Exhibit F

MEMORANDUM

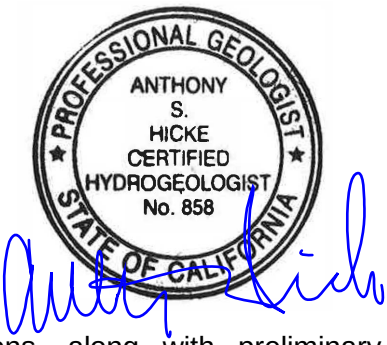
March 17, 2022

To: Mr. Mike Muelrath
Applied Civil Engineering, Inc. (ACE)
2074 West Lincoln Avenue
Napa, California 94558
Sent via email (mike@appliedcivil.com)

Job No. 746-NPA02

From: Geza Demeter, Anthony Hicke, and Richard C. Slade
Richard C. Slade & Associates LLC (RCS)

Re: Results of Napa County Tier 1 Water Availability Analysis
Red Dirt Grapes Vineyard Development Project
Napa County APNs 032-560-038 & 032-030-071
Vicinity Pritchard Hill, Napa County, California



Introduction

This Memorandum presents the key findings and conclusions, along with preliminary recommendations, regarding the Water Availability Analysis (WAA) prepared by RCS for the proposed new vineyard development at the Red Dirt Grapes property in Napa County (County), California. This document was prepared by RCS to provide conformance with Napa County Tier 1 requirements, as described in the County WAA Guidelines (WAA, 2015).

The Red Dirt Grapes property (referred to herein as the "subject property") is comprised by 54.7 acres and is located at 275 Long Ranch Road, in the vicinity of Pritchard Hill in Napa County. Figure 1, "Location Map", shows the boundaries of the subject property superimposed on a USGS topographic map. Property boundaries shown on Figure 1 were adapted from the County Assessor's parcel data, which are freely available on the County GIS website. Also shown on Figure 1 are the approximate locations of the two existing onsite water-supply wells (known herein as Well 1 and Well 2), and the locations of several known nearby, but offsite wells owned by others. Please note that the known offsite well locations shown on the figures herein are not intended to be an all-inclusive map showing all nearby offsite wells owned by others. These known offsite wells have been identified either by our field visit, via our driller's log research, or during past work for other projects in the region. Hence, other offsite wells may exist in the vicinity of the subject property. Figure 2, "Aerial Photograph Map", shows the same property boundaries and well locations that are illustrated on Figure 1, but the basemap for Figure 2 is an aerial photograph of the area, which was obtained using the ArcGIS Pro software package.

As reported by the project engineer, Applied Civil Engineering, Inc. (ACE) of Napa, California, the 54.7-acre subject property is currently developed with Well 1 and Well 2, four water tanks, access roads, and utilities. In addition, vineyards are currently under development on the portions of the

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property with less than 5% ground slope, but are not yet planted. Current water demands for the subject property are considered to be those extractions from Well 2 via a water easement with the neighboring Ovid Winery for their winery supply purposes, and extractions from Well 1 for domestic supply to a residence on the southern portion of the Ovid Winery property.

RCS understands the proposed project is to develop approximately 25 acres of new vineyards. (These 25 acres includes the vines currently under development on areas of the property with less than 5% slope). For this project, the future water demands for the new vineyards are proposed to be met using groundwater pumped from existing Well 1.

As part of the permit submittal for the proposed new vineyard project, a WAA is required by the County. The basic purpose of this Memorandum is to comply with the County's WAA guidelines for a "Tier 1" WAA (i.e., a Groundwater Recharge Estimate); those guidelines were promulgated by the County in May 2015. Because there are no known offsite wells located with 500 feet (ft) of Well 1 (the project well), County requirements for a "Tier 2" WAA analysis (i.e., a Well Interference Evaluation) have been "presumptively met" per the WAA Guidelines. A Tier 3 WAA analysis is also not required for this project. As shown on Table 1 of the WAA Guidance document (pg. 7, WAA, 2015) Tier 3 analyses are not required for projects in "All Other Areas", with the caveat that "Further analysis may be required under CEQA if substantial evidence, in the record, indicates a potentially significant impact may occur from the project." The project is located in an area considered to be "All Other Areas" by the WAA guidelines, and RCS is not aware of any substantial evidence in the record related to groundwater/surface water interaction.

Site Conditions

From RCS data review work and field reconnaissance visits to the subject property on November 18 and December 1, 2021, the following key items were noted and/or observed (refer to Figures 1 and 2):

a. The subject property is comprised by two contiguous parcels having County Assessor's Parcel Numbers (APN) of 032-560-038 (the northern parcel) and 032-030-071 (the southern parcel). The total assessed area of the subject property is 54.7 acres.

b. The subject property is situated within the foothills on the eastern side of Napa Valley, and south of Pritchard Hill. Based on the topographic contours illustrated in Figure 1, much of the subject property slopes moderately to the west-northwest.

c. Currently, the subject property is developed with Well 1 and Well 2, four water tanks, access roads, and utilities. Portions of the property with slopes less than 5% are currently being developed with vineyards, but are not yet planted.

d. Offsite areas surrounding the subject property are developed primarily with their own respective residences and vineyards. Naturally vegetated and/or wooded hillsides (i.e., undeveloped areas) were also observed farther offsite to the south.

e. As shown on Figures 1 and 2, both existing active water wells are located in the southernmost parcel of the subject property. As reported by ACE, Well 1 was historically used by the neighboring Ovid Winery for winery supply purposes. As part of parcel boundary reconfiguration and sale of a portion of the OVID property, Well 2 was constructed and dedicated to the Ovid Winery uses via a water easement. Hence,

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Well 2 is now the easement well, and is used to supply groundwater to the by the neighboring Ovid Winery (to the west of the subject property) for winery supply purposes. Currently, Well 1 is utilized for domestic-supply purposes for a residence located south of the subject property; the neighboring property has been sold and is being developed. That development includes a new well (not on the subject property). Once online, the new well will serve that residence, and no water from the onsite Well 1 will be delivered to the neighboring property. No other onsite wells were observed by the RCS groundwater geologist during the site visits.

f. During the site visit, an RCS groundwater geologist also traveled along the roads in the area surrounding the subject property in attempt to identify the possible locations and/or existence of nearby but offsite wells owned by others.

   RCS geologists also reviewed the County Planning, Building, and Environmental Service (PBES) electronic document retrieval website, in an attempt to acquire Well Completion Reports (WCRs, also known as driller's logs) that might exist for the onsite wells, including the wells located on those neighboring properties. In addition, RCS geologists also used the California Department of Water Resources (DWR) online Well Completion Report website to download driller's logs for the onsite wells and wells within the immediate vicinity of the subject property. As a result of those inquiries, a few driller's logs were obtained for wells historically constructed in the area.

   Figures 1 and 2 show the approximate locations of known, reported, and/or inferred nearby offsite wells surrounding the subject property, as determined from the field reconnaissance and well log research. None of these mapped, known offsite wells appear to lie to within 500 ft of the two existing active onsite wells. The nearest currently known offsite well to Well 1 is approximately 835 ft to the northeast, whereas the nearest known offsite well to Well 2 lies about 825 ft to the southwest.

Key Construction and Testing Data for Existing Onsite Wells

A DWR Well Completion Report was downloaded from the PBES website for Well 1 and is represented by Log No. 739711, a copy of which is appended to this Memorandum. Limited construction information for Well 2 was retrieved from the DWR online database, including the driller's log number (No. WCR2016-006080), however a copy of the driller's log was not available. Table 1, "Summary of Well Construction and Testing Data", provides key well construction data, groundwater airlifting data, and pumping data that are currently available for the two onsite wells.

Well Construction Data – Well 1

Key data listed on the available driller's log for Well 1 and/or identified during the site visit include:

a. Well 1 was drilled and constructed in February 2001 by Huckfeldt Well Drilling of Napa, California, using the direct air rotary method.

b. The pilot hole (the borehole drilled before the well casing was placed downwell) was reported to have been drilled to a depth of about 740 ft below ground surface (bgs). No geophysical electric log survey was conducted in the open pilot borehole for this well.

c. The borehole was cased with polyvinyl chloride (PVC) well casing having an inner diameter (ID) of 8 inches; the total casing depth of Well 1 is reported to be 736 ft bgs.

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d. Casing perforations for Well 1 are reportedly factory-cut slots having a slot opening width of 0.032 inches (32-slot). Perforations in this well were placed between the depths of 476 ft to 556 ft bgs and 636 ft and 716 ft bgs.

e. The gravel pack material listed on the driller's log is reported to be "#6 sand," and it was placed in the annular seal between the depths of 53 ft and approximately 725 ft bgs.

f. Well 1 is reportedly constructed with a concrete sanitary seal in the annular space from ground surface to 53 ft bgs.

Summary of Initial "Test" Data for Well 1

The driller's log for Well 1 provided the original post-construction static water level (SWL), and the original airlift test rate (as shown on Table 1), as follows:

- The initial SWL, following completion of well construction, was reported to be 431 ft bgs on March 2, 2001.
- The reported maximum airlift flow rate during initial post-construction airlifting operation in Well 1 was estimated by the driller to be 125 gallons per minute (gpm). As a rule of thumb, RCS groundwater geologists estimate that the typical operational pumping rates for a new well equipped with a permanent pump are on the order of only about one-half or less of the airlifting rate reported on a driller's log.
- A water level drawdown value was not (and could not) be provided on the driller's log, because water level drawdown cannot be measured during airlifting operations; thus, the original post-construction specific capacity[1] value for Well 1 cannot be calculated from the data on the available driller's log.

Pumping Test Data by Others for Well 1

On March 22, 2017, an 8-hour constant rate pumping test of Well 1 was performed by Ray's Well Testing Service, Inc. (RWTS) of Sebastopol, California. Testing of the well was performed using the permanent pump that existed at the time of testing; details regarding the depth of the permanent pump or the power rating of the pump were not recorded by the RWTS pumper at the time of the pumping test. The 8-hour pumping test was performed at a final flow rate of 75 gpm. Figure 3, "Water Level Data During Constant Rate Test by Others", shows the water level changes in Well 1 during that constant rate pumping test, as monitored by RWTS. A copy of the testing report form RWTS is provided in the Appendix to this document. Key data available from the constant rate pumping test by RWTS include:

- All water level data collected during the test were reportedly measured using an air-line device (referred to as an "air tube" in the RWTS documents).
- A SWL of 461 ft below the reference point (brp) was recorded by the pumper before the test began.
- Based on the reported pumping rates by the pumper, the well was initially pumped at a rate of 75 gpm and this rate remained the same for the duration of the pumping test.

[1] Specific capacity, in gallons per minute per 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 ddn) created in the well while pumping at that rate.

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- A maximum pumping water level (PWL) of 466.6 ft brp was reported by the pumper at the end of the continuous 8-hour pumping period; this represents a maximum water level drawdown of 4.7 ft at the end of the test.
- Based on the final pumping rate of 75 gpm, the specific capacity of Well 1 is calculated to have been 16 gpm/ft ddn at the time of testing.

Well Construction Data – Well 2

Key data listed on the DWR website[2] for Well 2 and/or identified during the site visit include:

a. Well 2 was drilled and constructed in August 2016 by Pulliam Well Exploration, Inc. of Napa, California, using the direct air rotary method.

b. The pilot hole was reported to have been drilled to a depth of about 678 ft bgs. A geophysical electric log survey was not conducted in the open pilot borehole for this well.

c. The borehole was cased with 8-in. ID PVC well casing, with a steel upper casing at ground surface; the total casing depth of Well 2 is reported to be 678 ft bgs.

d. Casing perforations for Well 2 are reportedly between the depths of 478 ft and 678 ft bgs. Information regarding the slot size of the casing perforations was not provided.

e. No data are available for the gradation of the gravel pack installed in the annular space. This pack was placed between the depths of 52 ft and approximately 678 ft bgs.

f. Well 2 is reportedly constructed with a concrete sanitary seal in the annular space from ground surface to 52 ft bgs.

Summary of Initial "Test" Data for Well 2

Data provided by the DWR website for Well 2 for the original post-construction SWL, and the original airlift test rate (as shown on Table 1), are as follows:

- The initial SWL, following completion of well construction, was reported to be 440 ft bgs in August 2016.
- The reported maximum airlift flow rate during initial post-construction airlifting operation in Well 2 was estimated by the driller to be 40 gpm.
- As previously noted, "water level drawdown" value was not provided on the DWR's website, because water level drawdown cannot be measured during airlifting operations; thus, the original post-construction specific capacity value for Well 2 cannot be calculated from the data provided on the DWR website.

[2] As mentioned above, the actual printed driller's log for Well 2 could not be located by RCS in County files, or in the online DWR database. However, RCS located a permit application for the drilling of the well in the Napa County files. Using the historic APN for the property shown on the permit, RCS correlated that to the APN information shown in the DWR database website. Further, the well depth shown on a pumping test data sheet (described herein) also correlated with the well depth shown on the DWR database. RCS therefore has a relatively high degree of certainty that the information discovered on the DWR website correlate to onsite Well 2, but there could be errors in the information.

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Pumping Test Data by Others for Well 2

A step drawdown pumping test and a constant rate pumping test were performed in Well 2 on October 6 and October 7, 2016, respectively, by RWTS. These tests were performed using a 10-horsepower temporary test pump that was installed at the time of testing by RWTS to a depth of approximately 588 ft brp. Water levels and pumping rates were measured and recorded by the RWTS pumper during the pumping test. Figure 4A, " Water Level Data During Step Drawdown Test by Others", and Figure 4B, "Water Level Data During Constant Rate Test by Others", illustrate the water level changes in Well 2 during the 6-hour step drawdown test and the 8-hour constant rate pumping test, respectively. Water level data for both tests were collected by RWTS personnel using an electric tape water level sounder[3]. Basic details of these pumping tests include the following:

- *Step Drawdown Test*

  Pumping for the step drawdown test of Well 2 was performed by RWTS on October 6, 2016, via a 6-hour, three-point step drawdown test. For this test, Well 2 was pumped continuously at the nominal pumping rates (or steps) of 15, 30, and 45 gallons per minute (gpm); all three steps were separately pumped for two hours each. The following summarizes the key data collected by RWTS during the step test for Well 2:

  - Prior to turning on the pump, an initial pre-test SWL of 435.5 ft brp was recorded manually by the pumper.
  - Reported pumping rates for Step Nos. 1, 2, and 3 were calculated to be 15, 30, and 45 gpm, respectively. As stated above, each step was pumped continuously for 2 hours (120 minutes); the pump was not turned off between each of the pumping steps.
  - PWLs measured at the end of each step rate were 444.7 ft, 447.0 ft, and 449.3 ft brp, for Step Nos. 1 through 3, respectively. These pumping levels resulted in short-term water level drawdowns in this well ranging from 9.2 ft to 13.8 ft.
  - Short-term specific capacities for the step test rates ranged from 1 gpm/ft ddn at a pumping rate of 15 gpm (Step No. 1), to 3.3 gpm/ft ddn at a pumping rate of 45 gpm (Step No. 3). Thus, the short-term specific capacity value increased during each successive step test rate.

- *Constant Rate Pumping Test*

  The constant rate pumping test portion of the aquifer test for Well 2 was performed by RWTS on October 7, 2016 for approximately 8 continuous hours (480 minutes) and at a reported constant pumping rate of 50 gpm. Figure 4B graphically illustrates the water levels as recorded occasionally by manual measurements taken by the RWTS pumper during the constant rate pumping test period. Below is a summary of the water level data collected by RWTS from Well 2 during the pumping portion and the water level recovery portion of the constant rate pumping test:

[3] Email communication with Nick Brasesco, Ray's Well Testing Service, March 2022

- A SWL of 435.5 ft brp, recorded by the RWTS pumper prior to the start of the constant rate test, shows that the well had fully recovered to the pre-step test static water level approximately 14 hrs after the end of the step drawdown test.
- A maximum PWL of 450.6 ft brp was measured at the end of the 8-hour period of continuous pumping; this represents a maximum water level drawdown of 15.1 ft at the end of the test. The data show that water levels were stable throughout the pumping test. The maximum PWL at the end of the test was reported to be 137.4 ft above the pump intake depth of 588 ft bgs.
- A constant pumping rate of 50 gpm was reported by RWTS for the 8-hour test. Based on this pumping rate, and the total water level drawdown of approximately 15.1 ft, the specific capacity of Well 2 is calculated to be approximately 3.3 gpm/ft ddn at the time of this RWTS test in October 2016.
- Following the end of the pumping test, water levels recovered to a SWL depth of 435.5 ft brp as recorded by the RWTS pumper on October 10, 2016, signifying a complete water level recovery after a period of approximately 66 hours of non-pumping.

- *Final Wellblend Groundwater Sampling Results*

  Near the end of the step drawdown test, a suite of wellblend water quality samples were collected by the RWTS pumper from Well 2. The sample containers were delivered to Analytical Sciences of Petaluma, California for analysis of general mineral and inorganic (metal) constituents. Table 2, "Results of Laboratory Analysis of Groundwater Quality Samples", summarizes water quality data from laboratory analyses of those groundwater samples a copy of the laboratory report is appended to this Memorandum. The following provides a summary of the analysis results:

  - General Mineral Analyses: Each of the listed constituents was detected at a concentration below its respective current State Water Resources Control Board (SWRCB), Department of Drinking Water (DDW) and the United States Environmental Protection Agency (EPA) respective Primary and/or Secondary Maximum Contaminant Levels (MCLs) or SWRCB Notification Level (NL), as applicable, for water to be used for domestic-use purposes.
  - Inorganic (Trace Element) Constituents: Each of the listed trace elements (inorganic chemicals) was detected below its respective MCL or NL for domestic use. Notably, boron was also reported as "Not Detected;" elevated concentrations of boron are known to be injurious to vine health.

Well Data from Site Visit

As discussed above, site visits to the subject property were performed by an RCS groundwater geologist on November 18 and December 1, 2021. The following information for the onsite wells was collected from those site visits:

g. Well 1 was observed to be equipped with a permanent pump, but the well was not being actively pumped at the time of the site visits. Several attempts to measure a SWL in Well 1 by the RCS groundwater geologist were unsuccessful as a result of some sort of downwell blockage encountered at about 496 ft brp. It is therefore

possible that the depth of the water level in the well at that time was deeper than 496 ft. It is also possible that the sounder became stuck at a shallower depth and allowed the sounding cable to pile around the blockage. At the time of the RCS site visits, Well 1 was observed to be equipped with a totalizer flowmeter device near the wellhead, which displayed a reading of 3,975,555 gallons on December 1, 2021.

- Well 2 was observed to be equipped with a permanent pump, but the well was not being actively pumped at the time of the site visits. An access port through the existing secure wellhead was not available to permit installing an electronic tape measuring device inside the well, and therefore, no water level measurement was possible. At the time of the RCS site visits, a totalizer flowmeter device was not observed near the wellhead of Well 2.

Local Geologic Conditions

Figure 5, "Geologic Map", illustrates the types, lateral extents, and boundaries between the various earth materials mapped at ground surface in the region by others. Specifically, Figure 5 has been adapted from the results of regional geologic field mapping of the Yountville quadrangle, as published by the California Geological Survey (CGS) in 2005. As shown on Figure 5, the key earth materials mapped at ground surface in the area, from geologically youngest to oldest, include the following:

a. Landslide deposits. Landslide deposits[4] (map symbol Qls) have been mapped in the region by others (see the yellow-colored areas on Figure 5). Arrows within these mapped landslide areas show the general direction of downslope movement within each landslide mass. Landslide areas do not occur on the subject property but are instead shown on Figure 5 to be exposed offsite to the north-northwest.

b. Sonoma Volcanics. The Sonoma Volcanics are comprised by a highly variable sequence of chemically and lithologically diverse volcanic rocks. These rock types include hard lava flows and flow breccias of andesitic composition (map symbol Tsvasl). As shown on Figure 5, these volcanic materials are exposed at ground surface in the region of the subject property.

RCS interpretation of the driller's descriptions of the drill cuttings listed on the available driller's log for Well 1 reveals that typical rocks of the Sonoma Volcanics were encountered when drilling the pilot borehole for this well. Typical driller-terminology for the drill cuttings on this log included: "hard fractured volcanics," "hard red volcanics," "hard black volcanics;" "tan volcanics;" "black and tan volcanics," and "dark red volcanics." Therefore, based on the generalized terminology used by the driller for this well, the Sonoma Volcanics are interpreted by RCS to extend to depths of at least 740 ft bgs beneath the subject property at the location of Well 1. As stated previously, the complete WCR for Well 2 was not available.

[4] Note that 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 landslides, and/or on the potential impact that landslides might have on any of the onsite structures, or to any onsite and/or offsite wells used for the subject property.

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Local Hydrogeologic Conditions

The earth materials that exist in the region surrounding the subject property can generally be separated into two basic categories, based on their relative ability to store and transmit groundwater to wells. These two basic categories include:

Potentially Water-Bearing Materials

The principal water-bearing materials beneath the subject property and its environs are represented by the hard, fractured volcanic flow rocks and flow breccias of the Sonoma Volcanics. The occurrence and movement of groundwater in these rocks tend to be controlled primarily by the secondary porosity within the rock mass, that is, by the fractures and joints that have been created in these harder volcanic flow-type rocks over time by various volcanic and tectonic processes. Specifically, these fractures and joints have been created as a result of the cooling of these originally molten flow rocks and flow breccias deposits following their deposition, and also from mountain building or tectonic processes (faulting and folding) that have occurred over time in the region after the rocks were erupted and hardened. Some groundwater can also occur in zones of deep weathering between the periods of volcanic events that yielded the various flow rocks, and also with the pore spaces created by the grain-to-grain interaction in the volcanic tuff and ash, if those rock types exist beneath the harder, flow-type rocks.

The amount of groundwater available at a particular drill site for a well constructed into the Sonoma Volcanics beneath the subject property would depend on such factors as:

- the number, frequency, size, and degree of openness of the fractures/joints in the subsurface
- the degree of interconnection of the various fracture/joint systems in the subsurface
- the extent to which the open fractures may have been possibly in-filled over time by chemicals precipitates/deposits and/or weathering products (clay, etc.)
- the amount of recharge from local rainfall that becomes available for deep percolation to the fracture systems
- to a lesser extent, the size of the pore-spaces formed by the grain-to-grain interactions of volcanic ash particles, if those rock types existed beneath the subject property.

As stated above, the principal rock type expected in the subsurface beneath the property is a combination of hard volcanic flow rock and flow breccias that are fractured to varying degrees. Descriptions of drill cuttings by the well driller that are recorded on the available driller's log for Well 1 are consistent with the typical descriptions of the various rocks known in the Sonoma Volcanics. From long-term experience by RCS with the fractured flow rocks within the Sonoma Volcanics, based on numerous other water well construction projects in Napa County, pumping capacities in individual wells have ranged widely, from rates as low as 5 to 10 gpm, to rates greater than 200 gpm.

Potentially Nonwater-Bearing Earth Materials

This category includes the geologically older and fine-grained sedimentary rocks of the Great Valley Sequence; these materials do not occur at ground surface on the property. Instead, these potentially nonwater-bearing rocks are considered to directly underlie the volcanic rocks that are

known to occur at ground surface and beneath the subject property to depths greater than at least 740 ft bgs (at Well 1), depending on location.

In essence, these diverse, geologically older sedimentary rocks are well-cemented and well-lithified and have an overall low permeability. Occasionally, localized conditions can allow for small quantities of groundwater to exist in these rocks wherever they may be sufficiently fractured and/or are relatively more coarse-grained. However, even in areas with potentially favorable conditions, well yields are often only a few gpm in these rocks, and the water quality can be marginal to poor in terms of total dissolved solids concentrations, and other dissolved constituents.

Geologic Structure

Several northwest-southeast trending fault traces[5] of the Soda Creek fault system, as mapped by others, has been interpreted by others to exist in the vicinity of the subject property as shown by the dark-colored, lines and/or dashed lines on Figure 5 (CGS 2005). Specifically, one of these fault traces is shown to be mapped through the southern edge of the subject property. Faults can serve to increase the number and frequency of fracturing in the local earth materials, including the underlying Sonoma Volcanics. If such fractures were to occur, they would tend to increase the amount of open area in the rock fractures which, in turn, could increase the ability of the local earth materials to store groundwater. Faults can also act as possible barriers to groundwater flow. Whether or not this fault is a barrier to groundwater flow is unknown.

Project Water Demands

For the purposes of this WAA, Well 1 is considered to be the "project well", as it the onsite well that will to be used to meet the future water demands of the proposed vineyard development project. Well 2 will continue to be used by the adjacent Ovid Winery per the reported water easement.

Existing and proposed (future) onsite water demands for the property have been estimated using data from a previously published WAA for the Ovid Winery property (Summit, 2018), information provided by the project Civil Engineer (ACE), and assumptions published in Appendix B of the County's WAA Guidance Document (WAA 2015). Table 3, "Groundwater Use Estimates", is intended to categorize the specific water demands of the project and other onsite uses. Those estimated annual groundwater demands for the project are discussed below.

Existing Water Demands

Existing water demands are considered to be those extractions from Well 1 for the existing residence to the south of the subject property, and Well 2 via the Ovid water easement. In the Ovid WAA (Summit, 2018), water extracted from the subject parcel are shown to be 0.8 AF/yr, calculated as the sum of winery process water demand (0.5 AF/yr), and winery domestic water demand (0.3 AF/yr). Further, typical estimates for residential use are on the order of 0.75 AF/yr.

To present a conservative analysis, this WAA assumes that 2 acre-feet per year (AF/yr) are currently extracted from the subject property; 1AF/yr for the Ovid winery, and 1 AF/yr for the offsite residence to the south.

[5] Note that it is neither the purpose nor within our 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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Proposed Water Demands

Groundwater demands for the proposed new vineyards will be met by pumping groundwater from the designated project well (Well 1). Water demand estimates for the proposed project have been estimated as follows:

a. Vineyard irrigation groundwater demand = 12.5 to 25 AF/yr
    - Based on the total proposed vineyard acreage of 25 acres and an estimated unit water use, ranging from approximately 0.5 to 1.0 AF per acre vine per year (AF/ac/yr) as estimated by ACE. Typically, and in accordance with the WAA Guidance document (2015), a unit use of 0.5 AF/yr/vineyard acre is used for estimated vineyard water demand. Here, the range in water use for the proposed vineyards accounts for possible higher unit-use demands during the vineyard establishment period, for potential heat protection, and possible higher vineyard irrigation demand during drought periods.
b. Existing water easement demand = 2 AF/yr (same as existing)
    - Based on an estimated use of 1 AF/yr for the offsite residence to the south and 1 AF/yr for the Ovid winery per ACE.
c. Total proposed future groundwater demand for the Red Dirt Grapes vineyard project = a + b = 14.5 to 27 AF/yr.

Proposed Pumping Rates for Well 1

To determine an appropriate pumping rate necessary from the project well (Well 1) to meet the future proposed groundwater demand of 13.5 to 26 AF/yr, it was conservatively estimated that groundwater required for the project well will be pumped during a 20-week irrigation season each year[6]. Based on this assumption, the project well would need to pump at a rate of about 30 to 56 gpm to meet the groundwater demands for the proposed project. These pumping rate assumes that project well would be pumped on a 75% operational basis (18 hours/day, 7 days/week) during the 20-week irrigation season. The necessary pumping rate would be significantly lower during the non-irrigation season each year because groundwater demands for the remainder of the year are only needed for domestic purposes.

Based on the constant rate pumping test performed on the project well by RWTS in March 2017 (at an average rate of 75 gpm), it appears that the project well is capable of meeting the instantaneous groundwater pumping rate demands required for the proposed vineyard project and offsite residence each year.

Rainfall

Long-term rainfall data are essential for estimating the average annual recharge that may occur at the subject property. Average annual rainfall totals that occur specifically at the subject property are not directly known, because no onsite rain gage exists. However, a rain gage with relatively long-term available data is reported to exist about 5.5 miles to the southeast of the subject property. Data for this gage are available from the California Data Exchange Center (CDEC)

[6] Note that the residential demands for the offsite residence will not be required from Well 1 once the property to the south has completed construction of its own well. Also, this analysis assumes that residential water will be pumped during the 20 week irrigation season; in reality it will be pumped throughout the year.

website maintained by DWR, and the gage is named "Atlas Peak." Data from the CDEC website for this gage are available for water year (WY) 1986-87 (October 1986 – September 1987) through WY 2021-22. Note that there appears to be some erroneous and/or missing data in WY 1994-95, WY 1995-96, WY 2004-05, and WY 2006-7. RCS removed these erroneous and/or missing data from the data set before calculating an average annual rainfall for this gage. Note that RCS only removed rainfall totals; no rainfall data were "added" to the data set. With these assumed erroneous data points removed from the data set, then an average rainfall of 38.1 inches (3.2 ft) from WY 1986-87 through WY 2021-22 is calculated at this gage. This rain gage is located at a higher elevation (±1,660 ft above mean sea level, amsl) than that of the subject property (between ±1,140 ft and ±1,382 ft amsl, depending on location on the property), and therefore the average annual rainfall at the subject property could be slightly lower than that experienced at this known gage location.

Another rain gage exists just south of Lake Hennessey, and the rainfall data for this gage, which is named "Lake Hennessey," is provided on the Napa One Rain website, which is maintained by the County. Location coordinates provided in the metadata show that this rain gage is located roughly 2 miles northwest of the subject property. Data for the Lake Hennessey rain gage are available for WY 2000-01 through WY 2021-22. However, there appear to be some erroneous and/or missing rain data for WY 2007-08, because it is highly unlikely that only 0.64 inches of rain fell that water year as reported for this gage. Again, RCS removed this possibly erroneous water year from the data set. The resulting average annual rainfall at this Napa One Rain Lake Hennessey rain gage is calculated to be approximately 22.3 inches (1.9 ft). Because the period of rainfall record for this is gage is shorter than other gage data (roughly 22 years) and includes 10 years of drought (as defined by DWR), RCS does not consider these data to be representative of the long-term annual average rainfall in the area surrounding the subject property.

The nearest rain gage to the subject property known to RCS with a significantly longer data record is located in St. Helena, California. The data for this gage are available from the Western Regional Climate Center (WRCC) website. For this rain gage, the period of record is listed as WY 1907-08 through WY 2021-22. Note that there are missing or erroneous data in WY 1979-80 and WY 1987-88. For the available period of record, the average annual rainfall at this St. Helena gage is reported to be 32.3 inches (2.7 ft), as calculated by the WRCC. This rainfall gage is located at a much lower elevation (±225 ft amsl) than that of the subject property, and therefore the average annual rainfall at the subject property is likely to be higher than that experienced at this known gage location. Also, because this rain gage is located 7.6 miles northwest of the subject property, it is less likely that these data are representative of the long-term average rainfall at the subject property.

To help corroborate the average annual rainfall data derived from the CDEC, Napa One Rain, and/or WRCC gages, RCS reviewed the precipitation data published by the PRISM Climate Group at Oregon State University. This data set, which is freely available from the PRISM website, contains "spatially gridded average annual precipitation at 800m grid cell resolution." The date range for this dataset includes the climatological period between 1991 and 2020. These gridded data provide an average annual rainfall distributed across the subject property. Using this data set, RCS determined that the average rainfall for the subject property for the stated date range is approximately 35.9 inches (2.99 ft).

An additional rainfall data source, an isohyetal map (a map showing contours of equal average annual rainfall) was prepared by the County for all of Napa County and is freely available for

download from the online Napa County GIS database website. As described in the metadata for the file (also available via the download page at the website), the isohyets are based on a 60-year data period beginning in 1900 and ending in 1960. As stated in the metadata for the file, the contour interval for the map is reported to be "variable due to the degree of variation of annual precipitation with horizontal distance", and therefore the resolution of the data for individual parcels is difficult to discern. The subject property is situated within the boundaries of the 35-inch average annual rainfall contour on the map. Based on our interpretation of the actual isohyetal contour map (not provided herein), the long-term average annual rainfall at the subject property may be on the order of 35 inches (2.92 ft), using these rainfall data.

Table 4, "Comparison of Rainfall Data Sources", shows a comparison of the data collected from the different rainfall sources discussed above. Based on the various rainfall data sources described herein and summarized on Table 4, RCS conservatively assumes that the long-term average annual rainfall at the subject property is 35.9 inches (2.99 ft), as derived from the PRISM data set. The 35.9-inch per year estimate is based on the data source with a relatively long period of record (30 years) and is more site-specific, when compared to the other rainfall data sources listed in Table 4 that exist at different elevations and/or are located further away from the subject property.

Estimate of Groundwater Recharge

Groundwater recharge on a long-term average annual basis at the subject property can be estimated as a percentage of the long-term average annual rainfall that falls directly on the subject property and becomes available to deep percolate into the local aquifer system(s) over the long term. The actual percentage of rain that deep percolates can be variable based on numerous conditions, such as: the slope of the land surface; the soil type that exists at the property; the evapotranspiration that occurs on the property; the intensity and duration of the rainfall; etc. Therefore, RCS has considered various analyses of deep percolation into the rocks of the Sonoma Volcanics, as relied upon by other consultants, government agencies, and RCS for other projects in the Napa Valley.

Recharge volumes estimated in this Memorandum are based on the long-term average annual rainfall values determined for the subject property using the available data presented previously. Note that a calculation of average annual rainfall (by calendar year or water year) for any long-term period always includes periods of below-average rainfall and above-average rainfall that occurred during the period over which the average was calculated. Therefore, the following recharge calculations also include consideration of drought year conditions.

Updated Napa County Hydrogeologic Conceptual Model (LSCE&MBK 2013)

Estimates of groundwater recharge as a percentage of rainfall were presented for a number of watersheds (but not all watersheds) in Napa County in the report titled "Updated Napa County Hydrogeologic Conceptual Model" (LSCE&MBK, 2013) prepared for Napa County. Watershed boundaries within Napa County are shown on Figures 8-3 and 8-4 in that report (not reproduced herein). Figure 6, "Watershed Boundaries," was prepared for this project using those same watershed boundaries provided by MBK Engineers (MBK), for which watershed water balance data are available in the LSCE&MBK, 2013 report. As shown on Figure 6, the watershed boundary between the "Conn Creek Watershed" and "Napa River Watershed near Napa," as referred to by MBK, traverses across a portion of the subject property. Approximately 46.5 acres (or 85%) of the 54.7-acre property are located within the Conn Creek Watershed, whereas the

remaining 8.2 acres (or 15% of the total property acreage) are located within the Napa River Watershed near Napa. As shown on Table 8-9 on page 97 of the referenced report (LSCE&MBK, 2013, not appended herein), 21% of the average annual rainfall that occurs within the Conn Creek Watershed were estimated to be able to deep percolate as groundwater recharge; for the Napa River Watershed near Napa, 17% of the average annual rainfall that occurs within this watershed were estimated to deep percolate as groundwater recharge (i.e., the recharge rate). For projects located within the "Napa River Watershed near Napa," RCS groundwater geologists have typically used a rainfall recharge percentage estimate between 14% and 17%. Based on the data currently available, RCS has assigned a conservative recharge percentage of 17% for the subject property. This is the same recharge percentage employed in the WAA for the OVID property (Summit 2018).

As stated above, the total surface area of the subject property is 54.7 acres. Assuming 35.9 inches (2.99 ft) of rainfall occurs on the subject property on a long-term average annual basis, then the total volume of rainfall that would fall each year directly on the property over the long term would be approximately 163.6 AF/yr (54.7 acres x 2.99 ft). Conservatively assuming that 17% of the average annual rainfall volume would be able to deep percolate to the groundwater within the Sonoma Volcanics directly beneath the subject property over the long term, then the average annual groundwater recharge at the subject property would be approximately 27.8 AF/yr (163.6 AF/yr x 17%). This estimated annual recharge volume of 27.8 AF/yr is nearly double the lower end of the range of estimated average annual groundwater demand for the proposed project of 14.5 AF/yr, and roughly the same as the higher end estimate of 27 AF/yr. Estimates for reductions in recharge due to slope were not necessary for this project as the topography at the subject property does not have slopes that are greater than 30 degrees.

Estimate of Groundwater in Storage

To help evaluate possible impacts to the local volcanic rock aquifer systems that might occur as a result of the future groundwater pumping for the proposed project, the volume of groundwater extracted from the property in the future can be compared to an estimate of the current volume of groundwater estimated to be in storage in the volcanic rocks strictly beneath the subject property. To estimate the amount of groundwater currently in storage beneath the subject property, the following parameters are needed:

a) Approximate surface area of subject property = 54.7 acres

b) Depth to base of perforations in Well 2 = 678 ft bgs. A driller's log for Well 2 could not be located; however, data regarding the depth and interval length of the perforated casing for the well was provided by the DWR website, and therefore, can be used to estimate the thickness of currently saturated rocks within the Sonoma Volcanics that might exist beneath the property. Based on the data gathered for the onsite wells, it is possible that the rocks of the Sonoma Volcanics extend to a much greater depth than that for Well 2 (as is the case for Well 1, which was drilled to a depth of about 740 ft bgs), and thus, the saturated zone beneath the property could extend deeper than is estimated using these data. However, the data gathered for Well 2 is used here to provide a more conservative estimate of the current volume of groundwater in storage beneath the subject property.

c) To present a conservative calculation of groundwater in storage, we will also assume that the current saturated thickness of the aquifer(s) beneath the subject property is roughly 216 ft vertical feet. This value is calculated using data from Well 1 by

subtracting the RWTS-measured SWL of about 462 ft bgs in this well (on March 22, 2017) from the reported depth to bottom of the perforations in the shallower Well 2 at 678 ft bgs. Based on the water level data presented herein, the March 2017 SWL in Well 1 is the deepest available SWL measured for the two onsite wells, and, thus, is used herein to provide a more conservative calculation of the minimum volume of groundwater currently in storage beneath the property.

d) Approximate average specific yield of the Sonoma Volcanics = 2%. The specific yield is essentially the ratio of the volume of water that drains from the saturated portion of the geologic materials (due to gravity) to the total volume of rocks. Specific yield of the Sonoma Volcanics can vary greatly, depending on a number of factors, including the degree and interconnection of the pore spaces and/or fracture zones within the rocks. A conservative estimate by Kunkel and Upson for the specific yield of the Sonoma Volcanics ranges from 3% to 5% (USGS 1960). For other nearby properties for which RCS has performed similar analyses, an even more conservative estimate for specific yield of 2% has been used. Hence, to present a conservative analysis, we will assume a specific yield of 2% for the Sonoma Volcanics rocks that underlie the subject property, but the actual value, in reality, could be higher.

e) Thus, a conservative estimate of the groundwater currently in storage (S), beneath the subject property (as of March 2017) is calculated as:

   S = property area (subpart a, above) times saturated thickness (subpart c, above) times average specific yield (subpart d, above) = (54.7 acres)(216 ft)(2%) = 236 AF

In contrast, the proposed average annual groundwater extraction from the property is estimated to be 14.5 to 27 AF/yr. Hence, the estimated annual groundwater extraction from the subject property represents only about 6% to 11% of the volume of groundwater conservatively estimated to currently be in storage in the volcanic rocks beneath the subject property based on water level data in Well 1 for March 2017, and the known depth to the bottom of the perforations in the shallower Well 2. Furthermore, this percentage does not include annual groundwater recharge that will occur from rainfall into the aquifers beneath the subject property. Based on the foregoing, the estimated groundwater demands of the proposed project and the entire subject property are not expected to cause a net deficit in the volume of groundwater within the aquifers beneath the property.

Possible Effects of "Prolonged Drought"

California has experienced a number of periods of extended drought throughout its history. Here, drought is defined as a meteorological drought, that is, a period in which the total annual precipitation is less than the long-term average annual precipitation (DWR 2015). For similar projects in the County, Napa County PBES has asked RCS to consider what the effects on groundwater availability at a particular property might be if a period of "prolonged drought" were to occur in the region, assuming the project were to operate in the future as described herein. Recharge volumes estimated in this document are based on the long-term average rainfall value determined for the subject property using available data. Recall that a calculation of average annual rainfall for any long-term period always includes periods of below-average rainfall and above-average rainfall that are known to have occurred during the period over which the average was calculated. Therefore, it is the opinion of RCS that the preceding calculations do inherently include consideration of drought year conditions.

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However, to help understand what potential conditions might exist in the local volcanic rocks beneath the property during a "prolonged drought period," a "prolonged drought" must be defined. As discussed by DWR, "there is no universal definition of when a drought begins or ends, nor is there a state statutory process for defining or declaring drought" (DWR 2015). California's most significant historical statewide droughts were defined by DWR as occurring during the following periods (DWR 2015):

- WY 1928-29 through WY 1933-34 – six years
- WY 1975-76 through WY 1976-77 – two years
- WY 1986-87 through WY 1991-92 – six years
- WY 2006-07 through WY 2008-09 – three years
- WY 2011-12 through WY 2015-16[7] – five years

Since publication of the DWR drought document (2015), WY 2019-20 through WY 2021-22[8] are also considered drought years in the State. As of March 10, 2022, the area of Napa County in which the subject property lies is currently mapped as "Severe Drought" on the National Drought Mitigation Center website (NDMC 2022).

Table 5, "Drought Period Rainfall as Percentage of Average", shows the average amount of rainfall that occurred during each drought period for which rainfall data exist at the three rain gages discussed above and shown on Table 5; that drought period rainfall amount is also expressed on Table 5 as a percentage of the total rainfall that was recorded at each respective gage. As shown on Table 5, determining the amount of rain that might fall during a "prolonged drought" is variable, and depends on the period of record for the specific rain gage. Clearly, WY 2019-20 to WY 2021-22 (the current drought period) recorded the lowest total rainfall at 25% for the St. Helena rain gage. As mentioned previously, this rain gage is located about 7 miles from the subject property and at a much lower elevation (~225 ft amsl) than the subject property (~1,100 ft amsl), and therefore, may not be representative of the actual rainfall amounts that occur at the subject property. The WY 2019-20 to WY 2021-22 drought period recorded by the Atlas Peak gage at 47%, which is at a similar elevation as (~1,600 ft amsl) and closer (5.5 miles) to the subject property, is likely more representative of the rainfall amounts experienced at the subject property during the same drought periods.

Hence, for the purposes of this analysis, a "prolonged" drought period rainfall is conservatively considered to be 47% of the average annual rainfall that occurred in the region. Further, to again be conservative, a "prolonged drought period" is estimated to last 6 years, which is the longest drought period on record according to DWR (DWR 2015); see Table 5. This six-year period is a quite conservative estimate, because the 47%-average figure corresponds with a three-year drought period, not a six-year drought period.

To meet six consecutive years of groundwater demand for the subject property, a total onsite groundwater extraction of 87 to 162 AF is estimated to be required (14.5 to 27 AF/yr of

[7] The DWR 2015 drought document was published in February 2015 and lists the drought that began in water year 2011-12 through the 2013-14 water year only; the drought continued throughout the State into WY 2015-16. Due to the rains in WY 2016-17, various sources, including the National Drought Mitigation Center website (NDMC 2018), declared an end to the drought in Northern California in 2017, which included Napa County.

[8] It should be noted that at the time of publication of this report, rainfall data for WY2021-22 is current as of February 2022, and therefore does not include any rainfall that may occur during the remainder of the water year.

groundwater demand multiplied by 6 years = 87 to 162 AF). Assuming groundwater recharge is reduced to 47% of the average annual recharge during each year of such a theoretical "prolonged drought period", then the resulting total of groundwater recharge that might occur during the six-year drought period for the subject property is calculated as follows:

- As shown herein, a conservative estimate of the average annual groundwater recharge on the subject property is estimated to be 27.8 AF/yr. Taking 47% of this annual volume yields a drought period recharge volume of 13.1 AF/yr.
- Assuming a drought period duration of 6 continuous years, then a total of 78.6 AF (13.1 AF/yr times 6 years) of water would be available to recharge the volcanic rocks beneath the property by virtue of deep percolation of the direct rainfall that occurs solely within the boundaries of the subject property.

Therefore, assuming a theoretical, extreme, six-year drought period during which only 47% of the average annual rainfall might occur, a conservative estimate of the total drought-period recharge at the subject property (78.6 AF) would be slightly less than the estimate of the total proposed onsite groundwater demand (87 to 162 AF) that may occur over the same six-year period.

As conservatively estimated above, 236 AF of groundwater are in storage within the rocks of the Sonoma Volcanics beneath the property. Hence, the theoretical six-year long drought period groundwater "recharge deficit" of 8.4 to 83.4 AF would represent about 4% to 35% of that volume of groundwater in storage. Temporarily removing an average of approximately 1.4 to 13.9 AF (when those deficits are divided by 6 years) of groundwater from storage every year during this 6-year long prolonged drought may cause water levels to decrease slightly beneath the subject property, but removal of such a relatively small percentage of groundwater from storage over an entire 6-year period of time is not expected to significantly impact groundwater levels beneath the property. Recharge that occurs during periods of average and above-average rainfall would continue to recharge the local aquifer system(s). Again, this drought analysis is quite conservative, and assumes a prolonged, extreme drought (47% of average rainfall occurring every year for six consecutive years).

Key Conclusions and Recommendations

1. The existing property is currently developed with Well 1 and Well 2, four water tanks, access roads, and utilities. In addition, areas of the property with less than 5% slope are currently under development to accommodate vineyard areas, but are not yet planted.
2. Two wells exist at the subject property. Well 1, the project well, will serve the demands of the proposed onsite vineyard and existing residence on the property to the south (until that property has its own water source). Well 2 is an easement well that provides water to the neighboring Ovid Winery.
3. Current groundwater extractions from the subject property via Well 1 are conservatively estimated to be 1 AF/yr for the residence to the south, and about 1 AF/yr via Well 2 for the Ovid Winery. In reality, the extraction for the OVID winery is likely lower, as the estimated demand for the Ovid Winery was reported to be 0.8 AF/yr in the Ovid WAA (Summit, 2018).

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4. The proposed project consists of developing 25 acres of new vines, which will require 12.5 to 25 AF/yr of groundwater for vineyard irrigation and potential heat protection for the proposed vineyards. (These 25 acres includes the vines currently under development on areas of the property with less than 5% slope).
5. Thus, the future average annual groundwater demand for the proposed project (including the 25 acres of new vines and the Ovid Winery use) is estimated to be approximately 14.5 to 27 AF/yr.
6. The groundwater demand for the proposed new vineyards and the residence to the south will be met by pumping groundwater from Well 1, the project well. Well 2 will continue to be utilized by the neighboring Ovid Winery via the reported easement.
7. To meet the estimated peak pumping rate for the project each year, the project well would need to pump at an operational basis of 18 hours per day, every day, and at a rate of about 30 to 56 gpm to meet vineyard irrigation and domestic use demands during an assumed 20-week irrigation season each year. During the remainder of the year, when there are no irrigation demands and only domestic needs are being met, the pumping rate necessary from the well will be much lower.
8. Based on the results of the constant rate pumping test of Well 1 by RWTS in March 2017 (it was pumped at a reported final rate of 75 gpm for a period of 8 continuous hours), this well appears to be capable of pumping at rates well above those required to meet the total future groundwater demands needed for the proposed
9. Groundwater recharge at the subject property on an average annual basis is estimated to be 27.8 AF/yr; this value is based on site-specific estimates of the average annual rainfall at the property (35.9 inches per year) and conservative estimates of the percentage of average rainfall that could be available to deep percolate into the fractures and jointed rocks of the Sonoma Volcanics that underlie the subject property.
10. Conservative estimates of recharge that may occur during a “prolonged drought” (as defined herein) show that, over a theoretical six-year period of continuous drought in which only 47% of the average annual rainfall might occur, a total of 78.6 AF of rainfall recharge is estimated to occur strictly within the boundaries of the subject property. This theoretical drought period recharge estimate of 78.6 AF is less than the estimated future groundwater demand of the property of 87 to 162 AF for the same continuous six-year period. Hence, the theoretical six-year long drought period recharge “deficit” of 8.4 to 83.4 AF would represent about 4% to 35% of the volume of groundwater currently in storage beneath the property (estimated to be 236 AF). Rainfall recharge during years of above-average rainfall would then replenish groundwater in storage that has been used to meet the groundwater demand of the entire property during a theoretical drought of six continuous years.
11. In the future, RCS recommends monitoring the static and pumping water levels on a regular basis, and also monitoring the instantaneous flow rates and cumulative pumped volumes from Well 1, via the use of a water level pressure transducer or other reliable means of measurement and periodically recording the values from the previously-installed dual-reading flow meter near the wellhead of Well 1. By continuing to observe the trends in groundwater levels and future well production rates/volumes

over time by qualified professionals, potential declines in water levels and/or well production in the onsite wells can be addressed in a timely manner.

MEMORANDUM

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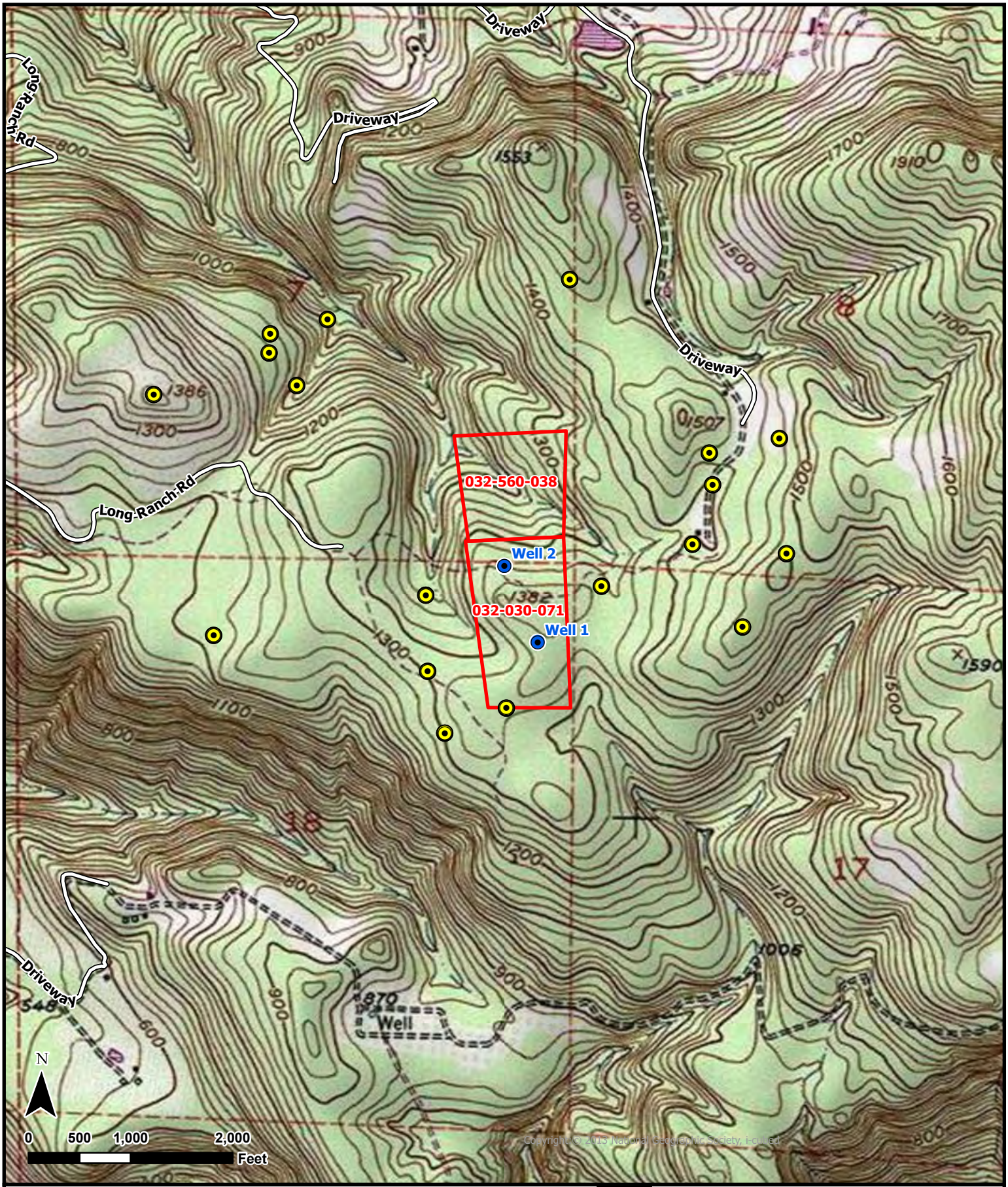


LEGEND

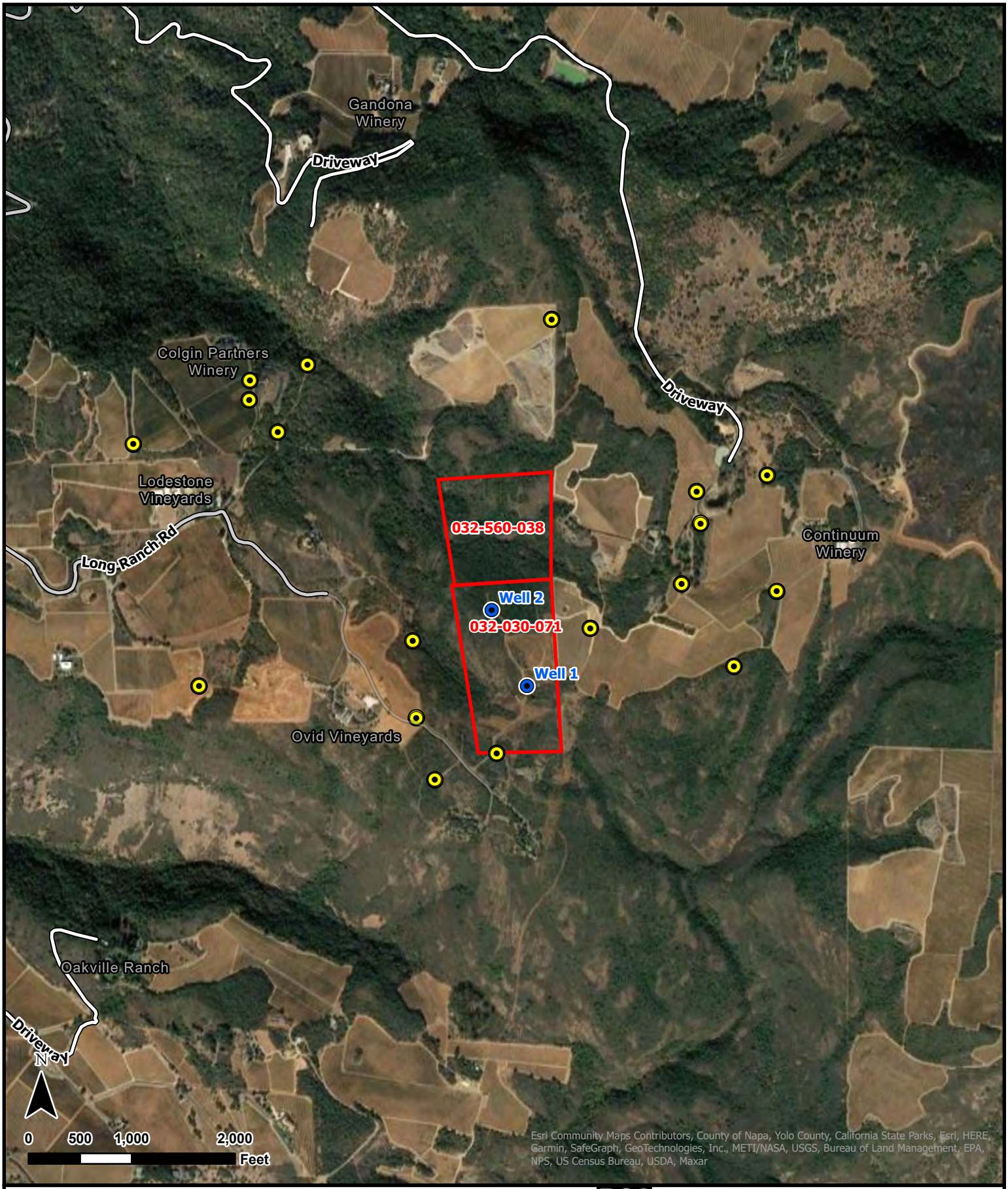
- Subject Property (showing County APNs)
- Onsite Well (Approx.)
- Offsite Well (Approx.)

RCS

FIGURE 1
LOCATION MAP

RCS Job No. 746-NPA02

March 2022



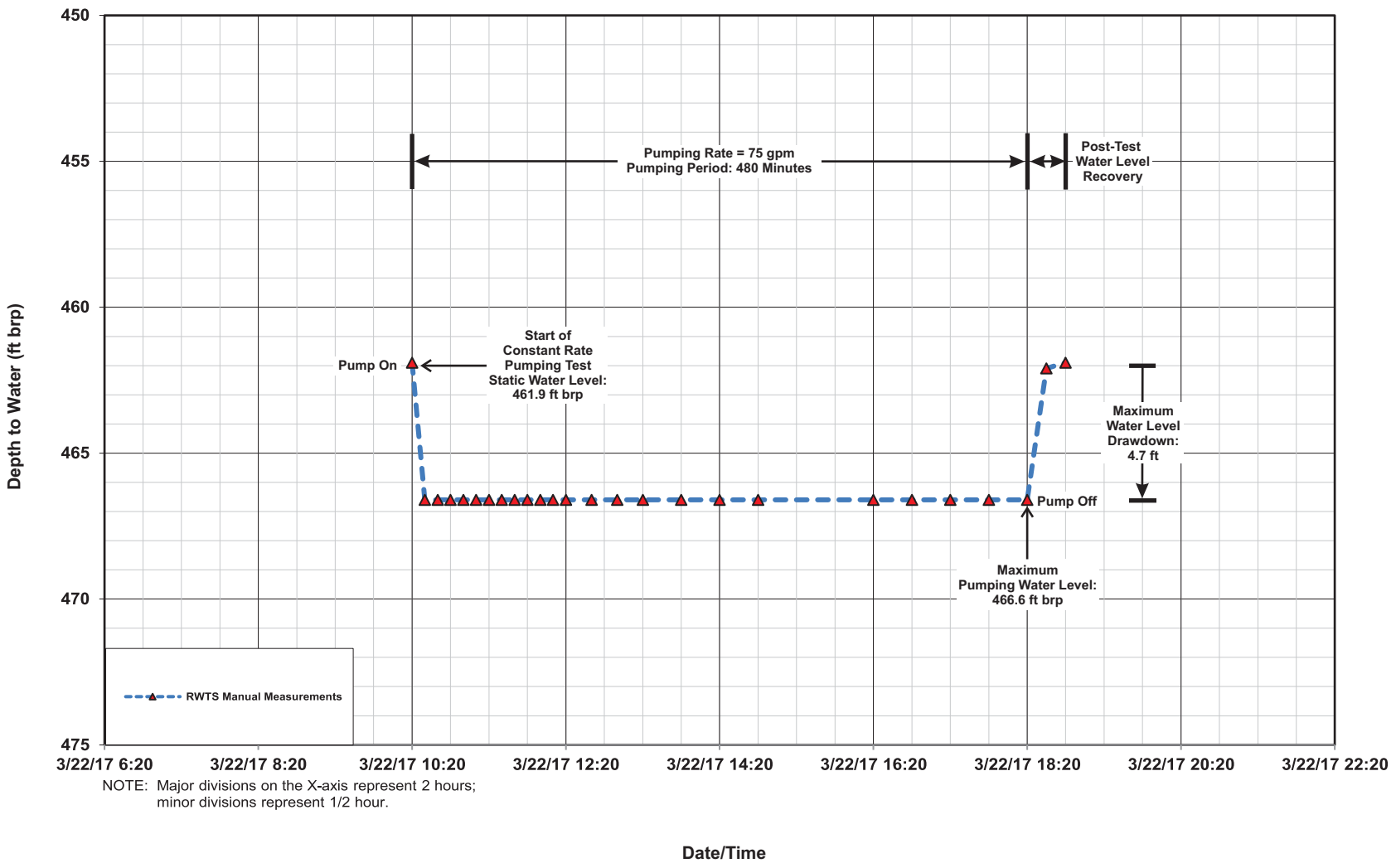
LEGEND

- Subject Property (showing County APNs)
- Onsite Well (Approx.)
- Offsite Well (Approx.)

RCS

FIGURE 2
AERIAL PHOTOGRAPH MAP

RCS Job No. 746-NPA02 **March 2022**



NOTE: Major divisions on the X-axis represent 2 hours; minor divisions represent 1/2 hour.

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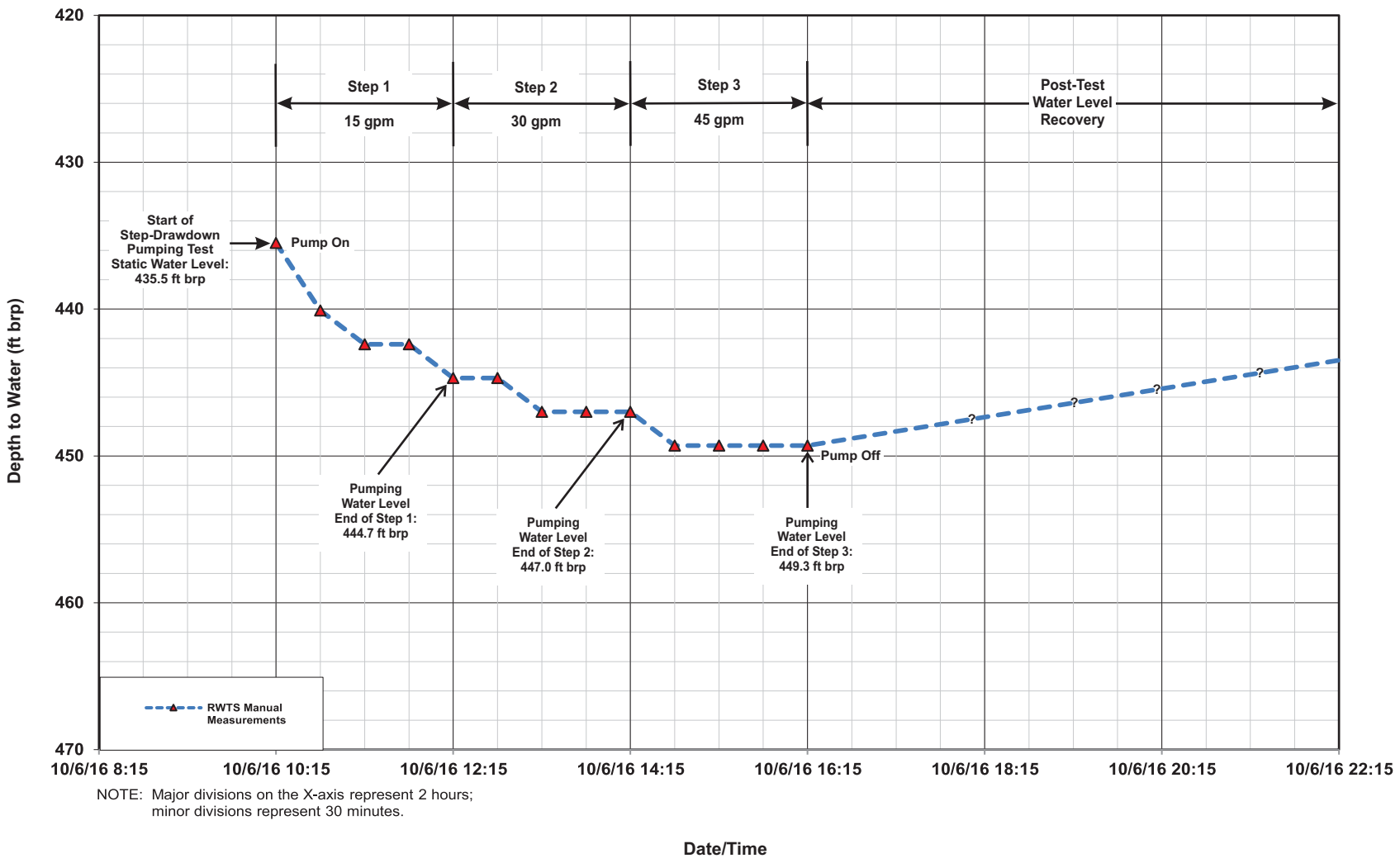
FIGURE 3
WATER LEVEL DATA DURING CONSTANT RATE TEST BY OTHERS
RED DIRT GRAPES WELL 1

Job No. 746-NPA02 **March 2022**



NOTE: Major divisions on the X-axis represent 2 hours; minor divisions represent 30 minutes.

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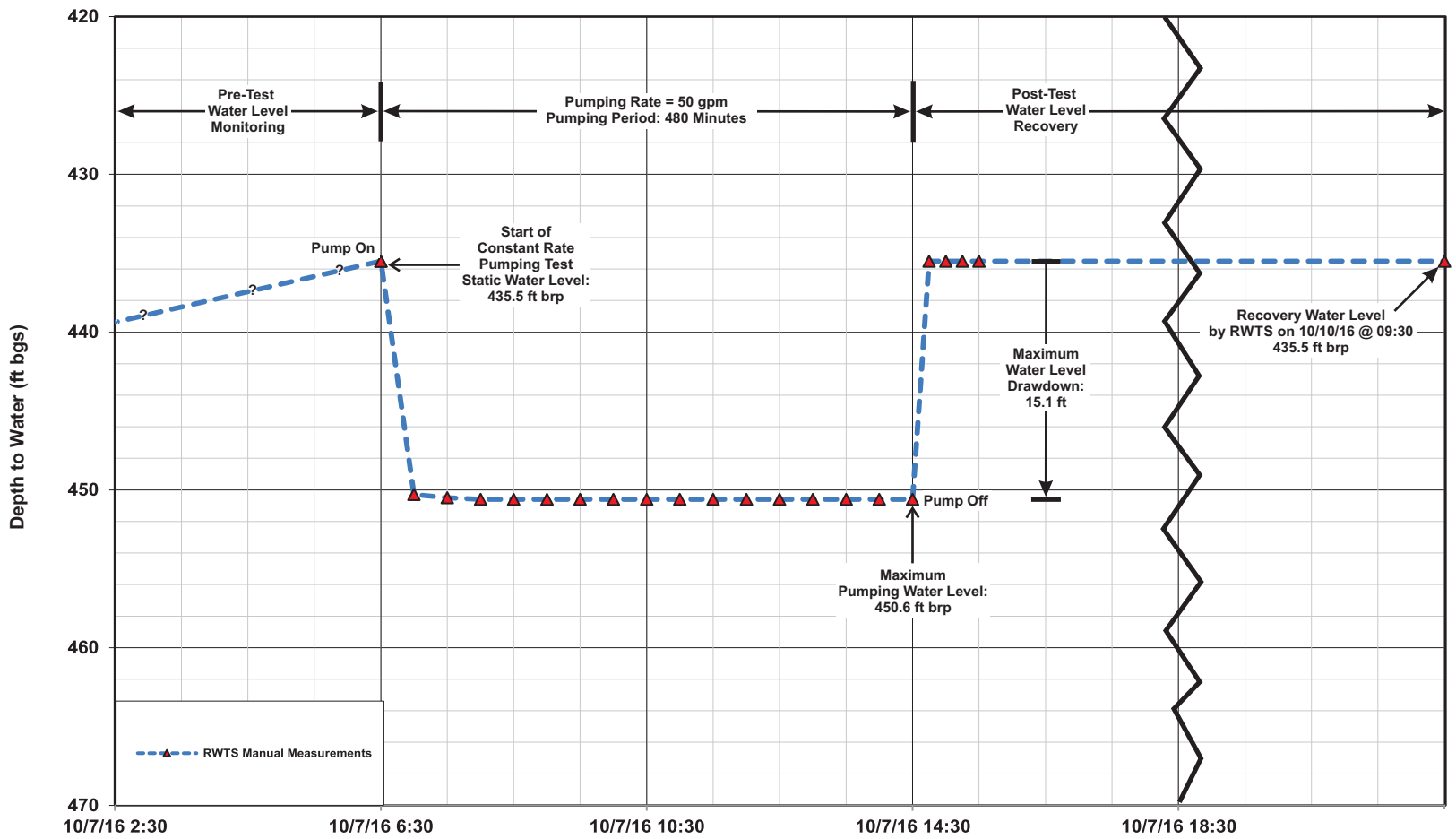
FIGURE 4A
WATER LEVEL DATA DURING STEP DRAWDOWN TEST BY OTHERS
RED DIRT GRAPES WELL 2

Job No. 746-NPA02 **March 2022**



NOTE: Major divisions on the X-axis represent 4 hours; minor divisions represent 1 hour.

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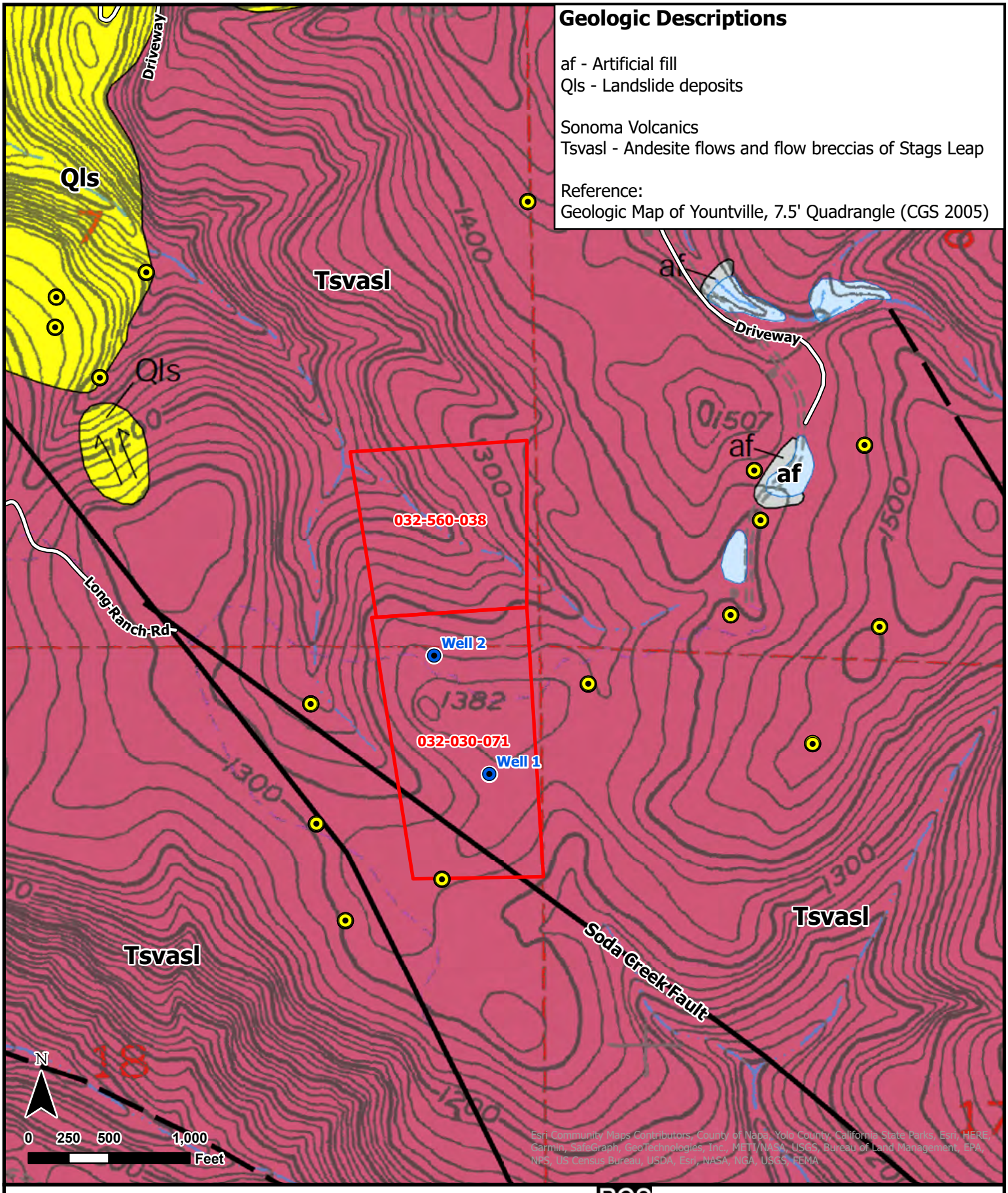
FIGURE 4B
WATER LEVEL DATA DURING CONSTANT RATE TEST BY OTHERS
RED DIRT GRAPES WELL 2

Job No. 746-NPA02 **March 2022**



LEGEND

- Subject Property (showing County APNs)
- Onsite Well (Approx.)
- Offsite Well (Approx.)
- Fault - dashed where inferred

RCS

FIGURE 5
GEOLOGIC MAP

RCS Job No. 746-NPA02

March 2022

LEGEND

- Subject_Property
- Napa County Watershed Boundary (LSCE&MBK, 2013)

RCS

FIGURE 6
WATERSHED BOUNDARIES

RCS Job No. 746-NPA02 March 2022

Table 1
Summary of Well Construction and Testing Data
Red Dirt Grapes Development Project

WELL CONSTRUCTION DETAILS

Reported Well Designation	DWR Well Log 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
Well 1	739711	February 2001	Rotary	740	736	PVC	8	15 in. (0-55 ft bgs) 12 in. (55-740 ft bgs)	53	476-556; 636-716	0.032 Machine-Slotted	53-736 #6 Sand	Active
Well 2	WCR2016-006080	August 2016	Air Rotary	678	678	PVC with Steel Upper	6	ND	52	478-678	ND	ND	Active

POST-CONSTRUCTION YIELD DATA

Reported Well Designation	DWR Well Log No.	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)
Well 1	739711	3/2/2001 Airlift	2	125	431	ND	ND
		3/22/2017 Pump	8	75	461.9	466.6	16.0
Well 2	WCR2016-006080	8/2016 Airlift	4	40	440.0	ND	ND
		10/7/2016 Pump	8	50	435.5	450.6	3.3

Notes: ND = No data available
ft bgs = feet below ground surface
in = inches
hrs = hours
gpm = gallons per minute
gpm/ft ddn = gallons per minute per foot of water level drawdown
Driller's log for Well 2 could not be located, however, limited info gathered from DWR website and RWTS pumping record.

Table 2
Results of Laboratory Analysis of Groundwater Quaility Samples
Well 2
Red Dirt Grapes Vineyard Development Project

Constituent Analyzed	Units	Maximum Contaminant Level	Reported Analytical Results
Specific Conductance	µS/cm	900; 1,600; 2,200[(1)]	230
pH	units	None	6.43
Sodium Absorption Ratio (SAR), Adjusted	unitless	None	0.515
Total Dissolved Solids	mg/L	500; 1,000; 1,500[(1)]	150
Total Hardness		None	92
Calcium		None	15
Magnesium		None	13
Sodium		None	11
Alkalinity (as $CaCO_3$)		None	110
Sulfate		250; 500; 600[(1)]	1.5
Chloride		250; 500; 600[(1)]	5.8
Fluoride		2	0.1
Nitrate as N		10	0.23
Silica (as SiO_2)		None	97
Zinc	µg/L	5,000[(2)]	220

Notes:

(1) The three listed numbers represent the recommended, upper and short-term Secondary Maximum Contaminant Levels for the constituent for domestic-use purposes.

(2) Values are non-enforceable Secondary Standards, Notification Levels.

µS/cm = micro Siemens per centimeter

mg/L = milligrams per liter

µg/L = micrograms per liter

ND = Not Detected

Bold red numbers indicate concentrations meet or exceed MCL for drinking water

Table 3
Groundwater Use Estimates
Red Dirt Grapes Vineyard Development Project

Groundwater Use	Estimated Groundwater Use (acre-feet/year)	
	Existing	Future
Existing Groundwater Use[(1)]	2	2
Vineyard - Proposed 25 acres[(2)]	---	12.5
Total Combined Groundwater Use (Existing + Proposed)	**2**	**14.5**

Notes:

[1] Estimates provided by ACE.

[2] This water demand estimate is based on values presented for specified land uses provided in Appendix B of the County's WAA Guidance Document (WAA 2015).

1 acre-foot = 325,851 gallons

Table 4
Comparison of Rainfall Data Sources
Red Dirt Grapes Vineyard Development Project

Rain Gage and/or Data Source	Years of Available Rainfall Record	Average Annual Rainfall in Inches (ft)[1]	Elevation of Rain Gage (ft amsl)	Distance of Rain Gage from Subject Property[2] (mi)	Elevation of Rain Gage Relative to Subject Property
Napa One Rain Lake Hennesey	WY 2000-01 through WY 2021-22[3]	22.3 (1.9)	330	2.0	Lower
CDEC Atlast Peak	WY 1986-87 through WY 2021-22[4]	38.1 (3.2)	1,660	5.5	Higher
WRCC St. Helena	WY 1907-08 through WY 2021-22[5]	32.2 (2.7)	225	7.6	Lower
PRISM	1991 to 2020	35.9 (2.99)	---	---	---
Napa County Isohyetal Map	1900 to 1960	35.0 (2.92)	---	---	---

Notes:

1. Rainfall totals for WY 2021-22 are current through February 2022.
2. The subject property is located at elevations between ~1,140 and ~1,382 ft amsl
3. Erroneous and/or missing rainfall data in WY 2007-08.
4. Erroneous and/or missing rainfall data in WY 1994-95, WY 1995-96, WY 2004-05, and WY 2006-07.
5. Erroneous and/or missing rainfall data in WY1979-80 and WY 1987-88.

Table 5
Drought Period Rainfall as Percentage of Average
Red Dirt Grapes Vineyard Development Project

Statewide Drought Period as Defined by DWR/NDMC	Drought Duration (years)	Average Rainfall by Raingage								
		Lake Hennesey Napa OneRain Period of Record - WY 2000-01 to WY 2021-22			Atlas Peak CDEC Period of Record - WY 1986-87 to WY 2021-22			St. Helena WRCC Period of Record - WY 1907-08 to WY 2021-22		
		[A] Total Gage Average (in)	[B] Drought Period Average (in)	[B/A] Drought Period Rainfall as % of Average	[A] Total Gage Average (in)	[B] Drought Period Ave. (in)	[B/A] Drought Period Rainfall as % of Average	[A] Total Gage Average (in)	[B] Drought Period Ave. (in)	[B/A] Drought Period Rainfall as % of Average
WY 1928-29 to WY 1933-34	6	ND	ND	ND	ND	ND	ND	32.2	23.9	74%
WY 1975-76 to WY 1976-77	2	ND	ND	ND	ND	ND	ND	32.2	13.4	42%
WY 1986-87 to WY 1991-92	6	ND	ND	ND	38.1	34.9*	92%*	32.2	21.2*	66%*
WY 2006-07 to WY 2008-09	3	22.3	9.4*	42%*	38.1	23.8	62%	32.2	24.8	77%
WY 2011-12 to WY 2015-16	5	22.3	19.6	88%	38.1	29.3	77%	32.2	21.7	67%
WY 2019-2020 to WY 2021-22†	3	22.3	13.0	58%	38.1	17.8	47%	32.2	8.0	25%

Notes:

ND = No rainfall data for corresponding drought period.

* = Rain gage data do not extend through entire drought period and/or are missing rainfall data within drought period.

† = Rainfall totals for WY 2021-22 are current through February 2022.

MEMORANDUM

APPENDIX

CALIFORNIA DEPARTMENT OF WATER RESOURCES
(DWR)
WELL COMPLETION REPORT (DRILLER'S LOG)

QUADRUPLICATE
For Local Requirements

Page 1 of 1

Owner's Well No. _____

Date Work Began 2-13-01, Ended 3-2-01

Local Permit Agency Napa County Environmental Mgmt.

Permit No. 96-11734 Permit Date 1-26-01

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 739711

DWR USE ONLY — DO NOT

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

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

DRILLING METHOD rotary FLUID _____

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	10	hard fractured volcanics
10	30	hard red volcanics
30	150	hard black volcanics
150	200	tan volcanics
200	220	black volcanics
220	320	black & tan volcanics
320	420	dark red volcanics
420	600	black volcanics
600	690	red volcanics
690	740	black volcanics
		CONT. CASING LAYOUT
636	716	screen PVC 8" .032 slot
716	736	blank PVC 8"

RECEIVED
APR 10 2001
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

TOTAL DEPTH OF BORING 740 (Feet)

TOTAL DEPTH OF COMPLETED WELL 736 (Feet)

WELL OWNER

Name [redacted]

Mailing Address [redacted]

CITY STATE ZIP

WELL LOCATION

Address 1481 Sage Canyon Road

City Str Helena

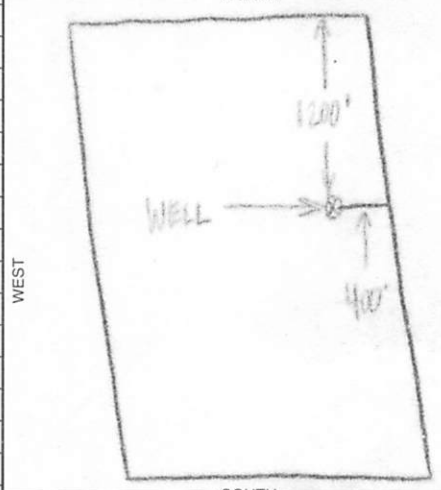
County Napa

APN Book 32 Page 030 Parcel 04

Township _____ Range _____ Section _____

Latitude ___ ___ ___ NORTH (DEG. MIN. SEC.) Longitude ___ ___ ___ WEST (DEG. MIN. SEC.)

LOCATION SKETCH



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

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

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

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
X 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 490 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 431 (Ft.) & DATE MEASURED 3-2-01

ESTIMATED YIELD * 125 (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)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	55	15								
55	740	12								
0	476		X				PVC F480	8	SDR-21	
476	556			X			PVC F480	8	SDR-21	/032
556	636		X				PVC F480	8	SDR-21	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	53	X			concrete
53	736			X	#6 sand

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

NAME HUCKFELDT WELL DRILLING
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

2110 Penny Lane Napa CA 94559
ADDRESS CITY STATE ZIP

Signed _____ 4-3-01 439-746
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

MEMORANDUM

APPENDIX

OCTOBER 6 AND 7, 2016 PUMPING TESTS
OF WELL 2
AND
MARCH 22, 2017 PUMPING TEST
OF WELL 1
BY
RAY'S WELL TESTING SERVICE, INC.

Phone: 707 823 3191 **Fax:** 707 317 0057 **Email:** rayswelltesting@gmail.com **Lic#**:903708
Address: 4853 Vine Hill Rd, Sebastopol Ca 95472

Date: 10/07/16
Report #: 8584
Report By: Matt Owens

Subject Property Address: 275 Long Ranch Rd, St. Helena CA 94574
Customer Name: Matthew Heil

WELL DATA:

Location/Description of well:	At end of service road to left of driveway
Type of Well:	Drilled
Depth of Well:	678 Feet
Diameter of Well Casing:	6” PVC with 10” steel overshot
Sanitary Seal (plate seal at top of well):	Cap
Annular Well Seal (in ground seal of bore hole):	52' Cement Seal

PUMP DATA:

Pump HP and Type:	10 HP Submersible Test Pump
Depth of Pump Suction:	588 Feet
Size of Tee at Well Head:	Test Pump
Submersible Cable Size:	Test Pump
Water Level Control:	Test Pump
Backpressure Test:	Test Pump

WELL PRODUCTION SUMMARY (see next page for pumping log):

Length of Test: 8 Hours
Type of Test: Constant Pumping Rate

Static Water Level:	435.5 Feet	**Starting Flow**	50 GPM
Water Level Drawdown:	15.1 Feet		
Final Pumping Level:	450.6 Feet	**Final Flow**	50 GPM

WATER LEVEL RECOVERY SUMMARY:

Pre Test Static Water Level:	435.5 Feet
Post Test Static Water Level:	435.5 Feet
Water Level Drawdown:	15.1 Feet
Water Level Recovery:	15.1 Feet
Water Level Recovery as % of Drawdown:	100.00%
Length Between End of Test and Recovery:	15 minutes

WELL PRODUCTION DATA & PUMPING LOG:

Date	Time	Interval	Water Level	Appearance	Sulfur Odor	Sand	GPM
10/07/16	06:30 AM	0 Minutes	435.5	Cloudy	No	No	50
10/07/16	07:00 AM	30 Minutes	450.3	Yellow Haze	No	No	50
10/07/16	07:30 AM	30 Minutes	450.5	Clear	No	No	50
10/07/16	08:00 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	08:30 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	09:00 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	09:30 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	10:00 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	10:30 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	11:00 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	11:30 AM	30 Minutes	450.6	Clear	No	No	50
10/07/16	12:00 PM	30 Minutes	450.6	Clear	No	No	50
10/07/16	12:30 PM	30 Minutes	450.6	Clear	No	No	50
10/07/16	01:00 PM	30 Minutes	450.6	Clear	No	No	50
10/07/16	01:30 PM	30 Minutes	450.6	Clear	No	No	50
10/07/16	02:00 PM	30 Minutes	450.6	Clear	No	No	50
10/07/16	02:30 PM	30 Minutes	450.6	Clear	No	No	50

Final Pumping Level: 450.6 Feet
Final Flow Rate: 50 GPM

WATER LEVEL RECOVERY DATA:

Date	Time	Interval	Water Level	Recovery %
10/07/16	02:45 PM	15 Minutes	435.5	100.00%
10/07/16	03:00 PM	15 Minutes	435.5	100.00%
10/07/16	03:15 PM	15 Minutes	435.5	100.00%
10/07/16	03:30 PM	15 Minutes	435.5	100.00%
10/10/16	09:30 AM	66 Hours	435.5	100.00%

Final post test static level measurement: 435.5 Feet
Final Water Level Recovery as % of Drawdown: 100.00%
Length of time between end of test and recovery: 15 minutes

Water levels and well depth are measured as feet below top of well casing unless otherwise noted.

DISCLAIMER:
Results of well production are accurate only at time of test. We cannot predict future production or water yield.

WATER QUALITY: (The following samples are being analyzed, please refer to follow up report)
Analysis Choice: State Source Chemical Monitoring **Turnaround:** Standard

Phone: 707 823 3191 **Fax:** 707 317 0057 **Email:** rayswelltesting@gmail.com **Lic#**:903708
Address: 4853 Vine Hill Rd, Sebastopol Ca 95472

Date: 10/06/16
Report #: 8584
Report By: Matt Owens

Subject Property Address: 275 Long Ranch Rd, St. Helena CA 94574
Customer Name: Matthew Heil

WELL DATA:

Location/Description of well:	At end of service road to left of driveway
Type of Well:	Drilled
Depth of Well:	678 Feet
Diameter of Well Casing:	6” PVC with 10” steel overshot
Sanitary Seal (plate seal at top of well):	Cap
Annular Well Seal (in ground seal of bore hole):	52' Cement Seal

PUMP DATA:

Pump HP and Type:	10 HP Submersible Test Pump
Depth of Pump Suction:	588 Feet
Size of Tee at Well Head:	Test Pump
Submersible Cable Size:	Test Pump
Water Level Control:	Test Pump
Backpressure Test:	Test Pump

WELL PRODUCTION SUMMARY (see next page for pumping log):

Length of Test: 6 Hours
Type of Test: Step Drawdown Test

Static Water Level:	435.5 Feet	**Starting Flow**	15 GPM
Water Level Drawdown:	13.8 Feet		
Final Pumping Level:	449.3 Feet	**Final Flow**	45 GPM

WATER LEVEL RECOVERY SUMMARY:

Pre Test Static Water Level:	435.5 Feet
Post Test Static Water Level:	435.5 Feet
Water Level Drawdown:	13.8 Feet
Water Level Recovery:	13.8 Feet
Water Level Recovery as % of Drawdown:	100.00%
Length Between End of Test and Recovery:	14 Hrs 15 Mins

WELL PRODUCTION DATA & PUMPING LOG:

Date	Time	Interval	Water Level	Appearance	Sulfur Odor	Sand	GPM
10/06/16	10:15 AM	0 Minutes	435.5	Cloudy	No	No	15
10/06/16	10:45 AM	30 Minutes	440.1	Yellow Haze	No	No	15
10/06/16	11:15 AM	30 Minutes	442.4	Clear	No	No	15
10/06/16	11:45 AM	30 Minutes	442.4	Clear	No	No	15
10/06/16	12:15 PM	30 Minutes	444.7	Clear	No	No	30
10/06/16	12:45 PM	30 Minutes	444.7	Clear	No	No	30
10/06/16	01:15 PM	30 Minutes	447	Clear	No	No	30
10/06/16	01:45 PM	30 Minutes	447	Clear	No	No	30
10/06/16	02:15 PM	30 Minutes	447	Clear	No	No	45
10/06/16	02:45 PM	30 Minutes	449.3	Clear	No	No	45
10/06/16	03:15 PM	30 Minutes	449.3	Clear	No	No	45
10/06/16	03:45 PM	30 Minutes	449.3	Clear	No	No	45
10/06/16	04:15 PM	30 Minutes	449.3	Clear	No	No	45

Final Pumping Level: 449.3 Feet
Final Flow Rate: 45 GPM

WATER LEVEL RECOVERY DATA:

Date	Time	Interval	Water Level	Recovery %
10/07/16	06:30 AM	14 Hrs 15 Mins	435.5	100.00%

Final post test static level measurement: 435.5 Feet
Final Water Level Recovery as % of Drawdown: 100.00%
Length of time between end of test and recovery: 14 Hrs 15 Mins

Water levels and well depth are measured as feet below top of well casing unless otherwise noted.

DISCLAIMER:
Results of well production are accurate only at time of test. We cannot predict future production or water yield.

WATER QUALITY: (The following samples are being analyzed, please refer to follow up report)
Analysis Choice: State Source Chemical Monitoring **Turnaround:** Standard

WELL TESTING SERVICE

Phone: (707) 823-3191 **Fax:** (707) 317-0057 **Email:** rayswelltesting@gmail.com
Address: 4853 Vine Hill Rd, Sebastopol Ca 95472 **CA Lic. #:** 903708

Well Yield Pump Test for Water Supply Permit

The following capacity testing was performed on well #11 at:

Ovid Napa Valley
255 Long Ranch Rd
St Helena CA 94574

Water flow rate measurements were determined by a Seaflow water meter and verified using a container and stopwatch. Water levels were measured with the existing air tube device that is currently installed in the well.

Please contact **Ray's Well Testing Service, Inc**. with any questions: (707) 823-3191

Respectfully submitted,
Nick Brasesco

Ray's Well Testing Service Inc.
Phone Number: 707 823 3191
Address: 255 Long Ranch Rd, St Helena Ca
Well ID Well 11

Page1 **8 -Hour Pump Test Form with Recovery Data** **Static Level:** 461.9

Date	Time	Interval	Water Level	Water color:	Odor:	Sand:	GPM
03/22/17	10:20 AM	10 Mins	461.9	Visibly Clear	No	No	75
03/22/17	10:30 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	10:40 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	10:50 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	11:00 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	11:10 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	11:20 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	11:30 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	11:40 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	11:50 AM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	12:00 PM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	12:10 PM	10 Mins	466.6	Visibly Clear	No	No	75
03/22/17	12:20 PM	20 Mins	466.6	Visibly Clear	No	No	75
03/22/17	12:40 PM	20 Mins	466.6	Visibly Clear	No	No	75
03/22/17	01:00 PM	20 Mins	466.6	Visibly Clear	No	No	75
03/22/17	01:20 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	01:50 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	02:20 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	02:50 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	04:20 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	04:50 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	05:20 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	05:50 PM	30 Mins	466.6	Visibly Clear	No	No	75
03/22/17	06:20 PM	30 Mins	466.6	Visibly Clear	No	No	75

Static level:	461.9
Water level drawdown:	4.7
Final Pumping level:	466.6

Page 2 8 -Hour Pump Test Form with Recovery Data

Date	Time	Interval	Water Level	Recovery %
03/22/17	06:35 PM	15 Mins	462.1	95.74%
03/22/17	06:50 PM	15 Mins	461.9	100.00%

-Water levels recorded as feet below surface.
-Water levels calculated with air tube readings from existing 1/4" air tube installed in the well.

MEMORANDUM

APPENDIX

ANALYTICAL LABORATORY REPORTS
FOR
WELL 2

Analytical Sciences

Report Date: October 19, 2016

Laboratory Report

Ray's Well Testing Service
4853 Vine Hill Rd
Sebastopol, CA 95472

Project Name: **275 Long Ranch Road**

Lab Project Number: **6100704**

This 6 page report of analytical data has been reviewed and approved for release.

Mark A. Valentini, Ph.D.

Laboratory Director

P.O. Box 750336
Petaluma, CA 94975-0336
Telephone: (707) 769-3128

110 Liberty Street
Petaluma, CA
94952

Total Coliform & E. Coli

Lab#	Sample ID	Compound Name	Result (MPN/100 mL)		RDL (MPN/100 mL)
6100704-01	**Raw Well**	Total Coliform	11		1
		E. Coli	<1	QT	1

Date Sampled:	10/06/16	Date Analyzed:	10/08/16	QC Batch: B016222
Date Received:	10/07/16	Method:	SM 9223 B-2004	

Metals by Graphite Furnace

Lab#	Sample ID	Compound Name	Result (µg/L)	RDL (µg/L)
6100704-01	**Raw Well**	Antimony (Sb)	ND	5.0
		Arsenic (As)	ND	2.0
		Selenium (Se)	ND	5.0
		Thallium (Tl)	ND	1.0

Date Sampled:	10/06/16	Date Analyzed:	10/19/16	QC Batch: B016215
Date Received:	10/07/16	Method:	EPA 200.9	

Metals by ICP

Lab#	Sample ID	Compound Name	Result (µg/L)	RDL (µg/L)
6100704-01	**Raw Well**	Aluminum (Al)	ND	50
		Barium (Ba)	ND	50
		Beryllium (Be)	ND	1.0
		Cadmium (Cd)	ND	1.0
		Chromium (Cr)	ND	2.5
		Iron (Fe)	ND	100
		Manganese (Mn)	ND	20
		Nickel (Ni)	ND	10
		Zinc (Zn)	220	50

Date Sampled:	10/06/16	Date Analyzed:	10/13/16	QC Batch: B016242
Date Received:	10/07/16	Method:	EPA 200.7	

Metals (mg/L)

Lab#	Sample ID	Compound Name	Result (mg/L)	RDL (mg/L)
6100704-01	**Raw Well**	Boron (B)	ND	0.050
		Sodium (Na)	11	2.0

Date Sampled:	10/06/16	Date Analyzed:	10/13/16	QC Batch: B016242
Date Received:	10/07/16	Method:	EPA 200.7	

Silica

Lab#	Sample ID	Compound Name	Result (mg/L)	RDL (mg/L)
6100704-01	**Raw Well**	Silica (SiO2)	97	10

Date Sampled:	10/06/16	Date Analyzed:	10/13/16	QC Batch: B016242
Date Received:	10/07/16	Method:	EPA 200.7	

Hardness

Lab#	Sample ID	Compound Name	Result (mg/L)	RDL (mg/L)
6100704-01	**Raw Well**	Calcium (Ca)	15	0.25
		Magnesium (Mg)	13	0.10
		Hardness	92	1.0

Date Sampled:	10/06/16	Date Analyzed:	10/13/16	QC Batch: B016242
Date Received:	10/07/16	Method:	SM 2340 B-2011	

Mercury

Lab#	Sample ID	Compound Name	Result (µg/L)	RDL (µg/L)
6100704-01	**Raw Well**	Mercury (Hg)	ND	0.20

Date Sampled:	10/06/16	Date Analyzed:	10/19/16	QC Batch: B016260
Date Received:	10/07/16	Method:	EPA 245.1	

pH

Lab#	Sample ID	Compound Name	Result (pH Units)		RDL (pH Units)
6100704-01	**Raw Well**	pH	6.43	HT	1.00

Date Sampled:	10/06/16	Date Analyzed:	10/07/16	QC Batch:	B016221
Date Received:	10/07/16	Method:	SM 4500-H B-2011		

Conductivity

Lab#	Sample ID	Compound Name	Result (µS/cm)	RDL (µS/cm)
6100704-01	**Raw Well**	Conductivity	230	0.5

Date Sampled:	10/06/16	Date Analyzed:	10/07/16	QC Batch:	B016221
Date Received:	10/07/16	Method:	SM 2510 B-2011		

Alkalinity

Lab#	Sample ID	Compound Name	Result (mg CaC03/L)	RDL (mg CaC03/L)
6100704-01	**Raw Well**	Total Alkalinity	110	5.0
		Bicarbonate Alkalinity	110	5.0
		Carbonate Alkalinity	ND	5.0
		Hydroxide Alkalinity	ND	5.0

Date Sampled:	10/06/16	Date Analyzed:	10/17/16	QC Batch:	B016257
Date Received:	10/07/16	Method:	SM 2320 B-2011		

Anions

Lab#	Sample ID	Compound Name	Result (mg/L)	RDL (mg/L)
6100704-01	**Raw Well**	Fluoride	0.10	0.10
		Chloride	5.8	0.50
		Nitrite as N	ND	0.15
		Nitrate as N	0.23	0.15
		Sulfate as SO4	1.5	0.50

Date Sampled:	10/06/16	Date Analyzed:	10/07/16	QC Batch: B016237
Date Received:	10/07/16	Method:	EPA 300.0	

Total Dissolved Solids by EC

Lab#	Sample ID	Compound Name	Result (mg/L)	RDL (mg/L)
6100704-01	**Raw Well**	Total Dissolved Solids	150	10

Date Sampled:	10/06/16	Date Analyzed:	10/07/16	QC Batch: B016201
Date Received:	10/07/16	Method:	EPA 120.1	

Sodium Absorption Ratio

Lab#	Sample ID	Compound Name	Result (SAR)	RDL (SAR)
6100704-01	**Raw Well**	Sodium Absorption Ratio (SAR)	0.515	0.00

Date Sampled:	10/06/16	Date Analyzed:	10/13/16	QC Batch: B016242
Date Received:	10/07/16	Method:	SAR by Calculation	

Notes and Definitions

QT	The bacterial test utilized is a quantitative test. A result of less than 1 (<1) is indicating bacteria are "absent" in 100 milliliters of sample water.
HT	The recommended holding time prior to analysis for dissolved oxygen, pH and residual chlorine is 15 minutes. This analysis was performed outside the recommended 15 minute holding time.
RDL	Reporting Detection Limit
ND	Analyte NOT DETECTED at or above the reporting detection limit (RDL)
mg/L	milligrams per Liter
ug/L	micrograms per Liter

PLEASE NOTE: The drinking water Maximum Contamination Limits (MCL) set by the California State Water Resource Control Board are as follows:

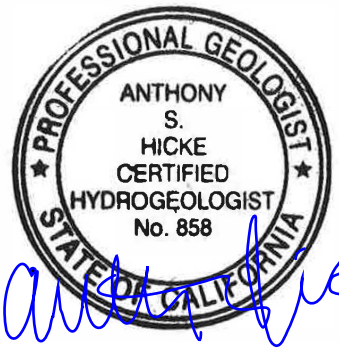
Arsenic (10 ug/L)
Bromate (0.010 mg/L)
Iron (300 ug/L)
Manganese (50 ug/L)
Nitrate as N (10 mg/L)
Nitrite as N (1.0 mg/L)
Lead (15 ug/L)
Copper (1300 ug/L)
Total Coliform / E. Coli (< 1 MPN/100 mL - Most Probable Number per 100 milliliters)

RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

MEMORANDUM

July 16, 2022

To: Mr. Mike Muelrath
Applied Civil Engineering, Inc (ACE)
2074 West Lincoln Avenue
Napa, CA 94558
Sent via email (mike@appliedcivil.com)



Job No. 746-NPA02

Re: Preparation of Napa County Tier 3 Water Availability Analysis (WAA)
Red Dirt Grapes Vineyard Development Project
Napa County APNs 032-560-038 & 032-030-071
Long Ranch Road, Pritchard Hill, Napa County, CA

Dear Mr. Muelrath:

Richard C. Slade & Associates LLC, Consulting Groundwater Geologists (RCS), is pleased to present this Memorandum regarding a Tier 3 Water Availability Analysis for the Red Dirt Grapes property, which is located at 275 Long Ranch Road, in the vicinity of Pritchard Hill in Napa County. RCS prepared a document titled "Results of Napa County Tier 1 Water Availability Analysis, Red Dirt Grapes Vineyard Development Project, Napa County APNs 032-560-038 & 032-030-071, Vicinity Pritchard Hill, Napa County, California" dated March 17, 2022 (RCS, 2022). That document was submitted to the County as part of the review process for the proposed vineyard development project. Following Napa County review of the application, Napa County issued a letter dated June 1, 2022, titled "Application Review Determination, Red Dirt Grapes LLC., Vineyard Conversion, Agricultural Erosion Control Plan (ECPA) File # P22-00143-ECPA, Terminus of Long Ranch Road: APNs 032-030-071 & 032-560-03" (PBES, 2022). Therein, a Tier 3 WAA analysis was requested by the County. As quoted from the County's June 1, 2022, letter for the project submission:

> *"1.b. Water Availability Analysis (WAA): Because the project well is within 1,500 feet of a blue-line stream, provide an addendum or update to the project WAA (Richard C. Slade & Associates, March 2022) that includes a Tier 3 analysis or documentation that the Tire 3 screening criteria in the WAA Guidance Document can be met.*

Therefore, the purpose of this document is to respond to the County PBES comment above, in accordance with the Napa County WAA guidelines (WAA, 2015).

Background

Figure 1, "Location Map" shows the subject property boundaries superimposed on the topographic map of the Yountville Quadrangle (USGS 1951). As shown thereon, three unnamed, dashed "blueline" intermittent streams are shown on the USGS basemap. These dashed "blueline stream locations coincide with "blueline streams" shown in the Napa County "bluelines_public" GIS data layer (Napa County GIS, 2004); these are also plotted on Figure 1. Two of the dashed "blueline" streams are north of the project well (Well 1). These two dashed "blueline" streams merge just north of the property boundary, and join a channel that directs any runoff toward the northwest, in the direction of Lake Hennessy. The third dashed "blueline" stream is located to the southeast of the project well; its channel directs any runoff in the direction of the Rector Reservoir.

Figure 2, "Aerial Photograph Map", shows an aerial photograph of the area and the same information as was shown Figure 1, but with the addition of an offsite reservoir location. During a site visit in February 2022, the project Civil Engineer, Mr. Mike Muelrath, observed this offsite reservoir (the reservoir is not owned by Red Dirt Vineyards and is not part of the Red Dirt Vineyards property). Based on the location of the reservoir shown on Figure 2, the "blueline" stream channel from the Napa County GIS data set may not be exactly located, as the reservoir should be within the stream channel. The reservoir was observed to be dry in February 2002, as was the intermittent "blueline" stream (see Figure 2). A second observation of this same "blueline" intermittent stream, but at a different location, was made just outside of the northwest subject property boundary. There, the project Engineer did observe water in the "blueline" channel, beneath the road crossing at that location. No observation was made in the southeast "blueline" intermittent channel, as access availability is unknown.

RCS is not aware of nor was RCS able to recover any information related to historic surface water flows in any of the three "blueline" intermittent streams shown on Figure 1. Anecdotal information from the project Civil Engineer and other property owners in the area suggest that flow in the "blueline" intermittent streams in the area occurs primarily during and immediately following rainfall events. The northeastern "blueline" channel shown on the Figures is reportedly spring-fed, and flows annually in the early part of the year, but ceases to flow in the summer months. The actual spring location that may feed this northeastern "blueline channel" is unknown, but is thought to exist on the property located to the west-northwest of the subject Red Dirt Grapes property. As shown on Figure 3, "Geologic Map" there are two reservoirs within the "blueline" intermittent stream channel on the neighboring property. The northeastern dashed "blueline" intermittent streamline derived from the County GIS data (Napa County GIS, 2004) begins at that furthest offsite, upstream reservoir. Hence, it is possible that any surface water flows in the "blueline" intermittent stream channel may be regulated by those upstream reservoirs.

Well Construction and Hydrogeology

As stated in the WAA report (RCS, 2022), Well 1 is the project well proposed to supply groundwater to the proposed vineyard development. The well has a deep cement sanitary seal set to a depth of 53 ft below ground surface (ft bgs), and two deep perforated intervals (from 476 ft to 556 ft bgs and 636 ft to 716 ft bgs). As described in the RCS WAA, the project Well (Well 1) is perforated solely within rocks of the Sonoma Volcanics. Figure 3, "Geology Map," is the same

geology map shown in the RCS-prepared WAA (RCS, 2022), and it shows that the ground surface at and beneath the subject property and surrounding areas are comprised solely by the Sonoma Volcanics. Figure 3 has been updated with the "blueline" intermittent stream information from the County GIS files, and includes the location of the offsite reservoir described above.

In addition, Figure 3 shows the alignments of three geologic cross sections created by RCS for the purposes of this Tier 3 analysis. The cross sections are shown on Figures 3, 4, and 5, Cross Sections A-A', B-B', and C-C', respectively. The cross section alignments were chosen to intersect the project well and one of the three "blueline" stream channels at the closest distance between the "blueline" channel and the project well. The cross sections are scaled drawings, and show the interpreted geologic conditions beneath the property and the construction of the project well. Each section is notated with the surface features that each cross section intercepts, including the intermittent "blueline" streams and property lines. Also shown on the cross sections is a water level depth measurement of 461.9 ft bgs previously collected in the project well, measured during a pumping test conducted in March 2017. This pumping test described in the RCS WAA (RCS, 2022). A March 2017 measurement was used because a more recent measurement attempt was unsuccessful, as described in the RCS WAA (RCS, 2022). Note that a 431-foot post-construction water level depth was reported on the driller's log for Well 1 (RCS, 2022). Hence, the water level in the project well has been deeper than 400 ft since its construction in 2001.

Notable on the cross sections the depths of the perforated intervals in Well 1 in relation to ground surface. Perforations in the well begin at a depth of 476 ft bgs. Hence, groundwater pumped from the well will have originated from the fractures in the volcanic rock at and below that depth. Also, the well was constructed with a 53-foot deep cement sanitary seal. This seal prevents surficial water (if any) from entering the borehole.

Also important to note from the cross sections is the elevation of the water level in the well in relation to the elevations of the "blueline" intermittent stream channels. The water level from March 2017 in Well 1 is at an elevation that is several hundreds of feet below those in the "blueline" surface channels in question. The closest elevation difference between a water level and a blueline surface water channel is illustrated on cross section A-A' (see Figure 4). As shown thereon, the static water level measured in March 2017 in Well 1 (the project well) was roughly 375 ft lower in elevation than the "blueline" intermittent stream channel located 740 ft northwest of the well. This significant elevation difference between the water level elevations in the project well and the surficial stream channels is significant evidence to support the assertion that the project well is not hydraulically connected to the "blueline" intermittent streams that surround the subject property.

Based on the data above, and as illustrated on the cross sections, Well 1 is not hydraulically connected to the "blueline" intermittent streams that surround the subject Red Dirt Grapes property. As shown on the Figure F-2 "Decision Tree" in the County's WAA Guidance Document (WAA, 2015), and described in the Guidance Document text, because the project well is not hydraulically connected to surface water(s), the "Groundwater/Surface Water Evaluation is complete."

Conclusions

- Well 1 (the project well) is not in direct hydraulic connection with the three USGS-defined (1951) "blueline" intermittent stream channels shown on Figures 1, 2, and 3. This lack of connection is demonstrated by the following:
    - Well 1 has a deep cement seal (53 ft bgs) and perforated intervals that begin at a depth of 476 ft bgs. Hence, this well derives its groundwater solely from factures within the Sonoma Volcanics.
    - The water level in the project well is currently and has always been at much lower elevations than the "blueline" intermittent stream elevations that surround the subject property.
- Because a lack of hydraulic connection has been demonstrated, then according to the WAA Guidance document (WAA, 2015), the Tier 3 analysis has been satisfied.

References:

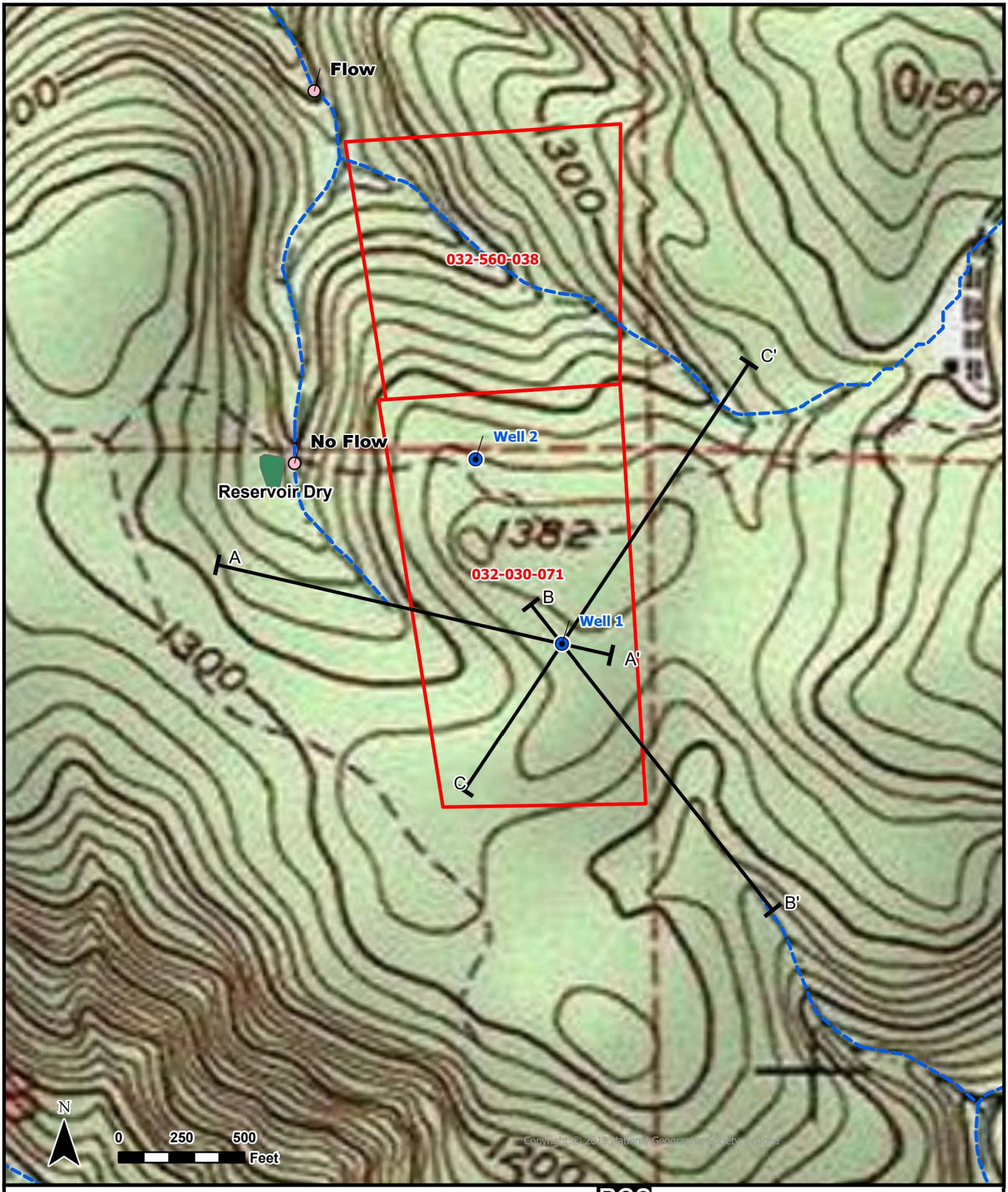
Napa County GIS Data, "Bluelines_public" data layer, Napa County GIS Data Catalog Website (http://gis.napa.ca.gov/giscatalog/catalog_xml.asp), January 27, 2004

Napa County Board of Supervisors, "Water Availability Analysis (WAA) – Guidance Document." Adopted May 12, 2015

Napa County Planning, Building & Environmental Services (PBES), "Application Review Determination Red Dirt Grapes LLC., Vineyard Conversion Agricultural Erosion Control Plan (ECPA) File # P22-00143-ECPA Terminus of Long Ranch Road: APNs 032-030-071 & 032-560-03". June 1, 2022.

Richard C. Slade & Associates LLC (RCS), "Results of Napa County Tier 1 Water Availability Analysis, Red Dirt Grapes Vineyard Development Project, Napa County APNs 032-560-038 & 032-030-071, Vicinity Pritchard Hill, Napa County, California". March 17, 2022.

United States Geological Survey (USGS), 1:24000-scale Quadrangle for Yountville, CA. 1951:



LEGEND

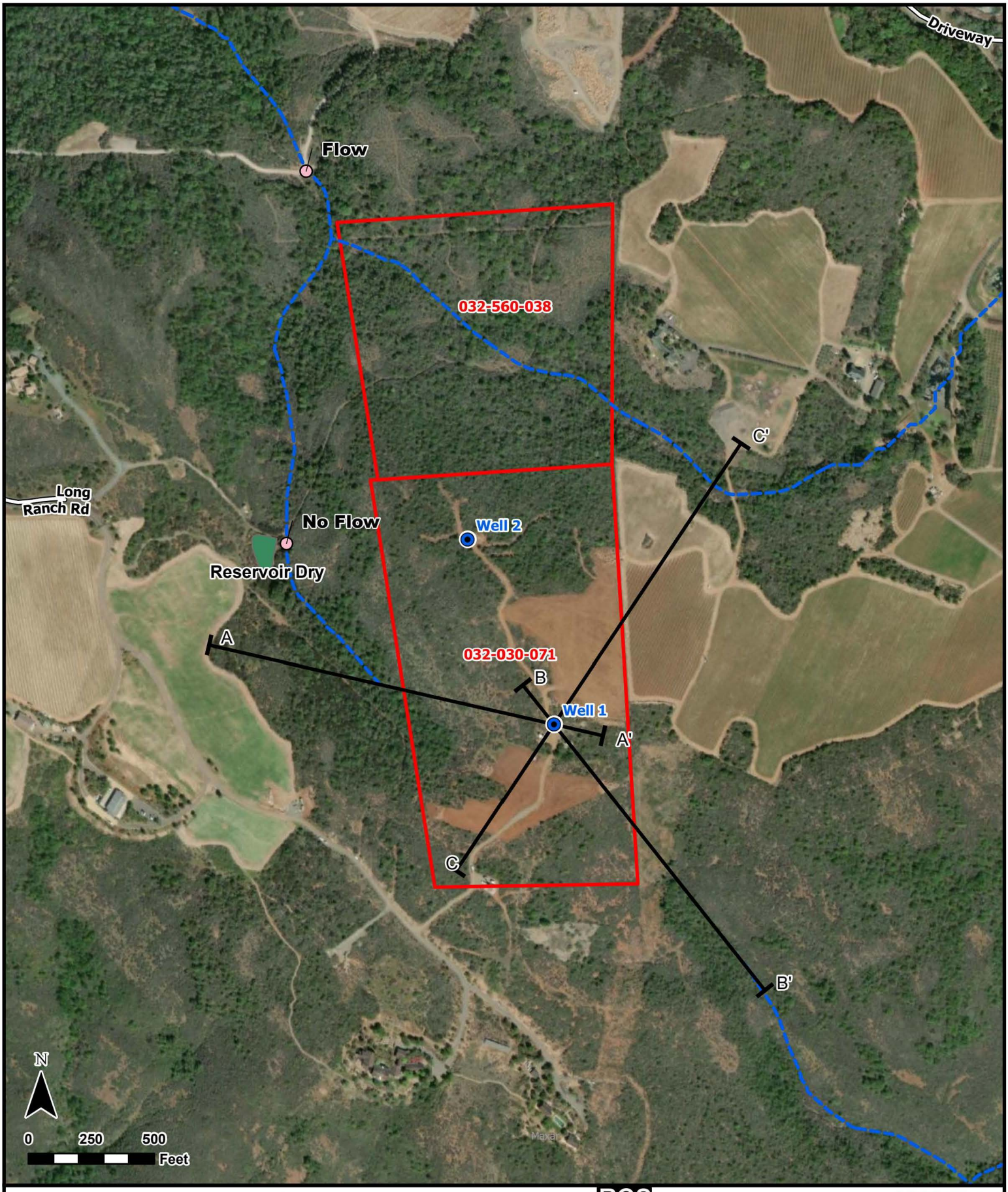
- Subject Property (showing County APNs)
- Napa County GIS Bluelines (2004)
- Cross Section
- Onsite Well (Approx.)
- Observation Points (February 2022)

RCS

FIGURE 1
LOCATION MAP

RCS Job No. 746-NPA02

July 2022



LEGEND

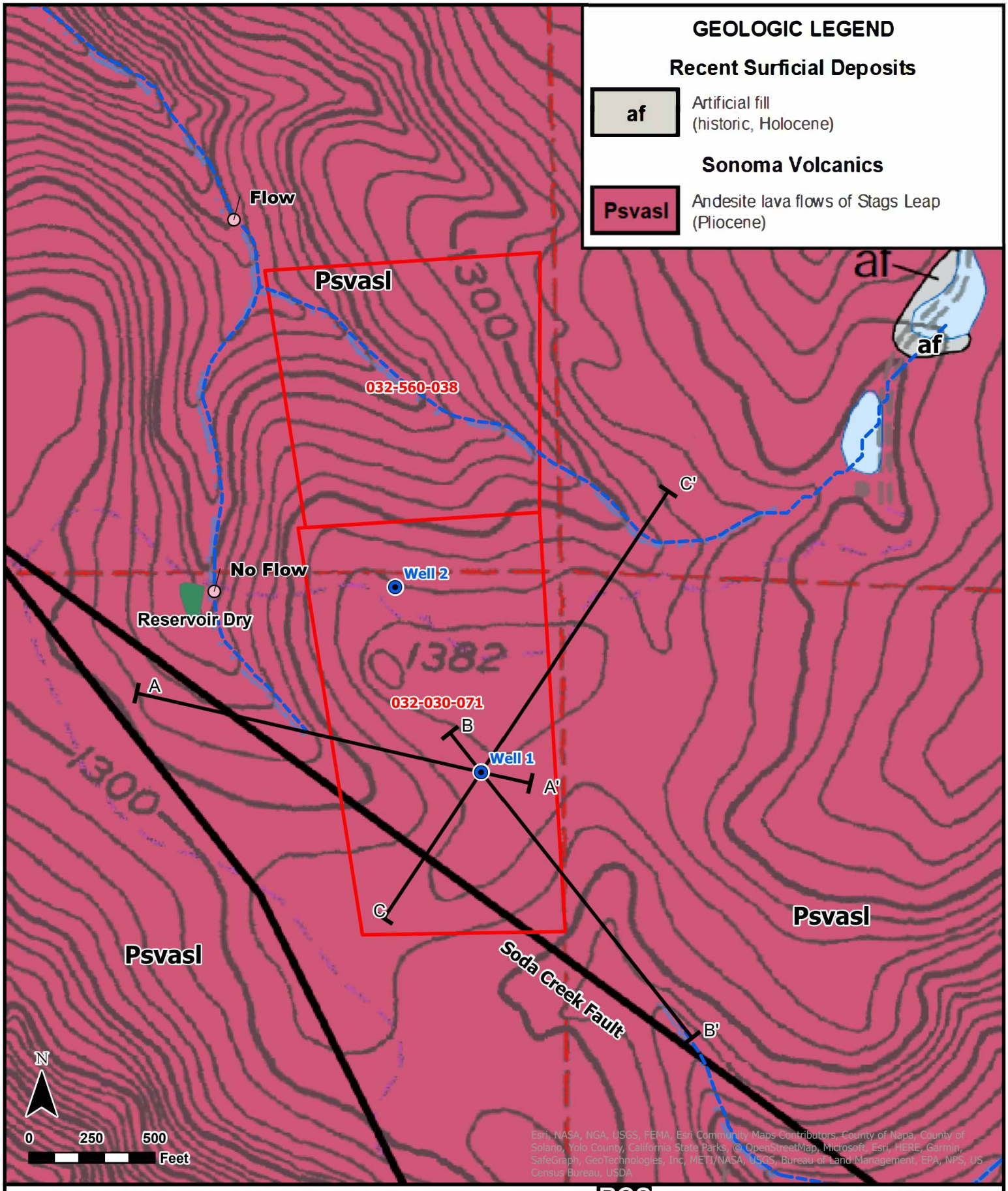
- Subject Property (showing County APNs)
- Napa County GIS Bluelines (2004)
- Cross Section
- Onsite Well (Approx.)
- Observation Points (February 2022)

RCS

FIGURE 2
AERIAL PHOTOGRAPH MAP

RCS Job No. 746-NPA02

July 2022



LEGEND

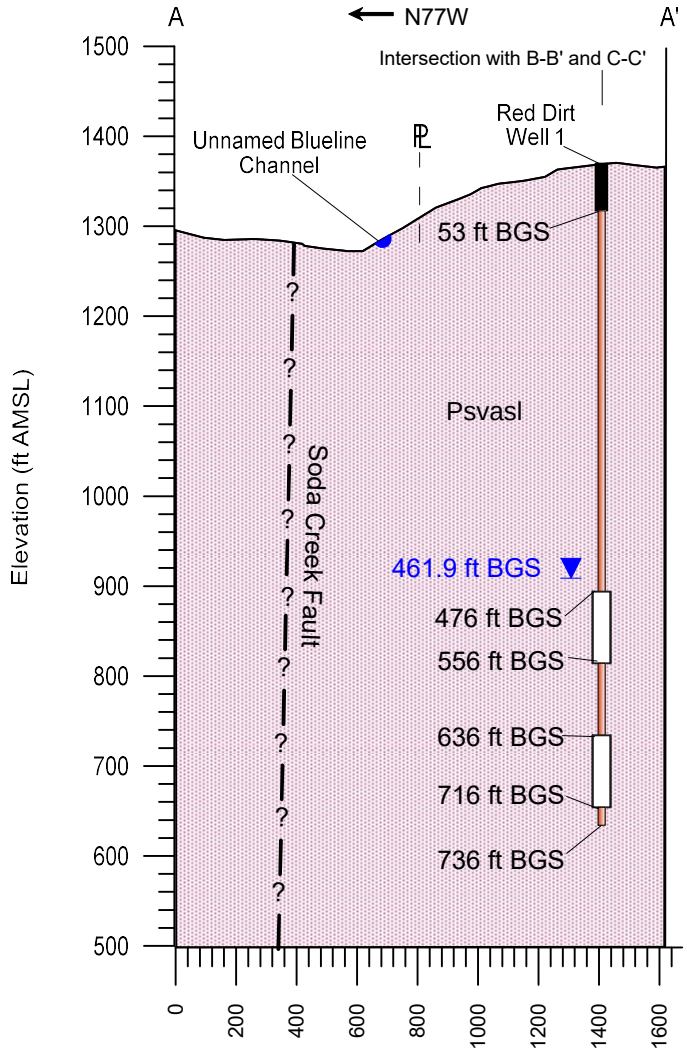
- Subject Property (showing County APNs)
- Napa County GIS Bluelines (2004)
- Cross Section
- Onsite Well (Approx.)
- Observation Points (February 2022)

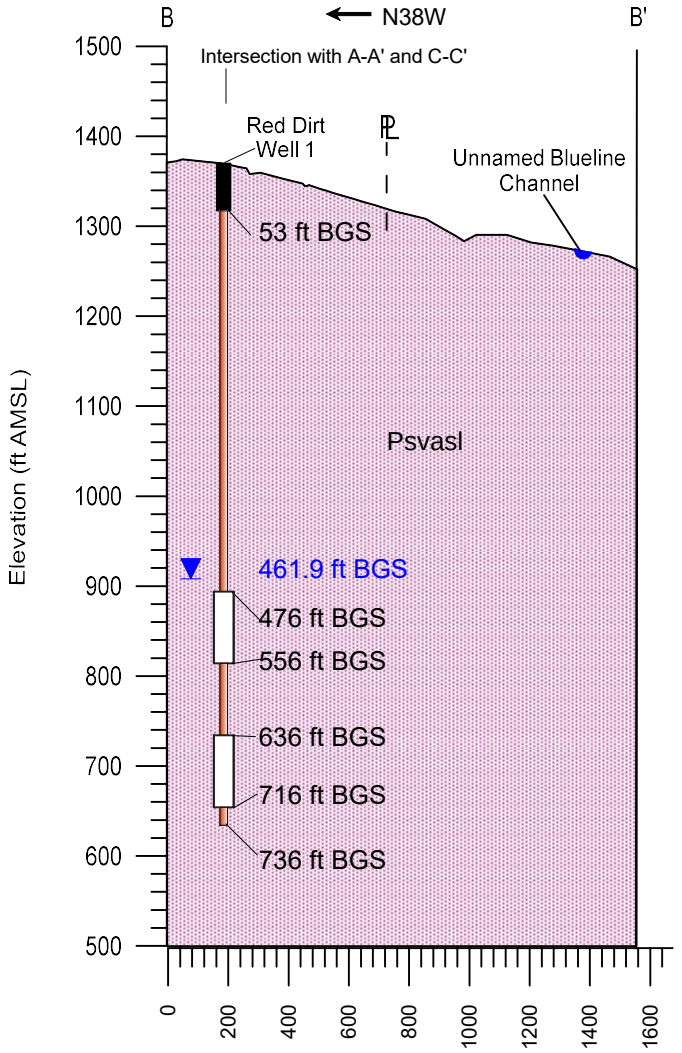
RCS

FIGURE 3
GEOLOGIC MAP

RCS Job No. 746-NPA02

July 2022





Vertical Exaggeration = 3x

See location of section line on Figures 1-3

ft BGS = Feet Below Ground Surface

ft AMSL = Feet Above Mean Sea Level

LEGEND

- Cement Seal
- Blank Casing
- Perforated Interval
- Static Water Level (March 2017)

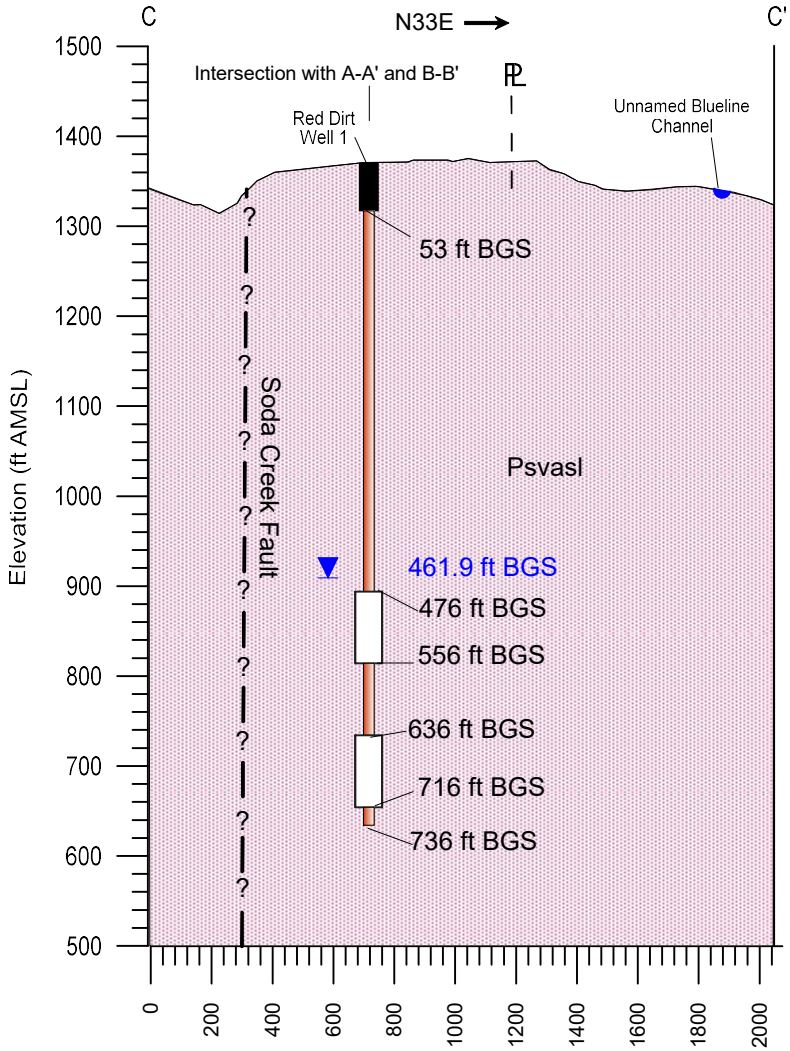
Psvasl — Andesite Lava Flows of Stags Leap (Pliocene)

RCS

FIGURE 4
CROSS SECTIONS AA' AND BB'

RCS Job No. 746-NPA02

July 2022



Vertical Exaggeration = 3x

See location of section line on Figures 1-3

ft BGS = Feet Below Ground Surface

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LEGEND

- Cement Seal
- Blank Casing
- Perforated Interval
- Static Water Level (March 2017)

Psvasl — Andesite Lava Flows of Stags Leap (Pliocene)

RCS

FIGURE 5
CROSS SECTION CC'

RCS Job No. 746-NPA02

July 2022