

Appendix 5-2

Santa Rosa Plain Subbasin 2026 Well Installation
Technical Memorandum, GEI Consultants, Inc.
Dated: September 30, 2026



Monitoring Well Installation Report

Sonoma County, CA

Submitted to:

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Certification

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Acronyms and Abbreviations

bgs	below ground service
CEQA	California Environmental Quality Act
Gregg Drilling	Gregg Drilling, LLC
Weeks Drilling	Weeks Drilling and Pump Co.
CLGWL	Chronic Lowering of Groundwater Levels
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
ft	Feet
GAMA	State Water Resources Control Board's Groundwater Ambient Monitoring and Assessment
GEI	GEI Consultants, Inc.
GDE	Groundwater Dependent Ecosystems
GPS	global positioning system
GSAs	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HSA	Hollow Stem Auger
IDW	Investigation Derived Waste
NOE	Notice of Exemption
NTU	Nephelometric Turbidity Unit
MW	Monitoring Well
PVC	Polyvinyl Chloride
SGMA	Sustainable Groundwater Management Act
Stewart Logging	Stewart Well Logging Service
Subbasin	Santa Rosa Valley Subbasin
SWD	Surface Water Depletion
USGS	U.S. Geological Survey
Water Levels	Depth to Water

1. Introduction

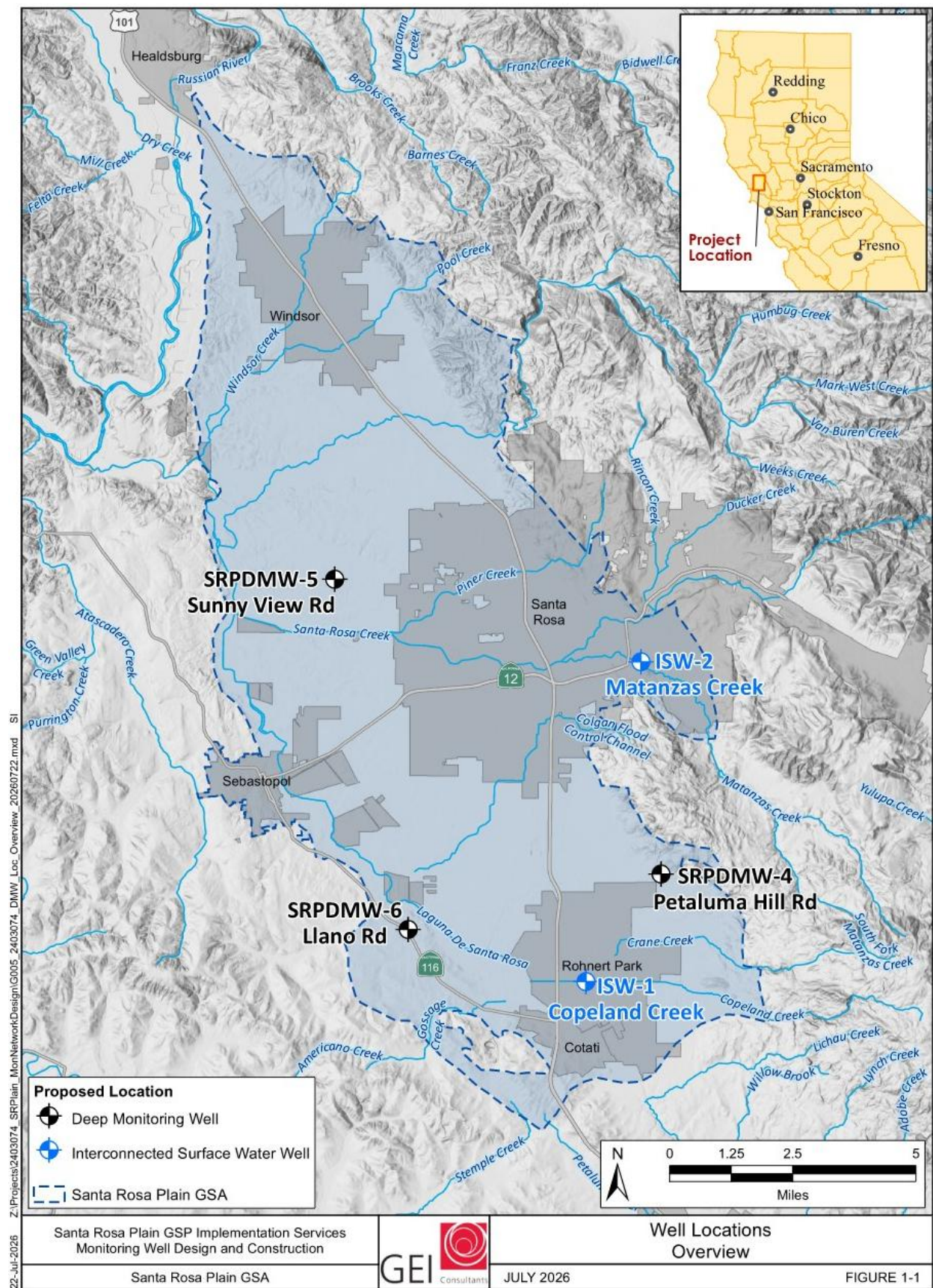
GEI Consultants, Inc. (GEI) prepared this report to summarize results of the construction of groundwater monitoring wells for the Santa Rosa Plain Groundwater Sustainability Agency (GSA) to advance sustainable groundwater management in the Santa Rosa Plain – Santa Rosa Valley Subbasin (Subbasin). Funding for this project has been provided in full or in part from The Budget Acts of 2021 and 2022 and through an agreement with the State Department of Water Resources (DWR), Grant Agreement No. 4600015629. Gregg Drilling, LLC (Gregg Drilling) of Benicia, California constructed two Interconnected Surface Water monitoring wells and Weeks Drilling and Pump Co. (Weeks Drilling) of Sebastopol, California constructed three nested monitoring wells to fill Data Gaps identified in the GSP (**Figure 1-1**). Three borings were drilled by Weeks Drilling using the mud rotary drilling method and two borings were drilled by Gregg Drilling using the hollow stem auger (HSA) drilling method.

The California Department of Water Resources (DWR) awarded the GSA a grant (Agreement No. 4600015629) as part of the Sustainable Groundwater Management Grant Program Sustainable Groundwater Management Act (SGMA) Implementation funding. The GSA plans to utilize the wells for the following:

- To address data gaps related to shallow and deep aquifer system groundwater level monitoring and groundwater-surface water interaction.
- To provide further groundwater information to support and implement long-term sustainable groundwater planning and management.

This report describes the activities undertaken for well installation and provides a summary of as-built well details, in addition to data collected during drilling, well construction, development, water quality sampling, and a geodetic survey to precisely locate the wells.

Figure 1-1. Well Location Map



2. Well Installation Program

The following subsections provide a description of the scope of work for the well installation program. The scope included the following tasks:

- Planning and Permitting
- Well Design and Installation, and
- Water Quality Sampling

2.1. Planning and Permitting

This task consisted of two activities: 1) environmental review and documentation, and 2) well permitting.

2.1.1. *Environmental Documentation*

GEI coordinated with the GSA to assess the construction of all monitoring wells with regard to the California Environmental Quality Act (CEQA) and found that they qualified for Categorical Exemptions in accordance with Sections 15306, 15304, and 15307. The projects were determined to be exempt as the installation of multi-level deep and shallow monitoring wells would result in minor, temporary alterations to the land but would not have a significant effect on the environment. Well siting considered potential sensitive habitats and cultural resources and these areas were avoided. In addition, there were no cumulative effects from the project or unusual circumstances which would lead to a significant effect on the environment.

Based on these findings, two Notice of Exemption were prepared, concluding that the monitoring wells were exempt from CEQA on the following grounds:

- Information collection: includes “basic data collection, research, experimental management, and resource evaluation activities which do not result in serious or major disturbance to an environmental resource. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded.” CG § 15306.
- Minor alterations to land allow for the construction of small new facilities or structures alterations in the condition of land, water or vegetation. CG § 15304.
- Actions by regulatory agencies for protection of natural resources: “actions taken by regulatory agencies as authorized by state law or local ordinance to assure the maintenance, restoration, or enhancement of a natural resource where the regulatory process involves procedures for the protection of the environment.” CG § 15307.

The Santa Rosa Plain GSA filed the Notice of Exemptions (NOEs) with the State Office of Planning and Research and the Sonoma County Clerk in January 2025 for the interconnected surface water wells and in March 2025 for the nested monitoring wells. Copies of the NOEs are provided in **Appendix A**.

2.1.2. Well Permitting

The Drilling contractors (Weeks Drilling and Pump Co. and Gregg Drilling LLC.) completed and submitted well permit applications to the Sonoma County Department of Health and Human Services, Sonoma County Permit and Resource Management Department, as applicable to each proposed well. The permit applications were approved prior to the start of the fieldwork. **Appendix B** contains copies of the approved Well Permits.

2.2. Well Installation

Well installation activities included mobilization, drilling of five borings, geophysical logging in mud rotary drilled borings, well construction and development, and water quality sampling in rotary drilled borings.

2.2.1. Mobilization

Project mobilization included mobilization of equipment, utility notification, and preparation of a Health and Safety Plan. The health and safety plan included safety procedures for the work performed chemical and physical hazard information, contingency plans, and preferred medical emergency treatment locations. Gregg Drilling notified Underground Service Alert of each HSA drilling activity at least 48 hours prior to initiation of the fieldwork. Weeks Drilling notified Underground Service Alert of each mud rotary drilling activity at least 48 hours prior to initiation of the fieldwork.

2.2.2. Drilling

Drilling was performed during three distinct time periods due to the availability of the drill rig and weather condition. ISW-2 and ISW-1 hollow stem auger drilling and construction were completed between November 3rd and 4th, 2025 respectively. SRPDMW-6 mud rotary drilling was completed between November 19th and 21st, 2025. SRPDMW-5 mud rotary drilling was completed between February 12th and March 13th, 2026. SRPDMW-4 mud rotary drilling was completed between June 2nd and 5th, 2026.

Five borings were advanced to depths ranging between 52 and 413 feet below the ground surface (bgs) for well installation. These wells were constructed to address various data gaps in the Subbasin. Wells ISW-1 and ISW-2 were constructed to monitor interconnected surface water and groundwater interaction, while Wells SRPDMW-4, -5, and -6 were constructed to monitor the groundwater levels in aquifers serving beneficial uses and users. **Table 2-1** provides each monitoring well construction details.

Well installation was conducted in the following order:

- ISW-2 (Matanzas Creek)
- ISW-1 (Copeland Creek)
- SRPDMW-6 (Llano Rd)
- SRPDMW-5 (Sunnyview Way)
- SRPDMW-4 (Petaluma Hill Rd)

Gregg Drilling provided the drilling and pumping services for the hollow stem auger drilling for this project (ISW-1 and ISW-2). Weeks Drilling and Pump Co. provided the drilling and pumping services for the Mud Rotary drilling for this project (SRPDMW-4, -5, and -6). Stewart Well Logging Service (Stewart Logging) performed borehole geophysical logging on borings drilled using mud rotary equipment. Fieldwork was conducted under the supervision of a California registered Geologist and Certified Hydrogeologist. The borings were logged in the field using grab samples of cuttings and driven (split spoon) cores. **Appendix C** contains the boring logs, **Appendix D** contains borehole geophysical logs, and **Appendix E** contains the As-built diagrams showing the lithology and geophysical logs in scale alongside the constructed wells. **Table 2-1** below contains construction details related to drilling each boring.

Table 2-1. Information Related to Drilling for Each Boring

Well Name	Total Depth of Bore (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft bgs)	Comments
ISW-1 Copeland Creek	50	49.9	34.9 to 44.9	Along a footpath bridge crossing the creek.
ISW-2 Matanzas Creek	60	47.8	22.8 to 42.8	Located along the shoulder of the road above the creek.
SRPDMW-4 Petaluma Hill Rd	380	Shallow: 115 Deep: 175	Shallow: 90 to 110 Deep: 150 to 170	No aquifer material encountered below 180 feet bgs.
SRPDMW-5 Sunnyview Way	413	Shallow: 95 Deep: 405	Shallow: 75 to 95 Deep: 380 to 400	No aquifer material present between completions; 100 to 355 feet bgs
SRPDMW-6 Llano Rd	360	Shallow: 225 Deep: 340	Shallow: 210 to 220 Deep: 315 to 335	Artesian water pressure conditions necessitated a special well head.

2.2.3. Well Construction and Development

The wells constructed in the mud rotary drilled boreholes (SRPDMW-4, -5, and -6) were constructed of 2.5-inch diameter, Schedule 80 Polyvinyl Chloride (PVC) blank well casing and 2.5-inch diameter, Schedule 80 PVC, 0.032-inch slot well screen. The wells constructed in the hollow stem auger drilled boreholes (ISW-1 and ISW-2) were constructed of 2-inch diameter, Schedule 40 PVC blank well casing and 2-inch diameter, Schedule 40 PVC, 0.030-inch slot well screen. **Table 2-1** summarizes details of the as-built well construction and **Appendix E** presents a scaled graphical depiction of the lithology that the wells were constructed in. **Appendix F** presents the final Well Completion Reports submitted to DWR by the drilling contractors.

Well construction for the hollow-stem auger wells (ISW-2 and ISW-1) were completed on their respective day of drilling on November 3rd and 4th, 2025. The first of the mud rotary monitoring wells, SRPDMW-6 (Llano Rd), was constructed on December 5th and 8th, 2025 as the last well before the winter holidays and inclement weather. SRPDMW-5 (Sunnyview Way) was constructed on March 16th and 17th, 2026. SRPDMW-4 (Petaluma Hill Rd) was constructed between June 11th and 12th, 2026.

Table 2-2 below contains specific information related to development for each well. **Appendix G** contains well development logs.

Typical well development for the monitoring wells was performed by the Contractor shortly after the monitoring wells were constructed and cement seal was allowed to cure for at least 48 hours. The wells were initially developed mechanically by using a rubber swab tool attached to a crane, physically moving water in and out of the screened intervals starting from the bottom of the screen to the top, followed by airlift development. The airlift removed accumulated sediments from the bottom of the wells and continued until water produced had a turbidity below 5 NTU. Some wells could not be developed to produce water below 5 NTU due to the geologic conditions of the location. ISW-1 could not be developed to these conditions due to a combination of slow recharge, and fine clay soils.

Pumping development was performed with a submersible pump once conditions stabilized, and no significant sediments were left. Pump development was considered complete after a minimum of three well volumes was purged and turbidity was less than 5 NTU. At SRPDMW-6, the groundwater occurs under artesian pressure, so pump development was not required as both completions of the well were producing water at rates of between 1 and 5 gpm unaided.

2.3. Water Quality Sampling

Groundwater sampling was conducted on the three nested monitoring wells once construction and development of each completion was finished. For SPRDMW-5 and -6, this occurred in May 2026, while the sampling of SRPDMW-4 was conducted at the end of the development stage in July 2026. Before monitoring well sampling, static groundwater levels were measured in the wells. **Table 2-3** below summarizes the depth to water (water levels) from top of the well casing, and the NTU levels prior to sampling.

Table 2-2. Water Levels

Well Name	Depth to Water from Top of Casing (feet btoc)	Last NTU Reading (field parameters)	Comments
ISW-1 Copeland Creek	10.4	573	Airlift development only, thick clay units in screened interval
ISW-2 Matanzas Creek	37.3	86	Airlift development only, volcanic ash lithology
SRPDMW-4 shallow	40.0	23.9	Volcanic ash lithology
SRPDMW-4 deep	40.1	2.72	
SRPDMW-5 shallow	17.0	9	Initial sulphury odor developed out
SRPDMW-5 deep	16.0	4	
SRPDMW-6 shallow	Artesian (~1 gpm)	3	Artesian flow prevented airlift/pump development
SRPDMW-6 deep	Artesian (~4 gpm)	1	Artesian flow prevented airlift/pump development

The monitoring wells were purged using electric submersible pumps. The wells were purged a minimum of three casing volumes of water. Following the well purge, samples were collected directly from the discharge tubing. **Appendix G** contains the purge logs from Well Industries.

Purging was considered complete after a minimum of three casing volumes were purged and turbidity was below 5 NTUs.

Once three purge volumes were removed and turbidity of the purge water was below 5 NTUs, samples were collected. A sample label containing a unique identification number was attached to each sample container and the sample recorded on the chain-of-custody form. Samples were placed in a cooler containing ice, and groundwater samples were dropped off same day at FedEx to be shipped to the laboratory. With the exception of samples collected at SRPDMW-4 shallow and deep, which were collected on a Friday and held over the weekend, then shipped on a Monday. The samples were accepted by the laboratory, and all were within the constituents' hold times.

BSK Laboratories analyzed the groundwater samples. The analyses were conducted on a normal turn-around basis in accordance with U.S. Environmental Protection Agency (EPA) specified holding times. The analyses were performed in general accordance with the methods shown in **Table 2-4** below.

Table 2-3. Methods Analysis

Analyte(s)	Method	Laboratory Location
Total Dissolved Solids	SM 2540C	Tustin, California
Arsenic	SW846 6010D	Tustin, California
Chloride	EPA 300.00	Tustin, California

Table 2-5 summarizes the analytical results. **Appendix H** contains the laboratory analytical reports and chain-of-custody forms.

Table 2-4. Water Quality Results Summary

Analyte	Analytical Testing Method	Units	Reporting Limit	MCL or SMCL	SRPDMW-4 (nested)		SRPDMW-5 (nested)		SRPDMW-6 (nested)	
					Shallow	Deep	Shallow	Deep	Shallow	Deep
General Chemistry										
Total Dissolved Solids	SM 2540C	mg/L	10.0	500	265	297	278	476	333	172
Chloride	EPA 300.0	mg/L	1.0	250	28	24	22	30	67	20
Metals (Filtered in Laboratory)										
Arsenic	SW846 6010D	mg/L	0.1	0.01	ND	ND	0.0172 J	0.0804 J	ND	0.0132 J

Notes:

All laboratory analysis performed by Eruofins Environment Testing

Bolded values are above the MCL or recommended SMCL

Dash (--) indicates no current standard or no available information

ND = Not Detected

MCL = Maximum Contaminant Level (California Drinking Water Standards)

SMCL = Secondary Maximum Contaminant Level (California Drinking Water Standards)

J = Analyte detected in the sample but value is below the Reporting Limit, concentration is an approximate value

2.3.1. *Investigation-Derived Waste*

Drill cuttings, drilling mud, development water, and purge water were generated during construction of the wells. Disposal of the hollow stem augur drill cuttings were facilitated by Costera Waste and Environmental, Inc., once the cuttings were containerized and transported off-site to their facilities. For the mud rotary drill sites, cuttings were temporarily stored on site and then hauled off site and properly disposed of at a qualified location, Canyon Rock facility in Forestville, CA.

Well development and purged water was transported off site at all well locations.

2.4. Geodetic Survey

A California licensed surveyor from Sonoma Water performed a geodetic survey of each monitoring well to obtain the latitude/longitude and elevation above Mean Sea-Level. The elevation of the top of each well casing were surveyed to the nearest 0.01 foot (NAVD88, based on the nearest found NGS benchmark). The well positions were surveyed by global positioning system (GPS) static survey methods at each well. **Appendix I** contains the final coordinates and elevations of each of the five well locations.

ISW-1 Copeland Creek

ISW-1 was drilled south of Copeland creek on the embankment next to a walking path bridge and USGS station between Enterprise Dr and Santa Alicia Dr. Geologic units encountered in the subsurface are interpreted as gravel fill at ground surface to a depth of about 5 feet, followed by silty clays to a depth of 40 feet bgs where the screened casing spans across into the aquifer material of well graded, well-rounded sands and gravels of volcanic origin which continued almost to total depth at 49 feet bgs where a sandy clay unit plugged the borehole to total depth of 50 feet bgs.

ISW-2 Matanzas Creek

ISW-2 was drilled along the shoulder of Hoen Frontage Ave as it transitions to Hoen Ave west of the road portion that bridges 40 feet above the water surface of Matanzas Creek. The top 5 feet of material are a mixture of road asphalt and supporting gravel fill, which transitioned to native sediments of intermixed gravel, sand, and clay beds. The screened casing interval was placed between about 23 and 43 feet bgs across the gravel mix areas, however a 5-to-6-foot layer of silty-ashy clay with obsidian is present between 34 to 41 feet bgs. The decision was made during drilling to extend deeper than planned to find a less turbid aquifer zone, however only a thick silty clay layer extended from 50 to 60 feet bgs.

SRPDMW-4 Petaluma Hill Road

Located just south of the Petaluma Hill Road, SRPDMW-4 was drilled in an open field overlaying an alluvial fan of sediments coming off of the Sonoma volcanic range. Preliminary studies showed a varying degree of gravels, sands, and clays without a definite pattern. Drilling at this location encountered clays to a depth of 40 feet bgs when the lithology transitioned to well graded sands and gravels to a depth of 110 feet bgs, the first well completion was screened in this material from 90 to 100 feet bgs. Below 110 feet bgs, a thick lean clay unit created an impermeable layer between aquifer material down to 120 feet

bgs, where more sandy gravels were encountered down to 170 feet bgs, where the second well completion was screened between 150 and 170 feet bgs.

The preliminary investigation for this location showed that a potential third aquifer zone would be encountered around 300 feet bgs, however upon drilling the borehole to those depths only sporadic lenses of sand and gravel were found in hundreds of feet of dense clays. It was decided that drilling deeper than the original spec would be beneficial to see if any aquifer material could be found, however none was found to a depth of 380 feet bgs, and the bottom of the borehole was backfilled to 180 feet bgs.

SRPDMW-5 Sunny View Way

SRPDMW-5 is located alongside a residential road adjacent to vineyards, just north of the corner confluence of Sunny View Way and Oak Farm Lane. Geologic materials encountered in this location consist of silty clays from ground surface to a depth of 60 feet bgs. From 60 to 100 feet bgs was a mixture of coarse-grained sand and gravel where the first well completion screened interval was set at 75 to 95 feet bgs. From 100 to 360 feet bgs, were thick blue clays with sporadic lenses of sand that did not produce water. Between 360 to 400 feet bgs, coarse grained sands and gravels were encountered, and the second well completion screened interval was placed at 380 to 400 feet bgs. A thick clay unit sat below to total depth of 410 feet bgs.

SRPDMW-6 Llano Road

SRPDMW-6 was drilled on a county road easement at the confluence of Llano Rd and Gravenstein Highway South (Hwy 116). Geologic materials encountered in this location consisted of coarse-grained sands and gravels down to a depth of 50 feet bgs, requiring a steel conductor casing to prevent borehole instability and ensure the straightness of the well casing within it during construction. From 50 to 130 feet bgs, dense clays with sporadic sand and gravel lenses were present. Aquifer material was encountered between 130 to 250 feet bgs consisting of well-rounded sands and gravels in alternating depositional facies, where the first well completion was screened between 210 and 220 feet bgs. Between 250 and 310 feet bgs were clay formations interbedded by angular gravel and sand layers without any hydraulic conductivity. Based on this lower impermeable zone, further drilling was decided to find lower aquifer material, which continued from 310 feet to the bottom of the borehole at 360 feet bgs in the form of a large sand and gravel unit where the final well completion was screened between 315 and 335 feet bgs.

To request appendices to this technical memorandum, email:
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