitoring
- ○ Remediation
- ○ Sparging
- ○ Test Well
- ○ Vapor Extraction
- ○ Other

Water Level and Yield of Completed Well

Depth to first water ___ (Feet below surface)

Depth to Static Water Level ___ (Feet) Date Measured ___

Estimated Yield * ___ (GPM) Test Type ___

Test Length ___ (Hours) Total Drawdown ___ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	30	44	Conductor	Low Carbon Steel	.250	30		
0	300	28	Blank	Low Carbon Steel	.312	16		
300	800	28	Screen	Low Carbon Steel	.312	16	Louver	0.090

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	30	Cement	Conductor
0	810	Filter Pack	Birdseye Gravel

Attachments

- ☐ Geologic Log
- ☐ Well Construction Diagram
- ☐ Geophysical Log(s)
- ☐ Soil/Water Chemical Analyses
- ☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

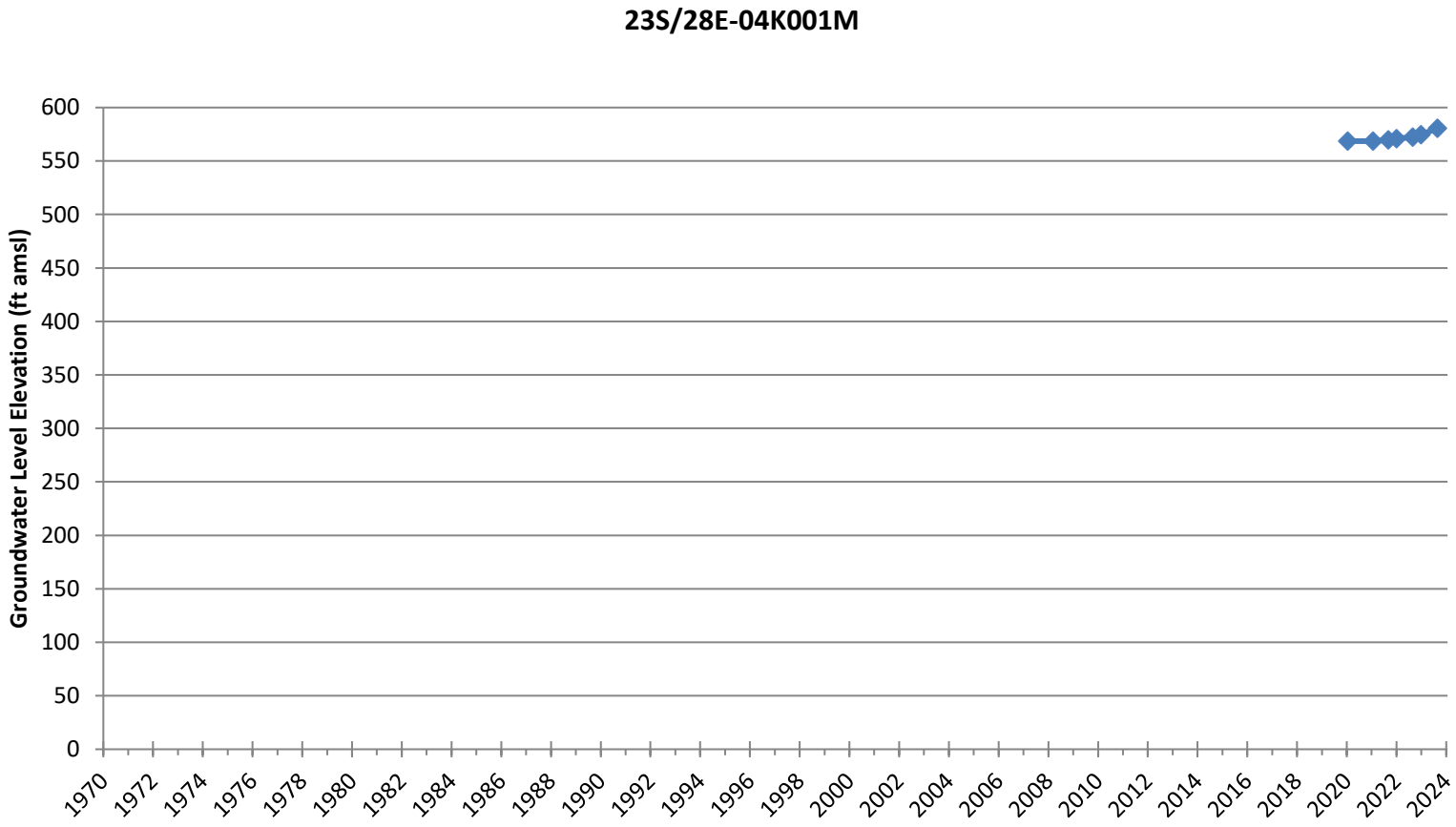
Name Johnson Drilling Corp (Person, Firm or Corporation)

PO BOX 769 (Address) McFarland (City) CA (State) 93250 (Zip)

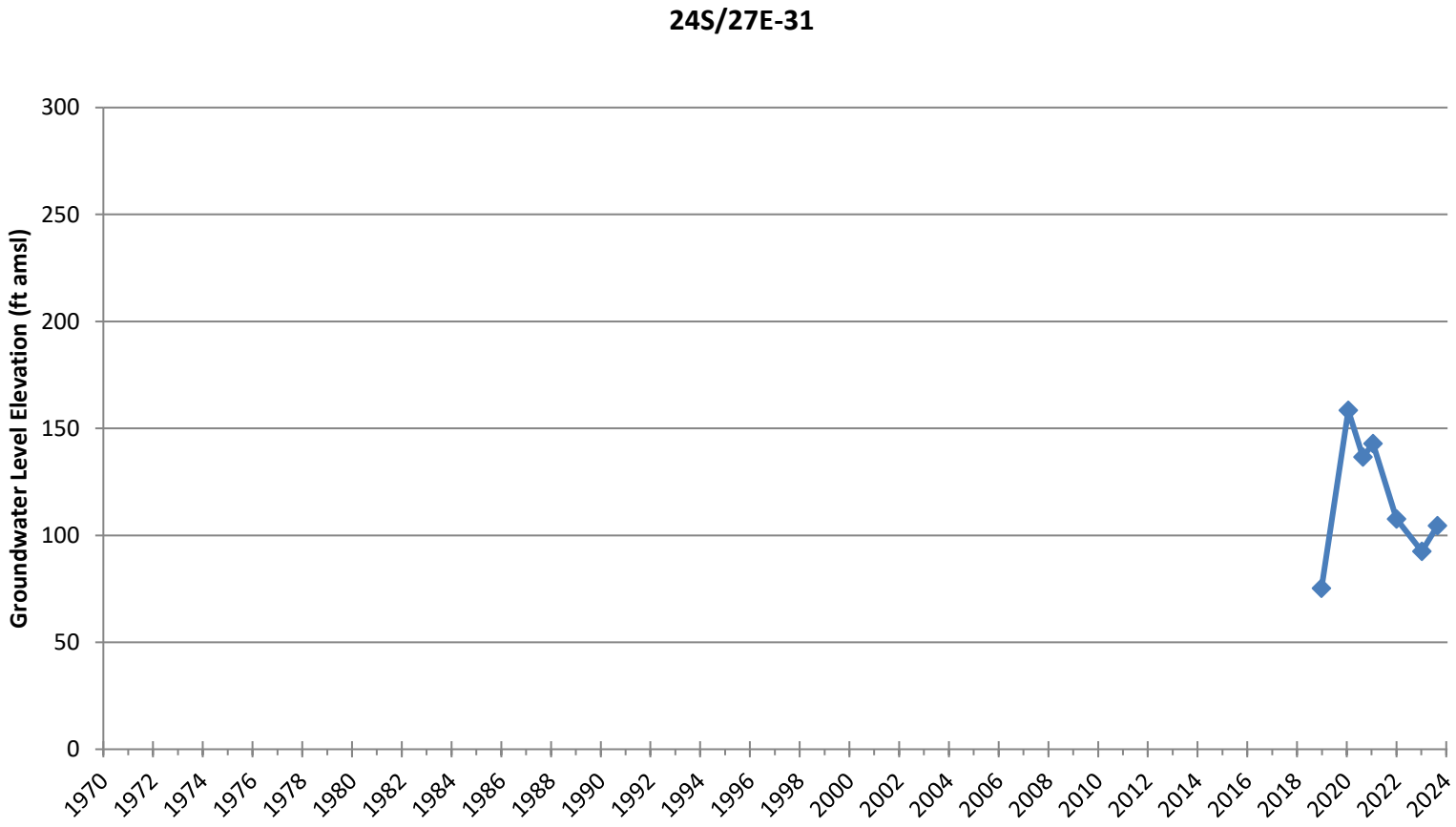
Signed ___ (C-57 Licensed Water Well Contractor) 4/10/2013 (Date Signed) 876307 (C-57 License Number)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Groundwater Hydrographs - Composite



Groundwater Hydrographs - Composite



ORIGINAL
File with DWR

Page 1 of 2

Owner's Well No. 5

Date Work Began 3-6-92, Ended

Local Permit Agency Tulare County Environmental Health

Permit No. Permit Date 2-25-92

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489110

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO. 24S/27E-31

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	5	Top Soil
5	16	Cemented Sand
16	27	Tan Clay 90%-Sand 10%
27	40	Sand 40% - Gravel 60%
40	48	Cemented Sand
48	60	Tan Clay 60% - Brown Clay40%
60	70	Gravel 80% - Clay 20%
70	90	Gravel 60% - Sand 40%
90	110	Clay 60% - Gravel 40%
110	120	Sand Gravel
120	130	Clay - Gravel
130	160	Gravel - Clay
160	170	Gravel
170	190	Gravel - Clay
190	200	Gravel - Sand
200	210	Clay - Gravel
210	220	Gravel
220	240	Gravel - Clay
240	250	Clay - Gravel
250	270	Gravel - Clay
270	290	Clay - Gravel
290	360	Gravel - Clay
360	400	Clay 60% - Gravel 40%
400	450	Clay 80% - Gravel 20%
450	470	Gravel 60% - Clay 40%
470	500	Clay 80% - Gravel 20%
500	530	Gravel 90% - Clay 10%
530	570	Tan Clay 80%-Sandy Gravel20%
570	590	Clay 80% - Sand 20%
590	600	Gravel 70% - Clay 30%

TOTAL DEPTH OF BORING 850 (Feet)

TOTAL DEPTH OF COMPLETED WELL 850 (Feet)

WELL OWNER

Name Richgrove Community Services Dis

Mailing Address P.O. Box 86

Richgrove California 93261

CITY STATE ZIP

WELL LOCATION

Address Lot 15A Tract 667

City Richgrove

County Tulare

APN Book 340 Page 020 Parcel 13

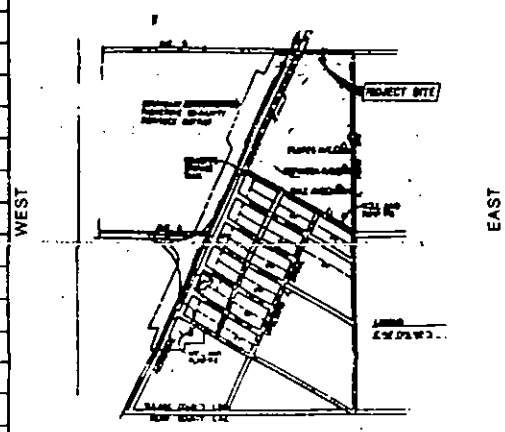
Township 24 Range 27 Section 31

or

Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG MIN. SEC WEST

LOCATION SKETCH

NORTH



SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deeper

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

X Domestic

___ Public

___ Irrigation

___ Industrial

___ TEST WELL

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Water

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 328' (Ft.) & DATE MEASURED

ESTIMATED YIELD* 7.24 (GPM) & TEST TYPE 1800 Mano

TEST LENGTH 14½ (Hrs.) TOTAL DRAWDOWN 151.7 (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	60	42"			X		A139B CB	30"	.250	X
0	490	28"				X	B	4"	.250	X
0	480	28"	X				A139B CB	16"	.312	X
480	510	28"		X			A139B CB	16"	.312	3/32"
510	560	28"	X				A139B CB	16"	.312	X
560	720	28"		X			A139B CB	16"	.312	3/32"

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
5	60	X			10sk sa s
0	462	X			9sk sa s

ATTACHMENTS (✓)

X Geologic Log

___ Well Construction Diagram

X Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

NAME Bakersfield Well & Pump Co., Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1600 E. California Ave., Bakersfield CA 93307
ADDRESS CITY STATE ZIP

Signed [signature] 4-9-92 551820
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

2/2

ORIGINAL
File with DWR

Page 2 of 2

Owner's Well No. 5

Date Work Began 3-6-92 Ended

Local Permit Agency Tulare County Environmental Health

Permit No. Permit Date 2-25-92

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489111

DWR USE ONLY — DO NOT FILL IN

24S/27E-13/1

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
600	620	Clay 60% - Gravel 40%
620	630	Clay 80% - Shale 20%
630	650	Clay 70% - Gravel 30%
650	670	Clay 70% - Gravel 20% Shale 10%
670	700	Clay 60% - Gravel 40%
700	710	Clay 80% - Sand 20%
710	720	Brown Clay 40, Gray Clay 50, Sand 10
720	730	Gravel 60% - Shale 40%
730	760	Clay 60% - Shale 40%
760	780	Clay 90% - Sand 10%
780	800	Clay 60% - Gravel 40%
800	840	Blue Clay 80, Sand 10, Gravel 10%
840	850	Blue Clay 70, Gravel 20, Shale 10%

TOTAL DEPTH OF BORING ___ (Feet)

TOTAL DEPTH OF COMPLETED WELL ___ (Feet)

WELL OWNER

Name Richgrove Community Services Di

Mailing Address P.O. Box 86

Richgrove California 93261

CITY STATE ZIP

WELL LOCATION

Address Lot 15A Track 667

City Richgrove

County Tulare

APN Book 340 Page 020 Parcel 13

or Township 24 Range 27 Section 31

or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

X Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ___ FLUID ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
720	760	28"	X				A139B CB	16"	.312	X
760	830	28"		X			A139B CB	16"	.312	3/32"
830	850	28"	X				A139B CB	16"	.312	X

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

X Geologic Log

___ Well Construction Diagram

X Geophysical Log(s)

___ Soil, Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

NAME Bakersfield Well & Pump Co., Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1600 E. California Avenue, Bakersfield CA 93307
ADDRESS CITY STATE ZIP

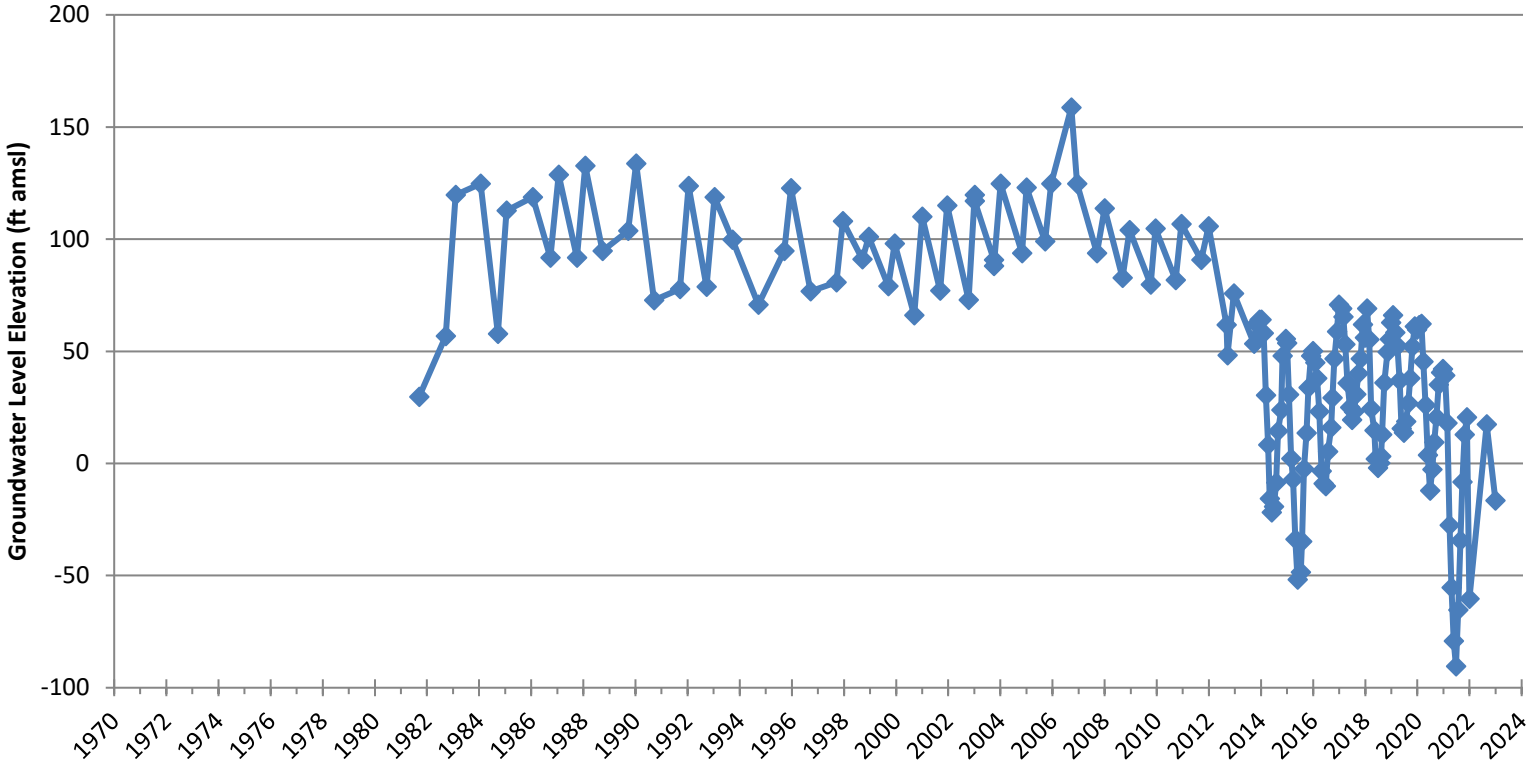
Signed [signature] 4-9-92 551820
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C57 LICENSE NUMBER

Appendix E

Driller's Logs and Hydrographs for Santa Margarita Aquifer Wells

Groundwater Hydrographs - Santa Margarita

24S/27E-32M001M



24/27-32

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No. 5
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

LOCATION NOT CHECKED

Do Not Fill In
No. 48319

State Well No.
Other Well No. 24/27-32

(1) OWNER:
Name Martin Gutunich
Address Rt. 1. Box 235
Delano, California

(2) LOCATION OF WELL:
County Kern Owner's number, if any—
R. F. D. or Street No.
About 1½ miles east of Old 65 at Kern Tulre line ¼ north

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft. to ft.	Diam.	Gage or Wall
1800 ft.	14"	x ¼"

Type and size of shoe or well ring
Describe joint

If gravel packed

Diameter of Bore	from ft.	to ft.
24"	0	1800

Size of gravel: 3/8"

(7) PERFORATIONS:
Type of perforator used Machine
Size of perforations 1/8" x 1 cc in., length, by in.

From ft. to ft.	Perf. per row	Rows per ft.
500 ft.	1/8" x 1 cc	

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata

From ft. to ft.

Method of Sealing Cement

(9) WATER LEVELS:
Depth at which water was first found ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 1800 ft. Depth of completed well 1800 ft.
Formation: *Describe by color, character, size of material, and structure.*

From ft.	to ft.	Formation
0	145	Sand
145	185	Coarse Sand
185	255	Sandy Clay
255	258	Sand
258	464	Sandy Clay
464	474	Hard Sandy Clay
474	504	Sandy Clay
504	512	Hard Sandy Clay
512	529	Clay
529	569	Blue Clay
569	574	Hard Slate
574	577	Sand
577	600	Sandy Clay
600	604	Hardd Slate
604	662	Blue Clay
662	734	Shale
734	803	Clay
803	810	Hard Shale
810	868	Clay & Shale
868	932	Sediment
932	936	Sand
936	985	Rotten Shale
985	988	Sand
988	1028	Blue Shale
1028	1118	Shale
1118	1185	Sediment & Shale
1185	1190	Sand
1190	1228	Sediment & Shale
1228	1234	Sand
1234	1269	Sediment & Shale
1269	1300	Tough Shale
1300	1303	Sand
1303	1451	Hard Shale
1451	1501	Clay & Shale Soft
1501	1537	Hard Shale
1537	1574	Blue Shale
1574	1585	Hard Shale
1585	1665	Sandy
1665	1690	Hard Shale
1690	1714	Sandy
1714	1728	Hard Shale
1728	1750	Hard Gray Sand
1750	1775	Soft Shale
1775	1800	Sand & Soft Shale

Work started 19 Completed 19

WELL DRILLER'S STATEMENT: 4/27/59 to 5/12/59
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Whitten Pumps Inc.
(Person, firm, or corporation) (Typed or printed)
Address 1744 High St.
Delano, California

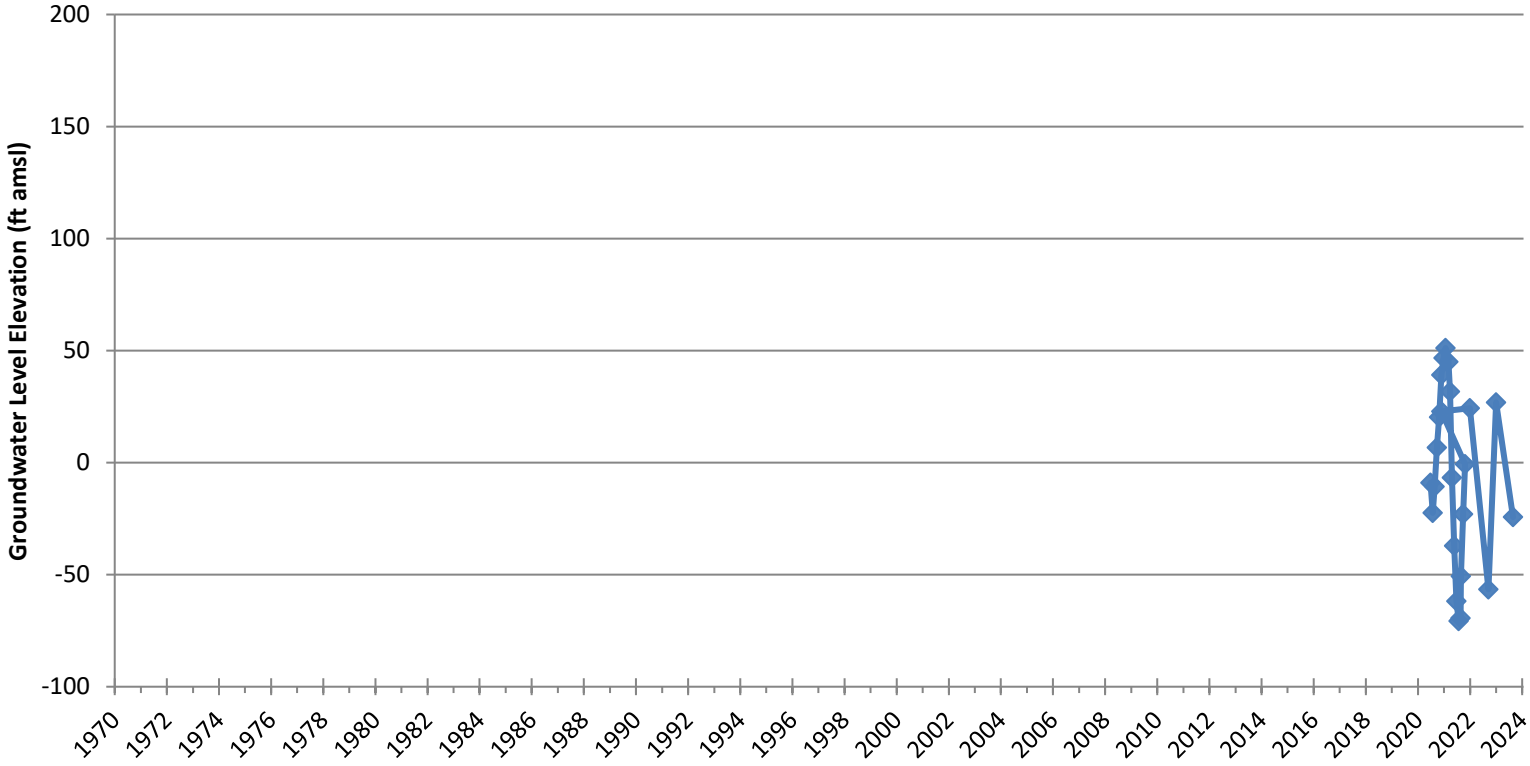
[SIGNED] Donald E. Whitten
Well Driller

License No. 148282 Dated , 19

DWR FORM NO. 246 (REV. 2-54)

Groundwater Hydrographs - Santa Margarita

TSMW-6SM



State of California

Well Completion Report

Form DWR 188 Submitted 1/7/2021
WCR2021-000188

Owner's Well Number: TSMW-6SM | Date Work Began: 03/05/2020 | Date Work Ended: 06/20/2020

Local Permit Agency: Tulare County Environmental Health Services Division

Secondary Permit Agency: | Permit Number: 2000070 | Permit Date: 02/24/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: KERN-TULARE WATER DISTRICT,

Mailing Address: 881 W Morton Ave

City: Porterville | State: ca | Zip: 93257

Planned Use and Activity

Activity: New Well

Planned Use: Monitoring

Well Location

Address:

City: | Zip: | County: Tulare

Latitude: 35 Deg. 49 Min. 57.36 Sec. N | Longitude: -119 Deg. 4 Min. 32.8799 Sec. W

Dec. Lat.: 35.8326 | Dec. Long.: -119.0758

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: | Location Determination Method:

APN: 339-120-019

Township:

Range:

Section:

Baseline Meridian:

Ground Surface Elevation:

Elevation Accuracy:

Elevation Determination Method:

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Reverse Circulation | Drilling Fluid: Water

Total Depth of Boring: 2020 Feet

Total Depth of Completed Well: 1955 Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)

Depth to Static Water Level: 493 (Feet) | Date Measured: 06/11/2020

Estimated Yield*: 46 (GPM) | Test Type: Pump

Test Length: 18 (Hours) | Total Drawdown: 13 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	10	POORLY GRADED SAND WITH SILT
10	20	POORLY GRADED SAND
20	30	POORLY GRADED SAND WITH SILT
30	80	POORLY GRADED SAND
80	110	CLAYEY SAND
110	120	LEAN CLAY WITH SAND
120	130	POORLY GRADED SAND
130	190	LEAN CLAY WITH SAND
190	240	LEAN CLAY WITH SAND
240	250	LEAN CLAY
250	280	CLAYEY SAND
280	290	LEAN CLAY
290	300	LEAN CLAY WITH SAND
300	310	CLAYEY SAND
310	320	LEAN CLAY

320	330	LEAN CLAY WITH SAND
330	340	LEAN CLAY
340	350	LEAN CLAY WITH SAND
350	450	LEAN CLAY
450	480	CLAYEY SAND
480	490	POORLY GRADED SAND WITH CLAY
490	500	LEAN CLAY
500	510	LEAN CLAY WITH SAND
510	520	LEAN CLAY
520	530	POORLY GRADED SAND WITH CLAY
530	540	LEAN CLAY
540	560	POORLY GRADED SAND WITH CLAY
560	590	LEAN CLAY
590	600	POORLY GRADED SAND WITH CLAY
600	630	LEAN CLAY
630	640	POORLY GRADED SAND WITH CLAY
640	690	LEAN CLAY
690	700	CLAYEY SAND
700	710	LEAN CLAY WITH SAND
710	750	LEAN CLAY
750	760	CLAYEY SAND
760	770	LEAN CLAY WITH SAND
770	790	LEAN CLAY
790	820	CLAYEY SAND
820	850	LEAN CLAY
850	870	CLAYEY SAND
870	890	LEAN CLAY
890	910	SILTY SAND
910	940	LEAN CLAY
940	980	SILT
980	990	POORLY GRADED SAND WITH CLAY
990	1010	POORLY GRADED SAND
1010	1040	SILT
1040	1060	SILT WITH SAND
1060	1080	SILT
1080	1090	LEAN CLAY
1090	1130	SILT
1130	1240	LEAN CLAY
1240	1250	LEAN CLAY WITH SAND
1250	1350	LEAN CLAY
1350	1360	SILTY SAND
1360	1370	CLAYEY SAND
1370	1380	SILT WITH SAND
1380	1390	SILTY SAND
1390	1400	SILT WITH SAND
1400	1410	SILT WITH SAND
1410	1420	LEAN CLAY
1420	1430	SILT WITH SAND

1430	1440	LEAN CLAY WITH SAND
1440	1450	SILT WITH SAND
1450	1460	POORLY GRADED SAND WITH SILT
1460	1530	LEAN CLAY WITH SAND
1530	1540	LEAN CLAY
1540	1550	LEAN CLAY WITH SAND
1550	1560	CLAYEY SAND
1560	1570	POORLY GRADED SAND WITH CLAY
1570	1580	LEAN CLAY
1580	1590	LEAN CLAY WITH SAND
1590	1630	POORLY GRADED SAND WITH CLAY
1630	1640	POORLY GRADED SAND
1640	1660	POORLY GRADED SAND WITH SILT
1660	1670	POORLY GRADED SAND
1670	1680	POORLY GRADED SAND WITH SILT
1680	1690	SILT WITH SAND
1690	1700	CLAYEY SAND
1700	1710	POORLY GRADED SAND WITH SILT
1710	1740	LEAN CLAY
1740	1750	CLAYEY SAND
1750	1760	LEAN CLAY WITH SAND
1760	1780	SILTY SAND
1780	1790	LEAN CLAY WITH SAND
1790	1800	SILTY SAND
1800	1830	LEAN CLAY
1830	1840	POORLY GRADED SAND WITH CLAY
1840	1850	POORLY GRADED SAND
1850	1860	CLAYEY SAND
1860	1870	POORLY GRADED SAND WITH SILT
1870	1880	LEAN CLAY WITH SAND
1880	1890	CLAYEY SAND
1890	1900	SILTY SAND
1900	1910	POORLY GRADED SAND WITH CLAY
1910	1920	POORLY GRADED SAND
1920	1930	POORLY GRADED WITH SILT
1930	1950	LEAN CLAY WITH SAND
1950	1960	LEAN CLAY
1960	1970	SILT WITH SAND
1970	1980	LEAN CLAY WITH SAND
1980	2000	LEAN CLAY
2000	2020	LEAN CLAY WITH SAND

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	30	Conductor or Fill Pipe	Low Carbon Steel	Grade: ASTM A53	0.375	20			MILD STEEL CONDUCTOR CASING
2	0	1600	Blank	Low Carbon Steel	Grade: ASTM A53	0.375	5.563			casing has 2' stick up above ground
2	1600	1950	Screen	Low Carbon Steel	Grade: ASTM A53	0.375	5.563	Milled Slots	0.06	Vertical Mill Slot Well Screen
2	1950	1955	Blank	Low Carbon Steel	Grade: ASTM A53	0.375	5.563			BLANK CASING WITH END CAP

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	30	Cement	Portland Cement/Neat Cement		
0	1495	Cement	Portland Cement/Neat Cement		
1495	1500	Other Fill	See description.	#60	FINE #60 SAND
1500	1955	Filter Pack	Other Gravel Pack	4x16	4 x 16 gradation
1955	2020	Filter Pack	Other Gravel Pack	4x16	

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	30	36
30	2020	17

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: NOR - CAL PUMP & WELL DRILLING INC
Person, Firm or Corporation

1325 BARRY ROAD (Address) | YUBA CITY (City) | CA (State) | 95993 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 01/07/2021 (Date Signed) | 908591 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

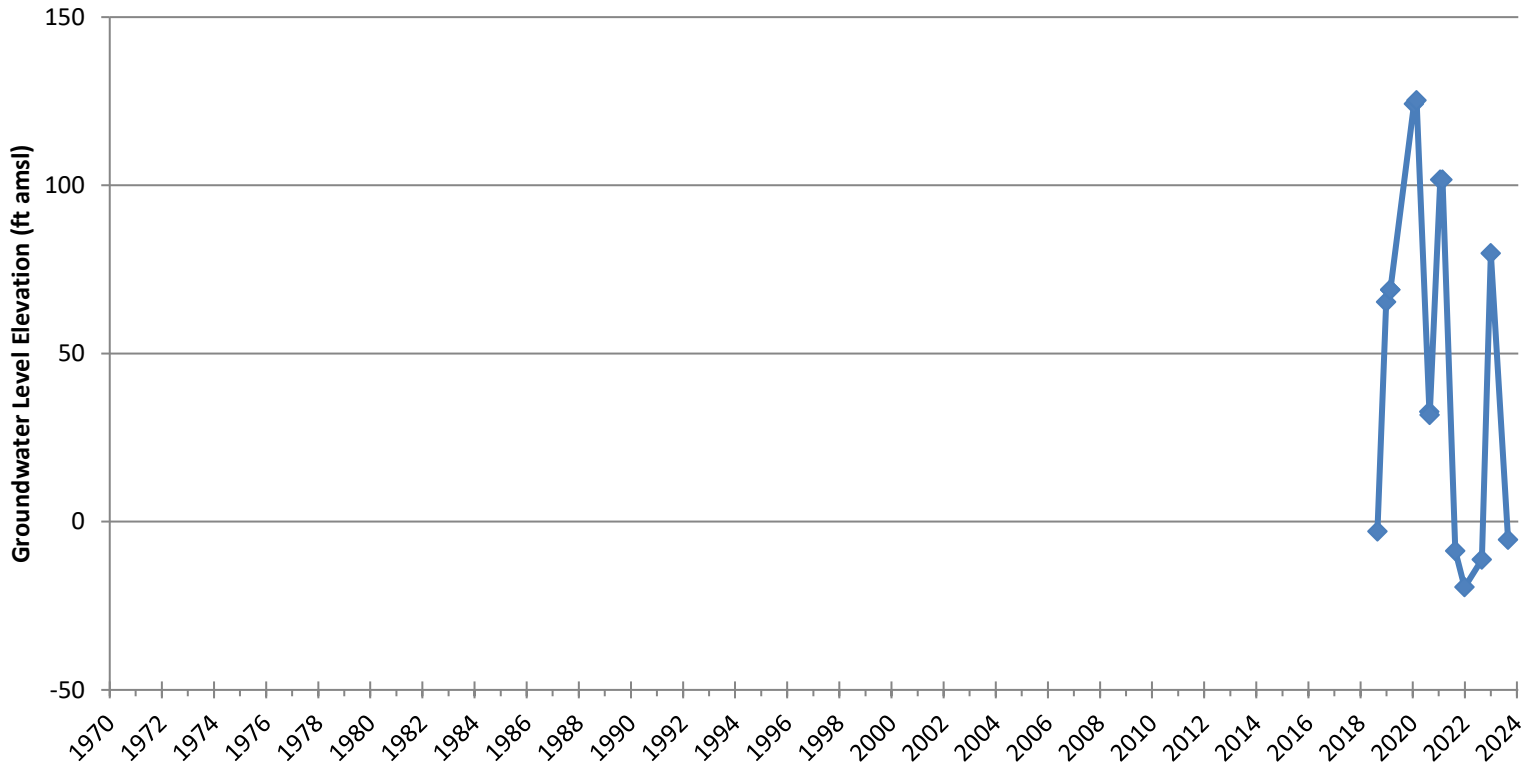
W — Longitude Deg/Min/Sec

TRS:

APN:

Groundwater Hydrographs - Santa Margarita

23S/27E-27



ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0925804

DWR USE ONLY — DO NOT FILL IN
23S/27E-27
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. North
Date Work Began 6-4-04, Ended 8-20-04
Local Permit Agency Tulare County Environmental Health
Permit No. 5400542 Permit Date 5-19-04

GEOLOGIC LOG

ORIENTATION (✓) x VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Reverse Circulation FLUID Poly Bore

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	60	Clay & Gravel
60	200	Sand & Clay
200	240	Sand & Little Clay
240	370	Sand & Grey Clay
370	380	Clay & Little Sand
380	390	Green Clay & Sand
390	400	Clay & Little Sand
400	410	Sand & Clay
410	440	Green Clay & Sand
440	540	Green Clay & Fine Sand
540	550	Green Clay Sand & Little Rock
550	930	Sand & Grey Clay
930	940	Grey Clay
940	960	Fine Sand & Grey Clay
960	1000	Sand Grey Clay & Shell
1000	1060	Sand & Grey Clay
1060	1090	Sand Grey Clay & Little Rock
1090	1150	Sand & Grey Clay
1150	1230	Sand Shell & Grey Clay
1230	1270	Shell & Grey Clay
1270	1290	Fine Sand & Shell , Grey Clay
1290	1380	Fine Sand & Grey Clay
1380	1430	Grey Clay
1430	1460	Fine Sand & Grey Clay
1460	1500	Grey Clay

TOTAL DEPTH OF BORING 1425 (Feet)
TOTAL DEPTH OF COMPLETED WELL 1405 (Feet)

WELL OWNER
Name Ducor Community Services Dist
Mailing Address P.O.Box 137
Ducor CA 93218
CITY STATE ZIP

WELL LOCATION
Address 1/4 Mile N. of Ave 56 75' West Brady
City Ducor
County Tulare
APN Book 321 Page 080 Parcel 025
Township 23 Range 27E Section 27
Lat ___ N (DEG. MIN. SEC.) Long ___ W (DEG. MIN. SEC.)

LOCATION SKETCH
NORTH
WEST EAST
100' X
75'
1/4 mile
Brady Rd
Ave 56
HWY 65
SOUTH
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)
x NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)
WATER SUPPLY
___ Domestic x Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 502 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 502 (Ft.) & DATE MEASURED 7-26-04
ESTIMATED YIELD * 550 (GPM) & TEST TYPE Constant/ Flowmeter
TEST LENGTH 24 (Hrs.) TOTAL DRAWDOWN 97 (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	42			x		ASTM 139	30	5/16	
+2	1015	26	x				ASTM A 606	14	5/16	
1015	1035	26	x				ASTM A 606	14	5/16	Comp Section
1035	1385	26		x			A 606 Ful Flo	14	5/16	.060
1385	1405	26	x				ASTM A 606	14	5/16	
+2	1010	26				x	A53 Grade B	3	Sch.40	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	995	x			
995	1000		x		
1000	1425				6x16
					CCST

ATTACHMENTS (✓)
___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME Bakersfield Well & Pump Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
7212 Fruitvale Ave Bakersfield CA 93308
ADDRESS CITY STATE ZIP
Signed [signature] 11-11-04 440537
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

Appendix F

Groundwater Level Field Measurement Form

Field Groundwater Level Measurements

Well Name/ Number:	Checked By:
Project:	Field Personnel:

Well Name/Owner	Date	Time	Reference Point Elevation (ft)	Depth To Groundwater (ft)	Groundwater Elevation (ft)	Instrument Type

Appendix G

Chalk/Tape Groundwater Level Measurement

Chalk/Tape Groundwater Level Measurements

Recorded By:

A	B	C	D	E	F	G	H
Well Name/Owner	Date	Time	Reference Point Elevation (ft)	Tape Measurement at Reference Point	Chalk Measurement	Depth To Groundwater (ft) (E - F)	Groundwater Elevation (ft) (D - G)

Appendix H

Quality Assurance Project Plan

ELEMENT 1: TITLE AND APPROVAL SHEETS

Draft Tule Basin Water Quality Coalition

Surface Water and Groundwater Monitoring Plan
Quality Assurance Program Plan

Revision
July 1, 2019

Approvals

_____

R.L. Schafer, RCE, RAE Date
Tule Basin Water Quality Coalition
Program Coordinator

_____

David De Groot, RCE Date
4Creeks, Inc.
Project Manager, Technical Lead

_____

Michelle Parker Date
R.L Schafer & Associates
Quality Assurance Manager, Laboratory Coordinator

_____

Belinda C. Vega, Laboratory Director Date
BSK Associates
Laboratory Program Manager

Draft Tule Basin Water Quality Coalition

Surface Water Monitoring Plan
Quality Assurance Program Plan

Revision
July 1, 2019

Approvals, cont.

_____

David Sholes, Non-Point Source/AG Planning Date
California Regional Water Quality Control Board
QAPP Review

_____

Renee Spears, Quality Assurance Officer Date
State Water Resources Control Board
QAPP Review

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APPENDICES

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D.1: BSK Associates Quality Assurance Manual (QAM)
D.2: ABC Laboratory Quality Assurance Manual (QAM)
D.3: PER Laboratory Quality Assurance Manual (QAM)

ELEMENT 3: DISTRIBUTION LIST

Coalition Contacts:

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Fresno, CA 93706

ELEMENT 4: PROJECT ORGANIZATION

Personnel

R.L. Schafer
Program Lead
Tule Basin Water Quality Coalition

Mr. Schafer graduated from the University of South Dakota, School of Mines and Technology in 1951, attended graduate school in the University of California and is a registered civil engineer in six states. Mr. Schafer specializes in water rights, hydrology, hydraulics & hydrography, water distribution systems, canals, pipelines and related structures; domestic water systems; well construction and equipment; drainage systems and flood control works. Mr. Schafer also directs land development projects, subdivisions of properties, topographic and boundary surveys and mapping thereof. Mr. Schafer has over 55 years of professional civil engineering experience representing private sector clients and numerous public districts in the San Joaquin Valley. Mr. Schafer has served as the Watermaster/Secretary of the Tule River Association since 1962, is a member of the Tulare County Water Commission, the Coordinator of the Tule Basin Water Quality Coalition, and is currently coordinating the formation and implementation of the Sustainable Groundwater Management Act in the Tule Sub-Basin.

David De Groot
Project Manager, Technical Lead
4Creeks, Inc.

Mr. De Groot graduated from Calvin College located in Grand Rapids, Michigan with his B.S. in Civil Engineering and is a registered civil engineer in the State of California. Mr. De Groot specializes in agriculture and water resource engineering, including hydrology, hydraulics, water distribution systems, canals, pipelines, waste management systems, irrigation systems, dairy design, and environmental permitting for agriculture and water related projects. Mr. De Groot has 13 years of professional engineering experience and represents many private clients and public districts within the Central Valley of California. Mr. De Groot is the Assistant Watermaster of the Tule River Association since 2009 and is the Technical Lead of the Tule Basin Water Quality Coalition.

Michelle Parker
QA Manager, Laboratory Coordinator
R.L. Schafer & Associates

Mrs. Parker has served as the Executive Assistant to R. L. Schafer and Office Manager of R. L. Schafer & Associates for 25 years, Treasurer of the Tule River Association with the responsibility for the preparation of all reports for the Tule River, along with preparation of

the Tule River Association Annual Reports. Mrs. Parker also serves as the Treasurer, Enrollment Administrator and Quality Assurance Manager for the Tule Basin Water Quality Coalition. As the QA Manager for the Coalition, Ms. Parker has the responsibility for maintaining and distributing the official approved QAPP.

Belinda C. Vega, Laboratory Director
Program Manager, BSK Associates

Ms. Vega is the Laboratory Director of BSK Associates' (**BSK**) analytical laboratory in Fresno, CA. Ms. Vega received her B.S. in Environmental Resources Engineering from Humboldt State University and has been with BSK Associates since 2018. Prior to working with BSK, Ms. Vega served as the V.P. of Operations for Torrent Laboratory. She has also served as General Manager for Test America and President of EMLab P&K. For the purposes of this QAPP, Ms. Vega will act as the Program Manager for the sampling and analytical services performed in accordance with this QAPP. Ms. Vega's responsibility in this role will be to understand the plan requirements and work in conjunction with the Coalition contacts to ensure those requirements are met by the primary and subcontract laboratories.

Michael Ng, Quality Assurance Manager
QA Manager, BSK Associates

Mr. Ng is the Quality Assurance (**QA**) Manager at BSK's Fresno Analytical Laboratory (BSK Labs). Mr. Ng received his M.S. Chemistry from California State University, Los Angeles, and has over 30 years of experience in environmental laboratory industry. He will be acting in the role of quality assurance to ensure that all data produced by BSK are of a known and documented quality, consistent with standard industry practices and the State's Environmental Laboratory Accreditation Program. Mr. Ng will be the primary point of contact for all matters related to the laboratory quality system and data quality concerns.

Stephane Maupas, Project Management and Acquisition Manager
Project Manager, BSK Associates

Mr. Maupas is the Project Management and Acquisition Manager at BSK's Fresno Analytical Laboratory (BSK Labs). Mr. Maupas received his B.S. Chemistry from California Polytechnic State University, San Luis Obispo, and has over 20 years of experience in environmental laboratory industry. He will be acting in the role of Laboratory Project Manager to ensure that each sampling and analytical event is performed in accordance with program requirements. Mr. Maupas will be the primary point of contact for the Coalition personnel, coordinating the field sampling events and analytical testing required by each monitoring event.

Contracted Laboratories

The **COALITION** has contracted with the following laboratories for chemical testing, toxicity testing, and sampling services. Sub-contracting laboratories are mentioned under each primary laboratory.

BSK Associates (**BSK**)
Fresno Analytical Laboratory
1414 Stanislaus St
Fresno, CA 93706
(559) 497-2888
(559) 485-6935 fax
www.bskassociates.com

BSK provides testing services for the chemistry and microbiology samples for Tule Basin Water Quality Coalition as well as the sampling services at all surface water monitoring sites.

Aquatic Bioassay and Consulting (**ABC**)
29 N. Olive St.
Ventura, CA 93001
(805) 643-5621
(805) 643-2930 fax
www.aquaticbioassay.com

ABC will provide the aquatic toxicity testing for the Coalition. ABC has been providing this service for the COALITION over the last several years either directly or indirectly when the district was part of the former Southern San Joaquin Valley Water Quality Coalition. ABC will serve in a subcontract role (**SUBCONTRACT LABORATORY**) to BSK.

In the event that BSK determines that the service provided by the SUBCONTRACT LABORATORY is inadequate to meet the data quality or scheduling needs of the COALITION, BSK may elect to redirect the aquatic toxicity testing to an alternate provider, namely, Pacific EcoRisk Laboratory. Similar to ABC Laboratory, Pacific EcoRisk is California ELAP certified and can perform aquatic toxicity testing that meets the data quality objectives of this QAPP.

Pacific EcoRisk Environmental Consulting and Testing (**PER**)
2250 Cordelia Road
Fairfield, CA 94534
(707) 207-7760
(707) 207-7916 fax
www.pacificecorisk.com

Should it become necessary to utilize any other subcontract laboratories other than ABC and PER, BSK will inform the COALITION as to the need for the change and provide a

letter for submission to the Regional Board to document the necessary deviation from the QAPP and to identify the new subcontract laboratories.

Laboratories used by the Coalition will be certified at a minimum under the California Environmental Laboratory Accreditation Program (**ELAP**). The laboratories listed in the QAPP will meet all Quality Assurance and Control requirements provided in this document. The selection of sub-contractors by a contracted lab must first be approved by the Coalition, and such sub-contractors must abide by the conditions set forth by the Regional Board and this QAPP document.

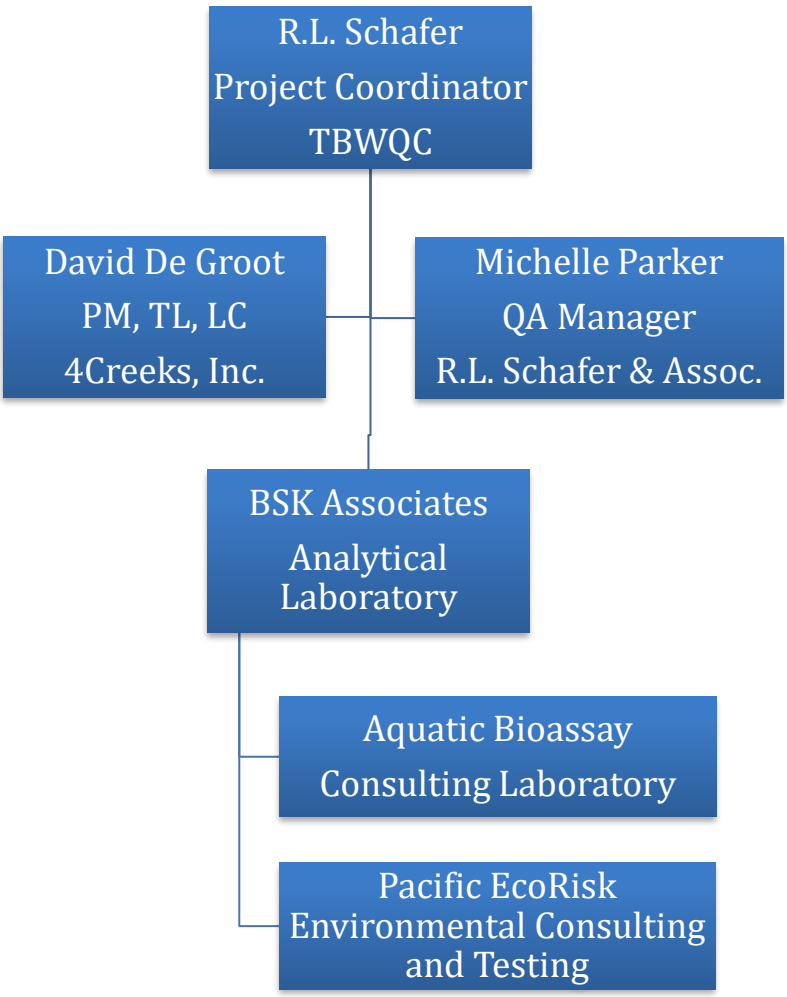

Figure 1. Organizational Chart

ELEMENT 5: PROBLEM DESCRIPTION AND BACKGROUND

Introduction

It is known that some waters of the State are negatively impacted by discharges from agricultural lands. Said discharges are likely to contain applied pesticides or chemical fertilizers that negatively impact the water quality and ecosystems present within the receiving waters. The TBWQC has conducted chemical and physical parameter testing of surface waters since 2004 on representative waterways within its boundaries, initially as part of the now dissolved Southern San Joaquin Valley Water Quality Coalition (SSJVWQC) and are currently under the California Regional Water Quality Control Board General Order R5-2013-0120.

The hydrology of the Coalition is one where surface water supplies are frequently limited, and when available in the case of Tule River, are only released from Success Reservoir to satisfy irrigation demands or flood-control. Groundwater is used by landowners where surface delivery infrastructure does not exist or when the public districts are unable to deliver irrigation water on the farmer's irrigation schedule.

This Plan is designed to monitor the constituents in Waters of the State, determine exceedances (if any), trace the source, under the Surface Water Monitoring Plan and the Groundwater Quality Trend Monitoring Workplan of the TBWQC, alter the Management Practices used to reduce/eliminate the exceedance. The Plan is further designed to provide groundwater quality (constituent) analyses as required by Order R5-2013-0120.

Project Objectives

In accordance with the requirements of the California Water Code, the Irrigated Lands Regulatory Program's Monitoring and Reporting Program Plan (MRP), the General Order objectives are to (1) categorize the current condition of the water of the state within the jurisdictional boundaries of the Coalition, (2) to identify any potential sources of pollutants that may contribute to the degradation of the water of the State, and, if identified, (3) to prevent further degradation (if any) of such water of the State as may be caused by irrigated agriculture through the implementation, where feasible, of management plans that prevent future negative impacts and eventual recovery of the waters to acceptable conditions that are protective of the identified beneficial uses.

Approaches Used

To achieve these objectives, the Coalition has implemented a Surface Water Monitoring Plan (SWMP) and a Groundwater Quality Trend Monitoring Workplan (GQTMW) with selected representative monitoring sites/wells within the TBWQC. Testing is done for physical and chemical constituents related to agricultural practices common to the region surrounding the monitoring site.

Surface water monitoring consists of monthly collection of samples at sites within natural channels that represent the beginning of irrigated agriculture, location of historic gaging stations, downstream of all sources of flow entering the waterway and other general conditions. When water is not present at the surface water sampling sites, monthly photo documentation of the monitoring sites are conducted. To maximize the occasions for surface water samples, Coalition personnel will monitor both the local agricultural irrigation schedules and the regional weather forecasts. During periods of active irrigation, regular stream flows or significant precipitation, the Coalition will conduct its monitoring events, but at the least monthly.

Groundwater monitoring consists of annual collection of samples from wells that are chosen to reflect the quality, as determined by the Coalition's Groundwater Quality Trend Monitoring Workplan (GQTMW) that employs wells in the upper most zone of first encountered groundwater as described in the Irrigated Lands Regulatory Program's MRP. Depth to groundwater measurements wells are conducted twice per year: during the Spring, normally during February for seasonal high data; and during the Fall, normally in October, for seasonal low data.

Regulatory Information

The Coalition covers essentially the center of the Tulare Lake Basin. The State has recognized that the conditions present within this Basin are distinctly different from the conditions found in the San Joaquin or Sacramento River Basins, and that the Tulare Lake Basin is closed and isolated from the San Joaquin-Sacramento River delta under normal hydrologic circumstances. As such, a separate basin plan was developed to address the Tulare Lake Basin.

Table 1 and Table 2 provide the Basin Plan Objectives (BPO) for surface water and groundwater, respectively, of the Tulare Lake Basin, as well as the spectrum of chemistries tested under the current monitoring and reporting program (MRP). Some of the BPO's for water quality are derived from standards in Title 22 of the California Code of Regulation. Many of the constituents listed do not have official numerical limits in place, although the interpretation of the narrative would lead to a zero tolerance.

Table 1: MRP Chemistries Tested for and BPOs for Tulare Lake Basin Surface Waters

CONSTITUENT	BASIN PLAN OBJECTIVE	UNITS	CONSTITUENT	BASIN PLAN OBJECTIVE	UNITS
Field Measurements			**Pesticides and 303(d) Parameters**		
Flow	-	cfs	2,4-D Acids & Salts	0.45	ug/L
EC	700	umhos/cm	Acetamiprid	0.01	ug/L
Temperature	Variable	ºC	Aldicarb	3	ug/L
pH	6.5 – 8.3	pH units	Atrazine	1	ug/L
Dissolved Oxygen	5-7 (W/C)	mg/L	Azinphos-methyl	0.01	ug/L
			Captan	0.01	ug/L
Drinking Water			Carbaryl	2.53	ug/L
E. Coli	235	MPN/100mL	Carbofuran	0.5	ug/L
TOC	NA	mg/L	Chloropicrin	8.5	ug/L
			Chlorothalonil	0.025	ug/L
General Physical			Chlorpyrifos	0.015	ug/L
Hardness	NA	mg/L	Clothianidin	0.01	ug/L
TSS	NA	mg/L	Cyanazine	1	ug/L
Turbidity	Variable	NTU	DDD	0.001	ug/L
			DDE	0.001	ug/L
Metals			DDT	0.001	ug/L
Arsenic	10	ug/L	Demeton-s	NA	ug/L
Arsenic (Dissolved)	150	ug/L	Diazinon	0.1	ug/L
Boron	700	ug/L	Dichlorvos	0.085	ug/L
Cadmium	Variable	ug/L	Dicofol	NA	ug/L
Copper	Variable	ug/L	Dieldrin	0.056	ug/L
Lead	Variable	ug/L	Dimethoate	1	ug/L
Molybdenum	10	ug/L	Disulfoton	0.05	ug/L
Nickel	Variable	ug/L	Diuron	2	ug/L
Selenium	5	ug/L	Endrin	0.036	ug/L
Zinc	Variable	ug/L	Glyphosate	700	ug/L
			Imidacloprid	0.002	ug/L
Nutrients			Linuron	1.4	ug/L
Ammonia-N	0.025	mg/L	Malathion	0.1	ug/L
Nitrate-N	10	mg/L	Mancozeb	1	ug/L
Nitrite-N	1	mg/L	Methamidophos	0.35	ug/L
Orthophosphate-P	NA	mg/L	Methidathion	0.7	ug/L
			Methiocarb	5	ug/L
Water Toxicity			Methomyl	0.52	ug/L
Ceriodaphnia dubia			Methoxychlor	0.03	ug/L
Pimephales promelas			Methyl Parathion	0.08	ug/L
Selenastrum capricornutum			Molinate	13	ug/L
Sediment Toxicity					
Hyalella azteca					

CONSTITUENT	BASIN PLAN OBJECTIVE	UNITS	CONSTITUENT	BASIN PLAN OBJECTIVE	UNITS
Pesticides and 303(d) Parameters			**Pesticides and Sediment Parameters**		
Norflurazon	0.011	ug/L	Bifenthrin	-	ng/g
Oryzalin	0.3	ug/L	Chlorpyrifos	-	ng/g
Oxamyl	50	ug/L	Cyfluthrin	-	ng/g
Oxyfluorfen	0.003	ug/L	Cypermethrin	-	ng/g
Paraquat	3.2	ug/L	Esfenvalerate	-	ng/g
Paraquat Dichloride	0.19	ug/L	Fenpropathrin	-	ng/g
Pendimethalin	0.07	ug/L	Lambda cyhalothrin	-	ng/g
Phorate	0.7	ug/L	Permethrin	-	ng/g
Phosmet	140	ug/L	Piperonyl Butoxide	-	ng/g
Pyraclostrobin	0.0029	ug/L			
Pyrethrins	0.1	ug/L			
Pyridaben	0.01	ug/L			
Simazine	4	ug/L			
Tebuconazole	0.0102	ng/L			
Thiobencarb	3.1	ng/L			
Trifluralin	5	ug/L			
Ziram	1	ug/L			

Table 2: MRP Chemistries Tested for and BPOs for Tulare Lake Basin Ground Waters

CONSTITUENT	BASIN PLAN OBJECTIVE	UNITS
Field Measurements		
EC	900-1,600	umhos/cm
Temperature	Variable	ºC
pH	6.5 – 8.3	pH units
Dissolved Oxygen	5-7 (W/C)	mg/L
Inorganic Chemicals		
Nitrate as Nitrogen (N)	10	mg/L
Total Dissolved Solids (TDS)	500-1,000	mg/L
General Minerals		
Anions		
Carbonate (as CaCO3)	NA	mg/L
Bicarbonate (as CaCO3)	NA	mg/L
Chloride	500	mg/L
Sulfate	500	mg/L
Cations		
Boron	NA	ug/L
Calcium	NA	mg/L
Sodium	NA	mg/L
Magnesium	NA	mg/L
Potassium	NA	mg/L

Program Background

Surface Water Monitoring

The requirement for a comprehensive testing program as part of the Agricultural Discharge Waiver (now Irrigated Lands Regulatory Program) was put in place July 2003 with the installation of a new discharge waiver. The program was revised in January 2008 to incorporate additional requirements for the selection of sample sites and the development of management plans, if triggered. Most recently, a new order (R5-2013-0120) adopted by the RWQCB in September 2013 for the Tulare Lake Basin which has led to the dissolution of the SSJWQC and the establishment of numerous coalitions, each focus on those concerns specific to the subbasin of the former combined coalitions.

Limited laboratory testing (water column toxicity) along with physical parameter measurements (dissolved oxygen [DO], electrical conductivity [EC], pH, and temperature)

were started on a systematic schedule in 2004. The water column toxicity tests included an evaluation of algae growth (*Selenastrum capricornutum*), fathead minnow (*Pimephales promelas*), and water flea (*Ceriodaphnia dubia*) survival. Each represents an important step in the aquatic food chain and when combined with the physical parameters, would be indicative of some form of water contamination. The laboratory test results for exceedances were transmitted to the Regional Board as an indicator of whether an exceedance existed in the Waters of the State within the Coalition.

Starting in June 2006, the testing of surface waters was expanded to include general chemistry (dissolved metals), nutrients, and pesticides that the Regional Board felt were important, and were consistent with other testing done under the Surface Water Ambient Monitoring Program (SWAMP). The surface water monitoring program was revised in 2008 to give the Coalitions greater flexibility in selecting the sampling sites, frequency of sampling, and constituents tested for as long as each change from the previous program could be adequately justified. Sampling of surface waters was increased to once per month for all monitoring sites. Reporting requirements under the program were also adjusted to quarterly reports of accumulated data (in a SWAMP compatible format) and one annual report of the data collected instead of two reports per year. The increased frequency of data reporting was to help the Regional Board see trends sooner, and the single report by the Coalitions was to help reduce costs.

The annual testing of surface waters was categorized as either Assessment or Core monitoring, with differing requirements for each. Surface water monitoring assessment sites are those sites that are new to the program and thus have no historical data associated with them.

Surface water monitoring core sites are those with historical data and are used for the monitoring of trends within the waterways of the Coalition. Both type of sites are monitored intensely for a one-year period, then only lightly sampled (lower chemistry test requirements) for the following two years, unless problems are detected during the first year.

A third type of surface water monitoring site to be monitored is a Special Project Monitoring Site, where research into a specific question is undertaken. Once sufficient data has been collected at such a site, it can be discontinued if no issues were identified.

Groundwater Quality Trend Monitoring

Previous to the implementation of the IRLP, monitoring of groundwater quality was performed under two Regional Water Quality Control Board programs: the Dairy General Order R5-2007-0035 adopted in May of 2007, and the individual Waste Discharge Requirements (WDR); along with two State Water Resources Control Board programs for the Division of Drinking Water and the Groundwater Ambient Monitoring and Assessment Program (GAMA), expanded in 2007. With the adoption of the ILRP General Order R5-2013-0120 by the RWQCB in September 2013, monitoring of waters of the State was expanded to include the determination of groundwater quality through the evaluations consisting of 1)

Groundwater Quality Assessment Report (GAR), 2) Management Practice Evaluation Program (MPEP), and 3) Groundwater Quality Trend Monitoring Program (GQTMP).

The purpose of the GAR was to provide a technical basis for the scope and level of effort for implementation of the of the General Order's groundwater monitoring and implementation provisions, accomplished by an assessment of all available, applicable, and relevant data and information to determine the high and low vulnerability areas where discharges from irrigated lands may result in groundwater quality degradation. At a minimum, the GAR is required to be reviewed and updated by the Coalition on a 5-year basis incorporating new information and data. The GAR provides the necessary foundation for design of the MPEP and GQTMP and identifies the areas where a GQTMP must be implemented. In January of 2016 the TBWQC received conditional approval on the Coalition's GAR.

The purpose for developing the MPEP was to evaluate the effectiveness of current agricultural management practices for protection of groundwater quality, consistent with the General Order requirements. The TBWQC elected to participate in the group option for developing the Management Practice Evaluation Workplan required under the General Order. The participants of the group plan include all of the Coalitions within the Tulare Lake Basin.

The GAR's initial groundwater assessment is the basis for development of the GQTMP. With the findings and data gaps identified in the GAR the TBWQC developed their Groundwater Quality Trend Monitoring Workplan (GQTMW) to further investigate the conditions of the existing groundwater quality and develop a plan for determining trends in groundwater quality for evaluation of the effects of irrigated agriculture on groundwater quality. The TBWQC received conditional approval from the Regional Board on their Groundwater Quality Trend Workplan in September 2018.

Beginning in the Fall of 2018, the TBWQC was required to begin collecting groundwater quality samples from the monitoring network included in the GQTMW and annually in the summer thereafter. Constituents required to be sampled for annually by the MRP consist of field-tested physical parameters (electrical conductivity [EC], pH, dissolved oxygen [DO], temperature) and laboratory tested inorganic chemicals (nitrate as nitrogen). In addition to the annually tested constituents, the MRP requires laboratory tested constituent of total dissolved solids [TDS], general mineral anions (carbonate, bicarbonate, chloride and sulfate) and cations (boron, calcium, sodium, magnesium and potassium) be tested initially and once every 5 years thereafter.

Decisions Made with Information Obtained from Monitoring

The purpose of any testing program is to detect a constituent exceedance in the waters of the State as the first step. The second step is to evaluate the seriousness of the detection. Once detection has been made, the approach of the Coalition is to trace the constituent exceedance to its potential source. This includes a physical survey of the

waterway for possible points of entry of applied irrigation waters (pipes, culverts, canal gates), evaluation and documentation of cropping patterns, and the eventual tracking of the application with the local agricultural commissioner. Once the likely source of the constituent exceedance has been identified, contact with the suspected grower(s) would begin so as to prevent future occurrences. A wide range of options are available, including improved irrigation waters management, changes in chemicals applied, changes in application methods, or any other procedure that would prevent the offsite movement of the detected constituent.

The data from the individual surface water and groundwater sampling points will be assessed according to the following beneficial use criteria:

Table 3: Coalition Sampling Points – Data Evaluation Criteria

Site name	Beneficial Use
Deer Creek at Road 120	Freshwater Habitat
Deer Creek at Road 176	Freshwater Habitat
Deer Creek at Road 248	Freshwater Habitat
Porter Slough near Road 192	Freshwater Habitat
Tule River at North Fork Road 144	Freshwater Habitat
Tule River at Road 92	Freshwater Habitat
White River at Road 208	Freshwater Habitat
GQTMP Supply Wells	Municipal & Domestic Supply

ELEMENT 6: PROJECT DESCRIPTION

Surface Water Sample Sites Description

The Coalition has identified seven natural channel locations where surface monitoring will be conducted under the monitoring program. The locations and schedule were identified as being the most representative of the surface waters within the Coalition boundaries. For additional details concerning the choice of the individual monitoring locations and schedule, please refer to the TBWQC Surface Water Monitoring Plan (8/4/14) and the associated addendum (2/9/15).

The monitoring locations are as follows:

1. **Deer Creek At Road 120 – Pixley, CA Site Description**

The Deer Creek at Road 120 station is located approximately 3.5 miles southwest of Pixley, CA. The land use surrounding this location is predominantly irrigated agriculture, ranging between different row crops and permanent crops. The station is located within the Pixley Irrigation District.

2. **Deer Creek At Road 176 – Pixley, CA Site Description**

The Deer Creek at Road 176 station, a stream gaging station, located approximately 6 miles southeast of Pixley, CA. The land use surrounding this station is predominantly irrigated agriculture, consisting of permanent crops and limited row crops. This station is located within the Saucelito Irrigation District.

3. **Deer Creek At Road 248 – Terra Bella, CA Site Description**

The Deer Creek at Road 248 station is located where the foothills of the Sierra Nevada Mountains meet the flat lands of the basin, approximately 2.5 miles northeast of Terra Bella, CA. At this location, the land use is primarily range land for cattle grazing. This location is not within an Irrigation District boundary.

4. **Porter Slough Near Road 192 – Porterville, CA Site Description**

The Porter Slough Near Road 192 monitoring station is located approximately 4.5 miles northwest of the City of Porterville. Porter Slough is a natural distributary of the Tule River with the head works approximately 2.5 miles downstream of Success Dam. The Porter Slough channel traverses 12 miles through the City of Porterville and Porterville Irrigation District prior to terminating into a Lower Tule River Irrigation District (LTRID) canal. The sampling point is located within Porter Slough upstream of the discharge into the LTRID canal. This monitoring station is located within the Porterville Irrigation District.

5. **Tule River At Road 144 (North Fork) – Woodville, CA Site Description**

The Tule River at Road 144 station is located approximately 3.5 northwest of Woodville, CA. The Tule River bifurcates at Road 192 into North and South Fork channels.

Downstream on the South Fork at Road 168, the South Fork further bifurcates into a Middle Fork and South Fork. At Road 144, the South Fork and Middle Fork rejoin as the South Fork and at Road 104 the South Fork and North Fork rejoin back into one main Tule River channel that continues to the Tulare Lake Bed. The Tule River at Road 144 monitoring site is located along the North Fork of the Tule River, just downstream of where a LTRID canal discharges CVP water from the Friant-Kern Canal into the Tule River. The land uses surrounding this station are predominantly agriculture, ranging from row crops to different permanent crops and is located in the northern central portion of Lower Tule River Irrigation District (LTRID).

6. Tule River At Road 92 – Tipton, CA Site Description

The Tule River at Road 92 station is located approximately 4 miles northwest of Tipton, CA. The Tule River at Road 92 station is located downstream of where the North Fork, Middle Fork, and South Fork all merge together forming a single Tule River Channel to the Tulare Lake Bed. This station is surrounded by irrigated agriculture of row crops and several permanent crops within the LTRID.

7. White River At Road 208 – Earlimart, CA Site Description

The White River at Road 208 station is located approximately 4 miles southwest of Ducor, CA. The monitoring station is located above the beginning of irrigated agriculture with the land use below this station planted predominantly with various permanent crops. The station is located within the Delano Earlimart Irrigation District (DEID).

Maps and coordinates of the sample site locations are included in Element 10 (Sampling Process Design / Monitoring Points).

Groundwater Sample Sites Description

An initial goal of the selection of groundwater sampling sites was to identify existing irrigation/domestic wells of first encountered groundwater that have adequate physical information to ensure the trends analyzed over time are reliable. The spatial coverage for the selection from existing groundwater wells of the monitoring well network is proposed to be four wells per township with one well for each nine square miles of the Township. In addition, for each "selected" well, a back-up or "secondary" well will be identified and utilized in case the selected well is damaged or is no longer in production. During the initial field verification and monitoring, the selected well will be included in the program to establish baseline groundwater depth and quality data. After the initial monitoring, only the selected well will be sampled annually. If the selected well is damaged permanently or is no longer in use, a replacement for the selected or secondary well will be identified at that time. The TBWQC covers in whole or in part twenty-nine (29) townships, identified as follows:

1. Township 21 South, Range 25 East
2. Township 22 South, Range 25 East
3. Township 23 South, Range 25 East

4. Township 23 South Range 23 East; those four townships include the communities of Tipton, Pixley, Earlimart and Alpaugh
5. Township 20 South, Range 27 East
6. Township 21 South, Range 27 East
7. Township 23 South, Range 27 East
8. Township 24 South, Range 27 East; those four townships cover the City of Porterville and the communities of Strathmore, Terra Bella, Ducor and Richgrove
9. Township 21 South, Range 26 East; covers the communities of Woodville and Poplar
10. Township 24 South, Range 24 East; covers the small community of Allensworth
11. Township 24 South, Range 25 East; covers urban sprawl of the community of Earlimart
12. Township 24 South, Range 26 East
13. Township 21 South, Range 28 East
14. Township 21 South, Range 29 East
15. Township 22 South, Range 28 East
16. Township 22 South, Range 27 East
17. The portion of the Tule Basin in Township 20 South, Range 26 East
18. Township 22 South, Range 26 East
19. Township 23 South, Range 26 East
20. The portion of Township 25 South, Range 26 East; covered by the Delano-Earlimart Irrigation District in Kern County
21. The portion of Township 21 South, Range 23 East
22. Township 22 South, Range 23 East
23. Township 24 South, Range 23 East
24. Township 21 South, Range 24 East
25. Township 22 South, Range 24 East
26. Township 23 South, Range 24 East
27. Township 23 South, Range 28 East
28. Township 24 South, Range 28 East
29. The portion of Township 22 South, Range 29 East

Map of the Tule Basin Water Quality Coalition Boundary is included in Element 10.

Summary of Work Performed for Surface Water and Groundwater Sampling

Sampling Procedures for Surface Water

The following is a description of the surface water sampling techniques to be used under this QAPP. The basic processes used to collect samples will remain unchanged from the previous MRP/QAPP although incorporation of the frequency of monitoring will require a more real-time determination of the sampling windows. Sampling, site photographs and reports will continue on a monthly basis for each surface water monitoring site.

Prior to the sampling event, physical parameter equipment will be recalibrated using known laboratory standards and according to the manufacturer's instructions. This equipment includes pH meters, EC meters, and DO meters. Known standards are brought to the field to recheck the calibration (pH, EC) at each site prior to sample collection.

Field samples of the water are collected in bottles provided by the laboratory (chemistry) or in one-gallon amber jugs specially purchased for the sampling event (water column toxicity). The containers are marked with site identification description, date and time of collection along with any preservative added by the lab on water resistant labels. Photo documentation is performed at each surface monitoring site each month.

Glass bottles are wrapped to prevent breakage during transport to the collection sites, and after collection, "blue" or gel ice packs are placed with the samples to reduce the sample temperature as low as possible in the field. Once all sampling points are collected, the samples will be transported to a location where they will be repacked for transportation to the laboratory. Samples will then be packed in "wet" ice and delivered to the laboratory on the same day of collection. The samples are packed with sufficient ice to lower the sample temperature to ≤6°C but not frozen.

Chains of custody are filled out with matching information (sample ID, sample date and time, site, and tests required) and are given to either the courier or the lab representative when the samples change hands.

The hold time for the water column toxicity samples is 36 hours, and the samples are shipped no later than the morning after collection. Ice levels are rechecked prior to shipment.

Sampling Procedures for Groundwater

The physical parameter equipment shall be calibrated at the beginning and once during each sampling day in accordance with the equipment manufacturer's specifications, as outlined in the instruction manual for the EC meter used. This equipment includes pH meter, EC meter, and DO meter.

Water supply wells shall be sampled by purging the well for a period of time adequate to purge the pump riser pipe. If the well is currently pumping, the sample may be taken

without purging the well. Water samples shall then be collected from the discharge point nearest the well head. Samples shall be collected directly into laboratory-prepared bottles. Samples may not be taken from any location after any treatment of the water for domestic use, such as from a faucet within the house.

Field measurements of temperature, pH, dissolved oxygen (DO), Electrical Conductivity (EC), will be conducted and recorded of aliquots of groundwater and not determined in the laboratory. Field water quality measurements and instrument calibration details will be recorded on the Well Sampling Record.

Efforts will be made to handle, store, and transport supplies and samples safely. Exposure to dust, direct sunlight, high temperature, adverse weather conditions, and possible contamination shall be avoided. Immediately following collection, samples shall be placed in a clean chest that contains ice or "blue" ice, and transported to the subcontracted laboratory as soon as practical. Samples should be chilled at 4°C to prevent degradation.

After samples have been collected and labeled, they shall be maintained under chain-of-custody procedures. These procedures document the transfer of custody of samples from the field to the laboratory. Each sample sent to the laboratory for analysis shall be recorded on a Chain of Custody record, which will include instructions to the laboratory for analytical services.

If the samples are to be left at a BSK sample drop-off location, the original chain-of-custody shall be sealed inside a plastic bag within the ice chest, and the chest shall be sealed with custody tape which has been signed and dated by the last person listed on the chain-of-custody. The laboratory shall sign as a receiver once samples are received.

Analytical Procedures

Once received by the laboratory, the samples will be checked for temperature and preservation requirements. Bottles will be inspected for integrity and any deviations noted as part of the sample conditions on receipt documentation. Any anomalies will be communicated to the Project Coordinator and corrective actions taken as required. At a minimum, the discrepancies will be noted as part of the Case Narrative included with the laboratory results.

Samples will be processed according to the test methods required by the General Order. All laboratory data will undergo a tertiary review process to ensure that the data meets the requirements of the method and the data quality objectives of the Order. The Laboratory Project Manager will create the Certificate of Analysis (Report). A case narrative will be written to identify any anomalies, QC failures or other material issues that do not meet the quality objectives of the Order.

A preliminary report will be provided to the Coalition within ten (10) business days of sample collection, and will include all partial laboratory results that are reviewed and

completed by then. The preliminary and final reports will be sent via email to the Project Coordinator and QA Manager.

Finally, the laboratory will prepare the required electronic data deliverables (EDD) as required by the MRP of the Order. Prior to delivery to the Project Coordinator, the laboratory personnel will evaluate the EDD using the SWAMP data integrity validation program as provided by the California Environmental Data Exchange Network (CEDEN) for surface water analysis results or the GeoTracker Electronic Submittal of Information (ESI) "Check EDD" tool for groundwater analysis results. Any critical failures observed will be addressed and the EDD will be reevaluated. Once complete with no critical errors, the EDD will be sent to the Project Lead along with a copy of the error log returned by the CEDEN or GeoTracker validation program.

Resource and Time Constraints

There are no significant resource constraints associated with the Surface Water Monitoring Plan (SWMP) or the Groundwater Quality Trend Monitoring Workplan (GQTMW). Both the Coalition and the laboratories have adequate resources to effectively perform the tasks required under the Plan and the General Order.

The responsibility of surface water sampling will be that of the primary laboratory, BSK. BSK has offices in the Fresno and Bakersfield areas. The Fresno location will be the primary respondent and operate as the base for crew and the sample receiving location. Multiple personnel will be trained on the sample collection procedures to ensure that BSK can respond to the sampling events with a minimal amount of notification. In the event of a scheduling conflict, staff from BSK's Bakersfield location will be dispatched to collect samples for the Coalition.

Coalition staff is responsible for collecting groundwater samples and have multiple staff members stationed in Visalia trained to use field instruments and procedures required for sample collection. The Fresno-based laboratory has extensive equipment and personnel to accommodate the water quality analysis workload generated under the SWMP and GQTMW.

Time represents the most significant restraint for both surface water and groundwater monitoring. The sample collection will require the close coordination of both Coalition and Laboratory personnel. Coalition personnel will closely monitor both the scheduled irrigation program and the regional weather forecast as well as sample date coordination with well owners to ensure a timely notification of sampling requirements. Laboratory and Coalition personnel will have the required water sampling equipment and materials (e.g. field instruments, sample containers, ice chests, etc.) on hand as a matter of practice to minimize the time requirements for the commencement of field sampling. The primary laboratory, BSK has a sample drop-off location in Visalia that facilitates the transportation of samples.

ELEMENT 7: QUALITY OBJECTIVES AND CRITERIA

The primary goal of any sampling and analyses program is to produce data that is of known and documented quality and is suitable for its intended use. The data generated under the TBWQC's SWMP and GQTMP will be used to make decisions regarding water quality in the Coalition, ensuring the preservation of the environment and the protection of human health. To that end, the data quality objectives set forth in the SWMP and GQTMW are established to ensure that (1) the collection of samples are representative of the environmental conditions associated with agricultural activities, that (2) the samples are handled and processed in a manner consistent with the requirements of the methods used and the practices set forth in this QAPP, and that (3) the data generated from the project are of sufficient quality to make sound decisions regarding the impact of agricultural activities on the waters of the State.

Performance Criteria Goals

The success of any given monitoring event will be determined based on the characteristic of completeness. The quality of completeness is a function of the number of successful checks or evaluations made on a project versus the total number of observations made. The overall completeness goal for each monitoring event is 90%. A discussion of completeness for both the sampling and the analytical portions of the SWMP and the GQTMW will follow below.

Quantitation Limits

The data generated as part of the SWMP and the GQTMW must be at a level of sensitivity low enough to detect and quantify constituents of concern at levels needed for preservation of the environment and human health. With that, the majority of the chemical testing is done to the parts-per-billion level.

Chemistry

The laboratory will establish reporting limits (RLs) at a level at or below the requirements of the General Order. These RLs will be based on a calibration point at or below the equivalent sample concentration. The laboratory will not report any value below the RL without qualification as an estimated value. All reported results will be bracketed by a calibration point.

To determine the low value at which the laboratory can detect the presence of a target analyte, the laboratory will conduct a Method Detection Limit (MDL) study in accordance with the procedure set forth in 40 CFR Part 136 Appendix B. This value is the lowest concentration at which the lab can state the compound is present with 99% confidence that it is truly non-zero.

Some methods are not amenable to conducting method detection limits studies. These methods are identified in Table 8 with a "-" in the column labeled MDL. This table reflects the MDLs in existence at the time this QAPP is approved. As per the requirements of the Order, the MDLs will be regenerated or verified by the laboratory at least every two years or when a material change is made in the method or equipment used to generate the original MDL study.

To provide the program with the most sensitive data possible but with the statistical confidence that a result is not a false positive, the laboratory will report results that exist between the MDL and the RL. As these values are outside of the calibration range of the equipment used, there exists some uncertainty as to the accuracy of the result return. For values reported between the MDL and RL, the laboratory will identify these as estimated values by applying a qualifier to indicate the uncertainty of the measurement (e.g. "J-Flagged").

Toxicity

Water toxicity tests will be considered significant at the 95% level of significance. TIEs will not be initiated until 50% survival or below is reported. Phase I TIE testing, along with a retest of the failed test, will begin as quickly as practical by the laboratory.

Table 8 summarizes the analytes, ILRP PQLs, method detection limits and reporting limits for this project.

Quality Control Measurements

Every effort will be made to provide quality from both the field sampling activities and from the fixed facility laboratory activities. Field and laboratory personnel are trained on proper sampling and analysis techniques appropriate to the tasks performed. All activities will be performed in accordance with established standard operating procedures (SOPs). See the Table 6 for listing of the applicable SOPs.

The results of the field and analytical activities will be gauged on a number of characteristics. Those characteristics are:

1. Representativeness. The monitoring sites selected for the SWMP and GQTMP by the Coalition will be indicative of the water quality within the Tule Basin. The surface water monitoring sites selected by the Coalition reflect the quality of the flows into and out of the Coalition. Samples will be collected based on real-time assessments of water flows, including those associated with storm events. Samples will be handled to ensure they maintain the conditions at they exist in the field and will be released to the laboratory in a timely manner to ensure that hold times are met.

   The monitoring sites selected for the GQTMW by the Coalition must be consistent with and indicative of the water quality relevant to irrigated agriculture. The groundwater

monitoring wells selected by the Coalition represent both high and low vulnerability areas, as well as areas contributing significant recharge to urban and rural communities where groundwater serves as a significant source of supply. Groundwater sampling will be collected on an annual basis. Samples will be handled to ensure they maintain the conditions at they exist in the field and will be released to the laboratory in a timely manner to ensure that hold times are met.

2. Comparability. All samples are to be collected in the same manner, from approximately the same location at each monitoring site. All conditions will be maintained as consistent as possible to ensure that testing performed across multiple monitoring events is comparable with variation only due to field conditions. Furthermore, tests used by the laboratory will be in accordance with the General Order requirements to ensure comparability to historical data generated for each of the sampling locations.

3. Sensitivity, Contamination, Accuracy, Recovery and Precision is determined based on the performance of the method on one or more quality control indicators.

   Sensitivity is an assessment of the ability of the method to detect the analytes of interest at levels that are significant to the Plan. Numerous factors can affect sample results such that the reporting limits would need to be elevated. These factors include dilutions due to target or non-target interferences, insufficient sample volumes, internal standard suppression, etc. Sensitivity will be assessed by comparing the Order required reporting limits to those actually observed for all samples.

   Contamination is an assessment of the field and laboratory background by the examination of a blank matrix known to be free of contaminants. The blank matrix (Method Blank) is carried through the entire analytical process and then assessed for the presence of the target constituent. The presence of such constituents in the blank indicates that the field conditions or laboratory background may be responsible for the presence of a target constituent in the sample.

   Accuracy is the ability of the method to generate a result within a prescribed range of its actual true value. For the test methods employed in this Plan, accuracy will be determined based on the use of a standard reference material (SRM) or Laboratory Control Sample (e.g. LCS, Blank Spike) that is free of interferences.

   Recovery is the ability of the method to produce an accurate result given the potential interferences of a sample matrix. This is accomplished by fortifying a sample matrix with a small amount of the target compounds. The fortified matrix (or matrix spike [MS]) is carried through the analytical process to determine if the sample matrix somehow interferes with the method itself, either via suppression or enhancement of the matrix spike result.

   Precision is the ability of the method to reproduce the same result within a prescribed acceptance range. For the test methods employed, precision will be assessed by the

analysis of a Laboratory Control Spike Duplicate, a Matrix Spike Duplicate or a Laboratory Sample Duplicate. The laboratory duplicate differs from a field duplicate in that the lab duplicate will be a secondary aliquot taken from the same container as the parent sample. A field duplicate is a second sample collected from the source and is treated as a separate unique sample that is "blind" to the laboratory.

4. Completeness. Completeness will be determined based on the measurement of the amount of valid data obtained per monitoring event (by site) versus the amount planned. The target of the Plan is to achieve 90 percent completeness at each event. Efforts to prevent sample loss include careful packaging of the sample for transport, and collection of adequate volumes for analysis, laboratory losses (errors, QC failures, and equipment failure). The laboratory shall determine the volumes required for the tests requested, and it is assumed that this final volume contains sufficient surplus to account for laboratory issues. As such, they have specified or provided the necessary containers for the sampling collection process.

   Completeness will be determined at two levels: Field and Transport, and Laboratory with levels reported within each quarterly report. As BSK does the surface water sampling for the Coalition, the calculation of completeness will be performed by them. The following describes the Completeness calculation to be used.

   Field and Transport completeness will include: completion of the site inspection report elements as specified on the Field Data Sheet, results of field instrument calibration checks, actual test results for physical parameters, completion of the Chain of Custody with the requested analyte list with no broken sample containers, and all samples received within temperature requirements. Chain of Custody forms (Appendix A.1) are provided by the lab and are pre-populated to include the analyses requested as determined by the Core vs. Assessment sampling schedule. The samples are inspected prior to packing with ice for breakage. Bottle counts are done when the labels are affixed to the containers. The Field and Transport evaluation program ends with the signed Chain of Custody, the reporting of the conditions of the samples as they are unpacked by the lab. Laboratory failures (e.g. breakage of sample container, samples received out of hold time, temperature exceedance, etc.) will be documented. All other measures beyond this point are associated with the Laboratory Completeness assessment.

   Photo documentation shall constitute 100 percent Completeness for those times when no sample water is available at surface water monitoring sites.

   The logbook sheets used for documentation of the Field and Transport portion of the monitoring event is included in Appendix A.2. An example of the spreadsheet used for the determination of the Field and Transport completeness is provided in Appendix A.4.

   Completeness for the Field and Transport activities will be determined based on the number of assessment points satisfying the expected criteria versus the total number assessed per sample site (22 individual assessment criteria per location).

Laboratory Completeness is achieved via an exhaustive examination of the results of both, field samples and the quality control indicators for each of the laboratory analyses. The laboratory completeness assessment is based on the characteristics of laboratory data listed above: sensitivity, contamination, accuracy, recovery and precision.

Completeness for the Laboratory activities will be determined based on the number of sample results that are not materially impacted by data quality issues. The calculation is the number of unaffected sample results versus the total number of data points generated for the sampling event.

An example of the spreadsheet used in the determination of Laboratory Completeness is included in Appendix A.3.

Table 4: Data Quality Objectives –

Measurement or Analysis Type	Sensitivity	Contamination	Accuracy	Recovery	Precision	Completeness
Physical Parameters (EC, pH, DO, temp)	X		X		X	X
Toxicity	X	X	X	NA	X	X
Pathogens	X	X			X	X
Nutrients/Anions	X	X	X	X	X	X
Carbonate/Bicarbonate Alkalinity	X	X	X		X	X
TDS	X	X	X		X	X
TSS	X	X			X	X
Metals	X	X	X	X	X	X
Carbamates	X	X	X	X	X	X
Organochlorines	X	X	X	X	X	X
Organophosphates	X	X	X	X	X	X
Pyrethroids	X	X	X	X	X	X
Herbicides	X	X	X	X	X	X

ELEMENT 8: SPECIAL TRAINING NEEDS / CERTIFICATIONS

As of this time, there are no Coalition staff members with specialized training in chemistry or laboratory procedures, outside of the coursework taken as part of their general educational curriculum. BSK personnel involved in the project have been performing sample collection procedures for many years and are familiar with the maintenance and calibration of the equipment used and the sampling techniques involved. Technical questions are fielded by the contracted labs and their sampling crew.

BSK's Quality Assurance Manager is responsible for the oversight of training. The QA Manager will ensure that adequate training is provided to the laboratory personnel on the requirements of this Program. The training will consist of both written review and hands-on training, all documented and contained within the Laboratory's record keeping system. The training files are maintained by the Laboratory's Quality Assurance Department.

BSK's field technicians undergo initial training and annual refresher training thereafter on proper sample collection techniques for both water and sediment. Initial training consists of a review and acknowledgement of understanding of the laboratory's standard operating procedure on sample collection. This is followed by hands on sample collection working in conjunction with one of BSK's experienced samplers. This hands-on training will continue until the trainer witnesses and documents the satisfactory understanding demonstration of proper technique. Once the Field Technician has demonstrated sufficient knowledge and understanding of the project, the training will be documented and included in the laboratory's training records. The field technicians are trained according to the following SOPs: Field Sampling from Streams, Rivers and Canals (SR-SP-0015), and Safety for Stream and Canal Sampling (SF-SP-0010).

Coalition field technicians undergo an initial training on proper sample collection techniques for groundwater wells. Initial training consists of a review and acknowledgement of understanding of standard operation procedures on groundwater sample collection. This followed by a hands-on sample collection working in conjunction with one of BSK's experienced samplers. This hands-on training will continue until the trainer witnesses and documents the satisfactory understanding demonstration of proper techniques.

BSK's Project Manager will undergo initial training on the details of the QAPP and other project requirements. The training will be conducted by the Laboratory Program Manager or his designee. The training will consist of a reading of the QAPP and a follow up review with the Project Manager. Following this training, the first work order will be reviewed by the Project Manager as well, both on the initial receipt of samples and also at the time of reporting. This final stage of training will include a review of the final work product, the case narrative, the field logs and any other program requirements associated with the QAPP. Once the BSK Project Manager has demonstrated sufficient knowledge and understanding of the project, the training will be documented and included in the laboratory's training records.

ELEMENT 9: DOCUMENTS AND RECORDS

Record keeping is a critical component to any research project. The data collected by the Coalition is maintained in multiple locations. Each lab is required to maintain a copy of the data for a specified period of time according to each laboratory's standard record retention requirements.

Record Handling

Copies of the data submitted by the labs to the Coalition are kept at the Coalition office in electronic and, where necessary, hardcopy format. Additional copies of the data are submitted to the Regional Board along with the quarterly and annual reports. Copies of this data are kept at the local Board office in Fresno, the Regional Board office in Rancho Cordova (and at the Coalition's office).

Data is submitted to the Coalition by the BSK Laboratory in PDF format, and stored electronically. This is more efficient than paper copies of the reports, given the voluminous amounts of data generated. CD's containing the data are routinely made and stored in a secure manner.

Data submission is to be in a CEDEN and GeoTracker ESI compatible excel spreadsheet, for SWAMP and GQTMP respectively, prepared by the individual laboratories (in addition to the additional data formats submitted), which will be combined into a single spreadsheet for submission to the Regional Board. Staff at the Regional Board will be responsible for the upload of data into the CEDEN database. Coalition staff will be responsible for the upload of data into the GeotTracker ESI database,

Data collected and held by the Coalition will be stored for a minimum of seven years at the Coalition office. How long the data submitted to the Regional Board is held is unknown. The Laboratories will store the raw data in both hardcopy and electronic format in accordance with their respective record retention requirements. For CA ELAP certified laboratories – a required credential for this program – laboratories are required to maintain all records for a minimum of five years. Sufficient records must be maintained to allow complete reconstruction of the data.

Documents retained by the Coalition may include: paper copies of the field data sheets, executed Chains of Custody, purchase orders for lab services, and printed copies of the Chemistry, Microbiology and Water Column Toxicity results. All of which are also backed up electronically.

Each data submission to the Regional Board will be a standalone file stored electronically with the Coalition. Once SWAMP analysis results are submitted and accepted by the Regional Board, the data will be integrated into the CEDEN database as maintained by the Central Valley Regional Data Center (CV RDC). GQTMP analyses results with be submitted to the Regional Board through the GeoTracker ESI system.

The QAPP, will be submitted to the Regional Board in the form of a CD. Two versions will be submitted, one containing proprietary information regarding chemical testing and the other for public viewing. They will be clearly labeled. A paper copy of each version will be provided to the Regional Board for review on request.

Once the QAPP is approved by the Regional Board and signed by all required parties, an official copy will be maintained and controlled by the Coalition Quality Assurance Manager. The QA Manager will be responsible for distributing the official copy to the recipient list specified in Element 3. Due to its size, the official copy will be distributed via CD, sent either through mail (or similar delivery) or hand delivered to each recipient's location. In the event of a change in the QAPP, the QA Manager will be responsible for ensuring the timely delivery of the latest revision.

Report Format

Reports for the Chemistry, Microbiology and Water Column Toxicity will be provided in a manner consistent with this QAPP required content.

Documentation of the field activities will include copies of field logs with anomalies noted, results for field measurements, executed chains of custody, and any additional forms, records, or logs that contain information critical to the quality of the data obtained from the sampling event.

Analytical Reports or Certificates of Analysis will contain the following information:

a. Project Name
b. Sample Description
c. Sample Date and Time of Collection
d. Collection Technique (e.g. grab, composite)
e. Sample Type (e.g. field sample, field blank, field duplicate)
f. Preparation and Test Method
g. Parameter
h. Result
i. Dilution Factor
j. Reporting and Detection Limit
k. Units
l. Date / Time Prepared and Analyzed
m. Data Qualifies
n. Quality Control Data including Blanks, Spikes, Duplicates, Surrogates
o. Case Narrative explaining all data anomalies or deficiencies
p. Chain of Custody
q. Sample Conditions on Receipt Summary
r. Subcontract Reports

Record Distribution

The Project QA Manager will have the responsibility of ensuring that the stakeholders have the current version of all relevant documentation including the QAPP. The QA Manager will issue control copies of the current QAPP to each QAPP recipient listed in Element 3 of this QAPP. On a change or revision, the QA Manager will retract the old version of the document and replace with the most current version. The same process will be used for all other documents required by this Plan.

ELEMENT 10: SAMPLING PROCESS DESIGN

Sampling will be conducted according to the schedule mandated within the MRP, with visits of all surface water monitoring sites on a monthly basis and groundwater monitoring of wells on an annual basis. The date for the surface water sampling event is held open with Coalition as the presence of water at each sampling location is uncertain. This allows the contracted lab to work with the Coalition staff to determine the appropriate date for surface water sampling collection to maximize the collection of a sample at a time of water flow. The groundwater sample collection will be conducted during the summer months of each year.

Surface Water Sampling Process Design

The sampling design is to test for the specified chemistries at each of the identified surface water monitoring sites, thus creating defined areas that can be easily addressed should detection occur. Modifications to the list of tested chemistries are planned once cropping patterns and pesticide usages are analyzed.

The SWMP study design is a simple one because of the nature of the waterways involved. Nearly all of the river and creek systems within the Tulare Lake Basin have been optimized for irrigation deliveries. The flow in the Tule River below Success Dam is controlled by the Army Corps of Engineers, while Deer Creek and White River are smaller watersheds and uncontrolled streams. The Plan is designed to detect any occurrence of chemical contamination of these waterways, and then to trace the source. The method for the connection of any chemical contamination to its source and, ultimately, the management practices or runoff related events are outlined in the SWMP.

All surface water monitoring sites listed within the MRP will be visited during each month. It is anticipated that several of the sampling sites will only require photo documentation for the majority of the sample dates. This is due to infrequent flow in the waterway. Specific sampling points at each location have been identified and the rationale for each point is detailed in the SWMP.

Should a site become inaccessible due to field conditions that prevent a Coalition or Laboratory representative to safely access the site, the condition of the site will be documented and the sampling site revisited as soon as conditions allow. This documentation will be included with the report submitted for the follow up (or make up) sampling event. Resampling due to accessibility problems will be addressed on a case by case basis and coordinated between the contract Laboratory and the Coalition. However, as noted in the SWMP, part of the rationale for the selection of the sampling points was the reliability of each to be accessible at all but the most extreme conditions.

However, in some cases, resampling may not be an option due to inclement weather or some other water management constraint. In the event that it is determined a surface water sample must be collected, the specific sampling point may need to be modified. The Coalition Program Manager and Technical Lead will make the determination if this

modification is required. If so, the Program Manager will have the responsibility of informing the Board of the modified sampling point and the rationale for doing so.

The occurrence of an exceedance at any of the surface water monitoring sites will trigger a review of the possible sites where the detected chemical could have been used. Also, a physical survey may be undertaken to determine where the chemical could have entered into the waterway. The exact course of action will depend upon the chemistry detected, and the conditions that were present when the sample was collected.

One or more of the surface water sampling sites may be wet during the full course of the year. For these samples, a full set of chemical tests (as specified by the MRP) will be analyzed during the first year of the program. Samples will be grab samples of ambient water.

A duplicate sample will be randomly collected from those sites with water present. However, given that some sites are more likely to be dry a portion of the year, those sites having water most of the year will likely be disproportionately chosen during most sampling events for the field duplicate. One duplicate will be collected for each event.

The only sources of natural variation within the testing program are the EC values. These sources of variation are natural, and as such, uncontrollable.

No known sources of bias exist within the testing program. Field instruments, which could be considered a source of bias, are constantly checked for calibration against known standards and rechecked at the field during the course of the day. The laboratories constantly recalibrate their instrumentation as per method, so that source of variation is minimized as well, the resultant data having no more variation than that inherently contained within the test methods employed.

Surface water sampling points for the coalition are identified in Table 5.

Table 5: Coalition Surface Water Sampling Point Coordinates

Site name	CEDEN Code	Latitude	Longitude
Deer Creek at Road 120	558DCR120	35.912400	-119.303729
Deer Creek at Road 176	558DCR176	35.946256	-119.181017
Deer Creek at Road 248	558DCR248	35.9929	-119.017900
Porter Slough near Road 192	558SPR192	36.116285	-119.134132
Tule River at Plano Street Bridge	TBD	36.055865	-119.133987
Tule River at North Fork Road 144	558TRA144	36.129178	-119.246882
Tule River at Road 92	558TRAR92	36.092952	-119.366727
White River ar Road 208	TBD	35.858597	-119.107887

All data collected as part of the sampling (pH, EC, temperature, turbidity, flow) will be considered critical to the program. All data will be used in the assessment of ambient conditions of the overall water quality. Field observations such as outside temperature, wind

directions, time of the day, etc. will be considered informational and not critical to the Plan. However, such observations should be documented as they may help explain any possible anomalies in the analytical data such as unexpected detections for parameters that are historically low or absent in the watershed.

The sampling schedule for each location is included in the SWMP.

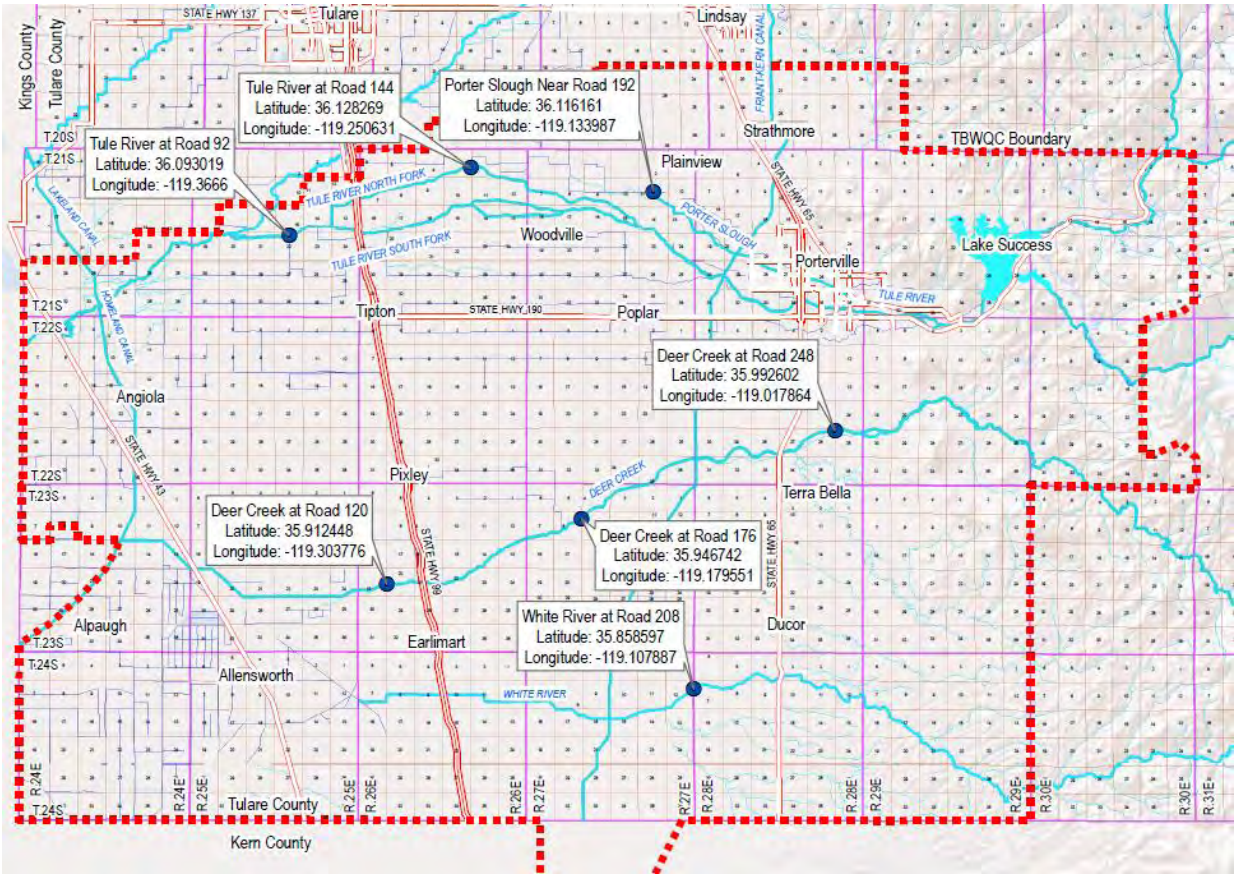

Figure 2: Tule Basin Water Quality Coalition Surface Water Monitoring Sites

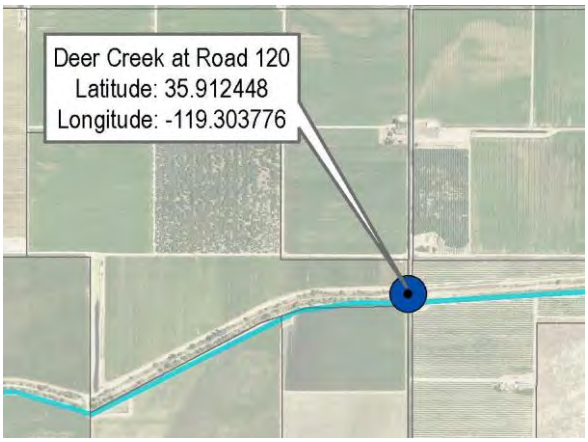

Figure 3: Deer Creek at Road 120 Site Map

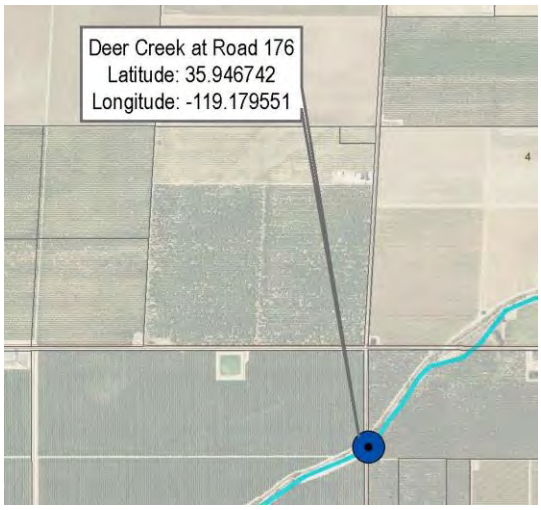

Figure 4: Deer Creek at Road 176 Site Map

Figure 5: Deer Creek at Road 248 Site Map

Figure 6: Porter Slough near Road 192Site Map

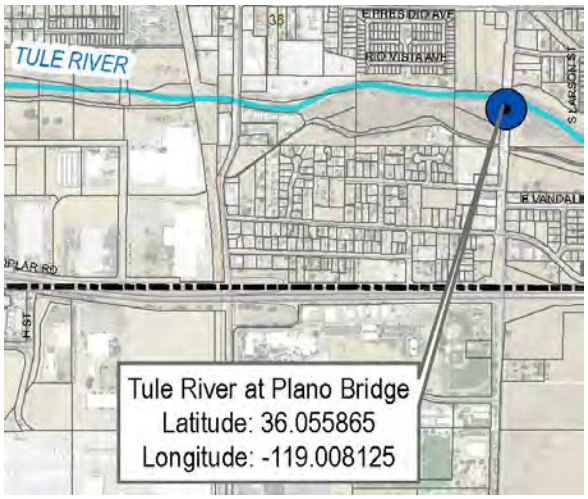

Figure 7: Tule River at Plano Street Bridge Aerial Site Map

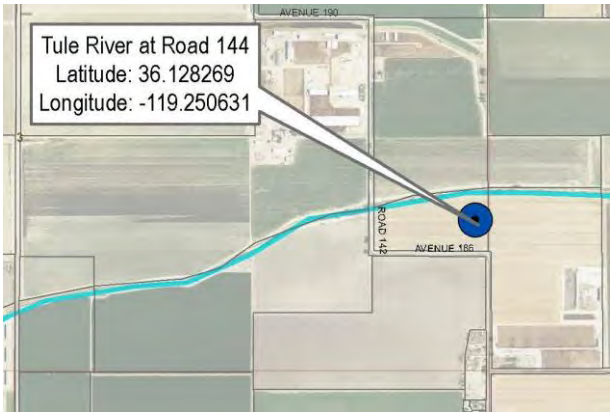

Figure 8: Tule River at North Fork Road 144 Site Map

Figure 9: Tule River at Road 92 Site Map

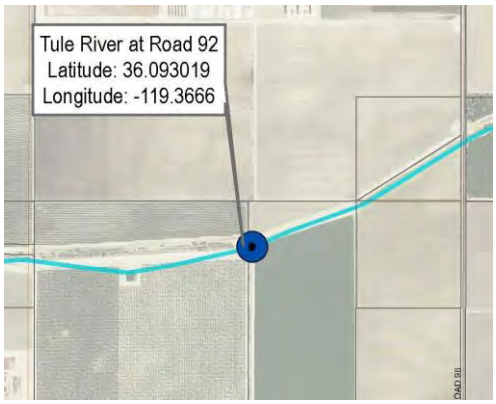

Figure 10: White River at Road 208 Site Map

Groundwater Sampling Process Design

The groundwater monitoring network as outlined in the GQTMW consists of sampling four wells per township, within both the High and Low Vulnerability areas within the TBWQC, provided, adequate existing wells are available. Domestic and shallow irrigation wells considered for the network are required to have permission from owners, be constructed in the upper most aquifer, with construction details, typically in the form of well completion reports.

Before wells are included in the monitoring program they must be reviewed and approved by the RWQCB to meet the requirements outlined in the MRP. Wells are presented to the RWQCB accompanied with GPS coordinates, well completion reports and construction details including: well depth, perforation intervals, seal information, and casing material.

The GQTMW for the TBWQC was designed in a two phased approach, see Figure 10. Phase 1 encompasses the township and ranges associated with disadvantaged communities (DACs) in the Coalition, with selection and monitoring of well beginning during the first year of the program (2018). Phase 2 makes up the remaining township and ranges within the Coalition and selection and monitoring of wells commencing in the second year (2019) of the program. In the third year of the program all wells will be sampled on the same schedule.

Wells in the GQTMP monitoring network will be sampled on an annual interval for a select group of water quality parameters and sampled every five years for a more extensive set of parameters. Monitoring includes field tested water quality parameters and laboratory analysis of nitrate as nitrogen and general minerals. Constituents and their frequency for analysis are outlined in the MRP.

Water samples shall be obtained from the wellhead, or as near the wellhead as possible, not from any point after the pressure tank. Samples shall not be collected from a

faucet inside the home. Wells without these physical capabilities for field sampling were not considered for the trend monitoring well, unless a spigot is installed at or near the wellhead.

If the well goes dry (Drought conditions), or if a well is not selected due to field conditions or access limitations, another well will be identified to replace the well that cannot or can no longer be used. The identification of the secondary well, should the selected well be abandoned, in the nine square mile areas of each township will allow time for identification of a replacement without a gap in data within the township. The Coalition Program Manager and Technical Lead will make the determination if a replacement is required. If so, the Program Manager will have the responsibility of informing the RWQCB of the replacement sampling well location and the rationale for doing so.

Wells used for the monitoring network are included in the GQTMW and periodic updates to network development will be provided to the RWQCB.

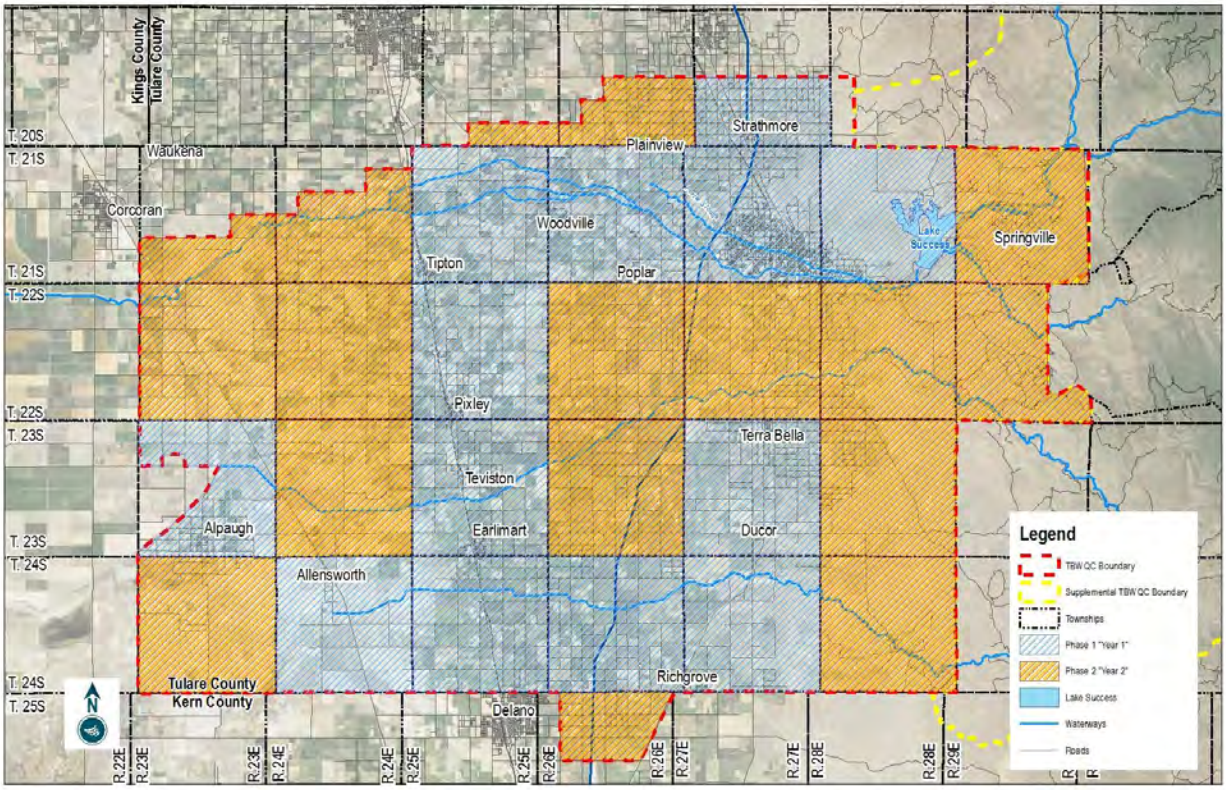

Figure 11: GQTMP Well Network

ELEMENT 11: SAMPLING METHODS

A more detailed description of the sample collection procedures are listed in the SOP in Appendix B.1. As part of the sample collection, photo documentation of the monitoring site will occur. Field technicians will photo log the location, both upstream and downstream of the sampling point as well as the actual point of collection. GPS coordinates will be confirmed and if the point of collection changes, new GPS coordinates will be recorded. A change in the location will only occur on notification and approval of the Project Coordinator.

In the case that the sampling crew is responding to a stormwater event and cannot sample at the exact coordinates indicated in this QAPP, samples will be collected upstream and the Project Coordinator will be notified as soon as possible. Sample analysis will not begin until the location has been approved by the Project Coordinator or his designee. If there is a material difference in the location of actual collection versus the targeted location (>75 yds), the Coalition Project Coordinator will be responsible for notifying the RWQCB.

Safety precautions and procedures in the SOPs for *Field Sampling* must be followed by the sampling crew. Sampling cannot be conducted if the water conditions at the site are deemed hazardous or unsafe. The Project Coordinator will be notified as soon as possible when samplings cannot be performed.

General Sampling Requirements

For the **surface water** sample to be deemed acceptable, the following criteria must be met:

1. Water must be present at the sampling location.
2. The sampler must remain downstream of the sample bottle while the sample is being collected.
3. A delay between samples must occur to allow any disturbed sediment to clear the area of sample collection.
4. The Water Column Toxicity sample bottles should be rinsed with sample water before the final sample is collected.
5. The samples must be kept chilled prior to packing with ice for transport.

Unacceptable surface water samples would include samples from waters that are too shallow to completely submerge the sample container without excessive disturbance of the sediment.

For the **water supply well** sample to be deemed acceptable, the following criteria must be met:

1. Prior to collecting a water sample from a supply well, the water well shall be allowed to run for a period of time that is sufficient for water quality parameter readings for temperature, pH, EC, dissolved oxygen, and turbidity to stabilize to within 10 percent.
2. If the well is currently pumping, the sample may be taken without purging the well.
3. Water samples shall be collected from the discharge point nearest the well head.
4. Samples shall be collected directly into laboratory-prepared bottles. and shall not be taken from a location after treatment of the water for domestic use.
5. The samples must be kept chilled prior to packing with ice for transport.

Surface Water Sediment Sample Collection Requirements

Sediment samples are considered acceptable if the depth of the sediment collected does not exceed 1 inch or 2.5 cm (per method). The sediment must be collected within a reasonable distance of the water collection site, and in sufficient volume to perform an adequate analysis.

Unacceptable sediment samples are those collected from depths in excess of 1 inch or 2.5 cm, from distances too far away from the monitoring site (potentially representing different conditions than those present when water samples are collected), and samples of insufficient volume. Failure to transport the sample at controlled temperatures would also constitute an unacceptable sample.

As a safety precaution, sediment collection should only be performed in a shallow, slow flowing stream or canal waterway, where the water is between a minimal surface flow of a few inches to a maximum depth that is below the height of the sampler's knee. The stream or canal flow must be slow flowing of less than one foot per second. Sampling attempted in conditions exceeding these limitations must be conducted with special safety harness, retrieval gear or rescue apparatus.

Sample Collection Volumes

The volume of collected samples are designated by the contracted laboratory to allow for sufficient volume to test, plus additional volume for retesting in the event of laboratory errors (spillage, instrument failure, operator error). Breakage, unfortunately, cannot be anticipated once the sample is delivered to the lab, so no contingency plan is available for such an occurrence. The only recourse is to fully duplicate all samples, which is impractical for all concerned.

Sample Collection Procedures

Pre-Collection
The sequence of events for a sampling event is as follows:

1. Several days before the event, all bottles are collected and labeled for the event. They are then packed into labeled ice chests for transport.
2. The day before the event, the calibration of the field instruments is performed according to manufacturer specifications. Adequate supplies of standard solutions are placed within the field equipment box for instrumentation checks while at the monitoring sites. Battery issues with field instruments are addressed at this time.
3. The day of the sample, chests are loaded into the vehicle along with a chest filled with frozen "blue ice" sample temperature maintaining blocks.

During Collection
Once at a site, the sequence is as follows:

1. One team member begins the filling out of the sample sheet for the site (field sheet and chain of custody), and takes a photo of the site. The monitoring site where the sample is collected does not change from event to event so the GPS coordinates remain the same from event to event. The names of the sampling crew are recorded on the sample sheet.
2. Ice chests to be used at the site are carried from the vehicle to the sample site.
3. Date, sampler, and time of sample are recorded on the bottles within the chests.
4. Field instruments are checked against the standard solutions (pH and EC) where appropriate, and the data recorded.
5. Field sampling technician will don powder free, nitrile gloves to guard against contamination.
6. If entry into the water is required, field technician approaches the sampling point from downstream to minimize the chance of sediment in the collection field. If sediment is materially disturbed, the zone must be allowed to clear before collecting a sample. ***(surface water sampling)***
7. Samples will be taken with a large carboy to minimize the number of bottles carried into the water body. Once filled, the contents of the carboy will be transferred into the actual preserved sample containers.
8. After all bottles have been filled, a fresh sample is analyzed for field parameters: pH, EC, temperature and dissolved oxygen. The stream velocity is also measured and recorded on the field log for surface water sampling.
9. Water samples are collected until all bottles are filled. Care is exercised to repack the bottles to prevent breakage.
10. If a duplicate sample is to be collected at the site, steps 5 – 9 are repeated.
11. Site photos are taken, with photos of the sampling point, upstream and downstream. ***(surface water sampling)***
12. "Blue" or gel ice is placed in the chests once they are carried back to the vehicle.

Following Collection

After the samples are returned to the office, and offloaded from the vehicle, cubed ice is packed into the chests (blue ice is removed). Chemical test samples are then transported to the lab. Water Column Toxicity samples are stored within the office for transport the next morning if the sampling crew returns too late in the day to package and ship to the aquatic toxicity laboratory.

The Laboratory will provide additional sample containers for the Field Duplicate and Site Specific QC (MS/MSDs). The laboratory will identify the bottles by location and by sample type (Dup, MS/MSD). It is critical that the sampling crew fill ALL bottles provided in the manner specified by the laboratory. Failure to fill all containers may result in insufficient quality control data to meet the project data quality objectives.

There is limited sampling equipment required for the collection of both aqueous and sediment samples. For the aqueous samples, a large 3-L carboy is the only container that may be reused between sampling location. To that end, the carboy will be triple rinsed between sampling locations using 300mL of laboratory grade deionized water. The use of any detergent as a cleansing agent could be problematic given the low reporting limit requirements of the program. Once triple rinsed, the carboy will be sealed and remain closed until the next sampling location. Prior to collection at the next site, the carboy shall be rinsed under the above matrix prior to collecting any samples.

Alternatively, the Laboratory may elect to use virgin bottleware for the collection of samples. If so, no decontamination procedures are required. Additional carboys and any other sampling devices will be carried in the event that there is a problem with the carboy or other device that might be shared between locations.

For the sediment samples, the trowel or large scoop is the only device that may be in contact with each sample. Therefore, after use it will be first rinsed with water from the stream where the sample was collected. This is done to remove any remaining solids. It will then be triple rinsed with deionized water, stored in a clean Zip-lock bag and kept sealed till the next sampling site. Once at the next location, it will be rinsed in the river or stream prior to the collection of the next sample.

Post Collection Handling

Transport represents the greatest risk to the sample once collected, and every effort shall be made to package the samples in protective materials. Glass containers are wrapped in “bubble-wrap” both before and after sample collection. Care is exercised when placing the “blue-ice” temperature control materials within the ice chests after the sample is collected, to prevent breakage. Travel speeds on unimproved roads are also limited.

Water Column Toxicity samples are collected in 1-gallon cubitainer jugs, with 6 gallons of sample per site. Each jug is rinsed using sample water prior to filling with the final sample. Headspace is left at top of bottle to reduce risk of bottle breakage at lab.

As stated in the SOP section (Appendix B.1), the field instruments are rinsed in distilled water after the second (duplicate) reading, and stored within the instrument case. The pH meter is returned to a container containing pH 7 solution for transport.

Problems are always unforeseen. Barring a technical failure in the field instrumentation or an accident during or between the sampling events, most anticipated issues can be dealt with in a manner that will not substantially affect data usability. However, technical failures will result in the loss of all data generated by the field instrument from the point of failure on due to the need to return the instrument to the manufacturer for repairs. Battery issues are eliminated by inspecting the instrument during calibration and by maintaining backup supplies for field activities.

Automobile accidents or the dropping of a sample container are by nature unpredictable.

Access restrictions to the monitoring site are likely to be rare, and corrected (if practical) by hiking to the site.

Sufficient staff exists to cover a sampling event in the event of scheduling conflict or illness.

The only samples that require homogenization are the sediment samples, which are collected across the entire main waterway. Individual containers of approximately 1L will be collected with a sufficient number filled to cover all the testing required including the Toxic Identification Evaluation (TIE) if required. Once transported back to the Laboratory, all individual containers will be emptied and combined into a single sample. The sample will be homogenized in a large stainless steel container and once thoroughly mixed, returned to the original containers. These individual containers will then be distributed to the primary contract Laboratory as well as any subcontract laboratories.

ELEMENT 12: SAMPLE HANDLING AND CUSTODY

Samples are to be collected only in containers provided by the laboratory. Substitute containers are strictly forbidden as the integrity of such containers would be unknown. Any alternative containers provided to the laboratory will be rejected unless otherwise authorized in writing by the Project Coordinator and Program QA Manager.

Using the correct container is critical as each test method has specific preservation requirements. Samples are preserved to ensure that the condition of the sample at the time of analysis is consistent with the conditions as it existed in the field. The laboratory uses a variety of conditions to inhibit bacterial growth that would degrade target analytes, to prevent certain constituents from precipitating and falling out of solution, to prevent oxidation/reduction of the various constituents, and to prevent parameters from evolving off as a gas. The preservation technique and storage requirements for each test method are listed in Table 6.

Once collected, each sample and analysis has a finite amount of time before it must be prepared or analyzed. If the time period (known as the holding time) expires, the results may be considered invalid and would normally be a cause for rejection of the subsequent data. The holding times for each test method are listed in the following Table 6.

Table 6: Method Preservation, Storage and Holding Time Requirements

Parameter	Preservative	Container	Storage	Hold Time to Prepare	Hold Time to Analyze
Ammonia/Ammonium	H_2SO_4	Plastic	<6°C	28 Days	-
Carbamates	None	Clear Glass	<6°C	7 Days	40 Days
Carbonate/Bicarbonate	None	Plastic	<6°C	-	14 Days
Glyphosate	$Na_2S_2O_3$	Amber Glass	<6°C	14 Days	-
Hardness (Calc)	HNO_3	Plastic	Ambient	-	180 Days
Herbicides	None	Amber Glass	<6°C	7 Days	40 Days
Metals	HNO_3	Plastic	Ambient	-	180 Days
Metals (Dissolved)	None	Plastic	Ambient	-	180 Days
Nitrate, Nitrite	None	Plastic	<6°C	-	48 Hours
OCl Pesticides	None	Amber Glass	<6°C	7 Days	40 Days
OP Pesticides	None	Amber Glass	<6°C	7 Days	40 Days
o-Phosphate	None	Plastic	<6°C	-	48 Hours
Paraquat	$Na_2S_2O_3$	Amber Plastic	<6°C	7 Days	21 Days
Pathogens	$Na_2S_2O_3$	Acrylic	<6°C	8 Hours	-
Pyrethroids (Sediment)	None	Clear Glass	<6°C	14 Days	40 Days
Solids (TDS and TSS)	None	Plastic	<6°C	-	7 Days
TOC	H_3PO_4	Clear Glass	<6°C	-	28 Days
Toxicity	Chilled to <6°C/wet ice	Plastic	<6°C	-	36 Hours
Triazine Pesticides	None	Amber Glass	<6°C	7 Days	40 Days
Turbidity	None	Plastic	<6°C	-	48 Hours

Samples are transported within ice chests that contain “blue ice” blocks to maintain low temperatures until the samples can be packed with wet ice. Glass bottles are wrapped in bubble wrap to prevent breakage (it also insulates the samples before they are packed in ice). Toxicity samples are repacked in ice (or have the levels checked) the next morning prior to transport.

Chains of custody forms are provided by the contracted lab and include all of the required information for the proper handling of the samples collected. As the sample passes from the control of one entity to another, the form is signed off by the responsible parties. Copies of the completed custody forms are provided with the final lab reports.

The Quality Assurance Manager and Laboratory Coordinators are responsible for the review and filing of the chains of custody forms.

Once at the lab, the condition of the samples is logged, with copies of the log appended to the lab report. Barcodes are attached to the samples and logged in a computerized tracking system.

Storage of the samples, once they are released to the lab, will be at the condition specified above. Any exceptions to the holding times listed above are noted in the laboratory report and are addressed on a case by case basis. Sample preservation is effectively handled by the chemistry lab as the bottles supplied are pre-treated with the proper preservation (if required, see above Table 6). Samples with pH preservation will be checked on receipt to verify that the sample has reached the proper pH. Any deviations from the method preservation requirements will be brought to the attention of the Project Lead. The laboratory will not proceed with the analysis of any improperly preserved samples without the approval of the Project Lead. Any samples analyzed that were not received under proper preservation will be noted in the report case narrative.

Records are maintained within the contracted lab that includes the checking in and out of samples during the analytical process as well as the disposal of samples following completion of the analytical process and archival. Samples are held under proper storage conditions until all analyses are conducted. Once complete, samples will be moved to a temporary archive where they await disposal. Samples are held by the laboratory for 60 days prior to being disposed.

ELEMENT 13: ANALYTICAL METHODS AND FIELD MEASUREMENTS

Standard Operating Procedures

The contract laboratory utilizes a number of EPA or Standard Methods preparation and determinative methods. The laboratory has SOPs for each method employed as well as SOPs for the procedural activities in the laboratory. The following Table 7 lists the method specific SOPs for this project with the current revisions at the time of submittal of this QAPP. Laboratory SOPs are periodically reviewed and may be updated as necessary.

Table 7: Standard Operating Procedures

Parameter	Method Description	Doc ID	Rev. Date
Ammonia	Ammonia by Gas Diffusion and Automated Phenate	IO-SP-0036-01	1/16/15
Anions	Anions by Ion Chromatography	IO-SP-0085-03	12/18/17
Alkalinity	Alkalinity by PC-Titrate	IO-SP-0061-09	8/17/16
Glyphosate	Glyphosate by HPLC, Post Column Derivatization	OR-SP-0009-06	7/28/17
Hardness	Hardness by Calculation	IO-SP-0044-02	2/17/17
Metals	Metals by ICP-MS	MT-SP-0008-01	11/2/17
	Metals by ICP-AES	MT-SP-0007-01	11/6/17
	Total Recoverable Metals Preparation	MT-SP-0001-01	10/31/18
Ortho-Phosphate and Phosphorus	o-Phosphate and Phosphorus by Ascorbic Acid Reduction	IO-SP-0072-04	6/20/16
Paraquat	Paraquat by SPE, HPLC-UV	OR-SP-0011-06	5/25/17
Pathogens	Multi-Tube Fermentation for Total and Fecal Coliform, and E. Coli	WM-SP-0002-04	11/14/17
Pesticides – N,P, Pyrethroids	Nitrogen, Organophosphorous Pesticides Pyrethroid Pesticides by GC/MS	OR-SP-0034-02	2/17/17
Pesticides – OCl	Organochlorine Pesticides by GC-ECD	OR-SP-0019-04	3/28/17
Solids (TDS and TSS)	Solids by Gravimetric Determination	IO-SP-0020-05	3/29/16
Total Organic Carbon	TOC by TOC analyzer (SM 5310C)	IO-SP-0067-07	12/18/17
Toxicity – Algae	Chronic toxicity	EPA-821-R-02-013	2002
Toxicity – Flea	Acute toxicity	EPA-821-R-02-012	2002
Toxicity - Minnow	Acute toxicity	EPA-821-R-02-012	2002
Toxicity - Hyalella	10 Day Sediment Survival and Growth Test – Hyalella azteca	EPA-600-R-99-064	2000
Turbidity	Turbidity by Nephelometry	IO-SP-0029-04	4/20/15
Sample Collection	Field Sampling from Streams, Rivers and Canals	SR-SP-0015-01	6/8/16
Sample Collection	Safety for Stream and Canal Sampling	SF-SP-0010-00	6/6/16

Copies of these SOPs can be found in Attachment B. These SOPs are considered proprietary information by the laboratory and will be redacted for the purpose of the public version of this QAPP.

Instrumentation

The contract laboratory will utilize a wide range of equipment in the performance of the analytical testing. While not exhaustive in content, the following list of equipment represents the minimal amount of instrumentation required to perform the testing under this Plan. The list does not indicate each individual piece of equipment as the laboratory maintains redundant equipment in many cases.

See Tables 11, 12 and 13 for a listing of field and laboratory instrumentation.

Field Monitoring

All field measurements will be performed at the time of sampling. There will be no *in situ* or continuous monitoring of field conditions at the specific monitoring sites. Any information about the conditions at the sampling points between sampling events would need to be inferred from other indirect sources such as water flows at points upstream or downstream or measurements made or samples collected and analyzed for other purposes. Otherwise, there are no other requirements for the deployment, maintenance, calibration or storage of related data for field equipment.

Method and Instrument Performance Criteria

The contract laboratory performs testing for several watersheds in support of their ILRP monitoring requirements. The test methods employed have been tailored to meet the requirements of this Plan to ensure compliance with the General Order, WDR and QAPP guidelines. All methods utilized are based on approved, standardized methods. There are no other "in-house" or non-standardized methods used for this Plan.

The contract laboratory will observe the following list of performance criteria for the testing done in support of this Plan.

Quantitation and Detection Limits

Table 8: Methods, Reporting Limits and Detection Limits

		BSK Reporting Information			
Constituent	**ILRP PQL**	**RL**	**MDL[1]**	**Units**	**Method**
Physical Parameters					
Flow	1	-	-	cfs	Field
pH	0.1	0.1	-	pH Units	Field
EC	100	5	-	umhos/cm	Field
DO	0.1	0.1	-	mg/L	Field
Temp	0.1	-	-	°C	Field
Turbidity	1	0.1	-	NTU	SM 2130B
TDS	-	10	-	mg/L	SM 2540C
TSS	10	10	-	mg/L	SM 2540D
Hardness as CaCO3	10	0.41	-	mg/L	SM 2340B
TOC	-	0.5	0.086	mg/L	SM 5310C
Percent Solids / Moisture	-	0.1	-	%	SM 2540B
Pathogens					
Fecal Coliform	2	1.8	-	MPN/100mL	SM 9221E
E. coli	2	1.8	-	MPN/100mL	SM 9221F
Water Column Toxicity					
Algae	NA	NA	NA	Cell/mL, % Growth	EPA 821-R-02-013
Water Flea	NA	NA	NA	% Survival	EPA 821-R-02-012
Fathead Minnow	NA	NA	NA	% Survival	EPA 821-R-02-012
Sediment Toxicity					
Hyalella azteca	NA	NA	NA	% Survival	EPA 600-R-99-064
Carbamates					
Aldicarb	0.5	0.4	0.017	ug/L	EPA 8321A
Carbaryl	0.5	0.1	0.022	ug/L	EPA 8321A
Carbofuran	0.5	0.1	0.021	ug/L	EPA 8321A
Methiocarb	0.5	0.4	0.014	ug/L	EPA 8321A
Methomyl	0.5	0.1	0.018	ug/L	EPA 8321A
Thiobencarb	-	0.5	0.0065	ug/L	EPA 8270C
Oxamyl	0.5	0.4	0.021	ug/L	EPA 8321A
Organochlorines					
DDD	0.02	0.01	0.00072	ug/L	EPA 8081A
DDE	0.01	0.01	0.00061	ug/L	EPA 8081A
DDT	0.01	0.01	0.0007	ug/L	EPA 8081A
Dicofol	0.1	0.1	0.015	ug/L	EPA 8270C
Dieldrin	0.01	0.01	0.00097	ug/L	EPA 8081A

		BSK Reporting Information			
Constituent	**ILRP PQL**	**RL**	**MDL[1]**	**Units**	**Method**
Endrin	0.01	0.01	0.00081	ug/L	EPA 8081A
Methoxychlor	0.05	0.01	0.00091	ug/L	EPA 8081A
Toxaphene	-	0.5	0.035	ug/L	EPA 8081A
Organophosphates					
Azinphos-methyl (Guthion)	0.1	0.1	0.032	ug/L	EPA 8270C
Chlorpyrifos	0.015	0.015	0.0029	ug/L	EPA 8270C
Diazinon	0.02	0.02	0.0036	ug/L	EPA 8270C
Dichlorvos	0.1	0.1	0.0048	ug/L	EPA 8270C
Dimethoate	0.1	0.1	0.0075	ug/L	EPA 8270C
Demeton-S (Demeton [O,S])	0.1	0.1	0.025	ug/L	EPA 8270C or EPA 8321A
Disulfoton	0.05	0.05	0.025	ug/L	EPA 8270C or EPA 8321A
Malathion	0.1	0.1	0.0046	ug/L	EPA 8270C
Methamidophos	0.2	0.2	0.022	ug/L	EPA 8270C or EPA 8321A
Methidathion	0.1	0.1	0.011	ug/L	EPA 8270C
methyl Parathion	0.1	0.1	0.003	ug/L	EPA 8270C
Phorate	0.2	0.1	0.0033	ug/L	EPA 8270C
Phosmet	0.2	0.2	0.03	ug/L	EPA 8270C
Herbicides					
Atrazine	0.5	0.5	0.029	ug/L	EPA 8270C
Simazine	0.5	0.5	0.024	ug/L	EPA 8270C
Cyanazine	0.5	0.5	0.036	ug/L	EPA 8270C
Diuron	0.5	0.4	0.022	ug/L	EPA 8321A
Molinate	-	0.5	0.0043	ug/L	EPA 8270C
Glyphosate	5	5	2.1	ug/L	EPA 547
Paraquat	0.5	0.4	0.21	ug/L	EPA 549.2
Linuron	0.5	0.4	0.014	ug/L	EPA 8321A
Trifluralin	0.05	0.05	0.0056	ug/L	EPA 8270C
Metals (Total /Dissolved)					
Arsenic	1	0.2	0.059	ug/L	EPA 200.8
Boron	10	10	4.6	ug/L	EPA 200.8
Cadmium	0.1	0.1	0.075	ug/L	EPA 200.8
Calcium	-	0.1	0.046	mg/L	EPA 200.7
Copper	0.5	1.1	0.49	ug/L	EPA 200.8
Lead	0.5	0.2	0.041	ug/L	EPA 200.8
Magnesium	-	0.1	0.046	mg/L	EPA 200.7
Molybdenum	1	0.5	0.32	ug/L	EPA 200.8
Nickel	1	1	0.20	ug/L	EPA 200.8

		BSK Reporting Information			
Constituent	**ILRP PQL**	**RL**	**MDL[1]**	**Units**	**Method**
Potassium	-	2	0.91	mg/L	EPA 200.7
Selenium	1	1	0.76	ug/L	EPA 200.8
Sodium	-	1	0.46	mg/L	EPA 200.7
Zinc	1	1	0.68	ug/L	EPA 200.8
Nutrients					
Nitrate-N	0.05	0.06	0.028	mg/L	EPA 300.0
Nitrite-N	0.05	0.05	0.020	mg/L	EPA 300.0
Ammonia	0.1	0.1	0.038	mg/L	EPA 350.1
Orthophosphate (as P)	0.01	0.01	0.0049	mg/L	SM 4500-P E
Phosphorus-P	-	0.01	0.0015	mg/L	SM 4500-P E
General Mineral					
Carbonate as CaCO3	-	3	-	mg/L	SM 2320B
Bicarbonate as CaCO3	-	3	-	mg/L	SM 2320B
Chloride	-	1	0.51	mg/L	EPA 300.0
Sulfate	-	1	0.40	mg/L	EPA 300.0
Pyrethroids / Chlorpyrifos					
Chlorpyrifos	-	10	0.36	ug/Kg	EPA 8270C
Bifenthrin	1.0	1.0	0.12	ug/Kg	EPA 8270C
Cyfluthrin	1.0	2.0	0.39	ug/Kg	EPA 8270C
Cypermethrin	1.0	2.0	0.54	ug/Kg	EPA 8270C
Deltamethrin	-	2.0	0.47	ug/Kg	EPA 8270C
Esfenvalerate (+Fenvalerate)	1.0	1.0	0.45	ug/Kg	EPA 8270C
Fenpropathrin	1.0	1.0	0.077	ug/Kg	EPA 8270C
Permethrin (cis-Permethrin)	1.0	1.0	0.11	ug/Kg	EPA 8270C
Lambda Cyhalothrin	1.0	1.0	0.062	ug/Kg	EPA 8270C
Piperonyl Butoxide	-	0.5	0.19	ug/Kg	EPA 8270C

1. The MDLs listed are those in existence at the time this QAPP was written. MDLs may change over time as the laboratory conducts ongoing studies due to changes in the method or equipment or is required to do so as per the SWAMP requirements.

Method Performance

The laboratory will observe the following method and instrument criteria for this project.

Table 9: Laboratory Method QC Criteria

Parameter	Calibration	Calibration Verification	Method Blank	Laboratory Control Spike (LCS)	LCS Duplicate	Matrix Spike (MS)	Matrix Spike Duplicate (MSD), Lab Duplicate	Field Duplicate	Surrogate Recovery
Ammonia	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 10%, Continuing Verification every 10 field samples, %Diff ≤ 10%*	*<RL*	*1 per batch of 20 samples, 90-110%*	*1 per batch of 20 samples, 20% RPD*	*1 per batch of 20 samples, 90-110%*	*1 per batch of 20 samples, 20% RPD*	*≤25% RPD*	*N/A*
Carbamates	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 10%, Continuing Verification every 10 field samples, %Diff ≤ 10%*	*<MDL*	*1 per Batch of 20 Samples, 50-150%*	*1 per Batch of 20 Samples, 30% RPD*	*1 per Batch of 20 Samples, 50-150%*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*Applied to all samples and QC, 50-150%*
Glyphosate	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 20%, Continuing Verification every 10 field samples, %Diff ≤ 20%*	*<MDL*	*1 per batch of 20 samples, 70-130%*	*1 per Batch of 20 Samples, 30% RPD*	*1 per batch of 20 samples, 70-130%*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*Applied to all samples and QC, 70-130% Rec*

Parameter	Calibration	Calibration Verification	Method Blank	Laboratory Control Spike (LCS)	LCS Duplicate	Matrix Spike (MS)	Matrix Spike Duplicate (MSD), Lab Duplicate	Field Duplicate	Surrogate Recovery
Hardness (Calc)	*Performed by Calculation. See Metals QC Criteria.*	*Performed by Calculation. See Metals QC Criteria.*	*<RL*	*Performed by Calculation. See Metals QC Criteria.*	*Performed by Calculation. See Metals QC Criteria.*	*Performed by Calculation. See Metals QC Criteria.*	*Performed by Calculation. See Metals QC Criteria.*	*≤25% RPD*	*N/A*
Herbicides	*5 Pts Min. (Linear Fit, R≥0.995 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 30%, Continuing Verification every 20 field samples, %Diff ≤ 15%*	*<MDL*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*1 per Batch of 10 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*Applied to all samples and QC, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*
Metals	*Single Point calibration plus Calibration Blank, multi-point curves must be fit using Linear Regression, R≥0.995*	*2nd Source Verification following calibration, %Diff ≤ 10%, Reporting Limit Verification following calibration, %Diff ≤ 10%, Continuing Verification every 10 field samples, %Diff ≤ 10%*	*<2.2x MDL*	*1 per batch of 20 samples, 85-115%*	*1 per batch of 20 samples, 20% RPD*	*1 per batch of 20 samples, 70-130%*	*1 per batch of 20 samples, 20% RPD*	*≤25% RPD*	*N/A*

Parameter	Calibration	Calibration Verification	Method Blank	Laboratory Control Spike (LCS)	LCS Duplicate	Matrix Spike (MS)	Matrix Spike Duplicate (MSD), Lab Duplicate	Field Duplicate	Surrogate Recovery
Anions – Nitrate, Nitrite, Chloride, Sulfate	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 10%, Continuing Verification every 10 field samples, %Diff ≤ 10%*	*<RL*	*1 per batch of 20 samples, 90-110%*	*1 per batch of 20 samples, 20% RPD*	*1 per batch of 10 samples, 80-120%*	*1 per batch of 10 samples, 20% RPD*	*≤25% RPD*	*N/A*
OCl Pesticides	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 30%, Continuing Verification every 20 field samples, %Diff ≤ 15%*	*<MDL*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*Applied to all samples and QC, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*
OP Pesticides	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 30%, Continuing Verification every 20 field samples or 12 hours , %Diff ≤ 20%*	*<MDL*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*Applied to all samples and QC, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*

Parameter	Calibration	Calibration Verification	Method Blank	Laboratory Control Spike (LCS)	LCS Duplicate	Matrix Spike (MS)	Matrix Spike Duplicate (MSD), Lab Duplicate	Field Duplicate	Surrogate Recovery
o-Phosphate	*5 Pts Min. (Linear Fit, R≥0.995)*	*2nd Source verification following calibration, %Diff ≤ 15%, Continuing Verification every 10 field samples, %Diff ≤ 10%*	*<RL*	*1 per batch of 20 samples, 90-110%*	*1 per Batch of 20 Samples, 20% RPD*	*1 per batch of 20 samples, 80-120%*	*1 per Batch of 20 Samples, 20% RPD*	*≤25% RPD*	*N/A*
Phosphorus	*5 Pts Min. (Linear Fit, R≥0.995)*	*2nd Source verification following calibration, %Diff ≤ 15%, Continuing Verification every 10 field samples, %Diff ≤ 10%*	*<RL*	*1 per batch of 20 samples, 90-110%*	*1 per Batch of 20 Samples, 20% RPD*	*1 per batch of 20 samples, 80-120%*	*1 per Batch of 20 Samples, 20% RPD*	*≤25% RPD*	*N/A*
Paraquat	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 20%, Continuing Verification at the beginning of the run, every 8 hours or 20 samples minimally*	*<MDL*	*1 per batch of 20 samples, 70-130%*	*1 per Batch of 20 Samples, 30% RPD*	*1 per batch of 20 samples, 70-130%*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*N/A*

Parameter	Calibration	Calibration Verification	Method Blank	Laboratory Control Spike (LCS)	LCS Duplicate	Matrix Spike (MS)	Matrix Spike Duplicate (MSD), Lab Duplicate	Field Duplicate	Surrogate Recovery
		thereafter, %Diff ≤ 20%							
Pathogens	*N/A*	*N/A*	*<RL[1]*	*N/A[1]*	*N/A*	*N/A*	*N/A*	*≤25% RPD*	*N/A*
Pyrethroids	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 30%, Continuing Verification every 20 field samples or 12 hours , %Diff ≤ 20%*	*<MDL*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*Applied to all samples and QC, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*
Solids (TDS, TSS)	*N/A*	*N/A*	*<RL*	***(TDS Only)*** *1 per Batch of 20 Samples, 70-130%*	*N/A*	*N/A*	*<20% RPD (Lab Dup)*	*≤25% RPD*	*N/A*
Toxicity	*N/A*	*N/A*	*0%*	*0%*	*NA*	*NA*	*NA*	*NA*	*NA*
Triazine Pesticides	*5 Pts Min. (Linear Fit, R≥0.995) 6 Pts Min. (Non-linear fit. R^2≥0.99)*	*2nd Source verification following calibration, %Diff ≤ 30%, Continuing Verification every 20 field samples or*	*<MDL*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*1 per Batch of 20 Samples, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*	*1 per Batch of 20 Samples, 30% RPD*	*≤30% RPD*	*Applied to all samples and QC, Rec Range Varies, Avg. Rec ± 3SD, See attached specification sheet*

Parameter	Calibration	Calibration Verification	Method Blank	Laboratory Control Spike (LCS)	LCS Duplicate	Matrix Spike (MS)	Matrix Spike Duplicate (MSD), Lab Duplicate	Field Duplicate	Surrogate Recovery
		12 hours , %Diff ≤ 20%							
Turbidity	*Single Point calibration plus Calibration Blank, dependent on expected range of use*	*2nd Source Verification following calibration, %Diff ≤ 10%, Reporting Limit Verification following calibration, %Diff ≤ 10%, Continuing Verification every 10 field samples, %Diff ≤ 10%*	*<RL*	*N/A*	*N/A*	*N/A*	*<20% RPD (Lab Dup)*	*≤25% RPD*	*N/A*
Alkalinity - Carbonate, Bicarbonate	*N/A*	*N/A*	*<RL*	*1 per Batch of 20 Samples, 80-120%*	*1 per Batch of 20 samples, 20% RPD*	*N/A*	*<20% RPD (Lab Dup)*	*≤25% RPD*	*N/A*

1. Pathogen analysis requires a daily positive control and negative control. BSK also performs a daily sterility check on prepared media.

Disposal Procedures

Most of the sample collected for any given monitoring event will be consumed as part of the analyses. However, as noted above, the contract laboratory will retain the remaining sample volume for a period of 60 days from receipt of the samples, approximately 45 days from the completion based on the standard turnaround time of 10 business days.

Once identified for disposal, samples are segregated into groups according to their waste classification. Any samples identified as hazardous based on the outcome of their testing will be put into the laboratory's waste streams and handled in accordance with EPA and DTSC regulations. Samples that are not determined to be hazardous based on the results of their testing will be disposed of according to their preservation type. Acidic and caustic samples will be neutralized and discarded down the sanitary sewer according to the local and Federal pre-treatment guidelines. Samples that are neutral are poured directly into the drain and flushed. Sample containers are rinsed and then recycled according to their material classification.

The laboratory maintains disposal records to indicate when each set of samples has been disposed.

Corrective Action Measures

The laboratory will take a variety of corrective actions for material failures related to sample conditions, holding time failures, preservation problems and quality control failures. All failures and corrective actions will be documented in the form of a data qualifier and / or addressed in detail in the Case Narrative at the beginning of the laboratory report. The details of these responses are included in the various method SOPs and other related supporting documentation. However, the general corrective actions related to a number of common QC failures are listed below:

<u>Calibration Linearity</u> failures are often caused by instrumentation that is in need of maintenance. If a calibration curve fails to meet linearity criteria, the instrument will be repaired and likely a new set of calibration standards prepared. Once complete, the instrument will be recalibrated.

<u>Initial (ICV) and Continuing Calibration (CCV)</u> failures occur periodically on the laboratory instrumentation. Often times these failures are associated with running large numbers of dirty samples which deteriorate the performance of the equipment. ICV failures will generally be handled by the preparation of a new set of calibration standards and ICV standard, and reanalysis of the ICV and CCV. This is often done in conjunction with maintenance performed consistent with that tied to calibration linearity problems.

<u>Method Blank Contamination</u> failures indicate that the ambient laboratory background may be contributing to sample contamination. The response to specific methods will vary but in general, any detection over a Reporting Limit (RL) will result in the re-

preparation and reanalysis of the associated samples unless the sample results are greater than 10x that found in the blank. Certain methods have corrective action requirements for detections above the MDL or at a multiple of the MDL. Those will be addressed on a case by case basis. All detections in the Method Blanks having a material impact on the data as defined by the ILRP QAPP guidelines will be addressed in the report case narrative.

Laboratory Control Spike Recovery and Precision failures are indicative of a problem in the analytical procedure. Recovery failures are generally addressed by a re-preparation and reanalysis of all samples and QC indicators. Several exceptions may be made where recoveries exceed the upper control limit and samples are non-detected for the failed compound. Precision failures will generally follow the same corrective action plan unless the RPD limit is narrower than the acceptance range for Recovery performance. Under those circumstances, the laboratory will not reject the results but will qualify the data to note the failure.

Matrix Spike Recovery and Precision failures indicate that the sample matrix itself may have some adverse effect on the method performance. However, if the LCS/LCSD recoveries meet control criteria, no corrective action will be needed. The problem at that point is assumed to be associated with the sample matrix itself and beyond the reasonable control of the laboratory. Sample results will be qualified and a note will be made in the case narrative. However, repeated failures for the same analyte will trigger an investigation as the ongoing failure may indicate that the method is poorly suited for a particular sample type and should be modified to address the performance issue.

Laboratory Duplicate failure may indicate a problem with sample homogeneity. On a Lab Duplicate failure, the sample itself will be examined for obvious matrix homogeneity issues. If there are no obvious reasons for the nature of the failure, the samples will be re-prepared and reanalyzed. If an obvious cause is determined, the sample results will be qualified and a note made in the case narrative. However, laboratory duplicate failures that occur when sample results are less than 10x the RL will be ignored as the magnitude of the RPD can be disproportionately affected by low sample results.

Field Duplicate failures indicate homogeneity or sampling issues that occur in the field. No corrective action is taken with such failures with the exception of qualifying the data and making a notation in the case narrative.

Surrogate Recovery failures will be addressed on a case by case basis. Samples with failing surrogate recoveries may be biased either high or low. Surrogate failures on clean matrices with no obvious sample interferences will be re-extracted if possible. Repeated failures will be assumed to be caused by matrix interference. If no re-extraction is possible, the data will be qualified. High surrogate failures on non-detected samples will be treated as immaterial to data usability and qualified only to call attention to the failure.

ELEMENT 14: QUALITY CONTROL

The laboratory will perform the following QC measures listed in Table 10 under this Plan.

Table 10: Required Quality Control by Method

	Samples per Batch	Method Blank	LCS / LCSD	MS / MSD	Lab Dup	Surr. Spike	Field Dup
Ammonia	20	X	X	X		N/A	X
Bicarbonate/ Carbonate Alkalinity	20	X	X		X	N/A	X
Carbamates	20	X	X	X		X	X
Glyphosate	20	X	X	X		X	X
Hardness (Calc)	20	X[3]	X[3]	X[3]		N/A	X
Herbicides	20	X	X	X		X	X
Metals	20	X	X	X		N/A	X
Anions	20	X	X	X		N/A	X
OCl Pesticides	20	X	X	X		X	X
OP Pesticides	20	X	X	X		X	X
o-Phosphate	20	X	X	X		N/A	X
Phosphorus	20	X	X	X		N/A	X
Paraquat	20	X	X	X			X
Pathogens	-	X[1]	X[1]	N/A		N/A	X
Pyrethroids	20	X	X	X		X	X
TOC	20	X	X	X		N/A	X
TDS	20	X	X[2]		X	N/A	X
TSS	20	X			X	N/A	X
Triazine Pesticides	20	X	X	X		X	X
Turbidity	20	X	N/A	N/A	X	N/A	X
Toxicity	NA	X[4]	X[4]	N/A	NA	N/A	X

1. Laboratory performs a sterility check, positive and negative control per day
2. Laboratory analyzes a certified standard reference material for TDS
3. QC for Hardness performed in analysis of Calcium and Magnesium which are used to determine Hardness by calculation
4. Laboratory performs a 0% control per test batch and reference toxicant per test batch or monthly depending on the species.

QC Definitions and Specifications - Chemistry

Method Blank

The method blank is a simulated sample comprised of a clean, interference-free matrix (typically deionized water) that is carried through the sample preparation and analysis procedure. It is used to determine if the ambient laboratory background is free from contaminants that may influence sample results. The results of the Method Blank are

assessed against the MDL and RL, depending on the method. Contamination in a method blank may require corrective action as described in Element 13.

Laboratory Control Spike / Duplicate (Blank Spike / Duplicate)

The Laboratory Control Spike – sometimes referred to as Blank Spike – is an interference-free matrix that is fortified with the target analyte at a level reasonably expected to be found in the field sample. Alternatively, laboratories typically fortify at a level that is roughly the midpoint of the calibration range. The result obtained for this "spike" is compared to the level of fortification that results in a recovery value. The recovery is compared to a set of control limits to determine if the method is performing as expected.

LCS or BS recovery is determined according to the following calculation:

$$\%\ \text{Recovery} = \frac{Result\ Observed}{Fortification\ Level} \times 100$$

LCS or BS Duplicate results are evaluated not only for recovery but also for Relative Percent Difference (RPD), a measure of precision. RPD is determined by the following calculation:

$$Relative\ Percent\ Difference = \frac{|LCS\ Res - LCSD\ Res|}{Avg\ (LCS,\ LCSD)} \times 100$$

Matrix Spike / Duplicate

The Matrix Spike (MS) is a sample that has been fortified in the same manner as the LCS or BS. The MS result demonstrates the impact of the sample matrix on the method performance. MS performance is also based on recovery that is calculated as follows:

$$\%\ \text{Recovery} = \frac{(MS\ Result - MS\ Parent\ Sample\ Result)}{Fortification\ Level} \times 100$$

The Matrix Spike is also performed in duplicate to provide the data user with an indication of the impact of the sample matrix on the precision or reproducibility of the method. The MS Duplicate is assessed by RPD which is calculated as follows:

$$Relative\ Percent\ Difference = \frac{|MS\ Res -\ MSD\ Res|}{Avg\ (MS,\ MSD)} \times 100$$

Laboratory and Field Duplicates

A Laboratory Duplicate is a second aliquot of a sample taken from the same container as the original sample that is run in parallel with the original parent sample. The duplicate

performance will indicate if the method and / or sample has some inherent variability that is atypical for the method. Like the LCSD or MSD, the Laboratory Duplicate is assessed based on RPD that is calculated in the same manner, comparing the result of the parent sample to that of the duplicate and dividing by the average of the two observations.

$$Relative\ Percent\ Difference = \frac{|Parent\ Res - Duplicate\ Res|}{Avg\ (Parent, Duplicate)}\ X\ 100$$

A Field Duplicate is a second collection of a sample, captured in its own unique container. The Field Duplicate is treated in the same manner as all other samples and is likewise assessed based on the same RPD calculation shown for the laboratory duplicate.

A failure of either the Laboratory or Field Duplicate indicates a potential lack of homogeneity in the sample collection or subsampling procedures.

- On failure of a Field Duplicate, the laboratory will inspect the sample containers for any observable differences between the primary and duplicate samples. If a material difference is observed (e.g. significant suspended or settled matter, differences in color or other physical characteristics), the laboratory will review both the field logs and the sampling procedure for any potential sources of variation. If there is an indication that a sampling error occurred, then the Coalition will be notified to make a determination regarding the usability and representativeness of the sample. If no problems are identified, the data will be qualified to indicate the discrepancy between results and reported to the Coalition.

- On failure of a Laboratory Duplicate, the laboratory will inspect the individual sample container used for the duplicate to ensure a correct subsampling occurred. If there is no obvious source of error, the laboratory will reanalyze the sample in duplicate to assess the situation. If a repeated error occurs, then the original data will be qualified and reported to the Coalition. If the error is no longer observed, then the original results will be discarded and the reanalysis will be reported. If there is an observable homogeneity issue that the laboratory cannot overcome, the results will be qualified as estimated values and reported to the Coalition.

QC Definitions and Specifications – Microbiology

Method Blank (Sterility Check)

The "method blank" for microbiology is a sterility check conducted on all the materials used in the analysis of all field samples, if the sterility check confirms there to be no ambient microbial background which could contribute to the presence of bacteria in the field samples. Positive growth in a sterility check would indicate that the materials used in

the analysis of the samples may be contaminated and therefore all associated results should be rejected as suspect.

Negative Control

A Negative Control is used to ensure that the media used in the analysis of samples does not support growth for any pathogen other than that specifically targeted by the method. Should a Negative Control exhibit growth, it would indicate that the media in use is not specific enough for the pathogen and that growth observed for the samples may be attributable to species other than that of interest for the project.

Positive Control

The Positive Control sample ensures that the media used in the analyses of a pathogen is suitable for growing the species of interest. If a positive control exhibits no growth, then sample results are suspect as potential false negatives. The positive control must exhibit some growth to prove that the media can support the culturing of the target species.

QC Definitions and Specifications – Toxicology

0% Control

The 0% Control is used to assess the cleanliness of the laboratory environment and the quality of the laboratory grade water used for sample dilution. The control should not experience any mortality, as this would be indicative of a toxic substance in the dilution water which is adding to any toxicity attributable to the sample.

Reference Toxicant

The Reference Toxicant is a known toxicant that is tested with the organisms to evaluate their response. This demonstrates that the method performance is within plus or minus two standard deviations from the mean of past tests conducted with a particular organism.

ELEMENT 15: INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

The ready availability of equipment shall be maintained by the contract laboratory and the TBWQC as they are responsible for both the field and in-house laboratory analyses

Field Instrumentation / Equipment

Field units are maintained constantly as they are subject to use on applications other than under this Plan. The instruments are used for non ILRP activities, and any indication of failure can quickly be addressed as the need arises. Batteries are replaced on a regular schedule to insure against failure in the field. Backup batteries and other parts subject to failure will be maintained in supply to ensure no material downtime. The instruments are regularly checked for calibration against known standards. Calibration will be documented as required below.

The field sampling crew will be responsible for ensuring that all support equipment is maintained and in good working order. Equipment that is damaged in a way that will adversely affect usage will be replaced. The equipment will be cleaned according to standard operating procedures in place for environmental field sampling prior to the sampling event and between sample monitoring sites.

The field instrumentation requiring Inspection, Maintenance and Calibration includes:

Table 11: BSK Field Instrumentation

Instrument	Make	Model
DO Meter	Oakton	DO 300
EC, pH Meter, Temperature	Oakton	PC 10
Flow Meter	Global Water	FP 211

Table 12: TBWQC Field Instrumentation

Instrument	Make	Model
DO, EC, pH, Temperature Meter	YSI	Pro

Laboratory Instrumentation

The contract laboratories have sufficient redundancy in their instrumentation to recover from the failure of any particular instrument. Calibrations are ongoing, as are MDL studies and other indicators of method performance. The laboratory maintains service contracts for key pieces of equipment where redundant equipment is not feasible due to the substantial cost of replacement.

Compliance with method procedures is a must. Instrument failures or anomalous data are documented in the laboratory report either in the form of a data qualifier or in the case narrative at the beginning of the laboratory report.

Table 13: Laboratory Instrumentation

Instrument	Make	Model
pH, EC, Alkalinity Titrator	Mansci	PC-Titrate
Nutrient Analyzer	Westco	SmartChem 200
Continuous Flow Analyzer	Skalar	3000
Ion Chromatograph	Metrohm	930 Compact IC Flex
HPLC-UV/Vis, Fluor, PDA	Thermo Separations	AS 3000
HPLC-MS/MS	AB Sciex	4000
GC-ECD	Agilent	7890
GC-MS	Agilent	6890/5975, 6890/5973
TOC Analyzer	Tekmar	Phoenix 8000
Turbidimeter	HF Scientific	DRT-15CE
ICP	Perkin Elmer	Optima 8300 RL
ICP-MS	Perkin Elmer	ELAN DRC IIe
Oven	VWR	1380FM

ELEMENT 16: INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Field Instrumentation

Laboratory field technicians and the TBWQC are responsible for ensuring the inspection, maintenance, and when appropriate, the calibration of field instruments and equipment.

Field instruments are calibrated (or verified as being in calibration) prior to the beginning of the sampling event, and rechecked in the field using known standards. Instruments that require calibration checks include the EC, pH, and DO meters listed above. Calibration procedures will be conducted according to the contract laboratory SOPs and consistent with manufacturer recommendations.

See Element 15 for a listing of equipment requiring calibration.

Laboratory Instrumentation

Laboratory analysts and technicians are responsible for the inspection, maintenance, operation and, where appropriate, calibration of their assigned laboratory instrumentation.

Calibration at the laboratory is conducted according to method requirements. Specific schedules are outlined in the laboratory specific SOPs provided in Appendix B (Proprietary copy only). Checks include initial and continuing calibration verifications to demonstrate the instrumentation remains in calibration and operating normally. The laboratory will run a calibration point or a calibration verification check at or below the equivalent of the project reporting limit. This ensures that the instrumentation has adequate sensitivity to achieve the levels needed for the project.

All calibration runs are documented and maintained by the laboratory in a manner consistent with its standard record retention requirements. Any deficiencies will be addressed according to the laboratory standard operating procedures. Corrective actions and additional details will be maintained in the laboratory's log books and raw data. Where applicable, these deficiencies will also be documented in the report Case Narrative should they have any material impact on data usability.

See Element 15 for a listing of the equipment requiring calibration.

ELEMENT 17: INSPECTION / ACCEPTANCE OF SUPPLIES AND CONSUMABLES

The contract laboratory will be solely responsible for the procurement, inspection and acceptance of supplies and consumables. Given the substantial volume of samples processed and the requirements of the ISO-17025 based quality system, the laboratory has policies and procedures in place to qualify and determine the suitability of each material for use. Suppliers of reagents, standards, consumables, parts and other supplies are limited by the laboratory purchasing system to ensure that the laboratory always receives supplies it has determined are suitable for use. A single person within the contract laboratory is responsible for the ordering and receiving of supplies.

Standards and reagents are tracked within the laboratory using a system of identification numbers. This system allows the laboratory to be able to trace the source of all measurements to a specific lot for any given critical supply. This is especially true of all standard and reference materials that serve as the basis for all laboratory calibrations. Certificates of Analysis for analytical standards and reagents are collected and retained by the Laboratory Quality Assurance Manager according to the Laboratory's record retention requirements.

Bottles and sampling supplies are included in this tracking system. Reagents used for preservatives are tracked and each bottle includes a lot number that can be traced to the day it was produced, the person who added the preservative where applicable, and the identity of the preservative used on that day. This allows the lab to trace any potential problems with a sample container back to the production source, permitting a retraction of sample container by lot number if required.

ELEMENT 18: NON-DIRECT MEASUREMENTS

The are no non-direct measurements used in this program. All flow rates within the system are obtained from the hydrologists or watermaster that supervises the delivery of irrigation water and monitors waterway flows. These values are derived based on the known discharges into the designated waterways and validated using flow measurements at key points within defined flow channels along the flow path. The flow rates are accurate to within 10% of the actual flows and deemed sufficiently accurate for the purposes of the program. Flow rates in the form of velocity measurements are one of the field parameters to be determined at the time of sample collection and will be the primary point of comparison when evaluating water flows at the time of collection.

ELEMENT 19: DATA MANAGEMENT

Presently, there are no *In Situ* or continuous measurements being made related to this Plan. Data production begins with field measurements and sample collection. All notes will be recorded on bound logbooks. Copies of the field documentation will be provided to the analytical laboratory for inclusion into the laboratory reports. The office where the sample crew originates will maintain the original records for a period of no less than five years, the same as the record retention policy of the laboratory.

The data generated by the laboratory will exist in both electronic and hardcopy records, each held for a minimum of five years from the date of generation. This includes the Laboratory Information Management System database that houses all the results and supporting data associated with the samples. The contracted laboratory scans all hardcopy records into an electronic archival which is also maintained consistent with the record retention policy.

Hardcopy data is held in a secure location controlled by the laboratory. Access is limited and records are disposed based on standard operating procedure. Electronic data – raw data files, scanned images, Adobe PDF reports, etc., – are held on secure company servers that are backed up daily. Backup media is rotated off site on a scheduled basis, a responsibility of the IT Department.

Data will be provided to the Coalition in electronic format. The analytical report will be an Adobe PDF that includes all results, QC, case narrative, chain of custody and sample receipt documentation. Laboratory raw data, other than the raw data for the toxicity testing, will not be included in the analytical report. However, all laboratory raw data such as chromatograms, spectra, summaries of initial and continuing calibrations, sample injection or sequence logs, prep sheets, etc., will be retained by the laboratory for a minimum of five years and will be provided if specifically requested by the Coalition.

In addition, the laboratory will create a CEDEN and GeaoTracker ESI compliant electronic data deliverable (EDD) for the SWAMP and GQTMP, respectively, that includes all required data for the programs. The EDD will be verified against the CEDEN data checker (http://ceden.org/CEDEN_checker/Checker/CEDENUpload.php) or Geotracker ESI data checker (https://geotracker.waterboards.ca.gov/esi) for content and structure. A copy of the error report will be provided to the Coalition in conjunction with the file for monthly, quarterly and annual reporting. Data from both the primary laboratory and the subcontract lab (toxicity data) will be produced in separate files and sent via email to the Coalition once evaluated.

Data received by the Coalition will be given a cursory review for correct format and completeness. All data, electronic or paper copy, will be filed according to sample date and monitoring site. Electronic format data will be filed in a manner that allows for historical trends and summaries to be analyzed along with quick retrieval for quarterly and annual submittals. The Coalition will work with the contracted laboratory if any issues regarding data are encountered.

ELEMENT 20: ASSESSMENT AND RESPONSE ACTIONS

The Quality Assurance Manager, in cooperation with the Laboratory Coordinators, will review both sampling procedures and laboratory performance annually. Changes in the SOPs used by any of the contracted labs will be communicated between the QA Manager and the Laboratory Coordinators as they occur. Both the QA Manager and the Laboratory Coordinator have "stop work" authority should a situation arise that necessitates an immediate corrective action.

The Laboratory Coordinator will have the responsibility of managing the contracted laboratory. Any issues encountered during the analysis of the samples are to be resolved by the Laboratory Coordinator and then communicated to the QA Manager. Any reported issues at the laboratories will be communicated to the Regional Board as needed and discussed in detail within the Annual Report.

The Laboratory Coordinator will work directly with the Laboratory Project Manager to resolve issues as they occur on any given monitoring event. For ongoing performance issues or to address matters related to the adherence to the QAPP, the Laboratory Coordinator will work directly with the Laboratory Program Manager. These two will meet at least on an annual basis to review the contract lab performance and to address any procedural changes required to ensure ongoing success of the program.

The laboratory QAPPs contained within the attached appendices all address the issue of analyst training and performance, as well as procedures for failed tests. These procedures closely match the Regional Board guidelines for standard laboratory practices and corrective actions.

A copy of the most recent MDL study is to be obtained on at least an annual basis along with a listing of the current SOPs. Material changes in any of the quality control practices, SOPs or other significant procedures may require a revision to this QAPP.

ELEMENT 21: REPORTS TO MANAGEMENT

Activities of the sampling staff are documented and reviewed as part of the submission to the laboratory for the monthly and annual monitoring events. The Laboratory Program Manager will have the responsibility to address any performance issues with the branch office where the sample crew for surface water sampling originated. The TBWQC Technical lead shall address performance issues of groundwater sampling staff. Anomalies or other failures will trigger a Non-Conformance Report ultimately leading to a Corrective Action/Preventative Action (CAPA) event. This will include a root cause determination and a remedial corrective action where necessary. These corrective action reports will be made available to the Laboratory Coordinator on request.

As a result of the meetings between the Laboratory Coordinator and the Laboratory Program Manager, the Coordinator will prepare a summary report of the outcomes of the meeting. The report will contain details on the performance of the contract laboratory, improvements or enhancements to be made that will improve the overall success of the Plan, and any remedial measures taken to address potential performance issue leading to deficiencies in data deliverables.

Quarterly reports (CEDEN formatted data) and annual reports (GeoTracker ESI) are prepared by the Laboratory Coordinators and submitted to the QA Manager for final review. Once the review is completed, the Project Coordinator will prepare a cover letter to accompany the data for the Regional Board. The Project Coordinator is responsible for the drafting of the yearly report for submission to the Regional Board.

Reports submitted to the Regional Board will be sent to the liaison within the Fresno, CA office. Additional copies of the integrated report are kept at the Coalition office.

ELEMENT 22: DATA REVIEW, VERIFICATION AND VALIDATION

Data submitted to the Coalition has undergone a thorough review process at the contracted labs. A statement that the data has been reviewed and is acceptable is provided with the lab report linked to each chain of custody.

The laboratories follow a three tier review process. The primary analyst conducting the analysis is responsible for the generation of results. This analyst performs a double check of their work as part of the reporting process. Upon completion, the data package is then handed off to a peer review, most often the immediate supervisor or another qualified peer reviewer. The peer review consists of a check against all method requirements with documentation applied to any deficiencies. Once all results have undergone a peer or secondary review, the Laboratory Project Manager will review the report in its entirety, looking for agreement within the results and consistency with project requirements. Partial results may be provided to the Coalition on a preliminary basis, if the results have been reviewed through the three-tier review process.

For this QAPP, the report will undergo a final review by the Laboratory Program Manager or his designee. This person checks reports against the requirements of the QAPP and prepares the case narrative. This person generates the CEDEN electronic deliverable and evaluates the content using the CV RDC electronic data checker. Once complete, the report is finalized and sent to the Coalition.

Once received by the Coalition, the data is further reviewed by the QA Manager for exceedances, and the appropriate communication reports are prepared, if necessary, to the Regional Board.

ELEMENT 23: VERIFICATION AND VALIDATION METHODS

The Coalition QA Manager is responsible for the final review and determination of the validity and usability of the data. The determination of completeness is performed at both the level of the field activities and the in-house laboratory activities. Any questions or anomalies resulting from this review will be addressed directly with the laboratory prior to making the final determination. The overall completeness goal for the project is 90%.

ELEMENT 24: RECONCILIATION WITH USER REQUIREMENTS

The purpose of the sampling program is to determine if any constituents of concern exceed water quality standards in the water samples. If such detections are made, the Coalition will then open an inquiry as to the persistence of the detection (is it in more than one site, is it still present in the next sample period), review the conditions prior to the sampling event that produced the detection, and begin to research the potential sources of the detection.

The data, as reported by the lab, is considered valid if no problems are identified within the laboratory report and case narrative. In the event that the laboratory data quality indicators do not meet the criteria listed in Table 8 (or exceed other requirements listed in the cited analytical method), then the data will be annotated with data qualifiers that identify the deficiency. Laboratory reports containing notations that indicate QC failures or other issues that do not meet QAPP requirements will need to be assessed for impact. Not all failures result in the rejection of data but scrutiny will be applied to all failures or QAPP deviations. It is the responsibility of the QA Manager to make the final determination of data usability and its suitability for intended use. All QC failures or other known deficiencies will be indicated on the laboratory Certificate of Analysis, either in the form of a data qualifier and/or noted in the detailed Case Narrative provided therein. These deficiencies represent the possible limitations on the use of the data but will nonetheless be reported in order for the Coalition and Board to determine their suitability for use.

All data will be uploaded into the SWAMP Information Management System or GeoTracker ESI. At this point the Board may use the data in the overall evaluation of the surface water and groundwater quality in the Tule Basin watershed. Future decisions for water regulations will be made, in part, on the information provided under this Plan.

Questions will always arise when a toxicity level shows an exceedance, but the chemistry data taken at the same time fails to show a toxic substance that might cause the problem. Given the relatively limited list of monitoring parameters versus the number of both known and unknown potential contaminants, it is not inconceivable that a constituent could contribute to toxicity but fail to be identified from the chemistry testing. Continuing discrepancies between the outcome of the toxicity testing and the chemistry testing should be further evaluated in an attempt to determine the possible presence of a persistent, harmful parameter.

Any concerns or unanswered questions that arise from the data will be addressed as comments or footnotes within the written reports submitted to the Regional Board.

ELEMENT 25: DEFINITIONS

Term	Definition
BPO	Basin Plan Objective
BS/BSD	Blank Spike / Blank Spike Duplicate
CAPA	Corrective Action / Preventative Action
CEDEN	California Environmental Data Exchange Network
CA ELAP	California Environmental Laboratory Accreditation Program
CV RDC	Central Valley Regional Data Center
EDD	Electronic Data Deliverable
ESI	Electronic Submittal of Information
General Order (Order)	CA Central Valley Regional Board Order #R5-2013-0120 (Amended by R5-2014-0143 and R5-2015-0115)
GQTMP	Groundwater Quality Trend Monitoring Program
GQTMW	Groundwater Quality Trend Monitoring Workplan
ISO	International Organization for Standardization
IT	Information Technology
LCS/LCSD	Laboratory Control Spike / Laboratory Control Spike Duplicate. Often used interchangeably with BS/BSD.
ILRP	Irrigated Lands Regulatory Program
MDL	Method Detection Limit
MRP	Monitoring and Reporting Program
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NTC	
PQL	Practical Quantitation Limit
QA	Quality Assurance
QAPP	Quality Assurance Program Plan
QC	Quality Control
RDC	Regional Data Center
RL	Reporting Limit
RPD	Relative Percent Difference
SOP	Standard Operating Procedure
SSJVWQC	Southern San Joaquin Valley Water Quality Coalition
SWAMP	Surface Water Ambient Monitoring Program
SWMP (Plan)	Surface Water Monitoring Plan (Tule Basin SWMP)
TBWQC	Tule Basin Water Quality Coalition
TIE	Toxicity Identification Evaluation

APPENDIX A.1

Chain of Custody

BSK ASSOCIATES

1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
- ☐ Standard - 10 business days
- ☐ Rush (Surcharge may apply)
- Date needed:

ANALYTICAL CHAIN OF CUSTODY

*Required Fields

Temp:

Company/Client Name*:	Report Attention*:	Invoice To*:	Phone*:	Fax:
	Additional cc's:	PO#:	E-mail*:	

Address*:	City*:	State*:	Zip*:

Project:	Project #:	How would you like to receive your completed results?* ☐ E-Mail ☐ Fax ☐ Mail

Reporting Options: ☐ Trace (J-Flag) ☐ Swamp ☐ EDD Type: _____

Sampler Name (Printed/Signature)*:

Regulatory Carbon Copies
- ☐ SWRCB (Drinking Water)
- ☐ Merced Co
- ☐ Fresno Co
- ☐ Madera Co
- ☐ Tulare Co
- ☐ Other: _____

Regulatory Compliance
- ☐ EDT to California SWRCB (Drinking Water)
- System Number*: _____
- ☐ Geotracker #: _____

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX

Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name)		Date	Time	Payment Received at Delivery: Date: Amount: PIA#:	Check / Cash Init.

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: _____ Custody Seal: Y / N

Cooling Method: Wet Blue None Chilling Process Begun: Y / N

Payment for services rendered as noted herein are due in full within 30 days from the date invoiced. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in BSK's current Standard Terms and Conditions for Laboratory Services. The person signing for the Client/Company acknowledges that they are either the Client or an authorized agent to the Client, that the Client agrees to be responsible for payment for the services on this Chain of Custody, and agrees to BSK's terms and conditions for laboratory services unless contractually bound otherwise. BSK's current terms and conditions can be found at www.bskassociates.com/BSKLabTermsConditions.pdf

SR-FL-0012-07

APPENDIX A.2

Field Sample Collection Logs

ILRP/SWAMP 2.5 Field Data Sheet - Water Sample Collection			Pg of Pgs
Coalition Name:			DATE (mm/dd/yyyy):
StationID & Name :			FIRST SAMPLE TIME:
ProjectID:	Arrival Time:	Departure Time:	Target Lat. & Long.:
Sampling Crew (and Agency):			Actual Lat & Long:
			Datum: / Accuracy (ft / m):

OBSERVATIONS	WADEABLE: YES / NO	PICTURE NAME/S:
DOMINANT SUBSTRATE: Concrete, Cobble, Gravel, Sand, Mud, Unk., Other		
SITE ODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other	SKY CODE: clear, partly cloudy, overcast, fog, hazy	
OTHER PRESENCE: Vascular, Nonvascular, OilySheen, Foam, Trash, None, Other	PRECIPITATION: None, Foggy, Drizzle, Rain, Snow	
WATER ODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other	PRECIPITATION (last 24 hrs): Unknown, <1", >1", None	
WATER CLARITY: Clear (see bottom), Cloudy (>4" vis), Murky (<4" vis)	WATERCOLOR: colorless, green, yellow, brown, other	
OBSERVED FLOW: NA, Dry Waterbody Bed, No Observed Flow, Isolated Pool, 0.1 - 1cfs, 1 - 5 cfs, 5 - 20 cfs, 20 - 50 cfs, 50 - 200 cfs, >200cfs		

Comments:

PHYSICAL PARAMETERS	SAMPLE COLLECTION Sample Depth (circle one): 0.1 m (subsurface grab) -88 (integrated)
Water Temp (Celsius):	STARTING BANK: LB / RB/ NA
Air Temp (Celsius):	OCCUPATION METHOD: Walk-in, Bridge, Other
*pH>8.5 or <6.5 pH:	SAMPLING EQUIPMENT: Indiv bottle by hand, By pole, Other
*EC>700 EC (uS/cm):	SAMPLE LOCATION: Bank, Near Bank, Thalweg, Midchannel, Open Water
*DO<7.0 DO (mg/L):	HYDRO-MODIFICATION: None, Bridge, Pipes, Concrete Channel, Grade Control, Culvert, Other
TDS:	HYDROMODLOC: US / DS / NA

CALCULATED SITE DISCHARGE (cfs):		Wet Channel Width (m):	Wet Channel Width (m):
Transfer Calculated Value From Discharge Worksheet		Midchannel depth (m):	Stage:

√	Sample ID	Analyte	Container	Number	Notes

APPENDIX A.2

Field Sample Collection Logs

ILRP/SWAMP 2.5 Discharge Worksheet

Coalition Name:		DATE (mm/dd/yyyy):
StationID & Name :		FIRST SAMPLE TIME:
ProjectID:	Method: USGS (bridge), USGS (wading), culvert, other:	

Left Edge Water (LEW):	Start Time (24 hr):	Discharge (cfs):
Right Edge Water (REW):	End Time (24 hr):	Discharge calculated by:

#	Angle (if from bridge)	Interval Midpoint (meters or feet)	Interval Depth (meters or feet)	% Depth (from surface)*	Revolutions/Velocity (m/s or f/s)	Notes
1				0.2 / 0.8 or 0.6		
2				0.2 / 0.8 or 0.6		
3				0.2 / 0.8 or 0.6		
4				0.2 / 0.8 or 0.6		
5				0.2 / 0.8 or 0.6		
6				0.2 / 0.8 or 0.6		
7				0.2 / 0.8 or 0.6		
8				0.2 / 0.8 or 0.6		
9				0.2 / 0.8 or 0.6		
10				0.2 / 0.8 or 0.6		
11				0.2 / 0.8 or 0.6		
12				0.2 / 0.8 or 0.6		
13				0.2 / 0.8 or 0.6		
14				0.2 / 0.8 or 0.6		
15				0.2 / 0.8 or 0.6		
16				0.2 / 0.8 or 0.6		
17				0.2 / 0.8 or 0.6		
18				0.2 / 0.8 or 0.6		
19				0.2 / 0.8 or 0.6		
20				0.2 / 0.8 or 0.6		
21				0.2 / 0.8 or 0.6		
22				0.2 / 0.8 or 0.6		
23				0.2 / 0.8 or 0.6		
24				0.2 / 0.8 or 0.6		
25				0.2 / 0.8 or 0.6		
26				0.2 / 0.8 or 0.6		
27				0.2 / 0.8 or 0.6		
28				0.2 / 0.8 or 0.6		
29				0.2 / 0.8 or 0.6		

*two measurement should be taken (0.2 and 0.8 from the surface of the water) if the depth is greater than 0.76m (2.5ft).

APPENDIX A.2

Field Sample Collection Logs

ILRP/SWAMP 2.5 Field Data Sheet - Sediment Sample Collection				Pg of Pgs
Coalition Name:			DATE (mm/dd/yyyy):	
StationID & Name :			FIRST SAMPLE TIME:	
ProjectID:	Arrival Time:	Departure Time:	Target Lat. & Long.:	
Sampling Crew (and Agency):			Actual Lat & Long:	
			Datum:	Accuracy (ft / m):

OBSERVATIONS		WADEABLE: YES / NO	PICTURE NAME/S:
DOMINANT SUBSTRATE:	Concrete, Cobble, Gravel, Sand, Mud, Unk., Other		
SITE ODOR:	None, Sulfides, Sewage, Petroleum, Mixed, Other	SKY CODE:	clear, partly cloudy, overcast, fog, hazy
OTHER PRESENCE:	Vascular, Nonvascular, OilySheen, Foam, Trash, None, Other	PRECIPITATION:	None, Foggy, Drizzle, Rain, Snow
WATER ODOR:	None, Sulfides, Sewage, Petroleum, Mixed, Other	PRECIPITATION (last 24 hrs):	Unknown, <1", >1", None
WATER CLARITY:	Clear (see bottom), Cloudy (>4" vis), Murky (<4" vis)	WATERCOLOR:	colorless, green, yellow, brown, other
OBSERVED FLOW:	NA, Dry Waterbody Bed, No Observed Flow, Isolated Pool, 0.1 - 1cfs, 1 - 5 cfs, 5 - 20 cfs, 20 - 50 cfs, 50 - 200 cfs, >200cfs		
DOMINANTSUBSTRATE:	Bedrock, Concrete, Cobble, Gravel, Sand, Mud, Unk, Other_____		
SEDODOR:	None, Sulfides, Sewage, Petroleum, Mixed, Other_____		
SEDCOLOR:	Colorless, Green, Yellow, Brown		
SEDCOMPOSITION:	Silt/Clay, Fine Sand, Coarse Sand, Gravel, Cobble, Mixed, Hard Pan Clay		

Comments:

PHYSICAL PARAMETERS		SAMPLE COLLECTION	Sample Depth (circle one): 1 cm, 2 cm, -88 (integrated depth or core)
Water Temp (Celsius):		STARTING BANK:	LB / RB/ NA
Air Temp (Celsius):		OCCUPATION METHOD:	Walk-in, Bridge, Other
*pH>8.5 or <6.5	pH:	SAMPLING EQUIPMENT:	Hand trowel, Eckman Sampler, Other
*EC>700	EC (uS/cm):	SAMPLE LOCATION:	Bank, Near Bank, Midchannel Bed
*DO<7.0	DO (mg/L)	HYDRO-MODIFICATION:	None, Bridge, Pipes, Concrete Channel, Grade Control, Culvert, Other
	TDS:	HYDROMODLOC:	US / DS / NA

√	Sample ID	Analyte	Container	Number	Notes

APPENDIX A.3

Example Laboratory Data Completeness Worksheet

Lab Data Completeness Worksheet

Sampling Event	Month, Year	**Sample Results**		**Acceptable Data Quality Indicators**								**Total DQIs**			
Method	**Analyte**	**Total**	**Adversely Impacted**	**Sensitivity**	**Contamination**	**Accruacy (LCS)**	**Precision (LCS)**	**Recovery (MS)**	**Precision (MS)**	**Precision (Lab Dup)**	**Hold Time**	**# Acceptable**	**# Performed**	**Percent Sample Completeness**	**DQI Success Rate**
ASTM D422	Grain size											0			
EPA 200.7, Calc	Hardness (as CaCO3)											0			
EPA 200.8	Arsenic (Total)											0			
EPA 200.8	Boron (Total)											0			
EPA 200.8	Cadmium (Dissolved)											0			
EPA 200.8	Cadmium (Total)											0			
EPA 200.8	Copper (Dissolved)											0			
EPA 200.8	Copper (Total)											0			
EPA 200.8	Lead (Dissolved)											0			
EPA 200.8	Lead (Total)											0			
SM 2540C	Total Dissolved Solids (TDS)											0			
SM 2540D	Total Suspended Solids (TSS)											0			
SM 4500-NH3 G	Ammonia											0			
SM 4500-P E	Orthophosphate											0			
SM 5310C	Total Organic Carbon (TOC)											0			
SM 8010F	Unionized Ammonia (calculated value)											0			
SM 9221 B,F	E. Coli											0			
SM 9221 E	Fecal Coliform											0			
Walkley Black	Total Organic Carbon (TOC)											0			
	Totals	0	0	0	0	0	0	0	0	0	0	0	0		

APPENDIX A.4

Example Field and Transport Completeness Worksheet

Field Data Completeness Worksheet					
	Date Sampled				
		Sampling Locations			
Activity		**Sample Point 1**	**Sample Point 2**	**Sample Point 3**	**Sample Point 4**
Field Sampling					
	Water Present at Location?				
	Photo documentation captured?				
	Field Equipment Rinsed?				
	All containers for all samples filled?				
	Sample Labels Verified to COC?				
	Lat. / Long. Recorded?				
	Field Conditions Recorded?				
Field Measurements Collected					
	Flow				
	Temp				
	pH				
	EC				
	Dissolved Oxygen				
Sample Transport					
	Were samples packed on ice?				
	COC signed by sampler?				
	Was COC included in cooler?				
Sample Receipt					
	Samples received within temperature?				
	If no, received on ice on date collected?				
	All bottles unbroken and intact?				
	Bottle labels agree with COC?				
	Were bottles correct for tests requested?				
	Sufficient sample received for all tests?				
	Arrived at lab within hold times?				
	Passing Criteria	0	0	0	0
	Total Assessments	0	0	0	0
	% Complete				
	% Completeness - Field Activities				

Appendix I

Groundwater Sampling Form

Groundwater Sampling

Appendix I

Job Name:_____ Well No./ I.D._____
Job Number:_____ Well Type: ☐ Monitor ☐ Extraction Other:
Recorded By:_____ Well Material: ☐ PVC ☐ St. Steel Other:
(Signature) Date: Time:
Sampled By:_____

WELL PURGING

PURGE VOLUME

Casing Diameter (**D** inches): ☐ 2 ☐4 ☐ 6 ☐ Other:____
Total Depth of Casing (**TD** in feet BTOC):
Water Level Depth (**WL** in feet BTOC):
Number of well volumes to be purged (**# Vols**):
☐3 ☐4 ☐5 ☐10 ☐Other:

PURGE METHOD

☐ Bailer - Type:_____
☐ Submersible ☐ ☐Centrifugal ☐ Bladder; Pump No.:
☐ Other Type:

PUMP INTAKE SETTING

☐ Near ☐ Bottom ☐ Near Top Other:
Depth in ft (BTOC): Screen Interval in ft (BTOC):
From_____ To_____

PURGE VOLUME CALCULATION:

(_____) - (_____) • _____ ^{2} • _____ • .0408 = _____gallons

TD (feet) **GW** (feet) **D** (Inches) **# Vols** *Calculated Purge Volume*

PURGE TIME

Start:_____ Stop:_____
Elapsed:

PURGE RATE

Initial:_____ gpm
Final: _____gpm

ACTUAL PURGE VOLUME

_____ • _____ = _____ gallons

FIELD PARAMATER MEASURMENTS:

Minutes Since Pumping Began:	pH	Cond. (μ Mhos/cm)	T ☐C° ☐F°	Other:
Meter Nos.:				

OBSERVATIONS DURRING PURGING (Well Condition, Turbidity, Color, Odor):

DISCHARGE WATER DISPOSAL:

☐ Sanitary Sewer ☐ Storm Sewer
☐ Other:_____

WELL SAMPLING

SAMPLING METHOD

☐ Same As Above
☐ ☐Bailer - Type:_____
☐ Submersible ☐ ☐Centrifugal ☐ Bladder; Pump No.:_____
☐ Grab - Type:_____
☐ Other - Type:_____

SAMPLE DISTRIBUTION Sample Series:_____

Sample No.	Volume/ Cont.	Analysis Requested	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original Sample No.	Duplicate Sample No.	Type	Sample No.	Type	Sample No.

Thomas Harder & Co.
Groundwater Consulting