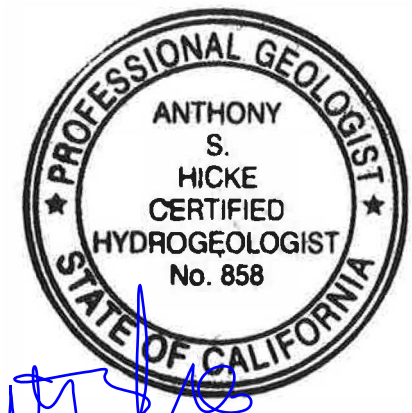
MEMORANDUM

January 31, 2023



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Job No. 713-NPA01

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

Re: Results of Napa County Tier 1, Tier 2, and Tier 3 Water Availability Analyses
Hourglass Winery
4208 Silverado Trail North
Calistoga, CA 94515

Introduction

This Memorandum presents the key RCS findings, conclusions, and preliminary recommendations regarding the Water Availability Analysis (WAA) for the proposed new winery project for the Hourglass Winery property (subject property) in Napa County, California. This document was prepared for the property owner to provide hydrogeologic analyses in conformance with Napa County Tier 1, Tier 2, and Tier 3 WAA requirements, as described in the Napa County WAA Guidelines Document (WAA, 2015).

The subject property is comprised by two parcels and is located at 4208 Silverado Trail North in the Calistoga area of Napa County (County). The Napa County Assessor's Parcel Numbers (APNs) for the two parcels are 021-010-001 and 018-060-024, with assessed acreages of 30 acres and 15 acres, respectively. Figure 1, "Well Location Map," shows the approximate boundaries of the subject property superimposed on a USGS topographic map of the area. The approximate parcel boundaries shown on Figure 1 were adapted from the County Assessor's parcel data, which are freely available on the County GIS website. Note that acreages measured using GIS calculation methods do not agree with the assessed acreages. However, as is standard practice for WAA work by RCS in Napa County, RCS will rely on the assessed acreages for the

purposes of this WAA Memorandum. Figure 1 also shows the locations of the existing onsite wells, (Well Nos. 1, 2, 3, 4, and 5) as well as the approximate locations of some offsite wells owned by others. Note that the locations of the proximal offsite wells shown on Figure 1 are not considered to represent all nearby but offsite wells owned by others that may exist in the area. Figure 2, "Aerial Photograph Map," shows the same property boundary and well locations that are illustrated on Figure 1, but the base map for Figure 2 is an aerial photograph of the area (photo dated April 16, 2022) that was obtained via the ArcGIS Pro software package.

The property (including the onsite vines and existing winery) was badly damaged during the Glass Fire in 2020,. Recently, 18.7 acres of vines were replanted to replace the burned vines. The proposed project includes the redevelopment of a winery on the property to replace the winery that was destroyed by the fire. RCS understands the proposed project is to construct a new winery with a production capacity of 60,000 gallons of wine per year. The winery will include, along with wine production and the necessary employees, a wine tasting room and other events. Water demands for all future onsite developments will be met using groundwater from onsite wells. The vineyards and landscaping at the subject property will be irrigated using groundwater pumped primarily by Well Nos. 1, 2, 3, and 4, with some supplemental water being pumped from Well 5 when necessary. All irrigation water is to be pumped to and distributed from an onsite pond (the pond is visible on Figure 2 on the southern portion of the larger parcel). All winery demands will be met using groundwater pumped from Well 5, and therefore Well 5 is considered to be the "project well" of the analyses herein.

The basic purpose of this Memorandum is to comply with all three "Tiers" of Napa County's WAA guidelines promulgated by the County in May 2015 (WAA, 2015). A "Tier 1" WAA requires preparation of the annual groundwater recharge that occurs at the subject property, and comparison of that recharge estimate to the proposed groundwater use at the property. Because there is at least one known offsite well owned by others (see Figure 1) that is located within 500 ft of Well 5 (i.e., the "project well"), then a "Tier 2" WAA is required to determine possible offsite well interference that may be caused by pumping of the project well to meet the groundwater demands of the project. A "Tier 3" WAA analysis is required because the project well is located within 1,500 ft of a "Significant Stream" as defined by Napa County Planning, Building, and Environmental Services (PBES). Figures 1 and 2 show the "Significant Streams" defined by Napa County PBES.

Site Conditions

From review of data provided by the property owner and the project Civil Engineer, Advanced Civil Engineering of Napa, CA (ACE), and from the field reconnaissance visit by an RCS geologist to the subject property on June 9, 2019 (prior to the September 2020 Glass Fire), the following key items were noted and/or observed (refer to Figures 1 and 2):

a. The Hourglass Winery property is comprised by two individual parcels having County Assessor's Parcel Numbers (APNs) of 021-010-001 and 018-060-024 with assessed acreages of 30 acres and 15 acres, respectively. The total County-assessed area of the subject property is therefore 45 acres. Note that the property is currently undergoing a lot line adjustment such that the boundary between the two parcels that comprise the subject property may change slightly compared to that which is shown on Figures 1 and 2. The outer boundaries of the two parcels will not be changed as part of the lot line adjustment.

b. The subject property is located on the east side of the Napa Valley near the City of Calistoga. As illustrated by the topographic contours illustrated in Figure 1, the subject property is situated in a small valley just east of the Silverado Trail, with a portion of the property extending up into a hillside area.

c. Two intermittent creek channels[1], Dutch Henry Creek and Biter Creek, are shown on Figure 1 to pass within the boundaries of the subject property. The two creeks are classified as "Significant Streams" as defined by Napa County PBES (PBES, 2022c). At the time of the RCS July 2019 site visit, both creeks were observed by the RCS geologist to be dry.

d. As shown on Figures 1 and 2, there are five water-supply wells at the subject property. Groundwater for vineyard irrigation is pumped primarily using Well Nos. 1, 2, 3, and 4. Occasionally, some supplemental groundwater is pumped from Well 5 when necessary.

e. One pond exists on the subject property. The pond is lined and is filled only with direct rainfall and with groundwater pumped from the onsite well. No surface water runoff is used to fill the onsite pond. The wells are reportedly "cycled" throughout the irrigation season to fill the pond and allow periods of rest (water level recovery) for each well.

f. Development on offsite areas east, north, and west of the subject property consist primarily of vineyards and residences. Areas offsite to south are primarily undeveloped and naturally vegetated (see Figure 2); note that the Figure 2 aerial photograph was taken before the 2020 Glass Fire.

g. During the July 2019 site visit, the RCS geologist traveled along Lommel Road, Dutch Henry Canyon Road, and the Silverado Trail in an attempt to identify possible locations of nearby, offsite wells owned by others. RCS refers to such work as a "windshield survey." During this survey, the RCS geologist attempted to identify possible offsite well locations by observing typical well-house enclosures, pressure tanks, storage tanks, power lines, or direct observation of a wellhead.

   RCS geologists also identified the approximate locations of possibly existing offsite wells owned by others using records downloaded from an online search of the County website (PBES, 2022b). Using the website, a few "Well Completion Reports" (WCRs, also known as "driller's logs") or well drilling permits were obtained for the locations for wells historically drilled 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. Those locations are not considered to be inclusive of all actual offsite wells that may exist in the area. Note that Well 5, the project well, is located within 500 ft of the locations of three of those offsite wells.

Local Geologic Conditions

Figure 3, "Geology Map," illustrates the types, lateral extents, and boundaries between the various earth materials mapped at ground surface in the region by others. Specifically, Figure 3 has been adapted from the results of regional geologic field mapping of the Calistoga 7.5' Quadrangle,

[1] The two drainages in question are shown as "dashed lines" on the USGS topographic map (denoting intermittent status).

Napa and Sonoma Counties, as published by the California Geological Survey (CGS, 2013). As shown on Figure 3, the key earth materials mapped at ground surface in the area, from geologically youngest to oldest, include the following:

- Stream channel deposits (map symbol Qhc). These deposits are comprised of fluvial sediments that lie within the two intermittent stream channels that cross the property, and are composed of relatively thin (extending to depths of only a few feet or so) of loose sand, silt, and gravel.
- Alluvial-type deposits (map symbols Qa, Qhf). These deposits consist of undifferentiated and/or undivided alluvium and/or alluvial fan deposits. These deposits are generally unconsolidated, and consist of layers and lenses of sand, gravel, silt, and clay deposited as a result of the erosion of and transport from the nearby hills. These alluvial deposits (map symbol Qhf) are shown on Figure 3 to be exposed at ground surface beneath a majority of the topographically lower and flatter valley portions of the subject property, and extend west across the property toward Silverado Trail and the main floor of the Napa Valley. Because the subject property is situated at the base of hills, the alluvium is interpreted to be relatively thin beneath the property, with the thickness of the deposits becoming greater from east to west, ranging from total depths of 10 ft to perhaps 30 ft to 50 ft below ground surface (bgs).
- Sonoma Volcanics (map unit Tsrc). The Sonoma Volcanics are comprised by a highly variable sequence of chemically and lithologically diverse volcanic rocks. Surrounding the subject property, and exposed in the higher elevation portions of the property, is the Rhyolite of Calistoga, one of the many rock types (or units) that comprise the Sonoma Volcanics geologic formation. This unit forms dome hills protruding from the valley alluvium in and around Calistoga, including the hills surrounding the subject property. The unit is comprised of hard lava flows of rhyolite composition, with interbeds of pumiceous ash-flow tuff (volcanic ash), and welded tuff. These volcanic rocks are also interpreted to underlie the alluvium beneath the subject property. The total thickness of these rocks beneath the subject property is unknown but is interpreted to extend to depths of at least 500 ft or more, based on the driller's descriptions of earth materials available on WCRs available for the onsite wells (the WCRs are discussed later in this Memorandum).
- Great Valley Complex and Franciscan Formation. Geologically older (Cretaceous- and Jurassic-aged) Great Valley Complex rocks and Franciscan Formation Rocks are not shown on Figure 3 but are known to be exposed offsite at ground surface to the north and east of the subject property, outside of the map boundaries of Figure 3. These rocks consist mainly of well-consolidated to cemented thickly bedded sandstone, conglomerate, siltstone, and shale. These geologically older rocks, which are considered to be the bedrock of the area, are interpreted to underlie the volcanic rocks at depth beneath the subject property.

Local Hydrogeologic Conditions

The earth materials described above can generally be separated into two basic categories, based on their relative ability to store and transmit groundwater to wells. These two basic categories are:

Potentially Water-Bearing Materials

The Sonoma Volcanics, which are represented by consolidated pumiceous ash flow tuff, welded tuff, and hard, fractured volcanic flow rocks, are considered to be the principal water-bearing materials beneath the subject property and its environs. The occurrence and movement of groundwater in Sonoma Volcanic 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 welded tuffs (consolidated ash deposits), or 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 ash flow 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 within the pore spaces created by the grain-to-grain interaction in volcanic tuff and ash.

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 thickness of ash flow tuffs and flow rocks beneath the property.
- Whether the preponderant volcanic material beneath the property is well-consolidated ash flow tuff and flow rocks, or softer, less consolidated, fine-grained ash materials.
- The number, frequency, size and degree of openness of the fractures/joints in the volcanic rocks.
- The degree of interconnection of the various fracture/joint systems in the subsurface and to ground surface.
- The extent to which the open fractures may have been possibly in-filled over time by chemical 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.

As stated above, the principal rock type interpreted to exist to depths of at least 500 ft in the subsurface beneath the property, based on review of WCRs for onsite wells, is the Sonoma Volcanics rocks. From our long-term experience with the Sonoma Volcanics, and based on our numerous other water well construction projects in Napa County, pumping capacities in individual wells have ranged widely, from rates as low as a few gpm (if abundant, poorly consolidated and fine-grained ash flow tuff is present), to rates as high as 200 gpm or more (if abundant harder, fractured flow rocks and welded tuffs are present).

Potentially Nonwater-Bearing Rocks

This category includes the geologically older and fine-grained sedimentary rocks of the Great Valley Complex. These potentially nonwater-bearing rocks are interpreted to underlie the volcanic rocks at great depth beneath the subject property. In essence, these diverse and geologically old 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 bedrock materials 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 bedrock materials, and the water quality can be marginal to poor in terms of total dissolved solids concentrations, and other dissolved constituents.

Key Construction and Testing Data for Existing Wells

As stated above, five wells exist within the boundaries of the subject property at the locations shown on Figures 1 and 2. DWR Well Completion Reports (WCRs, or "driller's logs") were provided to RCS for each well by the property owner; copies of those WCRs are included in the Appendix to this report. Table 1, "Summary of Available Well Construction and Pumping Data," provides a tabulation of key well construction and pumping data that are available for the onsite wells. The wells are grouped according to which of the two onsite parcels they were constructed. Note that a WCR was provided for an older onsite well (with designation "destroyed" on Table 1). Data for that destroyed well are included on Table 1 to present a complete dataset, and a copy of its WCR is also included in the Appendix. However, the exact location on the property where the destroyed well used to exist is unknown, and therefore no location for the destroyed well is shown on Figures 1 or 2.

Well Construction Data

Table 1 is sorted according to the individual parcel on which each well exists, and includes key construction data for the onsite wells. Review of Table 1 reveals the following:

- Construction dates for the onsite wells range from 1991 to 2008.
- Well depths range from 370 ft to 508 ft deep.
- All wells are constructed with PVC casing, with casing diameters ranging from 5 inches to 6 inches.
- Sanitary seal depths range from 20 ft to 54 ft below ground surface for the onsite wells. For the proposed winery project, Well 5 will be pumped to meet all winery demands, and is considered to be the "project well". It is therefore noteworthy that Well 5 is constructed with a cement sanitary seal from ground surface to 54 ft bgs. This seal depth, greater than 50 ft, meets the requirements necessary to allow Well 5 to be used for public water supply purposes.

Summary of Key Airlifting "Test" Data

The driller's logs for the onsite wells provide the depth to the original post-construction static water levels (SWLs) for the onsite wells, along with the original airlifting test rates (as shown on Table 1). These data include:

- Initial SWL depths following completion of well construction reportedly ranged from 25 ft to 121 ft bgs, depending on the well and its date of construction, with the exception of Well 4. Well 4 had a much deeper SWL (at 360 ft bgs) following the completion of its construction.

- Reported maximum airlift rates[2] for initial post-construction airlifting operations in the onsite wells were estimated by the respective driller to have ranged from 25 gallons per minute (gpm) in Well 1, to 130 gpm in the Well 3, at the time of their respective well constructions.
- "Water level drawdown" values during airlifting were not listed on the driller's logs for the onsite wells, because water level drawdown cannot be measured during airlifting operations; thus, the original post-construction specific capacity[3] value for the wells cannot be calculated from the limited data on the driller's log.

Pumping Tests

Two different pumping tests were performed in Well 5 as part of the Winery project development. Each test was performed for a specific purpose, and as such, the tests were performed at different pumping rates and different durations. In addition, well capacity testing was performed in the four onsite irrigation wells (Wells 1, 2, 3, and 4). Below is a description of each test, including the testing goals, specific testing parameters, and the results of each test.

First Pumping Test of Project Well (Well 5), December 2020

On December 28, 2020, a 72-hour constant rate pumping test of Well No. 5 was performed by LGS Drilling, Inc. (LGS), a pumping contractor located in Vacaville, California. The purposes of the testing were to determine: whether or not Well 5 could meet the demands of the winery project; and whether or not pumping Well 5 at the necessary demand rate induced water level drawdown impacts on nearby offsite wells owned by others.

Before commencement of the pumping test, LGS performed limited well rehabilitation in Well 5. This is because the well had not been pumped for some time and because of possible fire damage to the well. This rehabilitation work consisted of mechanical, chemical, and pumping development to help to remove biological growths and possible sediment that may have that accumulated in the casing perforations and adjoining gravel pack over time. Well rehabilitation is part of normal well maintenance and is strongly recommended for all wells by RCS.

Nearby Offsite Wells

Three offsite wells are known to exist within 500 ft of Well 5 (see Figures 1 and 2). Two of these wells are located northeast of Well 5, whereas the other offsite well is located southeast of the subject property (east of Lommel Rd). In order to collect data necessary to determine possible offsite well impacts due to pumping the project well, the wells to the northeast of the property were identified by RCS and the property owner as possible water level observation points for the testing period.

Access onto the property to the northeast of Well 5 was arranged with the owner of that property by the Hourglass property owner. This access arrangement allowed LGS to assess the two wells to determine if either could be used as a water level observation monitoring point (similar to the Hourglass wells, these offsite wells were also damaged by the Glass Fire.) Although the

[2] As a rule of thumb, RCS geologists estimate that normal operational pumping rates for a new well equipped with a permanent pump are typically on the order of only about one-half or less of the airlifting rate reported on a driller's log.

[3] 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.

wellheads were badly damaged by fire, access was possible through the wellhead of one of the offsite wells. This well is labeled as "Observation Well, Dec 2020 PPG Test" Figures 1 and 2, and is located approximately 245 ft from Well 5 (the project well). The presumed driller's log for this observation well (WCR 0940789) was obtained from Napa County. Key construction details for this offsite observation well derived from the WCR include:

- The Observation Well was drilled and constructed in 2009 to a depth of 505 ft using PVC casing; this is similar to the depth of Well 5.
- Perforations extended between the depths of 155 ft to 505 ft bgs in the 5-inch diameter casing. The perforations are notably similar in depth to those in onsite Well 5 (the Pumping Well); see Table 1.
- A cement sanitary seal was emplaced to a depth of 25 ft bgs in the offsite well.

Data Collection

Water level data were collected in Well 5 (the Pumping Well) by LGS using a manual water level sounder. In addition, an electronic water level monitoring device (a pressure transducer data logger) was deployed into Well 5. The data logger was programmed to automatically collect water level data at a frequency of once every two minutes; LGS also collected occasional manual measurements (multiple measurements per day) in the offsite Observation Well. Figure 4, "Constant Rate Pumping Test, Hourglass Winery Well 5," shows the water level data collected during the pumping test in both Well 5 (the Pumping Well) and the offsite water level Observation Well; both the manual data and the data logger-collected data are shown thereon. Regular totalizer dial readings were collected from wells throughout the pumping test period by LGS.

Results of Testing

Testing of Well 5 was performed using, as reported by LGS, a 3-horsepower test pump installed to a depth of approximately 425 ft below the wellhead reference point (ft brp). The 72-hour pumping test was performed at an average flow rate of 9 gpm. Key data available from the constant rate pumping test by LGS include:

- A SWL of 123.1 ft brp was measured in the Pumping Well (Well 5) before the test began.
- Based on totalizer data recorded by the pumper, the Well 5 was initially pumped at a rate of 14 gpm. Although a constant rate pumping test was intended, declining water levels during the test required the pumper to incrementally reduce the pumping rate beginning after 24 hours of pumping. Ultimately, a rate of 8 gpm was achieved by the pumper after about 52 hours of pumping. The average pumping rate over the entire length of the 72-hour test was 9 gpm.
- A maximum pumping water level (PWL) of 314.7 ft brp was measured after approximately 52 hours of pumping. The pumping rate adjustments at hour 52 of the test caused an increase in PWLs for a few hours, after which time the PWLs began to decline again. Following the various pumping rate reductions described above, a final PWL of 302.0 ft brp was measured at the end of the 72-hour pumping period, after the

pumping rate adjustment; this represents a water level drawdown of 183.2 ft at the end of the test.

- Based on the average pumping rate of 9 gpm, the specific capacity of Well No. 5 is calculated to have been 0.05 gpm/ft ddn at the time of testing, following a pumping duration of 72 hours.
- No water level changes were observed in the offsite water level Observation Well at any time during the 72 hours of continuous pumping, despite the pumping rate fluctuations and water level drawdowns in the Pumping Well. Seven water level measurements were collected by LGS in the Observation Well over the course of the pumping test at Well 5. Based on these data, no water level drawdown interference was induced in the offsite Observation Well by virtue of pumping Well 5 for 72 continuous hours.

Second Pumping Test of Project Well (Well 5), October 2021

A second pumping test was performed in Well 5, beginning on October 5, 2021. The purpose of the second test was to pump the well at a constant rate for 10 days, for the express purpose of generating the necessary data to comply with the requirements set forth in the California Code of Regulations (CCR), Title 22 §64554, "New and Existing Source Capacity". For this test, Well 5 was pumped at a nominal rate of 3 gpm for a period of 10 days, with water level data collected throughout the test. Consistent with State regulations for the purpose of obtaining an accurate static water level value, prior to beginning the 10-day test, the well was pumped for 2 hours at the same pumping rate at which the test was to be conducted (3 gpm), followed by 12 hours of non-pumping, after which time an accurate SWL depth was monitored.

Data Collection

This second, longer pumping test was administrated primarily by Hourglass Winery staff, with advisement from RCS. Occasional manual water level data were collected by Hourglass staff using an electric tape water level sounder. A pressure transducer (data logger) was also installed and operated in Well 5 by ACE (the project Civil Engineer). Data were collected by the transducer at a frequency of one measurement every five minutes for the duration of the pumping potion of the test and the recovery period. Figure 5, "Water Level Data During October 2021 Constant Rate Pumping Test of Hourglass Winery Well 5" illustrates the water level data collected during the 10-day testing period. No water level data from the offsite Observation Well were collected during this second pumping test.

Results of Testing

A 10-day (14,400 minute) pumping test was performed successfully, with an average pumping rate of 3.1 gpm over the duration of the test, and the necessary water level and flow rate data were collected. Key information gleaned from the testing data collected by the property owner and ACE, as illustrated on Figure 5, are as follows:

- The initial pre-test pumping and recovery period, as required by CCR Title 22 §64554 was successfully completed.
- A SWL of 147.9 ft brp was recorded just prior to the start of the test.

- After approximately 5-days of pumping, the slope of the water level drawdown curve changed significantly. Multiple inflection points (changes in slope) can be observed on the water level drawdown curve shown on Figure 5. Such inflection points suggest that flow into the well is changing. Different aquifer systems are being stressed as the effects of pumping the well propagate further into the aquifer from the well bore. The changes in slope are indicative of the variable nature of aquifer properties in fractured rock aquifer systems, like those found in the Sonoma Volcanics.
- Water levels were stable at the end of the testing period. Although difficult to discern on Figure 5 due to the scale of the graph, the pumping water level in the project well was stable and essentially unchanged during the last four hours of the pumping test (the water level decrease over that period was only 0.1 ft).
- A maximum PWL of 371.6 ft brp was measured at the end of the 10-day pumping period. This PWL represents a total water level drawdown of 223.7 ft at the end of the test. Additionally, these end-of-test, deepest PWLs are known to be ~53 ft above the pump intake depth of 425 ft brp.
- Rapid water level recovery was observed following the cessation of pumping. Water levels recovered to 90% of the total drawdown within just over one day of the end of the test. Full water level recovery was achieved just after five days of non-pumping.
- A specific capacity value for Well 5 at the end of the 10-day test is calculated to be 0.014 gpm/ft ddn at the time of testing.

Pumping Tests of Irrigation Wells (Wells 1, 2, 3, and 4)

Each of the four onsite irrigation wells were damaged to varying degrees as a result of the 2020 Glass Fire. In response to the damage, the property owner retained LGS to determine whether or not each of these four wells was still viable. LGS therefore performed limited pumping development in each well for an hour or two. Following the limited development, test pumping was performed. The pumping tests were not formal constant rate pumping tests or constant drawdown pumping tests, but they were similar in nature and closely approximated such tests (referred to herein as "capacity testing"). Importantly, water level and flow rate data were collected for each test period, and the data are useful to identify the estimated operational pumping rate of each well. Similar to Well 5, each of the four irrigation wells was subjected to well rehabilitation work prior to performing the well capacity testing.

This capacity testing of the four irrigation wells occurred between December 30, 2020 and February 4, 2021. Table 3, "Summary of Irrigation Well Capacity Pumping Tests", summarizes the testing results based on data collected, recorded, and reported by LGS. Key data available from these tests by LGS include:

- All data were recorded by LGS, including water level data, pumping rate data, and other observations.
- Water level data were collected using a manual electric tape water level sounder, except for the water levels in Well 4, which were collected using a sonic water level sounder.
- Pumping rates ranged from 7 gpm to 20 gpm for the wells, with testing durations ranging from 2 hours to 24.5 hours.

- Water level recovery rates and magnitudes were variable for each of the four irrigation wells. Water level recovery was nearly complete for Wells 1 and 3. Well 3 showed rapid water level recovery, while Well 4 showed average water level recovery rates. Well 2 exhibited relatively slow water level recovery rates.
- Water level data for Well 4 are considered to be questionable due to a reported blockage downwell that prevented accurate water level monitoring. Reportedly, no sounding tube to facilitate water level measurements could be installed in the well, either. Using a sonic water level meter, an estimate of the static water level was derived, but no other water level data could be measured. The LGS pumper reported that the water levels in Well 4 were likely deeper than 300 ft bgs.
- Well 4 had a blockage downwell that prevented the measurement of reliable water level data.
- Recommended operational rates shown on the table are based on the lowest pumping rate performed by LGS at the end of each pumping period. Based on discussions with the property owner, these reported values are the general well capacities for each of the wells.
- The total combined recommended operation pumping rate of all four irrigation wells is 41 gpm, or 27 gpm not including Well 4 (excluded due to questionable water level measurements).

Project Groundwater Demands

For the purposes of this WAA, Well 5 is considered to be the "project well", as it will be used to meet all proposed water demands for the proposed Winery. Before destruction of the property by the 2020 Glass Fire, onsite water demands for the former vineyards and winery were met by pumping groundwater from all five onsite wells. For vineyard irrigation, water was pumped into the onsite pond, and then distributed for irrigation directly from the pond. Water for the winery was directed to onsite tanks for distribution.

In the future, Well 5 will be the sole onsite well to provide groundwater to the proposed Winery. Groundwater pumped for winery purposes from Well 5 will be pumped into a tank (or tanks) and then distributed to the various winery uses. For the onsite vineyards, water from Wells 1, 2, 3, and 4 will initially be pumped into the onsite reservoir and thereafter it will be distributed for irrigation. Occasionally, Well 5 will also be pumped into the onsite reservoir and used for supplemental vineyard irrigation needs in the future; this is expected to typically occur near the end of the irrigation season when vineyard demands are highest.

Note that in this document, "existing" groundwater demands are meant to refer to groundwater use at the property that existed before the 2020 Glass Fire.

Proposed Groundwater Demands

A summary of groundwater demands for the entire subject property, including those new water demands for the proposed winery, has been prepared by ACE; the table is appended to this document. As shown thereon, the proposed groundwater use for the entire property in the future is 13.5 acre feet per year (AFY), and this has been calculated as follows.

- Project Winery Demand (to be pumped from Well 5) = 1.67 AFY.

- This includes both process water and domestic uses for the winery and is rounded up from the ACE estimate of 1.668 AFY
- As shown on the table prepared by ACE, this is only a slight increase of less than 0.6 AFY from the existing winery demand of 1.106 AFY

- Irrigation Water Use (to be pumped primarily from Wells 1, 2, 3, and 4) = 11.83 AFY. This value includes water demands for both the vineyard and landscaping at the property.
  - Landscaping Irrigation Water Use = 1.228 AFY
  - Vineyard Irrigation Water Demand = 10.6 AFY
    - This demand estimate considers a total of 21.2 acres of vines on the Hourglass property, calculated as the sum of:
      - 18.7 acres of existing vineyards
      - 2.5 acres of vineyards (with existing entitlement) that have not yet been planted.
    - This 10.6 AFY demand estimated was reportedly calculated by ACE using the standard assumption from the Napa County WAA Guidelines (2015) that one acre of vines uses 0.5 AF of water per year. The vineyard manager for the Hourglass property, Mr. Josh Clark of Hardin Clark Vineyard Management, estimates the annual groundwater demand for the onsite vineyards (including the entitled but not yet planted vineyards) to be about 8.8 AFY, or about 0.41 AF per acre of vines. To present a more conservative analysis, the higher value of the County's standard assumption is used herein.
  - Irrigation demand at the property will remain unchanged; the proposed future irrigation demand is the same as the existing groundwater demand for irrigation.

Proposed Pumping Rates

To meet the project winery groundwater demand of 1.67 AFY for process water and domestic water purposes, Well 5 would need to pump at a rate of approximately 2 gpm. This rate is calculated assuming Well 5 is operated on a 50% operations basis throughout the year (pumping 12 hours per day, every day of the year). As evidenced by the pumping tests performed in the project well (discussed above), Well 5 is quite capable of supplying water at these rates, and has been subject to two long term pumping tests at rates greater than 2 gpm; the 72-hour test, which was conducted at an average rate of about 9 gpm; and the subsequent 10-day test was successfully completed at a rate of about 3 gpm.

Wells 1, 2, 3 and 4 will need to pump at a combined rate of approximately 23 gpm to meet the groundwater demand for all required irrigation (both vineyard irrigation and landscaping). This assumes that irrigation pumping occurs only during a typical, 20 week irrigation season only, and that the four wells are operated on a 50% operations basis throughout the year (pumping 12 hours per day, every day of the year). As shown on Table 3 and discussed above, based on the capacity testing performed by LGS, the four irrigation wells are able to pump at total combined rates of

27 gpm to perhaps as high as 41 gpm. In addition, if necessary, Well 5 has extra capacity (above the necessary 2 gpm for Winery demands) that can be used to supplement the irrigation supply.

Tier 1 – "Groundwater Recharge Estimate"

Napa County recently promulgated new guidelines for WAA preparation with respect to groundwater recharge calculations in response to the Governor's Executive Order N-7-22 (PBES, 2022a) and the ongoing drought in the State The County has mandated for parcels outside of the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin, as defined by the California Department of Water Resources (CA DWR) Bulletin 118 (CA DWR, 2021), that groundwater recharge must consider "average rainfall" to be only the average annual rainfall that has occurred in the last 10 water years[4]. If a parcel lies within a designated groundwater basin, then the allowable groundwater usage allotments are to be calculated as 0.3 acre feet per year (AFY) of allowable groundwater usage for each one acre of land occupied by the subject property.

Groundwater basin boundaries in the State have been defined and designated by the California Department of Water Resources (CA DWR) in their Bulletin 118, "California Groundwater" (2021). Those CA DWR boundaries are the same as those used to define groundwater basin boundaries for the purposes of Groundwater Sustainability Plan (GSP) preparation. Figures 2 and 3 show the boundaries of the Napa Subbasin of the Napa-Sonoma Groundwater Basin (referred to herein as "the groundwater basin") and defined by the CA DWR (CA DWR Bulletin 118, 2021), along with the boundaries of the subject property. As shown on Figures 2 and 3, only a portion of the property lies within the boundaries of the defined groundwater basin. Further, review of Figure 3 reveals that the boundary of that groundwater basin does not appear to align with the geologic mapping of the area; a hydrogeologist would expect the boundary of the groundwater basin to more closely follow the contact between the younger alluvial materials and the volcanic rock exposures in the area.

Review of the 10-year PRISM average data set (PBES, 2022a) reveals that the ten-water year average rainfall for period 2012 to 2021 for the subject property is 30.4 inches (2.5 ft). 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). Watershed boundaries within Napa County are shown on Figures 8-3 and 8-4 in that report (not reproduced herein). The subject property is located within the boundary lines of the watershed referred to by MBK as the "Napa River Watershed at St. Helena." As shown on Table 8-9 on page 97 of the referenced report (LSCE&MBK, 2013), 14% of the average annual rainfall that occurs within this watershed was estimated to be able to deep percolate as groundwater recharge (i.e., the recharge rate). Multiplying the 2.5 ft of rainfall by the 14% groundwater recharge percentage yields 0.4 ft of rainfall per unit area. Assuming one acre of land, then the calculated groundwater recharge rate would be approximately 0.4 AFY/ac.

For the purposes of these WAA analysis for the Hourglass property, even though a majority of the property is located outside of the groundwater basin, RCS will not apply the higher value of 0.4 AFY/ac recharge value listed above, but rather the more conservative 0.3 AFY/ac recharge value required to be used when a property is within the groundwater basin. Based on the assessed acreage of the subject of 45 acres (one parcel assessed at 15 acres, and the second

[4] Here, a water year is defined as beginning on October 1 and ending on September 30 of the following year. As an example, water year 2012 would begin on October 19, 2020, and end on September 30, 2021.

assessed at 30 acres), multiplied by the 0.3 AFY/ac recharge value, a total annual recharge value of 13.5 AFY is calculated for the subject property[5].

As described above, the annual winery groundwater demand was estimated by ACE to be 1.67 AFY, whereas the irrigation demand was conservatively estimated by ACE to be 11.83 AFY, for a total groundwater demand of 13.5 AFY for the entire property. Because the estimated groundwater demand for the project is equal to the conservative estimate of groundwater recharge at the property, the Tier 1 WAA conditions are satisfied.

Tier 2 – "Well Interference Evaluation"

Because there are three offsite wells located within 500 ft of Well 5, then a Tier 2 WAA is necessary to determine whether or not pumping the project well (Well 5) for the proposed winery project will cause water level drawdown interference on neighboring wells. As discussed above under the heading "First Pumping Test of Project Well (Well 5), December 2020", water levels were monitored in an offsite Observation Well on a neighboring property during the 72-hour pumping test of Well 5 conducted in December of 2020. This offsite well is located approximately 245 ft northeast of Well 5 (see Figure 2). Additionally, the construction details for this offsite water level Observation Well and Well 5 (the Pumping Well) are very similar; the wells are constructed to similar depths and with similar perforated intervals.

Well 5 was pumped at an average pumping rate of 9 gpm for 72 continuous hours. As shown on Figure 4, water levels that were measured periodically in the Observation Well were unchanged during the Well 5 pumping period. Hence, no water level interference was observed in the offsite Observation Well by virtue of pumping the Project Well (Well 5). Because no water level drawdown was observed in this offsite well, then the test satisfies the acceptable drawdown criteria defined in the "Default Well Interference Criteria" shown on Table F-1 of the May 12, 2015 Napa County WAA Guidelines (WAA, 2015). Those drawdown criteria in the WAA Guidelines (WAA, 2015) show that water level drawdown interference is not considered significant by the County if the induced drawdown interference is less than 10 ft for offsite wells that have a casing diameter up to six inches (the casing diameter of this water level Observation Well is five inches).

The magnitude of water level drawdown in an aquifer (or aquifers) that is created by virtue of pumping a well is generally, with a few exceptions that are not applicable to the project site, greatest nearest the pumping well. Water level drawdown effects decrease as the distance from the pumping well increases. This water level drawdown region surrounding any pumping well is commonly referred to by hydrogeologists as a water level "cone of depression". Because the December 2020 pumping test showed that pumping Well 5 had no effect on the neighboring Observation Well located 245 ft to the northeast, then it can be inferred that water level drawdown effects would also not be observed at any wells in the area at distances even greater than 245 ft from the pumping well.

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

Napa County has published information defining which Rivers, Streams, and Creeks within the County are considered "significant" for the purposes of Tier 3 WAA review. These "Significant

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

Streams" have been defined by Napa County on a recently published, undated map titled "Napa County Well Permit Standards: Significant Streams". Napa County has made available two GIS layers from the map: "Significant_Streams" and "Significant_Streams_1500ft_Buffer" (PBES 2022c). These two layers were used by RCS to determine if there were any streams of significance on the subject property, and if Well 5 (the project well) is within 1,500 feet of a "Significant Stream". According to the County's WAA Guidelines (WAA, 2015), if a project well lies within 1,500 ft of a significant stream, creek, or river, then a Tier 3 WAA is required.

Figure 1 shows the subject property boundaries superimposed on a Unites States Geological Survey (USGS) topographic map of the Calistoga Quadrangle. As shown thereon, two creek channels cross the subject property: Biter Creek, and Dutch Henry Creek. Dutch Henry Creek is tributary to Biter Creek. Any runoff in Dutch Henry Creek flows toward the south, toward its confluence with Biter Creek. Biter Creek flows toward the southwest (upstream) of the confluence with Dutch Henry Creek, and nearly due south (downstream) of that confluence. Well 5 is located about 95 ft west of Biter Creek, and about 1,000 ft east of Dutch Henry Creek (see Figure 1). The combined creek channel crosses under Silverado Trail just downstream of the confluence, where Biter Creek continues to flow south where it eventually meets the Napa River. According to a document titled "Northern Napa River Tributary Streams Survey Report" (NCRCD, 2012), the combined creek channel is known as Selby Creek from Silverado Trail to the Napa River.

Creek Flow Observations

As shown on Figure 1, both Dutch Henry Creek and Biter Creek are shown on the USGS base map as a dashed line, denoting an "intermittent stream". This means that neither creek is known to flow year round (i.e., they are not perennial streams). Instead, the creeks likely flow only during or immediately after periods of precipitation in the region (typically the winter and perhaps early spring months). During the later spring and summer months, Biter Creek and Dutch Henry Creek in the vicinity of the subject property are very likely dry. The intermittent nature of both creeks was confirmed by the property owner based on observations made over the years of owning the property.

RCS was able to recover only limited information related to historic surface water flows in both Dutch Henry Creek and Biter Creek. As mentioned above, at the time of the RCS July 2019 site visit to the subject property, both creeks were observed to be dry. As reported by the property owner, both creeks were also dry during the 2020 and 2021 pumping tests of Well 5. In January 2023, both creeks were observed by Hourglass staff to be flowing.

A survey of the Selby Creek Watershed (with includes both Dutch Henry Creek and Biter Creek) is described in the May 2012 Napa Resource Conservation District (NRCD) report titled "Northern Napa River Tributary Streams Survey Report" (NCRCD, 2012). Qualitative creek flow information is described in that document. Figure 9 in that document (not reproduced herein) labels both Dutch Henry Creek and Biter Creek as a "Dry Channel" (NCRCD, 2012) in the vicinity of the subject property (and Well 5), with many pictures of the dry channel areas (dated September 13, 2011) included in the text of the document. The text states that "During the survey period, the majority of the [Selby Creek] stream channel was dry", and "Biter Creek was completely dry during the survey" (NCRCD, 2012). Limited, isolated pools were noted in portions of Dutch Henry Creek (the locations of which are unclear in the document text), and the document notes "a lack of stream flows" at the time of the survey (NCRCD, 2012)

Another attempt to determine historic surface flow in Biter Creek was completed by reviewing historic "street view" photographs of the creek available from the Google Maps website (Google Maps, 2022). Observations were made looking roughly south from Silverado Trail, in the area around where Biter Creek crosses under Silverado Trail and becomes Selby Creek, south of the subject property. Table 4, "Summary of Street View Stream Photo Review," is a summary of the qualitative creek conditions determined by RCS via review of the available "street view" photographs. As shown in the table, the photographs available for the Creek support the assertion that the Creek is intermittent, and typically only flows during the rainy season (roughly between December and April each year).

Table 4 – Summary of "Street View" Stream Photo Review

Date of "Street View" Photo	Flow Visible? (Y/N)	Qualitative Flow Volume Assessment
May 2021	N	Dry
March 2021	Y	Limited Flow
April 2019	Y	Significant Flow
December 2016	Y	Significant Flow
April 2016	Y	Limited Flow
July 2015	N	Dry
May 2014	N	Dry
April 2013	N	Dry
June 2012	N	Dry
May 2011	N	Dry
November 2007	N	Dry

Groundwater Sustainability Plan Review

In Section 6, "Groundwater and Surface Water Conditions", of the Napa Valley Subbasin GSP, (LSCE, 2022), a discussion of the hydraulic connection of groundwater and creeks within the County, as simulated by computer modeling, is presented. Figure 6-123b (not reproduced herein) shows the "average annual hydraulic connection" of creeks, including a portion of Biter Creek/Dutch Henry Creek that lies within the groundwater basin and at the southern end of the subject property (LSCE, 2022). That portion of Biter Creek/Dutch Henry Creek is shown as having "> 0 weeks – 2 weeks" of annual hydraulic connectivity nearest the subject property, and up to "> 2 weeks – 13 weeks" of connectivity further downstream, outside of the boundaries of the

subject property (LSCE, 2022). As stated on page 6-45 of Section 6 of the GSP, "An average annual hydraulic connection exceeding 26 weeks likely reflects a connection that extends beyond the wet season" (LSCE, 2022). Because connectivity to groundwater of Biter Creek in the area of the subject property is limited to approximately 13 weeks per year (according to the GSP), then any connection to groundwater (if any) likely does not extend beyond the wet season.

Geologic Cross Section

To help demonstrate the lack of connectivity between Well 5 (the Project Well) and the two intermittent creek channels (Biter Creek and Dutch Henry Creek) that lie within 1,500 ft of Well 5, RCS created a Geologic Cross Section of the property; see Figure 6, "Cross Section A-A'". Figures 1, 2 and 3 show the alignment of the geologic cross section created by RCS for the purposes of this Tier 3 analysis. The alignment of the cross section was chosen such that it intersected both the project well and the channels of both Biter Creek and Dutch Henry Creek, along the shortest straight-line distance to capture both Creeks. The cross section is a scaled schematic illustration that shows the interpreted geologic conditions beneath the property and the well casing construction of the project well (Well 5). Well 3 (an irrigation well) is also depicted on the section because the cross section line happens to intersect that well. Figure 6 is notated with the surface features that the cross section intercepts, including creek names and the subject property boundaries. Also shown on the cross section are select SWL depth measurements collected over time in Well 5 and Well 3. The SWL measurements shown on the figure were measured by either an RCS geologist, Hourglass staff, or LGS (the pumping contractor).

The lack of connection between groundwater accessible to the project well and surface water in the vicinity of the subject property is also demonstrated on Figure 6. As illustrated on the figure, Well 5 has a 54-foot deep sanitary cement seal that precludes groundwater in the alluvial sediments that may be in contact with possible flows in Biter Creek and Dutch Henry Creek from entering the well. Further, the perforations in Well 5 begin at a depth of 94 feet bgs, within the volcanic rocks, far below the bottom depths of either creek channel.

Static water levels measured in Well 5 (the project well) are shown on Figure 6, and are visible in relation to the approximate elevation of the bottom of the nearby creeks. Every SWL level shown on Figure 6 is lower in elevation that the bottom of either Biter Creek or Dutch Creek. The two most recent SWL measurements in Well 5 are from November 18, 2022, and January 19, 2023. The November 2022 measurement was more than 130 ft deeper than the elevation of the bottom of Biter Creek, and the January 2023 measurement was more than 120 feet deeper than the bottom of the same Creek, as examples. The fact that the water levels measured in Well 5 have remained at depths deeper than the estimated bottom of both creeks is further evidence that the creeks are not directly connected to the perforation intervals in Well 5. Also, in November 2022, the two creeks were observed to not be flowing, but in January 2023, both Creeks were observed to be flowing. In both instances, the water levels in Well 5 were far below the bottom of the Creek. Therefore, the water level data from Well 5 combined with the qualitative observations of flow (or lack thereof) in the creek shows that water in the creek cannot be correlated with the water level in Well 5. If, theoretically, a connection between the groundwater in Well 5 and the two creeks did exists, then the water levels in the wells would be expected to be at or near the elevation of the bottom of the creeks, suggesting a "connected stream" condition. Here, the groundwater accessed by Well 5 is shown to be "disconnected" from creek flow.

Groundwater available to Well 5 is stored in a fractured rock aquifer system. Pumping tests of Well 5 (described above) showed significant drawdown during pumping. Even changes in the

slope of the drawdown curve suggest the variability of fracture systems in the volcanic rocks at depth in the area; no information reviewed suggests that fractures in the volcanics rocks are in direct contact with Dutch Henry Creek or Biter Creek. As shown on the Figure 3 geologic map, both creek channels lie on top of thin deposits of alluvial stream channel and alluvial fan deposits along those channels.

Observations and data presented above strongly support the assertion that the project well is not hydraulically connected to Dutch Henry Creek or Biter Creek. 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."

Key Conclusions and Recommendations

1. The proposed Project is to re-establish a Winery at the subject property to replace the winery that was destroyed as a result of the 2020 Glass Fire. The new Winery will have a production of 60,000 gallons of wine per year, and will include water demands for employees, tastings, and other events.
2. Water demands for the winery will be met solely by pumping Well 5.
3. The subject property includes a vineyard, comprised of by 18.7 acres of existing vineyards and 2.5 acres of vineyards with existing entitlement that have not yet been planted.
4. Consistent with past practice, water demands for the existing vineyards will continue to be met by pumping groundwater from Wells 1, 2, 3, and 4 into the onsite irrigation pond. Occasionally, Well 5 will be used to supplement the onsite irrigation water.
5. The proposed (future) average annual groundwater demand for the winery is 1.67 AFY. This is an increase of just less than 0.6 AFY from the existing (pre-Glass Fire) groundwater demand of 1.1 AFY (as estimated by ACE).
6. Irrigation demands for vineyards and landscaping at the property will remain unchanged at 11.83 AFY, the same as the existing (pre-fire) demand.
7. Assuming groundwater recharge at the subject property 0.3 AFY/ac of land (in accordance with Napa County PBES (2022d), then the 45-acre property would receive 13.5 AFY of groundwater recharge annually. This is equal to the total groundwater demand proposed for the property of 13.5 AFY (winery demand of 1.67 AFY plus irrigation demand of 11.83 AFY). Hence, the project complies with the Napa County Tier 1 WAA requirements (WAA, 2015).
8. Well 5 was subjected to two long-term pumping tests: a 72-hour test during which Well 5 was pumped at an average rate of approximately 9 gpm; and a 10-day constant rate pumping test, with an average pumping rate of about 3 gpm. Both pumping rates are more than sufficient to satisfy the 2-gpm pumping rate necessary to meet the demands of the proposed Winery (assuming a 50% well operational rate, and a year-round pumping schedule).
9. Well capacity pumping tests were performed by others in Wells 1, 2, 3, and 4. The total tested pumping capacity of the four wells combined ranges from 27 gpm to as high as 41 gpm. These combined pumping rates are sufficient to meet the irrigation

demands of the property of 23 gpm (assuming that the wells are pumped on a 50% operational basis, every day during a 20-week long irrigation season).

10. During the December 2020, 72-hour pumping test of Well 5, water levels were monitored in both the pumping well (Well 5) and an offsite Observation Well owned by a neighbor located roughly 245 ft from Well 5. Construction of both wells is very similar, with similar depths and similar perforated casing intervals. At an average pumping rate of about 9 gpm (a much higher pumping rate than the 2 gpm required for the Winery project) , and after 72 hours of continuous pumping, no water level decline (i.e., no water level drawdown interference) was induced in the Observation Well by virtue of pumping Well 5 (the project well). Because no water level drawdown impacts were observed in the offsite well, the Tier 2 WAA requirements (WAA, 2015) have been met.
11. Multiple data sources related to flow measurements in Dutch Henry Creek, Biter Creek, and Selby Creek were reviewed by RCS. RCS also created a geologic cross section (Figure 4) to help illustrate the subsurface hydrogeologic conditions and relative elevation of Well 5 construction details to the nearby creeks (within 1,500 ft of Well 5). Data reviewed support the assertion that Well 5 is not hydraulically connected to either Dutch Henry Creek or Biter Creek (when flowing), and therefore, Tier 3 WAA requirements (WAA, 2015) have been satisfied. Observations that further support this lack of hydraulic connectivity between groundwater beneath the subject property and intermittent flow in both creeks include:
    - Based on the available data, flow in both Creeks is typically constrained to the wetter portion of the year, following significant rain events. Many data sources show that both creeks are often dry.
    - A watershed survey conducted by NCRCD in 2012 noted that the streams in the Selby Creek watershed were essentially dry channels at the time of the survey.
    - Well 5 is constructed in a manner that excludes flow into the well by virtue of a cement sanitary seal that extends to a depth of 54 ft bgs. At this depth, groundwater in the thin alluvial sediments (if any) is excluded from entering the well.
    - Perforations in the Well 5 casing begin at a depth of 94 ft bgs, far below the depth of the alluvium in either creek channel.
    - Water level data for Well 5 for several different dates show water elevations that are below the bottom elevations of both stream channels. Further, flow conditions in the creek do not correlate with water level elevation in Well 5.
12. RCS recommends continuation of groundwater monitoring at the subject property. This would include the frequent, ongoing monitoring of static and pumping water levels in Well 5, and also monitoring of the instantaneous flow rates and cumulative pumped volumes from the well.

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Table 1
Summary of Available Well Construction and Pumping Data
Hourglass Winery

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
APN 021-010-001												
Well 1	482423	April 1991	Air Rotary	515	508	PVC	5	8	0-24 (cement)	90-508	Factory-cut 0.125	24-508 3/8" Gravel
Well 3	527309	January 1997	Air Rotary	380	370	PVC	5	9	0-3 (cement); 3-21 (bentonite)	170-370	Factory-cut 0.125	21-370 Pea Gravel
APN 018-060-024												
Destroyed	119626	June 1986	Air Rotary	160	160	PVC	6	10	0-20 (cement)	95-160	Factory-cut 0.040	20-160 3/4"
Well 2	710541	November 2000	Air Rotary	500	487	PVC	6	9	0-22 (concrete)	207-227; 367-427; 447-487	Factory-cut 0.032	22-487 Pea Gravel
Well 4	0938175	October 2006	Air Rotary	530	518	PVC	5	9	0-53 (cement)	300-518	Factory-cut 0.032	53-518 Well Pack Gravel
Well 5	1073626	August 2008	Mud Rotary	460	460	PVC	5	9	0-54	94-460	Factory-cut 0.032	54-460 Well Pack Gravel

POST-CONSTRUCITON YIELD DATA

Reported Well Designation	Date & Type of Yield Data	Duration of "Test" (hrs)	Estimated Flow Rate (gpm)	Static Water Level (ft)	Pumping Water Level (ft)	Estimated Specific Capaity (gpm/ft ddn)
APN 021-010-001						
Well 1	4/29/91 Airlift	2	21	25	ND	ND
Well 3	1/22/21 Airlift	8	13	271	275	3
APN 018-060-024						
Destroyed	June 1986 Airlift	1	40	96	ND	ND
Well 2	1/13/21 Airlift	24	7	294	386	0.08
Well 4	1/22/21 Airlift	8	13	271	275	3.16
Well 5	12/21/20 Airlift	72	9	123	306	0.05

Notes: 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

Table 2
Summary of Recent Pumping Data
Hourglass Winery

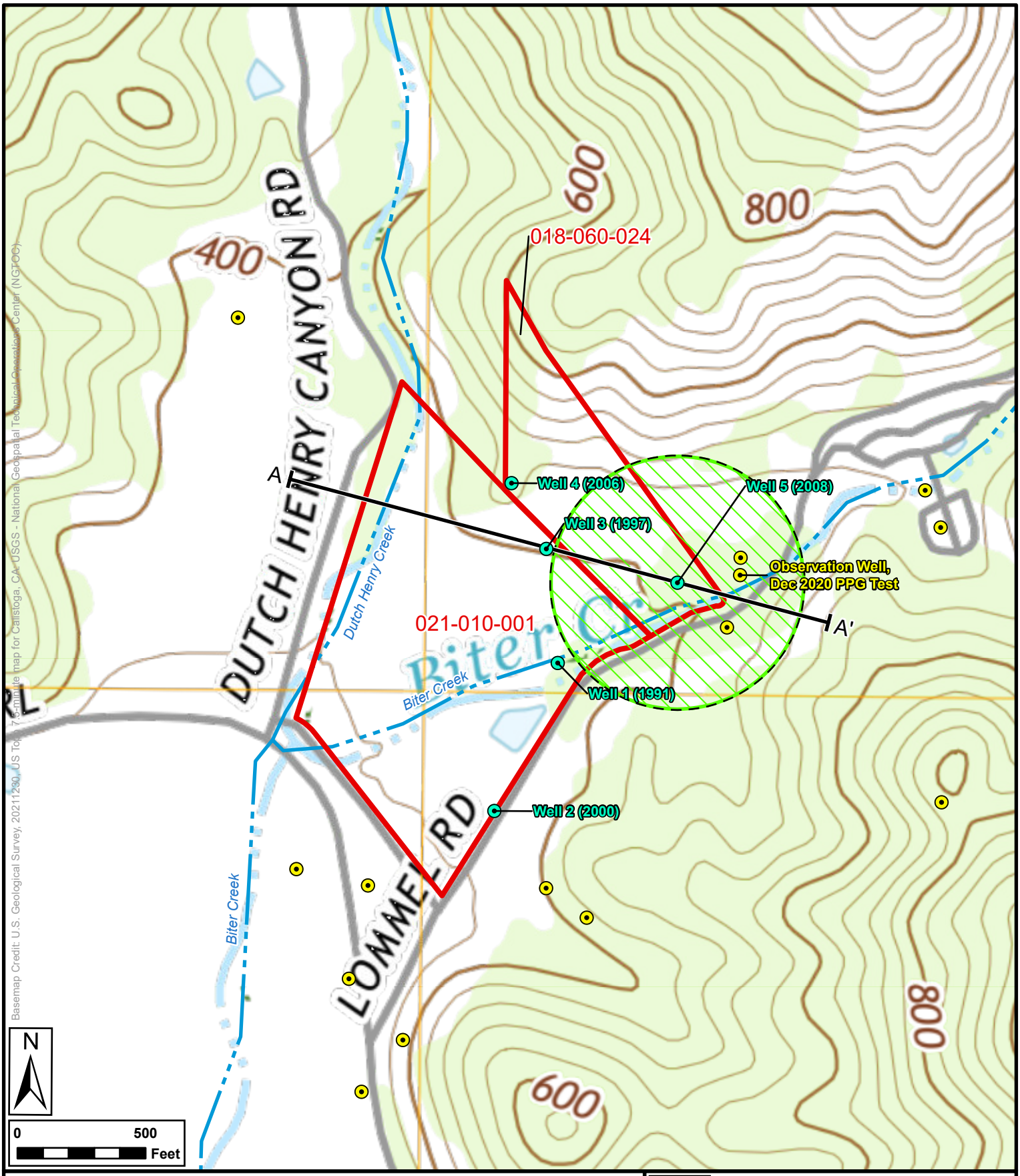
Reported Well Designation	Date & Type of Yield Data	Duration of "Test" (hrs)	Estimated Flow Rate (gpm)	Static Water Level (ft)	Pumping Water Level (ft)	Estimated Specific Capaity (gpm/ft ddn)
APN 021-010-001						
Well 1	2/4/21 Pumping	7	14	43	395	0.04
Well 3	1/22/21 Pumping	8	13	271	275	3.2
APN 018-060-024						
Destroyed	June 1986 Airlift	1	40	96	ND	ND
Well 2	1/13/21 Pumping	24	7	294	386	0.08
Well 4	1/22/21 Pumping	8	13	271	275	3.2
Well 5	12/21/20 Pumping	72	9	123	306	0.05

Notes: ft bgs = feet below ground surface
hrs = hours
gpm = gallons per minute
gpm/ft ddn = gallons per minute per foot of water level drawdown

Table 3
Summary of Irrigation Well Capacity Pumping Tests
Hourglass Winery

Reported Well Designation	Date of Capacity Testing	Duration of Pumping (hrs)	Average Flow Rate During Pumping Period (gpm)	Pre-Test Static Water Level (ft)	Final Pumping Water Level (ft)	Final Recovery Water Level (ft)	Duration of Recovery (hrs)	Type of Pumping Test	Recommended Operational Rates (gpm)
APN 021-010-001									
Well 1	2/4/21	7.25	13.90	42.5	395	68.30	16.75	Constant Drawdown	7
Well 1	2/5/21	2	20	68.3	242.2	41.5	71	Constant Rate	
Well 3	1/22/21	8	13	271	275.12	271.1	0.15	Constant Rate	13
APN 018-060-024									
Well 2	1/13/21	24.5	7	294.1	399	384.0	96	Constant Drawdown	7
Well 4	12/30/20	1	14	300?	N/A	N/A	N/A	Constant Rate	14?

Notes: ft bgs = feet below ground surface
hrs = hours
gpm = gallons per minute
gpm/ft ddn = gallons per minute per foot of water level drawdown



LEGEND

- Onsite Well (Showing Year Drilled)
- Offsite Well (Approximately Located)
- 500-ft Buffer Zone Around Well 5
- Cross Section Line
- Significant Stream (PBES & LSCE, 10/5/22)
- Subject Property (Showing APN; Adapted from Napa County Parcels, 11/2/22)

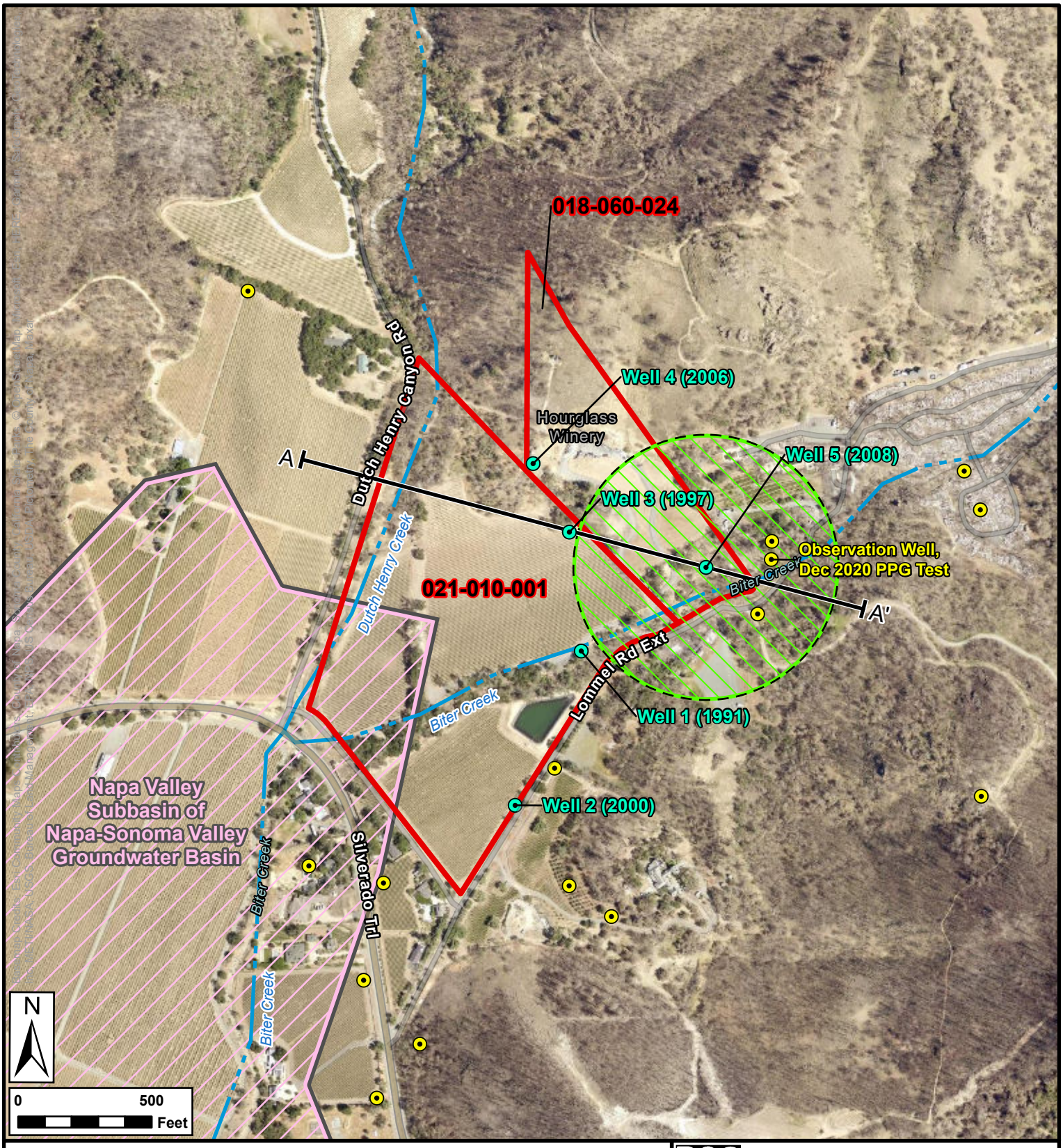
Note: All locations shown are approximate.

RCS

Figure 1
Location Map

RCS Job No. 713-NPA01 January 2023

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



LEGEND

- Onsite Well (Showing Year Drilled)
- Offsite Well (Approximately Located)
- 500-ft Buffer Zone Around Well 5
- Cross Section Line
- Significant Stream (PBES & LSCE, 10/5/22)
- Subject Property (Showing APN; Adapted from Napa County Parcels, 11/2/22)
- Groundwater Basin Boundary (DWR, 2021)

Note: All locations shown are approximate.

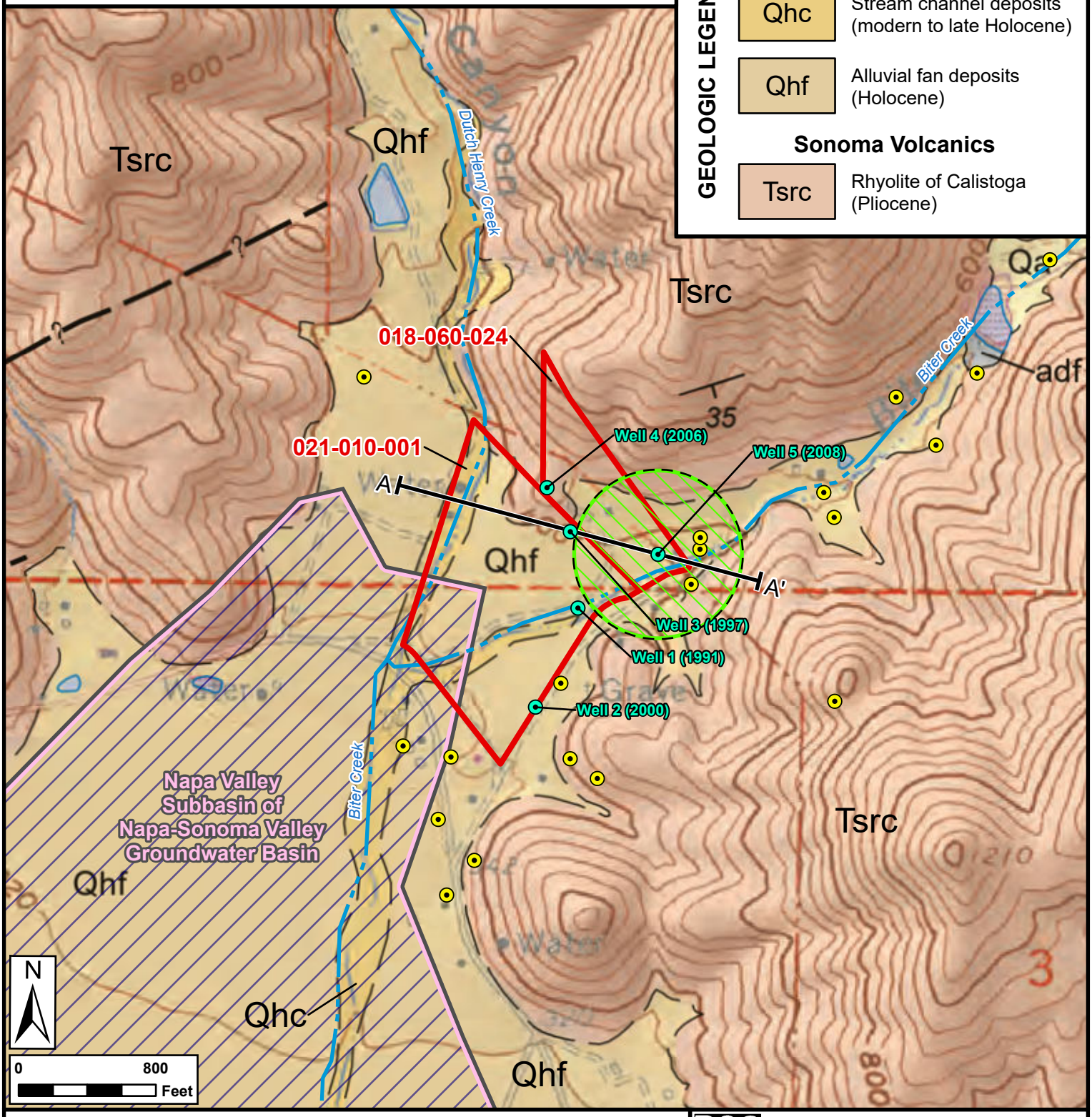
RCS

Figure 2
Aerial Imagery Map

RCS Job No. 713-NPA01 January 2023

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

Geologic map adapted from:
Delattre, M.P. & Gutierrez, C.I., 2013. Preliminary Geologic Map of the Calistoga 7.5' Quadrangle, Napa and Sonoma Counties, California: A Digital Database. Version 1.0. California Geological Survey.



LEGEND

- Onsite Well (Showing Year Drilled)
- Offsite Well (Approximately Located)
- 500-ft Buffer Zone Around Well 5
- Cross Section Line
- Significant Stream (PBES & LSCE, 10/5/22)
- Subject Property (Showing APN; Adapted from Napa County Parcels, 11/2/22)
- Groundwater Basin Boundary (DWR, 2021)

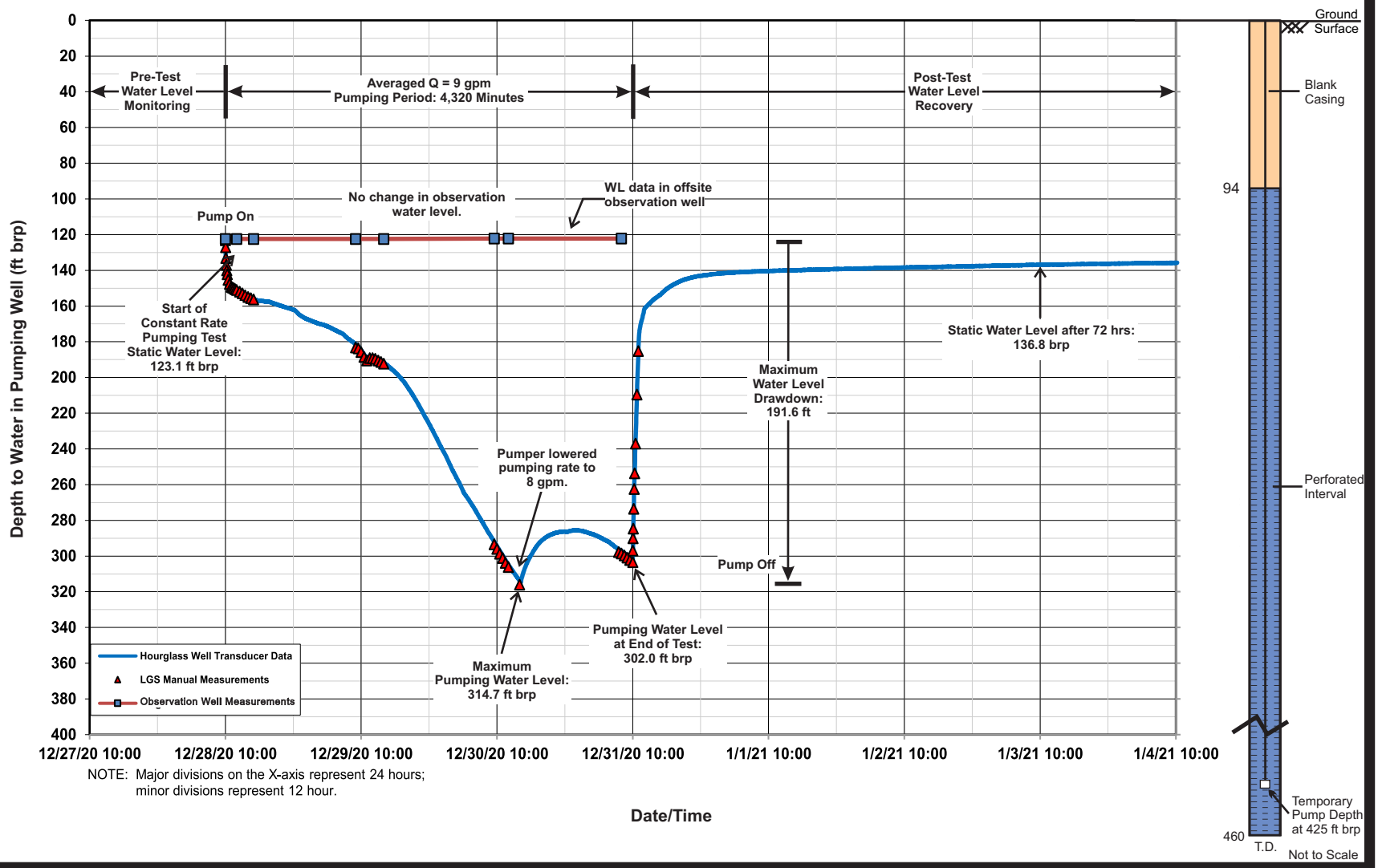
Note: All locations shown are approximate.

RCS

Figure 3
Geology Map

RCS Job No. 713-NPA01 January 2023

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

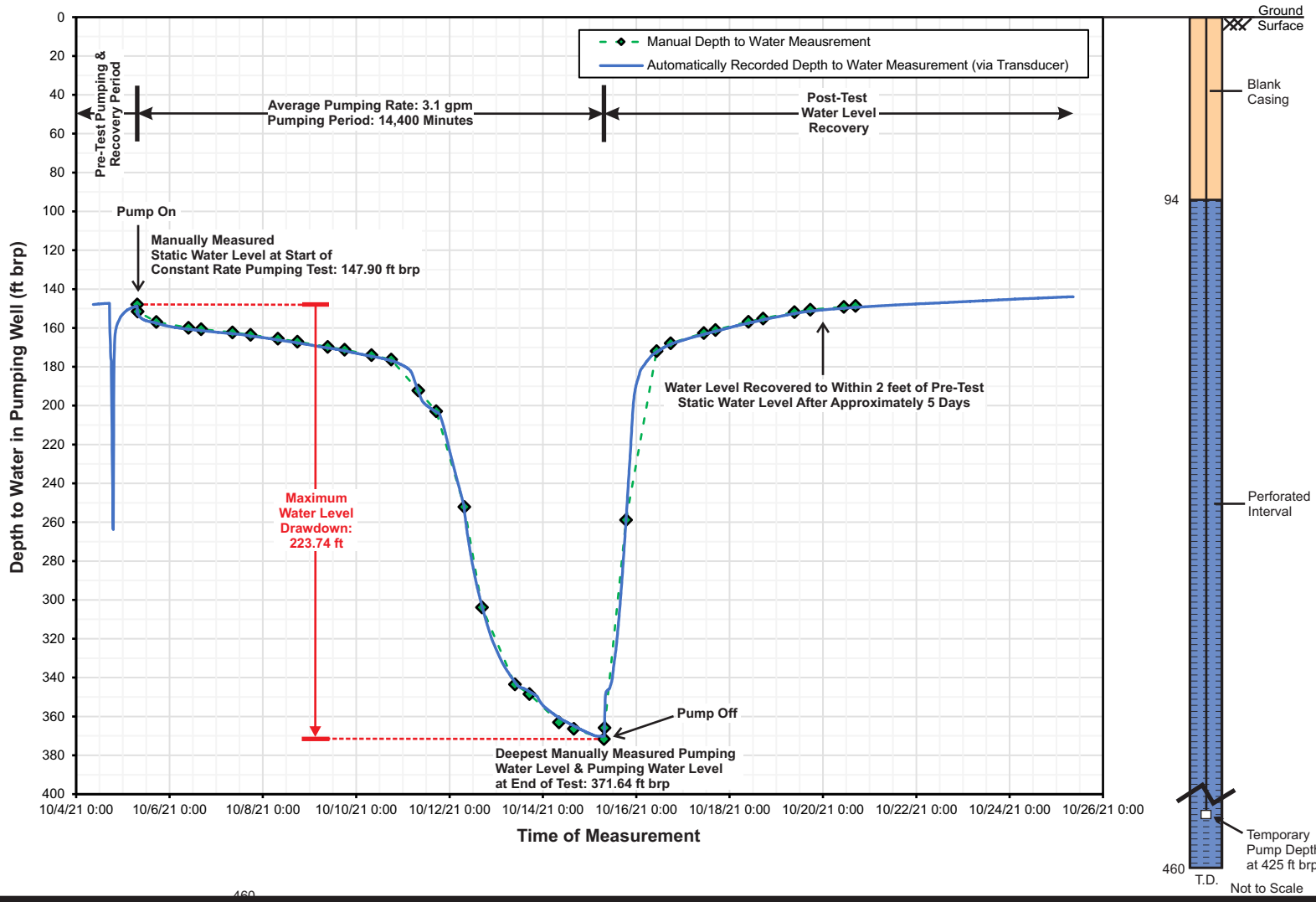


NOTE: Major divisions on the X-axis represent 24 hours; minor divisions represent 12 hour.

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

FIGURE 4
CONSTANT RATE PUMPING TEST
HOURGLASS WINERY WELL 5

Job No. 713-NPA01 **January 2023**



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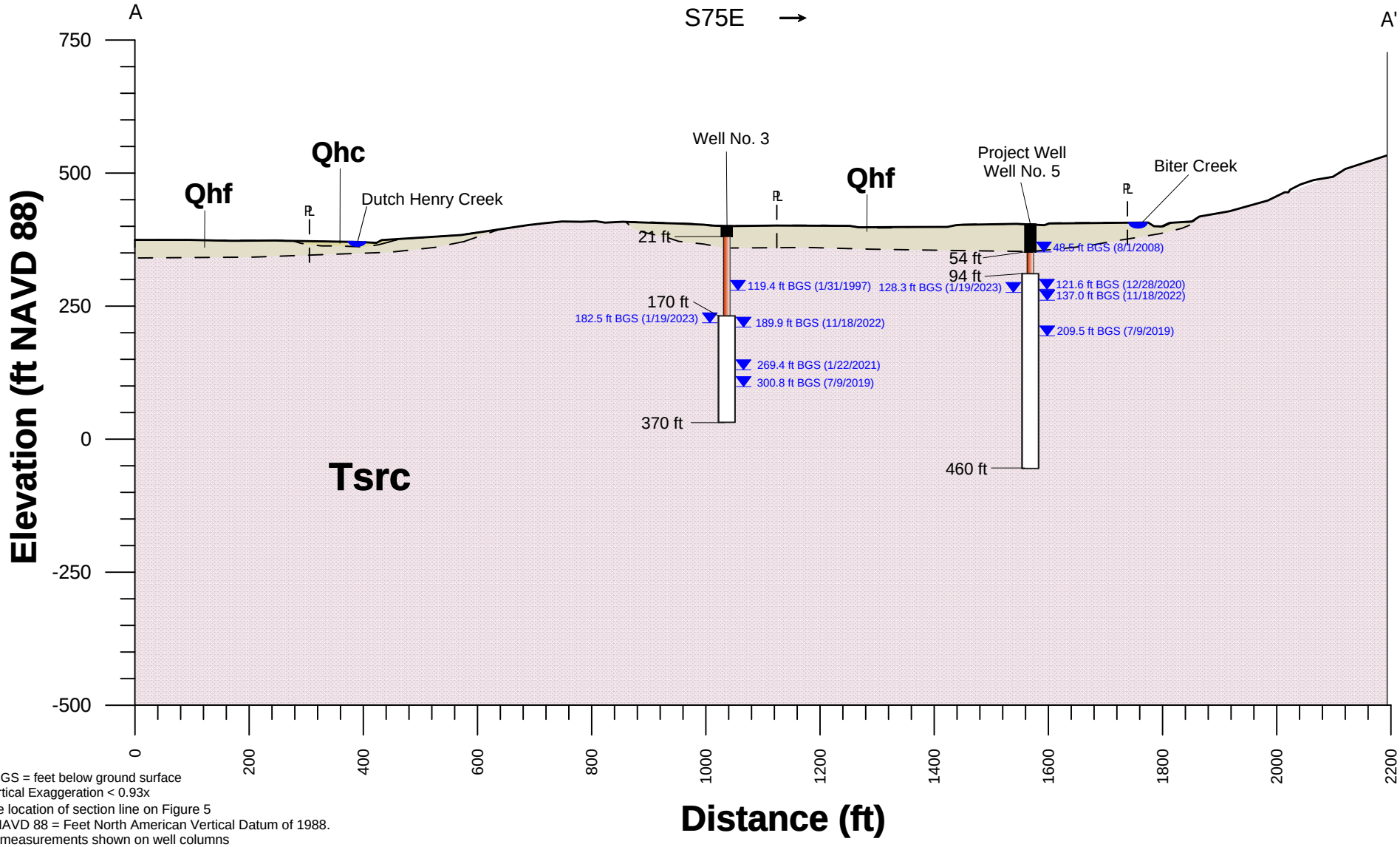
Sherman Oaks, CA 91401
Southern California: (818) 506-0418
Northern California: (707) 963-3914
www.rcslade.com

FIGURE 5
WATER LEVEL DATA DURING
OCTOBER 2021 CONSTANT RATE PUMPING TEST
OF HOURGLASS WINERY WELL 5

Job No. 713-NPA01 **January 2023**



ft BGS = feet below ground surface
Vertical Exaggeration < 0.93x
See location of section line on Figure 5
ft NAVD 88 = Feet North American Vertical Datum of 1988.
All measurements shown on well columns
are below ground surface.

LEGEND

- Cement Seal
- Blank Casing
- Perforated Interval
- Static Water Level
- PL Property Line
- Qhc — Stream channel deposits (modern to latest Holocene)
- Qhf — Alluvial fan deposits (Holocene)
- Tsrc — Rhyolite of Calistoga (Pliocene)

RCS

FIGURE 6
CROSS SECTION A-A'

RCS Job No. 713-NPA01

January 2023

APPENDIX

WELL COMPLETION REPORTS

FOR

HOURGLASS PROPERTY

ORIGINAL
File with DWR

Page ____ of ____
Owner's Well No. ____

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 482423

Date Work Began 4-22-1991 , Ended 4-30-1991
Local Permit Agency Napa County Environmental Mgmt.
Permit No. 028436 Permit Date 4-19-1991

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO. 08N06W03E
LATITUDE ____ LONGITUDE ____
APN/TRS/OTHER ____

Well 1

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ____ HORIZONTAL ____ ANGLE ____ (SPECIFY)
DEPTH TO FIRST WATER 90 (Ft.) BELOW SURFACE

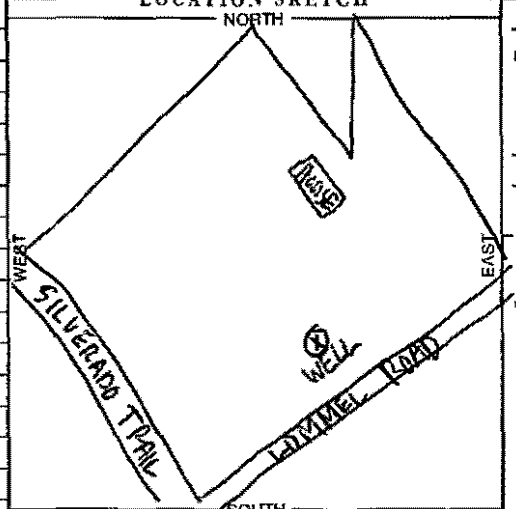
DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	6	Br. clay & boulders
6	55	br. clay with gravel
55	130	tuff
130	515	rhyolite

TOTAL DEPTH OF BORING 515 (Feet)
TOTAL DEPTH OF COMPLETED WELL 508 (Feet)

WELL LOCATION

Address 4208 Silverado Trail
City Calistoga
County Napa
APN Book ____ Page ____ Parcel #021-010-001
or
Township 9 N. Range 6 W. Section 34
or
Latitude ____ DEG. ____ MIN. ____ SEC. NORTH Longitude ____ DEG. ____ MIN. ____ SEC. WEST

LOCATION SKETCH



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

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
____ Deepen
____ Other (Specify)
____ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)

____ MONITORING
WATER SUPPLY
____ Domestic
____ Public
XX Irrigation
____ Industrial
____ "TEST WELL"
____ CATHODIC PROTECTION
____ OTHER (Specify)

DRILLING METHOD Rotary (air) FLUID ____

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 25 (Ft.) & DATE MEASURED 4-29-91
ESTIMATED YIELD* 21 (GPM) & TEST TYPE air
TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN 480 (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	24	10								
24	515	8								
0	90		x				plastic	5	F480	
90	508			x			plastic	5	F480	1/8"

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	24	x			grout
24	508			x	3/8 gravel

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

ADDRESS 2110 Penny Lane CITY Napa STATE CA. ZIP 94559

Signed Lloyd Huckfeldt
WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED 4-30-1991

C57 LICENSE NUMBER 439-746

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. _____

Date Work Began 11-16-00 , Ended 11-22-00

Local Permit Agency Napa County Environmental Mgmt.

Permit No. 96-11684 Permit Date 11-14-00

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 710541

DWR USE ONLY — DO NOT FILL IN
09N06W34
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	25	clay with boulders
25	90	volcanic tuff
90	480	volcanic rhyolite
480	500	hard green volcanics
		cont. casing layout
367	427	screen PVC 6" .032 slot
427	447	blank PVC 6"
447	487	screen PVC 6" .032 slot

TOTAL DEPTH OF BORING 500 (Feet)

TOTAL DEPTH OF COMPLETED WELL 487 (Feet)

Well 2

WELL LOCATION

Address 4208 Silverado Trail

City Calistoga

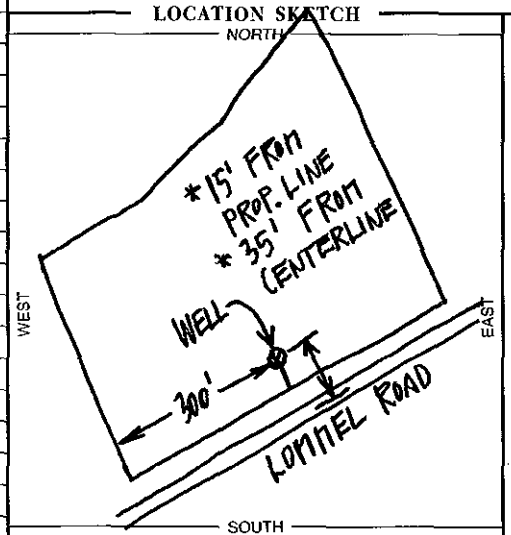
County Napa

APN Book 18 Page 060 Parcel 24

Township _____ Range _____ Section _____

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

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 390 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 90 (Ft.) & DATE MEASURED 11-22-00

ESTIMATED YIELD * 18 (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	25	15								
25	500	9								
0	207		X				PVC F480	6	SDR-21	
207	227			X			PVC F480	6	SDR-21	.032
227	367		X				PVC F480	6	SDR-21	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	22	X			concrete
22	487			X	pea gravel

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

2110 Penny Lane Napa CA 94559
ADDRESS CITY STATE ZIP

Signed _____ 11-28-00
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED

439-746
C-57 LICENSE NUMBER

DWR 188 REV 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. _____

Date Work Began 1-28-97, Ended 1-31-97

Local Permit Agency Napa County Environmental Mgmt.

Permit No. _____ Permit Date 1-24-97

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 527309

DWR USE ONLY — DO NOT FILL IN
08N06W03
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

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

DEPTH TO FIRST WATER 19 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	19	clay with embedded boulders
19	40	light brown weathered tuff
40	60	gray rhyolite
60	300	light gray rhyolite med. hard
300	360	hard rhyolite
360	370	med. rhyolite
370	380	gray ash clay

TOTAL DEPTH OF BORING 380 (Feet)

TOTAL DEPTH OF COMPLETED WELL 370 (Feet)

Well 3

WELL LOCATION

Address 4208 Silverado Trail

City Calistoga

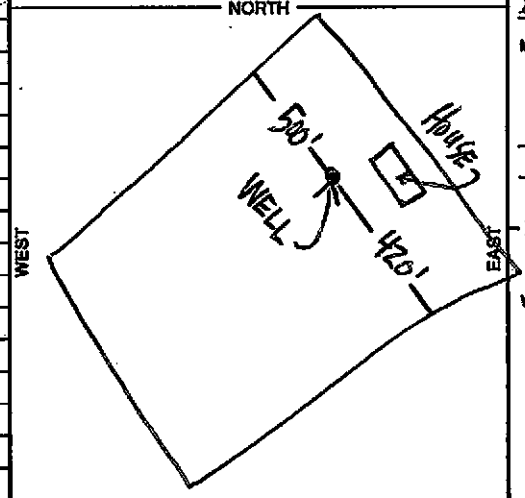
County Napa

APN Book 021 Page 010 Parcel 001

or Township _____ Range _____ Section _____

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

LOCATION SKETCH



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

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

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

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY
___ Domestic
___ Public
X Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Rotary Air FLUID _____

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 121 (Ft.) & DATE MEASURED 1-31-97

ESTIMATED YIELD* 130 (GPM) & TEST TYPE air lift

TEST LENGTH 1 (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	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	25	10								
25	380	9								
0	170		X				PVC F480	5	SDR-21	
170	370			X			PVC F480	5	SDR-21	1/8"

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	3	X			concrete
3	21		X		bentonite
21	370			X	pea gravel

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

ADDRESS 2110 Penny Lane CITY Napa STATE CA ZIP 95449

Signed _____ (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 2-4-97 C-57 LICENSE NUMBER 439-746

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

CONFIDENTIAL PUBLIC RECORD WATER CODE SECTION 13752

ORIGINAL
File with DWR

Page ___ of ___
Owner's Well No. ___
Date Work Began 10/19/2006, Ended 10/25/2006
Local Permit Agency Napa County
Permit No. 06-01495 Permit Date 10/19/2006

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0938175

DWR USE ONLY — DO NOT FILL IN
09N06W34
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Air

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	18	Brown Ash
18	105	Gray Oil Shale
105	190	White Clay & Gray Ash
190	255	Gray Oil Shale
255	420	White & Gray Hard Ash
420	440	Gray Shale
440	530	White Hard Ash

TOTAL DEPTH OF BORING 530 (Feet)
TOTAL DEPTH OF COMPLETED WELL 518 (Feet)

NOT FOR PUBLIC DISCLOSURE
CONFIDENTIAL
WATER CODE SECTION 13752

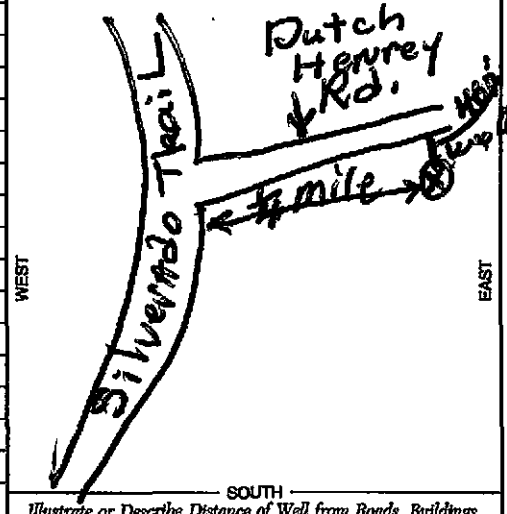
WELL OWNER

Nam
Mai
CITY
Well 4

WELL LOCATION

Address 9 Button 4208 Silverado Trail
City Calistoga
County Napa
APN Book 018 Page 060 Parcel 024-000
Township ___ Range ___ Section ___
Lat ___ DEG. ___ MIN. ___ SEC. N
Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH



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

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 370 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 360 (Ft.) & DATE MEASURED 10-25-06
ESTIMATED YIELD 12+ (GPM) & TEST TYPE Air Lift
TEST LENGTH 5 (Hrs.) TOTAL DRAWDOWN N/A (Ft.) GPM at day of Test
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	53	11	✓				Plastic	5	F480	
53	300	8 3/4	✓				"	"	"	
300	518	8 3/4		✓			"	"	"	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	53	✓			
53	518				Well Pack Gravel

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

NAME Pulliam Well Exploration (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS 5110 Highway 128 CITY Napa STATE CA ZIP 94558
Signed [signature] C-57 LICENSED WATER WELL CONTRACTOR
DATE SIGNED 11-14-06 C-57 LICENSE NUMBER 808-508

DWR 188 REV. 05-03 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM OSP 03 78636

18-060-024

QUADRUPLICATE
For Local Requirements

Page ___ of ___
Owner's Well No. Well 5

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 1073626

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

Date Work Began 07/23/2008, Ended 08/01/2008
Local Permit Agency Napa County
Permit No. E08-00380 Permit Date 07/16/2008

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Mud

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	12	Brown Clay, Dirt & Gravel
12	50	Brown Clay & Boulders
50	65	White Ash & Rock
65	95	White Clay & Ash
95	105	White Rock
105	120	White Clay
120	200	White Rock
200	220	White Clay Rock
220	240	White Rock
240	300	White Clay Rock
300	380	White Rock
380	400	White Clay Roc
400	460	White Rock

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

RECEIVED
AUG 26 2008
DEPT. OF ENVIRONMENTAL MANAGEMENT

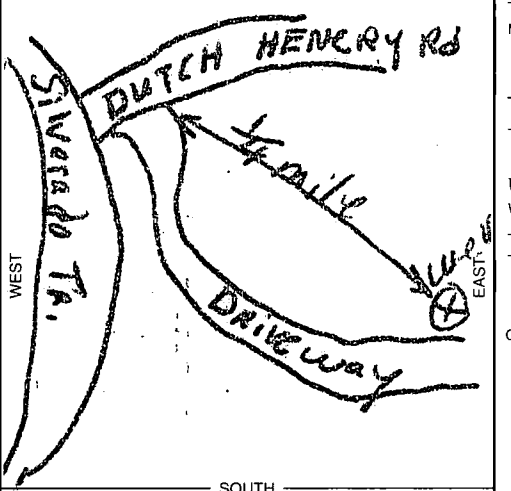
WELL OWNER

Name Button Vineyard LLC
Mailing Address 1104 Adams St.
CITY St Helena CA STATE 574 ZIP

WELL LOCATION

Address 701 Lommel Rd.
City Napa
County Napa
APN Book 018 Page 060 Parcel 024-000
Township ___ Range ___ Section ___
Lat ___ N DEG. MIN. SEC. Long ___ W DEG. MIN. SEC.

LOCATION SKETCH



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

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

USES (✓)

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER UK (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 50 (Ft.) & DATE MEASURED 8-1-08
ESTIMATED YIELD * 60 (GPM) & TEST TYPE 2 Ft
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN ___ (Ft.) GPM at Day of Test
** 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	54	11	✓				Plastic	5	F480	
54	94	8 3/4	✓				✓	✓	✓	
94	460	8 3/4		✓			✓	✓	✓	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	54				
54	460				Well Pack Gravel

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

NAME ___ (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
5110 Highway 128 Napa, CA 94558
ADDRESS CITY STATE ZIP
Signed [signature] C-57 LICENSED WATER WELL CONTRACTOR
DATE SIGNED 8-1-08
808-508 C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

018 060 024

Do not fill in

No. 119626

State Well No.

Other Well No. 09N06W34

...e of Intent No.

...l Permit No. or Date

Destroyed Well

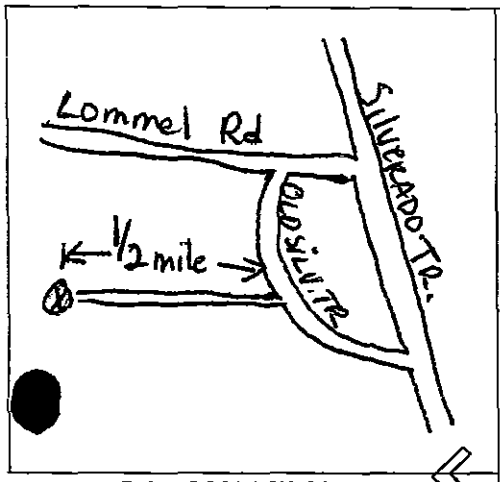
(2) LOCATION OF WELL (See instructions):

County Napa Owner's Well Number 18-060-24

Well address if different from above 4208 Old Silverado Tr.(Lommel)

Township Range Section

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



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

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

(5) EQUIPMENT:

Rotary ☐ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size 3/4"
Diameter of bore 9 7/8"
Packed from 20 to 160 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen machine

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	95	6	200	95	160	.040

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing grout

(10) WATER LEVELS:

Depth of first water, if known 105 ft.
Standing level after well completion 96 ft.

(11) WELL TESTS:

Was well test made? Yes ☒ No ☐ If yes, by whom? driller
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test 96 ft. At end of test ? ft
Di...ge 40 gal/min after 1 hours Water temperature
C...al analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:

Total depth 160 ft. Depth of completed well 160 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	6"	soil
6"	3'	tuffa
3'	105	semi-hard blue grey rock
105	160	hard blue grey rock, black stringers, fractured

Work started 6/20 1986 Completed 6/30 1986

WELL DRILLER'S STATEMENT:

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

SIGNED Harold Gregson (Well Driller)

NAME Doshier and Gregson Drilling, Inc. (Person, firm, or corporation) (Typed or printed)

Address 5365 Napa-Vallejo Highway

City Vallejo Zip 94589

License No. 294001 Date of this report 7/7/86

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

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

APPENDIX

HOURGLASS WINERY
GROUNDWATER USE ESTIMATES
BY
APPLIED CIVIL ENGINEERING (ACE)

APPLIED CIVIL ENGINEERING INCORPORATED

Hourglass Winery

Groundwater Use Estimate

	Estimated Water Use (Acre-Feet / Year)		
	Existing		Proposed
Residential Water Use			
Primary Residence[1] - Not Applicable	0.000		0.000
Pool[1A] - Not Applicable	0.000		0.000
Second Dwelling Unit - Not Applicable	0.000		0.000
Guest Cottage - Not Applicable	0.000		0.000
Total Residential Domestic Water Use	0.000		0.000
Winery Domestic & Process Water Use			
Winery - Daily Visitors[2][3]	0.060		0.067
Winery - Events with Meals Prepared Onsite[2][4]	0.000		0.075
Winery - Events with Meals Prepared Offsite[2][5]	0.008		0.021
Winery - Employees[2][6]	0.067		0.202
Winery - Event Staff[2][6]	0.003		0.014
Winery - Process[2][7]	0.968		1.290
Total Winery Water Use	1.106		1.668
Irrigation Water Use			
Lawn[8]	0.000		0.000
Other Landscape[9]	1.228		1.228
Vineyard - Irrigation[10]	10.600		10.600
Vineyard - Frost Protection - Not Applicable	0		0
Vineayrd - Heat Protection - Not Applicable	0		0
Total Irrigation Water Use	11.828		11.828
Total Combined Water Use	12.93		13.50

Estimates per Napa County Water Availability Analysis - Guidance Document, May 12, 2015 unless noted

[1] 0.5 to 0.75 ac-ft/yr for Primary Residence, includes some landscaping per Napa County WAA Guidance Document

[1A] 0.1 ac-ft/yr for pool without cover per Napa County WAA Guidance Document

[2] See attached Winery Production, Guest, Employee and Event Staff Statistics

[3] 3 gallons of water per guest per Napa County WAA Guidance Document

[4] 15 gallons of water per guest per Napa County WAA - Guidance Document

[5] 5 gallons of water per guest used because all food preparation, dishwashing, etc. to occur offsite

[6] 15 gallons per shift per Napa County WAA - Guidance Document

[7] 2.15 ac-ft per 100,000 gallons wine per Napa County WAA - Guidance Document

[8] 0.1 ac-ft/yr per 1,000 sf of lawn per Napa County WAA - Guidance Document - 0 sf lawn

[9] Estimate provided by owner based on past usage

[10] 0.5 ac-ft/ac per Napap County WAA - Guidance Document - 18.7 acres of vineyard existing and 2.5 acres entitled but not yet planted

APPLIED CIVIL ENGINEERING INCORPORATED

Hourglass Winery

Existing Winery Production, Visitor, Employee & Event Staff Statistics

Winery Production[1]	45,000	gallons per year
Tours and Tastings by Appointment[1]		
Monday through Thursday	18 guests max per day	
Friday through Sunday	18 guests max per day	
Total Guests Per Year		6,552
Events - Meals Prepared Offsite[1]		
15 per year	30 guests max	450
1 per year	100 guests max	100
0 per year	0 guests max	0
Total Guests Per Year		550
Events - Meals Prepared Onsite[1]		
0 per year	0 guests max	0
0 per year	0 guests max	0
0 per year	0 guests max	0
Total Guests Per Year		0
Winery Employees[2]		
4 employees	1 shift per day	
Total Employee Shifts Per Year		1,460
Event Staff[3]		
15 per year, 30 guests	3 event staff	45
1 per year, 100 guests	10 event staff	10
0 per year, 0 guests	0 event staff	0
Total Event Staff Per Year		55

[1] Winery production, tours and tasting and event guest statistics per Winery Use Permit Modification Application

[2] Employee counts per Winery Use Permit Application

[3] Assumes 1 event staff per 10 guests (in addition to regular winery employees)

APPLIED CIVIL ENGINEERING INCORPORATED

Hourglass Winery

Proposed Winery Production, Visitor, Employee & Event Staff Statistics

Winery Production[1]	60,000	gallons per year
Tours and Tastings by Appointment[1]		
Monday through Thursday	20 guests max per day	
Friday through Sunday	20 guests max per day	
Total Guests Per Year		7,280
Events - Meals Prepared Offsite[1]		
0 per year	30 guests max	0
1 per year	100 guests max	100
3 per year	250 guests max	750
1 per year	500 guest max	500
Total Guests Per Year		1,350
Events - Meals Prepared Onsite[1]		
54 per year	30 guests max	1,620
0 per year	0 guests max	0
0 per year	0 guests max	0
Total Guests Per Year		1,620
Winery Employees[2]		
12 employees	1 shift per day	
Total Employee Shifts Per Year		4,380
Event Staff[3]		
54 per year, 30 guests	3 event staff	162
1 per year, 100 guests	10 event staff	10
3 per year, 250 guests	25 event staff	75
1 per year, 500 guests	50 event staff	50
Total Event Staff Per Year		297

[1] Winery production, tours and tasting and event guest statistics per Winery Use Permit Modification Application

[2] Employee counts per Winery Use Permit Modification Application

[3] Assumes 1 event staff per 10 guests (in addition to regular winery employees)