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Water Availability Analysis

The Winery at Mount Veeder Use Permit P22-00248-UP, Exception to the Conservation Regulations P25-00088-UP, and Exception to the Roads and Street Standards
Planning Commission Hearing - June 4, 2025

RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

MEMORANDUM

March 22, 2024

RCS Job No. 622-NPA04

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No. 858
STATE OF CALIFORNIA

Re: Results of Napa County Tier 1 & Tier 2 Water Availability Analysis
For a Proposed New Winery at
1300 Mt. Veeder Road, Napa, California 94558

Introduction

This Memorandum presents the key findings, conclusions, and preliminary recommendations regarding a Water Availability Analysis (WAA) by RCS for a proposed winery development project at 1300 Mt. Veeder Road (the subject property), in Napa County (County), California. RCS understands that the proposed project consists of the development of a new winery. This WAA was prepared on behalf of the property owner, P&M Vineyards Holdings LLC, to provide hydrogeologic analyses pertaining to the proposed new winery, in conformance with current Tier 1 and Tier 2 WAA requirements (Napa County, 2015 & 2024b). The following summarizes the applicability of each WAA Tier to the proposed development:

- A "Tier 1" WAA ("Groundwater Use for Napa County") is required for County-approval of the proposed project because it will result in new groundwater demands for a discretionary project (Napa County, 2015 & 2024b).
- A "Tier 2" WAA ("Well & Spring Interference") is required for County-approval of the proposed project because at least one offsite well owned by others is known to exist within 500 feet of the proposed project well, "Well A" (Napa County, 2015 & 2024b).
- A "Tier 3" WAA ("Groundwater / Surface Water Interaction") is not required for County-approval of the proposed project because the proposed project well, "Well A", is located outside of County-defined 1,500-foot "Significant Stream" buffer areas (PBES & LSCE, 2023b).

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Background

Multiple WAA documents have been prepared for the subject property in the past. RCS completed a Tier 1 and Tier 2 WAA for the subject property as part of a vineyard development project in 2019 (RCS, 2019). Later, RSA⁺ prepared a Tier 1 WAA for the proposed Winery project (RSA⁺, 2022). County review of the RSA⁺ (2022) WAA noted that a Tier 2 analysis was required for the project, and RCS was retained for that work. While performing that work, it was discovered that the closest neighbor to the project well (Well A) constructed a newer well closer to Well A than their previous wells. The Bachich "New Well" was drilled in 2018, after the August 2017 testing and the RCS site visits associated with the 2019 WAA, so the effects of the August 2017 testing of Well A could not be assessed on the Bachich New Well. At the time of publication of the 2019 WAA, RCS was not aware of any drilling activity on Mr. Bachich's property between the time of the site visits leading up to the August 2017 testing, and the 2019 publication of that WAA.

Further, some aspects of the project water use have changed compared to what was presented in both prior WAAs by RCS and RSA⁺, and certain County requirements for WAA analyses have also changed since issuance of the prior documents. As such, RCS has prepared this subject Tier 1 and Tier 2 WAA to supersede both prior documents.

Site Conditions and Project Description

The subject property is comprised by a single 114.87-acre[1] parcel identified by Napa County Assessor's Parcel Number (APN) 034-230-029, situated in the hills west of the Napa Valley, between the city of Napa and the town of Yountville, in Napa County, California. Figure 1, "Regional Map", shows: the approximate boundary of the subject property[2]; Napa County's "Significant Streams" and "Significant Streams" 1,500-foot buffer areas (PBES & LSCE, 2023a & b); some of the local watersheds tributary to the Napa River (LSCE & MBK, 2013); and the boundaries of the local groundwater basins defined by the California Department of Water Resources (DWR, 2021). A majority of the western portion of the property is within a County-designated 1,500-foot buffer area around Pickle Creek (designated as a "Significant Stream"), but the entire property is located outside of the local groundwater basin, known as the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin (DWR, 2021). Most of the subject property is within both the Redwood Creek Watershed and the Napa Creek Watershed at Napa, whereas the remaining portion is within the Napa River Watershed near Napa; these watersheds are defined by the County's consultants (LSCE & MBK, 2013).

Figure 2, "Property Map", Figure 3A, "Geologic Map (CGS 2017)", and Figure 3B, "Geologic Map (USGS 2007)" show several of the same data that are shown on Figure 1, but add additional data including, depending on the Figure: the locations of onsite wells; the approximate locations of several offsite wells that are either known to exist or may possibly exist; and Tier 2 WAA setback distances (500 feet and 1,500 feet) around the location of the proposed project well, Well A.

The locations of the known and possible offsite wells were approximated by RCS based on records retrieved from the County's Electronic Document Retrieval website (PBES, 2023), on communications with the owner of an adjacent parcel to the northeast of the subject parcel, and on data collected during a site visit to the property by an RCS geologist. The records retrieved

[1] Assessed area per Napa County (2024a).

[2] The subject property boundary used for this Memorandum was derived from a boundary provided to RCS by Munselle Engineering; it is the same boundary that was presented in the accepted WAA for a vineyard development on the property (RCS, 2019).

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from Napa County consisted of various types of documents including State Well Completion Reports (WCRs, also known as "driller's logs") and drilling permits for wells that may have been drilled in the area. No evidence of any offsite springs used for water supply purposes within 1,500 feet of the project well was discovered amongst the PBES records reviewed. The locations of known and possible offsite wells and springs shown on the Figures herein should not be considered an exhaustive representation of all nearby wells; other wells and springs used for water supply purposes may also exist in the area. Note that the location of the proposed project well (Well A) is less than 500 feet from three known offsite wells (see "Bachich" wells on Figure 2). Also, there are no known offsite springs used for water supply purposes within 1,500 feet of Well A.

Based on communications with and review of data provided by the project engineers (Mr. Dean Laberge & Mr. Bruce Fenton of RSA+), by the vineyard manager (Mr. Gavin Sharrocks of P&M Vineyards Holdings LLC), and the owner of three proximal offsite wells (Mr. George Bachich); based on data presented in the prior WAA by RCS (2019); and from the findings of a July 26, 2023, field reconnaissance visit by an RCS geologist to the subject property, the following key items were noted and/or observed (refer to Figure 2):

- In the January 2019 RCS WAA, proposed developments included a vineyard consisting of planting 16.4 acres of new vines. The scope of onsite developments proposed in that 2019 WAA has since been partially completed; the current net planted area of existing onsite vineyards is reportedly 5.87 acres.
- Under the approved 2019 ECP, 13.73 total net plantable acres of vines are permitted be developed at the property.
- The only other water-using development that currently exists at the subject property, other than the aforementioned 5.87 acres of onsite vineyard, is a 3-bedroom residence with minor associated landscaping; no other significant water-using onsite developments are known to exist.
- Three water-supply wells exist at the subject property; the proposed project well (Well A), and two additional wells (Old Well and New Well). Up until recent vandalism of solar panels that formerly powered the New Well, this well was used to meet the demands of the residence. The residence is currently receiving water from an emergency backup source that will be curtailed as part of development of the proposed winery. The Old Well is currently inactive, but the owner intends to keep it available for future water supply needs (e.g., as emergency backup supply).
- The applicant intends to develop a new winery on the subject property that is mostly underground, with minor associated landscaping. As part of the proposed winery project, the permitted, 2019 ECP net plantable vineyard area of 13.73 acres will be reduced to 13.62 net plantable acres (reduced by 0.11 acres).
- Development on offsite areas surrounding the subject property consists of vineyards, various buildings, and forested areas.
- During the July 2023 site visit, the RCS geologist traveled along roads in the immediate vicinity of the subject property with the goal of identifying possible nearby, offsite wells. RCS refers to such work as a "windshield survey." During this survey, the RCS geologist attempted to identify the locations of possible offsite wells by observing typical well-house enclosures, pressure tanks, storage tanks, power lines, or by making direct observations of wellheads.

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Key Construction and Testing Data for Onsite Wells

A California Department of Water Resources (DWR) Well Completion Report (WCR) is available only for onsite Well A (WCR e0345319); no driller's logs are available for the onsite New Well or Old Well. Available historical pumping data for the New Well and Old Well were provided to RCS by Napa County PBES. Table 1, "Summary of Well Construction and Pumping Data," provides a tabulation of available key well construction, groundwater airlifting data, and pumping data for the three onsite water wells.

Well Construction Data

Key data listed on the available driller's log, information from available well pumping data, and/or identified during visits to the subject property by RCS geologists include:

- Well A was constructed in June 2017 by Huckfeldt Well Drilling (Huckfeldt), of Napa, California; the drilling method was reported to be direct mud rotary. A downhole geophysical log (also known as an "electric log" or "E-log") was performed in the open pilot borehole of this well. RCS geologists were involved with the siting, design, and testing of Well A, and provided recommendations for the final casing design of this well. RCS geologists were not present in the field during any part of the pilot hole drilling, reaming, or well construction work by Huckfeldt.
- For Well A, the pilot hole depth (the borehole drilled before the well casing was placed downhole) was reported by Huckfeldt to be 500 feet (ft) below ground surface (bgs). The pilot hole depths of the New Well and the Old Well are unknown.
- Well A was constructed using PVC well casing with a nominal diameter of 6 inches and was cased to a total depth of 460 ft bgs. The New Well was observed during an RCS field visit to be constructed of steel casing with a nominal diameter of 8 inches. The Old Well was also observed during an RCS field visit to be constructed with 5-inch nominal diameter PVC casing.
- Casing perforations in Well A consist of machine-cut slots with apertures of 0.032 inches (32-slot). These slots were reportedly placed continuously between the depth intervals of: 60 to 240 ft bgs, 260 ft to 400 ft bgs, and 420 ft to 440 ft bgs.
- The gravel pack material listed on the driller's log for Well A is described as "#6 sand" and was emplaced in the annulus around the casing between the depths of 52 ft bgs and 470 ft bgs.
- Well A was reportedly constructed with a sanitary seal consisting of cement (grout) that was set to a depth of 52 ft bgs. The sanitary seal depths of the New Well and Old Well are unknown.
- The dates of drilling and construction for the New Well and Old Well are unknown. Historical pumping records (from August 2002) for the New Well revealed that this well is at least 24 years in age. The total depth of the New Well has been reported by Dave Bess Pump & Well (Bess), of Napa, California to be 72 ft bgs. Bess also reported the total depth of the Old Well to be 80 ft bgs. A 1996-dated lot line adjustment map involving the subject property was also discovered amongst County records (PBES, 2023), indicating the presence of a well at the approximate location of the New Well and Old Well existed. Thus, one of these wells is probably on the order of at least 28 years in age.

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Summary of Key Airlifting "Test" Data for Onsite Wells

The driller's log for Well A provided a brief listing of its original, post-construction airlift data (see Table 1). These data include:

- Following construction of Well A, an initial static water level (SWL) of 164 ft bgs was measured by Huckfeldt on June 30, 2017.
- Maximum flow rates during initial post-construction airlifting were estimated by Huckfeldt to be 90 gallons per minute (gpm) after a period of 2 hours of airlifting in Well A. As a rule of thumb, RCS geologists estimate the operational pumping rate for a new well equipped with a permanent pump to typically be on the order of only about one-half or less of the airlifting rate reported on a driller's log.
- The amount of water level "drawdown" was not listed on the driller's log, because water level drawdown cannot be measured during airlifting operations. The original post-construction specific capacity[3] value for Well A could therefore not be calculated from the available data on the driller's log.

Pre-2015 Pumping Test Data from Others

In January 2015, separate 2-hour pumping tests were performed in both the New Well and Old Well by D. Bess Pump & Well (Bess) of Napa, CA. Key data available from these pumping tests include:

- New Well – A pre-test SWL of 13 ft below the wellhead reference point (brp) was recorded by Bess prior to testing on January 21, 2015. While pumping at a constant rate of 12 gpm, a final pumping water level (PWL) of 18 ft brp was reported by Bess. Based on the total water level drawdown of 5 ft, a short-term specific capacity of 2.40 gpm/ft ddn was calculated for this 2-hour pumping test.
- Old Well – A pre-test SWL of 10 ft brp was recorded by Bess prior to testing on January 22, 2015. Based on the total water level drawdown of 60 ft and a final pumping rate of 6 gpm at the end of the 2-hour testing period, a short-term specific capacity of 0.10 gpm/ft ddn was calculated. During the test, the pumping rate was reduced from 16 gpm to 6 gpm approximately 30 minutes into the pumping test because the pump had reportedly "broken suction" at the higher rate (i.e., water levels dropped to the depth of the pump intake and the pump was drawing in air).

An older, short-term (approximately 2-hour long) pumping test was also performed in the New Well in August 2002 by McLean & Williams (M&W), of Napa, California. The final pumping rate during this 2-hour pumping test was reported to be 22 gpm. Based on a SWL of 15 ft, and a final PWL of 32 ft, the short-term specific capacity of the New Well was calculated to be 1.29 gpm/ft ddn in August 2002.

Well Data from Site Visits

As discussed above, site visits to the subject property were performed by RCS geologists on August 24, 2016; August 1, 2017; and July 26, 2023. The following information for the three onsite wells was ascertained during these site visits:

[3] Specific capacity, in gallons per minute of foot of water level drawdown (gpm/ft ddn), represents the ratio of the pumping rate in a well (in gpm) divided by the amount of water level drawdown in ft (ft ddn) created in the well at that rate.

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- New Well – This well was observed to be not pumping at the time of the RCS site visits, but it appeared to be disconnected from the power source at the time of the July 2023 site visit. As reported by the property owner and described above, the solar panels that powered this well were recently vandalized, and the well is therefore in need of repair. Reportedly, this well was historically plumbed to an onsite water tank near the existing onsite residence. A SWL of 16.8 ft brp was measured by the RCS geologist during the August 2016 visit, 13.3 ft brp during the August 2017 visit, and 12.0 ft brp during the July 2023 visit; the reference point for these measurements is approximately 1.5 ft above ground surface (ags). Thus, it appears that water levels have gradually increased in this well by over this nearly 7-year period (August 2016 to July 2023). The SWL of 12.0 ft brp in July 2023 is also higher than the water level measurements collected by Bess in January 2015, and by M&W in August 2002. This well is currently not equipped with a flow totalizer device.
- Old Well – This well was observed to not be equipped with a permanent pump and no electrical or discharge piping was observed to be connected to the well at the times of our visits. SWLs of 14.3 ft brp and 10.6 ft brp were measured by RCS geologist during the August 2016 and August 2017 visits, respectively, followed by an SWL of 7.4 ft brp during the July 2023 site visit; the reference point for these measurements is approximately 0.8 ft ags. Similar to the New Well, it appears that water levels in the Old Well have been increasing over time, increasing by 9.9 ft in over a period of nearly 7 years (August 2016 to July 2023). A SWL of 10 ft brp was measured by Bess prior to their testing of this well in January 2015. As with the New Well, this well is currently not equipped with a flow totalizer device.
- Well A – During the July 2023 site visit, this well was observed to be equipped with a permanent pump. At the time of that site visit, a SWL of 194.3 ft brp was measured in Well A, from a reference point of 1.5 ft ags. The well had reportedly not been pumped at least overnight, but the actual amount of time since the well had last been pumped is not known. During the August 2017 sit visit, the well was not actively pumping, and a SWL measurement of 170.1 ft brp was recorded in this well by the RCS geologist, from a reference point of approximately 2.2 ft ags. The well did not exist at the time of our August 2016 site visit. The SWL depth of 164 ft brp measured by Huckfeldt on June 30, 2017, was roughly 6 ft shallower than the SWL measured by the RCS geologist on August 1, 2017, which in turn was approximately 23 feet deeper than the August 2017 measurement.

  Several additional water level measurements in Well A have been recorded by vineyard personnel, but a reference point for these measurements was not reported (it is assumed that the same 1.5 ft ags measurement point recently noted by the RCS geologist was used for these measurements). On April 5, 2023, the SWL measured in this well was 173 ft brp, followed by a water level measurement of 182 ft brp on July 20, 2023, which was accompanied by a note stating that the well had been used within 24 hours. The next measurement in this well was a 201 ft brp PWL, measured on August 26, 2023, followed by the final available water level measurement in Well A, a SWL of 169 ft brp, measured on October 30, 2023.

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August 2017 Aquifer Testing of Well A

Well A was drilled and constructed by Huckfeldt Well Drilling (Huckfeldt) of Napa, CA, in June 2017, and was subsequently subjected to an aquifer pumping test in August 2017. The primary purpose of the August 2017 pumping test of Well A was to determine if the well could pump at rates necessary to supply the agricultural groundwater demands described in the 2019 vineyard development WAA by RCS.

At the time of the August 2017 aquifer testing, two nearby offsite wells were reported to be located within 500 ft of Well A; Bachich Irrigation Well and Bachich Main Well (see Figure 2). Mr. Bachich drilled an additional well in 2018 that is located even closer to Well A, referred to as Bachich New Well (see Figure 2). Because of the presence of these wells within the 500-ft setback area defined in Napa County's WAA Guidelines (2015, 2024b), a Tier 2 WAA ("Well Interference Evaluation") was performed for Well A (RCS, 2019).

For the original Tier 2 evaluation (RCS, 2019), RCS recommended performing an aquifer test in Well A (the pumping well) and using the onsite New Well, Bachich Irrigation Well, and Bachich Main Well as additional water level observation wells while pumping Well A. The August 2017 aquifer test was designed by RCS to meet the following requirements:

- Determine if Well A could pump at sufficient rates to meet the total combined agricultural groundwater demands proposed in the 2019 WAA (approximately 27 gpm).
- Monitor the amount of water level drawdown created in the pumping well due to its own pumping.
- Monitor water level recovery rates in the pumping well after completion of the pumping test.
- Monitor the amount of water level decline (i.e., water level drawdown interference), if any, induced in the onsite New Well or in the nearby offsite Bachich wells (Irrigation and Main) due to pumping of Well A.
- Help determine the aquifer parameters of transmissivity and possibly storativity for the Great Valley Sequence rocks encountered by the onsite wells. Storativity cannot be determined using water level drawdown data from a given pumping well, but it can be calculated if water level drawdown interference is induced in another water level observation well being monitored during a pumping test.

For this the August 2017 pumping test, Mr. George Bachich (the neighbor and owner of the "Bachich" wells) was notified in advance of the recommended aquifer test for the subject Well A, and an offer was made to Bachich to have RCS monitor water levels in his wells during the testing period. RCS geologists provided a description of the upcoming aquifer testing to be performed at Well A and necessary offsite water level monitoring protocols for a basic Tier 2 WAA pumping test requirement. Instead, Mr. Bachich opted to obtain his own water level measurements in his wells during the pumping test of Well A, providing those data to RCS following the test.

Test Protocol

The logistics and protocol for the August 2017 aquifer (pumping) test of Well A were developed by RCS geologists and provided to LGS Drilling (LGS) of Vacaville, CA, who was contracted by the Owner to perform the aquifer test. Key portions of that aquifer test protocol included: a 3-rate step drawdown test to help determine an appropriate rate for the subsequent constant pumping rate test; a period of baseline water level monitoring prior to the start of the constant rate pumping

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test; the constant pumping rate pumping portion of the aquifer test for Well A; and a final period of water level recovery monitoring following the pumping portion of the test. Provided below is a summary of the key aquifer testing protocol:

- Transducer Installation – Water level pressure transducers were installed into onsite Well A and the New Well by RCS geologists during a site visit to the subject property on August 1, 2017. No transducer was installed into the Old Well due to its age, relatively close proximity to, and similarly shallow well construction to that of the New Well. A barometric pressure transducer was also installed by the RCS geologist near the Well A wellhead. All three transducer devices were operational and collected water level or barometric pressure readings between August 1 and 9, 2017.

  In both onsite wells (Well A and the New Well), 300 psi water level transducers were installed inside the well casings; the transducer manufacturer and model type of both devices was In-Situ LevelTROLL™ 400. The accuracy of the 300-psi transducer, as reported by the manufacturer, was ±0.0658 ft. The barometric pressure transducer installed at Well A had a manufacturer-reported accuracy of ±0.0691 ft.

  As discussed above, transducers were not installed into either of the nearby offsite Bachich wells; Mr. Bachich instead opted to periodically collect manual water level readings in his two wells (Bachich New Well was not yet drilled at the time of the August 2017 testing) during the subject aquifer test of Well A.

- Step Drawdown Test – The purposes of the step drawdown test were to pump Well A at different rates (or steps) for specific time periods while recording water levels and pumping rates at each step, to permit analysis of the test data. Evaluation of these data allowed RCS geologists to select an appropriate pumping rate for the subsequent 24-hour constant rate pumping test in Well A. The step drawdown test was performed on August 2, 2017.

- Baseline Water Level Monitoring – The purpose of the baseline water level monitoring was to record groundwater level fluctuations that may have been occurring in the area after the step test but prior to the constant rate pumping portion of the test. Changes in such background (baseline) water levels can occur due to various influences, including natural water level fluctuations in the aquifer and water level declines caused by water level drawdown interference from other pumping wells in the area. Baseline monitoring in Well A and the New Well essentially began immediately after the end of the step drawdown test on August 2, 2017, and continued until the start of the 24-hour pumping test on August 4, 2017. During this baseline monitoring period, no onsite wells were pumped.

- Constant Rate Pumping Test – The key portion of the aquifer test, the 24-hour constant rate pumping test, was performed at Well A on August 4 and 5, 2017. The well was continuously pumped at an RCS-recommended rate of 30 gpm throughout the 24-hour pumping portion of the constant rate pumping test. None of the water level observation wells (i.e., the New Well, Bachich Irrigation Well, and Bachich Main Well) were pumped during the 24-hour pumping test period of Well A.

  Water levels were automatically recorded in Well A and the New Well by the transducers during the Well A pumping test at a frequency of one measurement every minute, whereas the barometric pressure transducer recorded measurements once every 10 minutes. Occasional manual water level measurements were also collected in Well A by an LGS pumper to help corroborate the transducer-collected measurements in that

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well. Following review of the datasets, the manual measurements collected by the LGS pumper were determined by RCS geologists to be in general agreement with the transducer-collected water level data, and were thus corroborative of the transducer-collected water level data.

Manual water level measurements were collected in the offsite observation wells (Bachich Irrigation and Bachich Main) solely by Mr. Bachich using his own electric tape sounder-like device during the pumping test of Well A. These data were then provided by Mr. Bachich to RCS geologists following completion of the Well A constant rate pumping test and water level recovery period.

- Water Level Recovery Monitoring – Following the end of the pumping portion of the constant rate pumping test at Well A, water level recovery data were collected by the installed transducers for an additional period of roughly 4 days at Well A and the New Well. Those transducers were eventually removed from those wells by RCS geologists on August 9, 2017.
- Discharge of Pumped Groundwater – During the step drawdown test and 24-hour pumping test period at Well A, groundwater was discharged into a temporary pit that had previously been used as a discharge location for fluids generated during the construction and development of that well; this discharge point had been previously approved by the Owner.

Results of August 2017 Aquifer Test

Water level data collected between August 1 and 9, 2017 for Well A (pumping well) and the three observation wells (New Well, Bachich Irrigation, and Bachich Main) are shown on Figure 4A, "Water Level Data During Aquifer Testing." Although not shown independently on the water level graphs herein, barometric pressure data were also collected during the aquifer test. Before plotting each water level graph, the transducer-recorded water level data for Well A and the New Well were barometrically compensated using the barometric data collected by the barometric pressure transducer (i.e., changes in barometric pressure were factored out of each water level data set such that the water level data shown herein are only representative of actual water level changes in the wells). During the entire aquifer testing period, barometric pressure measurements by the barometric pressure transducer installed at Well A varied by up to only 0.08 pounds per square inch (psi), equal to a water level change of only approximately 0.18 ft.

Step Drawdown Testing

Testing of Well A began on August 2, 2017, at 10:00 AM, with a 9-hour, three-point step drawdown test. For this step drawdown test, Well A was pumped continuously at the RCS-recommended nominal pumping rates (or steps) of 20, 35, and 50 gpm; each of the three step rates were pumped continuously for three hours. The following summarizes the key data collected during the step test for Well A:

- Prior to turning on the pump, an initial pre-test static water level of 169.1 ft brp was recorded by the transducer in Well A.
- Using the totalizer flow dial, average pumping rates for each of the three steps were calculated to be 18 gpm, 34 gpm, and 48 gpm, for Steps 1, 2, and 3, respectively. As stated from the totalizer dial readings above, each step rate was pumped continuously for three hours (180 minutes); the pump was not turned off between each of the pumping steps.

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- Pumping water levels measured at the end of each step rate ranged from 175.9 ft to 202.3 ft brp, for Steps 1 through 3, respectively. These pumping levels resulted in water level drawdowns ranging from 6.8 ft to 33.2 ft for Steps 1 to 3, respectively.
- Short-term specific capacities for the step test rates ranged from 2.64 gpm/ft ddn at a pumping rate of 18 gpm (Step 1), to 1.45 gpm/ft ddn at a pumping rate of 48 gpm (Step 3). Calculated specific capacity values in wells tend to be higher at lower pumping rates (and for shorter pumping durations) and vice versa.

Background Water Level Monitoring

As previously noted, background water levels were monitored for a period of roughly 2 days in Well A and the New Well, via transducers, following the end of the step drawdown test and prior to the start of the constant rate pumping test at Well A. In addition, manual water level measurements were periodically collected in the Bachich Irrigation and Bachich Main wells strictly by Mr. Bachich during this period. Below is a summary of these pre-test (background) water level observations for each well (refer to Figure 4A):

- Onsite Well A – Water levels appear to still be in a condition of recovery following the step drawdown test in this well, during the background water level monitoring period. During this 2-day period, water levels recovered (increased) by 31.6 ft between August 2 and 4, 2017 from 202.3 ft brp (i.e., the pumping water level at the end of Step 3) to 170.7 ft brp (water level prior to the start of the constant rate pumping test).
- Onsite New Well – Static water levels recorded by the transducer in the New Well during the background water level monitoring period appeared to be relatively stable and were at a depth of approximately 13.4 ft brp throughout the monitoring period.
- Offsite Bachich Irrigation Well – This well was turned off on August 3 at 9:50 AM after reportedly pumping a total of 50 gallons. Manual water level data collected by Mr. Bachich in this well showed that water level depth then rose by 5.2 ft over the next roughly 24 hours, from 35.0 ft brp on August 3 at 9:50 AM, to 29.8 ft brp on August 4 at 9:40 AM (prior to the start of the Well A constant rate pumping test).
- Offsite Bachich Main Well – Similar to the New Well, water levels in the Bachich Main well appeared to be relatively stable during the background water level monitoring period. On August 2, at 4:25 PM, a water level of 100.8 ft brp was measured by Mr. Bachich. The following day, on August 3 at 9:50 AM, a water level of 103.5 ft brp was measured by Mr. Bachich. However, this well was reportedly pumped by Mr. Bachich between 9:15 AM and 9:50 AM on August 3, and in this period a total of 1,600 gallons was pumped. After the pump in this well was shut off at 9:50 AM on August 3, water levels recovered to 100.9 ft brp by 12:06 PM that same day. Water levels then remained stable at 100.9 ft brp between 12:06 PM on August 3 and 9:45 AM on August 4 (just prior to the start of the constant rate pumping test on August 4).

Although the basic protocol for this aquifer test of onsite Well A included the provision that none of the onsite and offsite wells that were to be monitored for water levels during the entire test should be pumped, Mr. Bachich recorded relatively short pumping events in both of his wells on August 3, during the baseline water level monitoring period (see Figure 4A). As a result of that pumping, water levels declined slightly in both Bachich wells. However, no water level impacts caused by those short pumping events in the Bachich wells were observed in the onsite Well A or the onsite New Well. These pumping events in the Bachich wells did not compromise the results of the pumping tests.

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Constant Rate Pumping Period

Pumping for the constant rate pumping portion of the aquifer test in Well A began at 10:00 AM on August 4, 2017, and continued for 24 continuous hours (1,440 minutes) at an average pumping rate of 31 gpm. The pumping rate was determined from totalizer dial readings recorded by the LGS pumper throughout the pumping period.

Figure 4B, "Water Level Data During Constant Rate Pumping Test," depicts the water levels in Well A that were recorded by the pressure transducer and via occasional manual water level measurements obtained by the pumper. Also shown on Figure 4B are the water level data collected from the observation wells used during this aquifer testing. Below is a summary of those data:

- <u>Well A (Pumping Well)</u> – A pre-test static water level of 170.7 ft brp was measured in this well just before the pump was turned on to begin the subject pumping test. After 24 hours (1,440 minutes) of continuous pumping, the deepest pumping water level in Well A was measured at a depth of 205.9 ft brp. This represents a maximum water level drawdown during the 24-hour constant rate pumping test of 35.2 ft and calculates to a longer-term specific capacity for this well of 0.88 gpm/ft ddn. The pumping water levels in this pumping well did not appear to be completely stable by the end of the pumping test. Specifically, in the last 4 hours of the pumping period, the pumping water level in this well was decreasing at a rate of about 0.65 ft per hour. Also, this final pumping water level of 205.9 ft brp was approximately 234 ft above the bottom of the perforations in the well.

  Following pump shut-off, water level recovery data were collected for an additional period of 4 days until RCS geologists removed the transducer from Well A, on August 9, 2017. Water levels during this non-pumping period were observed to recover to a depth of 177.1 ft brp on August 6, 2017 (24 hours after the end of the pumping period); this depth represents a water level recovery of roughly 88%. Water levels continued to increase slowly throughout the remainder of the 4-day recovery period. Water levels had recovered to a depth of 171.2 ft brp by 1:30 PM on August 9, 2017. This represents a 99% recovery of the total drawdown recorded during the pumping portion of the test.

- Observation Wells
  - <u>New Well</u> – Water levels in the New Well remained relatively stable during the constant rate pumping test of Well A, and only fluctuated both up and down by a couple tenths of a foot during the entire pumping period. The transducer data showed that water levels declined by roughly 0.1 ft to 0.2 ft in the first 12 hours of testing, but they then increased (rose) by 0.1 ft to 0.2 ft in the final 12 hours of testing. These are likely diurnal fluctuations in the water levels because they were also observed in the days preceding and following the constant rate pumping test. Therefore, a definitive water level drawdown impact was not observed in the New Well during the 24-hour constant rate pumping test in Well A.
  - <u>Bachich Irrigation</u> – Water levels recorded by Mr. Bachich in his offsite Bachich Irrigation well also showed no definitive water level drawdown impact during the 24-hour constant rate pumping test at Well A. Water levels in the Bachich Irrigation Well were reported to have increased 0.87 ft (from 29.75 ft to 28.88 ft brp) during the 24-hour pumping period at Well A. During the first 24 hours of the subsequent water level recovery period, water levels continued to increase from 28.88 ft to 28.04 ft brp.

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No other water level data were collected in this well by Mr. Bachich during the 4-day recovery period.

- Bachich Main – Manual water levels collected by Mr. Bachich in his other well were reported to have decreased by only 0.02 ft (from 100.92 ft to 100.94 ft brp) during the 24-hour pumping test of Well A. An initial static water level of 100.92 ft brp was recorded in this well at 9:45 AM on August 4 by Mr. Bachich, just before commencement of the Well A pumping period. Multiple water level measurements reported by Mr. Bachich remained stable at a water level of 100.92 ft brp from 9:45 AM on August 4 until 6:45 AM on August 5. At 6:45 AM on August 5 (15 minutes before pumping ceased at Well A), Mr. Bachich reported a slightly deeper water level measurement of 100.94 ft brp (0.02 ft deeper than the initial static water level). Five additional water level measurements of 100.94 ft were collected throughout the day on August 5; with the final measurement being recorded at 6:12 PM. Thus, water levels appear to have been stable throughout the day on August 5. On August 6 at 6:40 AM, after Well A had been shut down for over 20 hours, Mr. Bachich measured a water level of 100.98 ft brp, 0.04 ft deeper than the water level measured roughly 24-hours prior. It therefore appears that water levels again slightly decreased in the overnight hours.

As shown on Figure 4B, it is unclear why the water levels in the Bachich Main well were stable during most of the daylight hours, and then decreased by small amounts overnight during both the pumping period and non-pumping (water level recovery) period of the Well A pumping test.

It is theoretically possible that the small decline in water levels in the Bachich Main well (a total decline of 0.06 ft as noted above) could have been caused by pumping Well A. Aquifers with low hydraulic conductivities, such as those that exist within the Great Valley Sequence rocks that underlie the subject property, sometimes exhibit time-delayed drawdown effects in water level observation wells. Time-delayed effects, however, do not help to explain the apparent stability of water levels in the daylight hours and the subsequent decrease in water levels overnight between August 4 and August 6 in the Bachich wells. It should also be considered that the small amount of water level decline could also merely be the result of variations in measurement, as water levels in the Bachich wells were measured by Mr. Bachich using his own manual-tape sounder device.

Even if the assumption is made that that 0.06 ft of water level decline measured in the Bachich wells is attributable to the pumping of Well A, such a small amount of drawdown is not significant. The water level decline value of 0.06 ft is far less than the “Default Well Interference Criteria” shown on Table F-1 of the May 12, 2015, Napa County WAA Guidelines. Table F-1 (not reproduced herein) in the WAA Guidelines (2015) presents well interference criteria that the County may apply in the determination of “significant adverse effects” when pumping water wells are spaced less than 500 ft apart. The water level drawdown values listed in Table F-1 of the WAA Guidelines (2015) are 10 or 15 feet (depending on a few variables), both of which are much greater than maximum 0.06 ft of water level decline noted in the Bachich wells.

Based on the data collected during the Well A pumping test, water levels in the Bachich wells were not definitively impacted during the 24-hour pumping test of Well A — and to the extent the overnight water level decline of 0.06 ft in Mr. Bachich’s wells might possibly be attributable to pumping of Well A, such a decline is far less than significant.

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It should also be noted that Mr. Bachich has stated his opinion to RCS that water levels in his two wells decreased as a result of the initial drilling operations for Well A in June 2017. On June 18, 2017, when pilot hole drilling in Well A had begun, Mr. Bachich reportedly recorded a water level of 86.7 ft brp in his Main well. Pilot hole drilling in Well A was completed to a depth of 500 ft bgs on June 19, 2017. On June 20 and 21, Mr. Bachich reported water levels of 96.3 ft and 96.8 ft brp, respectively, in his Main well. However, it is unknown if these water levels are pumping or static water levels, as those details were not reported by Mr. Bachich at the time of data delivery. Also, it is unclear if any pumping was performed by Mr. Bachich in his Irrigation well during this period (which could have had an impact on his Main well). Importantly, no water levels were recorded or reported for Mr. Bachich's wells in the weeks or months prior to pilot hole drilling of Well A. It is also possible that water levels were declining in the region prior to the commencement of drilling Well A because water levels typically decline in wells during the summer and fall. Due to the proximity of Mr. Bachich's wells to the Well A drill site, and the relatively shallow depths of Mr. Bachich's wells, it is also possible that the initial drilling of Well A did impact water levels in the Bachich Irrigation and Main wells while the borehole for Well A was drilled through the shallower portions of the subsurface. However, the pumping test performed at Well A demonstrates that a significant connection does not exist between Well A and Mr. Bachich's then-existing wells. Further, as illustrated on the Figure 5 cross section (discussed further herein), significant differences in water levels existed in August 2017 between water levels in Well A and those in the Bachich wells.

Calculation of Aquifer Parameters

Important aquifer parameters such as transmissivity (T) and storativity (S) can often be determined using data collected during a pumping test of a well. Transmissivity is a measure of the rate at which groundwater can move through an aquifer system, and therefore is essentially a measure of the ability of an aquifer to transmit water to a pumping well. Transmissivity can be expressed in terms of gallons per day per foot of aquifer thickness (gpd/ft). Storativity (S) is a measure of the volume of groundwater that can be taken into or released from storage in an aquifer for a given volume of aquifer materials; storativity is dimensionless and has no units. Storativity calculations can only be made using water level drawdown data monitored in an observation well during a pumping test of another well; storativity cannot be calculated using water level drawdown data acquired solely from a pumping well.

Water level drawdown and recovery data collected from Well A during the August 2017 constant rate pumping test were input into the AQTESOLV version 4.5 Professional computer program (HydroSOLVE, 2007). Water level drawdown data from observation wells are typically used in these solutions, but as discussed above, the onsite New Well and the two then-existing Bachich Wells (Bachich Irrigation and Bachich Main) did not show definitive water level drawdown during the testing period of Well A (pumping well). Therefore, only water level drawdown and recovery data collected from Well A during the August 2017 aquifer test were input into AQTESOLV. Numerous analytical solutions were applied to the Well A data to determine reasonable transmissivity values using both automatic and manual curve fitting procedures. The solutions utilized consisted of unconfined, confined, semi-confined, and/or fractured aquifer solutions. Several variations of these solutions were analyzed by RCS.

When using these types of solutions, certain assumptions must be made about the aquifer. In general, for the solutions listed below, key assumptions are: that the aquifer has an infinite areal (lateral) extent; that the pumping well fully penetrates the aquifer system(s); and that water is instantaneously released from storage with the decline of hydraulic head. Also, for the purposes

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of this analysis, the assumption is made that the saturated aquifer thickness at Well A is 270 ft. This was determined by taking the vertical distance between the static water level in Well A (prior to the start of the recent testing) and the bottom of the casing perforations in Well A.

Shown below are the two curve-fitting solutions used, the transmissivity values calculated, the Figure number in this Memorandum on which the water level data and fitted-curve are presented, and additional assumptions about the aquifer inherent in the solution. In both cases below, a storativity value could not be calculated because definitive water drawdown was not observed in the observation wells.

- Theis/Hantush – Figure 6A, "Constant Rate Pumping Test Analysis, Theis/Hantush Solution, Confined Aquifer, Well A (Pumping Well)" – The curve for the confined aquifer solution is the "best fit" to the later time portion of the water level data acquired during the test and during the water level recovery period in pumping Well A. A transmissivity value of approximately 291 gpd/ft is calculated for these data. The Theis (1935)/Hantush (1961) solution assumes numerous conditions, including that the aquifer is isotropic (the same in all directions).
- Hantush-Jacob – Figure 6B, "Constant Rate Pumping Test Analysis, Hantush-Jacob, Leaky Aquifer, Well A (Pumping Well)" – The curve for the confined aquifer solution has been reasonably matched to fit much of the water level drawdown and recovery data acquired during the pumping test of Well A. A transmissivity value of approximately 260 gpd/ft is calculated for these data. The Hantush-Jacob (1955) solution assumes numerous conditions, including that the leaky aquifer is isotropic (the same in all directions).

Based on the two analytical solutions described above, possible transmissivity values ranged from roughly 260 gpd/ft to 291 gpd/ft, but storativity values could not be determined since there was not definitive water level drawdown monitored in any of the observation wells (the onsite New Well and the Bachich Irrigation and Bachich Main wells). As noted previously, storativity cannot be calculated using water level data solely from the well being pumped during an aquifer test.

The range of transmissivity values calculated above are considered low. This reveals the Great Valley Sequence rock aquifer systems into which Well A and the other shallower-onsite wells are constructed are likely of limited areal (horizontal) extent and/or lack abundant interconnected fractures in the vicinity of the property. In similar analyses performed by RCS on unrelated projects for wells constructed within these Great Valley Sequence rock materials, transmissivity values have varied from about 5 gpd/ft to 300 gpd/ft. Therefore, the transmissivity values determined from the recent aquifer testing performed in Well A fall within this range.

Local Geologic Conditions

Figure 3A, "Geologic Map (CGS 2017)", illustrates the types, lateral extents, and boundaries between the various earth materials mapped at ground surface in the region by others. Figure 3A has been adapted from the results of regional geologic field mapping of the Napa and Sonoma quadrangles, as published by the California Geological Survey (CGS) in 2017 (Wagner & Gutierrez). Note that this map has superseded the 2004 CGS map presented in the 2019 RCS WAA. However, these maps are extremely similar in the vicinity of the subject property, except for minor differences in mapped landslide deposits that are inconsequential for the purposes of this Memorandum, and some nomenclature differences for the various geologic units. Key earth materials mapped at ground surface in the area, as shown on Figure 3A include, from geologically youngest to oldest, the following:

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- Recent Sedimentary Deposits (map symbols Qhc, Qhty, Qht, Qls, Qpa). These deposits consist of the following within the view of Figure 3A: stream channel and stream terrace deposits (Qhc, Qhty, and Qht); landslide deposits (Qls); and undivided alluvium deposits (Qpa). These deposits are generally unconsolidated, and consist of layers and lenses of sand, gravel, silt, and clay. None of these alluvial-type deposits, other than Qls, are exposed at ground surface on or near the subject property.

  Several historic landslide areas have been mapped in the region by others (bright, yellow-colored areas), including two at ground surface in the southern, western, and northern portions of the subject property. Arrows within these mapped landslide areas show the general direction of ground surface movement with each slide.

  It was not a part of our Scope of Hydrogeologic Services for this project to study, investigate, analyze, determine, or opine on the potential activity of these landslides, and/or the potential impact of these landslides on the property or on the proposed new winery.

- Sonoma Volcanics (map symbol Psvbsl). The Sonoma Volcanics are comprised of a highly variable sequence of chemically and lithologically diverse volcanic rocks, along with sediments derived thereof. These types of rocks can include the following: mafic lava flows and tuffs; rhyolite to dacite ash flow tuff; lava flows; intrusions; breccia; and tuffaceous sediment. As shown on Figure 3A, the Sonoma Volcanics are not exposed anywhere on the subject property, but a ground surface exposure of the Andesite flow breccia of Stags Leap (Psvbsl) was mapped by others northeast of the subject property. In many parts of Napa and Sonoma counties, these volcanic rocks tend to be viable aquifer systems. The RCS Geologist did not observe any outcrops of Sonoma Volcanics on the subject property during their site visits. Further, these rocks do not underlie any of the older sedimentary rocks that are discussed below.

- Domengine Sandstone (map symbol Ed). This sedimentary unit is shown on Figure 3A to be exposed at ground surface to the southeast of the subject property and south of a mapped fault; the fault is shown as a thick, black-colored dashed line. The Domengine sandstone unit is of Eocene age and reportedly consists of brown quartzo-felspathic sandstone with minor thin claystone interbeds. There are no outcrops of Domengine sandstone exposed on the subject property, and they do not underlie the subject property.

- Great Valley Sequence (map symbol Kgv). These geologically old (Cretaceous-aged) sedimentary rocks are exposed at ground surface throughout most of the subject property and likely underlie the onsite landslide deposits, as shown on Figure 3A. These rocks primarily consist of well-consolidated to cemented, thinly bedded mudstone, siltstone, and shale, with minor amounts of thinly bedded sandstone. Due to their geologic age and the high degree of consolidation, generally low permeability, and lack of intergranular (primary) porosity, these rocks are not typically considered to be a viable water-bearing formation.

  The quality and quantity of groundwater produced from this formation depends on the fractured nature of these rocks and the amount of average annual recharge (rainfall) experienced at the subject property. These rocks are also known to underlie all other geologically younger rocks exposed across the region (including the landslide materials mentioned above) and are considered to be the regional bedrock.

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A second geologic map was also reviewed for this project, Figure 3B, "Geologic Map (USGS 2007)", which was adapted from the United States Geological Survey (USGS) map titled, "Geologic Map and Map Database of Eastern Sonoma and Western Napa Counties, California" (Graymer, et al., 2007). The Figure 3B map is noted to be slightly different geologically, with regard to the presence of additional geologic structure, compared to the geology shown on Figure 3A. Specifically, Figure 3B includes a queried fault and the nomenclature used for rocks of the Great Valley Sequence that are not shown on the Figure 3A map. A summary of key differences between the Figure 3A and Figure 3B geologic maps include:

- Recent Sedimentary Deposits. These geologic materials are shown on Figure 3A as map symbols Qhc, Qhty, Qht, Qhf, and Qpa; whereas these same materials are shown on Figure 3B as map symbols Qhc, Qha, Qhf, and Qoa, and they are shown in one more location on Figure 3A, where the Qhc deposit diagonally traverses the southwestern portion of the map view. Furthermore, the landslide deposits shown on Figure 3A (map symbol Qls) are not depicted on Figure 3B.
- Great Valley Sequence. These older geologic rocks are shown on Figure 3B as map symbols Kgvu and KJgvl, as opposed to the single map symbol (KJgv) that is used on Figure 3A. On Figure 3B, the Great Valley Sequence has been mapped as younger and older units of differing composition that are separated by a queried fault. The upper unit (Kgvu) of the Great Valley sequence is reportedly comprised of sandstone, shale, and conglomerate, whereas the lower unit (KJgvl) is reported to be comprised of sandstone and shale. The upper unit is distinguished from the older, lower unit by a greater amount of sandstone and its fossil content (Graymer, et al., 2007). The geologic contact between the two units is shown as a fault on Figure 3B; in the vicinity of the subject property, this fault/geologic contact is inferred and questionable due to a heavy vegetation cover at ground surface (Graymer, et al., 2007). Conversely, no fault or other geologic contact is not shown on Figure 3A in the location of the aforementioned fault that divides Kgvu from KJgvl on Figure 3B. However, the location and extent of the ground surface exposures of these Great Valley Sequence rocks are essentially the same on both maps.

As discussed above, RCS geologists were involved with the siting, design, construction, and testing of onsite Well A. Samples of drill cuttings collected by the driller during pilot hole drilling of Well A were provided to RCS to be geologically logged. The earth materials observed by RCS geologists for Well A were observed to be brown to grey to greenish grey shale with interbedded layers of sandstone to a depth of 500 ft bgs. The entire pilot borehole to a depth of 500 ft bgs is therefore interpreted by RCS to consist of geologic materials that can be assigned to rocks of the Great Valley Sequence.

Review of the driller's descriptions of drill cuttings listed on the available driller's logs for other nearby offsite wells and/or test holes revealed that pilot hole drilling of these wells also encountered earth materials typical of Great Sequence Valley rocks to depths of at least 680 ft bgs. Typical driller-terminology for the drill cuttings on those driller's logs included "blue shale," "shale and clay," "shale and sandstone," and "gray shale."

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Geologic Structure

A series of faults and/or fault zones[4] have been mapped by others at ground surface in the region and are shown on Figures 3A and 3B; these geologic structures are typically shown by the presence of thick black lines; these lines are typically dashed or dotted where uncertain or unknown. These faults generally appear to be northwest–southeast trending faults. The Holocene-aged active West Napa fault is shown on Figures 3A and 3B to be located roughly ½-miles northeast of the subject property. As shown only on Figure 3B, an unnamed fault is shown to transect the central portion of the subject property, just to the southwest of the onsite Old and New Wells.

The possible impacts of these faults on groundwater availability are unknown due to an absence of requisite data. Fault activity over time could have served to increase the degree and extent of fracturing in the local Great Valley Sequence rocks. Such activity tends to increase the amount of open area in the rock fractures which, in turn, can increase the capacity of those local earth materials to store and transmit groundwater. It is unknown if these faults are barriers to groundwater flow.

In the area of the subject property, Great Valley Sequence rocks have been moderately to strongly deformed by folding and faulting, and bedding relationships can be complex (LSCE, 2014). As shown on Figures 3A and 3B, bedding attitudes (strikes and dips) reported for the beds nearest the subject property are depicted with strikes that are generally oriented in a northwest-southeast direction, and dips (declination of the strata from the horizontal) that are generally 45 degrees or more to the northeast.

Based on the data discussed above, Figure 5, “Geologic Cross Section A-A’,” shows the generalized RCS interpretation of the subsurface conditions along the alignment of Section A-A’; the location of this cross section, relative to the subject property, is shown on Figures 3A and 3B. As shown on Figure 5, Great Valley Sequence rocks (map symbol KJgv on Figure 3A, and map symbols Kgvu and KJgvl on Figure 3B) are interpreted to underlie the entire subject property. Specifically, the Great Valley upper unit (map symbol Kgvu on Figure 3B) is exposed at ground surface across the southern portion of the property, whereas the reportedly more shale-dominant lower unit (map symbol KJgvl on Figure 3B) is exposed in the northern portion of the property, which encompasses the existing onsite wells. Based on the bedding attitude data presented on the published geologic map (Graymer, et al., 2007), both upper and lower units are shown on the Figure 5 cross section with bedding planes that generally dip at 45 degrees or greater to the northeast. The shape and slope of the fault contact between the upper and lower units is only roughly estimated and has been queried, as shown on Figure 5. Due to limited information, the relative direction and/or magnitude of historic movement[4] on the fault shown on Figure 5 is unknown.

Also shown on the Figure 5 cross section are the locations of the three onsite wells (New Well, Old Well, and Well A) and two of the three nearby offsite wells owned by Mr. George Bachich (Bachich New and Bachich Main), represented by a simple construction schematic of each well (casing depths, sanitary seal depths, and perforation intervals, as available), along with recent water level data for each of these wells. Note that some of the wells on Figure 5 have been projected onto the cross section line, and also note that Bachich Irrigation, which is inactive, is

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[4] It is neither the purpose nor within the Scope of Hydrogeologic Services for this project to assess the potential seismicity or activity of any faults that may occur in the region.

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not shown of Figure 5 because it almost entirely overlaps (when projected onto the line) the active Bachich New Well.

Notable on the RCS-prepared geologic cross section are the following:

- Each of the onsite wells appear to be perforated and constructed solely within the lower unit of the Great Valley Sequence rocks (map symbol KJgvl on Figure 3B).
- The nearby offsite Bachich wells are also shown to be perforated in the lower unit of the Great Valley Sequence rocks. The Bachich Main Well appears to be entirely perforated within the same depth intervals in which the uppermost perforated interval exists in Well A, whereas the perforated interval of the Bachich New Well extends over a much larger portion of the perforated interval of Well A. However, Well A is constructed with perforations that extend much deeper than the two other onsite wells and the Bachich Wells. Note, that although the Bachich Irrigation Well is not shown, it is constructed similarly to the Bachich Main Well.
- The August 2017 static water level elevation in Well A is significantly lower than in the other wells shown on the cross section for which an August 2017 measurement is available, and it is also significantly lower than that measurement for the not-shown Bachich Irrigation Well. This is particularly noteworthy with respect to the Bachich Irrigation well and the Bachich Main well, which are located[5] 182 ft and 322 ft, respectively, from Well A. These data indicate that the local fractured rock aquifer systems are likely not continuous with respect to depth (i.e., are anisotropic, and may be biased toward horizontal interconnection as opposed to vertical interconnection), and therefore, the deeper portions of Well A may not be in direct hydraulic communication with the older Bachich wells or the other onsite wells — a likelihood discussed more in Conclusion 7 below. In essence, the groundwater in these rocks tends to be "compartmentalized" (i.e., it occurs in "pockets" in the subsurface), and Well A is likely extracting groundwater from different subsurface "pockets" than are accessed by the Bachich wells that existed in August 2017.
- Recent water level data are not available for either the Bachich Irrigation Well or the Bachich Main Well, but water levels measured on July 26, 2023 are available for all of the other wells shown on Figure 5 (as measured by RCS or provided by Mr. Bachich); these July 2023 water levels are shown on Figure 5. Review of these July 2023 water levels shows that at the time of measurement, the water levels in the onsite New and Old Wells were shallow, whereas the water levels in Well A and the Bachich New Well were relatively deep. On that date, the water level in the Bachich New Well was deeper than in Well A.

Local Groundwater Basin

Groundwater basin boundaries in California have been defined and designated by the State Department of Water Resources (DWR) in Bulletin 118, "California's Groundwater" (2021), and were used to define groundwater basin boundaries for the purposes of Groundwater Sustainability Plan (GSP) preparation (LSCE, 2022). Figure 1 shows the boundaries of the local groundwater basins (the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin and the Sonoma Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin) in DWR Bulletin 118

[5] Well-to-well distances have been updated to reflect well locations with improved accuracy, relative to those reported in the prior WAA for the subject property (RCS, 2019).

(2021), relative to the boundary of the subject property. As shown on that Figure, the entire subject property is outside of the local groundwater basins.

Water Demands

Existing Water Demands

Existing onsite water demands have been estimated in accordance with information provided by the project engineer (RSA+) and the vineyard manager (Mr. Gavin Sharrocks); no recent totalizer records are available for Well A or the onsite New Well. These demands consist of the following:

a. Residential Demand (no landscaping[6])= 0.403 acre-feet[7] per year (AFY).
   i. Estimated by RSA+ based on a 3-bedroom residence that consumes 120 gallons/bedroom.
b. Vineyard Irrigation (5.87-acre vineyard) = 2.64 - 2.94 AFY (rainfall dependent).
   i. 2.64 AFY during average-rainfall years (unit irrigation rate of 0.45 AFY/acre[8]).
   ii. 2.94 AFY during below-average-rainfall years (unit irrigation rate of 0.50 AFY/acre[8]).
      I. Mr. Sharrocks estimated that 10% additional irrigation demand might be required to help meet increased vineyard demands during below-average rainfall years, provided through additional irrigation events. However, drought tolerant rootstocks have been utilized, so this estimate of increased demand may not ever be realized.
      II. Mr. Sharrocks stated that no heat or frost protection is required for the existing vineyard operations.
      III. Mr. Sharrocks estimated that the existing vineyard irrigation rate is lower than the initial vineyard irrigation rate estimated in the RCS 2019 WAA because the actual planted vine density is 25% lower than originally envisioned in the 2019 ECP. Therefore, the lower unit-irrigation rate derived from actual irrigation of the existing onsite vineyards has been assumed herein.

Existing total water demand during average-rainfall years =
a. + b.i. = 0.403 + 2.64 AFY = 3.04 AFY

Existing total water demand during below-average-rainfall years =
a. + b.ii. = 0.403 + 2.94 AFY = 3.34 AFY

Thus, current onsite water demands are estimated to total between 3.04 and 3.34 AFY, depending on rainfall received, and all onsite groundwater demands are currently met by Well A.

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[6] Existing irrigated vegetation associated with residence reportedly consists solely of a small vegetable garden, per the vineyard manager.

[7] 1 acre-foot = 325,851 gallons

[8] Within the range of the standard unit irrigation rate for vineyards in WAA Guidance Document (Napa County, 2015).

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Permitted Water Demands

Under the approved 2019 ECP, 13.73 total net plantable acres of vines are permitted be developed at the property. Therefore, permitted water demands at the property consist of the following:

a. Residential Demand (no landscaping)= 0.403 AFY.
b. Vineyard Irrigation (13.73-acre vineyard) = 6.18 – 6.87 AFY (rainfall dependent).
   i. 6.18 AFY during average-rainfall years (unit irrigation rate of 0.45 AFY/acre).
   ii. 6.87 AFY during below-average-rainfall years (unit irrigation rate of 0.50 AFY/acre).

Permitted total water demand during average-rainfall years =
a. + b.i. = 0.403 + 6.18 AFY = 6.58 AFY

Permitted total water demand during below-average-rainfall years =
a. + b.ii. = 0.403 + 6.87 AFY = 7.27 AFY

Proposed Water Demands

Reclaimed and treated process wastewater derived from the winery will be used to offset a portion of vineyard irrigation, thus reducing the vineyard's direct reliance on groundwater. As with the existing onsite water demands, proposed onsite water demands following development of the proposed winery project have been estimated in accordance with information provided by the project engineer and the vineyard manager. Furthermore, the permitted 13.73-acre net planted area approved under the 2019 ECP is being reduced to 13.62 acres (decrease of 0.11 acres) to accommodate development of the proposed winery. The vineyard areas discussed below assume the full, permitted 13.62-acre net planted area has been realized. Proposed onsite demands consist of the following:

a. Residential Demand (no landscaping) = 0.403 AFY (no change with project).
b. Vineyard Irrigation (13.62-acre vineyard) = 6.13 - 6.81 AFY (rainfall dependent).
   i. 6.13 AFY during average-rainfall years (unit irrigation rate of 0.45 AFY/acre).
   ii. 6.81 AFY during below-average-rainfall years (unit irrigation rate of 0.50 AFY/acre).
   iii. 0.270 AFY of vineyard irrigation to be supplied from winery process wastewater to offset groundwater demand.
c. Winery Demand (by RSA$^+$) = 0.625 AFY
   i. Process Water = 0.384 AFY
   ii. Domestic Water = 0.116 AFY
   iii. Landscaping = 0.125 AFY

Proposed total groundwater demand during average-rainfall years =
a. + b.i. - b.iii. + c. = 0.403 + 6.13 - 0.270 + 0.625 AFY ≈ 6.9 AFY.

Proposed total groundwater demand during below-average-rainfall years =
a. + b.ii. - b.iii. + c. = 0.403 + 6.81 - 0.270 + 0.625 AFY ≈ 7.6 AFY.

For the purposes of this WAA, it is assumed that the total future groundwater demand of the project will be 7.6 AFY. Hence the future demand of the project (7.6 AFY) is only 0.33 AFY higher than the permitted demand (7.27 AFY) for the subject property.

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Following the proposed winery development project, all proposed onsite demands (including existing demands) would be met by groundwater pumped from Well A, except for the 0.270 AFY of vineyard irrigation supplied by reclaimed winery process water. As stated above, this estimate assumes complete (13.62-acre) vineyard buildout.

As described in the RCS 2019 WAA, once full buildout is achieved, vineyard water use is anticipated to decrease over time as the existing vines mature; Mr. Sharrocks stated that they are committed to achieving dry farming of the subject vineyard.

Proposed Pumping Rate

To estimate the pumping rate that would be required from Well A to meet the demands that it is proposed to supply (up to 7.6 AFY), the following conservative assumptions and calculations were made:

- Groundwater pumping would only occur during a 22-week irrigation season (154 days/year), for twelve hours per day (720 minutes/day).

Therefore, the pumping rate required from Well A to meet the 7.6 AFY of demands that it is proposed to supply would be 22.3 gpm, calculated as follows:

$$\text{Required Pumping Rate from Well A} = 7.6\text{ AFY} \times \frac{325{,}851\text{ gallons}}{\text{AF}} \times \frac{\text{year}}{154\text{ days}} \times \frac{\text{day}}{720\text{ minutes}} = 22.3\text{ gpm}$$

As demonstrated by the August 2017 constant rate pumping test described above, Well A is capable of producing groundwater at a sustained rate of 31 gpm, which is considerably higher than the 22.3 gpm required to meet the estimated proposed groundwater demands to be supplied by this well in the future. Thus, onsite Well A provides a more than adequate water supply for all the proposed future water-using developments on the subject property.

WAA Tier 1: "Groundwater Use for Napa County"

Napa County promulgated additional guidelines[9] for WAA preparation with respect to groundwater recharge calculations in response to the Governor's Executive Order N-7-22 (Napa County, 2022a & 2024b) and the drought in the State at that time. For projects that require a WAA and are located outside of the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin, the County requires that a calculation of parcel-specific groundwater recharge be performed to determine allowable groundwater usage. Napa County also requires that parcel-specific groundwater recharge estimates for such WAAs consider "average rainfall" to be the average annual rainfall that has occurred in the last 10 water years, such as defined in the County's 10-year average precipitation dataset (PBES & LSCE, 2022). As described above, the subject property is located outside of the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin.

Parcel-Specific Precipitation

Spatial analysis of the County's 10-year average rainfall data set (PBES & LSCE, 2022) determined that the area-weighted average rainfall for the 10-Water Year period of 2012 to 2021 within the subject parcel boundary shown on the Figures herein is 29.12 inches. Multiplying this rainfall average by the 114.87-acre assessed area of the subject property, then dividing by a

[9] A "prolonged drought analysis" is no longer required for WAA preparation due to the required use of the 10-year annual rainfall average or the unit groundwater use of 0.3 AFY/ac (Napa County, 2022b).

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factor of 12 (inches to feet conversion), results in a total of 278.75 AFY. This value is the average volume of rainfall that the subject property receives each water year, per the County's current 10-year (Water Years 2012 to 2021) average methodology. However, it does not consider the deep percolation rate (groundwater recharge rate) at the subject property.

Parcel-Specific Groundwater Recharge

Groundwater recharge on a long-term average annual basis at the subject property can be estimated as a percentage of average rainfall that falls on the property and subsequently undergoes deep percolation, ultimately entering the local aquifer system beneath the property. The actual percentage of rainfall that undergoes deep percolation is a function of numerous local and regional conditions, including ground surface slopes; soil types; ground cover; evapotranspiration; and the frequency, intensity, and duration of rainfall, among other possible factors. Therefore, various analyses of deep percolation of rainfall into the local bedrock and/or Great Valley Sequence rocks have been reviewed for this analysis, including work by other consultants and governmental agencies.

Estimates of groundwater recharge as a percentage of rainfall were presented for several watersheds that are tributary to the Napa River in LSCE & MBK (2013). Those watershed boundaries are shown on Figures 8-3 and 8-4 of LSCE & MBK (2013) and are also shown on Figure 1 of this Memorandum. As described earlier in this Memorandum, most of the subject property is within both the Redwood Creek Watershed and the Napa Creek Watershed at Napa, whereas the remainder is within the Napa River Watershed near Napa.

The northeastern portion of the property is the portion that is not within either the Redwood Creek Watershed or the Napa Creek Watershed at Napa. Note that the entire Redwood Creek Watershed is inside the Napa Creek Watershed at Napa, but neither of these watersheds are within the Napa River Watershed near Napa. A 10% deep percolation rate was selected for the purposes of this Tier 1 WAA based on the recharge rate for the Redwood Creek Watershed presented on Table 8-10 of LSCE & MBK (2013), referred to thereon as "Recharge (% of Precip.)". Selection of this deep percolation rate instead of the marginally higher 11% rate for the Napa Creek Watershed at Napa, or the considerably higher 17% rate reported by LSCE & MBK for the Napa River near Napa Watershed, results in a more conservative analysis with a lower annual groundwater recharge volume.

Multiplication of the 10% groundwater recharge rate of LSCE & MBK (2013) with the average volume of rainfall that the subject property receives each water year (278.75 AFY) results in a parcel-specific average groundwater recharge rate of 27.88 AFY, by the County's current 10-year average groundwater recharge methodology. However, this calculation does not consider the significant area defined by RCS (2019) on which deep percolation was assumed to not occur, and it also does not directly consider the effect of ground surface slope on the deep percolation rate.

Reduced Recharge Area

A Phase 2 Water Availability Analysis was performed for the Woolls Ranch property (LSCE, 2014), which is located on an adjacent parcel to the south of the subject property. That report included information on three test holes that were drilled on the western side of the Woolls Ranch property; the locations of each of these test holes are shown on several of the Figures of this Memorandum, including Figure 7, "Conservative Recharge Area". These test holes were reported as "dry holes" and were not completed as water wells. Also, as described in their report and shown on a LSCE-prepared geologic cross section (LSCE, 2014), due to the lack of subsurface geologic data, the hydrogeology between those test holes and the nearby Woolls "Pond Well" is relatively unknown. Due to the proximity of the western portion of the subject P+M Vineyards property, rainfall recharge may also be somewhat limited in those areas. In addition, because of the unknown hydrogeologic conditions described by LSCE (2014), RCS excluded from recharge estimates a similar portion of the subject property. To present a conservative analysis, RCS reduced the area of the subject property that is theoretically available for deep percolation of rainfall. Figure 7 illustrates the portion of the subject property available for deep percolation of rainfall as part of our conservative estimate. This conservative recharge area occupies roughly the northeastern third of the subject property. The southern boundary of this conservative recharge area was determined from information derived from geologic cross sections presented in the Woolls Ranch WAA (LSCE, 2014). The strike (or orientation) of this southern boundary was determined by RCS based on bedding attitudes reported on geologic map (USGS, 2007). Following omission of the subject property outside of the conservative recharge area, only 44.5 acres[10] of the 114.87-acre subject property were assumed to be available for deep percolation of rainfall.

An additional spatial analysis of the County's 10-year average rainfall data set (PBES & LSCE, 2022) was performed to determine the area-weighted average rainfall for the 10-Water Year period of 2012 to 2021 within the 44.5-acre conservative recharge area, resulting in a value of 28.94 inches. Multiplying this rainfall average by the 44.5-acre area of the conservative recharge area, then dividing by a factor of 12 (inches to feet conversion), results in a total of 107.3 AFY. This value is the average volume of rainfall that falls directly onto the conservative recharge area, per the County's current 10-year (Water Years 2012 to 2021) average methodology. The product of that conservative recharge area volume and the 10% recharge rate from LSCE & MBK (2013) is 10.7 AFY, which is the average volume of rainfall that annually undergoes deep percolation within the conservative recharge area of the subject parcel. However, an additional element that can further refine this recharge calculation, the effect of slope on groundwater recharge, is discussed below.

Effect of Slope on Groundwater Recharge Potential

Any estimate of the percentage of rainfall that enters an aquifer system via deep percolation that relies on estimates of rainfall, evapotranspiration, and surface water outflow for an entire watershed, such as the estimates provided by LSCE & MBK (2013), inherently includes the effects of ground surface slope. To provide a more site-specific estimate of the potential effects of ground slope on groundwater recharge at the subject parcel within the above-discussed conservative recharge area, a ground surface slope analysis is provided below.

Many basic geologic references assume that recharge potential is reduced on steeper slopes because steeper slopes tend to increase surface water runoff rates and less time is therefore available for rainfall to percolate (infiltrate) into the ground before running off as surface flow. Page 56 of LSCE & MBK (2013) asserts that deep percolation recharge from rainfall is "significantly reduced" for land areas with slopes angles (inclinations) >30°. On page 11 of LSCE & MBK (2013), an assessment of slope angles >30° is also mentioned, and this was attributed to a prior LSCE report, namely "LSCE 2011" therein; that document is likely to be the reference listed as "2011a" on page 134 of LSCE & MBK (2013). LSCE (2011) states on page 29 that "areas in which the slope of the land surface exceeds 30 degrees, beyond which recharge

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[10] This calculated area is slightly different than reported in the 2019 RCS WAA for the subject property, likely because of spatial projection differences and different software employed today.

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potential is significantly reduced." No other references or data are presented in any of the above-referenced documents to quantify the qualitative description of "significantly reduced". Because the various factors that affect groundwater recharge are likely interrelated (Yeh et al., 2009), assigning a value to define the amount that recharge is diminished as a function of slope is extremely difficult. No references were reviewed by RCS that quantify the possible reduction of deep percolation that might occur as a function of ground surface slope angle.

The watershed-wide estimates of the deep percolation rate of rainfall for the entire Redwood Creek Watershed by LSCE & MBK (2013) were based on water balance calculations that included rainfall throughout the entire watershed. As discussed above, those watershed-scale calculations inherently include all slopes within the watershed, including slopes >30°. Therefore, to provide a more conservative and site-specific estimate of groundwater recharge within the conservative recharge area, it is assumed that deep percolation does not occur on areas with slopes >30°, and that rainfall that falls on areas of >30° slope would leave the property through some other hydrologic process (e.g., surface runoff, evapotranspiration, etc.).

A site-specific ground surface slope analysis was derived using a U.S. Geological Survey (USGS) digital elevation model (2020b) of the property. Within the conservative recharge area, 96.3% of the ground surface slopes (approximately 42.9 acres) were determined to not exceed 30°, whereas the remaining 3.7% of the ground surface slopes (approximately 1.6 acres) exceeded 30°. If it is assumed that rainfall does not undergo deep percolation over the 1.6-acre portion of the conservative recharge area with slopes in excess of 30°, the remaining average annual recharge that is estimated to occur at the subject property would be 10.3 AFY (28.94 inches of rainfall, multiplied by the 42.9-acre area of the more gently sloped areas, divided by a factor of 12 to convert from inches to feet, and multiplied by the 10% deep percolation rate). Therefore, after consideration of the slope analysis described above, the estimated average annual groundwater recharge volume at the subject property (strictly within the conservative recharge area) is calculated to be 10.3 AFY.

In accordance with current Napa County guidelines (2015 & 2024b) and based on the conservative analyses presented above, average annual groundwater recharge at the subject property, and thus allowable groundwater extractions from the subject property, is 10.3 AFY. This estimate of groundwater recharge and allowable groundwater extractions is considerably higher than the 7.6 AFY of groundwater extractions proposed for the subject property. Because total proposed onsite groundwater extractions (7.6 AFY) are less than the estimated average annual groundwater recharge at the property (10.3 AFY), the Tier 1 WAA conditions are satisfied for the proposed winery development project and for the other existing groundwater uses that would continue in the future at the subject property.

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WAA Tier 2 – Review of Possible "Well & Spring Interference"

RCS reviewed publicly available records for evidence of offsite wells (PBES, 2023) and springs (PBES, 2023; USGS, 2023) near the subject property. This review resulted in discovery of three known or possible offsite wells within 500 feet of the location of Well A (the project well), but no evidence was discovered suggesting the existence offsite springs that are used for water supply purposes within 1,500 feet of Well A. A Tier 2 WAA was already prepared for the subject property (RCS, 2019), which showed far less than significant effects on two of the offsite within 500 ft of Well A. However, it was discovered that an additional well had been drilled since that analysis had been prepared, referred to herein as "Bachich New Well", within 500 ft of Well A. Therefore, to satisfy current County requirements for the proposed winery development (Napa County, 2015 & 2024b), a Tier 2 WAA was prepared to evaluate the possible water level drawdown interference that operational pumping of Well A might impart on Bachich New Well.

Bachich New Well

The year following the pumping tests of Well A, Mr. Bachich drilled an additional well, referred to herein as "Bachich New Well". This additional well was drilled even closer to Well A than the prior two Bachich wells. According to Mr. Bachich, the New Well was drilled because his other wells (Main and Irrigation) effectively went dry (i.e., could not be pumped for extended periods without breaking suction). The Bachich New Well is significantly deeper than the older Bachich wells and is constructed with a significant length of perforations that overlap with onsite Well A (see Figure 5).

For the purposes of this WAA, because of the small distance (137 ft) between Well A and the Bachich New Well, the significant vertical overlap of the casing perforations of these wells, and the lack of higher frequency water level data from Well A for additional water level comparisons, it is assumed that the aquifer system from which Well A can extract water is at least partially connected to the aquifer system accessible to the Bachich New Well. This assumption is supported by the water level data provided by Mr. Bachich, discussed below.

Mr. Bachich provided a significant amount of water level data collected in his New Well; those data are shown on Figure 8, "Comparison of Well A and Bachich New Well Water Levels". On that Figure, the water level data from Bachich Well A were assumed to have been measured relative to a reference point of 1.5 ft ags, which is comparable to the measurement reference point of Well A, of 1.48 ft ags. All water level elevations shown on Figure 8 were calculated by subtracting depth to water measurements from the ground surface elevations at each of the wells, as derived from a high-resolution digital elevation model (USGS, 2020a).

Only limited water level data for Well A are available after the August 2017 pumping test. Furthermore, a totalizer is not installed on Well A, so quantitative production totals are not available subsequent the August 2017 pumping test. Of the five manual water levels available for Well A for which temporally overlapping water level data are available for Bachich New Well, two are higher elevation than in the Bachich New Well, whereas three are lower in elevation than in Bachich New Well. However, only the April and October Well A water levels on Figure 8 are considered likely to be true static water levels; the July Well A water levels were measured with known or possible within the preceding 24 hours, and the August Well A water level was measured while the well was actively pumping. Comparison of the temporally overlapping water level data from Well A and the Bachich New Well does not reveal a consistent trend.

Despite the limited available data for Well A, RCS was able to infer water level drawdown interference in the Bachich New Well dataset that resulted from operations of a nearby well. Three

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key patterns are apparent in the Bachich New Well water level data shown on Figure 8; a seasonal trend and two different drawdown and recovery patterns. The largest-scale of these patterns is a strong seasonal trend, which presents as a 1-year-wavelength sinusoidal pattern with an amplitude of approximately 35 ft. This type of seasonal pattern is typical of wells throughout Napa County and would be expected to at least some extent in most settings where rainfall and corresponding groundwater recharge is strongly seasonal, like it is in aquifers in the higher elevation hilly regions of Napa County. Even in the complete absence of local and regional groundwater pumping, seasonal water level variations like those shown on Figure 8 would still be expected to occur in aquifer in the hills of Napa County as a result of various natural processes including discharge from springs and seeps; baseflow/underflow; and evapotranspiration. However, seasonally increased pumping for irrigative uses (e.g., agricultural, domestic landscaping, etc.) probably increases the amplitude of this phenomenon.

Water level drawdown recorded in the Bachich New Well appears to occur nearly every day throughout the year, but two categories of water level drawdown "events" appear to exist in the Bachich New Well water level data (Figure 8). Most of the drawdown events can be classified as "small", in which water levels in the well fell by no more than approximately 4 ft over a short period of time. Conversely, a smaller number of drawdown events can be classified as "large", in which water levels in the well fell on the order of roughly 4 to 7 ft over a short period of time; these "large" events are highlighted in yellow on Figure 8, based on qualitative review of the water level data shown thereon. Following both types of events, water level recovery was observed to occur quickly, albeit not completely, each time. However, a key observation is that none of the individual water level drawdown events exceeded 8 ft in magnitude.

RCS interprets the "small" drawdown events as induced by pumping of the Bachich New Well, whereas the "large" drawdown events are probably induced, at least in part, by operational pumping of a nearby well during the irrigation season, but possibly not Well A. It was reported to RCS by the vineyard manager that Well A was operated an average of 2-3 days per week during the 2023 irrigation season (May through October). However, the "large" drawdown events do not appear to occur at that frequency, occurring less frequently. No active nearby wells are known to exist near the Bachich New Well, other than Well A, and the nearest known likely irrigation well, other than Well A, is more than 1,400 ft to the northwest of Bachich Well A.

The largest of the observed drawdown events are likely the result of simultaneous pumping of the Bachich Well and another well (possibly Well A), which may have produced cumulative drawdown effects in the Bachich New Well. This is phenomenon is known as the principle of superposition, which describes how water level drawdown observed in a given well is the cumulative result of all cones of depression[11] that intersect that well at a given time. In this scenario, the Bachich New Well is at the center of its self-induced cone of depression, and the water level in the Bachich New Well is simultaneously being influenced (drawn down) by the separate but overlapping cone of depression induced by Well A.

As discussed above, recent totalizer records for Well A are not available, so water use from Well A was estimated. However, according to vineyard manager Mr. Gavin Sharrocks, pumping durations from Well A are never more than 24 hours, and generally do not exceed 16 hours. This

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[11] When groundwater is pumped from an active water well, a hydraulic gradient is generally induced towards that well, known as a water level "cone of depression", that horizontally radiates from the pumping well at the center of this cone. In most circumstances, the greater the pumping rate and/or the longer the duration of pumping, the greater the water level drawdown is in a theoretical pumping well. Higher pumping rates and longer pumping durations in that theoretical pumping well will also tend to increase the water level drawdown induced in nearby wells that are connected to the pumping well through a common aquifer system.

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statement is supported by the reported lack of storage into which Well A can pump; all irrigation water pumped from Well A is conveyed directly to the vines (i.e., direct irrigation). Thus, operational periods of the well cannot exceed the irrigation periods for the vines.

At no time were any of the drawdown events observed to reach 8 ft in the Bachich New Well. Even if those largest events were induced entirely by Well A (which is very likely not the case), that amount of water level drawdown does not exceed the 10-ft drawdown interference criterion described on Table F-1 of the WAA guidance document (Napa County, 2015). Therefore, because the 10-ft criterion was not exceeded, the Tier 3 requirements for the proposed winery development project have been met, and the Tier 2 analysis is complete. Furthermore, because the pumping rate proposed for the project well (Well A) is the same that was proposed in the RCS 2019 WAA, and because significant water level interference was not induced in the Bachich Main and Irrigation Wells as a result of a 24 hour pumping test of Well A, the results of that prior Tier 2 WAA are directly applicable to the subject analysis for the Bachich Main and Irrigation Wells (i.e., Tier 2 requirements have been met).

WAA Tier 3 – Review of Possible "Groundwater/Surface Water Interaction"

Napa County has published information defining which rivers, streams, and creeks within the County are considered "significant" for the purposes of Tier 3 WAA review. These "Significant Streams" are defined in GIS data available from a County GIS data source, where they are referred to as "Significant_Streams" and "Significant_Streams_1500ft_Buffer" (PBES & LSCE, 2023a & b). According to the County's updates to WAA requirements (Napa County, 2024b), a Tier 3 WAA is required if a project well is located within 1,500 feet of a Significant Stream.

Figures 1 and 2 show the spatial relationship between the subject property and the nearby Significant Streams 1,500-foot buffer areas, demonstrating that most of the subject property is within a Significant Streams 1,500-foot buffer area. However, the project well (Well A) is located outside of the County's Significant Streams 1,500-foot buffer areas. The Tier 3 requirements for the proposed winery development are therefore presumptively met, and a Tier 3 WAA is not necessary for County-approval of the proposed winery project (Napa County, 2015, 2024a, 2024b).

Key Conclusions and Recommendations

1. The proposed project consists of developing a new winery on the subject property. Existing developments on the property consists of 5.87 acres of vineyard and a residence.
2. Current onsite water use has been estimated to be 3.34 acre-feet per year (AFY). Note, that the permitted vineyard has not yet been fully built out; 5.87 acres of vineyard currently exist onsite.
3. The permitted groundwater demand considering the approved 2019 ECP for the subject property is 7.27 AFY, assuming full buildout of 13.73 acres of vines (net planted acres).
4. Following development of the proposed winery, the estimated total onsite groundwater demand will be 7.6 AFY, which is only 0.33 AFY higher than the permitted demand (7.27 AFY). The proposed project will reduce the permitted net vineyard acreage by 0.11 acres, from 13.73 acres to 13.62 acres.
5. All onsite groundwater demands are currently met by onsite Well A. Residential water supply was provided by the onsite New Well until recently, but associated solar panels that powered the New Well were vandalized, rendering it inoperable. The residence is currently receiving

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water from an emergency backup source that will be curtailed as part of development of the proposed winery.

6. All onsite water demands would be met by Well A following development of the proposed winery.
7. The estimated property-specific average annual groundwater recharge at the subject property is 10.3 AFY. This conservatively estimated average annual recharge volume is considerably greater than the total future groundwater use proposed for the property of approximately 7.6 AFY. Therefore, because proposed groundwater use does not exceed parcel-specific groundwater recharge, the proposed project is compliant with Napa County's Tier 1 WAA requirements (Napa County, 2015 & 2024b).
8. The proposed project well, Well A, is capable of meeting all proposed onsite water demands.
9. A Tier 2 WAA was performed because there are at least three offsite wells (Bachich Irrigation Well, Bachich Main Well, and Bachich New Well) located within 500 ft of the onsite Well A. This Tier 2 WAA includes the August 2017 aquifer testing of Well A that evaluates the effects that pumping of Well A might have on Mr. Bachich's then-existing wells (Bachich Irrigation well and Bachich Main Well), and it also includes an analysis of recent water level data measured in the Bachich New Well, as provided by Mr. Bachich. The Bachich New Well was drilled in 2018, after the August 2017 testing and the RCS site visits associated with the 2019 WAA, so the effects of the August 2017 testing of Well A could not be assessed on the Bachich New Well. At the time of publication of the 2019 WAA, RCS was not aware of any drilling activity on Mr. Bachich's property between the time of the site visits leading up to the August 2017 testing, and the 2019 publication of that WAA.
   a. Results of the August 2017 pumping test of Well A revealed that after 24 hours of continuous pumping at an average pumping rate of 31 gpm, a final pumping water level of 205.9 ft brp was recorded in Well A. Based on a static water level 170.7 ft brp, a maximum water level drawdown of 35.2 ft was induced in Well A. Results of the Well A pumping test also showed that water levels did not become completely stable at the end of the pumping portion of the aquifer test. Following 24 hours of water level recovery, water levels in the well recovered to a level of 88% of the total drawdown during the testing period. After approximately 4 days, water levels reached 99% of the pre-pumping test levels.

      During the pumping portion of the August 2017, Well A aquifer test, significant water level drawdown impacts were not induced in the onsite New Well or either of the two nearby Bachich wells that existed at the time of the testing. Even if the slight water level decline recorded in the Bachich Main well reported by Mr. Bachich were to have been induced by the pumping of Well A, the amount of drawdown reported (approximately 0.06 ft) is classified as insignificant because it is much smaller than the significance values recommended in the County WAA guidelines (Napa County, 2015). Additionally, as shown on Figure 5, the August 4, 2017, static water level elevation of Well A was significantly lower than the temporally corresponding water level elevations in those two Bachich wells. Well A is separated from the Bachich Irrigation and Bachich Main wells by only 182 ft and 322 ft, respectively. Despite the relatively small distances between these wells, significant differences in water level elevations are exhibited in the available data for the August 2017 testing; this suggests that the wells might be constructed into and draw water primarily from different "compartmentalized" fractured rock aquifers.

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b. For the purposes of this WAA, because of the small distance (137 ft) between Well A and the Bachich New Well, the significant vertical overlap of the casing perforations of these wells, and the lack of higher frequency water level data from Well A for additional water level comparisons, it is assumed that the aquifer system from which Well A can extract water is at least partially connected to the aquifer system accessible to the Bachich New Well.

c. Water level drawdown recorded in the Bachich New Well data provided by Mr. Bachich appears to occur nearly every day throughout the year. Most of the drawdown events are relatively small and were probably caused by pumping of the Bachich New Well. Other less frequent drawdown events are larger, during which water levels in the Bachich New Well fell on the order of roughly 4 to 7 ft over a short period of time. Following both types of events, water level recovery was observed to occur quickly. However, a key observation is that none of the individual water level drawdown events exceeded 8 ft in magnitude. Even if the theoretical assumption is made that the largest of the non-seasonal drawdown events measured in the Bachich New Well were induced entirely by pumping of Well A, the drawdown measured in the Bachich New Well has not exceeded the 10-ft criterion described on Table F-1 of the County WAA Guidelines (Napa County, 2015), which demonstrates compliance with the applicable Tier 2 criteria.

10. A Tier 3 WAA is not necessary for either the proposed winery development because the proposed project well (Well A) is located outside of the County-defined Significant Streams 1,500 buffer areas.

11. RCS recommends initiation of groundwater monitoring at the subject property, in all existing and future onsite wells. This should include the frequent, ongoing monitoring of static and pumping water levels in all onsite wells, and the monitoring of instantaneous flow rates and cumulative pumped volumes from the active onsite pumping wells.

Closure/Disclaimer

This Memorandum regarding RCS's WAA for a proposed winery development project at 1300 Mt. Veeder Road, in Napa, CA, has been prepared for P&M Vineyard Holdings, LLC and applies only to the evaluation of the subject property for the requirements discussed herein. This WAA has been prepared in accordance with the care and skill generally exercised by reputable professionals, under similar circumstances, and in this or similar localities. No other warranty, either express or implied, is made to the conclusions or professional advice presented herein.

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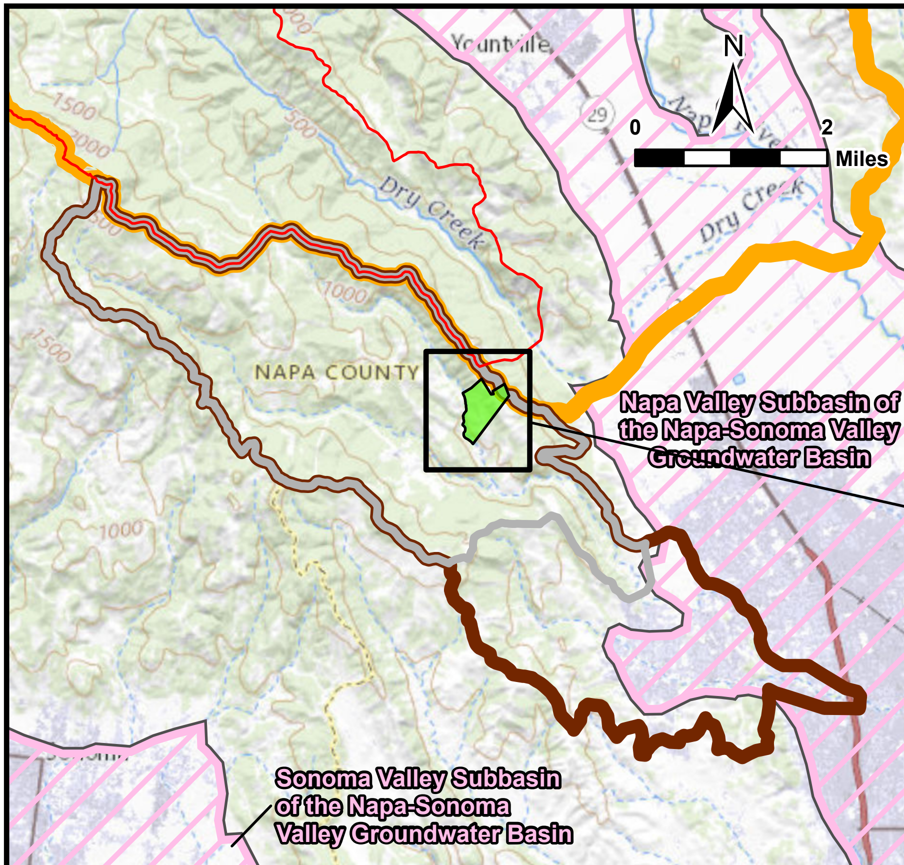
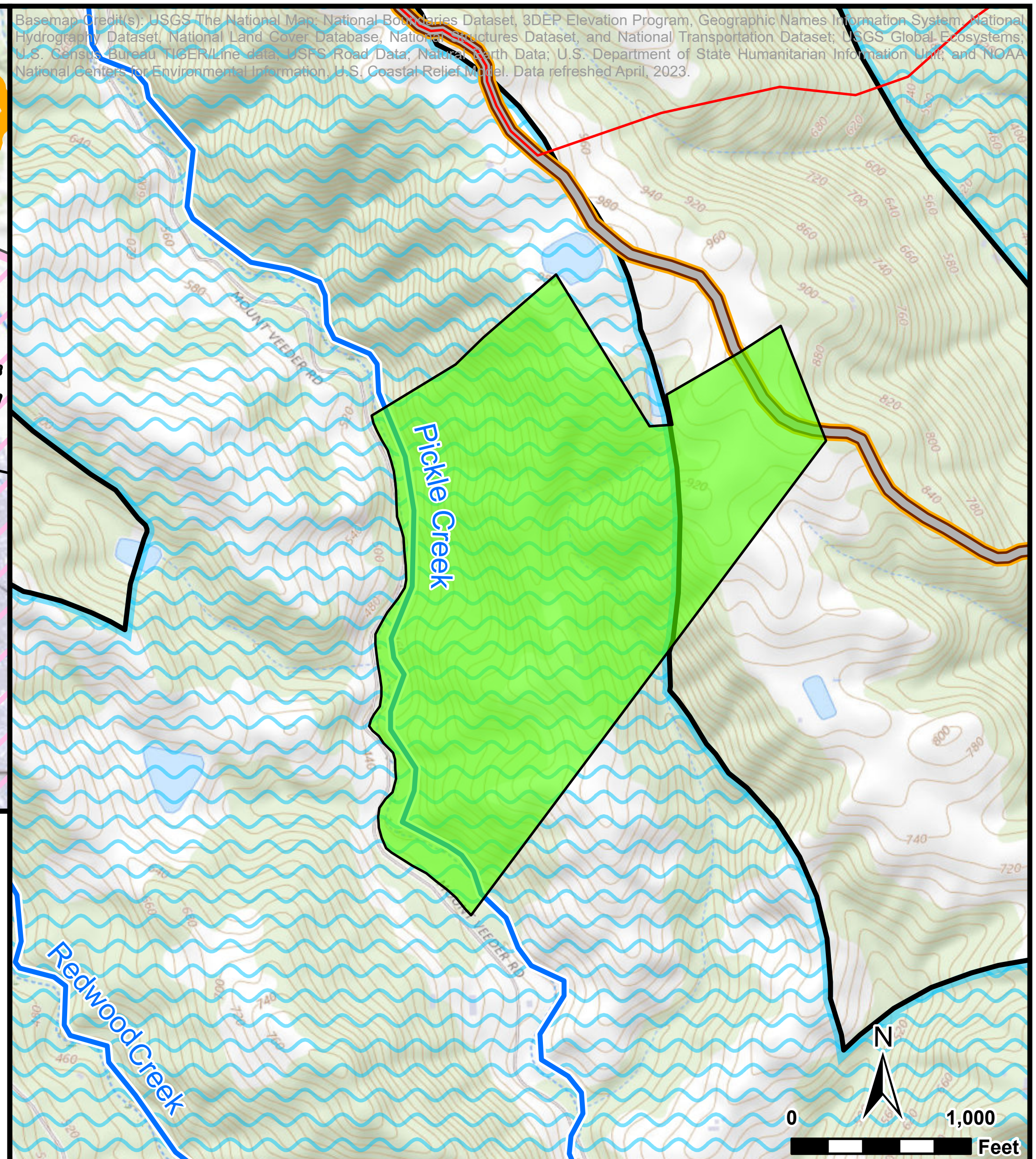
Wagner & Gutierrez, 2017 (Wagner, D.L. and Gutierrez, C.I.). *Preliminary Geologic Map of the Napa and Bodega Bay 30' x 60' Quadrangles, California*. 1:100,000-scale. California Geological Survey.



Watersheds in LSCE & MBK (2013)

- Dry Creek Watershed
- Redwood Creek Watershed
- Napa Creek Watershed at Napa
- Napa River Watershed near Napa

- Subject Property (Munselle Engineering)
- Significant Streams (PBES & LSCE, 2023a)
- Significant Streams 1,500-foot Buffer (PBES & LSCE, 2023b)
- Groundwater Basin (DWR, 2021)



RCS

Figure 1
Regional Map

RCS Job No. 622-NPA04 **March 2024**

Cartographic Presentation by E. Linden. Spatial Reference Name: NAD 1983 StatePlane California II FIPS 0402 Feet.

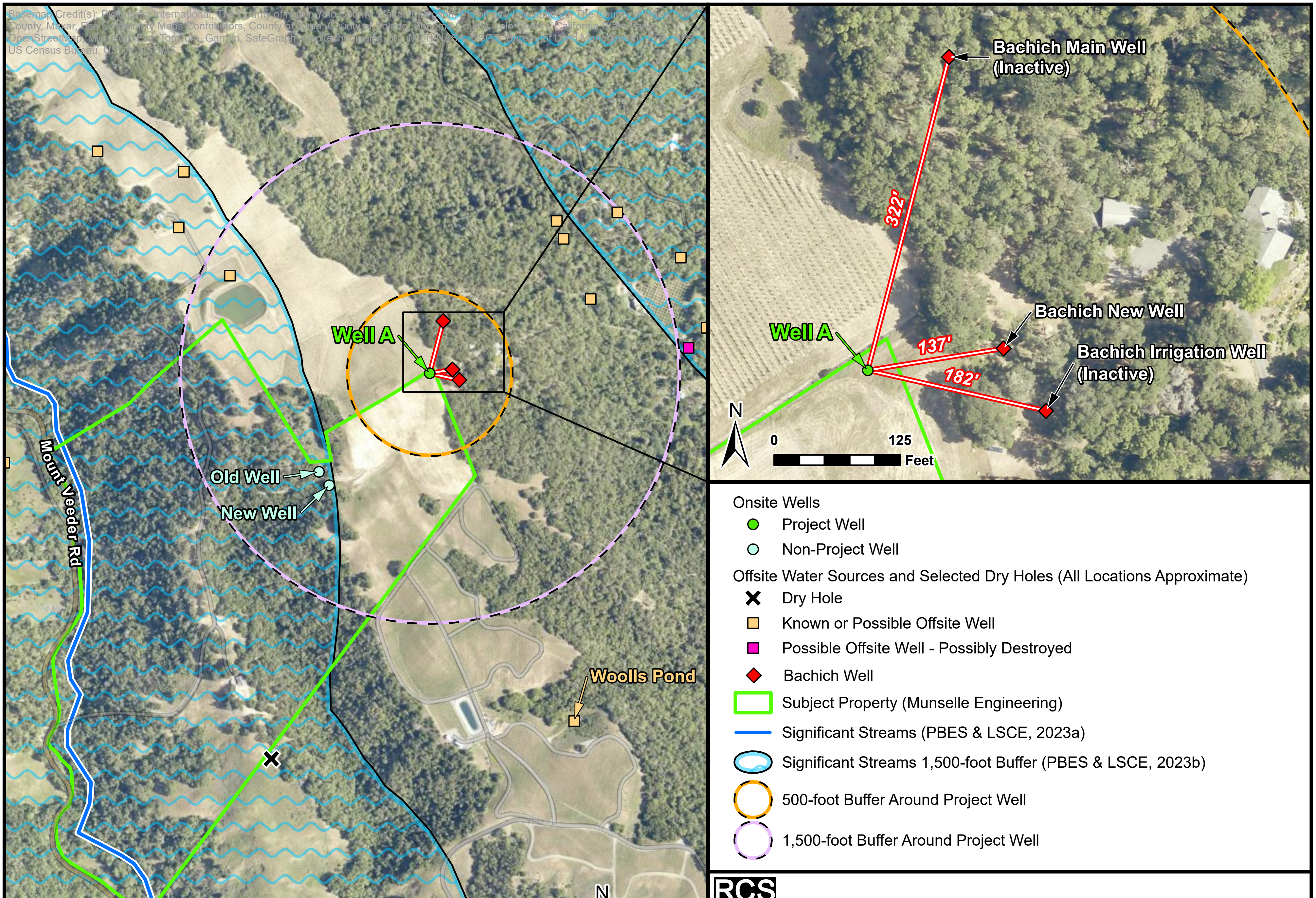
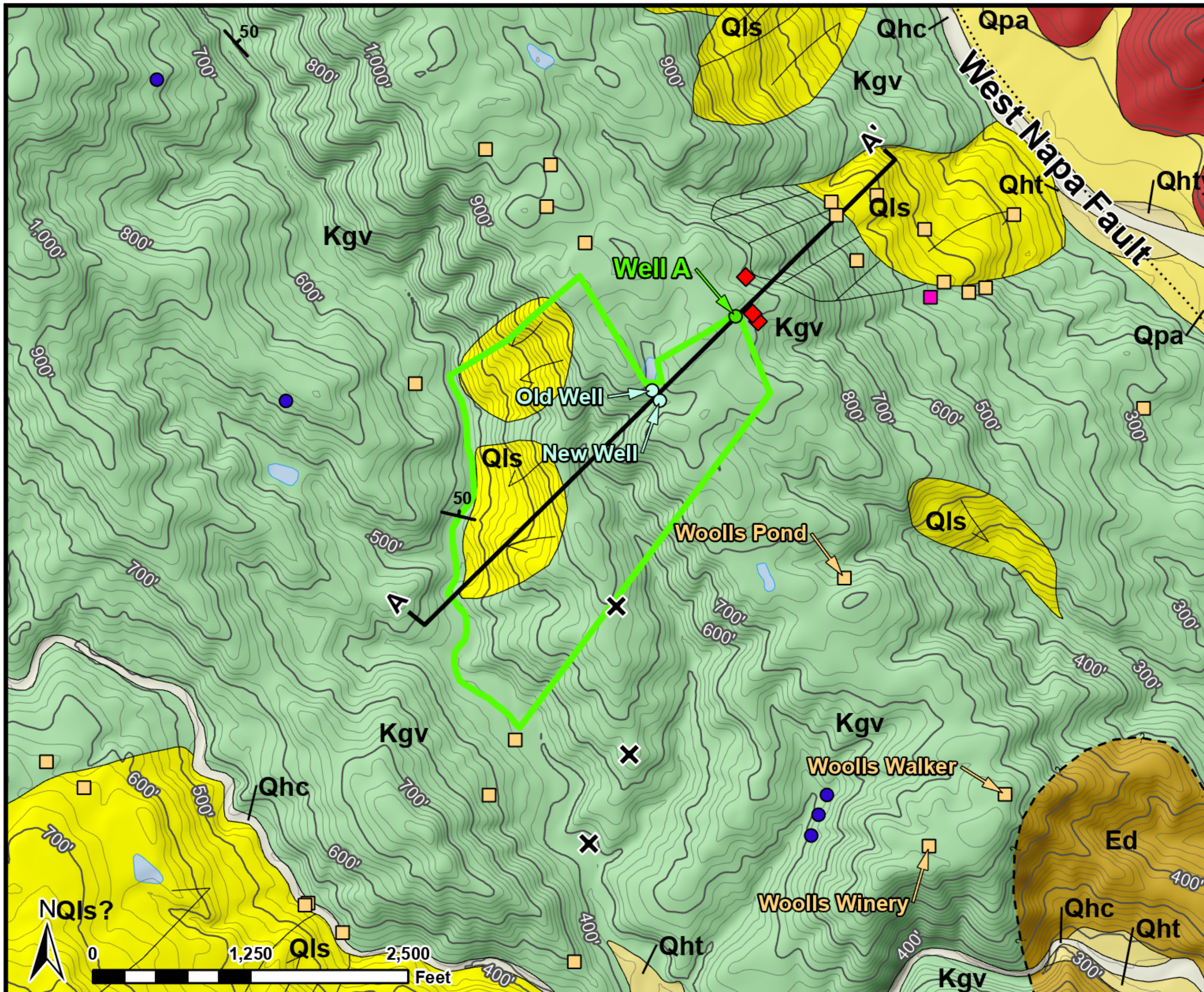


Figure 2
Property Map

RCS Job No. 622-NPA04 **March 2024**

Cartographic Presentation by E. Linden. Spatial Reference Name: NAD 1983 StatePlane California II FIPS 0402 Feet.



Geologic Legend

Recent Sedimentary Deposits

- **Qhc** Stream channel deposits (modern <150 years to late Holocene)
- **Qhty** Stream terrace deposits (latest Holocene)
- **Qht** Stream terrace deposits (Holocene, 10,000 years)
- **Qls** Landslides (Holocene to Pleistocene)
- **Qpa** Alluvium, undivided (latest Pleistocene)

Sonoma Volcanics

- **Psvbsl** Andesite flow breccia of Stags Leap (Pliocene [4.3-4.35 Ma])

Older Sedimentary Rocks

- **Ed** Domengine Sandstone (Eocene)

Great Valley Sequence

- **Kgv** Undivided sedimentary rocks (Cretaceous)

- 50 Bedding orientation, showing dip angle
- Direction of landslide movement
- Landslide scarp
- Geologic contact, certain
- Fault, concealed
- Fault, inferred, queried
- A A' Cross Section Alignment (see Figure 4)

Elevation Contours (Derived from USGS DEM, 2020c)

- 100-foot Contour (NAVD 88)
- 20-foot Contour (NAVD 88)

Geologic map adapted from: Wagner, D.L., & Gutierrez, C.I. (2017). Preliminary Geologic Map of the Napa and Bodega Bay 30' x 60' Quadrangles, California. California Geological Survey.

Onsite Wells

- Project Well
- Non-Project Well
- Subject Parcel Boundary (Munselle Engineering)

Offsite Water Sources and Selected Dry Holes (All Locations Approximate)

- Dry Hole
- Known or Possible Offsite Well
- Possible Offsite Well - Possibly Destroyed
- Known or Possible Spring
- Bachich Well

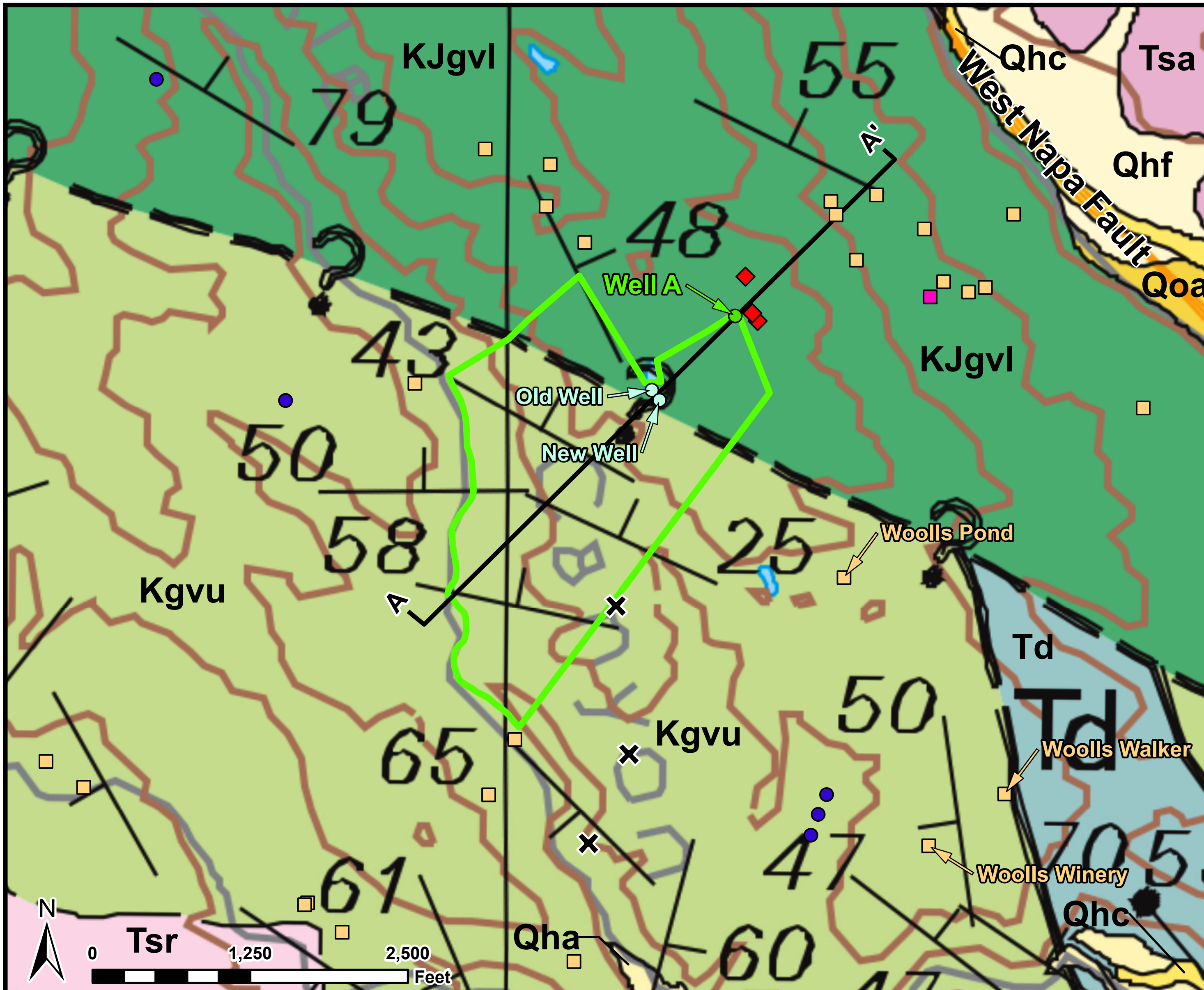
Note: Hillshade basemap derived from USGS DEM (2020c).

RCS

Figure 3A
Geologic Map
(CGS 2017)

RCS Job No. 622-NPA04 **March 2024**

Cartographic Presentation by E. Linden. Spatial Reference Name: NAD 1983 StatePlane California II FIPS 0402 Feet.



Geologic Legend

Recent Sedimentary Deposits

- **Qhc** Stream channel deposits (late Holocene)
- **Qha** Alluvium (Holocene)
- **Qhf** Alluvial fan deposits (Holocene)
- **Qoa** Alluvium (late and early Pleistocene)

Sonoma Volcanics

- **Tsr** Rhyolite flows (Pliocene and late Miocene)
- **Tsa** Andesite to basalt lava flows (Pliocene and late Miocene)

Older Sedimentary Rocks

- **Td** Unnamed sandstone (Eocene and Paleocene)

Great Valley Sequence

- **Kgvu** Sandstone, shale, and conglomerate (Late Cretaceous)
- **KJgvl** Sandstone and shale (Late Cretaceous and Late Jurassic)

Contact—Depositional or intrusive contact, dashed where approximately located, dotted where concealed

Fault—Dashed where approximately located, small dashes where inferred, dotted where concealed, queried where location is uncertain, orange denotes Quaternary-active fault, magenta denotes Holocene active-fault

?

35 Strike and dip of bedding

48 Strike and dip of bedding, top indicator observed

Geologic map adapted from: Graymer, et al., 2007. Geologic map and map database of eastern Sonoma and western Napa Counties, California. US Geological Survey Science Investigations Map 2956.

Onsite Wells

- Project Well
- Non-Project Well
- Subject Parcel Boundary (Munselle Engineering)
- A A' Cross Section Alignment (see Figure 4)

Offsite Water Sources and Selected Dry Holes (All Locations Approximate)

- Dry Hole
- Known or Possible Offsite Well
- Possible Offsite Well - Possibly Destroyed
- Known or Possible Spring
- Bachich Well

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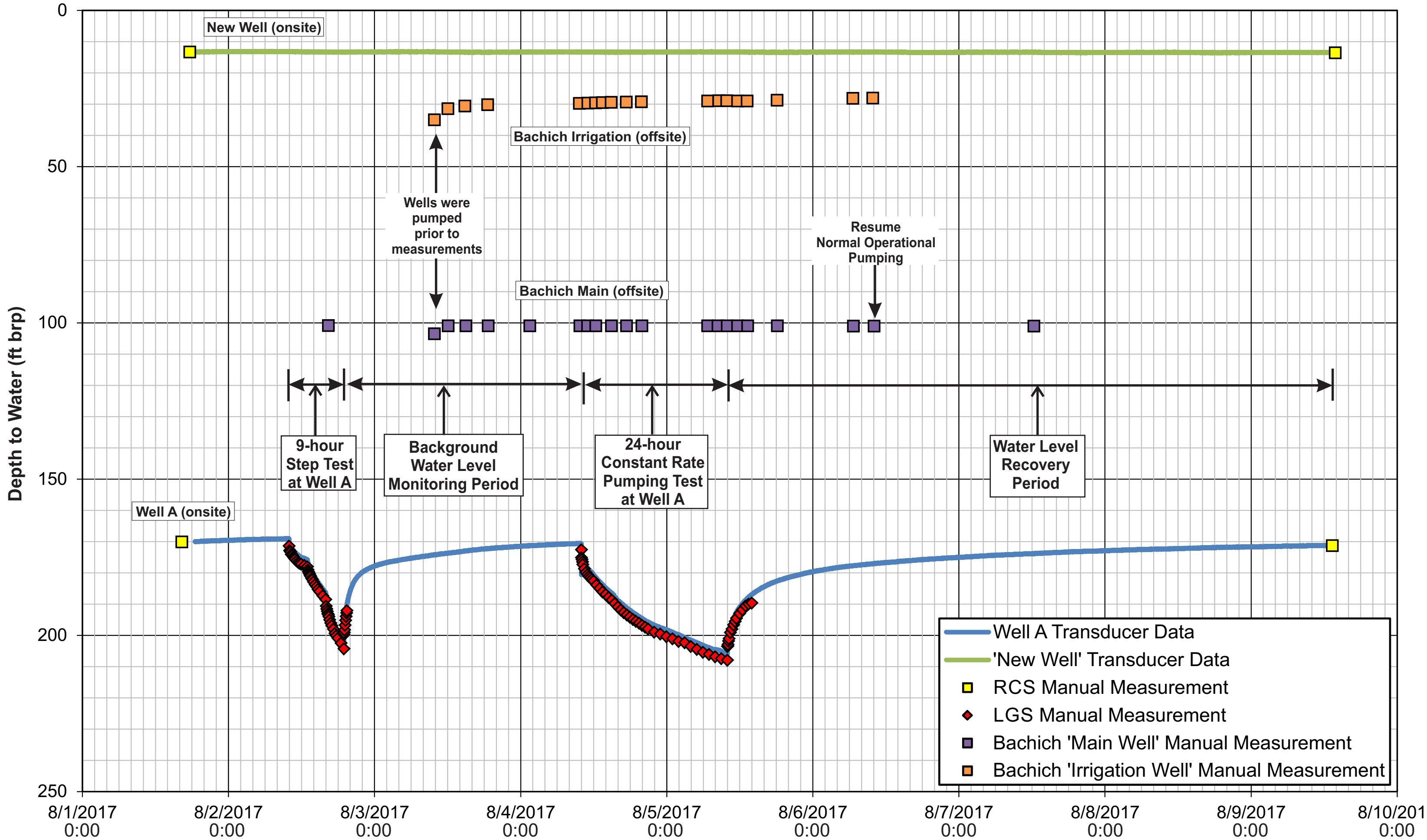
Figure 3B
Geologic Map
(USGS 2007)

RCS Job No. 622-NPA04 **March 2024**

Cartographic Presentation by E. Linden. Spatial Reference Name: NAD 1983 StatePlane California II FIPS 0402 Feet.



Note: Major Divisions on the X-axis represent 1 day;
Minor divisions represent 2 hours

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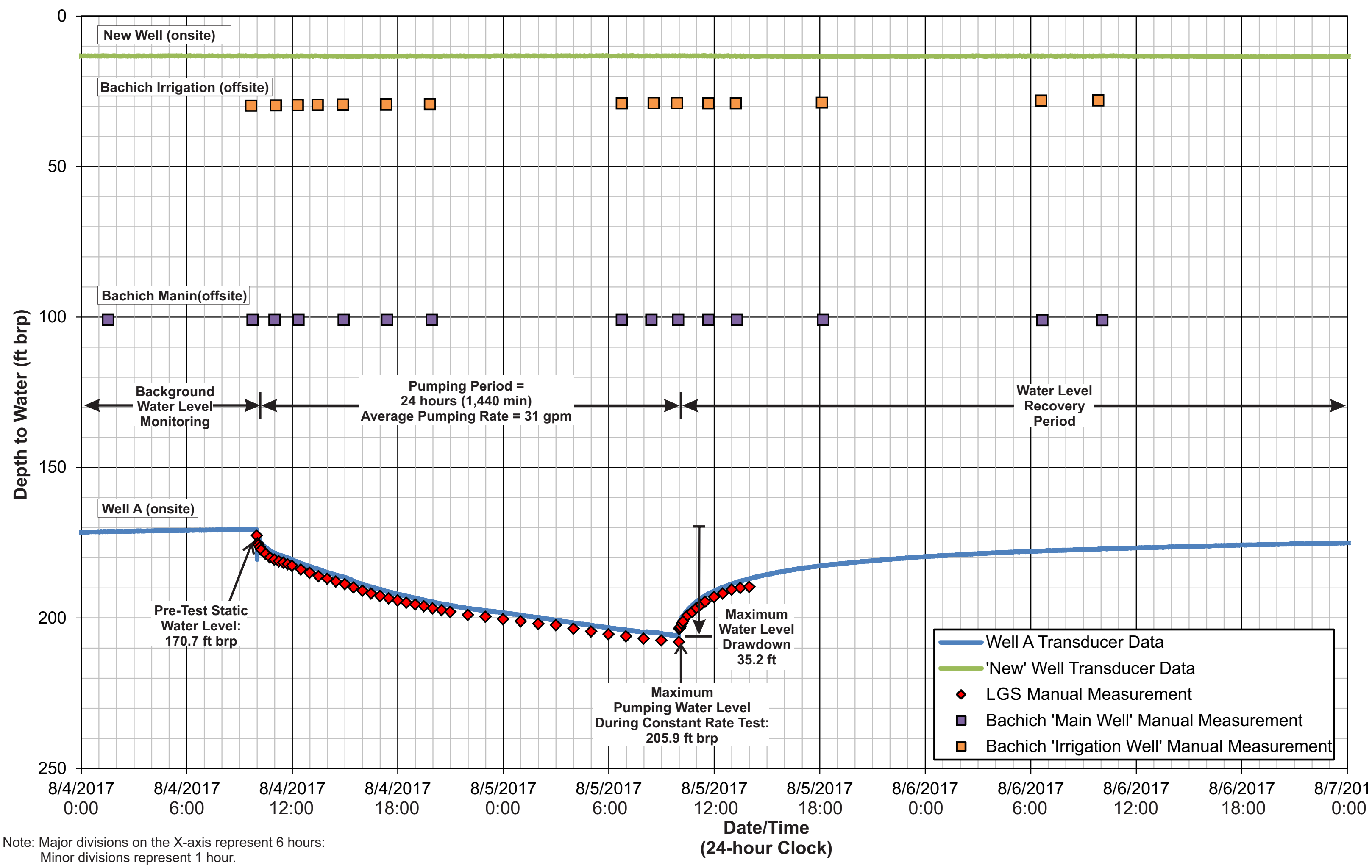
CONSULTING GROUNDWATER GEOLOGISTS
14051 Burbank Blvd., Suite 300
Sherman Oaks, CA 91401
Southern California (818) 506-0418
Northern California (707) 963-3914
www.rcslade.com

Figure 4A
Water Level Data During Aquifer Testing

Job No. 622-NPA04

March 2024



Note: Major divisions on the X-axis represent 6 hours:
Minor divisions represent 1 hour.

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Figure 4B
Water Level Data During Constant Rate Pumping Test of Well A

Job No. 622-NPA04 **March 2024**

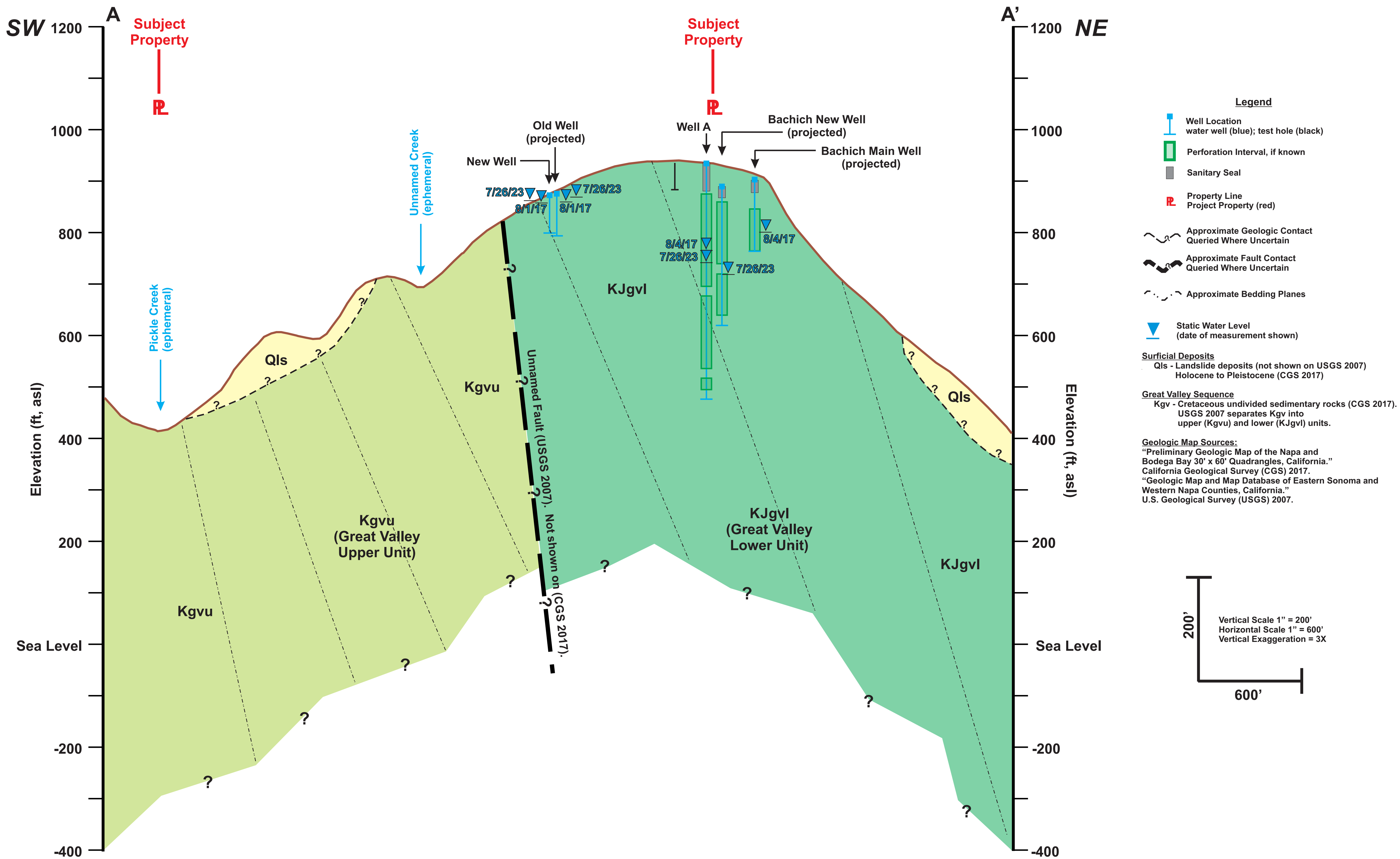

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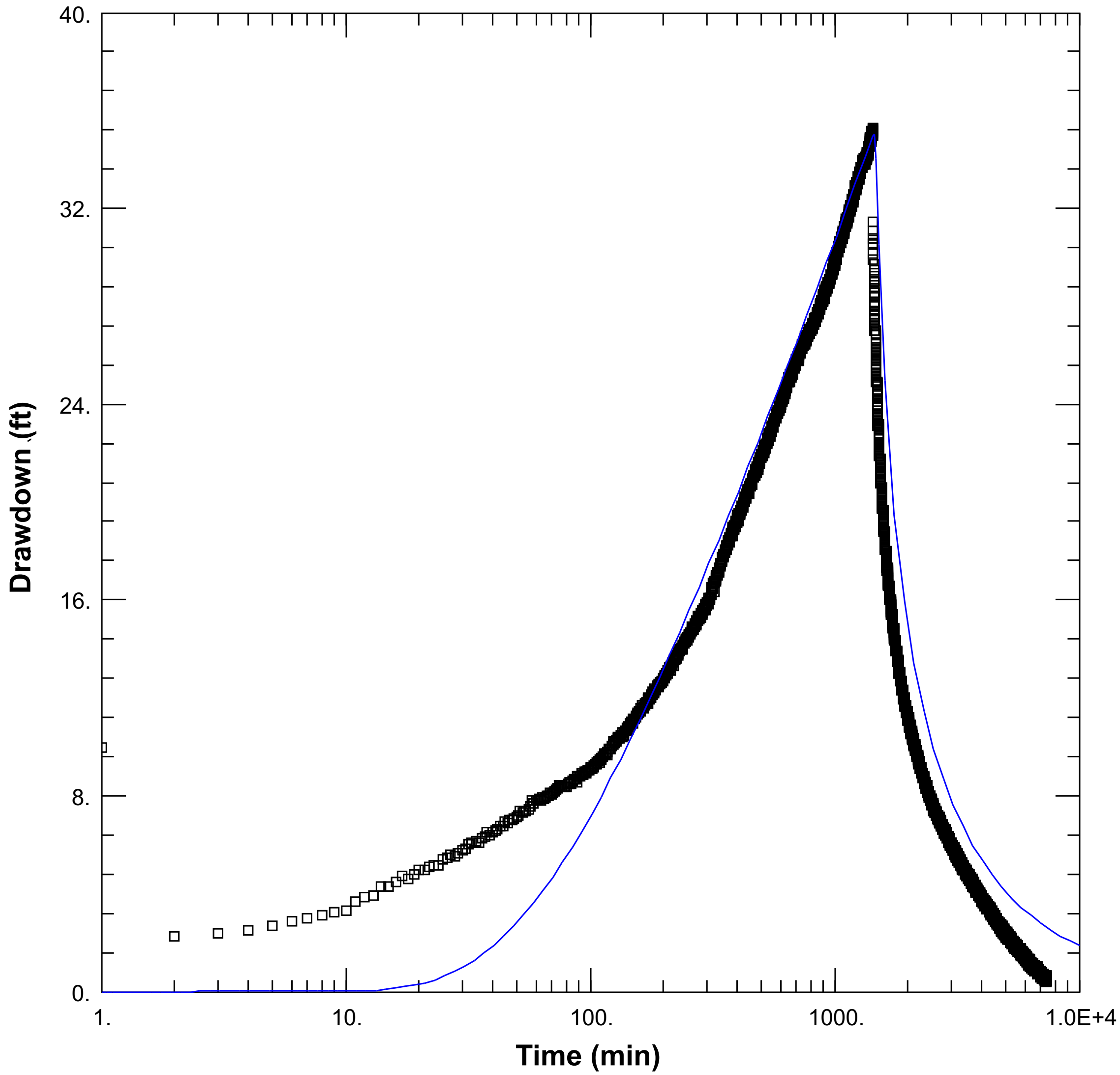
Figure 5
Geologic Cross Section A-A'

Job No. 622-NPA04

March 2024



Obs. Wells

□ Well A (pumping well)

Aquifer Model

Confined

Solution

Theis/Hantush

Parameters

T = 291 gal/day/ft

*A storativity (S) value can only be calculated from the observation well water level data.

Test Date = August 4-5, 2017
(24-hour test)
Pre-Test
Static Water Level = 170.7 ft brp

Average pumping rate = 31 gpm

Graphical Solution by:
AQTESOLV Vers. 4.50 Pro
by Hydrosolve, Inc.

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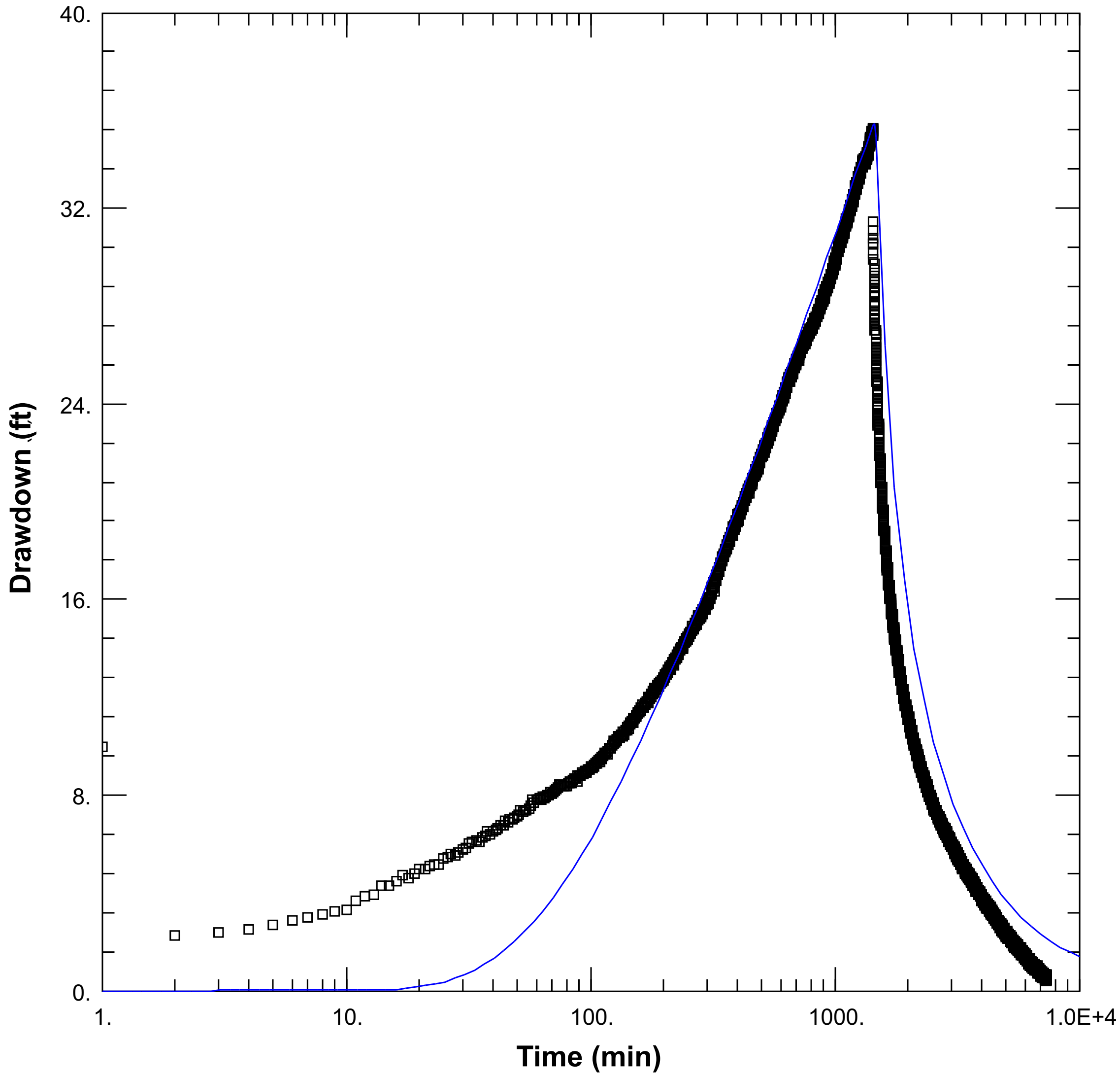
Figure 6A
Constant Rate Pumping Test Analysis
Theis/Hantush Confined Aquifer Solution
Well A (Pumping Well)

Job No. 622-NPA04

March 2024



Obs. Wells

□ **Well A (pumping well)**

Aquifer Model

Leaky

Solution

Hantush-Jacob

Parameters

T = 260 gal/day/ft

***A storativity (S) value can only be calculated from the observation well water level data.**

Test Date = August 4-5, 2017
(24-hour test)
Pre-Test
Static Water Level = 170.7 ft brp

Average pumping rate = 31 gpm

Graphical Solution by:
AQTESOLV Vers. 4.50 Pro
by Hydrosolve, Inc.

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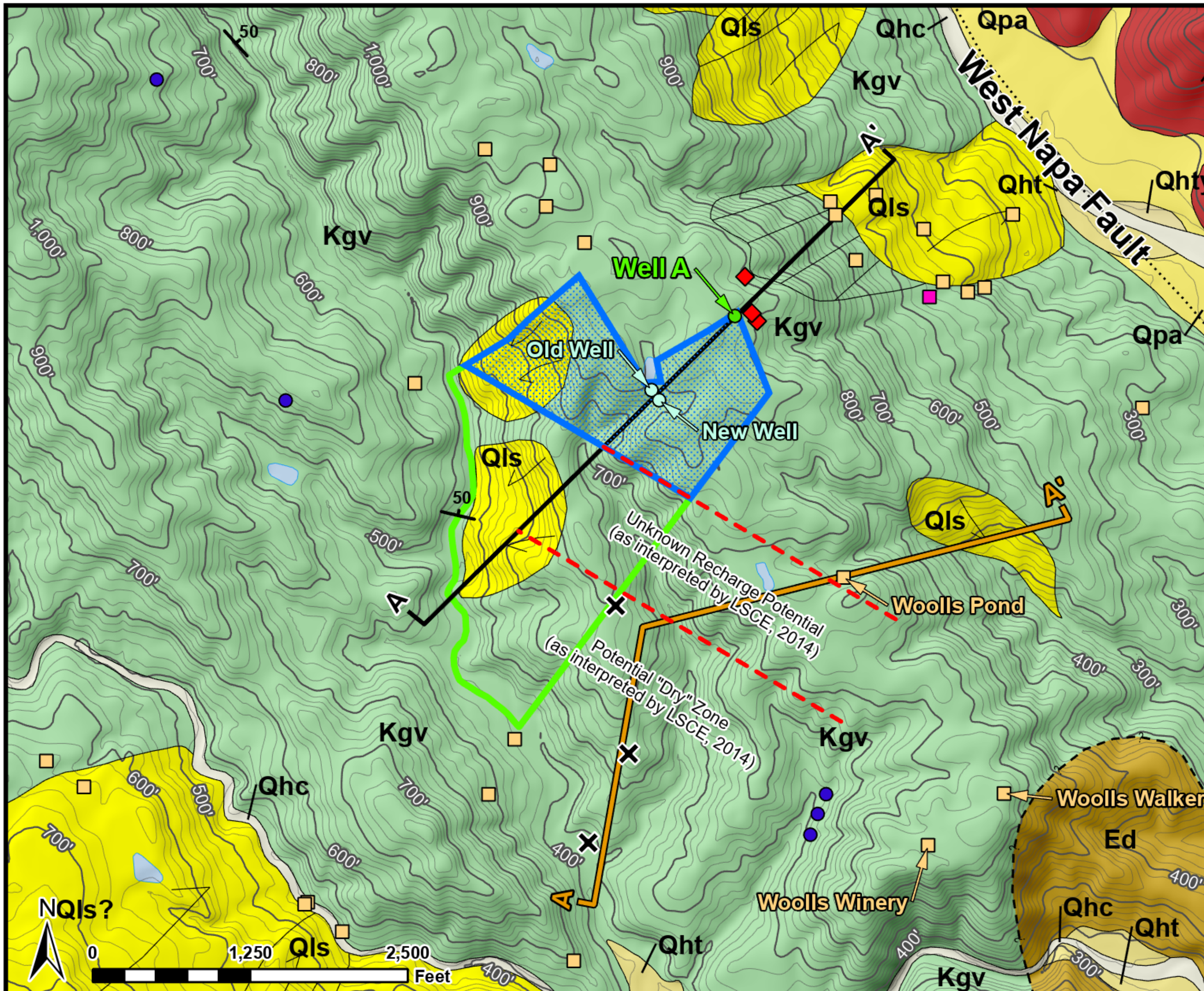
Figure 6B
Constant Rate Pumping Test Analysis
Hantush-Jacob Leaky Aquifer Solution
Well A (Pumping Well)

Job No. 622-NPA04 **March 2024**



Geologic Legend

Recent Sedimentary Deposits

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- 100-foot Contour (NAVD 88)
- 20-foot Contour (NAVD 88)

Geologic map adapted from: Wagner, D.L., & Gutierrez, C.I. (2017). Preliminary Geologic Map of the Napa and Bodega Bay 30' x 60' Quadrangles, California. California Geological Survey.

Onsite Wells

- Project Well
- Non-Project Well
- Conservative Recharge Area
- Subject Parcel Boundary (Munselle Engineering)

Offsite Water Sources and Selected Dry Holes (All Locations Approximate)

- Dry Hole
- Known or Possible Offsite Well
- Possible Offsite Well - Possibly Destroyed
- Known or Possible Spring
- Bachich Well
- A A' Approximate Alignment of Woolls Ranch WAA Cross Section (LSCE, 2014)

Note: Hillshade basemap derived from USGS DEM (2020c).

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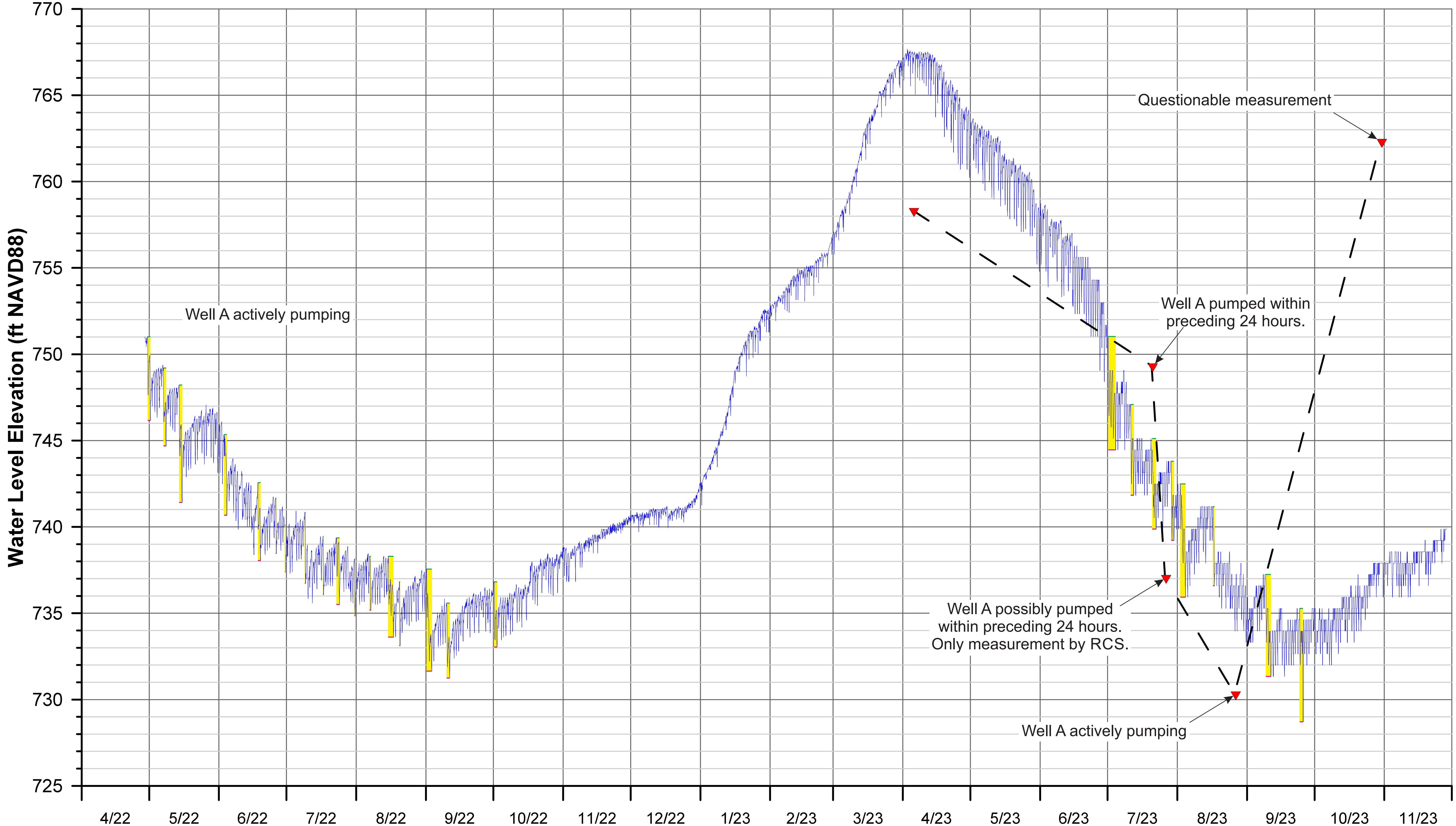
Figure 7
Conservative Recharge Area

RCS Job No. 622-NPA04 March 2024

Cartographic Presentation by E. Linden. Spatial Reference Name: NAD 1983 StatePlane California II FIPS 0402 Feet.



- Well A Measurement.
All recorded by vineyard personnel, except where noted.

Bachich New Well Measurement.
Continuously recorded by meter.me.

ft = feet
brp = below reference point
NAVD 88 = North American Vertical Datum of 1988

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Figure 8
Comparison of Well A and Bachich New Well Water Levels

RCS Job No. 622-NPA04 **March 2024**

Table 1
Summary of Well Construction and Pumping Data

Reported Well Designation	DWR Well Completion Report No.	Date Drilled	Method of Drilling	Pilot Hole Depth (ft bgs)	Casing Depth (ft bgs)	Casing Type	Casing Diameter (in)	Borehole Diameter (in)	Sanitary Seal Depth (ft bgs)	Perforation Intervals (ft bgs)	Type and Size (in) of Perforations	Gravel Pack Interval (ft) and Size	Current Status of Well	Post-Construction Yield Data					
														Date & Type of Yield Data	Duration of "Test" (hrs)	Estimated Flow Rate (gpm)	Static Water Level (ft)	Pumping Water Level (ft)	Estimated Specific Capacity (gpm/ft ddn)
New Well	ND				72	Steel	8	ND					Active	8/2002 Pump	2	22	15	32	1.29
														1/2015 Pump	2	12	13	18	2.40
														10/2016 Pump	8	15	19	37	0.83
Old Well	ND				80	PVC	5	ND					Active	1/2015 Pump	2	6	10	70	0.10
Well A	e0345319	Jun-17	Direct Mud Rotary	500	460	PVC	6	9	52	60-240 260-400 420-440	Factory-Cut Slots 0.032"	52-470 #6 sand	Active	6/2017 Airlift	2	90	164	ND	ND
														8/2017 Pump	24	31	171	206	0.88

Notes: ft bgs = feet below ground surface
SWL = static water level
brp = below reference point, generally top of well head

APPENDIX

STATE WELL COMPLETION REPORT

FOR ONSITE WELL A

AT

1300 MT. VEEDER ROAD PROPERTY

E17-00254 Well WL

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. e0345319

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

Owner's Well No. 1-2017
Date Work Began 6/12/2017, Ended 6/30/2017
Local Permit Agency Napa County Environmental Mgmt
Permit No. E17-00254 Permit Date 6/5/2017

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID BENTONITE

DEPTH FROM SURFACE Ft	to Ft	DESCRIPTION *Describe material, grain, size, color, etc*
0	30	BROWN SHALE & CLAY
30	45	GRAY SHALE
45	46	SANDSTONE
46	54	SHALE
54	70	80% SHALE / 20% SANDSTONE
70	75	SHALE & CLAY
75	85	50% SANDSTONE / 50% SHALE
85	88	HARD FRACTURED SANDSTONE
88	148	85% SHALE / 15% SANDSTONE
148	153	80% HARD SHALE / 20% SANDSTONE
153	159	SANDSTONE
159	175	SHALE & CLAY
175	215	85% SANDSTONE / 15% SHALE
215	235	90% SHALE / 10% SANDSTONE
235	300	80% SHALE / 20% CLAY
300	360	95% HARD SHALE / 5% CLAY
360	367	HARD SHALE
367	400	SHALE & CLAY
400	407	SHALE & SANDSTONE
407	438	SHALE & CLAY W SANDSTONE STRINGERS
438	440	SHALE & CLAY
440	500	SHALE & CLAY W SANDSTONE STRINGERS
		CONTINUED CASING LAYOUT
400	420	BLANK PVC 6"
420	440	SCREEN PVC 6" 032 SLOT
440	460	BLANK PVC 6"

TOTAL DEPTH OF BORING 500 (Feet)
TOTAL DEPTH OF COMPLETED WELL 460 (Feet)

WELL OWNER

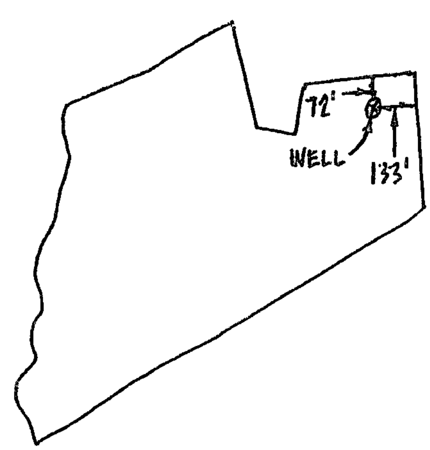
Name P & M Vineyards Holdings, LLC
Mailing Address P.O. Box 1480
Sebastopol CA 95473
CITY STATE ZIP

WELL LOCATION

Address 1300 Mt. Veeder Road
City Napa CA
County Napa
APN Book 034 Page 230 Parcel 029
Township ___ Range ___ Section ___
Latitude ___ DEG MIN SEC Longitude ___ DEG MIN SEC

LOCATION SKETCH

NORTH



SOUTH
WEST
EAST

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 45 (Ft) BELOW SURFACE 1
DEPTH OF STATIC WATER LEVEL 164 (Ft) & DATE MEASURED 6/30/2017
ESTIMATED YIELD * 90 (GPM) & TEST TYPE AIR LIFT
TEST LENGTH 2 (Hrs) TOTAL DRAWDOWN N/A (Ft)
May not be representative of a well's long-term yield

CASING (S)

DEPTH FROM SURFACE Ft	to Ft	BORE-HOLE DIA (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	85	12								
85	500	9								
0	60		✓				PVC F480	6	SDR-21	
60	240			✓			PVC F480	6	SDR-21	.032
240	260		✓				PVC F480	6	SDR-21	
260	400			✓			PVC F480	6	SDR-21	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft	to Ft	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	52	✓			10 SK SAND
52	470			✓	#6 SAND
470	500			✓	CUTTINGS

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 HUCKFELDT WELL DRILLING, INC
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
2110 Penny Lane Napa CA 94559
ADDRESS CITY STATE ZIP
Signed [signature] 07/06/17 439-746
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