# “I”

# Water Availability Analysis
# March 5, 2021 – Tier I & II WAA
# October 4, 2022 – Tier I-III Addendum

APPLIED CIVIL ENGINEERING INCORPORATED

**Vida Valiente Winery**

**Groundwater Use Estimate**

| | Estimated Water Use (Acre-Feet / Year) | | |
|---|---|---|---|
| | Existing | | Proposed |
| **Residential Water Use** | | | |
| Primary Residence[1] | 0.750 | | 0.000 |
| Pool[1A] | 0.100 | | 0.000 |
| Second Dwelling Unit - Not Applicable | 0.000 | | 0.000 |
| Guest Cottage - Not Applicable | 0.000 | | 0.000 |
| Total Residential Domestic Water Use | 0.850 | | 0.000 |
| **Winery Domestic & Process Water Use** | | | |
| Winery - Daily Visitors[2][3] | 0.000 | | 0.094 |
| Winery - Events with Meals Prepared Onsite[2][4] | 0.000 | | 0.027 |
| Winery - Events with Meals Prepared Offsite[2][5] | 0.000 | | 0.005 |
| Winery - Employees[2][6] | 0.000 | | 0.151 |
| Winery - Event Staff[2][6] | 0.000 | | 0.005 |
| Winery - Process[2][7] | 0.000 | | 0.645 |
| Total Winery Water Use | 0.000 | | 0.926 |
| **Irrigation Water Use** | | | |
| Lawn[8] - Not Applicable | 0.000 | | 0.000 |
| Other Landscape[9] | 0.000 | | 0.500 |
| Vineyard - Irrigation | 1.710 | | 1.605 |
| Vineyard - Frost Protection - Not Applicable | 0 | | 0 |
| Vineayrd - Heat Protection - Not Applicable | 0 | | 0 |
| Total Irrigation Water Use | 1.710 | | 2.105 |
| **Total Combined Water Use** | 2.6 | | 3.0 |

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 per MWELO irrigation calculations prepared by landscape irrigation designer

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APPLIED CIVIL ENGINEERING INCORPORATED

**Vida Valiente Winery**

**Winery Production, Visitor, Employee & Event Staff Statistics**

| | | | |
|---|---|---|---|
| **Winery Production**[1] | | 30,000 | gallons per year |
| | | | |
| **Tours and Tastings by Appointment**[1] | | | |
| Monday through Thursday | 28 guests max per day | | |
| Friday through Sunday | 28 guests max per day | | |
| Total Guests Per Year | | 10,192 | |
| | | | |
| **Events - Meals Prepared Offsite**[1] | | | |
| 3 per year | 60 guests max | 180 | |
| 1 per year | 125 guests max | 125 | |
| 0 per year | 0 guests max | 0 | |
| Total Guests Per Year | | 305 | |
| | | | |
| **Events - Meals Prepared Onsite**[1] | | | |
| 24 per year | 24 guests max | 576 | |
| 0 per year | 0 guests max | 0 | |
| 0 per year | 0 guests max | 0 | |
| Total Guests Per Year | | 576 | |
| | | | |
| **Winery Employees**[2] | | | |
| 9 employees | 1 shift per day | | |
| Total Employee Shifts Per Year | | 3,285 | |
| | | | |
| **Event Staff**[3] | | | |
| 24 per year, 24 guests | 3 event staff | 72 | |
| 3 per year, 60 guests | 6 event staff | 18 | |
| 1 per year, 125 guests | 13 event staff | 13 | |
| Total Event Staff Per Year | | 103 | |

(1) Winery production, tours and tasting and event guest statistics per Winery Use Permit Application

(2) Employee counts per Winery Use Permit Application

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

# MEMORANDUM

March 5, 2021

To: Mr. Hayes Drumwright
16 Calle Ameno
San Clemente, California 92672
Sent via email (hayesdrumwright@gmail.com)

Cc: Mr. Sam Kaplan (samkaplan.slk@gmail.com)
Ms. Donna Oldford (dboldford@aol.com)
Mr. Mike Muelrath (mike@appliedcivil.com)

Job No. 669-NPA02

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

Re: Results of Napa County Tier 1 and Tier 2 Water Availability Analyses
Vida Valiente Winery
407 Crystal Spring Road
Vicinity St. Helena, Napa County, California
Napa County APN 021-410-013

## 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 Vida Valiente 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 and Tier 2 WAA requirements, as described in the Napa County WAA Guidelines Document (WAA, 2015).

The subject property is comprised by a single parcel and is located at 407 Crystal Springs Road in the St. Helena area of Napa County (County). Figure 1, "Well Location Map," shows the boundary of the subject property superimposed on a USGS topographic map of the area. This approximate parcel boundary was adapted from the County Assessor's parcel data, which are freely available on the County GIS website. Also shown on Figure 1 is the location of the existing onsite water well (labeled as "Existing Well"), and the approximate locations of some nearby offsite wells owned by others. The locations of the proximal wells shown on Figure 1 are not considered to represent all nearby but offsite wells owned by others that currently 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 that was obtained via the ArcGIS Pro software package. Note that the air photo was taken before the 2020 Glass Fire and shows structures and vegetation that may no longer exist. Other features shown on Figures 1 and 2 are discussed later in this Memorandum.

As reported by the project engineer, Mr. Mike Muelrath of Applied Civil Engineering, Inc (ACE), the subject property had been developed with a residence, a pool, a guest house, and 3.4 acres of existing vineyards; however, the residential structures were destroyed during the 2020 Glass Fire. Water demands for the existing onsite developments have historically been met via groundwater pumped by the onsite Existing Well; reportedly, this well does not have a 50-foot sanitary seal. RCS understands the proposed project is to develop a new winery (having a production of 30,000 gallons of wine per year) with employees, a wine tasting room, and other events. In order to meet the requirements for the proposed Public Water System permit, a new water-supply well with a minimum 50-foot sanitary seal is proposed to be constructed onsite. The location for the proposed well is ±65 ft to the northeast of the Existing Well (see Figures 1 and 2). For the subject winery project, future winery water demand and existing onsite water demands for vineyard irrigation and the residential structures are proposed to be met using the groundwater pumped from the proposed New Well. The Existing Well will be used as a redundant backup water supply well for the onsite vineyards and residences only.

The basic purpose of this Memorandum is to comply with Napa County's WAA guidelines for a "Tier 1" WAA ("i.e., a groundwater recharge estimate); those guidelines were promulgated by the County in May 2015. Also, as shown on Figures 1 and 2, there is at least one known offsite well, owned by others, that is located within 500 ft of the Existing Well and proposed New Well (i.e., the "project well"); the locations of the offsite wells in the area were determined during an RCS site reconnaissance visit, and from RCS review of publicly-available records. This offsite well is labeled as the Neighbor Well on the figures herein. Hence, a "Tier 2" WAA (i.e., a well interference evaluation) needed to also be performed for this project to provide estimates of the possible water level drawdown interference that might be induced in the neighboring well from future pumping by the new project well.

## Site Conditions

From review of in-house data provided by the property owner and ACE, and from the field reconnaissance visit by an RCS geologist to the subject property on June 2, 2020 (prior to the September 2020 Glass Fire), the following key items were noted and/or observed (refer to Figures 1 and 2):

a. The Vida Valiente Winery property is comprised by a single parcel having a County Assessor's Parcel Number (APN) of 021-410-013. The total County-assessed area of the subject property is 16.9 acres.

b. The subject property is located in the hills along the east side of Napa Valley and north of St. Helena. As illustrated by the topographic contours illustrated in Figure 1, the subject property is situated in a small valley and the property boundary extends to the south up a steep ridgeline. The steeper portion of the property slopes to the northeast toward the center of the valley.

c. There are no mapped ephemeral creeks or drainages[1] within the boundaries of the subject property. An unnamed "dashed" ephemeral creek, which drains southeast from Bell Canyon Reservoir, is shown on Figure 1 along the northern boundary and a

[1] Such drainages would typically be shown as "dashed lines" on a USGS topographic map (denoting ephemeral status).

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small portion of the northeastern boundary of the property. This ephemeral creek drains toward the southeast out of the small valley and is tributary to the Napa River to the south. At the time of the June 2020 site visit, this creek was observed to be flowing.

d. The subject property is currently developed with 3.4 acres of vineyards, which are located in the northern and topographically flatter portion of the property (see Figures 1 and 2). Other onsite developments had included a residence and a pool, which was located near the Existing Well, and a guest house; the residence and the guest house were destroyed in the 2020 Glass Fire.

e. As shown on Figures 1 and 2, there is one water-supply well (i.e., the "Existing Well") located in the northwest portion of the subject property. The Existing Well was observed to be active and equipped with a permanent pump during the June 2020 site visit. The proposed New Well will be located approximately 65 ft northeast of the Existing 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 June 2020 site visit, the RCS geologist traveled along Crystal Springs Road to the north of the property, and walked the northwestern, northern, and northeastern boundaries of the property in an attempt to identify possible locations and/or the existence of nearby, but 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 contacted Napa County Planning, Building, and Environmental Services (PBES) in attempt to acquire "Well Completion Reports" (also known as "driller's logs") that might exist for the Existing Well, and for possible wells located on those neighboring offsite properties. In addition, RCS geologists also used the California Department of Water Resources (DWR) online Well Completion Report website to download driller's logs for possibly existing wells within the immediate vicinity of the subject property. As a result of these inquiries, a few driller's logs were obtained and/or locations were reported 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. Recall that the Existing Well and the proposed New Well are shown on Figures 1 and 2 to be located within 500 ft of an offsite well on the neighboring property to the northwest.

## Key Construction and Testing Data for Existing Well

A DWR Well Completion Report (i.e., driller's log) is not available for the Existing Well. However, limited well construction data and testing information were provided in pumping test summary reports prepared by Oakville Pump Service, Inc. (OPS) and Ray's Well Testing Service (RWTS) for pumping tests performed on the Existing Well in September 2017 and April 2019, respectively;

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these summary reports were provided to RCS geologists by the Owner. 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 Existing Well.

*Well Construction Data*

Based on data listed on the available pumping reports and/or information identified during the June 2020 site visit, key well construction data for the Existing Well listed on Table 1 are as follows:

a. The Existing Well was constructed with steel casing having an inside diameter of 8 inches; the drilling method used to construct this well is unknown.

b. The total casing depth was reported to be approximately 172 ft, as reported by RWTS in their documentation for the April 2019 pumping test of this well.

c. The types, sizes, and depths of the casing perforations and the type and gradation of the gravel pack used for well construction are not known.

d. The depth of the sanitary seal of the Existing Well is unknown, but is assumed by the Owner and the ACE to be less than 50 ft; thus, this well does not meet State and/or County requirements for the groundwater pumped from this well to be used for public supply purposes for the proposed winery.

*Pumping Test Data by Others for the Existing Well*

On September 21, 2017, a 4-hour constant rate pumping test of the Existing Well was performed by OPS of Oakville, California. Testing of the well was performed using the existing permanent pump installed at the time of testing; the permanent pump was reported by OPS to be a 1-horsepower pump having a pumping capacity of 15 gallons per minute (gpm) and an installation depth of approximately 140 ft bgs. Water levels and pumping rates were measured and recorded by the OPS pumper during the pumping test. Figure 3A, "Water Level Data During September 2017 Constant Rate Pumping Test," illustrates the water level changes that occurred in the Existing Well during the 4-hour pumping test period. Key data available for the September 2017 pumping test by OPS include:

- A static water level (SWL) of 52.0 ft below reference point (brp) was recorded by the OPS pumper prior to testing.
- A maximum pumping water level (PWL) of 67.3 ft brp was measured at the end of the 4-hour pumping period. This PWL represents a water level drawdown of 15.3 ft at the end of the test. The data shows that water levels were relatively stable by the end of the pumping test, having decreased by approximately 0.7 ft in the last 2 hours of the pumping test. This represents a water level decline of approximately 0.3 ft/hour. Additionally, PWLs were reported to be well above the pump intake depth of 140 ft brp.
- During the pumping test period, pumping rates reportedly remained constant at a rate of approximately 17 gpm. Based on the reported pumping rate and the total water drawdown of 15.3 ft; the specific capacity of the Existing Well was calculated to be 1.1 gallons per minute per foot of water level drawdown (gpm/ft ddn) at the time of this OPS test in 2017.

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- Following the end of the pumping test, water levels recovered to a depth of 54.6 ft brp (or 83% recovery) after a period of approximately 25 minutes of non-pumping. No additional water level recovery measurements are available.

A more recent pumping test was performed on the Existing Well on April 10, 2019. This 8-hour constant rate pumping test was performed by RWTS of Sebastopol, California. Testing of the well was performed with a test pump installed by RWTS to a reported depth of 140 ft bgs. Figure 3B, "Water Level Data During April 2019 Constant Rate Pumping Test," illustrates the water level changes that occurred in the Existing Well during the 8-hour pumping test period. Below are key data for this more recent pumping test:

- A SWL of 45 ft brp was recorded by the RWTS pumper prior to the start of the pumping test. This SWL is approximately 7 ft shallower than the measurement collected by the OPS pumper roughly 19 months before in September 2017.
- The well was initially pumped at a rate of 25 gpm, but this rate was adjusted to 35 gpm approximately 15 minutes into the pumping test, and this higher rate was continued for the remainder of the 8-hour pumping test.
- A final PWL of 72.3 ft brp was recorded by the RWTS pumper; this represents a total water level drawdown of 27.3 ft. Based on the reported final pumping rate of 35 gpm, a specific capacity value of 1.3 gpm/ft ddn was calculated for this well during the time of its April 2019 testing. PWLs appeared to be relatively stable during the pumping test, and only declined 0.3 ft in the last 4½ hours of testing.
- Following the end of the 8-hour pumping test period, two water level recovery measurements were recorded by the RWTS pumper. After a period of 5 minutes following the cessation of pumping, water levels had recovered to 54 ft brp (or 83% recovery). A final water level recovery measurement of 46.5 ft brp (or 97% recovery) was recorded on April 12, 2019, after approximately 40.5 hours of water level recovery.
- Near the end of the pumping test, a suite of groundwater samples was reportedly collected by RWTS and delivered to a laboratory for analysis of constituents for irrigation purposes.

After the pumping test was completed, RWTS re-installed the existing permanent pump into the Existing Well.

As discussed above, a site visit to the subject property was performed by an RCS geologist on June 2, 2020, accompanied by Mr. Mike Muelrath of ACE. The following information for the Existing Well was collected from that site visit:

- The Existing Well was observed to be equipped with a permanent pump, and the pump was turned on (pumping) during the June 2020 visit. Mr. Muelrath turned the pump off temporarily during the site visit, and the RCS geologist manually measured water level readings of 55.8 ft, 53.7 ft, and 53.6 ft at approximately 3 minutes, 17 minutes, and 24 minutes, respectively, after the pump had been turned off.
- This well was not equipped with a totalizer flowmeter at the time of the RCS site visit.

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*Specific Capacity Data*

A useful indicator of well performance or efficiency (in terms of changes in water level drawdown over time with respect to pumping rate) is the specific capacity of a well, which can be calculated from the results of an aquifer (pumping) test or from data generated during regular periods of pumping and water level monitoring. In general, when groundwater is pumped from an active water well, a hydraulic gradient is established toward the well, and a cone of water level depression forms within the local aquifer system, with the pumping well located at the locus (center) of this cone. In general, the greater the pumping rate (and/or the longer the duration of pumping), the greater the water level drawdown will be in the pumping well (drawdown represents the vertical distance between the non-pumping [or static] water level and the resulting pumping water level in the well). As an indication of the relative efficiency or productivity of a well, the term "specific capacity" is commonly used to define the amount of water (in gpm) that the well will yield for each foot of water level drawdown created while the well is pumping at a particular rate. The specific capacity[2] of a well is calculated using the pumping rate of the well (in gpm) divided by the total water level drawdown (in ft) created in that well while pumping at that rate and is expressed in units of gallons per minute per foot of water level drawdown (gpm/ft ddn). As is typical for any well, the higher the pumping rate and/or the longer the duration of continuous pumping will result in a lower specific capacity.

During the 4-hour pumping test of the Existing Well in September 2017 while pumping at a rate of 17 gpm, the specific capacity of this well was calculated to be 1.1 gpm/ft ddn. During the 8-hour pumping test of this well in April 2019 while pumping at a rate of 35 gpm, the specific capacity was calculated to be 1.3 gpm/ft ddn. The specific capacity values calculated from the pumping tests described above are considered to be typical for the finer-grained ash flow tuff geologic materials within the Sonoma Volcanics into which the Existing Well has been constructed (and into which the New Well will be constructed).

**Local Geologic Conditions**

Figure 4, "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 4 has been adapted from the results of regional geologic field mapping of the Eastern Sonoma and Western Napa Counties (2007), as published by the United State Geological Survey (USGS). As shown on Figure 4, the key earth materials mapped at ground surface in the area, from geologically youngest to oldest, include the following:

a. Alluvial-type deposits. 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. These alluvial deposits (map symbol Qhf) are shown on Figure 4 to be exposed at ground surface in the topographically lower and flatter valley portion of the property and also in areas further south along the main floor of the Napa Valley.

[2] The specific capacity of a well depends on several factors, including the hydrogeologic characteristics and thickness of the local aquifer system, the method of well construction, well design details such as gravel pack gradation and gravel envelope thickness, the type and degree of well development performed, the age and current condition of the casing perforations and gravel pack, and the pumping rate and pumping duration of the pumping event being monitored. Hence, it can be difficult to compare specific capacity values from one well to another even if the two wells are in the same aquifer system, but such comparisons can yield valuable information when conditions are similar.

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b. Sonoma Volcanics. The Sonoma Volcanics are comprised by a highly variable sequence of chemically and lithologically diverse volcanic rocks. The rock types shown on Figure 4 include hard lava flows of rhyolite composition (map symbol Tsr), pumiceous ash-flow tuff, and tuff (map symbols Tst and Tsft). As shown on Figure 4, these pumiceous and finer-grained volcanic materials (map symbol Tst) are exposed at ground surface in the hillier, southern portions of the property, and are also interpreted to underlie the alluvium beneath the subject property.

c. Great Valley Complex. The geologically older (Cretaceous- and Jurassic-aged) Great Valley Complex rocks are not shown on Figure 4, but are exposed offsite at ground surface to the north and east of the subject property outside of the map boundaries on this figure. These rocks consist mainly of well-consolidated to cemented thickly bedded sandstone, conglomerate, siltstone, and shale. These geologically older rocks are considered to be the bedrock of the area and 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 and hard, fractured volcanic flow rocks, are 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:

- Whether the preponderant volcanic material beneath the property is comprised of well consolidated ash flow tuff and flow rocks, or softer, less consolidated, fine-grained ash materials.
- The thickness of ash flow tuffs and flow rocks beneath the property.
- 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 types expected in the subsurface beneath the property and its environs, based on the driller's logs of the offsite wells on nearby properties, appear to be mainly the volcanic tuffs. Although no Well Completion Report is available for the Existing Well, the basic driller's descriptions of drill cuttings for nearby offsite wells for which such data exist are consistent with the typical descriptions of the various rocks known in the Sonoma Volcanics. From our long-term experience with the Sonoma Volcanics, based on numerous other water well construction projects in Napa County, pumping capacities in individual wells have ranged widely, from rates as low as 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 that exist 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.

## Project Groundwater Demands

For the purposes of this WAA, the proposed New Well is considered to be the "project well", as it will be used to meet all proposed water demands of the property, including the new public-supply water demands of the proposed winery development project. Before destruction by the 2020 Glass Fire, onsite water demands for the vineyards, residence (with pool), and guest house were supplied by groundwater pumped from the Existing Well. For the purposes of this document, these "pre-20202 Glass Fire" use will be considered "existing uses" that were historically met by pumping the Existing Well.

*Proposed Groundwater Demands*

Water demands for the entire subject property, included those new water demands for the proposed winery, have been estimated by ACE. These proposed water use estimates by ACE[3] were presented in the "Transient Non-Community Water System Information" document prepared

[3] These water demand estimates were reportedly based on those values presented for specified land uses provided in Appendix B of the County's WAA Guidance Document (WAA 2015).

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for the subject property by ACE dated February 8, 2020, and revised on December 3, 2020; a copy of this document is appended to this Memorandum.

Annual groundwater demands for the proposed project were estimated by ACE to be 3.0 acre-feet per year (AF/yr). Water use estimates include the future demands for the proposed winery, vineyard irrigation, and the residences (once these structures are rebuilt). Water demands for pre-Glass Fire existing onsite uses (not including the proposed new winery) will not increase as a part of the proposed project. Water demands for all onsite uses will be met by pumping groundwater from the proposed New Well (i.e., the "project well"), once it is constructed, tested, equipped with a permanent pump, and operational. The new well will therefore become the primary groundwater source on the property, whereas the Existing Well will be used as an emergency redundant backup water supply well for only the existing vineyards and residence.

*Proposed Pumping Rates*

An average daily water demand of 2,678 gallons was estimated by ACE. Assuming the New Well was pumped on a 50% operational basis (i.e., 12 hours per day) to meet that average demand, then the new well would need to pump at a rate of 3.7 gpm. The maximum daily water demand (MDD) for the proposed project was estimated by ACE to be approximately 6,026 gallons[4]. To meet the proposed water system MDD of 6,026 gallons, it was estimated by ACE that the proposed New Well (i.e., project well) would need to pump at a rate of at least 8.4 gpm. This also assumes the proposed New Well would be pumped on a 50% operational basis, or 12 hours per day on those maximum demand days.

Based on the results of the September 2017 and April 2019 pumping tests performed by others in the Existing Well, pumping rates were reported to be on the order of 17 to 35 gpm, depending on the date and size of pump installed during each pumping test. As discussed above, both pumping tests appeared to be successful at periods of 4 to 8 hours in duration, because pumping water levels appeared to be relatively stable near the end of each test. Pumping rates reported during both tests of the Existing Well were higher than the pumping rates required to meet the groundwater demands the of proposed project during an average day and a maximum demand day (3.7 gpm and 8.4 gpm, respectively).

Due to the close proximity of the proposed location of the New Well to the location of the Existing Well, the New Well is likely to be capable of performing similarly to that of the Existing Well, once the new well is constructed and thoroughly developed and properly tested. Hence, it is very likely that the Proposed New Well will be capable of meeting the pumping rates necessary for the project.

## Tier 2 "Well Interference Evaluation"

Although the proposed New Well (the project well) has not yet been constructed, the New Well is proposed to be constructed ±65 ft to the northeast of the Existing Well. It is assumed the proposed New Well will be constructed similarly to the Existing Well with the following exceptions: the New Well will likely be constructed to depths greater than the existing well; and the New Well will be constructed with the required 50-foot deep sanitary seal). Once constructed, the New Well can be used to meet the public-supply water demands of the proposed winery, as well as the existing water demands (pre-Glass Fire) for the onsite residences and vineyards. The Existing Well would

[4] Calculated using a peaking factor of 2.25 per California Waterworks Standards Section 64554b.3.(C).

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then serve as a backup well and as a redundant and/or emergency supply for vineyard irrigation on the property.

As stated above, it is assumed that the New Well (once constructed) will perform similarly to the Existing well. Therefore, using the proposed location of the New Well in conjunction with the data generated from historical pumping tests of the Existing Well (summarized above under the heading "Key Construction and Testing Data for Existing Well"), estimates of theoretical water level drawdown impacts by virtue of pumping the New Well can be calculated.

*Calculation of Aquifer Parameters*

Important aquifer parameters such as transmissivity (T) and storativity (S) are required in order to calculate theoretical water level drawdown impacts that might result in nearby wells by the future pumping of the project well. These parameters are typically determined using data collected during a pumping test of a well. Transmissivity is a measure of the rate at which groundwater can move through an aquifer system, and therefore is essentially a measure of the ability of an aquifer to transmit water to a pumping well. Transmissivity is expressed in units of gallons per day per foot of aquifer width (gpd/ft). Storativity (S) is a measure of the volume of groundwater taken into or released from storage in an aquifer for a given volume of aquifer materials; storativity is dimensionless and has no units. Storativity calculations can only be made using actual amounts of water level drawdown, if any, monitored in an observation well during a pumping test of another well; storativity cannot be calculated using water level drawdown data acquired solely from the pumping well.

The water level drawdown data and limited water level recovery data collected from the Existing Well during the most recent April 2019 constant rate pumping test were input into the software program AQTESOLV (version 4.5 Professional). Data from this 2019 pumping test were used (as opposed to that from the 2017 test) because the 2019 test was more recent, and because the well was pumped for a longer duration (480 minutes), and at a higher pumping rate (35 gm). Because no water level data were collected in any observation well during the 2019 test, a value for storativity (S) could not be calculated.

Numerous analytical solutions were applied to the Existing Well pumping test data using the software in an attempt to determine transmissivity values using an automatic curve fitting procedure. The solutions utilized consisted of unconfined, confined, semi-confined, and/or fractured aquifer solutions; several variations of these solutions were evaluated by RCS. Certain assumptions are made about the aquifer when applying these solutions. In general, for the solutions listed below, key assumptions for use include: that the aquifer has an infinite areal (lateral) extent; that the aquifer is isotropic (the same in all directions); that the pumping well fully and/or partially penetrates the aquifer system(s); and that groundwater is instantaneously released from storage with the decline of hydraulic head. Also, for the purposes of this evaluation, the conservative assumption is made that the saturated aquifer thickness at the Existing/Proposed New Well was approximately 127 ft at the date of the pumping test. This saturated aquifer thickness was determined by calculating the vertical distance between the static water level in the Existing Well (approximately 45 ft brp on April 10, 2019) and the bottom of the well casing in this Existing Well (at a depth of approximately 172 ft bgs; see Table 1). In reality, the thickness of the saturated volcanic materials beneath this location on the property is likely greater.

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Listed below are the curve-fitting solutions used, the resulting transmissivity values that were calculated, and the figure number in this Memorandum on which the water level data and fitted-curve are presented. Again, for each solution presented, a storativity value could not be calculated because water level data were not monitored in any offsite water level observation well during the 2019 constant rate pumping test.

- Theis/Hantush – Figure 5A, "Constant Rate Pumping Test Analysis, Theis/Hantush Solution, Confined Aquifer, Existing Well." – As shown on the figure, the curve for the confined aquifer solution has been "best fit" to the later-time water level drawdown data observed in the Existing Well. A transmissivity value of approximately 1,836 gpd/ft is calculated for these data.
- Moench – Figure 5B, "Constant Rate Pumping Test Analysis, Moench, Leaky Aquifer, Existing Well." As shown on the figure, the curve for the leaky aquifer solution has been reasonably matched to most of the later-time portion of the water level drawdown data collected during the pumping period in the Existing Well. A transmissivity value of approximately 259 gpd/ft is calculated for these data.
- Gringarten-Witherspoon – Figure 5C, "Constant Rate Pumping Test Analysis, Gringarten-Witherspoon, Fractured Aquifer, Existing Well." – As shown on the figure, the curve for the fractured aquifer solution has been reasonably fit to the latter portion of the water level drawdown data acquired during the pumping test of the Existing Well. A transmissivity value of approximately 2,182 gpd/ft is calculated for these data.

Transmissivity values determined from the April 2019 pumping test in the Existing Well using AQTESOLV vary between approximately 259 and 2,182 gpd/ft, depending on the analytical solution chosen. Transmissivity values reported by others for Sonoma Volcanic-type rocks can vary from as low as ±100 gpd/ft to as high as ±20,000 gpd/ft. Thus, it appears the transmissivity values calculated herein fall within this range and are therefore considered to be representative of the local Sonoma Volcanic rocks.

An independent evaluation of transmissivity (T) using data from the subject pumping test was made via the empirical relationship $T \approx 1{,}750 * (Q/s)$[5], where (Q/s) is the specific capacity of the pumping well (1.3 gpm/ft ddn, as calculated from the April 2019 pumping test of the Existing Well) and 1,750 is an empirical constant for the semi-confined aquifer systems assumed to exist in the rocks of the Sonoma Volcanics. Applying this relationship to the specific capacity value calculated for the subject pumping test of the Existing Well yields a transmissivity value on the order of 2,275 gpd/ft. This theoretical transmissivity value is slightly higher than the maximum value of T determined via the analytical solutions determined using AQTESOLV software and the pumping test data. This empirical method to estimate transmissivity only considers drawdown and does not factor in any water level recovery, whereas the curve-fitting solutions used in AQTESOLV tend to utilize both water level drawdown and recovery data (when available) to determine transmissivity. Transmissivity values determined by the curve-fitting solutions are considered to be more representative of the regional spatial area and more indicative of long-term pumping conditions.

[5] This methodology is described in Driscoll (1986)

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*Theoretical Drawdown in Nearby Wells by Virtue of Pumping the Proposed New Well*

As shown on Figures 1 and 2, there is one offsite well located within 500 ft of the Existing and proposed New Well. RCS assigned the well a designation of "Neighbor Well" for our analysis of the theoretical amount of potential water level drawdown interference. The Neighbor Well is located approximately 255 ft to the northwest of the proposed New Well.

To calculate the theoretical amount of water level drawdown interference that might possibly be induced in the offsite Neighbor Well by the future pumping of the proposed New Well, and to help satisfy requirements of the County's Tier 2 WAA, RCS used the AQTESOLV software to perform a "predictive simulation" of the potential (theoretical) water level drawdowns that might occur in the region due to future pumping by the proposed New Well. Below is a list of the inputs/assumptions used as part of our theoretical drawdown calculations:

- Neighbor Well Construction Assumptions – As part of the driller's log research described above, RCS obtained Well Completion Report No. 0901145. Based on the APN reported on the log, it is assumed that this WCR represents the one for the Neighbor Well. As shown thereon, the Neighbor Well has the following construction details:
    - A borehole diameter of 12 inches.
    - PVC well casing 8 inches in diameter.
    - Perforations between the depths of 140 and 435.
- Inherent Theis Assumptions – For the subject simulations, RCS used the Theis (1935)/Hantush (1961) solution in the AQTESOLV software. Again, the Theis (1935)/Hantush (1961) solution assumes numerous conditions about the aquifer system, including that aquifer is homogeneous and isotropic (the same in all directions) and that the aquifer is of infinite areal extent.
- Well Penetration – For the purposes of the simulation, both the proposed New Well and the Neighbor Well are assumed to be "fully penetrating" wells. AQTESOLV documentation states that "the screens of a fully penetrating well extend over the entire aquifer's saturated thickness". Because the Neighbor Well is deeper than the Existing Well, it is assumed that the proposed New Well will be constructed to the same approximate depth as the Neighbor Well for the purposes of this simulation.
- Aquifer Thickness – The thickness of the saturated Sonoma Volcanic rock aquifer system near the Existing/Proposed New Well is estimated to be approximately 390 ft. This represents the vertical distance from the SWL water level in the Existing Well (about 45 ft brp as of April 10, 2019), and the 435-foot depth to the bottom of perforations in the Neighbor Well.
- Transmissivity and Storativity – To perform the required calculations, it was first necessary to calibrate the theoretical equations by simulating a future 8-hour period of continuous pumping in the proposed New Well and then attempt to reproduce the water level drawdown values that were manually recorded by the RWTS pumper in the Existing Well during its April 2019 pumping test. Based on the results of the previous curve-fitting procedures to determine the aquifer parameters (see the previous section "Calculation of Aquifer Parameters"), transmissivity (T) values ranged between 259 gpd/ft and 2,182 gpd/ft. Because no water level observation data were monitored in any nearby water level observation well during the pumping period of the Existing Well (the pumping well), a value

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for storativity could not be directly calculated. A storativity[6] value of $3.9x10^{-4}$, which represents a dimensionless value, is assumed for the local aquifer system. Note that this is considered to be a conservative assumption for storativity for the local volcanic rocks.

To better calibrate the software to the actual drawdown values that were recorded by RWTS pumper in the Existing Well during the 8-hour pumping test, adjustments were made to the assumed transmissivity value used in the AQTESOLV simulation. After an iterative process, a transmissivity value of 1,925 gpd/ft was found to provide drawdown values that were more comparable to those that were actually monitored in the field during the test of the Existing Well. This transmissivity value of 1,925 gpd/ft yielded a theoretical water level drawdown value of approximately 27.4 ft in the Existing Well, which is similar to the drawdown actually observed during testing of the Existing Well (27.3 ft). Figure 6A, "Transmissivity Calibration, the Existing Well" illustrates the theoretical amounts of water level drawdown that were calculated to occur after 8 hours of continuous pumping of the Existing Well at a constant rate of 35 gpm, based on a transmissivity of 1,925 gpd/ft and a storativity of $3.9x10^{-4}$.

Once the transmissivity value was better calibrated to the drawdown values actually observed in the field in the Existing Well, the predictive water level drawdown simulation was performed. Data derived using the Existing Well data were applied to the proposed New Well (the pumping well), and simulations included the offsite Neighbor Well (the observation well). Figure 6B, "Theoretical Drawdown Calculations, Predictive Simulation" has been prepared to show the theoretically-calculated water level drawdown values in the proposed New Well (the pumping well) and also in the Neighbor Well (the observation well) that might occur after pumping the New Well for the assumed continuous period of 12 hours and at a constant pumping rate of 8.4 gpm (the rate necessary to meet the MDD for the project).

In this scenario, the offsite water level observation well (the Neighbor Well) is assumed to be not pumping during the New Well pumping period. As shown on Figure 6B, the results of the predictive simulation for theoretical water level drawdown values during future pumping of the New Well are presented as follows:

- New Well (pumping well) – After pumping at a future rate of 8.4 gpm for a continuous period of 12 hours, an approximate theoretical water level decline (i.e., self-induced water level drawdown) of 6.8 ft is calculated for this well.
- Neighbor Well (offsite observation well) – A theoretical water level drawdown interference value of 1.5 ft is predicted as a result of the future pumping the of the New Well at 8.4 gpm for 12 continuous hours.

The calculated theoretical water level drawdown interference value of 1.5 ft is considerably less than the acceptable values 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 15 ft for offsite wells that have a casing diameter greater than six inches (the casing diameter of the Neighbor Well is eight inches).

[6] In Appendix F, Table F-3 of the WAA Guidance document (WAA 2015), the specific storage value for "rock, fissured" ranges between $1x10^{-6}$ and $2.1x10^{-5}$ ($ft^{-1}$). Multiplying these specific storage values by the estimated aquifer thickness of 390 ft yields a range of dimensionless storativity values between $3.9x10^{-4}$ and $8.2x10^{-3}$. Therefore, using an S value of $3.9x10^{-4}$ is a conservative assumption for this analysis.

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## Rainfall

Long-term rainfall data are essential for estimating the average annual recharge that may occur at the subject property. Average annual rainfall totals that occur specifically at the subject property are not directly known, because no onsite rain gage exists. Long-term rainfall data exist for the "St. Helena" rain gage, which is located 3 miles south of the subject property. Data for this rain gage are available from the Western Regional Climate Center (WRCC) website. For this rain gage, the available period of record is 1907 through December 2020 and the data are listed by calendar year (January through December), not water year (beginning October 1 through September 30 of the following year). Note that there are several months and/or years of rainfall data missing in 1907, between 1915 and 1922, between 1979 and 1980, between 1985 and 1988, in 1992, and between 2011 and 2012. For the available period of record, the average annual rainfall at this St. Helena gage is 33.3 inches (2.78 ft), as reported by the WRCC. This rainfall gage is located at a lower elevation (~225 ft above mean sea level, amsl) than that of the subject property (between ~300 and ~640 ft asl), and therefore the average annual rainfall at the subject property could be higher than that experienced at this known gage location.

Rainfall data also exist for another nearby WRCC rain gage labeled the "Angwin Pacific Union College"; this gage is located roughly 3 miles northeast of the subject property. Data from the WRCC website for this gage date from calendar year 1940 through January 2021. Note there appear to be missing months of data between 1940 and 1943, 1975, and 2011 for this gage. For the available period of record, the average annual rainfall at this rain gage is reported by the WRCC to be 38.4 inches (3.20 ft). This rain gage is located at a higher elevation (~1,715 ft amsl) than that of the subject property, and thus, the average annual water year rainfall at the subject property could be lower than that experienced at this known gage location.

To help corroborate the average annual rainfall data derived from the WRCC gages, RCS reviewed the precipitation data published by the PRISM Climate Group at Oregon State University. This data set, which is freely available from the PRISM website, contains "spatially gridded average annual precipitation at 800m (800-meter) grid cell resolution." The date range for this dataset includes the climatological period between 1981 and 2010. These gridded data provide average annual rainfall values distributed across Napa County, including the region of the subject property. Using this data set, RCS determined that the average rainfall for the subject property for the stated date range is approximately 38.3 inches (3.19 ft).

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

Table 2, "Comparison of Rainfall Data Sources," provides a comparison of the data collected from the different rainfall sources discussed above. Based on those rainfall data sources and as

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summarized on Table 2, RCS will consider the long-term average annual rainfall at the subject property to be 38.3 inches (3.19 ft), as derived from the PRISM data set. The 38.3-inch per year estimate is based on the data source with a relatively long period of record (29 years) and is more site-specific, when compared to the other rainfall data sources listed in Table 2 that exist at different elevations, and/or are located at a significant distance from the subject property, and/or have a shorter period of available data.

**Estimate of Groundwater Recharge**

Groundwater recharge on a long-term average annual basis at the subject property can be estimated as a percentage of average rainfall that falls directly on the subject property and becomes available to deep percolate into the local aquifer system(s) over the long-term. The actual percentage of rain that deep percolates can be variable based on numerous conditions, such as: the slope of the land surface; the soil type that exists at the property; the evapotranspiration that occurs on the property; the intensity and duration of the rainfall; etc. Therefore, RCS has considered various analyses of deep percolation into the rocks of the Sonoma Volcanics, as relied upon by other consultants, government agencies, and RCS for other projects in the Napa Valley. Note that this analysis assumes the entire property is underlain by only volcanic rocks, and does not consider the alluvial deposits that underlie the northwestern portion of the property; the rainfall recharge percentage in alluvial deposits is considered to be higher than that in the volcanic rocks.

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

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

Estimates of groundwater recharge as a percentage of rainfall were presented for a number of watersheds (but not all watersheds) in Napa County in the report titled “Updated Napa County Hydrogeologic Conceptual Model” (LSCE&MBK, 2013) prepared for Napa County. Watershed boundaries within Napa County are shown on Figures 8-3 and 8-4 in that report (not reproduced herein). Figure 7, “Watershed Boundaries,” was prepared for this project using those same watershed boundaries provided by MBK Engineers (MBK), for which watershed water balance data are available in the LSCE&MBK, 2013 report. As shown on Figure 7, 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). Note that, as shown on Table 8-8 of LSCE&MBK (2013), several sub-watershed areas, including the “Napa River Watershed at St. Helena,” are tributary to a larger defined watershed area named the “Napa River Watershed near Napa.”

As stated above, the total surface area of the subject property is 16.9 acres. Assuming 38.3 inches (3.19 ft) of rainfall occurs on the subject property on a long-term average annual basis, then the total volume of rainfall that would fall each year directly on the property over the long term would be approximately 53.9 AF/yr (16.9 acres x 3.19 ft). Assuming that 14% of the average annual rainfall volume would be able to deep percolate to the groundwater within the Sonoma Volcanics directly beneath the subject property over the long term, then the average annual groundwater recharge at the subject property would be approximately 7.5 AF/yr (53.9 AF/yr x 14%). This estimated annual recharge volume of 7.5 AF/yr is greater than the estimated average annual groundwater demand from the subject property of 3.0 AF/yr.

## Effect of Ground Slope Angle on Recharge Potential

Any estimate of the percentage of rainfall that becomes available for deep percolation that relies on estimates of rainfall, evapotranspiration, and surface water outflow for an entire watershed, such as those estimates provided by LSCE&MBK 2013, inherently includes the effects of ground surface slope angle in the estimate. However, to provide a more complete consideration of the potential effects of ground slope angle on groundwater recharge specifically at the subject property, analysis of those effects is provided below.

Many basic geologic references assume that recharge potential is reduced on steeper slopes, as steeper slopes can increase surface water runoff rates, and therefore less time is available for rainfall to deep percolate. Page 56 of LSCE&MBK (2013) asserts that deep percolation recharge from rainfall is "significantly reduced" for land areas with slopes angles greater than 30 degrees. On page 11 of LSCE&MBK (2013), an assessment of slope angles (inclinations) greater than 30 degrees is also mentioned, and this was attributed to a prior LSCE report, namely "LSCE 2011"; that document is likely to be the reference listed as "2011a" on page 134 of LSCE&MBK 2013. In that referenced document (LSCE, 2011), the statement is made on page 29 that "areas in which the slope of the land surface exceeds 30 degrees, beyond which recharge potential is significantly reduced." No other references or data are presented in any of the above-referenced documents to quantify the qualitative description of "significantly reduced". Because the various factors that affect groundwater recharge are likely interrelated (Yeh, 2009), assigning a value to define the amount that recharge is diminished by slope inclination is extremely difficult. No references were reviewed by RCS that quantify the possible reduction of deep percolation that might occur as a function of slope angle/percentage.

Estimates of the deep percolation of rainfall for the entire "Napa River Watershed at St. Helena" were based on water balance calculations by others that included rainfall throughout the entire watershed. As discussed above, those watershed-scale calculations inherently include all slopes within the watershed, including slopes greater than 30 degrees. Therefore, to evaluate the site-specific recharge potential of the property and to also include assumptions about the varying recharge potential based on slope, then the deep percolation percentage used for slopes less than 30 degrees within the entire watershed would have to be increased to offset the decrease in the percentage for slopes greater than 30 degrees.

Table 3, "Estimated Recharge Based on Deep Percolation Assumptions for Slope Angle," shows a range of values for different assumptions for the amount of deep percolation that might occur on slopes greater than 30 degrees in the Sonoma Volcanics at the subject property. To create Table 3, deep percolation values were first calculated for the entire subject watershed (i.e., "Napa River Watershed at St. Helena"). That is, the deep percolation percentage for the slopes within the watershed that are less than 30 degrees were increased to offset the diminished deep percolation percentage for the slopes greater than 30 degrees. A range of values were calculated assuming a range of "diminishment factors" of 25%, 50%, 75%, and 100%. Once the deep percolation percentages for slopes less than and greater than 30 degrees were calculated for the

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entire watershed, then those same resultant percentages shown on Table 3 were applied to the subject property; recall that the entire property is underlain by rocks of the Sonoma Volcanics.

As shown above, a recharge estimate of 7.5 AF/yr is calculated for the subject property assuming a conservative value of 14% for the deep percolation of rainfall that would occur on all 16.9 acres of the subject property that are underlain by rocks of the Sonoma Volcanics. Approximately 6.4 acres of the subject property consist of slopes greater than 30 degrees. Hence, if the assumption is made that the deep percolation that occurs on the 6.4 acres of the subject property with slopes greater than 30 degrees is diminished by a factor of 100% (i.e., no recharge occurs on those steeper slopes), then the average annual recharge that is estimated to occur at the subject property would be 5.4 AF/yr; see Table 3 herein. This calculated recharge volume is greater than the estimated total proposed onsite groundwater demand of 3.0 AF/yr.

## Estimate of Groundwater in Storage

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

a) Approximate surface area of the subject property = 16.9 acres

b) Depth to bottom of the Existing Well = 172 ft bgs

- Since there is no driller's log for the Existing Well, it is assumed that perforations in this well extend to the bottom of the well. Based on information provided from pumping contractors who have performed pumping tests in the Existing Well, the bottom of the well has been sounded (or tagged) at a depth of 172 ft.

c) Saturated thickness = 120 feet. To present a conservative calculation of groundwater in storage, RCS will also assume that the current saturated thickness of the local aquifers beneath the recharge area is about 120 vertical feet. This value is calculated using the reported Existing Well depth data by subtracting the September 2017 pre-pumping test SWL measurement of 52 ft from the reported depth to the bottom of the well (and presumed bottom of perforations) at 172 ft. Based on the limited available water level data presented herein, the September 2017 SWL is the deepest recorded SWL measured for this well, and thus, is used to help provide a more conservative calculations of the minimum volume of groundwater currently in storage beneath the property. Also note that the nearby, offsite Neighbor Well (based on its available driller's log) is much deeper than the Existing Well, and therefore the saturated thickness of the aquifers beneath the subject property are likely greater than the depth of the Existing Well.

d) Approximate average specific yield of the Sonoma Volcanics = 2%. The specific yield is essentially the ratio of the volume of water that drains from the saturated portion of the geologic materials (due to gravity) to the total volume of rocks. Specific yield of the Sonoma Volcanics can vary greatly depending on a number of factors, including the degree and interconnection of the fracture zones within the rocks. A conservative

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estimate provided by Kunkel and Upson for the specific yield of the Sonoma Volcanics shows a range from 3% to 5% (USGS 1960). For other nearby properties for which RCS has performed similar analyses, an even more conservative estimate for specific yield of 2% has been used. Hence, to present a conservative analysis, we will assume a specific yield of 2% for the Sonoma Volcanics rocks that underlie the subject property, but the actual value, in reality, could be higher.

e) Thus, a conservative estimate of the groundwater currently in storage (S), beneath the subject property (as of February 2021) is calculated as:

- S = subject property area (subpart a, above) times saturated thickness (subpart c, above) times average specific yield (subpart d, above) = (16.9 ac)*(120 ft)*(2%) = 40.6 AF

In contrast, the proposed average annual groundwater demand from the subject property is estimated to be 3.0 AF/yr. Hence, the estimated groundwater demand from the entire property represents only about 7% of the groundwater conservatively estimated to currently be in storage in the volcanic rocks beneath the subject property based on conservative, site-specific water level data for the Existing Well. Furthermore, this percentage does not include annual groundwater recharge that will occur from rainfall into the onsite aquifers. Based on the foregoing, the estimated groundwater demands of the proposed project and the entire subject property are not expected to cause a net deficit in the volume of groundwater within the aquifers beneath the property so as to adversely impact wells on nearby but offsite properties to a point that they would not support permitted land uses.

## Possible Effects of "Prolonged Drought"

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

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

- WY 1928-29 through WY1933-34 – six years
- WY 1975-76 through WY 1976-77 – two years
- WY 1986-87 through WY 1991-92 – six years

- WY 2006-07 through WY 2008-09 – three years
- Recent drought – WY 2011-12 through WY 2015-16[7] – five years

Table 4, "Drought Period Rainfall as Percentage of Average," shows the average amount of rainfall that occurred during each drought period for which rainfall data exist at the three rain gages discussed above and shown on Table 4; that drought period rainfall amount is also expressed on Table 4 as a percentage of the total rainfall that occurred. As shown on Table 4, determining the amount of rain that might fall during a "prolonged drought" is variable, and depends on the period of record for the specific rain gage. The WY 1975-76 to WY 1976-77 drought period recorded by the Angwin rain gage and reported by the WRCC had the lowest total rainfall at 32% (drought period average was 13.4 inches), compared to the long-term average (33.3 inches), and that specific drought lasted two years. For comparison, the WY 1975-76 to WY 1976-77 drought period recorded by the WRCC St. Helena rain gage and reported by the WRCC had a total rainfall of 40% (drought period average was 12.3 inches), compared to the long-term average (38.4 inches). In addition, the WY 1928-29 to WY 1933-34 drought period lasted for six years, but rainfall during this drought at the WRCC St. Helena gage was 72% of the average annual rainfall. It is important to note that the drought year percentage listed on Table 4 is completely dependent on the period of record for each individual gage.

Hence, for the purposes of this analysis, a "prolonged" drought period rainfall is conservatively considered to be 32% of the average annual rainfall that occurred in the region (using the rainfall data from the WRCC Angwin rain gage). Further, to again be conservative, a "prolonged drought period" is estimated to last 6 years, which is the longest drought period on record according to DWR (DWR 2015); see Table 4. This six-year period is a quite conservative estimate, because the 32%-average figure corresponds with a two-year drought period, not a six-year drought period. These assumptions represent a quite conservative drought analysis when compared to the historical record.

To meet six consecutive years of groundwater demand for the subject property, a total onsite groundwater extraction of 18.0 AF is estimated to be required (3.0 AF/yr of groundwater demand multiplied by 6 years = 18.0 AF). Assuming groundwater recharge is reduced to 32% of the average annual recharge during each year of such a theoretical "prolonged drought period", then the resulting total of groundwater recharge that might occur during the six-year drought period for the subject property is calculated as follows:

- As shown herein, a conservative estimate of the average annual groundwater recharge on the subject property is estimated to be 5.4 AF/yr. Taking 32% of this annual volume yields a drought period recharge volume of 1.7 AF/yr.
- Assuming a drought period duration of 6 continuous years, then a total of 10.2 AF (1.7 AF/yr times 6 years) of water would be available to recharge the volcanic rocks beneath the property by virtue of deep percolation of the direct rainfall that occurs solely within the boundaries of the subject property.

[7] The DWR 2015 drought document was published in February 2015 and lists the recent significant drought through the 2013-14 water year only; the drought continued throughout the State into WY 2015-16. Due to the rains in WY 2016-17, various sources, including the National Drought Mitigation Center website declared an end to the drought in Northern California in 2017, which included Napa County. As of February 11, 2021, the area of Napa County in which the subject property lies, is currently mapped as "Extreme Drought" on the NDMC website (NDMC, 2021).

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Therefore, assuming a theoretical, extreme, six-year drought period during which only 32% of the average annual rainfall might occur, a conservative estimate of the total drought-period recharge at the subject property (10.2 AF) would be less than the estimate of the total onsite groundwater demand (18.0 AF) that may occur over the same six-year period.

As conservatively estimated above, 40.6 AF of groundwater may currently be in storage within the rocks of the Sonoma Volcanics beneath the property. Hence, the theoretical six-year long drought period groundwater "recharge deficit" of 7.8 AF would represent about 19% of that volume of groundwater in storage. Temporarily removing an average of approximately 1.3 AF (when those deficits are divided by 6 years) of groundwater from storage every year during this 6-year long prolonged drought may cause water levels to decrease somewhat beneath the subject property, but removal of such a relatively small percentage of groundwater from storage over an entire 6-year period of time is not expected to significantly impact groundwater levels beneath the property. Recharge that occurs during periods of average and above-average rainfall would continue to recharge the local aquifer system(s). Again, this drought analysis is quite conservative, and assumes an extreme drought (32% of average rainfall occurring every year for six consecutive years).

## Groundwater Quality

Samples of groundwater from the Existing Well were collected by others in June 2016 and April 2019. Table 5, "Summary of Available Groundwater Quality Data," summarizes water quality data from laboratory analyses of those groundwater samples; the laboratory analyses were performed by Caltest Analytical Laboratory of Napa, California in July 2016, and Alpha Analytical Laboratories, Inc. of Petaluma, California in April 2019. Copies of these laboratory reports are appended to this Memorandum. Data presented on Table 5 reveal the following with regard to key water quality constituents for groundwater pumped by the Existing Well at those time periods listed:

- The character of the groundwater from the local volcanic rock aquifer system(s) appears primarily to be a sodium-bicarbonate ($Na\text{-}HCO_3$) type of water.
- Total hardness (TH) was reported to have ranged between 28 milligrams per liter (mg/L) and 29 mg/L in the Existing Well. Water with a TH less than 60 mg/L is considered to be "soft."
- The pH of groundwater was reported to have ranged from 6.4 to 7.2. This value indicates that the water is slightly acidic (below pH 7) to slightly basic (above pH 7).
- Nitrate (as N) was detected in the Existing Well at 0.16 mg/L in June 2016, but was not detected (ND) in this well in April 2019.
- Arsenic (As) was not detected (ND) in the Existing Well during each of the sampling periods. Arsenic has a California Division of Drinking Water (DDW) Primary Maximum Contaminant Level (MCL) concentration of 10 micrograms per liter (µg/L), whenever the groundwater is to be used for public-supply purposes.
- Iron (Fe) was ND in June 2016, but was detected in this well in April 2019 at a concentration of 220 µg/L. Iron has a DDW Secondary MCL of 300 µg/L for domestic use.

**MEMORANDUM**

- Manganese (Mn) was ND in June 2016 and April 2019; Manganese has a DDW Secondary MCL of 50 µg/L for domestic use.

**Key Conclusions and Recommendations**

1. Prior to the 2020 Glass Fire, the subject Vida Valiente property was developed with 3.4 acres of existing vineyards, a residence (with a pool), and a guest house.
2. There is one existing onsite water well (the Existing Well). The Existing Well was used to meet all existing onsite water demands of the subject property prior to the Glass Fire.
3. The proposed project consists of developing a new winery (with a production of 30,000 gallons of wine per year), including employees, tasting, and other events.
4. The proposed (future) average annual groundwater demand for the subject property (including the winery, vineyards, residence with pool, and guest house) is estimated by the project engineer to be 3.0AF/yr.
5. Groundwater demands for the proposed new winery and existing onsite uses will be met by pumping groundwater from the proposed New Well, once constructed, developed, tested, and equipped with a permanent pump. The Existing Well will be used as a redundant and/or emergency supply for water for the onsite vineyards and residence. Water demands for vineyard irrigation, the residence with pool, and guest house, previously met by pumping the Existing Well, will not increase as part of the proposed winery project.
6. To meet the estimated annual groundwater demand of the proposed project (3.0 AF/yr) and the reported MDD of 6,026 gallons per day, the proposed New Well will reportedly need to pump at a rate of approximately 8.4 gpm. This pumping rate assumes the proposed New Well would be pumped on a 50% operational basis (12 hours/day) during the maximum demand days. During average demand days, the necessary pumping rate will be lower (assuming the same 12-hour day duty cycle).
7. Based on the results of the pumping tests performed in the Existing Well in September 2016 at 17 gpm, and in April 2019 at 35 gpm, it is anticipated that the proposed New Well will be capable of pumping at rates needed to meet the future groundwater demands and the MDD of the proposed project (approximately 8.4 gpm is needed). This also assumes the proposed New Well will be drilled near the Existing Well as shown on Figure 1, and constructed at least as deep as the Existing Well (very likely it will be constructed deeper).
8. Groundwater recharge at the subject property on an average annual basis is estimated to be 5.4 AF; this value is based on conservative estimates of the long-term average annual rainfall at the property (38.3 inches per year) and estimates of rainfall (14%) that could be available to deep percolate into the pore spaces and/or fractures and joints in the Sonoma Volcanics that underlie the subject property. Also included in the estimate of recharge is the assumption that deep percolation of rainfall occurs on the subject property with slopes greater than 30 degrees (approximately 6.4 acres of the property) is diminished by a factor of 100%. This estimated groundwater recharge of 5.4 AF/yr is greater than the 3.0 AF/yr estimated to be required on an average annual basis in the future from the subject property.

**MEMORANDUM**

9. Conservative estimates of recharge that may occur during an extreme “prolonged drought” (as defined herein) show that, over a theoretical six-year period of continuous drought in which only 32% of the average annual rainfall might occur, a total of 10.2 AF of recharge is estimated to occur strictly into the Sonoma Volcanics directly beneath the subject property. This theoretical drought period recharge estimate of 10.2 AF is less than the estimated groundwater demand of the proposed project of 18.0 AF for the same continuous six-year period. Hence, the theoretical six-year long drought period recharge “deficit” of 7.8 AF would represent about 19% of the volume of groundwater currently in storage beneath the property (estimated to be 40.6 AF). Rainfall recharge during years of above-average rainfall would then replenish groundwater in storage that has been used to meet the groundwater demand of the entire property during a theoretical drought of six continuous years.
10. Because there is an offsite well (the “Neighbor Well”) located within 500 ft of the proposed location of the New Well, a Tier 2 WAA was performed as part of our work. This Tier 2 theoretical drawdown analysis relied on data from the most recent (April 2019) pumping test of the Existing Well. Estimates of the theoretical amount of water level drawdown that might be induced in the Neighbor Well by virtue of pumping the proposed New Well at a rate and duration necessary for the project would be approximately 1.5 ft. This value is much less than the default drawdown interference criteria listed in Table F-1 of the 2015 WAA guidance document.
11. RCS recommends implementation of a groundwater monitoring program at the subject property. This would include the frequent, ongoing monitoring of static and pumping water levels in both the Existing Well and the proposed New Well, and also monitoring of the instantaneous flow rates and cumulative pumped volumes from both the Existing Well and the proposed New Well via dual reading flow meters (that record both flow rate and totalizer values) for each of the wells. RCS also recommends that water level transducers be purchased and installed in both wells to permit the automatic, frequent, and accurate recording of water levels in each well. By having qualified professionals observe the trends in groundwater levels and future well production rates/volumes over time, potential declines in water levels and well production in the wells, along with possible changes in operational pumping scenarios, can be addressed in a timely manner.

**MEMORANDUM**

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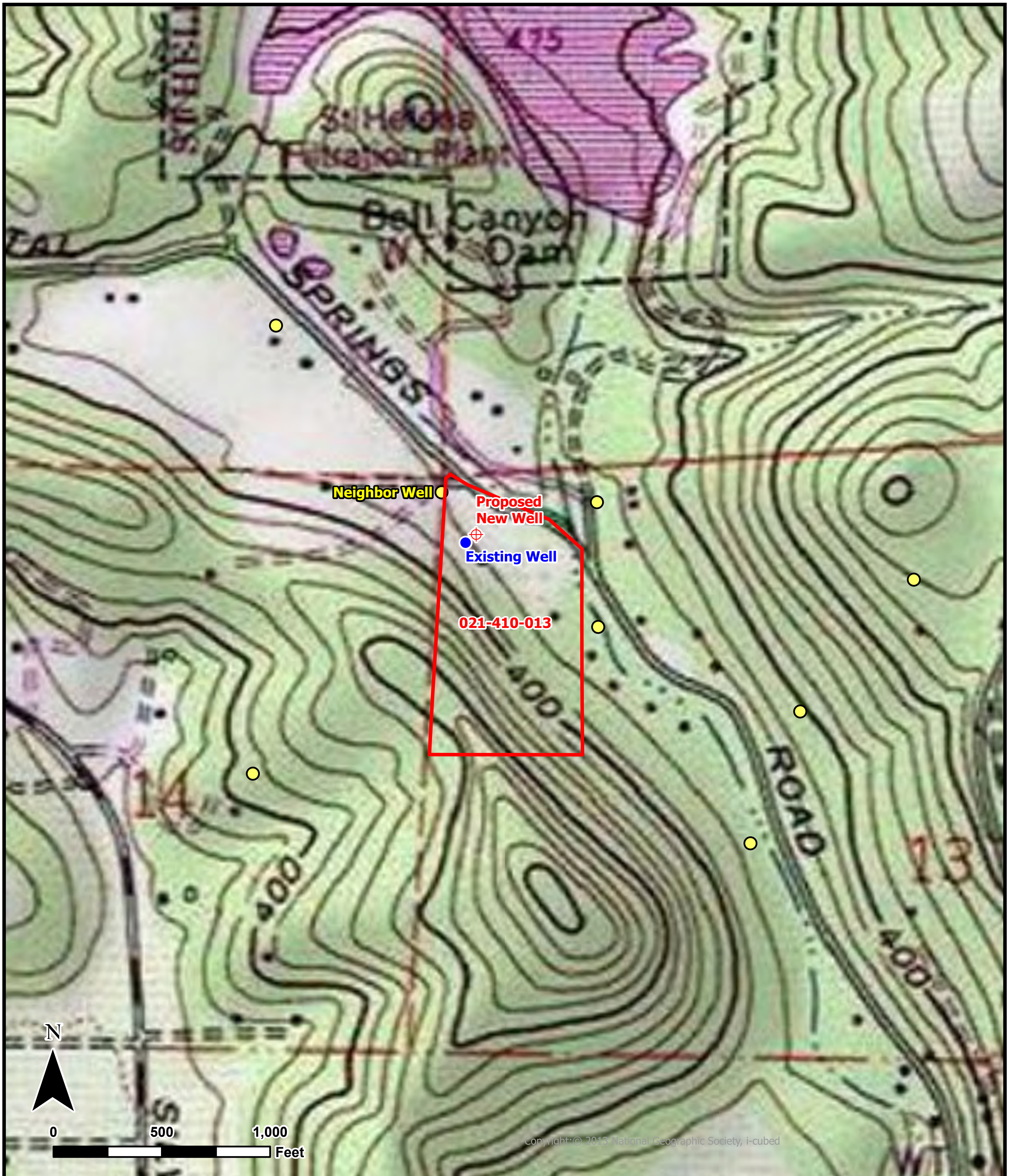
- Western Regional Climate Center, 2021. https://wrcc.dri.edu/




**LEGEND**

Subject Property

Onsite Water Well

Offsite Water Well (approx)

Proposed Well Location

RCS

**FIGURE 1**
**WELL LOCATION MAP**

**RCS Job No. 669-NPA02** **March 2021**

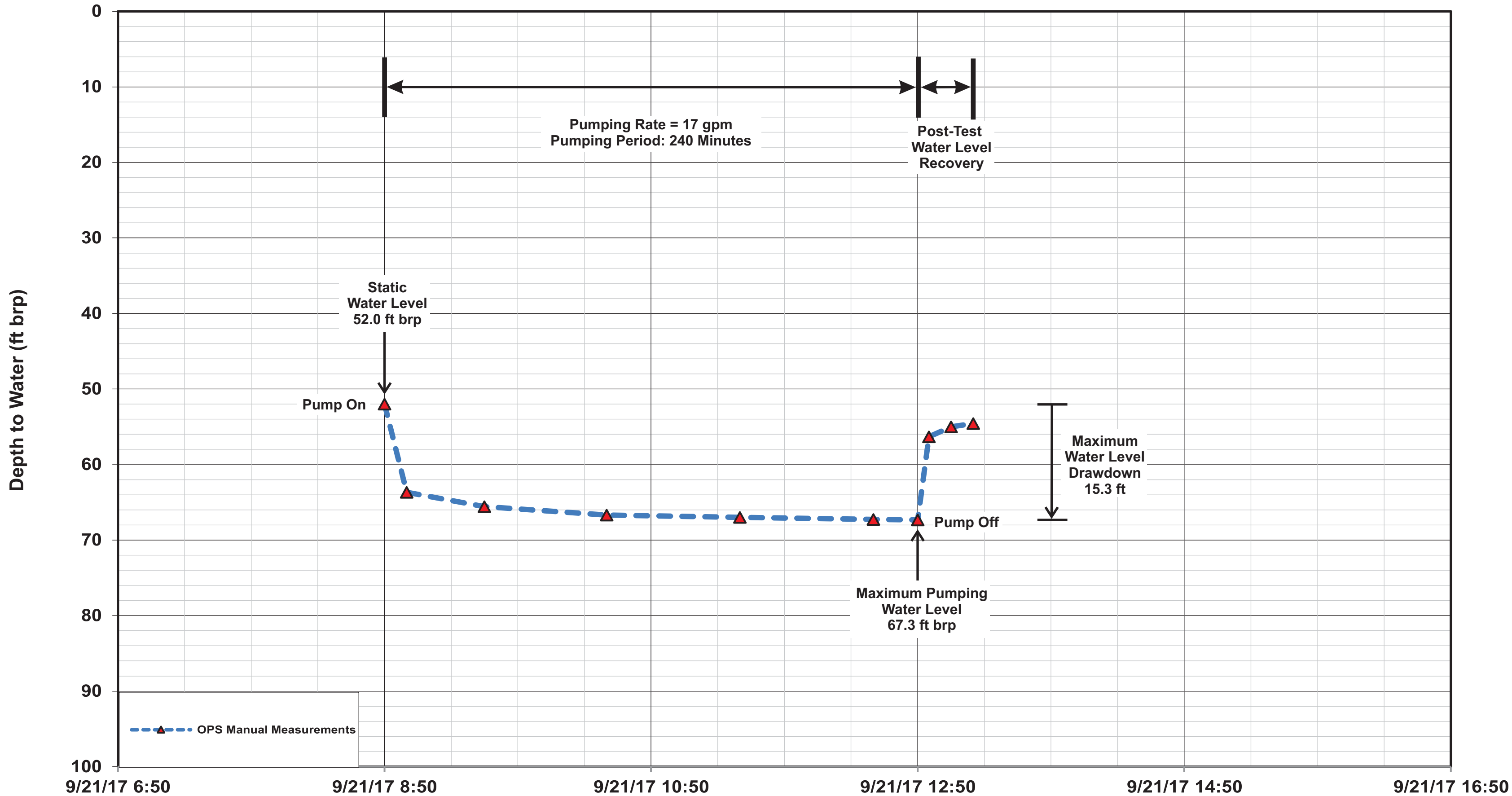

**LEGEND**

- Subject Property
- Onsite Water Well
- Offsite Water Well (approx)
- Proposed Well Location

RCS

**FIGURE 2**
**AERIAL PHOTOGRAPH MAP**

**RCS Job No. 669-NPA02** **March 2021**




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

Date/Time


RCS

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**FIGURE 3A**
**WATER LEVEL DATA DURING SEPTEMBER 2017**
**CONSTANT RATE PUMPING TEST**
**EXISTING WELL**
**VIDA VALIENTE WINERY**

**Job No. 669-NPA02** **March 2021**

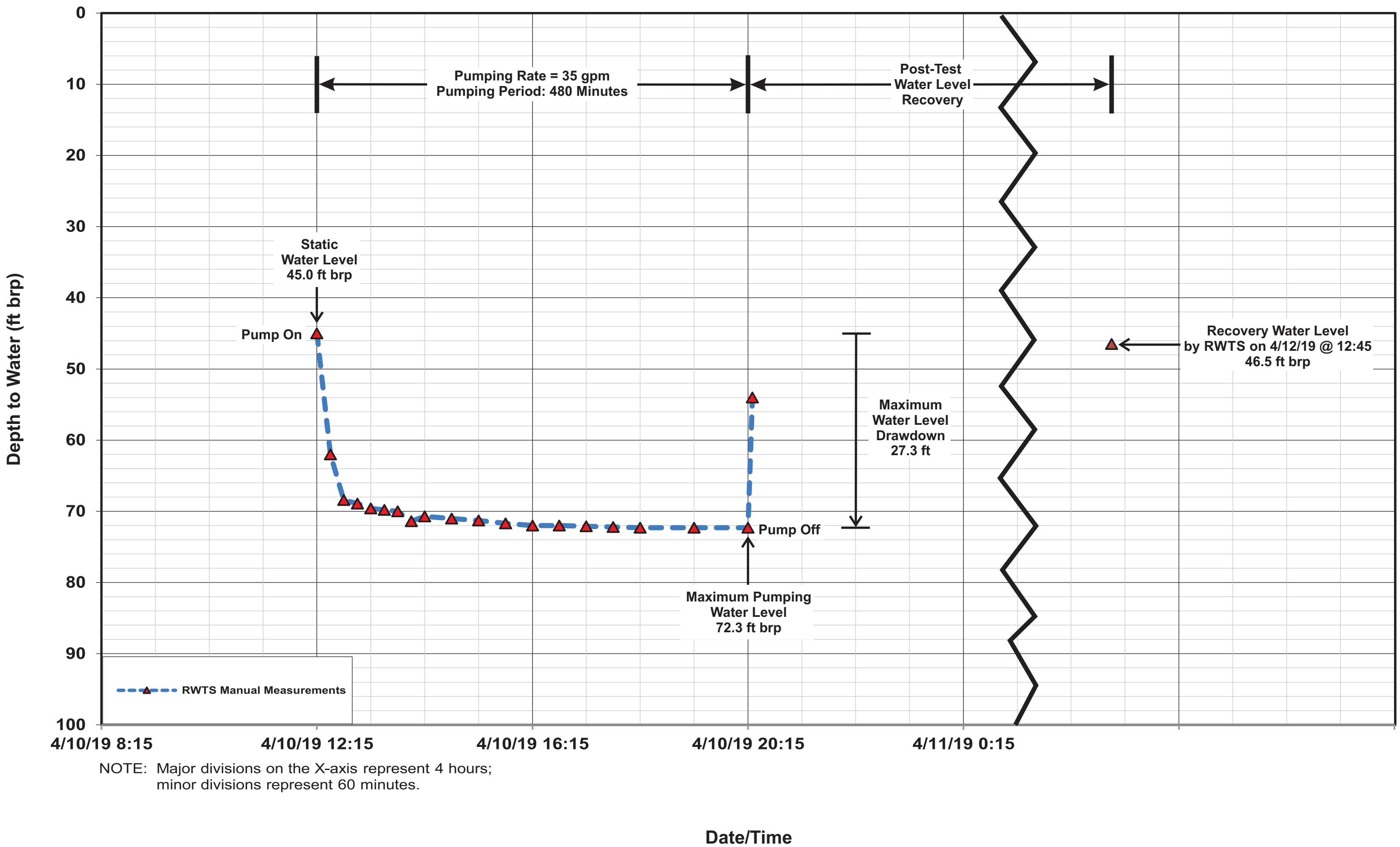



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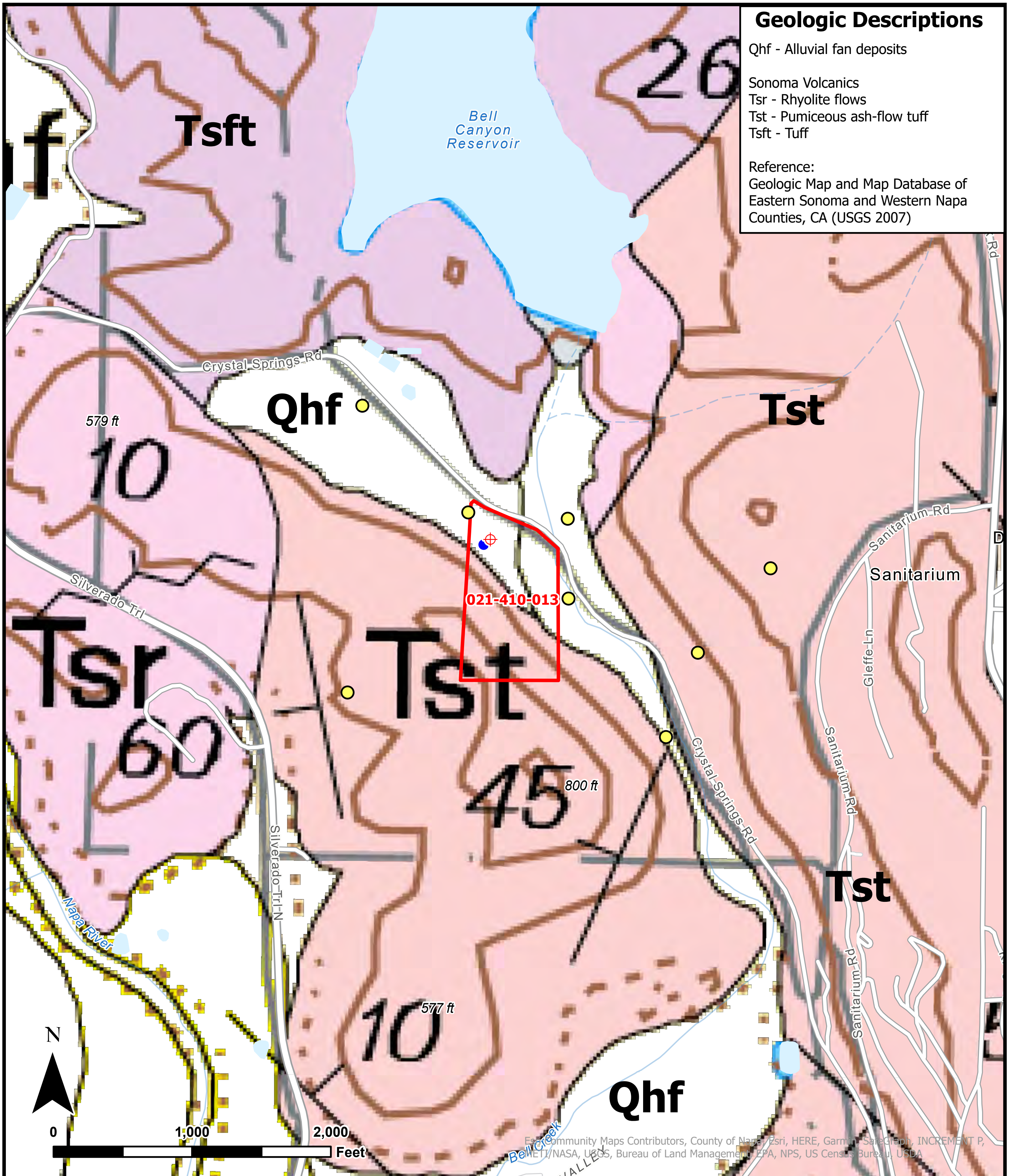
**FIGURE 3B**
**WATER LEVEL DATA DURING APRIL 2019**
**CONSTANT RATE PUMPING TEST**
**EXISTING WELL**
**VIDA VALIENTE WINERY**

**Job No. 669-NPA02** **March 2021**




## LEGEND

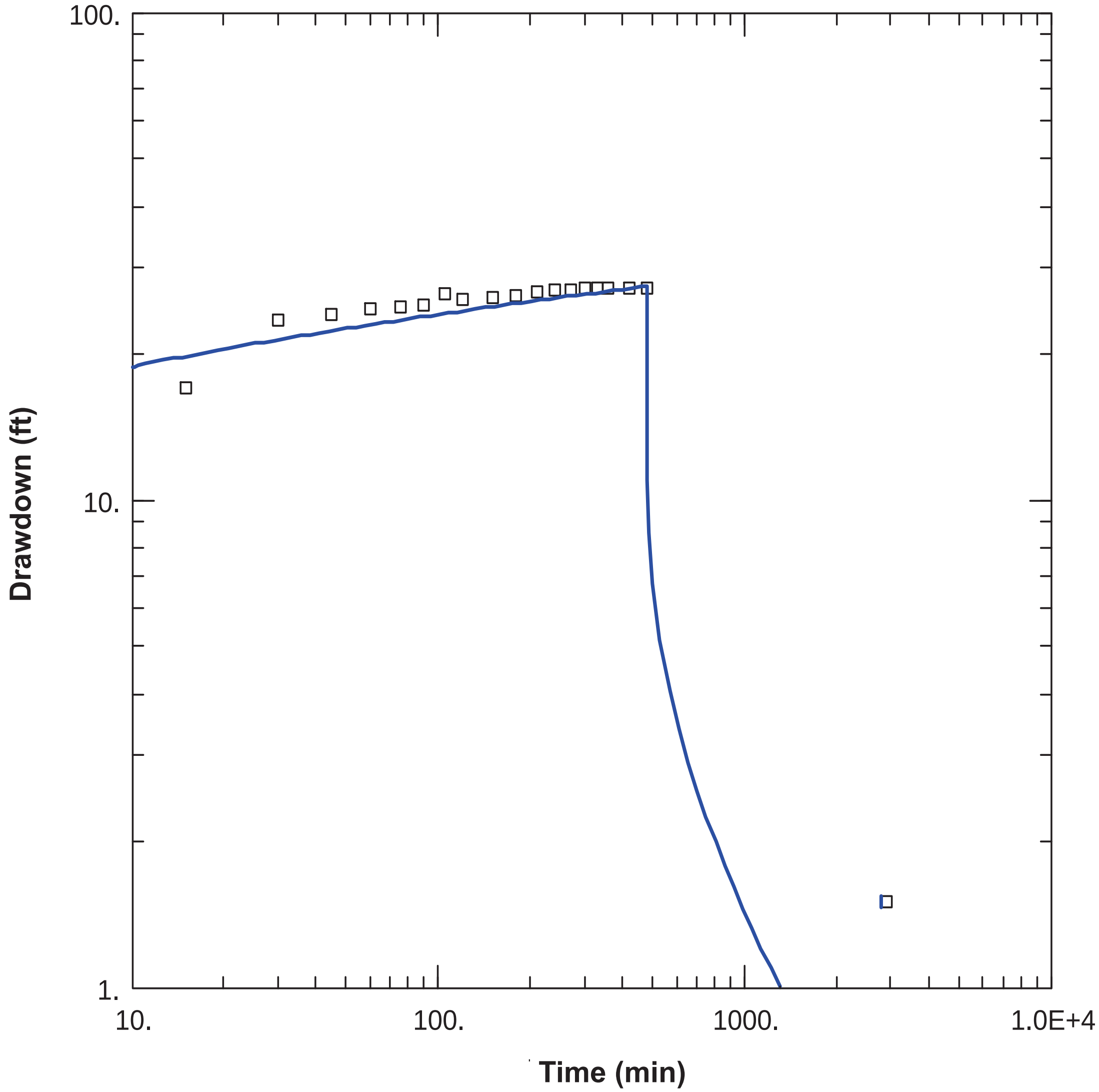
- Subject Property
- Offsite Water Well (approx)
- Onsite Water Well
- Proposed Well Location

RCS

**FIGURE 4**
**GEOLOGY MAP**

**RCS Job No. 669-NPA02**

**March 2021**




**Obs. Wells**

□ Existing Well

**Aquifer Model**

Confined

**Solution**

Theis/Hantush

**Parameters**

T = 1,836 gal/day/ft

*A storativity (S) value can only be calculated from water levels from an observation well.

**Test Date = April 10, 2019 (8-hour test)**

**Pre-Test Static Water Level = 45.0 ft brp**

**Average pumping rate = 35 gpm**

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


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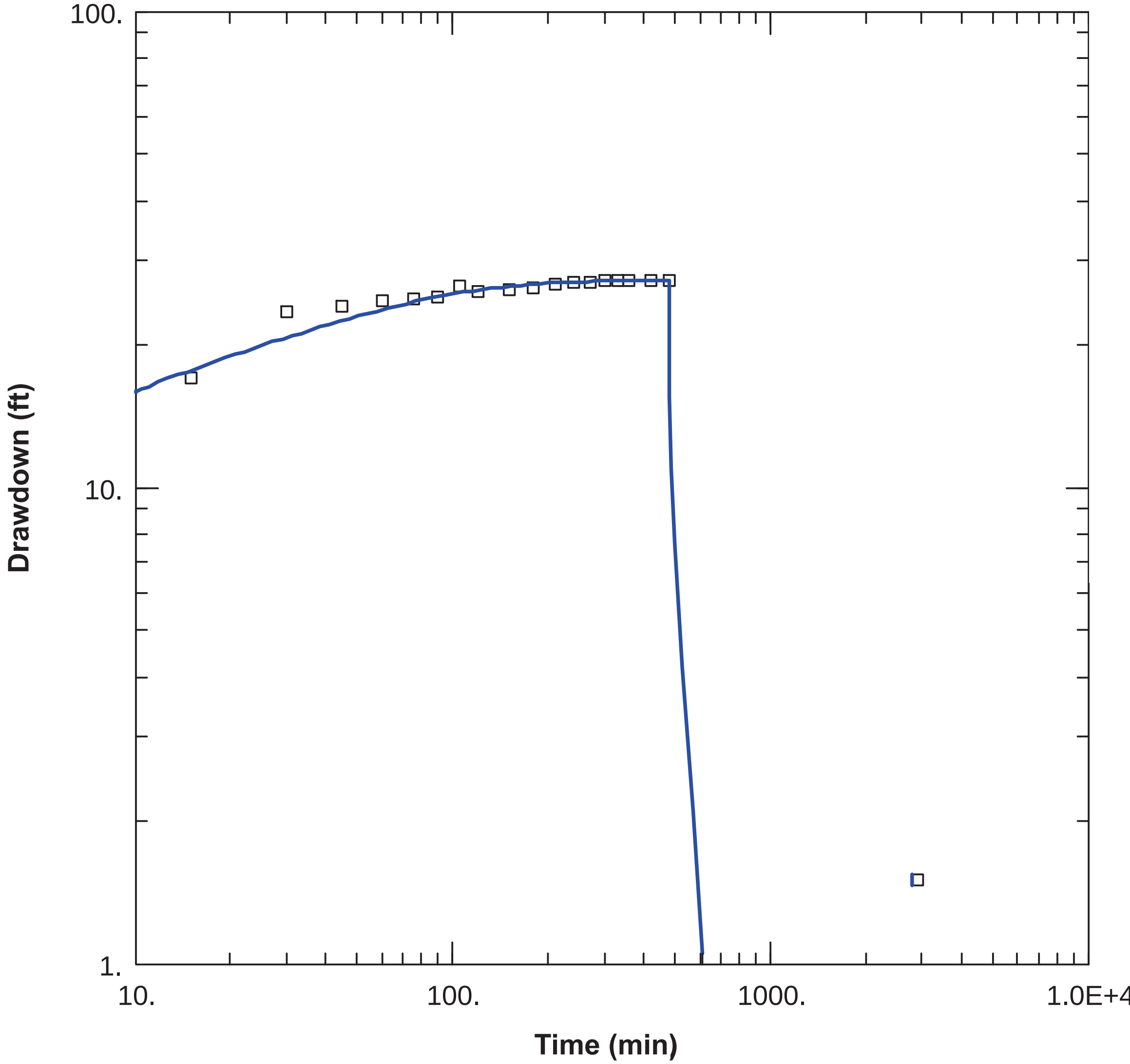
**Figure 5A**
**Constant Rate Pumping Test Analysis**
**Theis/Hantush Confined Aquifer Solution**
**Existing Well**

Job No. 669-NPA02

March 2021




**Obs. Wells**

□ Existing Well

**Aquifer Model**

Leaky

**Solution**

Moench

**Parameters**

T = 259 gal/day/ft

*A storativity (S) value can only be calculated from water levels from an observation well.

Test Date = April 10, 2019 (8-hour test)

Pre-Test Static Water Level = 45.0 ft brp

Average pumping rate = 35 gpm

Graphical Solution by:
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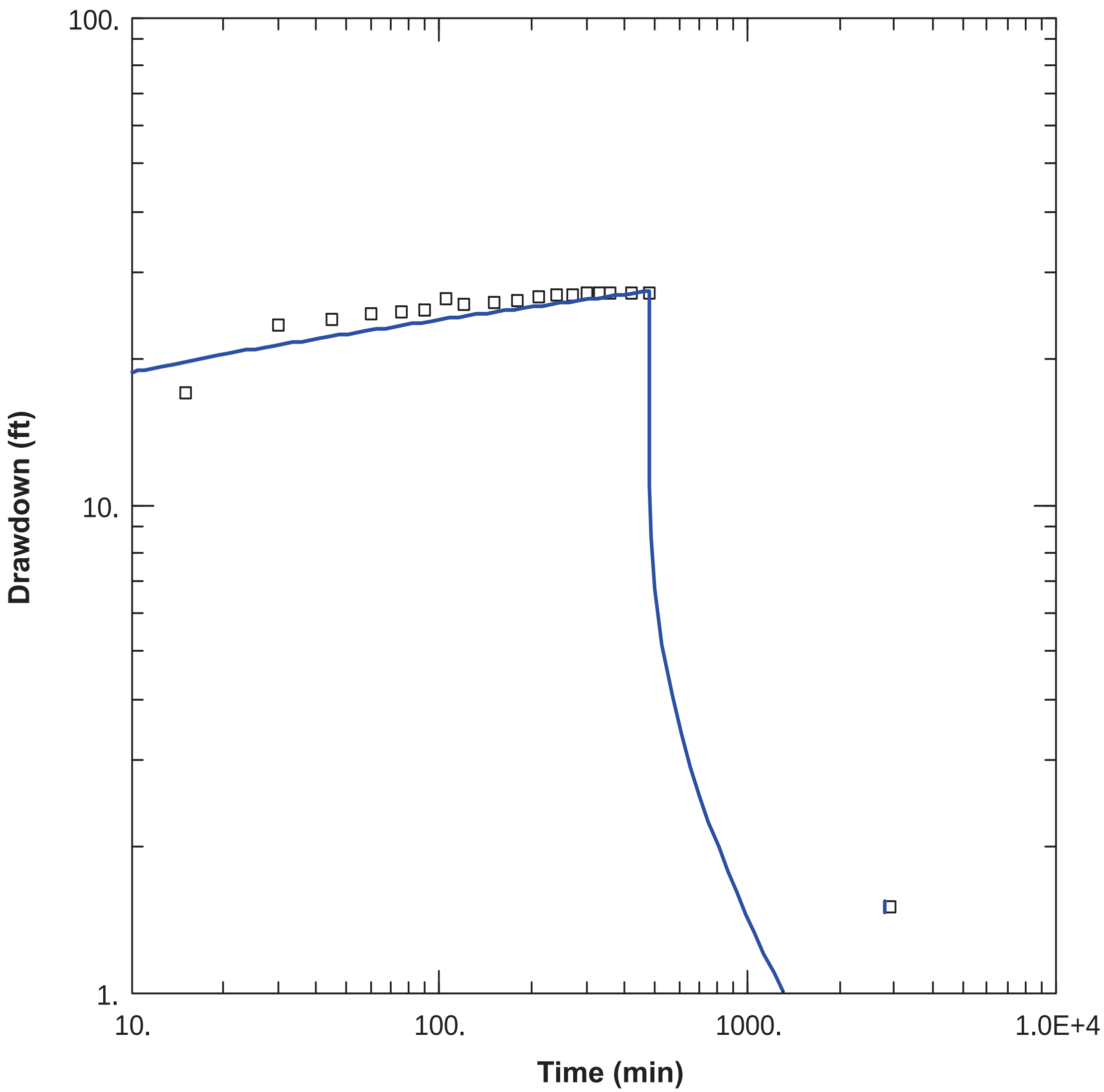
**Figure 5B**
**Constant Rate Pumping Test Analysis**
**Moench Confined Aquifer Solution**
**Existing Well**

Job No. 669-NPA02 March 2021




**Obs. Wells**

□ Existing Well

**Aquifer Model**

Fractured

**Solution**

Gringarten-Witherspoon

**Parameters**

T = 2,182 gal/day/ft

*A storativity (S) value can only be calculated from water levels from an observation well.

Test Date = April 10, 2019
(8-hour test)
Pre-Test
Static Water Level = 45.0 ft brp

Average pumping rate = 35 gpm

Graphical Solution by:
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by Hydrosolve, Inc.

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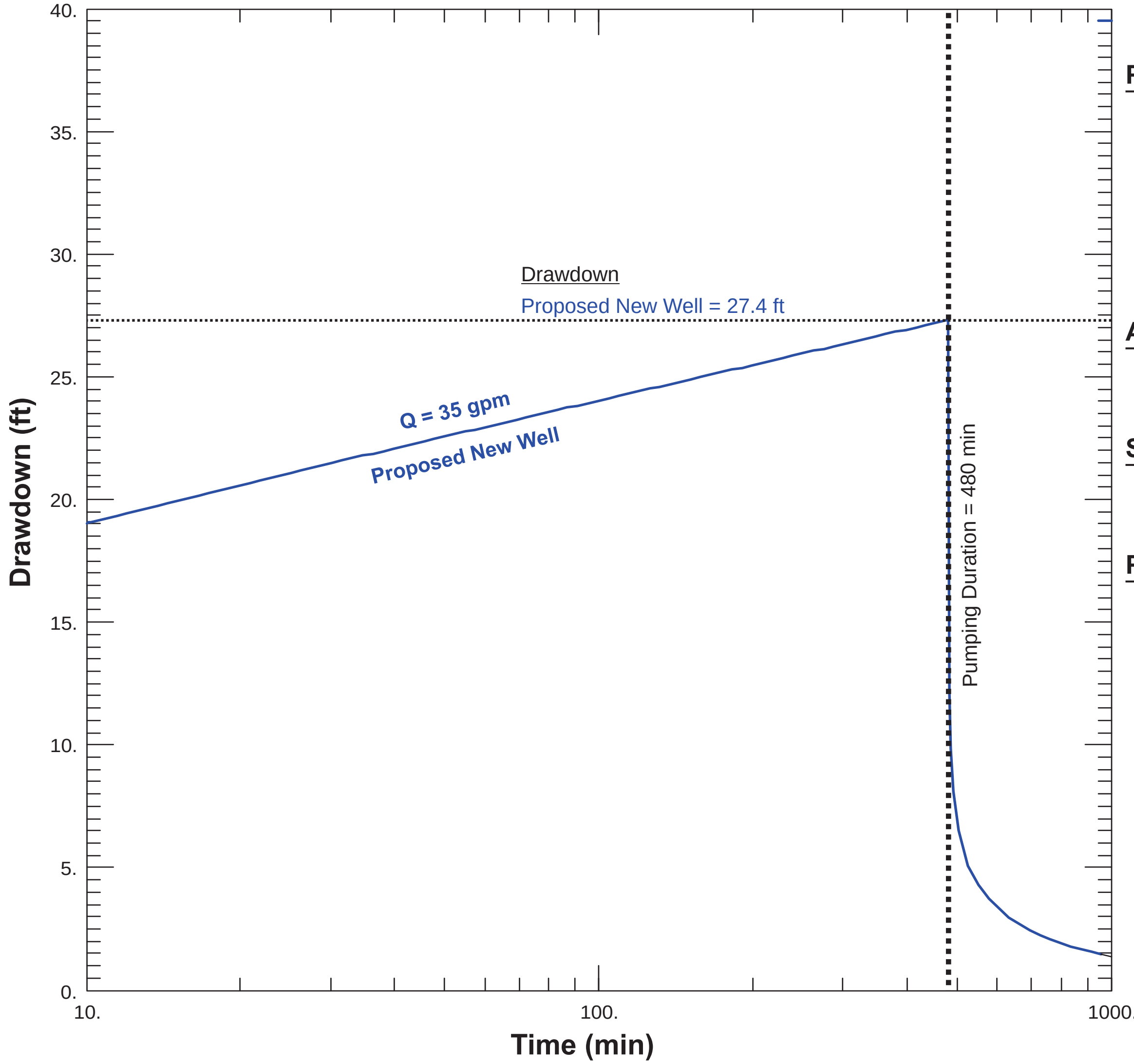
**Figure 5C**
**Constant Rate Pumping Test Analysis**
**Gringarten-Witherspoon Fractured Aquifer Solution**
**Existing Well**

Job No. 669-NPA02

March 2021




**Pumping Well**

□ Proposed New Well

**Aquifer Model**

Confined

**Solution**

Theis/Hantush

**Parameters**

T = 1,925 gal/day/ft
S = 0.00039 (unitless)
Pumping Rate = 35.0 gpm
Duration = 8 hours (480 minutes)

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

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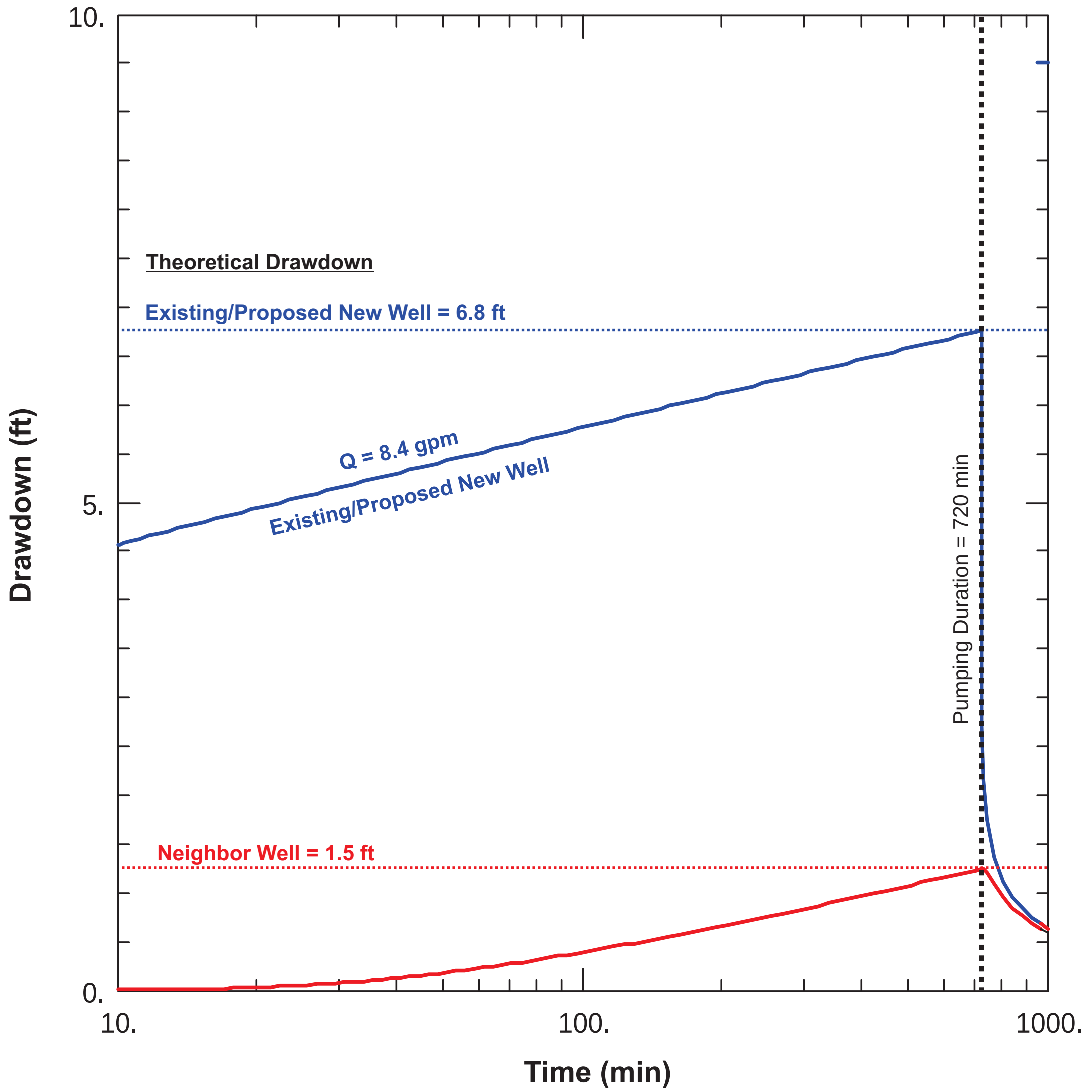
**Figure 6A**
**Theoretical Drawdown Calculations in the Proposed New Well**
**8 hours/35 gpm/T=1,925 gpd/ft**

Job No. 669-NPA02

March 2021




**Pumping Well**

□ Existing/Proposed New Well

**Observation Well**
**(northeast of Proposed New Well)**

Neighbor Well (255 ft)

**Aquifer Model**

Confined

**Solution**

Theis/Hantush

**Parameters**

T = 1,925 gal/day/ft
S = 0.00039 (unitless)
Pumping Rate = 8.4 gpm
Duration = 12 hours (720 minutes)

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


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**Figure 6B**
**Theoretical Drawdown Calculations**
**in the Observation Well**
**12 Hours/8.4 gpm/T=1,925 gpd/ft**

Job No. 669-NPA02

March 2021


## LEGEND

★ Subject Property

Napa County Watershed Boundary

RCS

# FIGURE 7 WATERSHED BOUNDARIES

RCS Job No. 669-NPA02

March 2021

# Table 1
# Summary of Well Construction and Yield Data
# Vida Valiente 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Well | ND | ND | ND | ND | 172 (reported 4/10/19) | Steel | 8 | ND | Yes (depth unknown) | ND | ND | ND |

## POST-CONSTRUCTION PUMPING 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) | Reported Pump Depth Setting (ft) |
|---|---|---|---|---|---|---|---|
| Existing Well | 9/21/17 Pump | 4 | 17 | 52.0 | 67.3 | 1.11 | 140 |
| | 4/10/19 Pump | 8 | 35 | 45.0 | 72.3 | 1.28 | 140 |

**Notes:**
ND = No data or not listed
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
## Comparison of Rainfall Data Sources
## Vida Valiente Winery

| Rain Gage and/or Data Source | Years of Available Rainfall Record | Average Annual Rainfall in Inches (ft) | Elevation of Rain Gage (ft asl) | Approximate Distance of Rain Gage from Subject Property (miles) | Gage Elevation Relative to Subject Property(1) |
|---|---|---|---|---|---|
| WRCC St. Helena | 1907 through December 2020(2) | 33.3 (2.78) | 225 | 3.0 | Lower |
| WRCC Angwin Pac Union College | 1940 through January 2021(3) | 38.4 (3.20) | 1,715 | 3.0 | Higher |
| PRISM | 1981 to 2010 | 38.3 (3.19) | --- | --- | --- |
| Napa County Isohyetal Map | 1900 to 1960 | 35.0 (2.92) | --- | --- | --- |

**Notes:**

1. The subject property is located at elevations between ±300 and ±640 ft asl
2. Missing and/or erroneous rainfall data in: 1907; 1915-1922; 1979-1980; 1985-1988; 1992; and 2011-2012.
3. Missing and/or erroneous rainfall data in: 1940-1943; 1975; and 2011.

# Table 3
## Estimated Recharge Based on Slope Deep Percolation Assumptions for Slope Angle
## Vida Valiente Winery

| Region | Area | Average Rainfall [1] | Rainfall Volume | Reduced Recharge Assumption based on Slope Angle | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Deep Percolation/Not Slope Dependent | | Deep Percolation on >30° Slope Diminished by 25% | | Deep Percolation on >30° Slope Diminished by 50% | | Deep Percolation on >30° Slope Diminished by 75% | | Deep Percolation on >30° Slope Diminished by 100% | |
| | | | | Deep Percolation Percentage | Deep Percolation Volume | Deep Percolation Percentage | Deep Percolation Volume | Deep Percolation Percentage | Deep Percolation Volume | Deep Percolation Percentage | Deep Percolation Volume | Deep Percolation Percentage | Deep Percolation Volume |
| | (acres) | (in) | (AF) | (%) | (AF) | (%) | (AF) | (%) | (AF) | (%) | (AF) | (%) | (AF) |
| **Entire Napa River Watershed at St. Helena** | | | | | | | | | | | | | |
| <30° Slope | 44,692 | 41.7 | 155,305 | 14.00% | 21,742.66 | 14.49% | 22,507.80 | 14.99% | 23,272.94 | 15.48% | 24,038.09 | 15.97% | 24,803.23 |
| >30° Slope | 6,291 | 41.7 | 21,861 | 14.00% | 3,060.57 | 10.50% | 2,295.43 | 7.00% | 1,530.29 | 3.50% | 765.14 | 0.00% | - |
| TOTAL = | 50,983 | | | TOTAL = | 24,803.23 | TOTAL = | 24,803.23 | TOTAL = | 24,803.23 | TOTAL = | 24,803.23 | TOTAL = | 24,803.23 |
| **Vida Valiente Winery Property** | | | | | | | | | | | | | |
| <30° Slope | 10.5 | 38.3 | 34 | 14.00% | 4.69 | 14.49% | 4.86 | 14.99% | 5.02 | 15.48% | 5.19 | 15.97% | 5.35 |
| >30° Slope | 6.4 | 38.3 | 20 | 14.00% | 2.86 | 10.50% | 2.14 | 7.00% | 1.43 | 3.50% | 0.71 | 0.00% | - |
| TOTAL = | 16.9 | | | TOTAL = | 7.6 | TOTAL = | 7.0 | TOTAL = | 6.5 | TOTAL = | 5.9 | TOTAL = | 5.4 |

Note: The "Napa River Watershed at St. Helena" values are used to calculate the change in deep percolation percentage of <30° slopes based on the deep percolation volume of 155,305 AF calculated using the assumptions shown. Deep percolation percentage values determined for the entire watershed are then used for site specific calculations.

[1] Average Rainfall for "Napa River Watershed at St. Helena" and "Vida Valiente Winery Property" per PRISM Dataset (1980-2010)

## Table 4
## Drought Period Rainfall as Percentage of Average
## Vida Valiente Winery

| Statewide Drought Period as Defined by DWR/NDMC | Drought Duration (years) | Average Rainfall by Raingage | | | | | |
|---|---|---|---|---|---|---|---|
| | | St. Helena WRCC Period of Record - 1907 through December 2020 | | | Angwin Pacific Union College WRCC Period of Record - 1940 through January 2021 | | |
| | | [A] Total Gage Average (in) | [B] Drought Period Average (in) | [B/A] Drought Period Rainfall as % of Average | [E] Total Gage Average (in) | [F] Drought Period Average (in) | [F/E] Drought Period Rainfall as % of Average |
| WY 1928-29 to WY 1933-34 | 6 | 33.3 | 23.9 | 72% | ND | ND | ND |
| WY 1975-76 to WY 1976-77 | 2 | 33.3 | 13.4 | 40% | 38.4 | 12.3 | 32% |
| WY 1986-87 to WY 1991-92 | 6 | 33.3 | 18.3* | 55%* | 38.4 | 23.7 | 62% |
| WY 2006-07 to WY 2008-09 | 3 | 33.3 | 24.8 | 74% | 38.4 | 27.6 | 72% |
| WY 2011-12 to WY 2015-16 | 5 | 33.3 | 21.7* | 65%* | 38.4 | 33.2 | 86% |

**Notes:**

ND = No rainfall data and/or missing rainfall data for corresponding drought period.

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

## Table 5
## Summary of Available Groundwater Quality Data
## Vida Valiente Winery

| Constituent Analyzed | Units | Maximum Contaminant Level or Secondary Standard | Existing Well | |
|---|---|---|---|---|
| | | | 6/30/2016 | 4/10/2019 |
| **General Physical Parameters** | | | | |
| **pH** | units | 6.5 to 8.5 | 7.2 | 6.4 |
| **Specific Conductance** | µmhos/cm | 900, 1,600, 2,200(1) | 110 | NR |
| **General Mineral Constituents** | | | | |
| **Total Hardness** | mg/L | None | 28 | 29 |
| **Total Dissolved Solids** | mg/L | 500, 1,000, 1,500(1) | 140 | 76 |
| **Bicarbonate (Total) as $HCO_3$** | mg/L | None | 55 | NR |
| **Bicarbonate (Total) as $CaCO_3$** | mg/L | None | NR | 44 |
| **Alkalinity (Total) as $CaCO_3$** | mg/L | None | 45 | 44 |
| **Calcium** | mg/L | None | 5.5 | 5.8 |
| **Chloride** | mg/L | 250, 500, 600(1) | 4.8 | 4.4 |
| **Magnesium** | mg/L | None | 3.5 | 3.4 |
| **Sodium** | mg/L | None | 9 | 8.9 |
| **Fluoride** | mg/L | 2 | 0.1 | NR |
| **Nitrate (as N)** | mg/L | 1 | 0.16 | NR |
| **Nitrates (as $NO_3$)** | mg/L | 45 | NR | ND |
| **Silica ($SiO_2$)** | mg/L | None | 80 | 93 |
| **Sulfate** | mg/L | 250, 500, 600(1) | 1.2 | NR |
| **Sodium Adsorption Ratio** | Units | None | 0.74 | 0.72 |
| **Inorganic (Trace Elements) Constituents** | | | | |
| **Arsenic** | µg/L | 10 | ND | <2 |
| **Boron** | µg/L | 1,000 (NL) | ND | <0.10 |
| **Iron** | µg/L | 300 | ND | 220 |
| **Manganese** | µg/L | 50 | ND | ND |
| **Zinc** | µg/L | 5,000 | ND | <50 |

**Notes:**

(1) The three listed numbers represent the recommended, upper, and short-term State Maximum Contaminant Levels for this constituent.

ND = constituent not deteceted

NR = constituent not reported

NL = Notification Level

µS/cm = microSiemens per centimeter

mg/L = milligrams per liter

µg/L = micrograms per liter

Laboratory analyses performed by Caltest Analytical Laboratory of Napa, California in June 2016, and by Alpha Analytical Laboratories, Inc. of Petaluma, California in April 2019.

# APPENDIX

PUMPING TESTS
OF THE EXISTING WELL
BY
OAKVILLE PUMP SERVICE, INC. (SEPTEMBER 21, 2017)
&
RAYS WELL TESTING SERVICE (APRIL 10, 2019)

# OAKVILLE PUMP SERVICE, INC.

#1 Walnut Drive / P.O. Box 435
Oakville, CA 94562
Phone (707) 944-2471 Fax (707) 944-5636
License # 744958 / oakvillepump.com

| | | | |
|---|---|---|---|
| **Report Date:** 9/21/17 | **Report By:** Wes Lutz | **Tested By:** W. Lutz | **Job#:** 17I 3497 |

**Property Information**

| | | | | | |
|---|---|---|---|---|---|
| Property Location: | 407 Crystal Springs | | | | AP#:021-410-013-000 |
| Buyers Name: | | | | | AP provided by Realtor |
| Buyers Agent or Rep: | | | | | |
| Property Owner Name: | Michael Mondavi | | | | |
| Listing Agent or Owner Rep: | Robyn Bentley | | | | |

**Well & Pump System Information:**

| | | | | |
|---|---|---|---|---|
| ***Well ID & Location on Property*** | ***Well Depth:*** | ***Pump Setting:*** | ***Casing Type & Size:*** | ***Sanitary Well Seal:*** |
| In shed adjacent to parking area | 171' | 140' | 8" Steel | Yes |
| ***Submersible Pump / HP / GPM:*** | ***Motor HP,Voltage,Phase:*** | ***Pipe Size & Type:*** | ***Check Valve Type:*** | ***Annular Seal / Pad:*** |
| 15 GPM 1 HP | 1 HP 230 VAC | 1.25" PVC Drop Pipe | None on surface | Yes |
| ***Submersible Pump Control Panel:*** | ***Low Water Protection:*** | ***Flow Control Valve:*** | ***Press Tank(s) & Qty:*** | ***Press. Relief Valve:*** |
| Pressure Switch/Conrol Box | Pump Tec | none | WX 302 | 3/4" |
| ***Submersible Pump Filtration:*** | **Sub Pump Misc Equipment Notes:** | | | |
| none | | | | |

| | | | | |
|---|---|---|---|---|
| ***Booster Pump Information:*** | ***Pump Controls:*** | ***Flow Control Valve:*** | ***Check Valve Type:*** | ***Press. Relief Valve:*** |
| N/A | N/A | N/A | N/A | N/A |
| ***Filtration Equipment:*** | ***Storage Tank Size/Type:*** | ***Booster Pump/Filtration/Tank Equipment Notes:*** | | |
| N/A | N/A | Well system turned off. | | |

**Water Analysis Testing:**

| *Sample Type:* | *Date Sampled:* | *Completion Date:* | *Lab Vender:* | *Notes:* |
|---|---|---|---|---|
| none | | | | |
| | | | | |

**Well Yield Test** (Log on second page)

| | | | | | |
|---|---|---|---|---|---|
| ***Date of Test:*** | ***Well Type:*** | ***Static Water Lvl:*** | ***Pumping Water Lvl:*** | ***Specific Capacity:*** | ***Well/Pump Yield:*** |
| ***9/21/17*** | Residential | 52' | 67' 4" | 1.1 GPM/ft drawdown | **17** |
| ***Start Time:*** | ***Test Duration:*** | ***Water Level Recovery:*** | | ***Recovery Time:*** | ***Total Gallons Pumped:*** |
| ***8:50*** | 4 Hours | recovered to: | 54' 7" | 25 minutes | 4130 |

*The well yield test is based upon duration and conditions existing at time of testing. The well production may and will change based upon time of year. The well output may be limited to the size of the pump and the well yield test may not properly represent the true capacity of the well.

**Observations:**

1.) Well head is at grade and may be suseptible to contamination
2.) Hand dug well near house has 3' high square rock/masory surround. 38' to water, 55' deep (from grade) 20"x20" on top opening to 4' diameter below
3.) The presence of a lower water protection device indicates this well may have had production issues at some point in time, but is not definitive.
4.)

**Recommendations:**

1.) Raise well head above grade/ensure adequate drainage around well casing.
2.) Ensure hand dug well does not pose a threat for contaminating aquifer or for anyone falling in.
3.)

**Well Test Log**

| Time: | Water Level | GPM Flow | Water Quantity Flowed (gals) | Basic Water Quality (Visual Color-Sand) | Turbidity (NTU) | Notes: |
|---|---|---|---|---|---|---|
| 8:50 | 52' | 17.5 | | turbid | | |
| 9:00 | 63' 8" | 17.5 | | turbid | | |
| 9:35 | 65' 7" | 17 | | clear | | |
| 10:30 | 66' 8" | 17 | | clear | | |
| 11:30 | 67' | 17 | | clear | | |
| 12:30 | 67' 3" | 17 | | clear | | |
| 12:50 | 67' 4" | 17 | | clear | | shutdown to monitor well recovery |
| 12:55 | 56' 4" | 0 | | N/A | | recovery |
| 13:05 | 55' | 0 | | N/A | | recovery |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13:15 | 54' 7" | 0 | | N/A | | recovery |
| | | | | | | |

**Additional Comments and Notes:**

1.) Napa County may require an unused well to be abandoned if they consider it a potential point for aquifer contamination.
2.) The well test in this case was limited by the size of the pump in the well. A larger pump would be able to more fully test this well.
3.) Steel cased wells can deriorate over time from corrosiont and need to be re-cased to keep the well from caving.
4.) There has been no camera inspection done to determine the condision of the well casing.
5.) This well should be able handle a larger pump if higher flow rates are required.
6.)
7.)
8.)
9.)
10.)

**System Pictures**

Well Site and Well Pump Equipment


Hand Dug Well

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

**Date:** 04/10/19
**Report #:** 10893
**Report By:** Matt Owens

**Subject Property Address:** 407 Crystal Springs Rd, St. Helena CA 94574
**Customer Name:** Barbour Vineyards c/o Luke McMullen

**WELL DATA:**

| | |
|---|---|
| **Location/Description of well:** | In pumphouse in front of main house |
| **Type of Well:** | Drilled |
| **Depth of Well:** | Measured 171.9 Feet, slight obstruction at 92 Feet below |
| **Diameter of Well Casing:** | 8” I.D. Steel |
| **Sanitary Seal (plate seal at top of well):** | Yes |
| **Annular Well Seal (in ground seal of bore hole):** | Unknown – Please refer to pumping log |

**PUMP DATA:**

| | |
|---|---|
| **Pump HP and Type:** | Test Pump |
| **Depth of Pump Suction:** | 140 Feet |
| **Size of Tee at Well Head:** | Test Pump |
| **Submersible Cable Size:** | Test Pump |
| **Water Level Control:** | Test Pump |
| **Backpressure Test:** | Test Pump |

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

**Length of Test:** 8 Hours
**Type of Test:** Drawdown & Constant Pumping Level

| | | | |
|---|---|---|---|
| **Static Water Level:** | 45 Feet | **Starting Flow** | 25.5 GPM |
| **Water Level Drawdown:** | 27.3 Feet | | |
| **Final Pumping Level:** | 72.3 Feet | **Final Flow** | 34.5 GPM |

**WATER LEVEL RECOVERY SUMMARY:**

| | |
|---|---|
| **Pre Test Static Water Level:** | 45 Feet |
| **Post Test Static Water Level:** | 46.5 Feet |
| **Water Level Drawdown:** | 27.3 Feet |
| **Water Level Recovery:** | 25.8 Feet |
| **Water Level Recovery as % of Drawdown:** | 94.51% |
| **Length Between End of Test and Recovery:** | 40 Hrs 30 Mins |

**WELL PRODUCTION DATA & PUMPING LOG:**

| Date | Time | Interval | Water Level | Appearance | Sulfur Odor | Sand | GPM |
|---|---|---|---|---|---|---|---|
| 04/10/19 | 12:15 PM | 0 Minutes | 45 | Orange | No | Pinch Iron Particulate | 25.5 |
| 04/10/19 | 12:30 PM | 15 Minutes | 62 | Orange Haze | No | Trace Iron Particulate | 35 |
| 04/10/19 | 12:45 PM | 15 Minutes | 68.4 | Cloudy Orange | No | 2 TBSP Course Sand | 35 |
| 04/10/19 | 01:00 PM | 15 Minutes | 68.9 | Orange | No | 1 TBSP Course Sand | 35 |
| 04/10/19 | 01:15 PM | 15 Minutes | 69.6 | Orange | No | 1 TBSP Course Sand | 35 |
| 04/10/19 | 01:30 PM | 15 Minutes | 69.8 | Orange | No | 1 TBSP Course Sand | 35 |
| 04/10/19 | 01:45 PM | 15 Minutes | 70 | Orange | No | Pinch Course Sand | 35 |
| 04/10/19 | 02:00 PM | 15 Minutes | 71.4 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 02:15 PM | 15 Minutes | 70.7 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 02:45 PM | 30 Minutes | 71 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 03:15 PM | 30 Minutes | 71.3 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 03:45 PM | 30 Minutes | 71.7 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 04:15 PM | 30 Minutes | 72 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 04:45 PM | 30 Minutes | 72 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 05:15 PM | 30 Minutes | 72.1 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 05:45 PM | 30 Minutes | 72.2 | Orange Haze | No | Pinch Course Sand | 35 |
| 04/10/19 | 06:15 PM | 30 Minutes | 72.3 | Orange Haze | No | Pinch Course Sand | 34.5 |
| 04/10/19 | 07:15 PM | 60 Minutes | 72.3 | Orange Haze | No | Pinch Course Sand | 34.5 |
| 04/10/19 | 08:15 PM | 60 Minutes | 72.3 | Orange Haze | No | Pinch Course Sand | 34.5 |

**Final Pumping Level:** 72.3 Feet
**Final Flow Rate:** 34.5 GPM

**WATER LEVEL RECOVERY DATA:**

| Date | Time | Interval | Water Level | Recovery % |
|---|---|---|---|---|
| 04/10/19 | 08:20 PM | 5 Minutes | 54 | 67.03% |
| 04/12/19 | 12:45 PM | 40 Hrs 30 Mins | 46.5 | 94.51% |

**Final post test static level measurement:** 46.5 Feet
**Final Water Level Recovery as % of Drawdown:** 94.51%
**Length of time between end of test and recovery:** 40 Hrs 30 Mins

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

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

**WATER QUALITY: (The following samples are being analyzed, please refer to follow up report)**
**Analysis Choice:** Irrigation Package **Turnaround:** Standard

**MEMORANDUM**

# APPENDIX

## TRANSIENT NON-COMMUNITY WATER SYSTEM INFORMATION BY APPLIED CIVIL ENGINEERING VIDA VALIENTE WINERY

# TRANSIENT NON-COMMUNITY WATER SYSTEM INFORMATION

FOR THE

# VIDA VALIENTE WINERY

LOCATED AT:
407 Crystal Springs Road
St. Helena, CA 94574
Napa County APN 021-410-013

PREPARED FOR:
Crystal Vines, LLC
Care Of: Hayes Drumwright
16 Calle Ameno
San Clemente, CA 92672

PREPARED BY:

APPLIED CIVIL ENGINEERING INCORPORATED

2074 West Lincoln Avenue
Napa, California 94558
Telephone: (707) 320-4968
www.appliedcivil.com

Job Number: 19-123

Original Submittal: 2/28/2020
Revision #1: 12/3/2020

REGISTERED PROFESSIONAL ENGINEER
MICHAEL R. MUELRATH
NO. 67435
Exp. 12/31/2020
CIVIL
STATE OF CALIFORNIA

Michael R. Muelrath — 12/3/2020

Michael R. Muelrath R.C.E. 67435 — Date

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## INTRODUCTION

Crystal Vines, LLC is applying for a Use Permit to construct and operate a new winery at their property located at 407 Crystal Springs Road in Napa County, California. The subject property, known as Napa County Assessor's Parcel Number 021-410-013, is located along the southwest side of Crystal Springs Road approximately 0.9 miles east of the intersection of Crystal Springs Road and Silverado Trail.

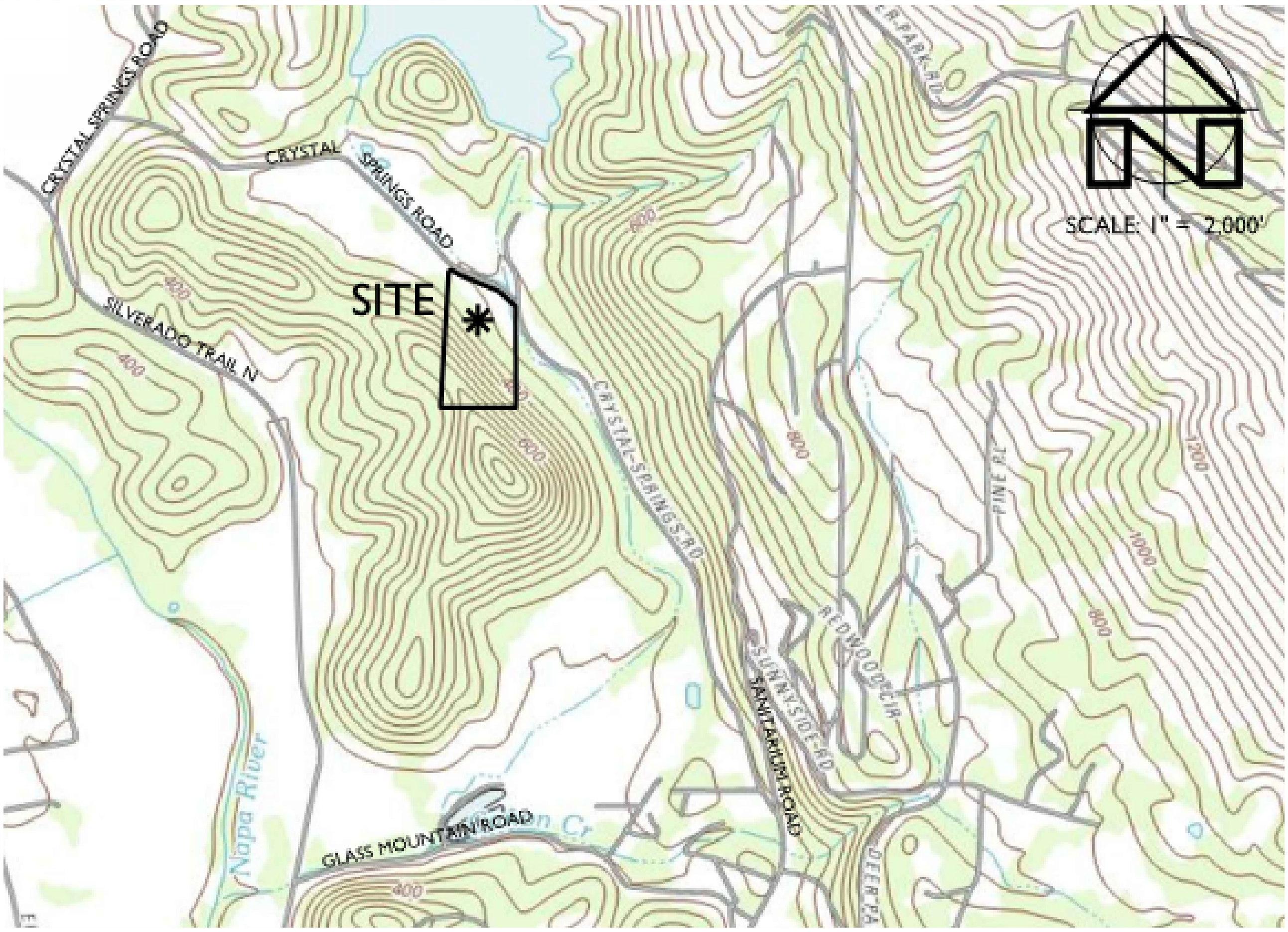


Figure 1: Location Map

The Use Permit application under consideration proposes the construction and operation of a new winery with the following characteristics:

- Wine Production:
    - 30,000 gallons of wine per year
    - Crushing, fermenting, aging and bottling

- Employees:
    - 5 full time employees
    - 2 part time employees
    - 2 seasonal employees

- Marketing Plan:
    - Daily Tours and Tastings by Appointment
        - 28 visitors per day maximum
    - Marketing Events Type #1
        - 2 per month
        - 24 guests maximum
        - Food prepared in onsite kitchen or offsite by catering company
    - Marketing Events Type #2
        - 3 per year
        - 60 guests maximum
        - Food prepared offsite by catering company
    - Marketing Events Type #3
        - 1 per year
        - 125 guests maximum
        - Food prepared offsite by catering company
        - Portable toilets brought in for guest use

Previous development on the property includes a single-family residence, a pool, a groundwater well, vineyards and the access and utility infrastructure typical of this type of rural residential and agricultural development (note that structures were burned in the Glass Fire). Please see the Vida Valiente Winery Use Permit Conceptual Site Plans for approximate locations of existing and proposed features.

Since the number of employees plus the number of visitors is expected to exceed 24 for 60 or more days out of the year, the project will be required to implement a Transient Non-Community Public Water System.

Crystal Vines, LLC has requested that Applied Civil Engineering Incorporated (ACE) prepare a brief report outlining the anticipated technical, managerial and financial aspects of the water system that will be required to serve the proposed winery to accompany the winery Use Permit application as required by Napa County.

## WATER SYSTEM NAME

The water system will be known as the “Vida Valiente Winery Water System”.

## NAME OF PERSON WHO PREPARED THIS REPORT

This report was prepared by Michael Muelrath, PE of Applied Civil Engineering Incorporated. Information regarding the parameters of the subject Use Permit application were provided by Crystal Vines, LLC.

## TECHNICAL CAPACITY

### System Description

Water for the existing residence and vineyard irrigation is currently provided by an existing groundwater well. The existing well does not have the required 50 foot deep, 3 inch wide annular seal and thus a new well will be required to serve the public water system. It is planned that the new well will be drilled in the vicinity of the new winery development as illustrated on the Vida Valiente Winery Use Permit Conceptual Site Plans.

The new well must be constructed per Napa County standards and treatment must be provided as required to meet applicable local, state and federal water quality requirements. Detailed plans for the water treatment system will be prepared and presented to Napa County for review during the building permit and water system permit stage, after the new well is drilled and the required yield and water quality testing is performed.

### Water Demand Projection

Napa County Water Availability Analysis Guidelines were used to estimate the annual water demand for the existing and proposed uses including the new winery and associated landscaping. The total proposed water use is estimated to be 3.0 acre-feet per year. Using the projected annual domestic water demand of 3.0 acre-feet per year, we have calculated an average daily demand of approximately 2,678 gallons and a maximum daily demand (MDD) of approximately 6,026 gallons (calculated using a peaking factor of 2.25 per California Waterworks Standards Section 64554b.3.(C)).

### Source Adequacy

The new well must be constructed with a minimum 50 foot deep, 3 inch wide concrete annular seal to meet the requirements for public water systems. A copy of the Well Completion Report providing information about the new well will be included with the water system application with the winery building permit application package to document adequacy of the seal.

### Water Supply Capacity

Assuming a conservative well pumping cycle of 12 hours per day the new well must be capable of producing at least 8.4 gallons per minute to meet the water system's MDD. We believe it is feasible to develop a well with at least this capacity on the subject property based on the current use of the existing well on the property and our review of well logs for wells on nearby properties.

Furthermore, the project hydrogeologist is preparing a water availability analysis confirming that the projected aquifer extraction is less than expected aquifer recharge and that long term supply will be sufficient to meet the needs of the public water system.

It will be the Applicant's responsibility to locate and develop the new water source that meets this minimum capacity requirement. The yield of the new well must be verified by pumping and measuring drawdown in accordance with California Waterworks Standards Section 64554 prior to submittal of the water system permit application package.

Once the water system is permitted and constructed we recommend that the water level, yield and drawdown in the well be monitored on an ongoing basis to detect any trends in changing water table levels and well yield so that alternate sources can be developed if needed.

The water system must also include a new storage tank that can store at least the MDD (6,026 gallons).

## Water Quality Characterization

Since a new well will be drilled it will be necessary to perform a full panel of water quality testing, including chemical and bacteriological analysis, upon completion of the new well. The water treatment system must then be designed to reduce all required contaminant levels to below the regulatory maximum contaminant level (MCL) for each constituent, as applicable. Based on preliminary testing of existing onsite wells and experience with other wells in the project area we judge that it will be feasible to provide treatment as needed to meet water quality requirements for the new public water system.

## Consolidation Analysis

We have reviewed the California Environmental Health Tracking Program Water System Map Viewer (http://www.cehtp.org/page/water/water_system_map_viewer) and found thirteen systems identified on the map that are located within 3 miles of the subject property:

1. City of St. Helena
2. Woodland Ridge Mutual Water Co.
3. Howell Mountain Mutual Water Company
4. Calistoga Farmworker Center
5. Tucker Acres Mutual Water Co.
6. Cal Fire Sonoma-Lake-Napa Unit HQ
7. Vailima Estates Mutual Water
8. Cannon Park Water Co.
9. Mund S Mobile Home Park
10. St. Helena Hospital
11. Linda Vista Mutual Water Co.
12. Linda Falls Terrace Mutual
13. La Tierra Heights Mutual

We have reviewed possibility of connecting to one of these existing systems with the Napa County Local Agency Formation Commission and have determined that it is not feasible to connect to an existing water system due to the fact that the property is outside of the service areas and also outside of the sphere of influence of all public water systems in the vicinity of the project area (see correspondence in Appendix 2).

## MANAGERIAL

### Organization

Management and routine operation of the water system will be performed by the winery staff. One staff member will be responsible for performing sampling, reporting and keeping up to date records onsite in accordance with Napa County requirements. The winery staff person in charge of the water system will consult with water system specialists as needed if issues arise with any components of the water system. The water system manager will report directly to the property owner, Crystal Vines, LLC.

### Land Ownership

The new well, storage tank and piping will all be located on the same property as the proposed winery and residence that it will serve. This property is owned by Crystal Vines, LLC (see ownership documents in Appendix 4). Since the well and all water system components are planned to be located on the winery property, no access or maintenance easements will be required.

### Water Rights

The Vida Valiente Winery Water System will use groundwater from a non-adjudicated groundwater basin exclusively and is therefore not subject to water rights through the State Water Resources Control Board.

## FINANCIAL

There will be no revenue generated by the water system.

The expected expenses for the water system can be broken down into initial startup cost and ongoing operational cost as shown below.

### Startup Cost

Startup cost includes the new well and pump for the new well, water transmission piping, water storage tank(s), water treatment system equipment, booster pump(s) and installation. The water treatment and storage equipment will be designed based on a full panel of water quality test results that will be performed on water from the new well. Based on previous experience we estimate that the cost for the well, well pump, water transmission piping, water storage tank, booster pump, water treatment system equipment and installation will be approximately $122,000 (see budget spreadsheet in Appendix 3).

Actual costs will be dependent upon the location of the new well, tank and other water system components as well as results of the water quality testing and design of the water treatment system.

## Annual Operating Cost

Annual operating cost for the water system will include a portion of one employee's salary, cost for performing quarterly and annual water quality testing, equipment maintenance, replacement of consumable items, electrical service charges, professional fees and capital replacement allowance. The actual cost to operate and maintain the water system will be dependent on the final design of the water system. We estimate that the annual cost associated with operating and maintaining the water system will be approximately $20,000 per year (see budget spreadsheet in Appendix 3).

## Funding

The startup cost will be financed along with the construction of the winery. The winery's annual budget must include a line item for water system operation and maintenance expenses to ensure finances are available to operate and maintain the water system throughout the life of the winery.

APPENDIX 1:  Vida Valiente Winery Use Permit Conceptual Site Plans
(Reduced to 8.5” x 11”)

# VIDA VALIENTE WINERY

## WINERY USE PERMIT CONCEPTUAL SITE PLANS


OVERALL SITE PLAN

SCALE: 1" = 80'

SCALE: 1" = 80'

0 80' 160'

### GRADING QUANTITIES*

| | |
|---|---|
| CUT | 10,000 ± CY |
| FILL | 300 ± CY |
| CAVE SPOILS | 9,700 ± CY (CUT) |
| NET** | 19,400 ± CY |

* THIS ESTIMATE IS PROVIDED AS A TOOL FOR THE REVIEWING AGENCIES TO EVALUATE THE ENVIRONMENTAL IMPACTS OF THE PROJECT. IT IS NOT INTENDED TO BE USED FOR CONSTRUCTION PURPOSES. CONTRACTOR IS TO PERFORM THEIR OWN EARTHWORK CALCULATIONS AND SHALL NOT USE THE ESTIMATES PRESENTED ABOVE. THIS ESTIMATE IS BASED ON IN PLACE VOLUMES AND DOES NOT INCLUDE FLUFF, SHRINKAGE, PAVING, AGGREGATES OR SELECT FILL VOLUMES.

** EXCESS SOIL CUT FROM THE PROJECT WILL BE HAULED OFFSITE TO A LOCATION PRE-APPROVED BY NAPA COUNTY.

### SLOPE SECTIONS

| | |
|---|---|
| A-A | 19% |
| B-B | 19% |
| C-C | 19% |
| D-D | 1% |
| E-E | 6% |
| AVERAGE | 13% |

### SOIL TYPE LEGEND:

125 CORTINA VERY STONY LOAM, 0 TO 5 PERCENT SLOPES

140 FORWARD GRAVELLY LOAM, 30 TO 75 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

### LEGEND:

- APPROXIMATE PROPERTY BOUNDARY (SUBJECT PARCEL)
- APPROXIMATE PROPERTY BOUNDARY (ADJACENT PARCEL)
- BLUELINE STREAM
- EXISTING VINEYARD
- PROPOSED EDGE OF PAVEMENT
- AC PAVING
- PERMEABLE SURFACE
- CONCRETE
- LANDSCAPE AREA


### LOCATION MAP

SCALE: 1" = 2,000'

### PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:
CRYSTAL VINES HOLDINGS LLC
16 CALLE AMENO
SAN CLEMENTE, CA 92672

SITE ADDRESS:
407 CRYSTAL SPRINGS ROAD
SAINT HELENA, CA 94574

ASSESSOR'S PARCEL NUMBER:
021-410-013

PARCEL SIZE:
16.9 ± ACRES

PROJECT SIZE:
4 ± ACRES

ZONING:
AGRICULTURAL WATERSHED (AW)

DOMESTIC WATER SOURCE:
PRIVATE WELL & WATER TANK

FIRE PROTECTION WATER SOURCE:
PRIVATE STORAGE TANK

WASTEWATER DISPOSAL:
ONSITE TREATMENT AND DISPERSAL

### SHEET INDEX:



### PROJECT DESCRIPTION:

THE PURPOSE OF THIS PROJECT IS TO SHOW THE CONCEPTUAL DESIGN AND SITE IMPROVEMENTS PROPOSED AS PART OF THE WINERY USE PERMIT APPLICATION.

### FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0265E, EFFECTIVE SEPTEMBER 26, 2008, ALL OR A PORTION OF THE PROJECT SITE IS LOCATED IN A SPECIAL FLOOD HAZARD AREA SUBJECT TO INUNDATION BY THE 1% CHANCE ANNUAL FLOOD (100 YEAR FLOOD). THE APPROXIMATE FLOOD HAZARD BOUNDARY LINE IS SHOWN ON THIS PLAN. SEE FIRM FOR ADDITIONAL INFORMATION.

### NOTES:

1. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION ON SHEET C1 WAS TAKEN FROM THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATABASE. TOPOGRAPHIC INFORMATION ON SHEET OTHER SHEETS WAS TAKEN FROM THE "MAP OF TOPOGRAPHY OF A PORTION OF THE LANDS OF 407 CRYSTAL SPRINGS ROAD" PREPARED BY ALBION SURVEYS, INC., DATED MARCH 2018, UPDATED NOVEMBER 6, 2019. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
2. AERIAL PHOTOGRAPH WAS OBTAINED FROM THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM (GIS) DATABASE, TAKEN APRIL TO JUNE 2018 WAS SLIGHTLY MODIFIED TO REPRESENT CURRENT CONDITIONS.
3. CONTOUR INTERVAL:
   SHEET C1: FIVE (5) FEET, HIGHLIGHTED EVERY TWENTY FIVE (25) FEET.
   OTHER SHEETS: ONE (1) FOOT, HIGHLIGHTED EVERY FIVE (5) FEET.
4. BENCHMARK: NAVD 88
5. THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.


APPLIED CIVIL ENGINEERING INCORPORATED
2074 West Lincoln Avenue
Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
www.appliedcivil.com


VIDA VALIENTE WINERY

WINERY USE PERMIT CONCEPTUAL SITE PLANS

OVERALL SITE PLAN

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT REVIEW NOT FOR CONSTRUCTION

| | |
|---|---|
| DRAWN BY: | PowerCAD LLC |
| CHECKED BY: | MRM |
| DATE: | DECEMBER 4, 2020 |
| REVISIONS: | BY: |
| 2/28/2020 PERMIT SUBMITTAL | YMS |
| 12/4/2020 USE PERMIT RESUBMITTAL | YMS |
| JOB NUMBER: | 19-123 |
| FILE: | 19-123CONC-OSP.DWG |
| ORIGINAL SIZE: | 24" X 36" |
| SHEET NUMBER: | C1 OF 8 |

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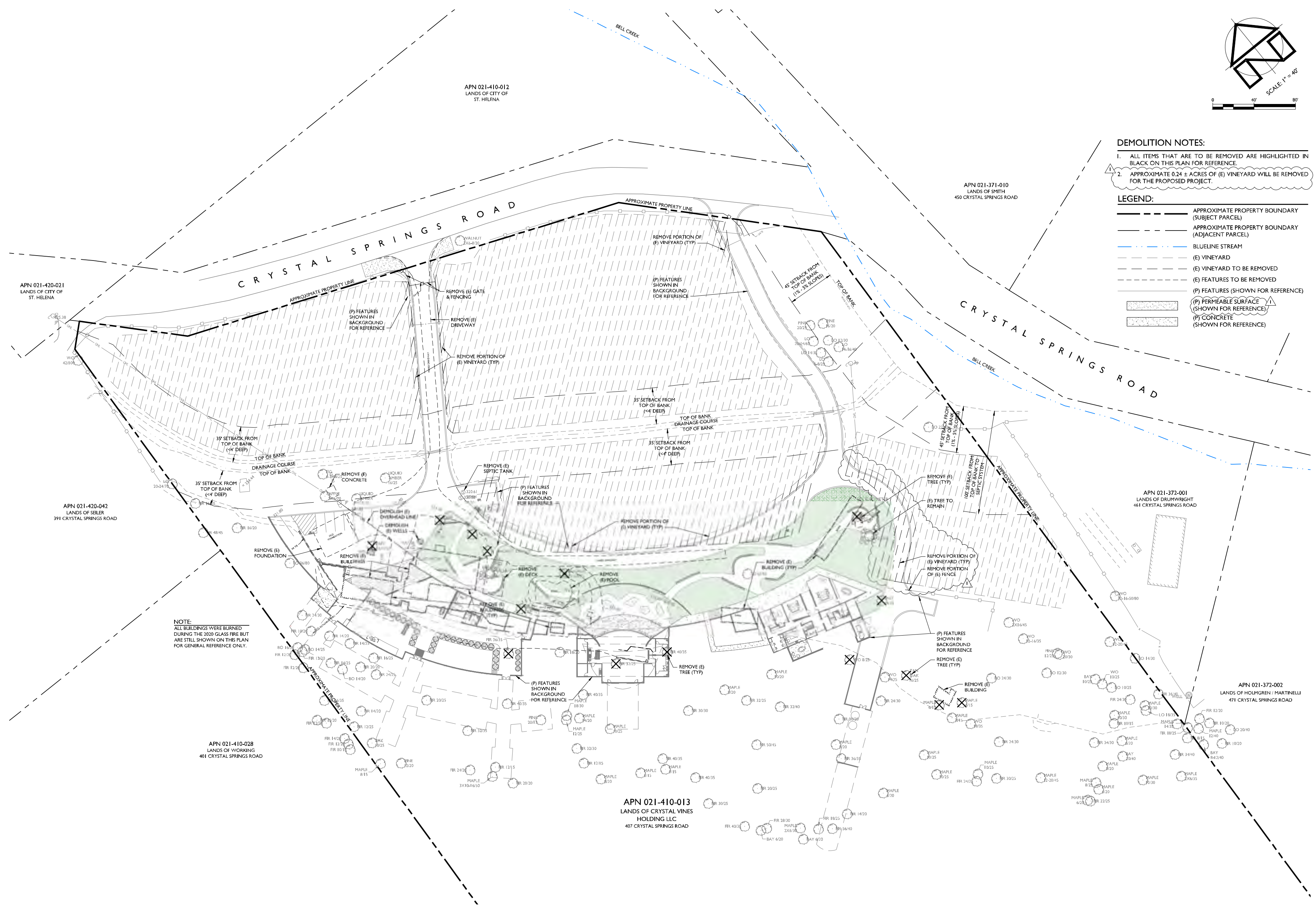


## WINERY SITE DEMOLITION PLAN

SCALE: 1" = 40'

### DEMOLITION NOTES:

1. ALL ITEMS THAT ARE TO BE REMOVED ARE HIGHLIGHTED IN BLACK ON THIS PLAN FOR REFERENCE.
2. APPROXIMATE 0.24 ± ACRES OF (E) VINEYARD WILL BE REMOVED FOR THE PROPOSED PROJECT.

### LEGEND:

- APPROXIMATE PROPERTY BOUNDARY (SUBJECT PARCEL)
- APPROXIMATE PROPERTY BOUNDARY (ADJACENT PARCEL)
- BLUELINE STREAM
- (E) VINEYARD
- (E) VINEYARD TO BE REMOVED
- (E) FEATURES TO BE REMOVED
- (P) FEATURES (SHOWN FOR REFERENCE)
- (P) PERMEABLE SURFACE (SHOWN FOR REFERENCE)
- (P) CONCRETE (SHOWN FOR REFERENCE)


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www.appliedcivil.com


# VIDA VALIENTE WINERY

WINERY USE PERMIT CONCEPTUAL SITE PLANS

WINERY SITE DEMOLITION PLAN

PREPARED UNDER THE DIRECTION OF:

DRAWN BY: PowerCAD LLC

CHECKED BY: MRM

DATE: DECEMBER 4, 2020

| REVISIONS: | BY: |
| --- | --- |
| 2/28/2020 PERMIT SUBMITTAL | YMS |
| 1 12/4/2020 USE PERMIT RESUBMITTAL | YMS |

JOB NUMBER: 19-123

FILE: 19-123CONC-DEMO.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: C2 OF 8

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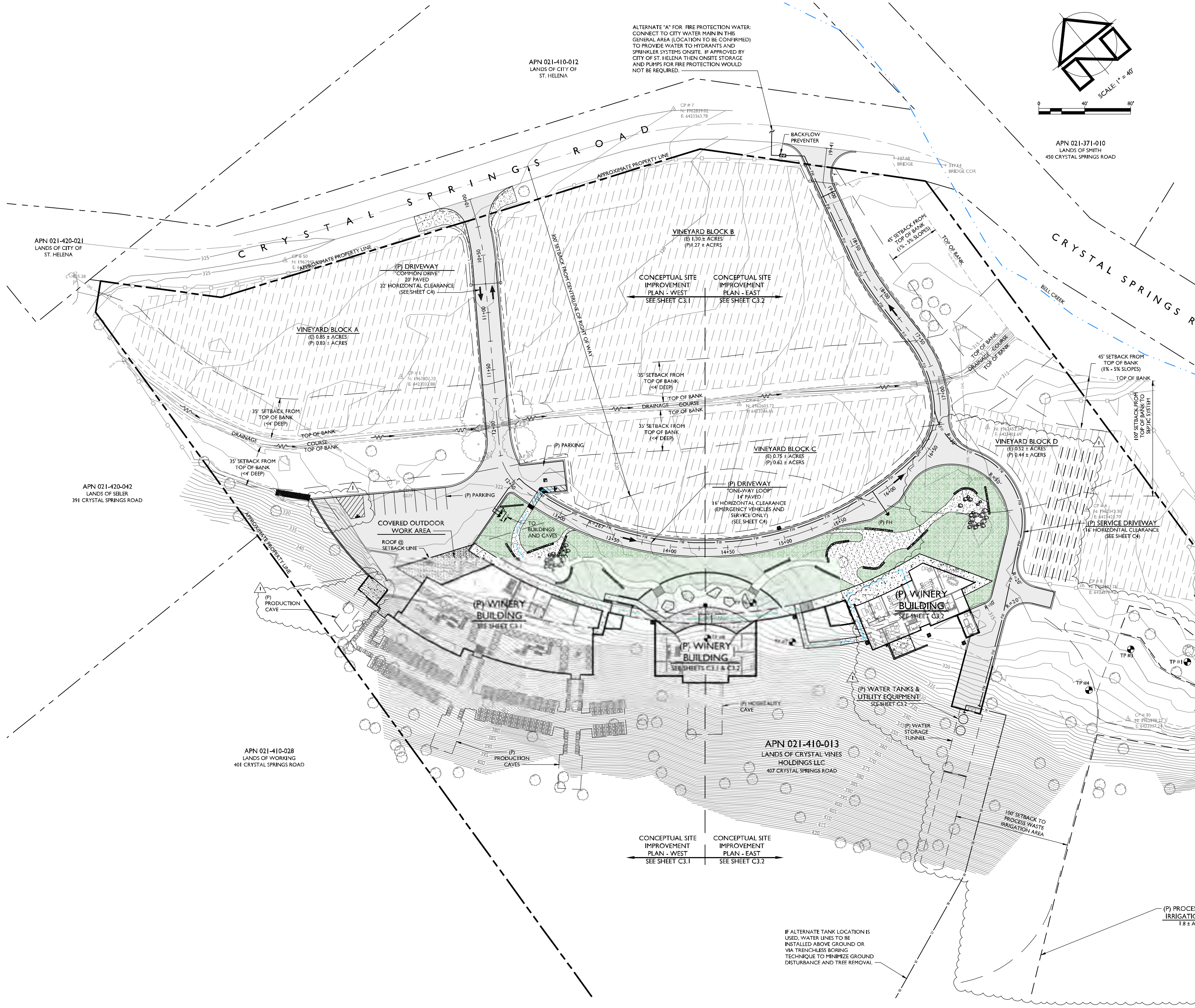


## WINERY CONCEPTUAL SITE IMPROVEMENT PLAN

SCALE: 1" = 40'

**TEST PIT NOTE:**

TEST PITS ONE THROUGH EIGHT (TP #1 - TP #8) WERE EXCAVATED BY MADRONE ENGINEERING AND WERE WITNESSED BY JOEL DICKERSON OF MADRONE ENGINEERING AND THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION ON APRIL 25, 2018.

**LEGEND:**

- APPROXIMATE PROPERTY BOUNDARY (SUBJECT PARCEL)
- APPROXIMATE PROPERTY BOUNDARY (ADJACENT PARCEL)
- BLUELINE STREAM
- EXISTING VINEYARD
- PROPOSED EDGE OF PAVEMENT
- AC PAVING
- PERMEABLE SURFACE
- CONCRETE
- LANDSCAPE AREA


APPLIED CIVIL ENGINEERING INCORPORATED
2074 West Lincoln Avenue
Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
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# VIDA VALIENTE WINERY

## WINERY USE PERMIT CONCEPTUAL SITE PLANS
## WINERY CONCEPTUAL SITE IMPROVEMENT PLAN

PREPARED UNDER THE DIRECTION OF:

REGISTERED PROFESSIONAL ENGINEER – MICHAEL R. MUELRATH – STATE OF CALIFORNIA – FOR USE PERMIT REVIEW – NOT FOR CONSTRUCTION – 12/4/2020

DRAWN BY: PowerCAD LLC
CHECKED BY: MRM
DATE: DECEMBER 4, 2020

| REVISIONS: | BY: |
|---|---|
| 2/28/2020 PERMIT SUBMITTAL | YMS |
| 12/4/2020 USE PERMIT RESUBMITTAL | YMS |

JOB NUMBER: 19-123
FILE: 19-123CONC-SITE.DWG
ORIGINAL SIZE: 24" X 36"
SHEET NUMBER: C3.0 OF 8

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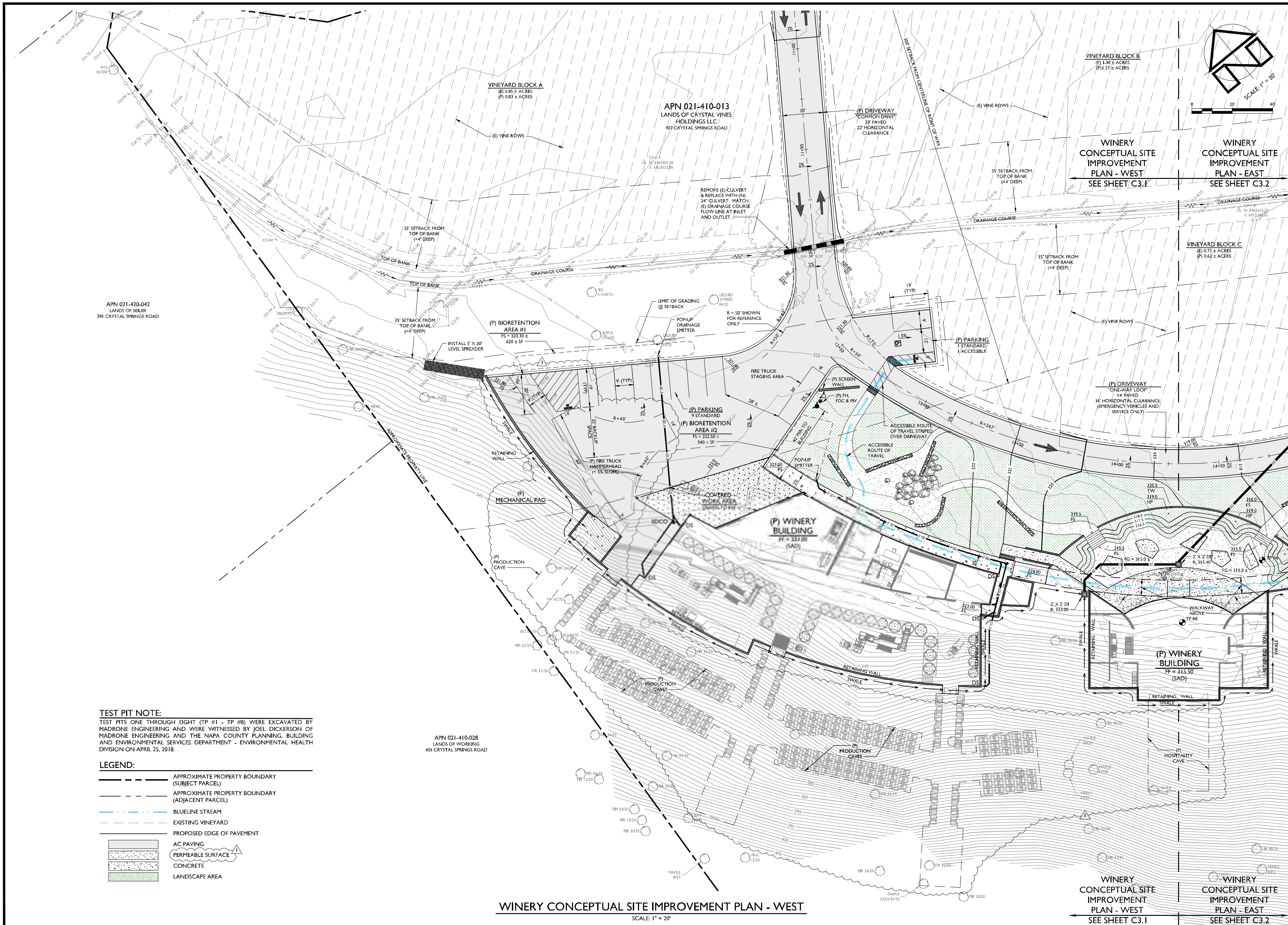


**TEST PIT NOTE:**

TEST PITS ONE THROUGH EIGHT (TP #1 - TP #8) WERE EXCAVATED BY MADRONE ENGINEERING AND WERE WITNESSED BY JOEL DICKERSON OF MADRONE ENGINEERING AND THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION ON APRIL 25, 2018.

**LEGEND:**

- APPROXIMATE PROPERTY BOUNDARY (SUBJECT PARCEL)
- APPROXIMATE PROPERTY BOUNDARY (ADJACENT PARCEL)
- BLUELINE STREAM
- EXISTING VINEYARD
- PROPOSED EDGE OF PAVEMENT
- AC PAVING
- PERMEABLE SURFACE
- CONCRETE
- LANDSCAPE AREA

## WINERY CONCEPTUAL SITE IMPROVEMENT PLAN - WEST

SCALE: 1" = 20'

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# VIDA VALIENTE WINERY

WINERY USE PERMIT CONCEPTUAL SITE PLANS

WINERY CONCEPTUAL SITE IMPROVEMENT PLAN - WEST

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT REVIEW - NOT FOR CONSTRUCTION

DRAWN BY: PowerCAD LLC

CHECKED BY: MRM

DATE: DECEMBER 4, 2020

| REVISIONS: | BY: |
|---|---|
| 2/28/2020 PERMIT SUBMITTAL | YMS |
| 12/4/2020 USE PERMIT RESUBMITTAL | YMS |

JOB NUMBER: 19-123

FILE: 19-123CONC-SITE.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: C3.1 OF 8

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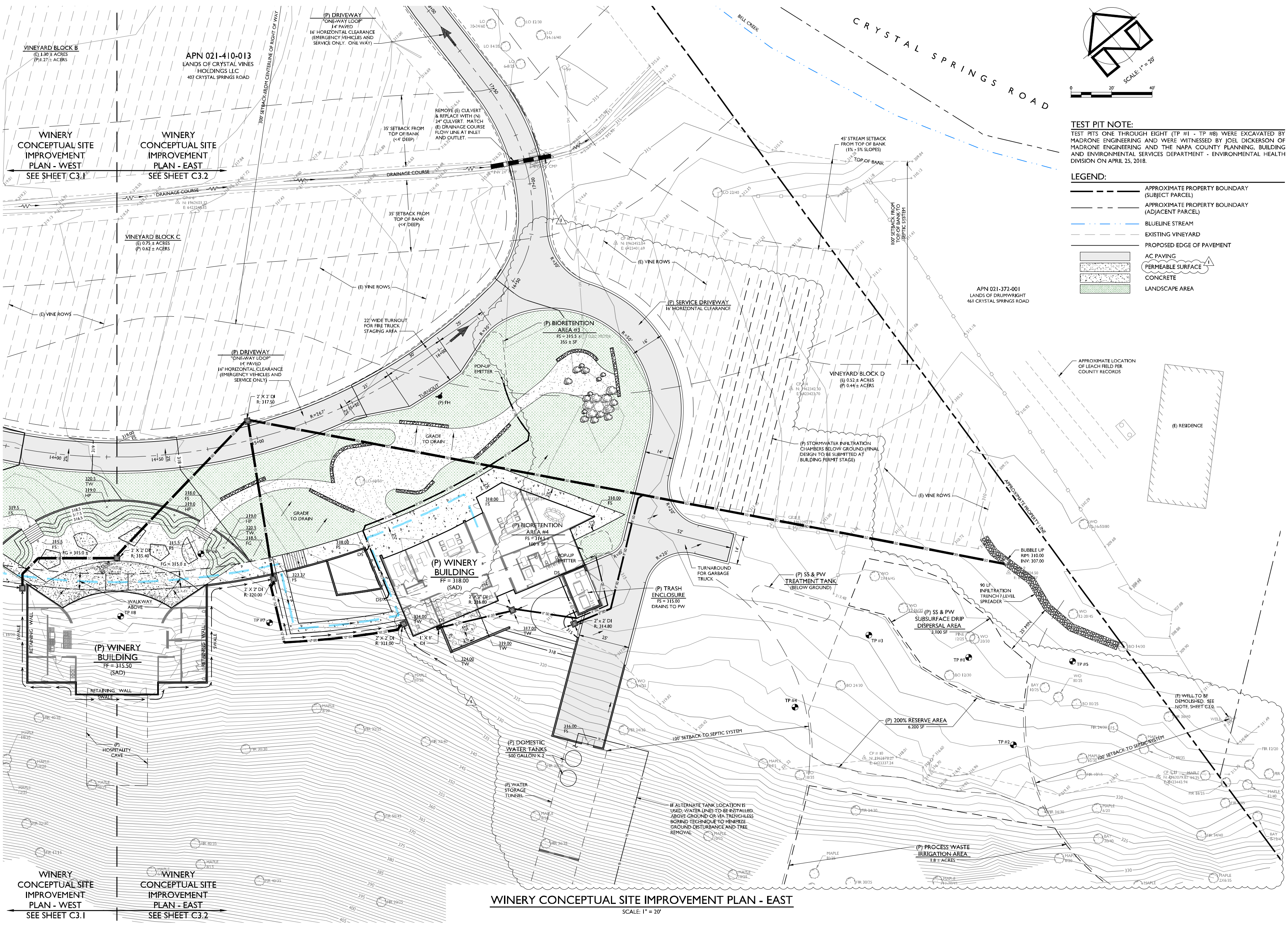


## WINERY CONCEPTUAL SITE IMPROVEMENT PLAN - EAST

SCALE: 1" = 20'

**TEST PIT NOTE:**

TEST PITS ONE THROUGH EIGHT (TP #1 - TP #8) WERE EXCAVATED BY MADRONE ENGINEERING AND WERE WITNESSED BY JOEL DICKERSON OF MADRONE ENGINEERING AND THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION ON APRIL 25, 2018.

**LEGEND:**

- APPROXIMATE PROPERTY BOUNDARY (SUBJECT PARCEL)
- APPROXIMATE PROPERTY BOUNDARY (ADJACENT PARCEL)
- BLUELINE STREAM
- EXISTING VINEYARD
- PROPOSED EDGE OF PAVEMENT
- AC PAVING
- PERMEABLE SURFACE
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- LANDSCAPE AREA


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# VIDA VALIENTE WINERY

WINERY USE PERMIT CONCEPTUAL SITE PLANS

WINERY CONCEPTUAL SITE IMPROVEMENT PLAN - EAST

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT REVIEW. NOT FOR CONSTRUCTION

| | |
|---|---|
| DRAWN BY: | PowerCAD LLC |
| CHECKED BY: | MRM |
| DATE: | DECEMBER 4, 2020 |
| REVISIONS: | BY: |
| 2/28/2020 PERMIT SUBMITTAL | YMS |
| 12/4/2020 USE PERMIT RESUBMITTAL | YMS |
| JOB NUMBER: | 19-123 |
| FILE: | 19-123CONC-SITE.DWG |
| ORIGINAL SIZE: | 24" X 36" |
| SHEET NUMBER: | C3.2 OF 8 |

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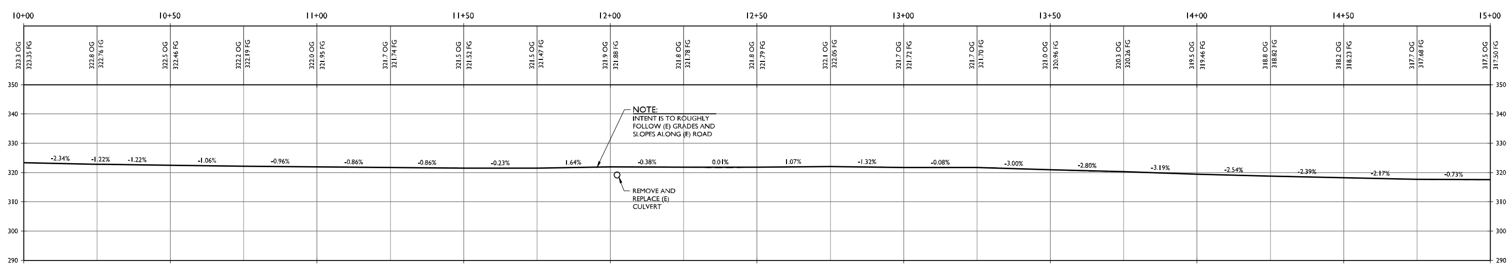
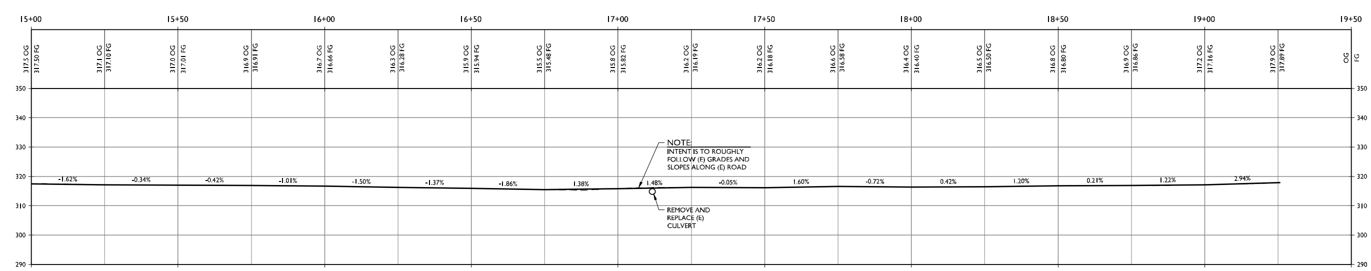
## WINERY DRIVEWAY PLAN

SCALE: 1" = 40'




## WINERY DRIVEWAY PROFILES

SCALE: 1" = 20'

# VIDA VALIENTE WINERY

WINERY USE PERMIT CONCEPTUAL SITE PLANS
DRIVEWAY PLAN AND PROFILE STA 10+00 TO STA 19+41

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Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
www.appliedcivil.com

PREPARED UNDER THE DIRECTION OF:

DRAWN BY: PowerCAD LLC

CHECKED BY: MRM

DATE: DECEMBER 4, 2020

REVISIONS: BY:
2/28/2020 PERMIT SUBMITTAL YMS
12/4/2020 USE PERMIT RESUBMITTAL YMS

JOB NUMBER: 19-123

FILE: 19-123CONC-DWY.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: C4 OF 8

FOR USE PERMIT REVIEW - NOT FOR CONSTRUCTION

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# VIDA VALIENTE WINERY

WINERY USE PERMIT CONCEPTUAL SITE PLANS
IMPERVIOUS SURFACE EXHIBIT

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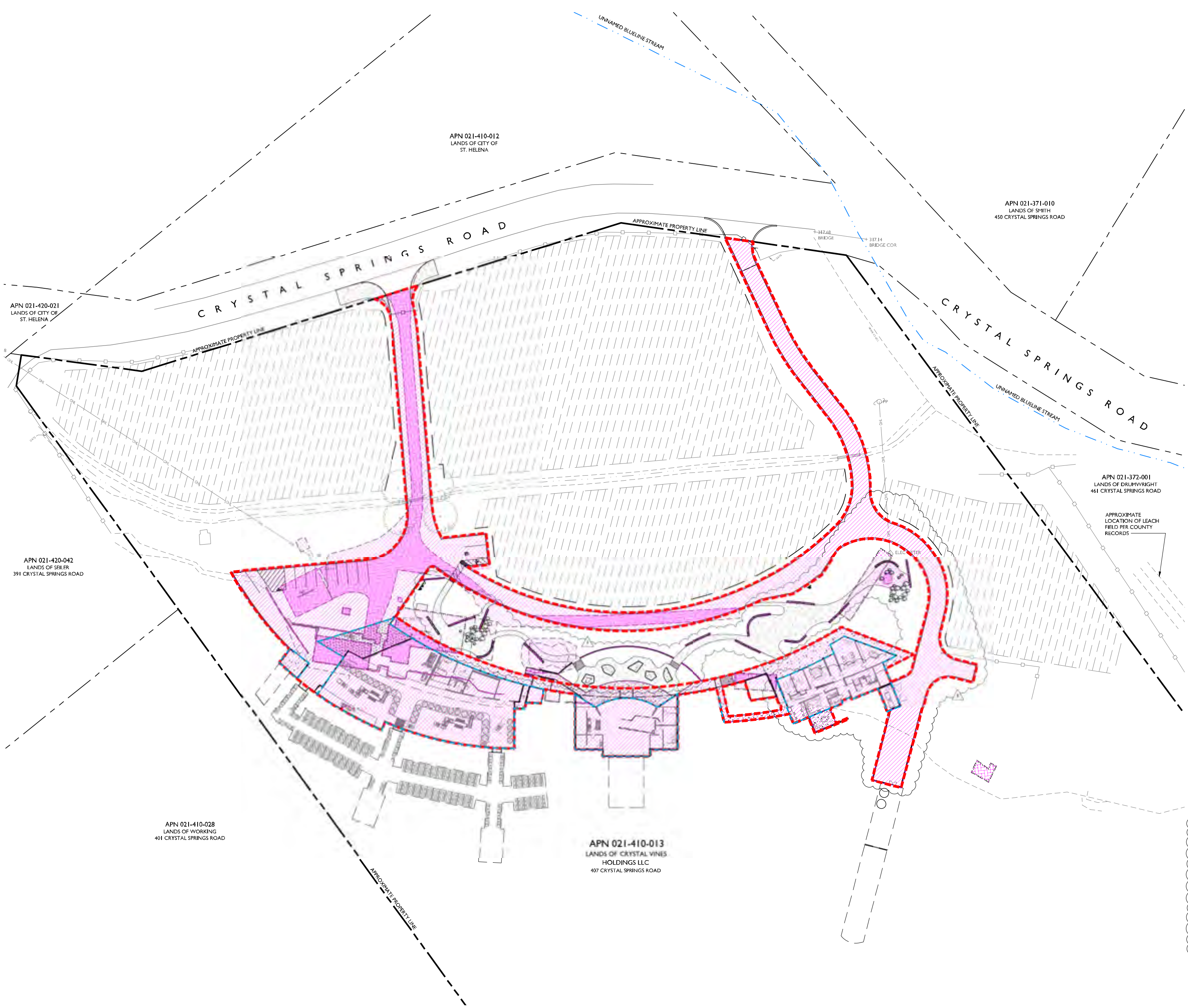


IMPERVIOUS SURFACE EXHIBIT
SCALE: 1" = 40'

## IMPERVIOUS SURFACE SUMMARY

| | PRE-PROJECT AREA (SF) | NEW AREA (SF) | RECONSTRUCTED AREA (SF) A* | RECONSTRUCTED AREA (SF) B** | TOTAL NEW AND RECONSTRUCTED AREA (SF) |
|---|---|---|---|---|---|
| TOTAL AREA OF IMPERVIOUS SURFACE | 17,600 | 50,050 | 12,150 | 5,850 | 62,200 |

*RECONSTRUCTED AREAS (A) ARE EXISTING IMPERVIOUS SURFACES THAT ARE BEING REPLACED WITH NEW IMPERVIOUS SURFACES.

**RECONSTRUCTED AREAS (B) ARE EXISTING IMPERVIOUS SURFACES THAT ARE BEING COMPLETELY REMOVED AND ARE NOT BEING REPLACED WITH NEW IMPERVIOUS SURFACES.

61,100 ± SF — WINERY COVERAGE AREA

21,150 ± SF — WINERY DEVELOPMENT AREA

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT REVIEW NOT FOR CONSTRUCTION

DRAWN BY: PowerCAD LLC

CHECKED BY: MRM

DATE: DECEMBER 4, 2020

| REVISIONS: | BY: |
|---|---|
| 2/28/2020 PERMIT SUBMITTAL | YMS |
| 1 12/4/2020 USE PERMIT RESUBMITTAL | YMS |

JOB NUMBER: 19-123

FILE: 19-123CONC-ISE.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: C5 OF 8

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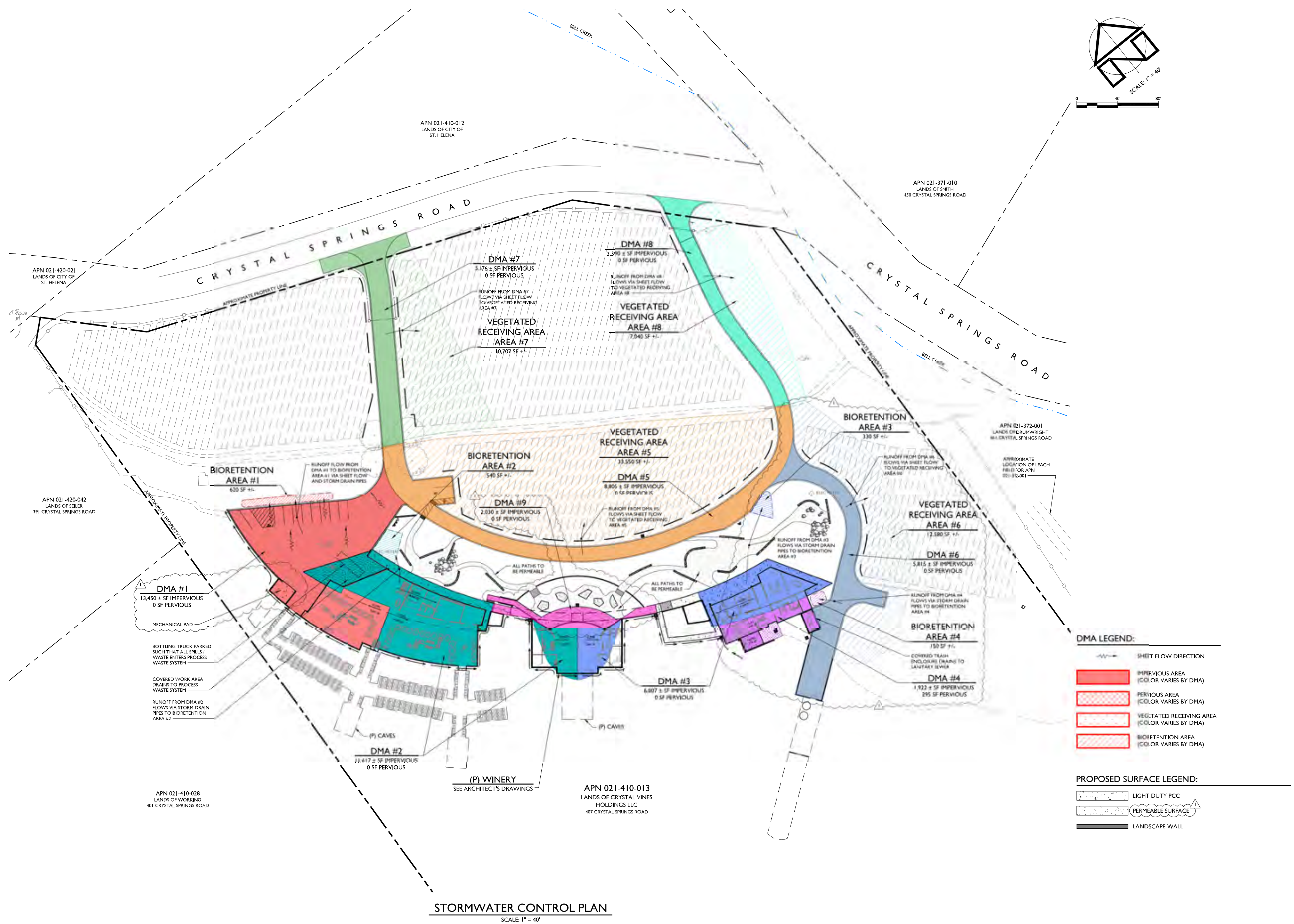


## STORMWATER CONTROL PLAN

SCALE: 1" = 40'

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Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
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VIDA VALIENTE WINERY
WINERY USE PERMIT CONCEPTUAL SITE PLANS
STORMWATER CONTROL PLAN

PREPARED UNDER THE DIRECTION OF:

FOR USE PERMIT REVIEW NOT FOR CONSTRUCTION

| | |
|---|---|
| DRAWN BY: | PowerCAD LLC |
| CHECKED BY: | MRM |
| DATE: | DECEMBER 4, 2020 |
| REVISIONS: | BY: |
| 2/28/2020 PERMIT SUBMITTAL | YMS |
| 12/4/2020 USE PERMIT RESUBMITTAL | YMS |
| JOB NUMBER: | 19-123 |
| FILE: | 19-123CONC-SCP.DWG |
| ORIGINAL SIZE: | 24" X 36" |
| SHEET NUMBER: | C6 OF 8 |

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APPENDIX 2:  Correspondence with LAFCO

## Mike Muelrath

**From:** Freeman, Brendon <bfreeman@napa.lafco.ca.gov>
**Sent:** Wednesday, November 27, 2019 9:21 AM
**To:** Mike Muelrath
**Subject:** RE: Water Service at 407 Crystal Springs Road, Napa County

Good morning Mike,

I am confirming the proposed public water system at 407 Crystal Springs Road, St. Helena, Napa County, CA (APN 021-410-013) is located outside the jurisdictional boundaries and spheres of influence of all cities and special districts in Napa County that are authorized to provide public water service. The property is located nearly two miles from the nearest city or district that provides public water service – the City of St. Helena – and therefore the City can't provide water service to the subject property under state law.

Pursuant to California Government Code Section 56133, cities and special districts may not extend water service outside their jurisdictional boundaries and spheres of influence unless there exists a documented threat to public health or safety involving the subject property. It is my understanding there is no such threat involving the subject property.

With all of this in mind, there are no public water service options available to the subject property involving a city or special district.

Please let me know if you have any questions or if there's anything else I can provide that may be helpful.

Thank you and have a great Turkey Day!

Brendon Freeman, Executive Officer
Local Agency Formation Commission of Napa County
1030 Seminary Street, Suite B
Napa, California 94559
Office: (707) 259-8645
Mobile: (707) 363-1783
www.napa.lafco.ca.gov
Like Us

---

**From:** Mike Muelrath <mike@appliedcivil.com>
**Sent:** Wednesday, November 27, 2019 6:17 AM
**To:** Freeman, Brendon <bfreeman@napa.lafco.ca.gov>
**Subject:** Water Service at 407 Crystal Springs Road, Napa County

Hi Brendon,

We are working on a public water system application for the property located at 407 Crystal Springs Road, St. Helena, Napa County, CA (APN 021-410-013). As part of the application we will need a note from you relative to this property's ability to connect to an existing public water system.

I look forward to your response and feel free to call with any questions.

Thank you,

Mike

**Applied Civil Engineering Incorporated**
(707) 320-4968 (Telephone)
(707) 320-2395 (Facsimile)
(707) 227-7166 (Mobile)

APPENDIX 3: Budgeting Spreadsheets

## FIVE YEAR BUDGET PROJECTION (Small Community Water System)

INSTRUCTIONS: Yellow-shaded cells are for data entry; all other cells are locked except line item descriptions which can be changed if needed. Years 2 through 5 will be compounded automatically by the inflation factor in Cell G6.

System Name: Vida Valiente Winery Water System

Inflation Factor (%): 3.0

System ID Number: TBD

| LINE | | EXPENSES AND SOURCE OF FUNDS | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| 1 | OPERATIONS AND MAINTENANCE (O&M) EXPENSES | | | | | | |
| 2 | | Salaries and Benefits | 6,240.00 | 6,427.20 | 6,620.02 | 6,818.62 | 7,023.17 |
| 3 | | Contract Operation and Maintenance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | | Power and Other Utilities | 2,500.00 | 2,575.00 | 2,652.25 | 2,731.82 | 2,813.77 |
| 5 | | Fees Regulatory | 674.00 | 694.22 | 715.05 | 736.50 | 758.59 |
| 6 | | Treatment Chemicals | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | | Coliform Monitoring | 240.00 | 247.20 | 254.62 | 262.25 | 270.12 |
| 8 | | Chemical Monitoring | 50.00 | 51.50 | 53.05 | 54.64 | 56.28 |
| 9 | | Transportation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | | Materials, Supplies, and Parts | 500.00 | 515.00 | 530.45 | 546.36 | 562.75 |
| 11 | | Office Supplies | 100.00 | 103.00 | 106.09 | 109.27 | 112.55 |
| 12 | | Miscellaneous | 500.00 | 515.00 | 530.45 | 546.36 | 562.75 |
| 13 | | Additional O&M for New Project | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14 | | Total O&M Expenses: | 10,804.00 | 11,128.12 | 11,461.96 | 11,805.82 | 12,160.00 |
| 16 | GENERAL AND ADMINISTRATIVE EXPENSES | | | | | | |
| 17 | | Engineering and Professional Services | 680.00 | 700.40 | 721.41 | 743.05 | 765.35 |
| 18 | | Depreciation and Amortization | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 19 | | Insurance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | | Existing Contribution to CIP (From CIP J48) | 7,681.25 | 7,681.25 | 7,681.25 | 7,681.25 | 7,681.25 |
| 21 | | O&M Reserve | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 22 | | Other Reserves | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23 | | Miscellaneous | 100.00 | 103.00 | 106.09 | 109.27 | 112.55 |
| 24 | ** | New Funding Project Costs | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 25 | | Additional New Project Contribution to CIP (From CIP J59) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 26 | ** | Debt Service | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 27 | | Total General and Administrative Expenses: | 8,461.25 | 8,484.65 | 8,508.75 | 8,533.58 | 8,559.15 |
| 28 | | TOTAL EXPENSES (Line 14+ Line 27): | 19,265.25 | 19,612.77 | 19,970.72 | 20,339.40 | 20,719.14 |
| 30 | REVENUES RECEIVED | | | | | | |
| 31 | | Cash Revenues (Water Rates) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 32 | ** | Depreciation Reserves | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33 | ** | Fees and Services | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 34 | ** | Hookup Charges | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 35 | ** | Withdrawal from CIP or Other Reserves | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 36 | ** | Other Fund Sources: Interest, Etc. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 37 | ** | Grants | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 38 | ** | SRF Loan | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 39 | ** | Business Loans | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | | TOTAL REVENUE (Lines 31 through 39): | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 41 | | NET LOSS OR GAIN: | -19,265.25 | -19,612.77 | -19,970.72 | -20,339.40 | -20,719.14 |

Report Prepared by (Name and Title): ______________________ Date: __________

(** Inflation factor not applied to future year projections)

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Number of Customers: | 1 | 1 | 1 | 1 | 1 |
| Average Monthly Revenue Needed Per Customer: | 1605.44 | 1634.40 | 1664.23 | 1694.95 | 1726.60 |

(total expenses ÷ # of customers ÷ 12)

# SIMPLIFIED CAPITAL IMPROVEMENT PLAN (CIP)

Date: 2/28/2020
System ID No.: TBD
System Name: Vida Valiente Winery Water System
Service Connections: 1

*Enter information only in YELLOW shaded cells

| QTY | COMPONENT | | | UNIT COST | INSTALLED COST | AVG LIFE, YEARS | ANNUAL RESERVE | MONTHLY RESERVE | MONTHLY RESERVE PER CUSTOMER |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Drilled Well, 6", steel casing | Depth: | 500 | 80 | 40000 | 25 | 1600.00 | 133.33 | 133.33 |
| 0 | Drilled Well, 8", steel casing | Depth: | 0 | 130 | 0 | 25 | 0.00 | 0.00 | 0.00 |
| 0 | Drilled Well, 12", steel casing | Depth: | | 200 | 0 | 25 | 0.00 | 0.00 | 0.00 |
| 1 | Wellhead Electrical Controls | | | 700 | 700 | 25 | 28.00 | 2.33 | 2.33 |
| 0 | Submersible Pump, 20 HP | | | 9000 | 0 | 7 | 0.00 | 0.00 | 0.00 |
| 0 | Submersible Pump, 3 HP | | | 2000 | 0 | 7 | 0.00 | 0.00 | 0.00 |
| 1 | Submersible Pump, 5 HP | | | 3500 | 3500 | 7 | 500.00 | 41.67 | 41.67 |
| 1 | Booster Pump Station, 10 HP, complete | | | 14000 | 14000 | 5 | 2800.00 | 233.33 | 233.33 |
| 1 | Booster Pump Station Electrical Controls | | | 5000 | 5000 | 5 | 1000.00 | 83.33 | 83.33 |
| 0 | Pressure Tank | Gallons: | | 1.5 | 0 | 10 | 0.00 | 0.00 | 0.00 |
| 1 | Pressure Tank | Gallons: | 80 | 1.5 | 120 | 10 | 12.00 | 1.00 | 1.00 |
| 0 | Storage Tank, Plastic | Gallons: | 5000 | 0.5 | 0 | 10 | 0.00 | 0.00 | 0.00 |
| 0 | Storage Tank, Redwood | Gallons: | | 1.3 | 0 | 40 | 0.00 | 0.00 | 0.00 |
| 0 | Storage Tank, Redwood | Gallons: | | 1.3 | 0 | 40 | 0.00 | 0.00 | 0.00 |
| 0 | Storage Tank, Steel | Gallons: | 12,445 | 1.2 | 0 | 50 | 0.00 | 0.00 | 0.00 |
| 0 | Storage Tank, Steel | Gallons: | | 1.2 | 0 | 50 | 0.00 | 0.00 | 0.00 |
| 0 | Storage Tank, Steel | Gallons: | | 1.2 | 0 | 50 | 0.00 | 0.00 | 0.00 |
| 1 | Storage Tank, Concrete | Gallons: | 10000 | 1.5 | 15000 | 80 | 187.50 | 15.63 | 15.63 |
| 3 | Master Meter, 2" | | | 450 | 1350 | 10 | 135.00 | 11.25 | 11.25 |
| 0 | Master Meter, 3" | | | 800 | 0 | 10 | 0.00 | 0.00 | 0.00 |
| 0 | Master Meter, 4" | | | 2500 | 0 | 10 | 0.00 | 0.00 | 0.00 |
| 0 | Hypochlorinator w/ Tank & Pump, Complete | | | 800 | 0 | 10 | 0.00 | 0.00 | 0.00 |
| 0 | Pipe w/ sand bedding, 1" (Enter linear feet for quantity) | | | 20 | 0 | 50 | 0.00 | 0.00 | 0.00 |
| 1000 | Pipe w/ sand bedding, 2" (Enter linear feet for quantity) | | | 25 | 25000 | 50 | 500.00 | 41.67 | 41.67 |
| 0 | Pipe w/ sand bedding, 3" (Enter linear feet for quantity) | | | 30 | 0 | 50 | 0.00 | 0.00 | 0.00 |
| 0 | Pipe w/ sand bedding, 4" (Enter linear feet for quantity) | | | 35 | 0 | 50 | 0.00 | 0.00 | 0.00 |
| 0 | Pipe w/ sand bedding, 6" (Enter linear feet for quantity) | | | 50 | 0 | 50 | 0.00 | 0.00 | 0.00 |
| 0 | Standpipe Hydrant, 1-1/2" | | | 700 | 0 | 20 | 0.00 | 0.00 | 0.00 |
| 0 | Standpipe Hydrant, 2-1/2" | | | 900 | 0 | 20 | 0.00 | 0.00 | 0.00 |
| 0 | Customer Meter w/ Box & Shutoff, Complete | | | 250 | 0 | 20 | 0.00 | 0.00 | 0.00 |
| 10 | Distribution Valve, 2" | | | 150 | 1500 | 10 | 150.00 | 12.50 | 12.50 |
| 0 | Distribution Valve, 3" | | | 250 | 0 | 10 | 0.00 | 0.00 | 0.00 |
| 0 | Distribution Valve, 4" | | | 600 | 0 | 20 | 0.00 | 0.00 | 0.00 |
| 0 | Distribution Valve, 6" | | | 850 | 0 | 20 | 0.00 | 0.00 | 0.00 |
| 1 | Air & Vacuum Relief Valve, Typical | | | 375 | 375 | 20 | 18.75 | 1.56 | 1.56 |
| 1 | Calcite Filter and Softening | | | 7500 | 7500 | 20 | 375.00 | 31.25 | 31.25 |
| 1 | UV | | | 7500 | 7500 | 20 | 375.00 | 31.25 | 31.25 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| | **SUBTOTAL Existing CIP Costs** | | | | $121,545.00 | | $7,681.25 | $640.10 | $640.10 |
| | | | | | | | | | |
| | **NEW Project CIP Costs** | | | | | | | | |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | OTHER ITEM | | | | 0 | 1 | 0.00 | 0.00 | 0.00 |
| | **SUBTOTAL New Project CIP Costs** | | | | $0.00 | | $0.00 | $0.00 | $0.00 |
| | | | | | | | | | |
| | **TOTAL Existing and New Project CIP:** | | | | $121,545.00 | | $7,681.25 | $640.10 | $640.10 |

Report Prepared by (Title): ______________________________ Date: ______________

NOTE: Installed costs are averages and include all materials and contracted labor and equipment.

NOTES:

APPENDIX 4: Ownership Documents

2019-0016021

Recorded
Official Records
County of
Napa
JOHN TUTEUR
Assessor-Recorder-Co.

11:12AM 16-Aug-2019

REC FEE 21.00
CC1-CONFORMED C 1.00
HOUSING TAX 75.00

JW
Page 1 of 3

**RECORDING REQUESTED BY AND WHEN RECORDED MAIL TO:**

Carle, Mackie, Power & Ross LLP
100 B Street, Suite 400
Santa Rosa, CA 95401
Attn: Phillip Kalsched, Esq.

**MAIL TAX STATEMENTS TO:**

Crystal Vines, LLC
16 Calle Ameno
San Clemente, CA 92672
Attn: Hayes Drumwright

FOR RECORDER'S USE ONLY

APN: 021-410-013

The undersigned grantors declare:

Documentary transfer tax is $NONE – Grantors and grantees are comprised of the same parties and their proportional interest remains the same immediately following transfer, R&T §11925.

This transfer is excluded from reassessment pursuant to §62(a)(2) of the California Revenue and Taxation Code.

## GRANT DEED

FOR VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, Hayes Drumwright, an individual ("**Grantor**"), hereby grants to Crystal Vines, LLC, a California limited liability company, all of its right, title and interest, now or hereafter enjoyed, or held, in and to the following described real property in the County of Napa, State of California:

SEE EXHIBIT "A" ATTACHED HERETO AND MADE A PART HEREOF

*[continued on next page]*

IN WITNESS WHEREOF, Grantor has executed this instrument as of the date hereinafter written.

Dated: 7-31, 2019

Hayes Drumwright

**NOTARY ACKNOWLEDGMENT**

A Notary Public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA )
)
COUNTY OF ORANGE )

On 31st of July, 2019, before me, ANTHONY SCARPONI, Notary Public, personally appeared Hayes Drumwright, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature on the instrument the person(s), or the entity upon behalf of which the person(s), acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

ANTHONY SCARPONI
COMM. # 2120407
NOTARY PUBLIC - CALIFORNIA
ORANGE COUNTY
COMM. EXPIRES AUG. 7, 2019

Notary Public

(SEAL)

SIGNATURE PAGE TO GRANT DEED

END OF DOCUMENT

## EXHIBIT A

PARCEL ONE:

The Northwest quarter of the Northwest quarter of the Northwest quarter of Section 13, Township 8 North, Range 6 West, Mount Diablo Base and Meridian.

Excepting Therefrom, however the following:

(a) That portion thereof included within the County Road as conveyed to the County of Napa by Deed of record in Book 43 of deeds, at page 6, said Napa County Records.

(b) That certain triangular tract in the northwestern corner thereof, described in the Deed to G. Webb Bertram of record in Book 88 of Deeds, at page 572, said Napa County Records.

(c) That portion conveyed to the City of St. Helena in Deed recorded November 20, 1958 in Book 583 at page 356 of Official Records of Napa County.

PARCEL TWO:

The Southwest quarter of the Northwest quarter of the Northwest quarter of Section 13, Township 8 North, Range 6 West, Mount Diablo Base and Meridian.

APN: 021-410-013

# APPENDIX

## LABORATORY ANALYTICAL REPORTS
## BY
## CALTEST ANALYTICAL LABORATORY (JULY 15, 2016)
## &
## ALPHA ANALYTICAL LABORATORIES, INC. (APRIL 24, 2019)

Friday, July 15, 2016

Nick Webster
Doshier-Gregson
5365 Broadway St.
American Canyon, CA 94503

Re Lab Order: R060934 Collected By: BEN WEBSTER
Project ID: CONTINUUIM-407 CRYSTAL SPRINGS PO/Contract #:

Dear Nick Webster:

Enclosed are the analytical results for sample(s) received by the laboratory on Thursday, June 30, 2016. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Enclosures

Project Manager: Eli N. Greenwald



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1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

## SAMPLE SUMMARY

Lab Order: R060934
Project ID: CONTINUUIM-407 CRYSTAL SPRINGS

| Lab ID | Sample ID | Matrix | Date Collected | Date Received |
|---|---|---|---|---|
| **R060934001** | **407 CRYSTAL SPRINGS WELL HEAD** | Water | 06/30/2016 13:20 | 06/30/2016 16:05 |



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## NARRATIVE

Lab Order: R060934
Project ID: CONTINUUIM-407 CRYSTAL SPRINGS

**General Qualifiers and Notes**

Caltest authorizes this report to be reproduced only in its entirety. Results are specific to the sample(s) as submitted and only to the parameter(s) reported.

Caltest certifies that all test results for wastewater and hazardous waste analyses meet all applicable NELAC requirements; all microbiology and drinking water testing meet applicable ELAP requirements, unless stated otherwise.

All analyses performed by EPA Methods or Standard Methods (SM) 20th Edition except where noted (SMOL=online edition).

Caltest collects samples in compliance with 40 CFR, EPA Methods, Cal. Title 22, and Standard Methods.

Dilution Factors (DF) reported greater than '1' have been used to adjust the result, Reporting Limit (RL), and Method Detection Limit (MDL).

All Solid, sludge, and/or biosolids data is reported in Wet Weight, unless otherwise specified.

Filtrations performed at Caltest for dissolved metals (excluding mercury) and/or pH analysis are not performed within the 15 minute holding time as specified by 40CFR 136.3 table II.

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

ND - Non Detect - indicates analytical result has not been detected.

RL - Reporting Limit is the quantitation limit at which the laboratory is able to detect an analyte. An analyte not detected at or above the RL is reported as ND unless otherwise noted or qualified. For analyses pertaining to the State Implementation Plan of the California Toxics Rule, the Caltest Reporting Limit (RL) is equivalent to the Minimum Level (ML). A standard is always run at or below the ML. Where Reporting Limits are elevated due to dilution, the ML calibration criteria has been met.

J - reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The 'J' flag is equivalent to the DNQ Estimated Concentration flag.

E - indicates an estimated analytical result value.

B - indicates the analyte has been detected in the blank associated with the sample.

NC - means not able to be calculated for RPD or Spike Recoveries.

SS - compound is a Surrogate Spike used per laboratory quality assurance manual.

NOTE: This document represents a complete Analytical Report for the samples referenced herein and should be retained as a permanent record thereof.



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## ANALYTICAL RESULTS

Lab Order: R060934
Project ID: CONTINUUIM-407 CRYSTAL SPRINGS

| | | | | | |
|---|---|---|---|---|---|
| **Lab ID** | **R060934001** | Date Collected | 6/30/2016 13:20 | Matrix | Water |
| **Sample ID** | **407 CRYSTAL SPRINGS WELL HEAD** | Date Received | 6/30/2016 16:05 | | |

| Parameters | Result Units | R. L. | DF | Prepared | Batch | Analyzed | Batch | Qual |
|---|---|---|---|---|---|---|---|---|
| **pH, Electrometric Analysis** | **Analytical Method:** SM 4500-H+ B-00 | | | | | **Analyzed by:** | DR | |
| pH | 7.2 pH Units | | 1 | | | 07/01/16 17:11 | BIO 16654 | |
| **Calculation, Hardness** | **Analytical Method:** Calculation | | | | | **Analyzed by:** | LM | |
| Hardness Calculation | 28 mg/L | 0.5 | 1 | | | 07/13/16 13:33 | CALC | |
| **Calculation, Sodium Adsorption Ratio** | **Analytical Method:** Calculation | | | | | **Analyzed by:** | LM | |
| Sodium Adsorption Ratio | 0.74 units | | 1 | | | 07/13/16 13:33 | CALC | |
| **Calculation, Total Anions** | **Analytical Method:** Calculation | | | | | **Analyzed by:** | DR | |
| Total Anions | 1.1 meq/L | | 1 | | | 06/30/16 22:37 | CALC | |
| **Calculation, Total Cations** | **Analytical Method:** Calculation | | | | | **Analyzed by:** | LM | |
| Total Cations | 0.95 meq/L | | 1 | | | 07/13/16 13:33 | CALC | |
| **Metals by ICPMS, Collision Mode, Total** | **Prep Method:** EPA 200.8 | | **Prep by:** | UKS | | | | |
| | **Analytical Method:** EPA 200.8 | | | | | **Analyzed by:** | LM | |
| Arsenic | ND mg/L | 0.0020 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Boron | ND mg/L | 0.10 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Calcium | 5.5 mg/L | 0.50 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Iron | ND mg/L | 0.10 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Magnesium | 3.5 mg/L | 0.50 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Manganese | ND mg/L | 0.0050 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Silica (as SiO2) | 80 mg/L | 1.0 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Sodium | 9.0 mg/L | 1.0 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| Zinc | ND mg/L | 0.020 | 4 | 07/08/16 00:00 | MPR 14473 | 07/13/16 13:33 | MMS 8085 | |
| **Electrical Conductance Analysis** | **Analytical Method:** SM 2510 B-97 | | | | | **Analyzed by:** | CLM | |
| Conductivity | 110 umhos/cm | 10 | 1 | | | 07/12/16 10:09 | WET 8639 | |
| **Total Dissolved Solids Analysis** | **Analytical Method:** SM 2540 C-97 | | | | | **Analyzed by:** | MN | |
| Total Dissolved Solids | 140 mg/L | 10 | 1 | | | 07/06/16 12:54 | WGR 6143 | |
| **Anions by Ion Chromatography** | **Analytical Method:** EPA 300.0 | | | | | **Analyzed by:** | DR | |
| Nitrogen, Nitrate (as N) | 0.16 mg/L | 0.1 | 1 | | | 06/30/16 22:37 | WIC 5440 | |
| Fluoride | 0.10 mg/L | 0.1 | 1 | | | 06/30/16 22:37 | WIC 5440 | |
| Chloride | 4.8 mg/L | 1 | 1 | | | 06/30/16 22:37 | WIC 5440 | |
| Sulfate (as SO4) | 1.2 mg/L | 0.5 | 1 | | | 06/30/16 22:37 | WIC 5440 | |
| **Alkalinity, Total by Standard Methods** | **Analytical Method:** SM 2320 B-97 | | | | | **Analyzed by:** | CLM | |
| Alkalinity, Total (as CACO3) | 45 mg/L | 10 | 1 | | | 07/01/16 10:54 | WTI 2802 | |
| Bicarbonate (as HCO3) | 55 mg/L | 12 | 1 | | | 07/01/16 10:54 | WTI 2802 | |
| Carbonate (as CO3) | ND mg/L | 6 | 1 | | | 07/01/16 10:54 | WTI 2802 | |
| Hydroxide (as OH) | ND mg/L | 2 | 1 | | | 07/01/16 10:54 | WTI 2802 | |



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# Caltest ANALYTICAL LABORATORY

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## SAMPLE CHAIN OF CUSTODY

LAB ORDER #: R060934

PAGE ____ OF ____

PROJECT # / PROJECT NAME: Continuum - 407 Crystal Springs

P.O. #:

CLIENT: Doshier Gregson

REPORT ATTN:

ADDRESS: 5365 Broadway St CITY: American Canyon STATE: Ca ZIP: 94503

BILLING ADDRESS: "

PHONE #: 707 2269698 FAX PHONE: 707 226 1648 SAMPLER (PRINT & SIGN NAME): Ben Webster

ANALYSES REQUESTED: Irrig Pkg per Ben W. / General Mineral / Lead / Arsenic / Silica / Boron (initialed 6/30/16)

TURN-AROUND TIME: ☐ STANDARD ☐ RUSH

DUE DATE: ____

| CALTEST # | DATE SAMPLED | TIME SAMPLED | MATRIX | CONTAINER AMOUNT/TYPE | PRESERVATIVE | SAMPLE IDENTIFICATION SITE | CLIENT LAB # | COMP. or GRAB | Irrig Pkg per Ben W. | General Mineral | Lead | Arsenic | Silica | Boron | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6/30/16 | 13:20 | | | | 407 Crystal Springs Well Head | | | X | X | X | X | X | X | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |

By submittal of sample(s), client agrees to abide by the Terms and Conditions set forth on the reverse of this document.

| RELINQUISHED BY | DATE/TIME | RECEIVED BY | RELINQUISHED BY | DATE/TIME | RECEIVED BY |
|---|---|---|---|---|---|
| Ben Webster | 6/30/16 16:05 | [signature] | | | |
| | | | | | |

**FOR LAB USE ONLY**

Samples: WC____ MICRO____ BIO____ MET____ SV____ VOA____ TEMP:____ °C SEALED: Y__ / N__ INTACT: Y__ / N__

BD: BIO____ WC____ MET____

CC: AA____ SV____ VOA____

SIL: HP____ PT____ QT____ VOA____

W/HNO$_3$____ H$_2$SO$_4$____ NaOH____

PIL: HNO$_3$____ H$_2$SO$_4$____ NaOH____ HCL____

COMMENTS

**MATRIX:** W = Aqueous Nondrinking Water, Digested Metals; ML = Low R.L.s, Aqueous Nondrinking Water, Digested Metals; DW = Drinking Water; SL = Soil, Sludge, Solid; FP = Free Product

**CONTAINER TYPES:** AL = Amber Liter; AHL = 500 ml Amber; PT = Pint (Plastic); QT=Quart (Plastic); HG = Half Gallon (Plastic); SJ = Soil Jar; B4 = 4 oz. BACT; BT = Brass Tube; VOA = 40 mL.VOA; OTC = Other Type Container

alpha
Alpha Analytical Laboratories, Inc. email: clientservices@alpha-labs.com
Corporate: 208 Mason Street | Ukiah, CA 95482 | T: 707-468-0401 | F: 707-468-5267 | ELAP# 1551

24 April 2019

Ray's Well Testing Service
Attn: Ray's Well Testing Service
4853 Vine Hill Rd.
Sebastopol, CA 95472
RE: Water Quality
407 Crystal Springs
Work Order: 19D1645

Enclosed are the results of analyses for samples received by the laboratory on 04/11/19 14:44. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Stephen F. McWeeney
Lab Manager

Alpha Analytical Laboratories, Inc. email: clientservices@alpha-labs.com
Corporate: 208 Mason Street | Ukiah, CA 95482 | T: 707-468-0401 | F: 707-468-5267 | ELAP# 1551

Bay Area: 262 Rickenbacker Circle | Livermore, CA 94551 | T: 925-828-6226 | F: 925-828-6309 | ELAP# 2728
Central Valley: 9090 Union Park Way Suite 113 | Elk Grove, CA 95624 | T: 916-686-5190 | F: 916-686-5192 | ELAP# 2922
North Bay: 110 Liberty Street | Petaluma, CA 94952 | T: 707-769-3128 | F: 707-769-8093 | ELAP# 2303
San Diego Service Center: 2722 Loker Avenue West Suite A | Carlsbad, CA 92010 | T: 760-930-2555 | F: 760-930-2510

| | | | | |
|---|---|---|---|---|
| Ray's Well Testing Service | Project: | Water Quality | | |
| 4853 Vine Hill Rd. | Project #: | 407 Crystal Springs | | Reported: |
| Sebastopol CA, 95472 | Project Mgr: | Ray's Well Testing Service | | 04/24/19 07:00 |

## Analytical Report for Samples

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| Raw Well | 19D1645-01 | Water | 04/10/19 18:00 | 04/11/19 14:44 |

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Alpha Analytical Laboratories, Inc. email: clientservices@alpha-labs.com
Corporate: 208 Mason Street | Ukiah, CA 95482 | T: 707-468-0401 | F: 707-468-5267 | ELAP# 1551

| | | | |
|---|---|---|---|
| Sample Name: | Raw Well | Report Date: | 04/24/19 07:00 |
| Laboratory ID: | 19D1645-01 | Sample Date: | 04/10/19 18:00 |
| Notes: | | Sample Received: | 04/11/19 14:44 |

## General Mineral and Physical

| Parameter | Result | MCL | Reporting Limit | Units | Test Method | Notes |
|---|---|---|---|---|---|---|
| Calcium | 5.8 | | 0.10 | mg/L | EPA 200.7 | |
| Magnesium | 3.4 | | 0.10 | mg/L | EPA 200.7 | |
| Sodium | 8.9 | | 0.20 | mg/L | EPA 200.7 | |
| Sulfate as SO4 | 1.7 | * | 0.50 | mg/L | EPA 300.0 | |
| Chloride | 4.4 | * | 0.50 | mg/L | EPA 300.0 | |
| Total Alkalinity as CaCO3 | 44 | | 5.0 | mg/L | SM2320B | |
| Bicarbonate Alkalinity as CaCO3 | 44 | | 5.0 | mg/L | SM2320B | |
| Carbonate Alkalinity as CaCO3 | <5.0 | | 5.0 | mg/L | SM2320B | |
| Hydroxide Alkalinity as CaCO3 | <5.0 | | 5.0 | mg/L | SM2320B | |
| Hardness, Total | 29 | | 1 | mg/L | SM2340B | |
| Total Dissolved Solids | 76 | * | 10 | mg/L | SM2510B | |

## Inorganic Chemicals

| Parameter | Result | MCL | Reporting Limit | Units | Test Method | Notes |
|---|---|---|---|---|---|---|
| Zinc | <50 | 5000 | 50 | ug/L | EPA 200.7 | |
| Arsenic | <2.0 | 10 | 2.0 | ug/L | EPA 200.8 | |

## Inorganic: Additional Analyses

| Parameter | Result | MCL | Reporting Limit | Units | Test Method | Notes |
|---|---|---|---|---|---|---|
| Boron | <0.10 | | 0.10 | mg/L | EPA 200.7 | |
| Sodium Adsorption Ratio | 0.72 | | | NA | SAR | |

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

## Notes and Definitions

| | |
|---|---|
| QM-01 | The spike recovery for this QC sample is outside of established control limits possibly due to a sample matrix interference. |
| MCL | Maximum Contaminant Level, the highest level of a contaminant that is allowed in drinking water regulated by the state of California. If no MCL is listed, the MCL has not been established. |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| * | Tiered Maximum Contaminant and/or Action Levels: Sulfate and Chloride 250-500-600 mg/L, Specific Conductance 900-1600-2200 umho/cm, TDS 500-1000-1500 mg/L. |

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

# Report of Mineral Analysis

DATE: 4/10/19

CUSTOMER NAME: Barbour Vineyards c/o Luke McMullen

PROPERTY ADDRESS: 407 Crystal Springs Rd, St. Helena CA 94574

| PARAMETER | RESULT | | RECOMMENDED RANGES |
|---|---|---|---|
| | Raw | | |
| PH | 6.37 | | < 7 Increasingly acidic - may be corrosive<br>6.8 to 8.5 - Recommended Range<br>>7 Increasingly basic |
| TOTAL HARDNESS | 1.7 gpg | | < 1 gpg Soft<br>1 to 3.5 gpg Slightly Hard<br>3.5 to 7 gpg Moderately Hard<br>7 to 10.5 gpg Hard<br>> 10.5 gpg Very Hard |
| TOTAL IRON | 0.22 mg/l | | 0.3 mg/l - SMCL |
| TOTAL MANGANESE | ND | | 0.05 mg/l - SMCL |
| CONDUCTIVITY | 105.1 us/cm | | 900 us/cm - Recommended Upper Limit<br>1600 us/cm - SMCL |
| NITRATES | ND | | 45 mg/l - MCL (tested as N03) |
| SILICA | 93 mg/l | | *There is no EPA recommended Limit |
| | | | |
| VISUAL APPEARANCE | Clear | | |

*Silica is increasingly reported as a nuisance at levels above 50 mg/l. 30 mg/l to 70 mg/l is common for the region.

Abbreviations:
gpg = grains per gallon
mg/l = milligrams per liter
us/cm = microseimens/centimeter
< = less than
> = greater than

MCL = Primary maximum contaminant level as set by the EPA
SMCL = Secondary maximum contaminant level as set by the EPA
NT = not tested
ND = not detected

**IMPORTANT INFORMATION ON THE LIMITATIONS OF THIS REPORT:**
The purpose of this report is to provide information regarding the general mineralogical character of a water supply. Unless specifically noted, this report does not include analysis for bacteria or any other health related contaminants. This analysis alone is therefore not suitable for determining the safety of a drinking water supply. This report is intended for the sole and exclusive use of our client named above. Our liability for error or omissions is expressly limited to the amount paid for the analysis.

# ADDENDUM MEMORANDUM

October 4, 2022

To: Mr. Hayes Drumwright
16 Calle Ameno
San Clemente, California 92672
Sent via email (hayesdrumwright@gmail.com)

Cc: Mr. Sam Kaplan (samkaplan.slk@gmail.com)
Ms. Donna Oldford (dboldford@aol.com)
Mr. Mike Muelrath (mike@appliedcivil.com)

Job No. 669-NPA02

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

Re: Addendum to Tier 1 and Tier 2 Water Availability Analyses
Vida Valiente Winery
407 Crystal Spring Road
Vicinity St. Helena, Napa County, California
Napa County APN 021-410-013

Ref: Results of Napa County Tier 1 and Tier 2 Water Availability Analyses
Vida Valiente Winery
Dated March 5, 2021

## Introduction

This Addendum Memorandum presents additional information requested by Napa County Planning, Building & Environmental Services (PBES) for the proposed new winery project for the Vida Valiente property (subject property) in Napa County, California. Napa County PBES reviewed the referenced RCS 2021 WAA, and requested additional Tier 3 analyses associated with Bell Creek, a nearby Creek in the Vicinity of the subject property. As stated in the PBES letter:

> *"Upon further review of the submitted WAA, proposed well site location, and Biological Resource Assessment, Staff notes the following; Bell Creek is an identified Blue Line Stream and surveys have identified Steelhead in the creek below Bell Canyon Reserve. This qualifies the Bell Creek as Surface Waters under the definition provided in the County of Napa Water Availability Analysis. Based on Staff's measurement the proposed well location is approximately 960 feet from Bell Creek. If they are maintained, RCS proposed pumping rates of 3.7 gpm to 8.4 gpm would keep the proposed well within the WAA Guideline's Tier 3 screening criteria*

**ADDENDUM MEMORANDUM**

*of a very low pumping capacity well and thus further analysis is not required. Staff makes the following request;*

*RCS or the applicant provide language, for Staff to consider, to condition and/or mitigate the project to not exceed a pumping rate of 10 gpm, to provide for regular reporting, and to implement the recommendations of item #11 in the submitted WAA 'Key Conclusions and Recommendations' section.*

*If the applicant intends to utilize the proposed well above 10 gpm, further analysis of the project's impact to surface waters and groundwater given the distance to Bell Creek would be required in the WAA."*

The WAA (RCS, 2021) considered a proposed new well that was not yet constructed at the time the WAA was prepared. Since the issuance of the PBES letter, the "New Well" was constructed and tested at roughly the same location the "Proposed Well" was shown in the WAA (RCS, 2021). Based on the results of pumping tests at the New Well (described below), this well will be utilized at rates greater than 10 gpm. Hence, the purpose of this Addendum Memorandum is to provide additional information with respect to the New Well as it is proposed to be used for the project, and to address the comments from PBES. This includes analysis of potential Tier 2 and Tier 3 impacts associated with pumping the New Well at rates higher than 10 gpm.

Figure 1, "Well Location Map," was adapted from the Figure 1 shown in the WAA (RCS, 2021). Figure 1 shows the boundary of the subject property superimposed on a USGS topographic map of the area. Also shown on Figure 1 is the location of the Existing Well (the well that existed at the property when the RCS, 2021 WAA was completed), the location of the recently constructed well (labeled as "New Well"), and the approximate locations of some nearby offsite wells owned by others. Figure 1 now also shows the alignment of Bell Creek in the vicinity of the subject property. 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 that was obtained via the ArcGIS Pro software package.

## New Well Construction Details and Pumping Test Data

In January and February of 2022, Huckfeldt Well Drilling, Inc (Huckfeldt) of Napa, California completed construction of the New Well at the location shown on Figure 2. The New Well is located approximately 51 ft southwest of the Existing Well. A copy of the driller's log for the New Well is appended to this Addendum. Table 1, "Summary of Well Construction and Yield Data," provides a tabulation of key well construction data and pumping data for the New Well.

### *New Well Construction Data*

Based on data listed on the available driller's logs, key well construction data for the two wells listed on Table 1 include:

- The New Well was drilled and constructed by Huckfeldt of Napa, California from January 11 to February 28, 2022 using the direct mud rotary drilling method.
- A pilot hole (the borehole drilled before the well casing was placed downwell) was drilled to 695 ft below ground surface (bgs) in the New Well.
- Construction of the new well consists of 8-inch nominal diameter PVC well casing, with a total casing depth of 690 ft bgs.

**ADDENDUM MEMORANDUM**

- Casing perforations are reported as mill- or factory-cut slots with an opening width of 0.032 in (32-slot). Perforation depth intervals were reported to be the following: 160 ft to 300 ft bgs; 340 ft to 480 ft bgs; 500 ft to 610 ft bgs; and 650 ft to 670 ft bgs.
- The driller's log for the New Well lists the gravel pack type as #6 sand and the gravel pack depth interval of the well as 87 ft to 690 ft bgs.
- The New Well was constructed with a cement sanitary seal to a depth of 87 ft bgs.

*Pumping Test Data for New Well*

On July 13, 2022, an 8-hour constant rate pumping test of the New Well was performed by Ray's Well Testing Service (RWTS) of Sebastopol, California. Testing of the well was performed using a temporary pump. A totalizer was installed prior to pumping tests, and the pumper also verified flowrate using a container and a stopwatch. That temporary pump was reported by RWTS to be a 10-horsepower, 460-volt, and 75 GPM capacity pump installed to a depth of approximately 607 ft bgs. Water levels and pumping rates were measured and recorded by RWTS. Water level measurements in the New Well (the pumping well) were also recorded automatically during the constant rate pumping test using a water level pressure transducer. That device was programmed by RCS geologists and installed by RWTS staff for use during the pumping test. In addition to the water levels that were recorded in the New Well, additional water levels were also manually recorded in the Existing Well (used as an observation well) during the pumping test. The existing well is located 51 ft from the New Well. Figure 3, "Water Levels During Constant Rate Pumping Test, New Well," illustrates the water level changes in these two onsite wells prior to, during, and following the 8-hour pumping test period. Key data derived from this July 2022 pumping test, and shown on Figure 3, include:

- A SWL of 61.5 ft below ground surface (bgs) was manually measured in the New Well immediately prior to activation of the well pump. This manual measurement was later used to calibrate the transducer-recorded water level data. The manual and transducer measurements made in the New Well closely agreed with each other throughout the test period.
- A SWL of 59.0 ft bgs was manually recorded in the observation well (the Existing Well) immediately prior to activation of the temporary pump in the New Well.
- A final pumping water level (PWL) of 79.3 ft bgs was measured at the end of the 24-hour pumping period in the New Well; this represents a water level drawdown of 17.8 ft at the end of the test. The transducer-recorded data show that after the initial water level drawdown in the earlier portion of the test, water levels continued to gradually decline. Near the halfway point of the pumping period the transducer, as well as manual measurements, show a rise in PWLs that is likely related to a pump adjustment. Specifically, PWLs increased by 0.8 ft in that instant. Over the last 3 hours of the pumping test PWLs dropped by 0.5 ft. Note that the PWL at the end of the test was about 530 ft above the reported pump intake depth in the New Well.
- The final water level measured in the Existing Well (the observation well) at the end of the 24-hour pumping period was 64.8 ft bgs. Hence, 5.8 ft of water level drawdown was induced in the observation well by virtue of pumping of the New Well during its pumping test.

**ADDENDUM MEMORANDUM**

- Based on the totalizer flow meter readings, an average pumping rate of 50.4 gpm was calculated for the 8-hour test of the New Well. Based on this average pumping rate and the total water drawdown of 17.8 ft, the specific capacity of New Well is calculated to be 2.8 gpm/ft of drawdown (ddn) at the time of this July 2022 pumping test. This specific capacity value is more than twice the specific capacity value derived from a September 2017 pumping test in the Existing Well (RCS, 2021).
- Following the end of the pumping test, water levels in the New Well recovered to a depth of 61.6 ft bgs (99.4% recovery) after a period of approximately 8 hours of non-pumping. Hence, the New Well recovered nearly completely following the 8-hour recovery period.

*Proposed Pumping Rates to Meet Project Demands*

As stated in the RCS-prepared WAA for the project (RCS, 2021), the project civil engineer, Applied Civil Engineering of Napa, CA (ACE) estimated the annual groundwater demands for the proposed project to be 3.0 acre-feet per year (AF/yr). This water use estimate includes the future demands for the proposed winery, vineyard irrigation, and the residences (once these structures are rebuilt). Water demands for all onsite uses will be met by pumping groundwater from the proposed New Well (i.e., the "project well"), whereas the Existing Well will be used as an emergency redundant backup water supply well for only the existing vineyards and residence.

ACE estimated an average daily water demand of 2,678 gallons and a maximum daily water demand (MDD) of approximately 6,026 gallons[1] for the proposed project. Assuming the New Well was pumped on a 50% operational basis (i.e., 12 hours per day) to meet that average demand and that MDD, then the new well would need to pump at rates of rate of 3.7 gpm and 8.4 gpm, respectively. However, the property owner and vineyard manager may choose to use a shorter pumping period to meet onsite demands. Assuming a much shorter duration operational basis of only 2 hours per day, then the New Well would need to pump at a rate of only about 22 gpm to meet the average demand, and 50 gpm to meet the MDD. As stated above, the New Well was pumped at a rate of 50.4 gpm during the 8-hour constant rate pumping test performed in July 2022, and hence, the New Well is capable of meeting the project demands even with shorter pumping durations and higher pumping rates.

*Calculation of Aquifer Parameters using Pumping Test Data*

Important aquifer parameters such as transmissivity (T) and storativity (S) are required in order to calculate theoretical water level drawdown impacts that might result in nearby wells, caused by the future pumping of the project well. These parameters are typically determined using data collected during a well pumping test. T is a measure of the rate at which groundwater can move through an aquifer system, and therefore is essentially a measure of the potential for an aquifer to transmit water to a pumping well. T is expressed in units of gallons per day per foot of aquifer (gpd/ft). S is a measure of the volume of groundwater taken into or released from storage in an aquifer for a given volume of aquifer materials; S is dimensionless and has no units. S calculations can only be made using actual measurements of water level drawdown monitored in an observation well during a pumping test of another well; S cannot be calculated using water level drawdown data acquired solely from the pumping well.

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[1] Calculated using a peaking factor of 2.25 per California Waterworks Standards Section 64554b.3.(C).

**ADDENDUM MEMORANDUM**

The water level drawdown data and water level recovery data collected from the New Well during the recent July 2022 constant rate pumping test were input into the software program AQTESOLV (version 4.5 Professional). Water level data collected from the Existing Well while pumping the New Well in July 2022 were used to calculate a value for S. Note that the same analysis was performed in the RCS 2021 WAA to determine aquifer parameters, but no observation well data were available for the prior tests.

Numerous analytical solutions were applied to the New Well pumping test data and the Existing Well observation data using the software in an attempt to determine transmissivity values using an automatic curve fitting procedure. The solutions utilized consisted of unconfined, confined, semi-confined, and/or fractured aquifer solutions; several variations of these solutions were evaluated by RCS. For this type of analysis, certain assumptions are made about the aquifer when applying these solutions. In general, for the solutions listed below, key assumptions for use include: that the aquifer has an infinite areal (lateral) extent; that the aquifer is isotropic (the same hydraulic properties in all directions); that the pumping well fully and/or partially penetrates the aquifer system(s); and that groundwater is instantaneously released from storage with the decline of hydraulic head. Also, for the purposes of this evaluation, the assumption is made that the saturated aquifer thickness in the vicinity of the onsite wells was approximately 630 ft on the date of the pumping test. This saturated aquifer thickness was determined by calculating the vertical distance between the static water level in the New Well (approximately 60 ft below the well head reference point [ft brp] on July 13, 2022) and the bottom of the well casing in the New Well (at a depth of approximately 690 ft bgs; see Table 1). In reality, the thickness of the saturated volcanic materials beneath this location on the property is likely greater.

Listed below are two of the curve-fitting solutions used and the resulting T and S values that were calculated; a plot of the water level data and fitted-curve are attached to this Addendum for reference. Only two solutions are presented here because they represented a reasonable curve-fit to the available data.

- Hantush (1960) Leaky Confined with Aquitard Storage - A T value of approximately 3,705 gpd/ft and a S 5.2 x $10^{-4}$ was calculated for these data. Curve-fitting for this solution was a very good match for the water level data for both the pumping well and the observation well.
- Theis (1935) Unconfined – A T value of approximately 4,360 gpd/ft and a S of 1.3 x $10^{-3}$ is calculated for these data. It should be noted that the Theis confined solution (not shown herein) produced similar results.

T values determined from the July 2022 aquifer test of the New Well using AQTESOLV are higher than the T value estimates calculated for the Existing Well, as presented in the RCS WAA (2021). This is likely because the New Well is constructed deeper than the existing well. Also, prior estimates relied on data from the pumping well only, and no observation well was available for the prior test.

## Tier 2 – Review of Possible Well Interference

As shown on Figures 1 and 2, the "Neighbor Well" is located approximately 257 ft to the northwest of the proposed New Well. Using the data and subsequent analyses of the July 2022 pumping test described above, estimates of the theoretical amount of potential water level drawdown interference caused on the neighboring well by virtue of pumping the New Well can be calculated.

**ADDENDUM MEMORANDUM**

To calculate the theoretical amount of water level drawdown interference that might possibly be induced in the offsite Neighbor Well by the future pumping of the New Well, and to help satisfy requirements of the County's Tier 2 WAA, RCS used the AQTESOLV software to perform a predictive simulation (or "forward simulation") of the potential (theoretical) water level drawdowns that might occur in the region due to future pumping by the proposed New Well. Below is a list of the inputs/assumptions used as part of our theoretical drawdown calculations:

- Neighbor Well Construction Assumptions – As part of the driller's log research described above, RCS obtained Well Completion Report No. 0901145. Based on the APN reported on the log, it is assumed that this WCR represents the one for the Neighbor Well. As shown thereon, the Neighbor Well has the following construction details:
    - A borehole diameter of 14 inches.
    - PVC well casing of 8 inches in diameter.
    - Perforations between the depths of 140 ft and 435 ft bgs.
- Inherent Theis Assumptions – For the subject simulations, RCS used the Hantush Leaky Confined with Aquitard Storage solution in the AQTESOLV software. Again, the Theis (1935)/Hantush (1961) solution assumes numerous conditions about the aquifer system, including that the aquifer is homogeneous and isotropic (hydraulically the same in all directions) and that the aquifer is of infinite areal extent. Note that, of the aquifer parameters derived from the two different curve-fitting solutions presented above, the Theis (1935)/Hantush (1961) solution estimated greater drawdown in the offsite wells, and therefore was used for these analyses to present a more conservative analysis.
- Well Penetration – For the purposes of the simulation, the New Well was assumed to be a "fully penetrating" well; the existing well and the Neighbor Well were assumed to be "partially penetrating". AQTESOLV documentation states that "the screens of a fully penetrating well extend over the entire aquifer's saturated thickness". This assumption is made because the New Well is deeper than both the Existing Well and the Neighbor Well.
- Aquifer Thickness – The thickness of the saturated Sonoma Volcanic fractured rock aquifer system near the Existing/Proposed New Well is estimated to be approximately 630 ft. This represents the vertical distance from the SWL in the New Well (about 60 ft brp on July 13, 2022), and the 690-foot depth to the bottom of perforations in the New Well.
- Transmissivity and Storativity – As stated above, a value for transmissivity (T) of 3,705 gpd/ft and a value of storativity (S) of $5.2 \times 10^{-4}$ (a dimensionless value) were derived from analysis of the July 2022 pumping test.

Using the aquifer data derived from the July 13, 2022 aquifer test, Figure 4, "Theoretical Drawdown Calculations, Predictive Simulation" has been prepared to show the theoretically-calculated water level drawdown values in the Neighbor Well that might occur after pumping the New Well for a continuous period of 8 hours at a constant pumping rate of 50.4 gpm (the rate at which the pumping test was performed); calculated water level drawdown values for the Existing Well are also shown. Also noted on Figure 4 are the water level drawdown values that might occur in the Neighbor Well when the New Well is pumped at a rate of 50.4 gpm for 2 hours (the actual duration necessary to meet the MDD of the subject property).

In this scenario, the offsite water level observation well (the Neighbor Well) is assumed to be not pumping during the New Well pumping period. As shown on Figure 4, the results of the predictive simulation for theoretical water level drawdown values during future pumping of the New Well show that water interference declines in the Neighbor Well are expected to be less than 1 foot after 2 hours of pumping at the New Well, and less than 2 ft after 8 hours of pumping at the New Well.

The calculated theoretical water level drawdown interference values for the Neighbor Well of <2 ft (8-hours of pumping) and <1 ft (2 hours of pumping) are considerably less than the acceptable values 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 show that water level drawdown interference is not considered significant by the County if the induced drawdown interference is less than 15 ft for offsite wells that have a casing diameter greater than six inches (the casing diameter of the Neighbor Well is eight inches).

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

Recently, Napa County has published information defining which Rivers, Streams, and Creeks within the County are considered "significant" for the purposes of Tier 3 Analysis. These "Significant Streams," as defined by Napa County, are shown 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". These two layers were used by RCS to determine if there were any streams of significance on the subject property, and if any of the project wells were 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 stream, creek, or river, then a Tier 3 WAA is required.

As shown on Figure 1, Bell Creek is shown to traverse the northeast corner[2] of subject property, and is approximately 300 ft from both the New Well and the Existing Well. Based on the elevation contours on the topographic map, when surface water runoff flow does exist in the channel, Bell Creek flows to the southeast. North of the subject property, two branches of Bell Creek are shown to originate from Bell Canyon Reservoir. These two branches join to form a single creek channel just north of Crystal Springs Road, where the Creek flows under a bridge, and then along the eastern side of the subject property. Figure 2 also shows the creek superimposed on an aerial photograph.

### *Bell Creek Flow Observations*

RCS was able to recover only limited information related to historic surface water flows in Bell Creek. In a document titled "Central Napa River Watershed Project, Salmonid Habitat Form and

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[2] It should be noted that the Bell Creek alignment from the County GIS data does not quite match the location of the creek on the Figure 1 topographic map, or the Figure 2 aerial photograph. In reality, Bell Creek is not found within the boundaries of the subject property.

**ADDENDUM MEMORANDUM**

Function" (NCRCD, 2005), the statement is made that "Surface flow in Bell Creek above Canon Creek [in the vicinity of the subject property] appears to be largely regulated by water releases from Bell Reservoir". Surveys of Bell Creek by NCRCD showed "a relatively constant release throughout the [September 2003 through November 2004] study period," and that in "November 2003 and November 2004… [Bell Creek] had no surface flow present". (NCRCD, 2005).

During a site visit to the property on June 2, 2020, an RCS geologist noted that Bell Creek was observed to be flowing in the portion of the Creek north of the subject property (north of Crystal Springs Road). Later, on July 13, 2022, the pumper from RWTS who was operating the New Well for the Tier 2 WAA aquifer test noted that Bell Creek was flowing at the bridge over Bell Creek at Crystal Springs road; the location of that observation is shown on Figure 2.

In Section 6, "Groundwater and Surface Water Conditions", of the Napa Valley Subbasin Groundwater Sustainability Plan (LSCE, 2022), hydraulic connection of groundwater and creeks within the County, as simulated by computer modeling, is discussed. Figure 6-123b shows the "average annual hydraulic connection" of creeks, including Bell Creek (LSCE, 2022). This modeling is limited to only the Napa Valley Groundwater Subbasin, and therefore does not extend along Bell Creek as far as the subject property. However, the portion of Bell Creek within the Napa Subbasin is shown as "> 2 weeks - 13 weeks" of annual hydraulic connectivity (LSCE, 2022). As stated by LSCE, this limited period of connection suggests that any hydraulic connection likely does not extend beyond the wet season (LSCE, 2022). Further, because the mapping does not extend further up Bell Creek than the Subbasin boundary, it is possible that hydraulic connection, if any, is limited even further than the modeling suggests for areas within the Subbasin.

*Hydrogeology and Cross Sections*

To help illustrate the relationships between the onsite wells, water levels in those wells, and Bell Creek, two geologic cross sections were prepared by RCS for the subject property. Figure 5, "Geology Map," is the same geology map shown in the RCS-prepared WAA (RCS, 2021); the map has been updated with the "Significant Stream" information published by Napa County (2022). Review of the geologic map shows that the subject property is underlain primarily by the various volcanic flow rocks and ash-flow tuffs assigned to the Sonoma Volcanics. The remainder of the subject property, consisting of roughly the northeastern half of the property, is underlain by alluvium. Based on map patterns and subsurface geologic data reviewed by RCS, the thickness of the alluvium is likely limited to 50 ft or less; refer to the RCS 2021 WAA for a more detailed discussion of the site hydrogeology.

Figure 5 shows the alignments of the two geologic cross sections created by RCS for the purposes of this Tier 3 analysis. The cross sections are shown on Figure 6, "Cross Section A-A'" and Figure 7, "Cross Section B-B'". The alignments of the two cross sections were chosen to intersect the New Well and the Existing Well, as well as the two branches of Bell Creek nearest the two onsite wells. Both cross sections are scaled drawings, and they show the interpreted geologic conditions beneath the property, along with key construction data for both the New Well and the Existing Well. In addition, although not located along the cross section lines, data for the Neighbor Well are projected onto both cross sections. Recall from the RCS WAA (2021) that the construction details of the Existing Well were uncertain, and therefore, no perforation intervals are shown for the Existing Well, and the cement sanitary seal shown for the well is queried. The cross sections are notated with the surface features intercepted by each cross section, including Bell Creek (both branches) and the subject property lines.

For both the Existing Well and New Well, two water level depths for each well are shown on the cross sections. The blue-colored water level is the depth of the non-pumping static water level collected in each well before pumping for the July 13, 2022 New Well aquifer test began. The red-colored water levels represent the water level measured in both wells just before the cessation of pumping in the New Well on July 13, 2022.

Notable on the cross sections is that each well depicted has a cement sanitary seal that is as deep as, or deeper, that the interpreted bottom-depth of the quaternary alluvium in the area, the same alluvium across which both branches of Bell Creek flows. These cement seals prevent surficial water (if any) from entering the upper portions of these wells. In addition, the shallowest perforations in the New Well re at a depth of 160 ft bgs, and derive water from the volcanic rocks. Hence, groundwater pumped from the New Well originates from the fractures and/or pore spaces in the volcanic earth materials at and below the depth of the upper perforation in the well..

Water level elevations shown on Figures 6 and 7 for both the Existing Well and the New Well are on the order of 60 ft bgs, which are much deeper than the Bell Creek elevation shown onteh cross section. This significant elevation difference between the water level elevations in the wells and the surfaces of the stream channels is significant evidence to support the assertion that the wells are not hydraulically connected to Bell Creek. Also recall that the pumper noted there was water visible in Bell Creek on July 13, 2022, the same day that the water levels depicted on the cross sections were measured. Because the water levels in the onsite wells are much deeper than water surface in Bell Creek, a direct hydraulic connection between the onsite wells and Bell Creek is unlikely.

Based on the data above, and as illustrated on the cross sections, the Existing Well and the New Well are not hydraulically connected to Bell Creek in the vicinity of the subject property. As shown on the Figure F-2 "Decision Tree" in the County's WAA Guidance Document (WAA, 2015), as described in the Guidance Document text, and because the onsite wells are not hydraulically connected to surface waters, the "Groundwater/Surface Water Evaluation is complete."

## Conclusions

- The water level drawdown impact on the Neighboring Well by virtue of pumping the New Well at a rate of ~50 gpm is very small, and well within the allowable amount of water level drawdown impact (15 ft) discussed in the WAA Guidelines (2015). Hence, Tier 2 requirements for use of the New Well at a pumping rate of 50 gpm (and lower rates) have been met.
    - To meet the MDD for the project, the New Well would only need to pump for about 2 hours at a rate of 50 gpm.
    - Pumping the New Well at lower pumping rates for longer durations would reduce the water level interference on the Neighboring Well even further.

**ADDENDUM MEMORANDUM**

- Neither the New Well (the project well) nor the Existing Well (a redundant backup well) are in direct hydraulic connection with Bell Creek, shown on Figures 6 and 7, and therefore meet the Tier 3 WAA requirements. This lack of connection is demonstrated by the following:

    - The New Well has a deep cement seal (87 ft bgs) and perforated intervals that begin at a depth of 160 ft bgs. The Existing Well has a deep cement seal (20 ft bgs). Hence, these wells very likely derive groundwater solely from factures and/or pore spaces within the Sonoma Volcanics that were encountered in the boreholes for the wells.

    - The water levels in the New Well and in the Existing Well are at much lower elevations than the elevation of the thalweg, or bottom, of Bell Creek in the vicinity of the subject property.

    - A pumping contractor noted that there was flow in Bell Creek on July 13, 2022, the same day that the ~60-ft deep water level measurements were collected in both onsite wells. If the onsite wells were in direct connection with Bell Creek, the water levels in the wells should have been at a similar elevation to Bell Creek (only a few feet below ground surface), and not 60 feet below ground surface.

    - Data from an NCRCD (2005) suggest that flows in Bell Creek are largely controlled by released from Bell Canyon Reservoir.

- Because a lack of hydraulic connection has been demonstrated, then according to the WAA Guidance document (WAA, 2015), the Tier 3 analysis has been satisfied.

**ADDENDUM MEMORANDUM**

## References:

Luhdorff & Scalmanini, Consulting Engineers (LSCE). 2022. Napa Valley Subbasin Groundwater Sustainability Plan, Section 6 - "Groundwater and Surface Water Conditions". January 2022

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

Napa County GIS Data, "Significant_Streams_1500ft_Buffer" data layer, ARC GIS Online Data Catalog (https://www.arcgis.com/home/item.html?id=8f3927797b6f490c89a8b07778dfed6f ), July 6, 2022.

Napa County GIS Data, "Significant_Streams" data layer, ARC GIS Online Data Catalog (https://www.arcgis.com/home/item.html?id=3e3a0f5a59f147e1ae99723f8420f096), July 27, 2022.

Napa County Groundwater Sustainability Website (https://www.countyofnapa.org/3074/Groundwater-Sustainability), "Figure 1, Napa County Well Permit Standards: Significant Streams", undated. (https://www.countyofnapa.org/DocumentCenter/View/25902/Figure-1-Significant-Streams-for-Tier-3)

Napa County Resource Conservation District (NCRCD), 2005. "Central Napa River Watershed Project", Prepared for the U.S. Department of Fish and Game. October 5, 2005.

Richard C. Slade & Associates LLC (RCS), 2021. "Results of Napa County Tier 1 and Tier 2 Water Availability Analyses", Vida Valiente Winery, 407 Crystal Spring Road, Vicinity St. Helena, Napa County, California. March 5, 2021.

# Table 1
# Summary of Well Construction and Yield Data
# Vida Valiente Winery

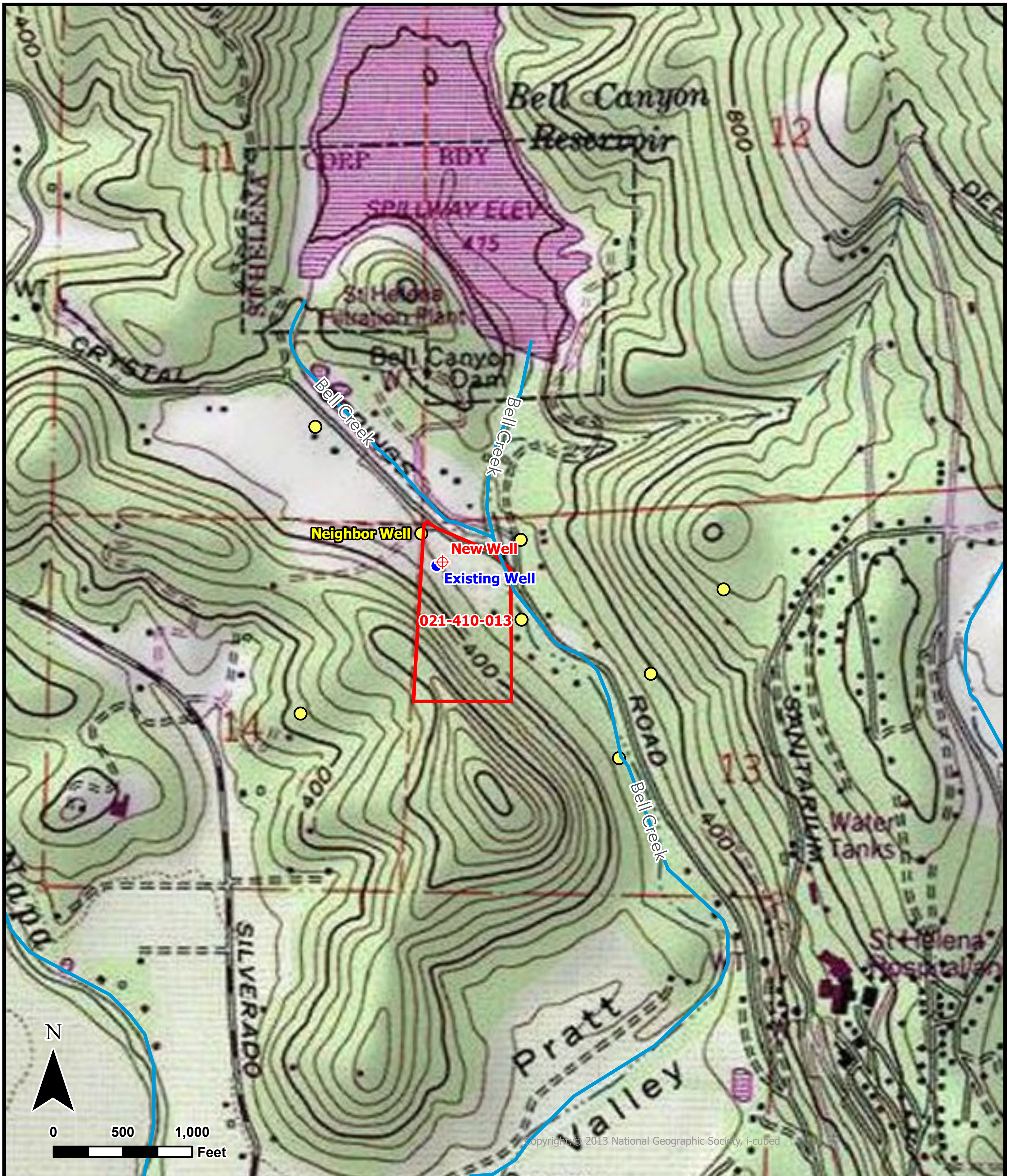
**WELL CONSTRUCTION DETAILS**

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New Well | WCR2022-001984 | 2/8/2022 | Direct Rotary | 695 | 690 | PVC | 8 | 15 | 87 | 160-300, 340-480, 500-610, 650-670 | 0.032 | 87-690, # 6 sand |

**POST-CONSTRUCTION PUMPING DATA**

| Reported Well Designation | Date & Type of Yield Data | Duration of "Test" (hrs) | Estimated Flow Rate (gpm) | Static Water Level (ft bgs) | Pumping Water Level (ft bgs) | Estimated Specific Capaity (gpm/ft ddn) | Reported Pump Depth Setting (ft bgs) |
|---|---|---|---|---|---|---|---|
| New Well | 7/12/22 Pump | 3 | 30 | 59.2 | 70.8 | 2.6 | 607 |
| | | 3 | 60 | | 83.5 | 2.5 | |
| | | 3 | 90 | | 97.8 | 2.3 | |
| | 7/13/22 Pump | 8 | 50 | 61.5 | 79.3 | 2.8 | |

**Notes:**
ND = No data or not listed
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




## LEGEND

- Subject Property
- Well Location
- Existing Water Well
- Significant Streams
- Offsite Water Well (approx)

RCS

# FIGURE 1
# WELL LOCATION MAP

**RCS Job No. 669-NPA02** **October 2022**

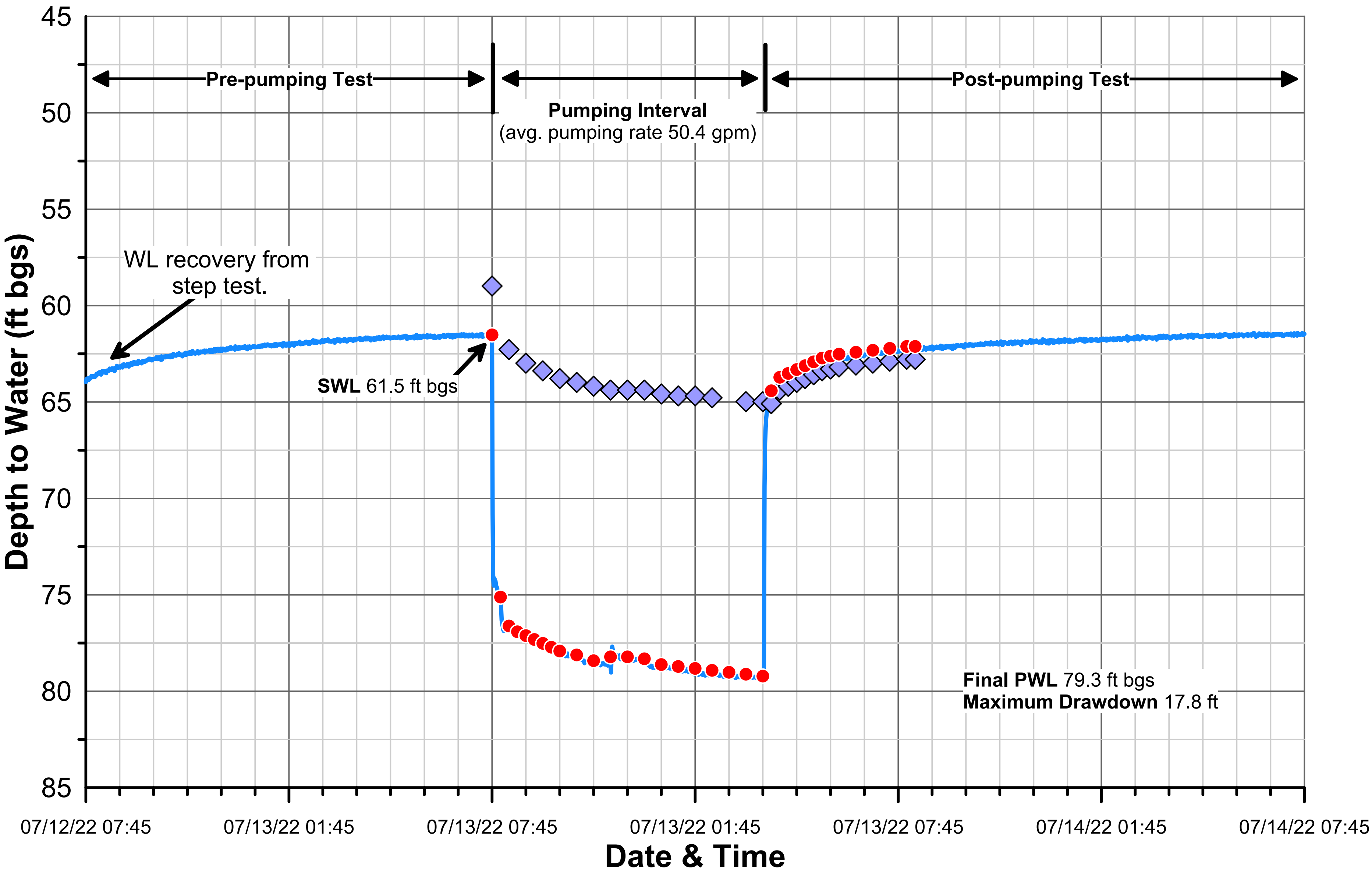

**LEGEND**

- Subject Property
- Existing Water Well
- Offsite Water Well (approx)
- Well Location
- Significant Streams

RCS

**FIGURE 2**
**AERIAL PHOTOGRAPH MAP**

**RCS Job No. 669-NPA02** **October 2022**




**LEGEND**

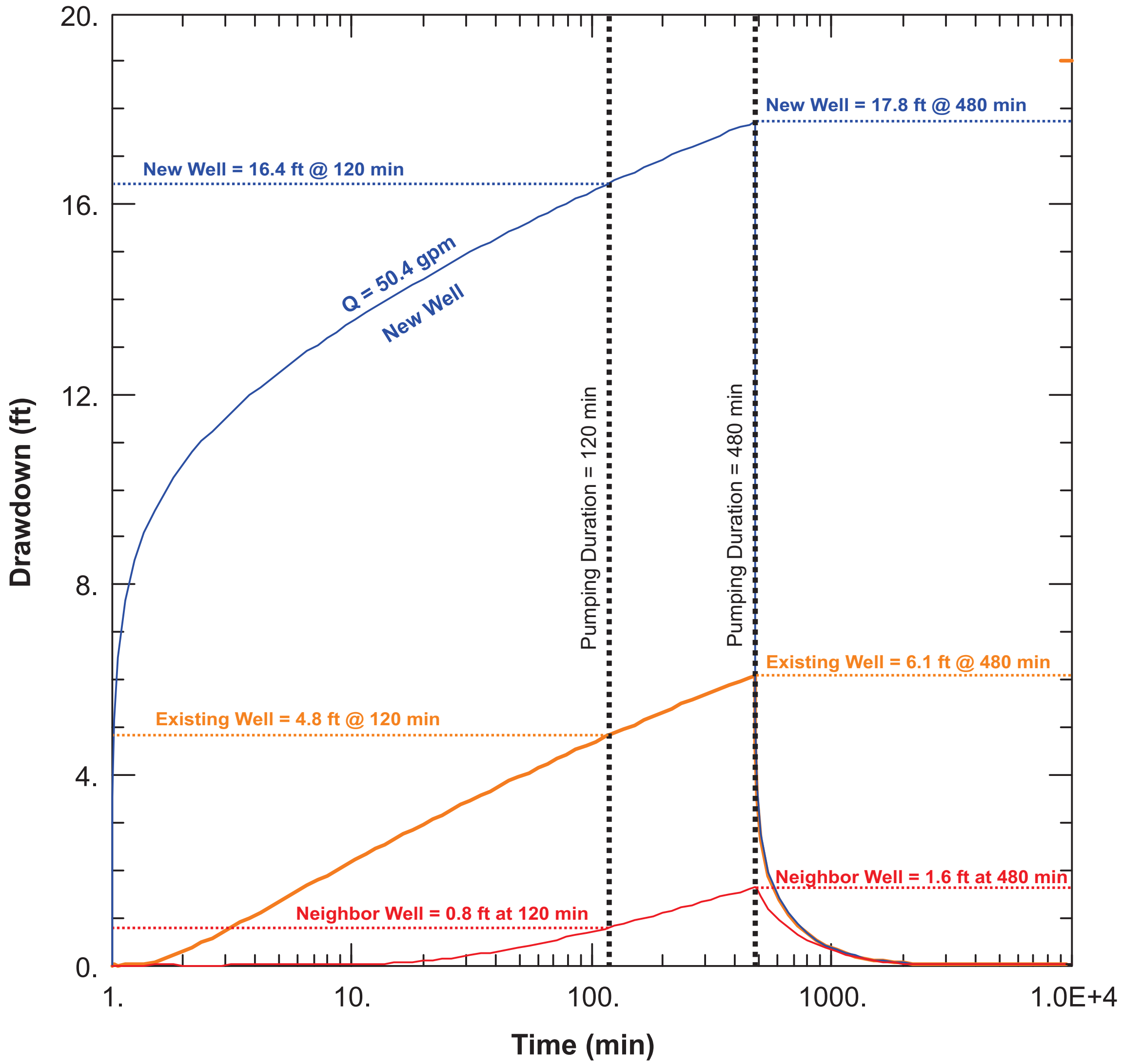
- New Well Manual WL Measurements
- Existing Well Manual WL Measurements
- New Well Transducer WL Measurements

RCS

# FIGURE 3
# WATER LEVELS DURING CONSTANT RATE PUMPING TEST NEW WELL

RCS Job No. 669-NPA02

October 2022




**Pumping Well**

□ New Well

**Observation Wells**

Existing Well (51 ft)

Neighbor Well (257 ft)

**Aquifer Model**

Leaky

**Solution**

Hantush with Aquitard Storage

**Parameters**

T = 3,705.1 gal/day/ft

S = 0.0005243 (unitless)

Pumping Rate = 50.4 gpm

Duration = 8 hours (480 minutes)

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


RCS

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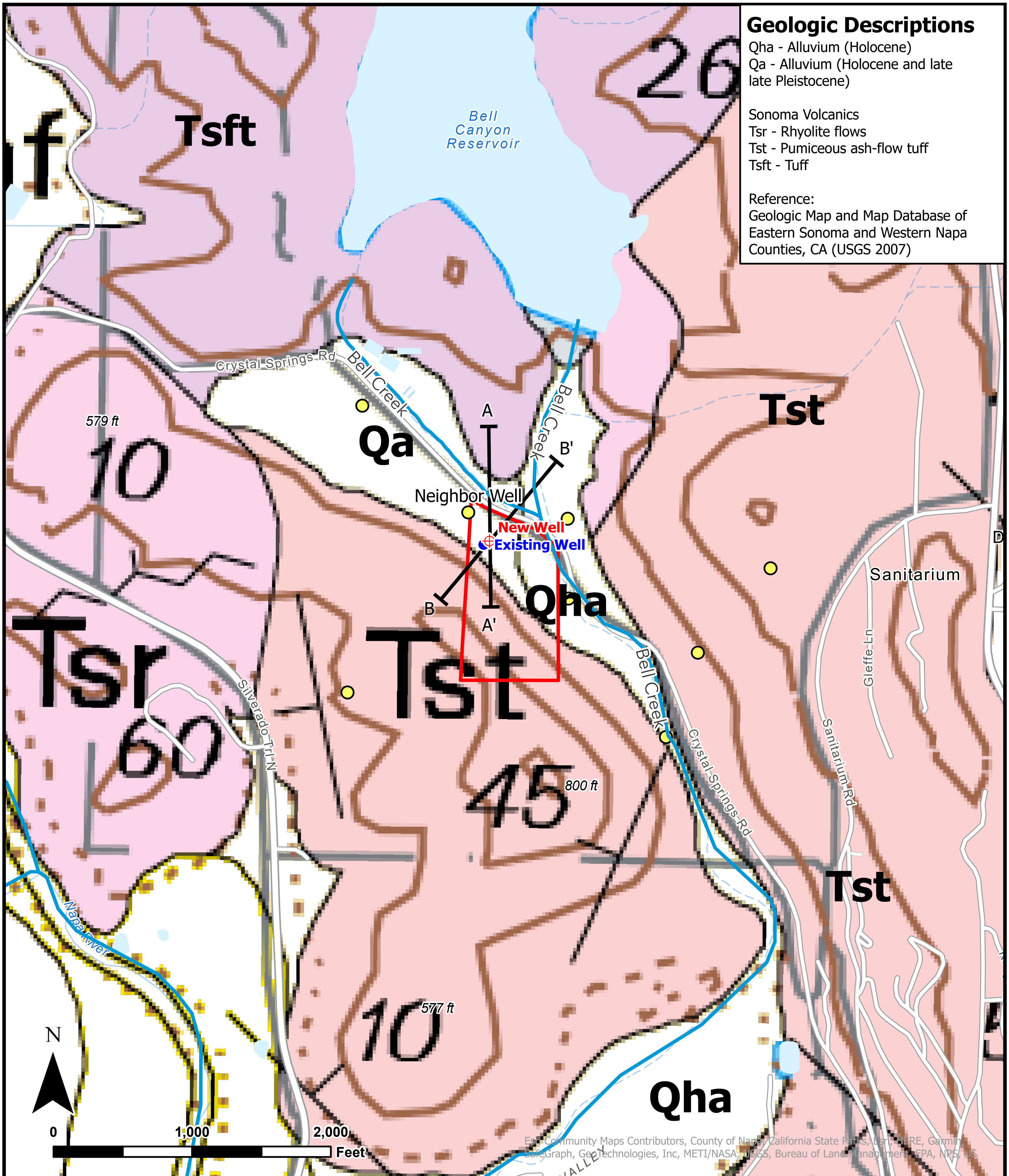
**Figure 4**
**Theoretical Drawdown Calculations**
**Predictive Simulations**
**8 Hours/50.4 gpm/T=3,705.1 gpd/ft**

Job No. 669-NPA02

October 2022




## Geologic Descriptions

Qha - Alluvium (Holocene)
Qa - Alluvium (Holocene and late late Pleistocene)

Sonoma Volcanics
Tsr - Rhyolite flows
Tst - Pumiceous ash-flow tuff
Tsft - Tuff

Reference:
Geologic Map and Map Database of Eastern Sonoma and Western Napa Counties, CA (USGS 2007)

## LEGEND

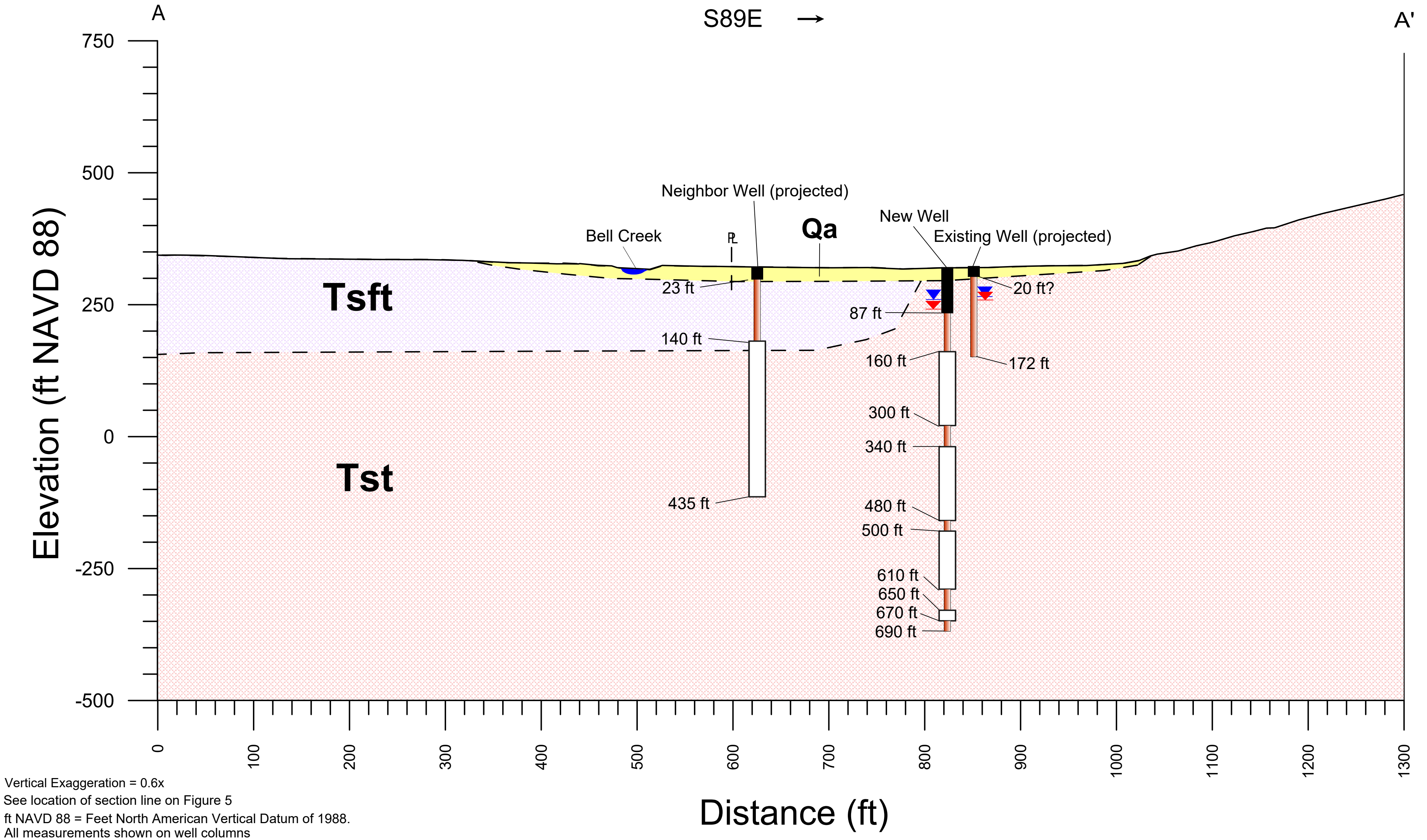
- Subject Property
- Existing Water Well
- Offsite Water Well (approx)
- Well Location
- Cross Section Lines
- Significant Streams

RCS

**FIGURE 5**
**GEOLOGY MAP**

RCS Job No. 669-NPA02

October 2022




Vertical Exaggeration = 0.6x
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

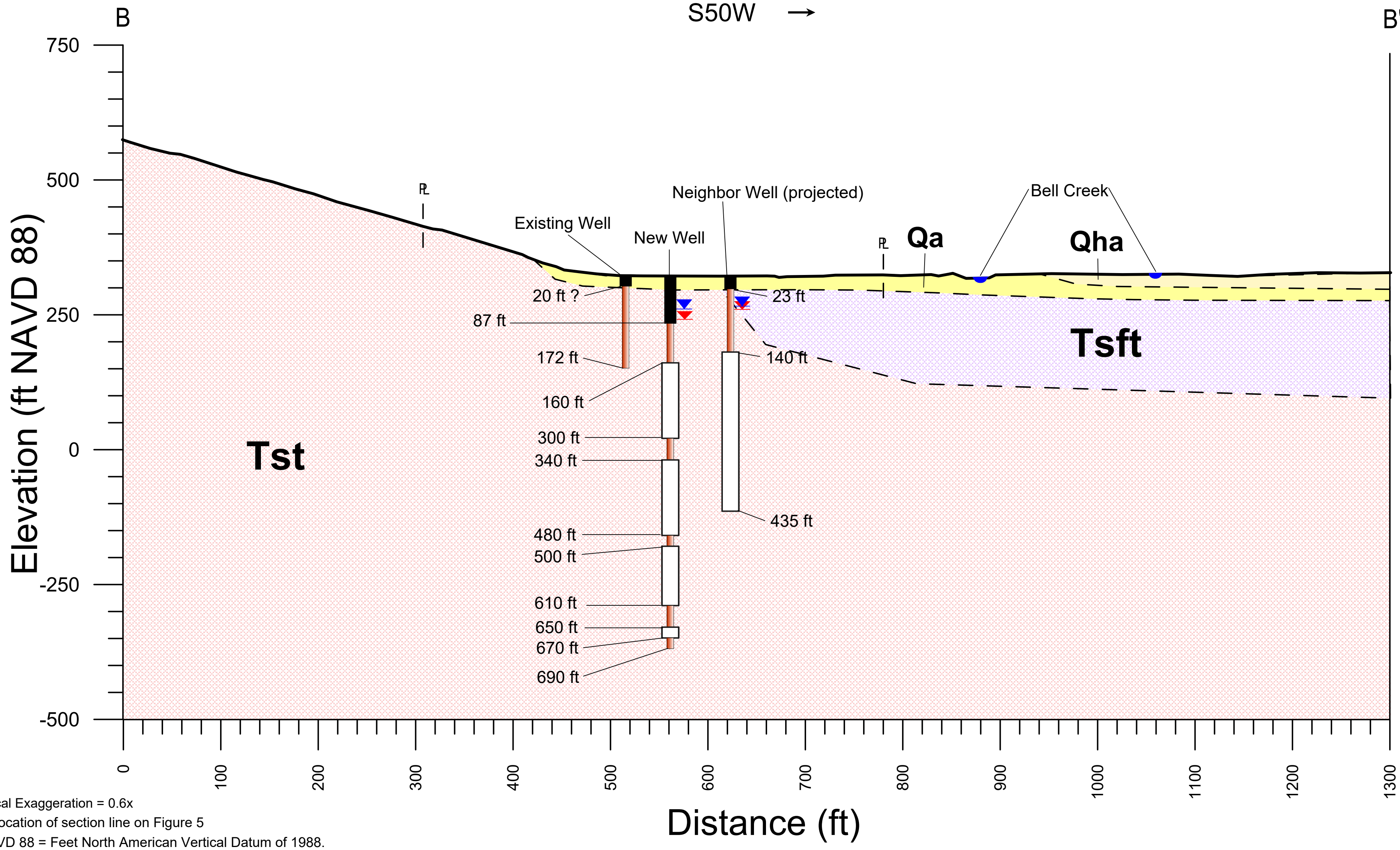
- Cement Seal
- Blank Casing
- Perforated Interval
- Static Water Level (July 2022)
- Pumping Water Level (July 2022)
  *"Pumping water level" for Existing Well is actually a non-pumping measurement collected during constant rate test on New Well.
- PL Property Line
- Qa Alluvium(Holocene and late Pleistocene)
- Tsft Tuff (Pliocene)
- Tst Pumiceous ash-flow tuff (Pliocene)

RCS

# FIGURE 6
# CROSS SECTION A-A'

RCS Job No. 669-NPA02

October 2022




Vertical Exaggeration = 0.6x
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 (July 2022)
- Pumping Water Level (July 2022)
  *"Pumping water level" for Existing Well is actually a non-pumping measurement collected during constant rate test on New Well.
- PL Property Line
- Qha Alluvium (Holocene)
- Qa Alluvium (Holocene and late Pleistocene)
- Tst Tuff (Pliocene)
- Tsft Pumiceous ash-flow tuff (Pliocene)

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# FIGURE 7
# CROSS SECTION B-B'

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