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## Water Availability Analysis

Water Availability Analysis  
4160 Silverado Trail  
Napa, California 94558  
APN 039-130-002

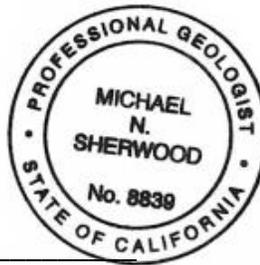
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Norman Weir, Hagafen Cellars, Inc.

Prepared by:

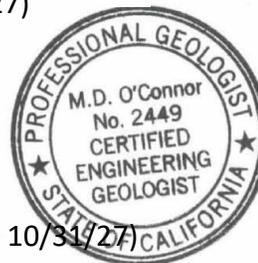


O'Connor Environmental, Inc.  
P.O. Box 794  
Healdsburg, CA 95448  
www.oe-i.com



A handwritten signature in blue ink, appearing to read "Michael Sherwood".

Michael Sherwood, PG #8839 (Exp. 6/30/27)  
Geologist/Hydrologist



A handwritten signature in blue ink, appearing to read "Matt O'Connor".

Matthew O'Connor, PhD, CEG #2449 (Exp. 10/31/27)  
Principal Hydrogeologist

Katherine Woodworth, BS  
Assistant Hydrologist

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## Introduction

The applicant, Hagafen Cellars, is seeking to modify their existing Use Permit #99477-MOD to expand tasting, retail sales, and daily visitor capacity. These modifications will not change the level of wine production, nor the septic or water systems. This project is located at 4160 Silverado Trail (APN: 039-130-002) in the Napa Valley Groundwater Sub-basin, formerly referred to as the “Valley Floor” aquifer-zone of Napa County. A Tier 1 WAA has been conducted by Stillwater Civil Design (2019) for this project as per County of Napa requirements, however the County has requested further analysis of impacts of the proposed project on nearby wells and streams (Tier 2 and Tier 3 analyses). All uses presented in this report are intended to supersede those presented in the 2019 Tier 1 WAA.

This Water Availability Analysis (WAA) was developed based on the guidance provided in the Napa County Department of Planning, Building, & Environmental Services' Water Availability Analysis Guidance Document formally adopted by the Napa County Board of Supervisors in May 2015. The WAA includes the following elements: a summary of estimates of existing and proposed water uses on the project parcel, compilation of drillers' logs from the area and characterization of local hydrogeologic conditions, analysis of the potential for well interference at neighboring wells located within 500-ft of the project well (Tier 2) and an analysis of potential impacts to streamflow on streams within 1,500-ft of the project well (Tier 3).

On June 7, 2022, in response to the Governor’s Emergency Executive Order N-722 Napa County instituted a new policy limiting new uses to the equivalent of 0.3 acre-ft/acre/year in the Napa Valley floor aquifer zone. This project appears to be able to proceed if the proposed change in use can be accomplished with no net increase in water use.

This report has been revised several times. The August 25, 2022, revision included additional descriptions of water use and proposed rainwater catchment to meet the County planning objective of no net increase of groundwater use. A second revision dated October 18, 2022, provided updated language regarding entitled uses and further clarified water use and rainwater capture estimates. The November 30, 2022, update corrected the number of employee work days under entitled conditions.

This update (April 2024) responds to issues discussed in a meeting with Emily Hedge (County of Napa) and Beth Painter in October 2023. The key elements of this revision are as follows:

- Project water use will not be changed; this permit modification seeks to establish that current and future water use rates are consistent. In other words, proposed use for this project is equal to existing use and no net change in use will occur. Since no increase in use is to occur, the previously proposed rainwater catchment will not be needed. Discussion of groundwater use has been updated and all discussion of rainwater catchment has been removed.

- In response to County comments regarding uncertainty in the Tier 3 WAA owing to a lack of information regarding construction details of the project well, a down-well video camera inspection was performed by Dr. Well with assistance by Imboden Pump on March 4, 2024. Results and interpretations of this video inspection are described in a new sub-section of this report and our Tier 2 and Tier 3 evaluations have been updated based on the new information.

## Limitations

Groundwater systems of Napa County and the Coast Range are typically complex, and available data rarely allows for more than general assessment of groundwater conditions and delineation of aquifers. In this region of Napa County, groundwater studies of the aquifer have been undertaken on behalf of the County for over 10 years, culminating in submittal to the State Department of Water Resources a Draft Groundwater Sustainability Plan for the Napa Valley Groundwater Basin. That body of hydrogeologic characterization and research contributes significant additional interpretation of the project site hydrogeology. Hydrogeologic interpretations in OEI's analysis are based on the drillers' reports made available to us through the California Department of Water Resources and County of Napa, available geologic maps and hydrogeologic studies, and professional judgment.

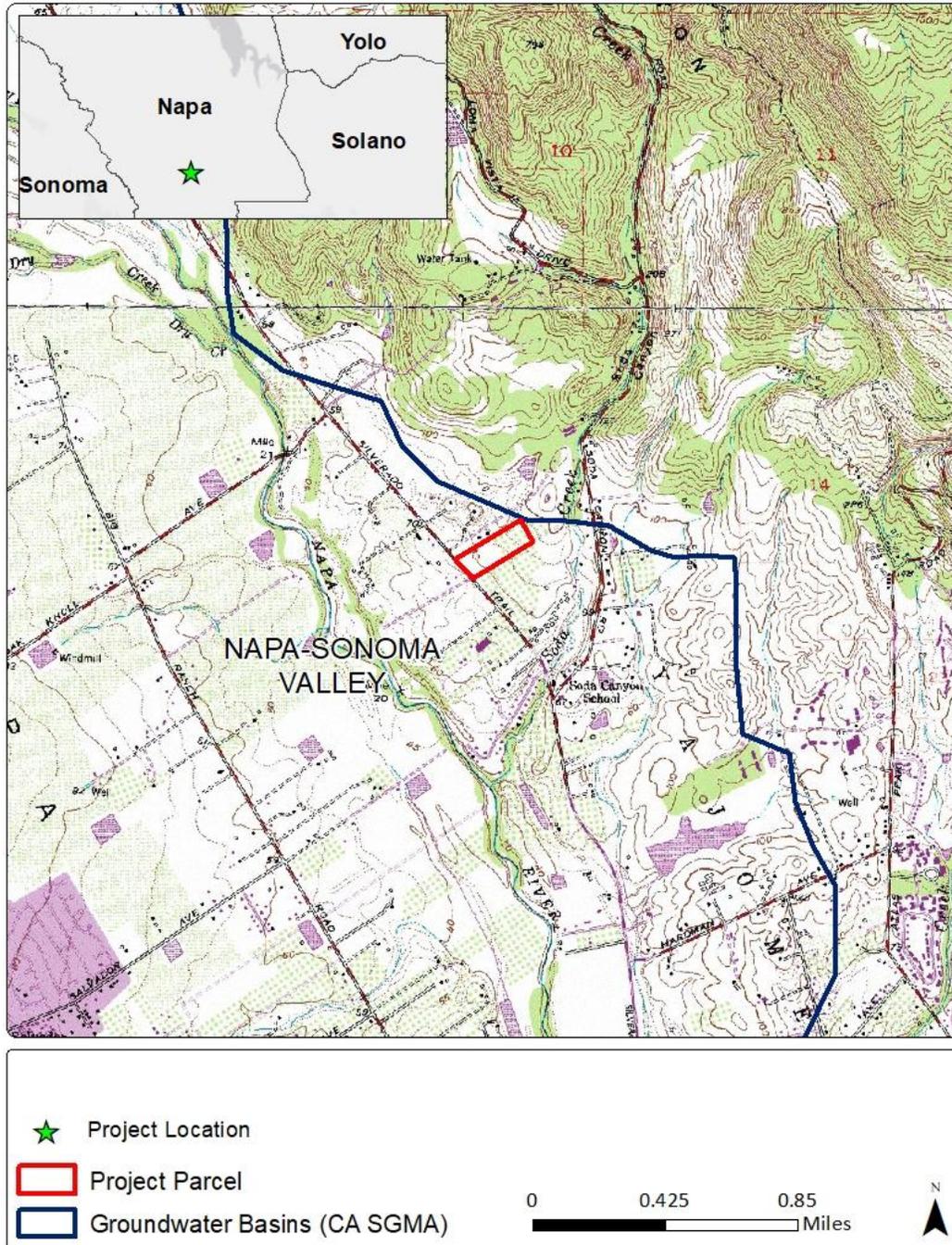


Figure 1: Project location map.

## Hydrogeologic Conditions

The project parcel is located on the floor of Napa Valley within the Napa Valley Subbasin of the Napa-Sonoma Valley Groundwater Basin, 2.5 miles north of the City of Napa. The surficial geology at the project site is primarily Pleistocene aged Quaternary Alluvial Deposits (Map Unit Qoa). Based on geologic logs from wells located in the surrounding area, these alluvial deposits are typically shallow, generally less than 40 feet deep in the wells nearest to the project well. The Qoa unit is described as: “sand, silt, clay, and gravel deposits with little or none of the original geomorphic expression preserved. Moderately to extremely dissected, in places tens or hundreds of meters above the current depositional surface, and capped by well-developed soils,” (USGS, 2007). The Quaternary alluvial units which include the Qoa unit are considered to comprise the principal aquifer system in the Napa Valley however, production wells in the basin also are screened within deeper Tertiary units including Tertiary Sedimentary rock, the Huichica Formation and Sonoma Volcanics (LSCE, 2013 and 2017). Based on geologic logs from wells it appears the Sonoma Volcanics underlie the surficial alluvium in the project area and most wells are screened in both the upper alluvial units as well as the lower volcanic units as is typical for wells in Napa Valley.

Bedrock underlying the alluvium is typically reported as “volcanic” in geologic logs for wells in the project area. These rocks are part of the Sonoma Volcanics and are specifically identified as the Andesite of Stag’s Leap (Map Unit Psvasl) in more recent mapping by Wagner and Gutierrez (CGS, 2010) and the Basaltic to andesitic lava flows (Map unit Tsa) by Graymer et. al. (USGS, 2007). The Sonoma volcanics are present in surficial geology in outcroppings on the margins of floor of Napa Valley, as well as in the mountains to the east of the project parcel.

In general, bedrock units of the Sonoma Volcanics have very low primary porosity and groundwater is stored in fractures resulting in highly variable well production. The andesitic unit has been described as comprised of individual lava flows displaying great variability in thickness and texture over short distances (Weaver 1949). Given this heterogeneity it can be expected that hydrogeologic conditions exhibit similar spatial variability. Yields in bedrock units of the Sonoma Volcanics are reported to range from zero to as high as several hundred gallons per minute (gpm) (LSCE 2013).

The Soda Creek Fault trends from north to south along the base of the uplands approximately 0.6 miles east of the project parcel (Figure 2). This fault is thought to limit flow from the east into the area of the project parcel (LSCE, 2017).

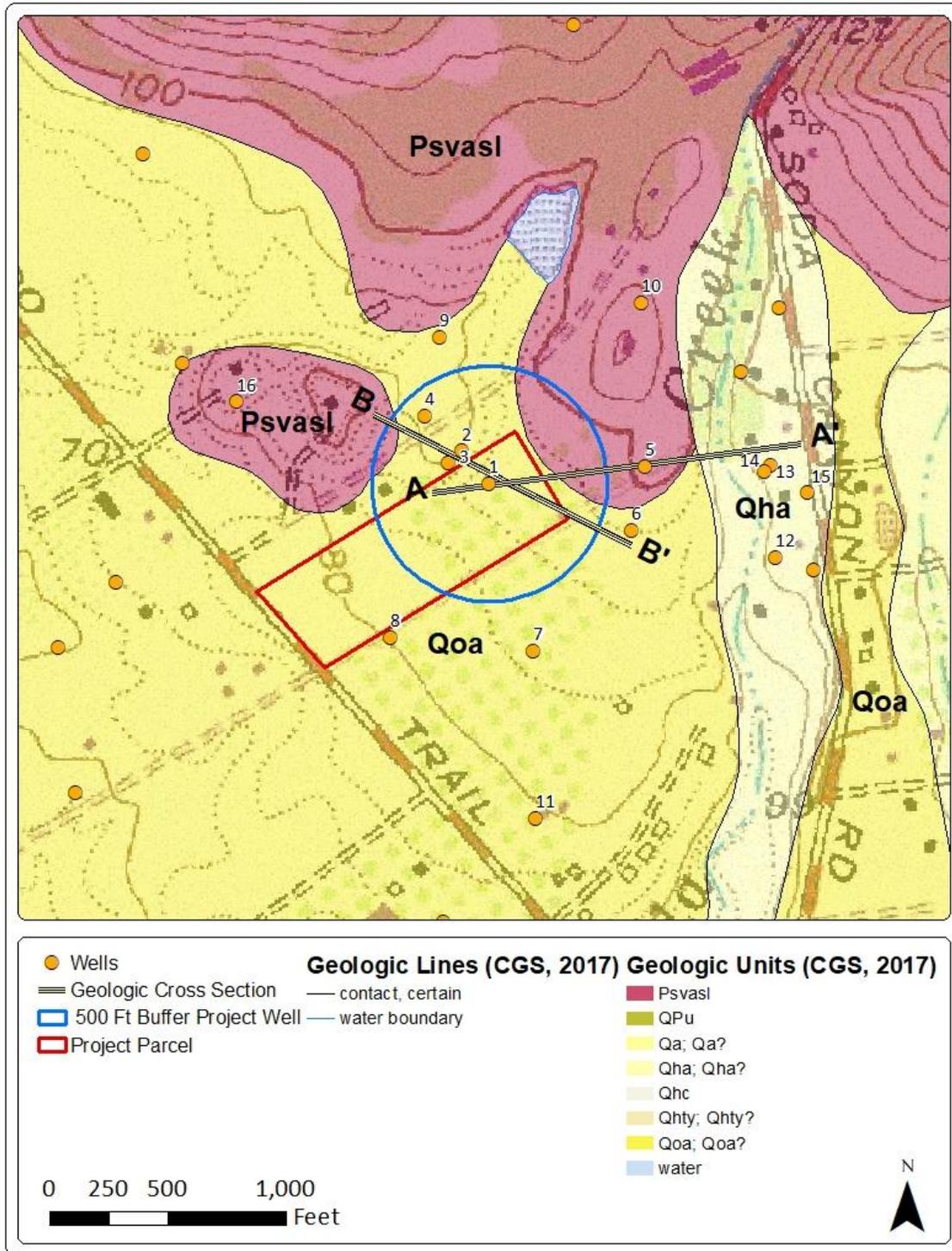


Figure 2: Surficial geology and locations of wells in the vicinity of the project parcel. Surficial geology based on data from the Preliminary Geologic Map of the Napa and Bodega Bay 30' x 60' Quadrangle (Wagner and Gutierrez, 2017). Note that the Andesite of Stags Leap (Unit Psvasl) is also known as the Tertiary Sonoma Volcanic Andesite Flow (Unit Tsa) in Napa Valley GSP documents (i.e. LSCF 2013 and 2017 and 2022).

## Well Data

Well Completion Reports for wells within the vicinity of the project parcel were obtained through the California Department of Water Resources (DWR) Well Completion Report Map Application and from Napa PBES. A subset of these logs was compiled (Table 1 and Appendix A) and georeferenced based on parcel and location sketch information (Figure 2). A Well Completion Report was unavailable for the project well; however, some construction details were provided in a well maintenance record from the project applicant's well contractor (Appendix A).

The project well (Well 1) is located on the eastern portion of the of the subject property between the vineyards and winery buildings (Figure 2). Maintenance records from Imboden Pump reported that the well is 194 feet deep with its pump set at a depth of 184 feet below ground surface (bgs). The oldest records from Imboden Pump date back to 1985 when a static water level of 51 feet bgs was reported. A two-hour air lift pump test performed in April of 1985 by Imboden Pump resulted in an estimated yield of 20 gallons per minute (gpm) with 100 feet of drawdown. More recently, Imboden Pump conducted a two-hour production test on Well 1 in October 2019 (Appendix B). After the first hour of pumping a stable water level was achieved for another hour while pumping at 25 gpm. The static water level in Well 1 prior to pumping was 93 feet and drawdown was reported to be 35 feet. The surficial rocks at the location of this well are mapped as Quaternary older alluvium (Map unit Qoa) which are presumed to-overlie the andesitic lava flows of the Sonoma Volcanics (Psvasl). Based on its depth it is possible that Well 1 is screened in a combination of alluvial and volcanic rocks. Review of nearby geologic logs indicates that it is very likely the majority, if not all, of its perforated sections are within the Sonoma volcanics.

### March 2024 Project Well Inspection

To obtain information about the construction of Well 1, a down-well camera inspection was performed by Dr. Well with assistance by Imboden Pump on March 4, 2024 (Appendix C). This process included the removal of the well pump and associated pipes to allow access for the downhole camera. The camera is equipped with a depth meter that appears on the video readout and is capable of pivoting to view down-well and to show well side walls. An approximately hour-long video of the inspection was recorded in which the camera is lowered into the well to the bottom of the well bore facing down-well with several stops to orient the camera toward the side walls of the well. After reaching the bottom of the well the camera was then slowly raised up and spun around while viewing the side walls of the well.

The main observations noted by Dr. Well (Appendix C) include:

- The 8.25 inch steel casing extends only to 17 feet from top of casing (approximately 15 ft bgs), after this point the well is uncased (open to adjacent aquifer materials to the bottom of the well),
- The total well depth is 200 feet below top of casing (198 feet bgs), and
- A static water level of 41 feet from top of casing (approximately 39 feet bgs) was observed.

A review of the downhole video by OEI Geologists Michael Sherwood and Matt O'Connor resulted in the following additional observations:

- At the base of the steel casing what appears to be cement was observed at the interface between the casing and bedrock indicating that a cement seal exists to approximately 15 feet bgs.  
Below the casing at 17 feet (15 feet bgs) to approximately 150 feet (148 feet bgs) a relatively consistent geology was observed. Materials appear to be well-cemented volcanoclastic with variable sized clasts in a finer matrix with no obvious fractures observed. Some uncertainty of interpretation exists owing to precipitated minerals and/or organic material forming a film on the surface of the boring walls.
- Below 150 feet (148 feet bgs) fractures became visible, and the rock was fine-grained, consistent with fractured andesite. A larger fracture zone appeared at 177 feet (175 feet bgs) and extended to 185 feet (183 feet bgs).
- Below 185 feet (183 feet bgs) fractures were not observed, and materials appear more fine grained down to the bottom of the well at 200 feet (198 feet bgs).

Our conclusions regarding the well and aquifer material are that:

- Well 1's 8.25 inch steel casing appears to be sealed with cement and extends down to approximately 15 feet bgs after which no casing exists.
- The absence of a well casing allows the well access to the volcanic material from approximately 15 bgs to 198 feet bgs. Subsurface material, including the aquifer material, includes consolidated volcanoclastic deposits to a depth of ~148 ft below which fractured andesite extends to a depth of ~183 ft and is likely the primary aquifer material. The deepest 15 ft of the well bore appears to be unfractured rock.
- The observed static water level (39 feet bgs) during the late winter season in two relatively wet years indicates significant aquifer recharge capacity.
- The aquifer saturated thickness in these conditions is approximately 50 feet.

### Neighboring Wells

The nearest neighboring wells to the project well are Wells 2 and 3, located 170 and 180 feet northwest of the project well on parcel APN039-130-001 (Figure 2). These wells were identified by the project applicant and located during field reconnaissance by OEI. Well completion reports were not available for these wells. Wells 2 and 3 are located in a similar geologic unit to Well 1.

The nearest well to the project well with a Well Completion Report is Well 4, northwest of Wells 2 and 3 approximately 395 feet from the project well. Well 4 was completed to a depth of 275 feet bgs in 1986 and after a 4 hour airlift test had an estimated yield of 150 gpm. At the time of completion, the well had a static water level of 45 feet bgs (Table 1). The Geologic Log for Well 4 indicates that the well intersects primarily brown or red ash as well as brown and black rock. These rock types are consistent with the Andesite of Stags Leap. The well is screened between 120 and 275 feet and as such it is completed entirely in rocks of the Andesite of Stags Leap.

**Table 1: Well completion details for wells in the vicinity of the project parcel. Note the screened interval for Well 1 represents the uncased open portion of the well.**

Well No.	1	2	3	4	5	6	7	8
Year Completed	-	-	-	1986	2008	1974	1978	1978
Depth (ft)	198	-	-	275	400	460	375	405
Estimated Yield (gpm)	20	-	-	150	20	12	30	30
Static Water Level (ft)	39	-	-	45	50	94	22	51
Top of Screen (ft)	15*	-	-	120	140	-	-	105
Bottom of Screen (ft)	198*	-	-	275	400	-	-	405
Reference No.	-	-	-	18164	e071144	1352	5077	121554
Map Unit	Qoa	-	-	Qoa/Tsa	Tsa	Qoa	Qoa	Qoa
Well No.	9	10	11	12	13	14	15	16
Year Completed	1981	1999	1973	2017	1999	2006	2017	1981
Depth (ft)	145	363	450	-	268	270	138	525
Estimated Yield (gpm)	100	135	20	6	50	50	1	165
Static Water Level (ft)	-	75	125	98	50	47	100	80
Top of Screen (ft)	65	140	140	-	108	130	-	240
Bottom of Screen (ft)	145	363	450	-	268	270	-	480
Reference No.	103458	814588	435	-	813856	1078792	17-4626	9782
Map Unit	Qoa	Tsa/Qha	Qoa	Qha	Qha	Qha	Qha	Tsa

Well 6 is the next closest well to Well 1 located 640 feet to the southeast. This well was drilled in 1974 cased to a depth of 460 feet. At the time of completion the static water level of the well was 94 feet bgs and after a four hour airlift test the estimated yield was 12 gpm and 180 feet of drawdown was recorded. The driller reports encountering topsoil and “sandy rock & clay” in the first 8 feet of drilling followed by 62 feet of “lite brown sandstone” which would be consistent with a commonly encountered aquifer rock identified as Tertiary sedimentary rock (Tss/h) by LSCE (2013). At 70 feet bgs the driller reports “hard grey rock” and “grey rock” for 122 feet after which a 48 foot thick layer of “lite grey sandstone” was reported. After 240 bgs the remaining 220 feet of drilling encountered layers of “grey rock”, “red lava” and “grey basalt rock”. From the descriptions of these rocks and geologic mapping by LSCE (2013), it is likely that the shallow sedimentary rocks are the Tss/h unit to a depth of about 70 bgs, and that at greater depths are rocks of the Sonoma Volcanics (possibly the Andesite of Stags Leap). A screened interval was not reported for Well 6; we assume the well is screened throughout its depth accessing both the upper layers of the Tss/h and lower layers of the Sonoma Volcanics (possibly the Psvasl).

In addition to the five wells discussed above, 11 wells could be located within about 1,500 ft of Well 1, most of which are completed to depths intersecting the Sonoma Volcanics (presumably the Psvsl) (Figure 2). These wells were drilled to depths between 138 to 525 feet bgs and have estimated yields ranging from 1 to 150 gpm. Static water levels at the time of completion ranged from 22 to 125 feet bgs. The Geologic Logs for these wells typically indicate upper layers of alluvial deposits including less consolidated gravels and sands to sandstones along with some significant layers of clay. Below the alluvial deposits volcanic rocks of varying colors and densities are

reported. Approximately half of the wells report encountering buried layers of volcanic ash or tuff and none of the well bores were reported encountering rocks belonging to the underlying basement rocks of the Franciscan Complex.

### Geologic Cross Section

Two geologic cross sections oriented generally west to east are shown in Figure 3 (See Figure 2 for cross-section locations). Well completion reports for wells located along these cross-sections indicate mostly shallow alluvium (Map Units Qha and Qoa) and Tertiary Sedimentary Rock (Tss/h) overlying volcanic material, or surficial outcroppings of the Sonoma volcanics (Map Unit Psvasl). Wells located along Cross-section A-A' which have known screened intervals are screened within the Sonoma Volcanics. On Cross-section B-B', Well 4 is screened completely within the Sonoma Volcanics while Well 6 is screened within both shallow sedimentary rocks (Tss/h) and the Sonoma Volcanics.

A well completion report for the project well could not be located, and only a depth is known. The recent March 2024 well inspection revealed that Well 1 penetrates and is open to only volcanic rock below the upper casing material which ends at a depth of 15 feet bgs. The screened interval shown for Well 1 in cross sections A and B (Figure 3) represents the interval where no casing exists. The fracture zone presumed to be the primary project aquifer is identified between 148 and 183 ft bgs. This zone corresponds to the upper end of casing in several wells as shown in both cross sections (Wells 5, 13 and 14 in Cross-section A-A' and Well 4 in Cross-section B-B') suggesting that these wells access a similar fracture zone. The Qoa deposits appear to be very thin in this area. The water surface elevation in March 2024 in Well 1 was 39 ft bgs and the depth of the upper most fractures in the primary project aquifer accessed by Well 1 is 148 ft bgs (Figure 3a). These elevations are approximately 24 ft and 133 ft below the channel bottom of Soda Creek along Cross-section A-A', indicating that the groundwater accessed in Well 1 lies at a depth greater than the channel of Soda Creek at least as far downstream as Silverado Trail. Water surface elevations in all wells including in Well 1 are located at or below the apparent depth of the alluvial units (Qoa and Qha), and screened intervals along with the observed fracture zone in Well 1 are also below any observed alluvium indicating that most wells are accessing water in the Sonoma Volcanics or possibly the Tss/h sedimentary rocks.

Neighboring wells located nearest to Well 1 (Wells 2 and 3) were located visually during field investigations but no documentation for these wells could be located. Their depths are approximated based on common depths of wells in the area. It would not be surprising if these wells were also uncased bedrock wells constructed like Well 1.

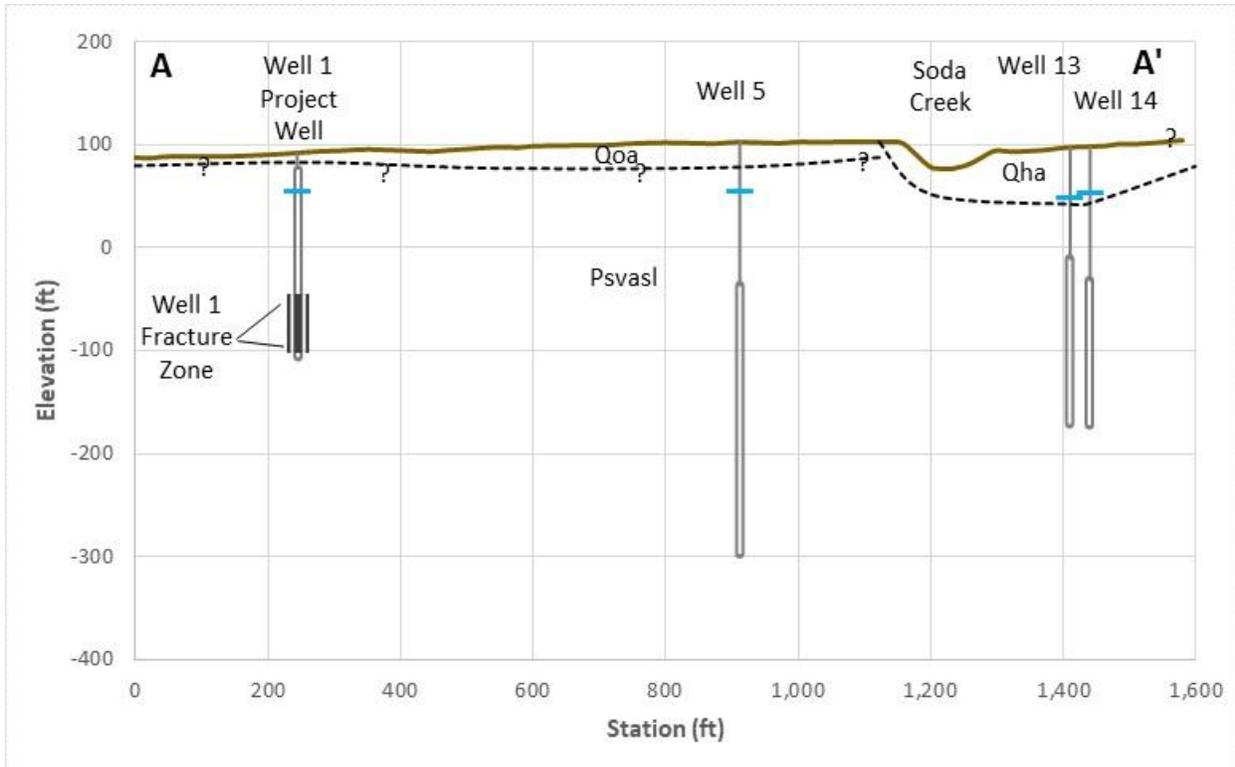
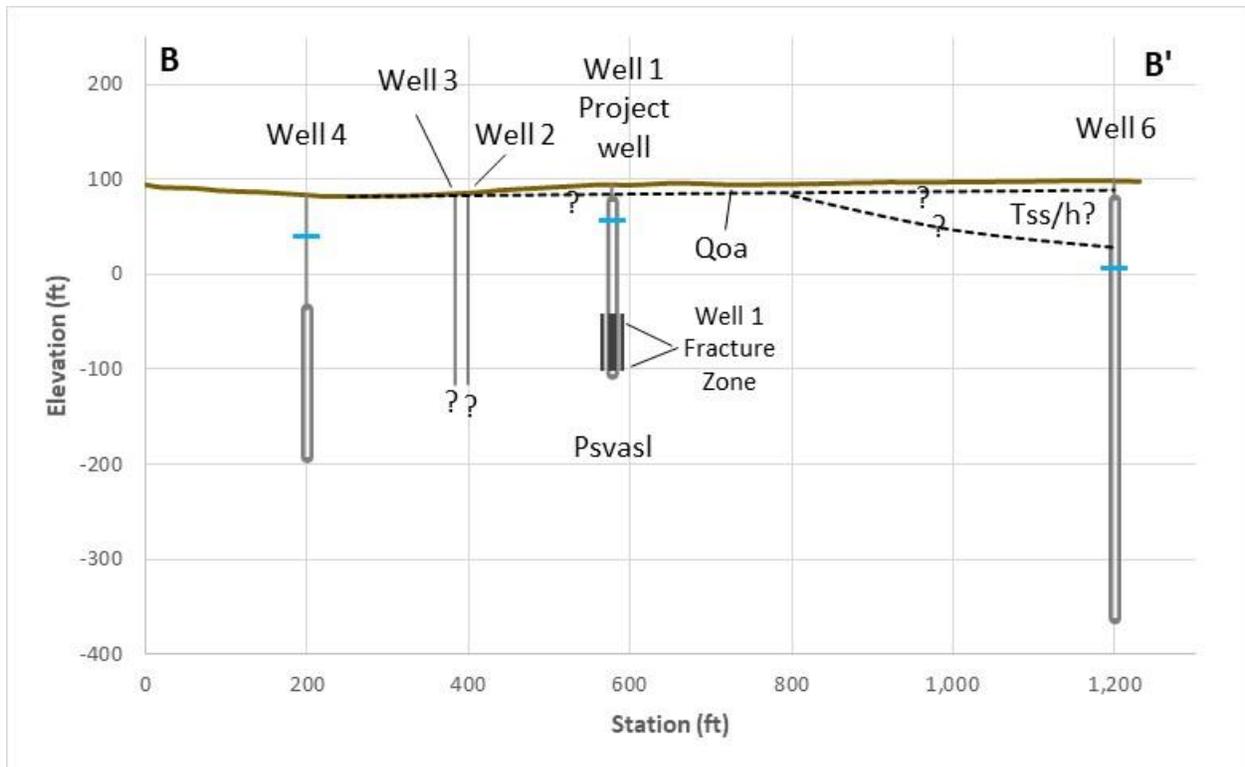


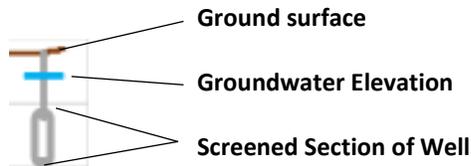
Figure 3a. Hydrogeologic cross-section A-A' oriented west-southwest to east-northeast through the project parcel (see Figure 2 for location).

\* Note that the the project well only has a blank steel casing down to 15 ft bgs. After this point the well is an open boring, this is represented as screened interval in Well 1. The fracture zone presumed to be the project aquifer is identified between 148 and 183 ft bgs.



Geologic Contact (Approx. Located) - - - - -

Well



**Figure 3b: Hydrogeologic cross section and B-B' oriented northwest to southeast through the project parcel (see Figure 2 for location).**

\* Note that the the project well only has a blank steel casing down to 15 ft bgs. After this point the well is an open boring, this is represented as screened interval in Well 1. The fracture zone presumed to be the project aquifer is identified between 148 and 183 ft bgs.

## Project Aquifer

The project well (Well 1) is situated on the eastern margin of the Napa Valley Groundwater Sub-basin. Due to the depth of the project well and surrounding wells, screened intervals of nearby wells and apparent shallow depth of alluvium near the project parcel we believe that the project well and nearby Wells 2 and 3 mostly access a fractured bedrock aquifer comprised of the Sonoma Volcanics that likely extends further to the west, north and east in uplands to the east of the project parcel shown in Figure 2. As can be seen in Figure 2, Wells 1, 2, 3, 4 and 9 lie between low hills and ridges comprised of the Staggs Leap Andesite (map unit Psvasl), and data from Well Completion Reports and the down-well video inspection of Well 1 all reveal thin overlying strata of soil and alluvium underlain by hard volcanic rocks consistent with those of the

Sonoma Volcanics, specifically the Staggs Leap Andesite. These conditions are represented in Cross-section A-A' (Fig. 3a).

In contrast, Wells 6, 7, 8 and 11 have substantial thicknesses of mixed alluvial sediments and sandstone overlaying hard volcanic rocks characteristic of the Staggs Leap Andesite. The alluvial/sandstone materials are suggestive of an aquifer unit described as Tertiary sands and clays and mapped as unit Tss/h (LSCE, 2013; Fig. 3-1a & b, Fig. 5-6, Fig. 5-7, Fig. 5-12). In Wells 6 & 8, these materials extend to a depth less than 100 ft bgs (represented by Cross-section B-B', Fig. 3b); in Wells 7 & 11, these materials extend to a depth greater than 240 ft. Hence, the project well (#1), and a group of similar wells (#'s 4 & 9 and presumably #'s 2 & 3) are understood to intersect a fractured bedrock aquifer adjacent to, but distinct from, a group of wells (#'s 6, 7, 8 & 11) that intersect variable thickness of LSCE's unit Tss/h. The inferred presence of Tertiary sedimentary rocks (Tss/h) near the surface in Well 6 to a depth of 70 ft bgs, together with the increasing thickness of the presumed Tss/h unit to the southwest of Well 6, suggests at least some aquifer conditions generally consistent with interpretation and mapping by LSCE (2013).

As described above, our understanding of Well 1 and its local aquifer obtained from the March 2024 down-well video inspection is that its aquifer consists of the fractured volcanic rocks of the Staggs Leap Andesite. A fracture zone observed in the video inspection is presumed to be associated with the primary aquifer accessed by the project well along with Wells 2, 3, 4, 5, 9, and 16 in the area. The fracture zone was observed to begin at a depth of 148 ft bgs in Well 1, this correlates to a similar elevation where neighboring wells (i.e. Wells 4, 5, 13, and 14) have their uppermost screened section. This aquifer likely receives recharge via direct percolation of rainfall, inflows from overlying alluvial units in addition to inflows from streambed infiltration from streams located along the eastern margin of the Napa Valley as well as via mountain block recharge (LSCE, 2017). Given the relatively great depths of wells and the low permeability of the underlying rocks, the project aquifer is likely confined or semi-confined. Additional discussion of this aquifer, including the estimation of its hydraulic parameters is found later in this report in the "Well Interference Analysis" section.

## Water Demand

Current water use, shown below, is greater than what was originally permitted. This permit modification seeks to update permitted use to match actual use. As a result, water demand for this project for both the existing and proposed conditions is the same.

Uses reported below are based on use rates provided in a prior Tier 1 Water Availability Analysis (WAA) prepared by Stillwater Civil Design (2019) and subsequent updates provided by the project applicant. All uses provided in this report are intended to supersede those made in the 2019 Tier 1 WAA. Uses include an existing 50,000 gal/year winery with five full-time, five part-time, and two seasonal employees. Based on the 2018 records, the winery received a maximum of 60 guests per day with a maximum weekly limit of 311. Annually, tasting room visitations will be no more than the maximum total of 9,719. In addition to the winery the project parcel contains one residence and 10 acres of vineyard. The total existing annual water use is estimated to be 5.40

acre-feet per year (Tables 2 and 3). Since no increase in use will occur for this project the requirement of the 2022 Drought Emergency policy requiring groundwater use to be either restricted to 0.3 acre-ft per acre of the project parcel or have no net increase appears to have been met.

**Table 2: Water Use totals for existing and proposed conditions.**

	Existing Condition (acre-ft/yr)	Proposed Condition (acre-ft/yr)
<b>Project Parcel</b>	<b>5.40</b>	<b>5.40</b>
Residential Use	0.75	0.75
Irrigation Use	3.00	3.00
Winery Use	1.33	1.33
Employee/Guest Use	0.32	0.32
<b>Total</b>	<b>5.40</b>	<b>5.40</b>

**Table 3: Water Use details for existing and proposed conditions on the project parcel.**

	# of Units	Use per Unit	Annual Water Use (AF/yr)
<b>Residential Use</b>			<b>0.75</b>
Residences, Primary	1 Residence	0.75 AF/Residence	0.75
<b>Agricultural Use</b>			<b>3.00</b>
Vineyard	10 Acres	0.30 AF/acre/yr	3.00
<b>Winery Use</b>			<b>1.33</b>
Process Water	50000 Gallons	2.15 AF/100,000 gal.	1.08
Domestic & Landscaping	50000 Gallons	0.50 AF/100,000 gal.	0.25
<b>Guest &amp; Employee Use</b>			<b>0.32</b>
Tasting Room Visitations	9719 Guests	3 gal./Guest	0.089
Events w/ On-Site Catering	725 Guests	15 gal./Guest	0.033
Employees	12 Employees	15 gal./shift @ 365 shifts/yr	0.20
<b>Total</b>			<b>5.40</b>

## Well Interference Analysis (Tier 2)

**This WAA was initially drafted under Drought Emergency policy effective beginning in summer 2022 that allowed new permitted uses if there is zero net increase in groundwater use. In the case of zero net increase in groundwater use under the Drought Emergency policy, the Tier 2 WAA is waived. We have retained the Tier 2 WAA analysis at the request of Napa County.**

The Napa County WAA guidance document requires a well interference analysis (Tier 2 WAA) if neighboring wells lie within 500-feet of the project well. There are three neighboring wells within 500 ft of the existing project well (Well 1). Well 2 is located approximately 170 ft northwest of the project well; Well 3 is approximately 180 ft northwest of the project well. Well 4 is approximately 390 ft northwest of the project well.

Construction details of Well 1 reported in maintenance records, a recent pump test and down-well video inspection are summarized in the Hydrogeologic Conditions section of this WAA along with details regarding most neighboring wells. Maintenance records and available well Completion Reports are reproduced in Appendix A. Driller's reports for the two closest neighboring wells (Well 2 and Well 3) were not available. Based upon review of construction details and local hydrogeology it appears that Wells 1, 2 and 3 are constructed within the same geologic map units. The surficial rocks mapped at the location of the project well are Quaternary older alluvium (Map unit Qoa) which are presumed to-overlie the Andesite of Stags Leap of the Sonoma Volcanics (Psvasl). Based on the recent well inspection it appears that Well 1 is not accessing alluvial rocks and has an open connection only to the Sonoma volcanics. The screened intervals of Wells 2 and 3 are not known but based on details of nearby wells we assume that their screened intervals overlap for a significant portion of their depths. Well 4 is screened from 120 to 275 feet and is also assumed to overlap with the project well. It is screened volcanic rocks similar to those presumed to be found in Wells 1, 2 and 3 and presumably of the same local aquifer. Due to the larger distance between Well 1 and Well 4, there is lower potential for well interference between these two wells. Due to the proximity between Wells 1, 2 and 3, it is likely that pumping in either well could cause some drawdown in the other and so this evaluation focus on the interaction between these wells. Since Well 2 is located closer at 170 feet we will use this distance in our drawdown evaluation.

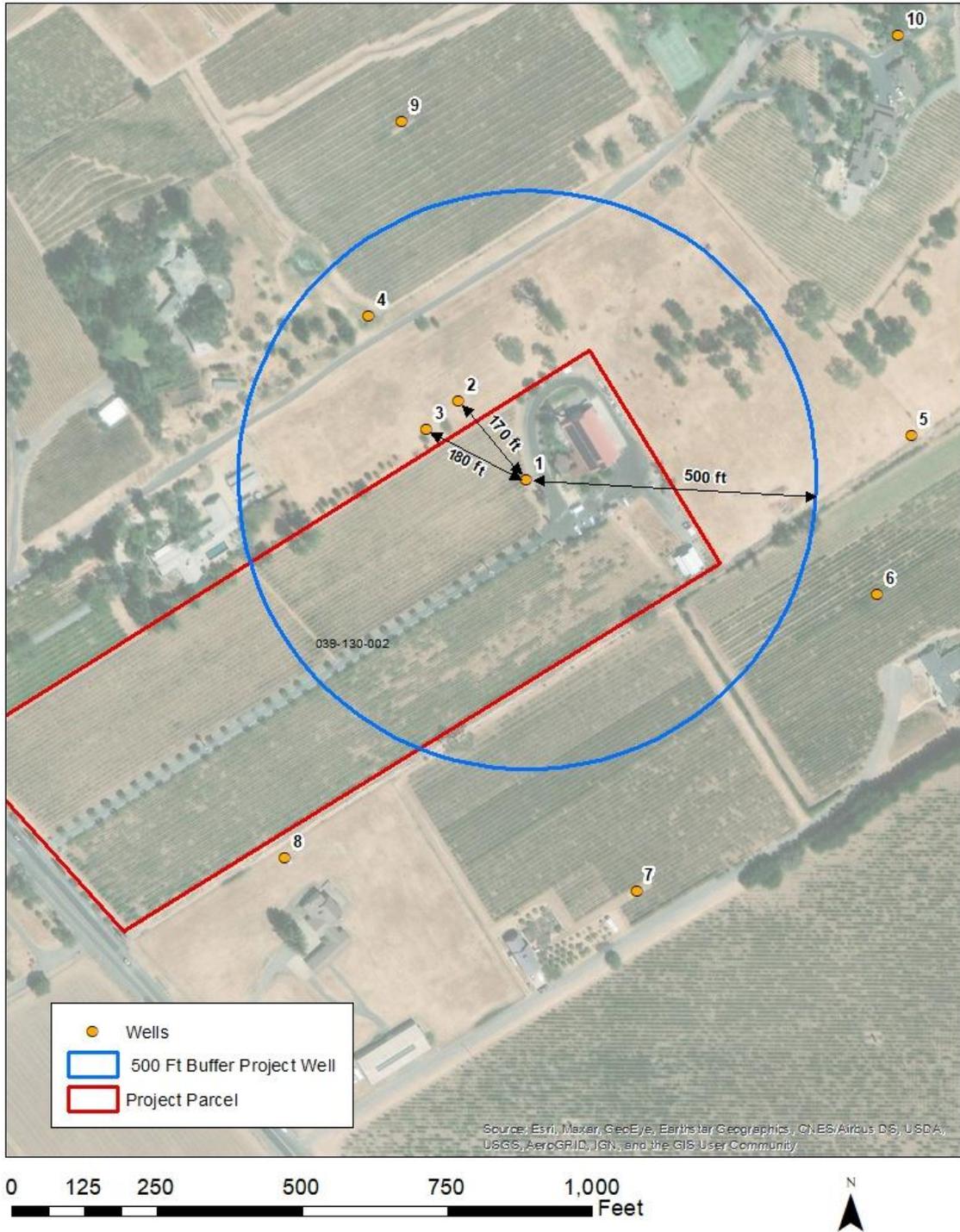


Figure 6: Locations of Well 1 (the Project Well) and neighboring wells within 500 ft: Well 2, Well 3 and Well 4

## Approach

The Napa WAA guidance recommends applying the Theis equation to wells located within 500 ft of the project well to estimate drawdown. The Theis equation (from Driscoll, 1986) is as follows:

$$s' = (Q/4\pi T) W(u)$$

with  $W(u)$  being the well function where

$$u = (r^2 S / 4 T t)$$

and the well function integral expanded as a series as:

$$W(u) = -0.5772 - \ln(u) + u - (u^2/2 \cdot 2!) + (u^3/3 \cdot 3!) - (u^4/4 \cdot 4!) \dots$$

where:

- $s'$  = drawdown (units in ft)
- $r$  = radial distance (units in ft)
- $S$  = storativity (dimensionless)
- $T$  = transmissivity (units in  $\text{ft}^2/\text{day}$ )
- $Q$  = discharge at the well (in gpm)
- $t$  = time (days)

Several assumptions are made when using the Theis equation:

1. The aquifer is homogeneous, isotropic, uniformly thick and of infinite areal extent.
2. Prior to pumping, the piezometric surface is horizontal
3. The fully penetrating well is pumped at a constant rate.
4. Flow is horizontal within the aquifer.
5. Storage within the well can be neglected.
6. Water removed from storage responds instantaneously with a declining head.

The well function equation above can be algebraically transformed to solve for  $r_o$  after the method of Weight and Sonderegger (2000):

$$r_o = [0.3 T t S^{-1}]^{0.5}$$

The 2015 Napa County guidance document pertaining to WAA's allows for 10 to 15 feet of water level drawdown attributable to well interference. For wells with casing diameter of six inches or less, drawdown of 10 feet is recommended as a threshold of concern; for wells with casing diameter greater than six inches, drawdown of 15 feet is recommended as a threshold of concern. Well 1 has a casing diameter of 8 inches, as such the threshold of concern for these wells is 15 feet. To estimate the likely radius of influence ( $r_o$ ) of the project well (Well 1) and the

potential drawdown (s) at Wells nearby estimates of the parameters T, t and S defined above are required.

### Estimated Aquifer Parameters

A time-drawdown pump test of 24 hours would normally be performed for a test to determine aquifer parameters to be used in a well interference analysis; however, no such pump test data is available for the project well. Well 1 was the subject of a brief two hour pump test in October 2019 by Imboden Pump (Appendix B). During the two hours of pumping a stable water level was achieved for an hour and with a rate of 25 gpm. Total drawdown reported was 35 ft.

Although these data do not come from longer and more rigorous testing that we might hope for they can provide some insight into aquifer properties. Consequently, the potential drawdown of groundwater elevation caused by operation of the project well was evaluated using data gathered from the interpretation of the pump test performed on Well 1 along with the evaluation of a range of hydraulic aquifer properties listed in the Napa WAA document and Local hydrogeologic studies.

Transmissivity (T) of the aquifer at the well can be estimated by two methods. First, T can be roughly approximated using single well pump test data and well theory, limited by a set of assumptions (Driscoll 1986, p. 1021). In this method, an empirical equation for confined and unconfined aquifers relates specific capacity ( $S_c$ , gallons per minute per foot of drawdown determined from a pump test) to transmissivity as:

$$2,000 S_c = T \text{ (confined aquifers)} \quad 1,500 S_c = T \text{ (unconfined aquifers)}$$

where  $S_c$  is in units of gallons per minute per foot (gpm/ft) and T is in units of gallons per day per foot (gpd/ft). This method of estimating T is very generalized and should not be relied upon if time-drawdown pump test data are available.

The depth of well screening in wells close to the project well along with the character of the hard fractured aquifer materials observed in Well Completion Reports indicates semi-confined or confined aquifer conditions. Consequently, one estimate of T is given by  $2,000 S_c$ . The pump test of Well 1 in October 2019 (Appendix B) gave  $S_c = 0.71$  gpm/ft; estimated T from this method is 1,429 gpd/ft, equivalent to about 191 ft<sup>2</sup>/day.

T can also be estimated using reference hydraulic conductivity (K) values for aquifer materials and multiplying by the saturated aquifer thickness (b) based on the definition  $T = Kb$ . Napa County Guidance suggests a range of K values between  $10^{-2}$  to  $10^2$  for Fractured Basalt (e.g. Sonoma Volcanics; Appendix G Table F4 in Napa 2015). A saturated aquifer thickness has been estimated based on observations made in the March 2024 well inspection by assuming that it includes the fracture zone down to the bottom of the well, an interval of 50 ft. Applying this to the range of K values gives a range of T values from 3.7.9 gpd/ft to 37,391 gpd/ft. Although this

is quite a large range the T values estimated for Well 1 falls near the center of the range and appears to be plausible.

Groundwater modeling developed for the 2017 Northeast Napa Area: Special Groundwater study (LSCE, 2017) assigned several aquifer physical parameters for the aquifer accessed by the project well. Hydraulic conductivities for model layers representing the Sonoma volcanics range from 1-2 ft/day for horizontal conductivity and from 0.001 to 0.5 ft/day for vertical conductivity. As stated above, the Theis equation assumes all flow to be horizontal and therefore horizontal conductivity is the appropriate reference parameter for this analysis. Assuming a saturated aquifer thickness of 105 ft, horizontal conductivity values would range from 786 to 1,570 gpd/ft. This range agrees well with the Transmissivity estimate of 1,429 gpd/ft derived using specific capacity. Understanding that our estimate does carry a certain amount of uncertainty we have decided to evaluate a range of T values using the lower end of the range derived from the Northeast Napa Area study, 786 gpd/ft, as our lower limit and the value based on the Well 1 pump test specific capacity, 1,429 gpd/ft as our upper limit.

Storativity (S) can be determined by an analytical pump test utilizing a pumping well and at least one observation well. No such pump test data are available for this site. Consequently, S must be estimated for purposes of evaluating likely values of  $r_o$ . In an unconfined aquifer, S ranges from 0.01 to 0.3, and for confined aquifers they range from about 0.001 to 0.00001 (Lohman 1972). Given the uncertain value of S due to the lack of observation well data, a range of likely values of S are considered to estimate the radius of influence of the well and the drawdown of water elevation that might be experienced in neighboring wells. Storativity values for the Northeast Napa Area modeling effort ranged from 0.001 to 0.00001 for units including the Sonoma Volcanics in agreement with Lohman's range for confined aquifers (LSCE, 2017).

S can also be calculated using known Specific Storage values for certain aquifer materials and multiplying by the saturated aquifer thickness. Napa County Guidance suggests a range of Specific Storage values between  $10^{-6}$  to  $2.1^{-5}$  for Rock, fissured (Appendix G Table F3 in Napa 2015). Applying the estimated saturated thickness of 105 ft to the range of Specific Storage values gives a range of storativity from 0.000105 to 2.57. This provides an estimate of the lower bound of the range of S of about 0.0001; the upper bound provided is not useful and should be considered undefined.

## Pumping Regime

To quantitatively estimate potential well interference using the procedure described above, it is necessary to determine a realistic pumping schedule for pumping wells to be analyzed. Time since pumping began (t) was determined by evaluating detailed water use records for the past three years provided by the applicant. Monthly water use records for 2019-2021 kept by the applicant were used to estimate a peak daily water demand. Peak use typically occurs in late summer and early fall and is mostly driven by vineyard irrigation. Estimated peak daily use ranged from 6,583 gallons to 13,103 gallons with an average of 9,784 gallons per day. Irrigation practices are typically limited by well pumping capacity and storage tank capacity; assuming storage is not

limiting and the project well pumps at a rate similar to the sustained yield of 20 gpm reported as the yield of the well in the Tier 1 WAA (Stillwater Civil Design, 2019), it would take 8.15 hours to meet the daily demand. The value of  $t$  used for this analysis is 0.34 days (8.15 hours/24 hours per day).

### Estimated Radius of Influence

Based on the equation presented above ( $r_o = [0.3 T t S^{-1}]^{0.5}$ ), the estimated radius of influence of Well 1 extends beyond Wells 2, 3 and 4, located about 178, 180 and 385 feet respectively from Well 1 (Figure 5). The validity of the equation used to estimate the radius of influence is constrained by the requirement that the well function  $w(u)$  for a given set of parameters ( $r$ ,  $S$ ,  $T$  and  $t$ ) remain relatively small ( $< 0.05$ , Driscoll, p. 219-220). For the set of parameters applicable to this scenario ( $t = 0.34$  days,  $T = 1,429$  gpd/ft (derived from the Well 1 pump test) and  $S = 0.00001$ )  $w(u) = 0.0011$  and the transformed Theis equation estimates a maximum radius of influence of 3,818 ft.

### Estimated Drawdown

Potential drawdown of water elevation in Well 2 resulting from pumping of Well 1 was estimated using the Theis equation. Aquifer properties were estimated from pump test data for Well 1 along with numbers derived from the Northeast Napa Area study and drawdown was evaluated for a combination of these data. Estimates of  $T$  range from the low end value of 786 gpd/ft (based on horizontal  $K$  values used in the Northeast Napa Area modeling), up to 1,429 gpd/ft from Well 1 pump test results, calculated using the empirical relationship between  $T$  and specific yield (Driscoll 1986). A range of storativity values from 0.00001 to 0.001 (Lohman, 1972 and LSCE, 2017) were used along with a daily pumping regime of 20 gpm for 8.16 hours. Applying these parameters, estimated drawdown at Well 2 ranges from 0 ft to 17 ft (Table 4).

Table 4. Theis drawdown calculation results

Scenario	Discharge Q (gpm)	Transmissivity T (ft <sup>2</sup> /day)	Time t (days)	Radius r (ft)	Storativity S	Drawdown s' (ft)
Well 1 Pump Test Low S	20	191	0.34	170	0.00001	10
Well 1 Pump Test High S	20	191	0.34	170	0.001	3.0
NE Napa Model Low S	20	105	0.34	170	0.00001	17
NE Napa Model High S	20	105	0.34	170	0.001	0

The WAA Tier 2 guidelines suggest a threshold of concern for drawdown of 15 ft for wells with casing diameters greater than six inches. Operation of the project well (Well 1) does not appear to cause significant drawdown in the nearest neighboring well (Well 2) for nearly all combinations of  $T$  and  $S$  values. Using the  $T$  value derived from the project well pumping test (191 ft<sup>2</sup>/day) drawdown at Well 2 is estimated to range from 3 ft to 10 ft. Using the lower  $T$  value (105 ft<sup>2</sup>/day) drawdown is 0 ft with a  $S$  value of 0.001 and 17 ft with  $S$  value of 0.00001. This final combination results in a drawdown value slightly greater than the threshold of concern of 15 ft for Well 2, but given the likely lower limit of  $S$  of 0.0001 (see p. 18), this magnitude of drawdown is unlikely.

As mentioned above, a long duration pumping test of the project well that includes an observation well provides more accurate estimates of the aquifer properties (T and S) for use in drawdown calculations. Specifically, to more accurately estimate Storativity (S), the pumping test would need to include monitoring data from a nearby well. We do have some information from the pumping test of Well 1 which allows us to estimate transmissivity; however, these tests were not long enough to provide great confidence in the estimate of T. Additionally, this test did not include monitoring at other wells and provides no estimate of S.

Owing to the uncertainty of the storativity value of the project aquifer we have evaluated a range of values to understand the range of possible impacts pumping the project well might have upon neighboring wells. It is, however, useful to understand the sensitivity of the drawdown calculations to S values. For example, by increasing the low end estimate of S by a factor of two to 0.00002, estimated drawdown is reduced to 14.94 ft, just below the threshold of concern defined by the County. That said, drawdown estimates presented here should be understood to have a range of uncertainty associated with them. Although only one of the combinations of parameters resulted in a drawdown beyond the threshold of concern it is important to review possible ways to mitigate the potential for excessive drawdown.

One option to mitigate potential drawdown of concern in Well 2 would be to reduce the pumping rate of Well 1. Reducing the pumping rate would reduce the magnitude of drawdown. For example, we considered reducing the pumping rate in Well 1 to 17 gpm. Reducing the pumping rate would increase the time required to meet the daily peak demand of 9,784 gallons to 9.59 hours or 0.40 days. Re-evaluation of drawdown calculations with this new pumping regime results in a reduction in drawdown to 14.8 ft under the “NE Napa Low S” scenario (Table 5). This example of a mitigation strategy to prevent potential well interference also shows that the degree of potential well interference is not extreme and is readily managed.

**Table 5. Theis drawdown calculation results with alternative pumping regime, reduced pumping rate and longer pump time.**

Scenario	Discharge Q (gpm)	Transmissivity T (ft <sup>2</sup> /day)	Time t (days)	Radius r (ft)	Storativity S	Drawdown s' (ft)
Well 1 Pump Test Low S	17	191	0.4	170	0.00001	8.9
Well 1 Pump Test High S	17	191	0.4	170	0.001	2.8
NE Napa Model Low S	17	105	0.4	170	0.00001	14.8
NE Napa Model High S	17	105	0.4	170	0.001	0

### Well Interference Analysis Conclusion

The WAA Tier 2 guidelines suggest a threshold of concern for drawdown of 15 ft for wells with casing diameters greater than six inches. Operation of the project well (Well 1) does not cause significant drawdown in the nearest neighboring well (Well 2) for nearly all combinations of estimated T and S values. One combination of parameters did produce a drawdown estimate that exceeded the threshold of concern. If necessary, potential well interference effects could

be mitigated by operating the project well at a slightly reduced pumping rate; however, we do not believe this is warranted given the very low risk of significant well interference.

## Groundwater/Surface Water Interactions

**This WAA was initially drafted under Drought Emergency policy effective beginning in summer 2022 that allowed new permitted uses if there is zero net increase in groundwater use. In the case of zero net increase in groundwater use under the Drought Emergency policy, the Tier 3 WAA is waived. We have retained the Tier 3 WAA analysis at the request of Napa County.**

### Hydrogeologic Conditions

The County-designated “significant stream” nearest Well 1 (the project well) is Soda Creek located approximately 1,150 feet to the east. A Well Completion Report and driller’s geologic log for the project well is not available; however, results of the March 2024 down-well video inspection revealed that the well is sealed off from and is not perforated in alluvial aquifer materials that could be interconnected with surface water in Soda Creek. The project well accesses an aquifer consisting of the fractured volcanic rocks of the Sonoma Volcanics (Andesite of Stags Leap) beginning at ~148 feet bgs. A fracture zone that may be the main source of groundwater flow into the well was observed from 175 and 183 feet bgs.

Field observations made in Soda Creek by OEI in spring of 2022 identified both alluvial deposits along with fractured volcanics in the approximately 25 ft high embankment and channel of Soda Creek in the reach closest to the project well. These observations indicate that Soda Creek fully penetrates the Qoa alluvial unit and partially penetrates the Sonoma Volcanics. As such, there is a possibility that Well 1 could have a hydrologic connection to Soda Creek. The most recent water surface elevation measured in Well 1 was 39 ft bgs and the depth of Well 1 is known to be 198 ft bgs. These elevations equate to approximately 24 ft and 183 ft below the channel bottom of Soda Creek (Figure 3a). The observed depth of the fractured rock in the well was approximately 133 feet below the channel of Soda Creek. Based on these observations, it is apparent that the local aquifer utilized by Well 1 lies at depth below the channel of Soda Creek and the piezometric surface associated with this confined or partially confined aquifer lies about 24 ft below the channel of Soda Creek.

Surface flows in Soda Creek are absent during large portions of the year (beginning as early as late spring through summer and into the fall) and has been documented to be a net losing stream, meaning that flows percolate through the streambed and out into the adjacent groundwater system. As described in the Northeast Napa Area study Soda Creek is “more affected by precipitation, and therefore climate, than groundwater pumping in determining the rate of stream flow and leakage to groundwater” (Pages ES-5 to ES-7 in LSCE, 2017).

## Guidance Regarding Acceptable Well Construction

Napa County guidance for Tier 3 analyses presents well distance standards and construction assumptions that "if applicable would be expected to preclude significant adverse effects on surface waters" (County of Napa, 2015). Specifically, the "Tier 3 Groundwater Surface Water Interaction Criteria" section (pgs 10-13) states:

*The groundwater/surface water criteria are presumptively met if the distance standards and project well construction assumptions are met (see Tables 3, 4, and 5).*

The guidelines for well construction that would mitigate potential interaction with surface water include a scenario representative of fractured bedrock aquifers (p. 11):

*Distance standards for project wells completed in consolidated formations will generally be no more restrictive than those shown in Tables 3, 4, and 5 for hydraulic conductivity values of 0.5 ft/day.*

For a well in a consolidated formation such as the Andesite of Stags Leap of the Sonoma Volcanics, the appropriate hydraulic conductivity category would be 0.5 ft/day. Hydraulic conductivity of the aquifer materials accessed by the project well can be estimated from the aquifer transmissivity are consistent with hydraulic conductivity for "consolidated formations", ranging from 2.1 to 3.8 ft/day assuming a saturated aquifer thickness of 50 ft from ~148 ft bgs to the bottom of the well where fractured andesite is open to the uncased well bore. These standards consider the planned pumping rate of the project well along with the well depth, screened interval, and seal depth along with aquifer hydraulic conductivity values and specify acceptable set-back distances between a well and a significant stream corresponding to specific combinations of the parameters considered.

Tables 3, 4 and 5 in the Napa WAA guidance document present these distance standards and assumptions developed primarily for wells constructed in unconsolidated aquifer materials. The project well (Well 1) is sealed in its uppermost 15 ft penetrating a thin layer of alluvium, below which the open boring penetrates consolidated volcanic rocks. The project well's yield of 20 gpm places it in the "Low capacity pumping rate" category of wells (defined by Napa County to be 10 gpm to 30 gpm) therefore, distance standards are evaluated using Table 4 (p. 12 of the Napa WAA Guidance document). Table 4 is reproduced below.

**Table 4.** Well Distance Standards and Construction Assumptions; Low capacity pumping rates (i.e., between 10 gpm and 30 gpm), constructed in unconsolidated deposits in the upper part of the aquifer system (unconfined aquifer conditions).

Aquifer Hydraulic Conductivity (ft/day)	Acceptable Distance from Surface Water Channel			Minimum Surface Seal Depth (feet)	Depth of Uppermost Perforations (feet)
	500 feet	1000 feet	1500 feet		
80			✓	50	150
50			✓	50	150
30			✓	50	100
0.5		✓		50	100

Per Table 4, an acceptable distance of 1,000 ft is recommended. Based on the recent down-well inspection it appears that the project well is sealed by an unperforated steel casing to a depth of 15 feet (likely a “conductor” casing installed by the driller to prevent caving of the bore hole in unconsolidated alluvium). This depth is less than the Minimum Surface Seal depth stated in Table 4; however, since Well 1 does not penetrate any alluvium below the sealed casing a connection to an upper alluvial aquifer, which would have a much greater likelihood of causing impacts to stream flow (and is likely the reasoning behind the surface seal criteria), is not possible and we consider the seal depth criterion is satisfied. Regardless of this fact it is apparent that the aquifer accessed by Well 1 (and other wells nearby) is the deeper consolidated fractured volcanic aquifer.

Given that there is no casing below 15 feet bgs, Well 1 is open to volcanic aquifer materials for the lower 183 feet of its depth. Although the well is open to the aquifer materials across this interval, fractures that are believed to provide most or all of the groundwater flowing into Well 1 are located beginning at 148 feet bgs with the most significant fractures between 175 and 183 feet bgs. This interval of the open bore well is considered the primary aquifer providing water for Well 1 and for the purpose of this evaluation is assumed to be equivalent to the screened interval of Well 1. Since the fracture zone is located at a depth greater than the 100 foot depth required of the Uppermost Well perforations, we consider this criterion is satisfied. We believe that the project well meets the distance standards and construction criteria specified in Table 4 and therefore “would be expected to preclude significant adverse effects on surface waters” per the Tier 3 groundwater/surface water interaction guidance provided by County of Napa.

As noted above, several additional factors indicate that impact upon flows in Soda Creek of pumping related to the proposed project are not likely to be significant. The characterization of Soda Creek as a losing stream mostly affected by precipitation and which consistently loses connection with groundwater (LSCE, 2017) indicates that surface waters, during the portion of the year when connected to groundwater, flow to the surrounding aquifer but the aquifer does

not provide groundwater to the stream (i.e. stream flow magnitude is not dependent on inputs from groundwater). Therefore, pumping of a well in an adjacent aquifer would be much less likely to impact streamflow in this reach of Soda Creek.

Several factors have led us to conclude that potential project impacts to streamflow are not significant. Along with the relatively large horizontal separation from the well (1,150 ft) and vertical separation between Well 1 and Soda Creek (133 ft from the top of the fracture zone elevation up to the channel bottom), a careful review of aquifer materials and well construction indicate that Well 1 satisfies criteria “expected to preclude significant adverse effects on surface waters”. The losing and disconnected character of Soda Creek and the low permeability of the local bedrock lead us to conclude that the proposed project will not have a significant impact on flows in Soda Creek.

## Summary

The total proposed water use for the project is estimated to be 5.40 acre-ft/yr. This represents about 45% of the allotted 12.2 acre-ft of groundwater that has historically been allowed per Napa County policy for the Valley Floor aquifer of 1 acre-ft/acre/yr. Per Drought Emergency policy adopted in 2022, new groundwater use is limited to the equivalent of 0.3 acre-ft/acre/year; this project has no net increase in water use.

Per 2022 County Drought Emergency policy, projects demonstrating no net increase in groundwater use are not required to perform Tier 2 or Tier 3 assessments. However, the County has indicated that Drought Emergency policy may be changed when drought conditions are lifted by the County Board of Supervisors. Consequently, the Tier 2 and Tier 3 analyses evaluating possible impacts of the proposed increase in groundwater use remain in this WAA to support any future permitting decisions.

The nearest neighboring well (Well 2) is located 170 ft from the project well (Well 1). A well interference analysis (Tier 2 WAA) was performed and drawdown in Well 2 resulting from pumping to meet the proposed project daily demand was determined to range from zero to 17 ft. Although this estimate of drawdown affecting the nearest neighboring well slightly exceeds the threshold of concern (15 ft), this only occurs in a scenario assuming an extremely low value of the Storativity parameter (S) that we believe is unlikely to represent local conditions. We do not believe that significant well interference is generated by the project well.

Potential effects of groundwater use on streamflow in Soda Creek were also considered (Tier 3 WAA). Tier 3 criteria state that for Well 1 to meet distance and construction standards it must be constructed 1,000 ft away from the water body in question and have a 50 ft-deep surface seal and that the minimum depth of uppermost well perforations be at least 100 ft bgs. Well 1 is located over 1,000 ft from Soda Creek and although the sealed interval is less than 50 ft we believe that the seal is sufficient and this part of the criteria satisfied since no alluvium is present in Well 1 aquifer material and a connection between Well 1 and any upper alluvial aquifer that could be connected to Soda Creek is not possible. The fractured rock determined to be the main aquifer accessed by Well 1 is located 148 to 198 ft bgs; we believe this depth interval in the

uncased well bore is equivalent to the screened interval of Well 1 and, hence, that the criterion pertaining to “depth to uppermost perforations” is satisfied. We concluded that Well 1 satisfies criteria “expected to preclude significant adverse effects on surface waters”. Additionally, we believe that other factors exist indicating that pumping of Well 1 will not significantly affect flows in Soda Creek. Flows in Soda Creek are believed to be of a losing character and more influenced by climate, namely precipitation, than pumping of groundwater. Based on that characterization (LSCE, 2017), the horizontal and vertical separation between the fractured rock aquifer in the project well (Well 1) and Soda Creek, relatively small amounts of drawdown estimated at a nearby Well in the Tier 2 analysis, we do not expect the proposed project will have significant effects on flow in Soda Creek.

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**APPENDIX A**  
**WELL COMPLETION REPORTS**

FEE 40 DATE 9/3/86  
 RECEIPT NO. 18164 BY JDH

Well 4

A.P. NO. 39-590 04

NAPA COUNTY HEALTH DEPARTMENT  
 DIVISION OF ENVIRONMENTAL HEALTH

APPLICATION & PERMIT TO CONSTRUCT A WATER WELL

NAME \_\_\_\_\_ ADDRESS \_\_\_\_\_  
 NAME Pulliam Drilling ADDRESS 2877 Piedmont DATE 9-3-86  
(Well Driller) (Job Location)

TYPE OF WORK: NEW WELL  RECONDITIONING \_\_\_\_\_ DEEPENING \_\_\_\_\_  
 TYPE I PERMIT  DESTROY \_\_\_\_\_ OTHER \_\_\_\_\_  
 TYPE II PERMIT \_\_\_\_\_ TEST HOLE \_\_\_\_\_

PROPOSED USE: DOMESTIC \_\_\_\_\_ IRRIGATION  INDUSTRIAL HOT WATER \_\_\_\_\_ MUNICIPAL \_\_\_\_\_  
 TEST WELL \_\_\_\_\_ OTHER \_\_\_\_\_

Sewage Disposal on site (existing or proposed) Public  Individual  Private \_\_\_\_\_  
 Distance from well to any part of nearest sewage disposal system 100+ feet.  
 (Sketch of site to accompany application) County road setback 90' feet from centerline.

TYPE OF EQUIPMENT TO BE USED: Rotary  Cable \_\_\_\_\_ Hand Dug \_\_\_\_\_ Other \_\_\_\_\_

WORKER'S COMPENSATION COVERAGE: (Check one of the following)  
 A certificate of current Worker's Compensation Insurance coverage is presently on file with this office.  
 A certificate of current Worker's Compensation Insurance is being filed with this application.  
 I certify that in the performance of the work for which this permit is issued I shall not employ any person in any manner so as to become subject to the Worker's Compensation laws in California.

Tom Pulliam Signature of Applicant 9-3-86 Date

CASING

CONSTRUCTION:  
 Total Depth 275 Ft. Depth of Casing 275  
 Surface Seal to 24 Ft.  
 Any Stratas Sealed: Yes \_\_\_\_\_ No   
 If yes, depth of stratas: \_\_\_\_\_  
 From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft./From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft.  
 Perforations:  
 From 130 Ft. to 275 Ft./From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft.  
 From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft.

WATER LEVELS

First Water at 137 Ft. Static level at 45 Ft.

WELL TESTS

How performed air test  
 Yield 150 GPM with 230 Ft. Drawdown after 4  
 Hrs. Annular space depth 24 Ft./Thickness 2  
 in. Diameter of casing 6" Material Plastic  
 Gravel Pack: Yes  No \_\_\_\_\_ Conductor Casing:  
 Yes \_\_\_\_\_ No \_\_\_\_\_ Sealed with: Concrete   
 Grout \_\_\_\_\_ Neat Cement \_\_\_\_\_ Pudd. Clay \_\_\_\_\_  
 Other \_\_\_\_\_ Chlorination by: Owner \_\_\_\_\_  
 Pump Co. \_\_\_\_\_ Driller \_\_\_\_\_

WELL LOG

(Formation; described by color, size of material, structure)

Ft.	to	Ft.
0	to	65
65	to	132
132	to	145
145	to	275
		Brn ash
		Brn ash and Brn rock
		Red ash and Blk. rock
		Brn and red ash with Blk rock

RECEIVED  
 JAN 8 1987  
 DIVISION OF ENVIRONMENTAL HEALTH

CONTRACTOR'S STATEMENT: I, Bill Pulliam, contractor for the above work, hereby certify that the above was installed according to all applicable rules and regulations covered by this permit, and that the information is true and correct to the best of my knowledge.

10-30  
 Office \_\_\_\_\_ Pink-Owner  
 Return to Office \_\_\_\_\_ Orange-Contractor Bill Pulliam  
 Contractor's Signature

QUADRUPPLICATE For Local Requirements

STATE OF CALIFORNIA WELL COMPLETION REPORT

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

Page 1 of 1

Owner's Well No. WELL #1

No. e071144

Date Work Began 3/19/2008, Ended 4/3/2008

Local Permit Agency Napa County Environmental

Permit No. E08-00099 Permit Date 3/18/2008

GEOLOGIC LOG

WELL OWNER

Table with columns: ORIENTATION, DRILLING METHOD, FLUID, DEPTH FROM SURFACE, DESCRIPTION. Includes text: VERTICAL, HORIZONTAL, ANGLE, Mud Rotary, Bentonite, Describe material, grain, size, color, etc.

Name Robert & Ariane Matschulat Mailing Address 46 Vineyard Lane Greenwich CT CITY STATE ZIP

WELL LOCATION Address 4150 Silverado Trail City Napa CA County Napa APN Book 039 Page 130 Parcel 003 Township Range Section Latitude

LOCATION SKETCH NORTH SOUTH WEST EAST ACTIVITY (NEW WELL, MODIFICATION/REPAIR, DESTROY, PLANNED USES, MONITORING, etc.)

RECEIVED APR 15 2008 DEPT. OF ENVIRONMENTAL MANAGEMENT

TOTAL DEPTH OF BORING 400 (Feet) TOTAL DEPTH OF COMPLETED WELL 400 (Feet)

WATER LEVEL & YIELD OF COMPLETED WELL DEPTH TO FIRST WATER N/A (Ft.) BELOW SURFACE DEPTH OF STATIC WATER LEVEL 50 (Ft.) & DATE MEASURED 4/3/2008 ESTIMATED YIELD 20 (GPM) & TEST TYPE Bailed TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN 120 (Ft.)

Table with columns: DEPTH FROM SURFACE, BORE-HOLE DIA., CASING (S) TYPE, MATERIAL / GRADE, INTERNAL DIAMETER, GAUGE OR WALL THICKNESS, SLOT SIZE IF ANY

Table with columns: DEPTH FROM SURFACE, ANNULAR MATERIAL TYPE, CE-MENT, BEN-TONITE, FILL, FILTER PACK (TYPE/SIZE)

- ATTACHMENTS (Geologic Log, Well Construction Diagram, Geophysical Log(s), Soil/Water Chemical Analysis, Other)

CERTIFICATION STATEMENT I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief. NAME Weeks Drilling & Pump (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED) P.O. Box 176 ADDRESS Sebastopol CA 95473 CITY STATE ZIP Signed Melissa J Lopez 04/08/08 DATE SIGNED 177681 C-57 LICENSE NUMBER

HEALTH DEPT. USE ONLY

FEE: 13.00

DATE: 10-24-74

RECEIPT NO: 1352

BY: Karla Comeyer

Well 6

RECEIVED # 39-390-11

NAPA COUNTY HEALTH DEPARTMENT  
DIVISION OF ENVIRONMENTAL HEALTH FEB 11 1975

APPLICATION & PERMIT TO CONSTRUCT  
A WATER WELL (ORDINANCE # ) DIVISION OF ENVIRONMENTAL HEALTH

NAME [Redacted] ADDRESS [Redacted] DATE 10-24-74  
(Owner) (Job Location)  
NAME M. Dean + Williams ADDRESS 878 6th Centre  
(Well Driller)

TYPE OF WORK  
NEW WELL  RECONDITIONING  DEEPENING   
TEST HOLES  DESTROYING  OTHER   
TYPE I PERMIT  TYPE II PERMIT  FEE

PROPOSED USE  
DOMESTIC  IRRIGATION  INDUSTRIAL  MUNICIPAL   
TEST WELL  OTHER

Sewage Disposal On Site (Existing or Proposed) Public  Individual  Private   
Distance from well to any part of nearest sewage disposal system  feet.  
(Sketch of site to accompany application. None)

TYPE OF EQUIPMENT TO BE USED  
Rotary  Cable  Hand Dug  Other

CONSTRUCTION PROPOSED  
Diameter of casing 8" Material Steel Annular Space: Size 2"  
Sealed with: Concrete  Grout  Neat Cement  Puddled Clay  Other   
Conductor Casing: Yes  No  Material   
Chlorination By: Owner  Pump Co  Driller

Harold McLean  
(SIGNATURE OF APPLICANT)

10/24/74  
(DATE)

NOTICE TO DRILLER: COMPLETE THIS PORTION AND PROVIDE OWNER WITH THIS COPY.

CASING  
CONSTRUCTION  
Total Depth 460 Ft.  
Surface Seal to 20 Ft.  
Any Stratas sealed: Yes  No   
If yes, depth of Stratas  
From      Ft. to      Feet  
From      Ft. to      Feet  
Perforations  
From      Ft. to      Feet  
From      Ft. to      Feet  
From      Ft. to      Feet  
WATER LEVELS  
First water at 126 Feet  
Static level at 94 Feet  
WELL TESTS  
How performed Air Jet  
Yield 12 GPM with      Feet  
Drawdown 180 Ft. after 4 Hrs.

WELL LOG  
(Formation; describe by color, size of material, structure)

	Ft.	to	Ft/
Top Soil	0	2	
Sand Rock & Clay	2	8	
White Brown Sandstone	8	70	
Hard Grey Rock	70	126	
Grey Rock	126	192	
White Grey Sandstone	192	240	
Grey Rock	240	302	
Red lava	302	308	
Grey Rock	308	420	
Grey Basalt Rock	420	460	

Signed: [Signature]  
License # 272321

HEALTH DEPT. USE ONLY

A.P. No. \_\_\_\_\_

FEE 20.00

NAPA COUNTY HEALTH DEPARTMENT  
DIVISION OF ENVIRONMENTAL HEALTH

TRB → 6-4-15  
WF

DATE 3/28/78

APPLICATION & PERMIT TO CONSTRUCT  
A WATER WELL

RECEIPT NO. 5077

BY M. Heid

NAME \_\_\_\_\_ ADDRESS \_\_\_\_\_ DATE 3/28/78

NAME William Williams (OWNER) ADDRESS 878 El Centro Ave., Napa, CA (JOB LOCATION)  
NAME \_\_\_\_\_ ADDRESS \_\_\_\_\_ (WELL DRILLER)

TYPE OF WORK: NEW WELL  RECONDITIONING \_\_\_\_\_ DEEPENING \_\_\_\_\_  
TEST HOLES \_\_\_\_\_ DESTROYING \_\_\_\_\_ OTHER \_\_\_\_\_  
TYPE I PERMIT  TYPE II PERMIT \_\_\_\_\_ FEE \_\_\_\_\_

PROPOSED USE: DOMESTIC  IRRIGATION \_\_\_\_\_ INDUSTRIAL \_\_\_\_\_ MUNICIPAL \_\_\_\_\_  
TEST WELL \_\_\_\_\_ OTHER \_\_\_\_\_

Sewage disposal on site (existing or proposed) Public \_\_\_\_\_ Individual  Private \_\_\_\_\_  
Distance from well to any part of nearest sewage disposal system 100 feet  
(Sketch of site to accompany application.)

TYPE OF EQUIPMENT TO BE USED: Rotary  Cable \_\_\_\_\_ Hand Dug \_\_\_\_\_ Other \_\_\_\_\_

CONSTRUCTION PROPOSED: Diameter of casing 8" Material Steel Annular Space: Size 2"  
Sealed with: Concrete  Grout \_\_\_\_\_ Neat Cement \_\_\_\_\_ Puddled Clay \_\_\_\_\_ Other \_\_\_\_\_  
Conductor Casing: Yes \_\_\_\_\_ No  Material \_\_\_\_\_  
Chlorination by: Owner  Pump Co. \_\_\_\_\_ Driller \_\_\_\_\_

\_\_\_\_\_  
(SIGNATURE OF APPLICANT) \_\_\_\_\_ (DATE) 3/28/78

RECEIVED  
APR 13 1978

CASING

WELL LOG

CONSTRUCTION  
Total Depth 375 Ft.  
Surface Seal to 20 Ft.  
Any stratas sealed: Yes \_\_\_\_\_ No   
If yes, depth of stratas:  
From \_\_\_\_\_ Ft. to \_\_\_\_\_ Feet  
From \_\_\_\_\_ Ft. to \_\_\_\_\_ Feet  
Perforations:  
From \_\_\_\_\_ Ft. to \_\_\_\_\_ Feet  
From \_\_\_\_\_ Ft. to \_\_\_\_\_ Feet  
From \_\_\_\_\_ Ft. to \_\_\_\_\_ Feet

(Formation; describe by color, size of material, structure)

	Ft.	to	Ft.
Surface soil	0		1
Sub soil	1		4
Sandstone	4		27
Sandstone with layers of rock	27		87
Soft sandstone with layers of clay and rock	87		194
Gravel & sandy clay, soft sandstone	194		243
Hard rock	243		330
Layers of hard rock & gravel	330		375

WATER LEVELS

First water at \_\_\_\_\_ Feet  
Static level at 22 Feet

WELL TESTS

How performed Air jet  
Yield 30 GPM with \_\_\_\_\_ Feet  
Drawdown 106 Ft. after 1 Hrs.

Signed J. Williams  
License No. 272321

ORIGINAL

STATE OF CALIFORNIA

Do not fill in

File with DWR

THE RESOURCES AGENCY

DEPARTMENT OF WATER RESOURCES

No. 121554

Number of Intent No. \_\_\_\_\_

WATER WELL DRILLERS REPORT

State Well No. \_\_\_\_\_

Permit No. or Date \_\_\_\_\_

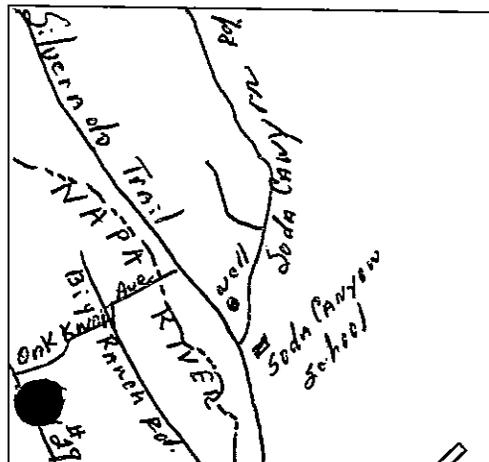
OGN/04W-15PL2 (WME)

Other Well No. ~~011/0015~~

(2) LOCATION OF WELL (See instructions) #39-390-09  
 County Napa Owner's Well Number \_\_\_\_\_  
 Well address if different from above Silverado Tr.  
 Township T. 6N. Range R. 4W Section \_\_\_\_\_  
 Distance from cities, roads, railroads, fences, etc. \_\_\_\_\_

(12) WELL LOG: Total depth 405 ft. Depth of completed well 405 ft.  
 from ft. to ft. Formation (Describe by color, character, size or material)

0	3	Surface soil
3	19	Sandy clay cemented gravel
19	59	Sandstone with layers of gravel
59	73	Rock with layers of gravel
73	153	Black, red & brown rock (hard)
153	331	Black, brown & red rock with traces of light yellow rock
331	361	Purple rock (hard)
361	394	White, brown, yellow & black rock (hard)
394	405	Purple rock (hard)



(3) TYPE OF WORK:

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

(4) PROPOSED USE:

- Domestic
- Irrigation
- Industrial
- Test Well
- Stock
- Municipal
- Other

(5) EQUIPMENT:

- Rotary  Reverse
- Cable  Air
- Other  Bucket

(6) GRAVEL PACK:

- Yes  No  Size Hea Gva.
- Diameter of bore 12 1/4 & 8 3/4
- Ranked from 20 to 405 ft.

(7) CASING INSTALLED:

- Steel  Plastic  Concrete

(8) PERFORATIONS:

(7) CASING INSTALLED:				(8) PERFORATIONS:		
From ft.	To ft.	Dia. in.	Gage of Wall	From ft.	To ft.	Slot size
0	405	6	160	105	405	STD

(9) WELL SEAL:

- Was surface sanitary seal provided? Yes  No  If yes, to depth 20 ft.
- Were strata sealed against pollution? Yes  No  Interval \_\_\_\_\_ ft.
- Method of sealing Concrete

(10) WATER LEVELS:

Depth of first water, if known \_\_\_\_\_ ft.  
 Standing level after well completion 51 ft.

(11) WELL TESTS:

- Was well test made? Yes  No  If yes, by whom? Driller
- Type of test Pump  Bailer  Air lift
- Depth to water at start of test 51 ft. At end of test 119 ft.
- Discharge 30 gal/min after 2 hours Water temperature \_\_\_\_\_
- Chemical analysis made? Yes  No  If yes, by whom? \_\_\_\_\_
- Was electric log made? Yes  No  If yes, attach copy to this report

Work started 10-27 19 78 Completed 12-1 19 78

WELL DRILLER'S STATEMENT:

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

SIGNED D. Williams (Well Driller)

NAME McLean & Williams Well Drilling

(Person, firm, or corporation) (Typed or printed)

Address 878 El Centro Avenue

City Napa, CA Zip 94558

License No. 272321 Date of this report 12-6-78

ORIGINAL  
File with DWR

STATE OF CALIFORNIA  
THE RESOURCES AGENCY  
DEPARTMENT OF WATER RESOURCES  
WATER WELL DRILLERS REPORT

Do not fill in  
No. 103458

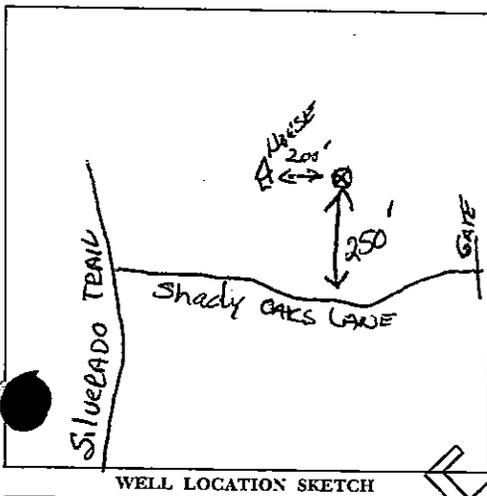
of Intent No. \_\_\_\_\_  
Permit No. or Date \_\_\_\_\_

State Well No. \_\_\_\_\_  
Other Well No. 06N04W15

(1) **OWNER**  
Address \_\_\_\_\_  
City \_\_\_\_\_  
(2) **LOCATION OF WELL** (See instructions):  
County Napa Owner's Well Number 39-590-08  
Well address if different from above Shady Oaks Lane  
Township \_\_\_\_\_ Range \_\_\_\_\_ Section \_\_\_\_\_  
Distance from cities, roads, railroads, fences, etc. \_\_\_\_\_

(12) **WELL LOG:** Total depth 145 ft. Depth of completed well 145 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	7	topsoil & boulders
7	50	black gray & red rock-med hard
50	75	black & red rock-hard fract
75	145	black red green & brown rock-hard fractures



(3) **TYPE OF WORK:**  
 New Well  Deepening   
 Reconstruction   
 Reconditioning   
 Horizontal Well   
 Destruction  (Describe destruction materials and procedures in Item 12)  
 (4) **PROPOSED USE:**  
 Domestic   
 Irrigation   
 Industrial   
 Test Well   
 Stock   
 Municipal   
 Other

(5) **EQUIPMENT:**  
 Rotary  Reverse   
 Cable  Air   
 Other  Bucket

(6) **GRAVEL PACK:**  
 Yes  No  Size \_\_\_\_\_  
 Diameter of bore \_\_\_\_\_  
 Packed from \_\_\_\_\_ to \_\_\_\_\_ ft.

(7) **CASING INSTALLED:**  
 Steel  Plastic  Concrete

(8) **PERFORATIONS:**  
 Type of perforation or size POWER SAW

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	65	8	*65*	65	145	1/8 x 3
			160			

(9) **WELL SEAL:**  
 Was surface sanitary seal provided? Yes  No  If yes, to depth 21 ft.  
 Were strata sealed against pollution? Yes  No  Interval \_\_\_\_\_ ft.  
 Method of sealing grout

(10) **WATER LEVELS:**  
 Depth of first water, if known 7.5 ft.  
 Standing level after well completion 50 ft.

(11) **WELL TESTS:**  
 Was well test made? Yes  No  If yes, by whom? driller  
 Type of test Pump  Bailer  Air lift   
 Depth to water at start of test \_\_\_\_\_ ft. At end of test \_\_\_\_\_ ft.  
 Discharge 100 gal/min after \_\_\_\_\_ hours Water temperature \_\_\_\_\_  
 Chemical analysis made? Yes  No  If yes, by whom? \_\_\_\_\_  
 Was electric log made? Yes  No  If yes, attach copy to this report

Work started 5/21 1981 Completed 5/22 1981

**WELL DRILLER'S STATEMENT:**  
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.  
 SIGNED J. Doshier (Well Driller)  
 NAME Doshier-Gregson Drilling, Inc  
 (Person, firm, or corporation) (Typed or printed)  
 Address 5365 Napa-Vallejo Hwy  
 City Vallejo, Ca Zip 94590  
 License No. 294001 Date of this report 5/26/81

HEALTH DEPT. USE ONLY  
FEE: 412  
DATE: 6/11/73  
RECEIPT NO: 4135  
BY: ATM

NAPA COUNTY HEALTH DEPARTMENT  
DIVISION OF ENVIRONMENTAL HEALTH  
APPLICATION & PERMIT TO CONSTRUCT  
A WATER WELL  
(ORDINANCE # )

NAME [Redacted] ADDRESS [Redacted] DATE 6/11/73  
(Owner) (Job Location)  
NAME Bushman & Larson ADDRESS Napa Wa Regional Hwy  
(Well Driller)

TYPE OF WORK  
NEW WELL  RECONDITIONING  DEEPENING   
TEST HOLES  DESTROYING  OTHER   
TYPE I PERMIT  TYPE II PERMIT  FEE

PROPOSED USE  
DOMESTIC  IRRIGATION  INDUSTRIAL  MUNICIPAL   
TEST WELL  OTHER

Sewage Disposal On Site (Existing or Proposed) Public  Individual  Private   
Distance from well to any part of nearest sewage disposal system 100 feet.  
(Sketch of site to accompany application.)

TYPE OF EQUIPMENT TO BE USED  
Rotary  Cable  Hand Dug  Other

CONSTRUCTION PROPOSED  
Diameter of casing 6" Material Steel Annular Space: Size 2"  
Sealed with: Concrete  Grout  Neat Cement  Puddled Clay  Other   
Conductor Casing: Yes  No  Material   
Chlorination By: Owner  Pump Co  Driller   
Robert Kingdon 6/11/73  
(SIGNATURE OF APPLICANT) (DATE)

NOTICE TO DRILLER: COMPLETE THIS PORTION AND RETURN TO DIVISION OF ENVIRONMENTAL HEALTH WITHIN 10 DAYS AFTER COMPLETION...

CASING  
CONSTRUCTION  
Total Depth 450 Ft. Completed  
Surface seal to 20' Ft.  
Any Stratats sealed Yes  No   
If yes, depth of Stratats  
From      Ft. to      Ft.  
From      Ft. to      Ft.  
Perforations  
From 140 Ft. to 450' Ft.  
From      Ft. to      Ft.  
WATER LEVELS  
First water at 243' Ft.  
Static level at 125' Ft.  
WELL TESTS  
How performed 5 H.P. Sub. Test Pump  
Yield 20 GPM with 190' ft.  
Drawdown      ft. after 20 Hrs.

WELL LOG  
(Formation; describe by color, size of material, structure) Ft. To Ft.

0	3	Top Soil
3	14	Boulders & Clay
14	128	Blue Clay w/Imbedded Gravel & Boulders
128	235	Gravel & Boulders w/ Clay Stringers
235	243	Brown Pumice
243	298	Fine Gravel & Sand
298	315	Gravel & Boulders
315	320	Boulders w/Hard Clay
320	455	Hard Black Rock w/ Brown Volcanic Lava

SIGNED: J.P. Bushman  
LICENSE # 258826

RECEIVED

JUN 27 1973

HUMAN SERVICES AGENCY  
ENVIRONMENTAL QUALITY CONTROL



QUADRUPLICATE  
For Local Requirements

Well 13 OF CALIFORNIA

39-130-34

DWR USE ONLY - DO NOT FILL IN

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

STATE WELL NO./STATION NO.	
LATITUDE	LONGITUDE
APN/TRS/OTHER	

Page \_\_\_ of \_\_\_

Owner's Well No. \_\_\_\_\_

No. **813856**

Date Work Began 06/01/99, Ended 06/07/99

Local Permit Agency Napa

Permit No. 96-11013 Permit Date 04/09/99

GEOLOGIC LOG

WELL OWNER

ORIENTATION ( )		DRILLING METHOD	FLUID	DESCRIPTION <i>Describe material, grain size, color, etc.</i>
VERTICAL	HORIZONTAL			
DEPTH FROM SURFACE				
Ft.	to Ft.			
0	2			topsoil
2	20			red clay small boulders
20	40			lt dk red black&gray rock
40	55			red clay
55	60			lt brown&dk red rock
60	70			dk brown rock hard fract
70	110			dk brown red rock hard fract
110	130			gray dk brown red rock fract hard
130	150			gray dk brown rock stringers black hard fract
150	170			gray rock stringers red&brown hard fract
170	210			dk red&gray rock med hard fract
210	230			red rock stringers black med&fract
230	268			red rock stringers dk red gray hard fract

Name George Broderson  
Mailing Address 1185 Soda Canyon Road  
Napa CA 945945  
CITY STATE ZIP

WELL LOCATION  
Address 1185 Soda Canyon Road  
City Napa  
County Napa  
APN Book 39 Page 130 Parcel 12  
Township \_\_\_\_\_ Range \_\_\_\_\_ Section \_\_\_\_\_  
Latitude \_\_\_\_\_ NORTH Longitude \_\_\_\_\_ WEST  
DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH

ACTIVITY ( )  
 NEW WELL  
MODIFICATION/REPAIR  
\_\_\_ Deepen  
\_\_\_ Other (Specify) \_\_\_\_\_  
\_\_\_ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")  
PLANNED USES ( )  
WATER SUPPLY  
\_\_\_ Domestic \_\_\_ Public  
\_\_\_ Irrigation \_\_\_ Industrial  
MONITORING \_\_\_  
TEST WELL \_\_\_  
CATHODIC PROTECTION \_\_\_  
HEAT EXCHANGE \_\_\_  
DIRECT PUSH \_\_\_  
INJECTION \_\_\_  
VAPOR EXTRACTION \_\_\_  
SPARGING \_\_\_  
REMEDIATION \_\_\_  
OTHER (SPECIFY) \_\_\_\_\_

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER \_\_\_\_\_ (Ft.) BELOW SURFACE  
DEPTH OF STATIC WATER LEVEL 50' (Ft.) & DATE MEASURED 06/07/99  
ESTIMATED YIELD \* 50.gpm (GPM) & TEST TYPE air  
TEST LENGTH \_\_\_\_\_ (Hrs.) TOTAL DRAWDOWN 125' (Ft.)  
\* May not be representative of a well's long-term yield.

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	CASING (S)						DEPTH FROM SURFACE Ft. to Ft.	ANNULAR MATERIAL TYPE					
		TYPE ( )				MATERIAL / GRADE	INTERNAL DIAMETER (Inches)		GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)	CE-MENT ( )	BEN-TONITE ( )	FILL ( )	FILTER PACK (TYPE/SIZE)
0	108	9	7/8	X										
108	268	9	7/8	X			200	6"	F480	factory			X	pea gravel

ATTACHMENTS ( )

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

NAME McLean & Williams, Inc.  
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 878 El Centro Ave. Napa CA 94558  
CITY STATE ZIP

Signed 11/10/99 396352  
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

**QUADRUPLICATE**  
For Local Requirements

STAT **Well 14** ORNIA

**WELL COMPLETION REPORT**

Refer to Instruction Pamphlet

No. **1078792**

Page \_\_\_ of \_\_\_

Owner's Well No. \_\_\_\_\_

Date Work Began **2/14/06**, Ended **2/17/06**

Local Permit Agency **None**

Permit No. **WWS 0072** Permit Date **2/14/06**

12/7/06 *JA*

DWR USE ONLY DO NOT FILL IN

STATE WELL NO./STATION NO. \_\_\_\_\_

LATITUDE \_\_\_\_\_ LONGITUDE \_\_\_\_\_

APN/TRS/OTHER \_\_\_\_\_

**GEOLOGIC LOG** **WELL OWNER**

DEPTH FROM SURFACE		DESCRIPTION
Ft.	to Ft.	
0	3	topsoil
3	20	brown sandy clay rock strata
20	30	brown clay
30	50	red black fractured rock
50	70	gray interbedded rock
70	90	gray black rock fractured
90	110	black rock
110	130	gray and black sandstone rock
130	150	gray red black rock
150	210	gray red black fractured rock
210	230	red lava rock fractured
230	250	black sandstone and lava fractured
250	270	black sandstone clay soil rock

**RECEIVED**

**AUG 30 2006**

**DEPT. OF ENVIRONMENTAL MANAGEMENT**

TOTAL DEPTH OF BORING **270** (Feet)

TOTAL DEPTH OF COMPLETED WELL **270** (Feet)

Name \_\_\_\_\_

Mailing Address \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

**WELL LOCATION**

Address **1201 West Canyon Road**

City \_\_\_\_\_

County \_\_\_\_\_

APN Book \_\_\_\_\_ Page **130** Parcel **022**

Township \_\_\_\_\_ Range \_\_\_\_\_ Section \_\_\_\_\_

Lat \_\_\_\_\_ Deg. \_\_\_\_\_ Min. \_\_\_\_\_ Sec. \_\_\_\_\_ N Long \_\_\_\_\_ Deg. \_\_\_\_\_ Min. \_\_\_\_\_ Sec. \_\_\_\_\_ W

**LOCATION SKETCH**

**ACTIVITY ( )**

NEW WELL

MODIFICATION/REPAIR \_\_\_\_\_

Deepen \_\_\_\_\_

Other (Specify) \_\_\_\_\_

DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG") \_\_\_\_\_

**USES ( )**

WATER SUPPLY \_\_\_\_\_

Domestic \_\_\_\_\_ Public \_\_\_\_\_

Irrigation \_\_\_\_\_ Industrial \_\_\_\_\_

MONITORING \_\_\_\_\_

TEST WELL \_\_\_\_\_

CATHODIC PROTECTION \_\_\_\_\_

HEAT EXCHANGE \_\_\_\_\_

DIRECT PUSH \_\_\_\_\_

INJECTION \_\_\_\_\_

VAPOR EXTRACTION \_\_\_\_\_

SPARGING \_\_\_\_\_

REMEDICATION \_\_\_\_\_

OTHER (SPECIFY) \_\_\_\_\_

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

**WATER LEVEL & YIELD OF COMPLETED WELL**

DEPTH TO FIRST WATER \_\_\_\_\_ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL **47** (Ft.) & DATE MEASURED **2/17/06**

ESTIMATED YIELD **50** (GPM) & TEST TYPE **air**

TEST LENGTH **5** (Hrs.) TOTAL DRAWDOWN **200** (Ft.)

\* May not be representative of a well's long-term yield.

DEPTH FROM SURFACE	BORE-HOLE DIA. (Inches)	CASING (S)				
		TYPE ( )	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	26	12 3/4	X	EM80	6	200
26	130	9 7/8	X	EM80	6	200
130	190	9 7/8	X	EM80	6	200
190	210	9 7/8	X	EM80	6	200
210	270	9 7/8	X	EM80	6	200

DEPTH FROM SURFACE	ANNULAR MATERIAL			
	TYPE	CE-MENT ( )	BEN-TONITE ( )	FILL ( )
0	26	X		
26	270			fractured rock

**ATTACHMENTS ( )**

\_\_\_ Geologic Log

\_\_\_ Well Construction Diagram

\_\_\_ Geophysical Log(s)

\_\_\_ Soil/Water Chemical Analyses

\_\_\_ Other \_\_\_\_\_

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

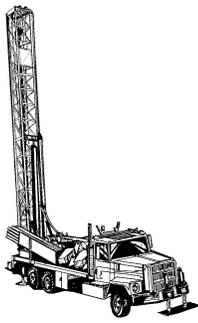
**CERTIFICATION STATEMENT**

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

NAME **McLean & Williams, Inc.**  
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS **878 W Center Ave., Napa, CA 94558** CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Signed *[Signature]* DATE SIGNED **2/28/06** 205352  
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER



# Weeks Drilling & Pump Co., Inc.

Well 15

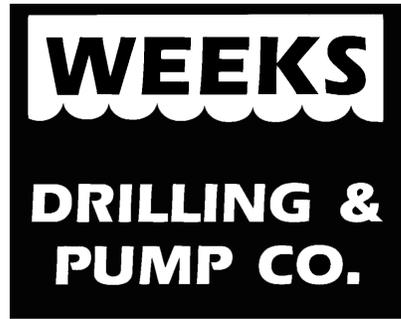
P.O. Box 176  
6100 Sebastopol Road  
Sebastopol, CA 95473

Phone: (707) 823-3184 or (707) 542-3272

Fax: (707) 823-4258

Ukiah Office (707) 462-9080

Contractor's License #: 177681



## Well Report Number 17-4626

Customer **J.R. Pittman**  
Mail Address **1181 Soda Canyon Road**  
City, State, Zip **Napa, CA 94558**  
Well Location **1181 Soda Canyon Road, Napa**  
Drilled by

Telephone

APN  
Date **9/22/17**

### Well Data

### Source (see codes):

Depth of well	<b>138'</b>	MDT <input checked="" type="checkbox"/>	CR <input type="checkbox"/>	OR <input type="checkbox"/>	NM <input type="checkbox"/>
Diameter of casing	<b>8" Steel</b>	MDT <input checked="" type="checkbox"/>	CR <input type="checkbox"/>	OR <input type="checkbox"/>	NM <input type="checkbox"/>
Depth of perforation		MDT <input type="checkbox"/>	CR <input type="checkbox"/>	OR <input type="checkbox"/>	NM <input checked="" type="checkbox"/>
Type of perforation		MDT <input type="checkbox"/>	CR <input type="checkbox"/>	OR <input type="checkbox"/>	NM <input checked="" type="checkbox"/>
Pump HP and type	<b>Goulds 25GS10 1hp 230v</b>	MDT <input checked="" type="checkbox"/>	CR <input type="checkbox"/>	OR <input type="checkbox"/>	NM <input type="checkbox"/>
Depth pump set	<b>122'</b>	MDT <input checked="" type="checkbox"/>	CR <input type="checkbox"/>	OR <input type="checkbox"/>	NM <input type="checkbox"/>

(Source Codes: MDT=Measured During Testing; CR=Company Records; OW=Owner Records; NM= Not Measured, requires additional testing beyond the scope of this report)

### Well Test

Date of test **9/22/17**

(1) Water level at start	<b>100 ft</b>	(2) Observed final pumping level	<b>112 ft</b>
(3) Draw down	<b>112 ft</b>	(4) Total pumping duration	<b>4 hrs</b>
Max. Pump Discharge	<b>1 gpm</b>		

#### Measured Production Test

(5) Observed total production	<b>405 gal</b>	(6) Average yield for pumping duration	<b>1 gpm</b>
Pump broke suction during test?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		

#### Constant Pumping Level Test

(7) Final observed yield rate	<b>1 gpm</b>	(8) Pumping duration at final observed yield rate	<b>4 hrs</b>
(9) Calc. observed yield production	<b>240gal</b>	Pump broke suction during test?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

### Water Quality Analysis If performed in conjunction with this report.

Domestic Suitability attached	Yes <input checked="" type="checkbox"/> Dated <b>9/29/17</b>	No <input type="checkbox"/>	Not sampled in testing <input type="checkbox"/>
Bacteriological analysis attached	Yes <input checked="" type="checkbox"/> Dated <b>9/29/17</b>	No <input type="checkbox"/>	Not sampled in testing <input type="checkbox"/>
Chemical analysis attached	Yes <input type="checkbox"/> Dated	No <input type="checkbox"/>	Not sampled in testing <input type="checkbox"/>

### Water System Visual Inspection

Well pump operation	Functional <input type="checkbox"/>	Deficient <input type="checkbox"/>	Not Observed <input checked="" type="checkbox"/>
Electrical equipment	Functional <input type="checkbox"/>	Deficient <input type="checkbox"/>	Not Observed <input checked="" type="checkbox"/>
Pressure tanks	Functional <input type="checkbox"/>	Deficient <input type="checkbox"/>	Not Observed <input checked="" type="checkbox"/>
Water pipes	Functional <input type="checkbox"/>	Deficient <input type="checkbox"/>	Not Observed <input checked="" type="checkbox"/>
Storage tanks	Functional <input type="checkbox"/>	Deficient <input type="checkbox"/>	Not Observed <input checked="" type="checkbox"/>
Booster pump operation	Functional <input type="checkbox"/>	Deficient <input type="checkbox"/>	Not Observed <input checked="" type="checkbox"/>

### Comments

### Attachments

Dated 9/25/17

By Robert G Hooten \_\_\_\_\_

**This report does not address code compliance. Please see definitions, additional terms, and disclaimers on the following page, which is an integral part of this report.**

California Groundwater Association (CGA) Standard form 490-1

**WELL REPORT  
DEFINITIONS, ADDITIONAL TERMS, AND DISCLAIMERS**

- Draw Down** Water in a well which is not being pumped will reach and generally stabilize at some level, called the static level. Draw down is the difference between the static, or starting, water level and the final water level in the well after or during pumping.
- Sustained yield** Sustained yield is the pumping rate at which long-term pumping can be maintained, and is the rate normally used to compare wells. If the test is of sufficient duration (and assuming the aquifer has a large storage capacity), sustained yield is the best indicator of long term well production during regular operation. As used in this report, final observed yield is the production rate measured at the conclusion of a test in which the pumping level in the well was held constant for the period of time indicated in section C 8. It is roughly equivalent to sustained yield, but the contractor makes no guarantee that the test was of sufficient duration to establish a true sustained yield. The abbreviation "GPM" means Gallons Per Minute.
- Average yield** In many wells, especially wells with small diameter casings, water levels cannot be monitored during pumping, and sustained yield can only be approximated by calculating average yield (which is total column pumped divided by total pumping time including any period in which the pump breaks suction). Since the pumping level may be declining while testing, and the measured water production may include water in storage in the well and surrounding formation at the start of the test, average yield calculations may be significantly higher than the true sustained yield (particularly where the pumping time is less than four hours).
- Calculations** The basis for calculations in Section C, Well Test from data in this report is as follows:
- Line (3): Draw Down equals (line1 – line2) or, the final observed pumping level subtracted from the starting water level.
  - Line(6): Average Yield for pumping duration in gpm (gallons per minute) equals (line5 ÷ line 4 / 60) or, observed total production in gallons divided by total production pumping duration in hours, divided by 60 minutes per hour,
  - Line (9): Calculated observed Yield Rate Production in gallons equals (line7 x line 8 x 60) or, final observed yield in gpm times the pumping duration in hours while at the final observed rate, times 60 minutes per hour.
- Unusual Conditions** Unusual Pumping Conditions. Wells that break suction while pumping or have high draw down in relation to the standing water level, are often indicative of marginal long-term water producers. These wells should always have protective shutoff devices on the pumps to prevent pump burnout from lack of water. A smaller capacity pump may improve electrical efficiency and sustain less wear by enabling longer pumping cycles. Conversely in stronger wells, the pump itself may be too small to pump the full well capacity, and thus the true sustained (or average) yield may be higher than observed in this test.
- Sole report** This report contains the sole observations and conclusions of Weeks Drilling & Pump Co. Inc. (hereinafter the company) pertaining to the testing of the Customer's well. Any prior statements of the agents or employees of the company which are not contained herein are superseded by this report, and shall be relied upon at the Customer's own voluntary risk.
- Test limitations** The data and conclusions provided are based upon the tests and measurements of the company using standard and accepted practices of the groundwater industry. However, conditions in water wells are subject to dramatic changes in even short periods of time. Additionally, the techniques employed may be subject to considerable error due to factors within the well and groundwater formation which are beyond the company's immediate control or observation. Therefore, the data are valid only as of the date and to the extent of the observational limitations of the test or installation indicated.
- Use of test** The test conclusions are intended for general comparison of the well in its present condition against known water well standards or guidelines, and should not be relied upon to predict either the future quantity or quality of water that the well will produce. Wells should be periodically re-tested to show both seasonal and long-term fluctuations.
- Disclaimers** In presenting the data and conclusions, the company makes no warranties, either express or implied, as to future water production of the well. Further, the company, unless expressly stated to the contrary, does not represent (1) that the well or pump system is in any particular condition or state of repair, or (2) that the test results will satisfy cognizant governmental ordinances or regulations, or (3) that the test duration or methodology is sufficient to meet local water system or new construction permit standards (which may require 24 hour or more tests), or (4) that the water is adequate for a particular purpose contemplated by Customer, or (5) the usefulness of the report for any purpose more than one year after the date of the test.
- Customer's release** In accepting this report, the Customer releases and holds the company harmless from liability for consequential or incidental damages arising (1) out of the breach of an express or implied warranty of future water production, or (2) in any manner through the further dissemination of this report, or its conclusions by either Customer or third parties, except as the dissemination is required to complete the project or other activity for which the report was prepared.



DATE 9-21-81  
RECEIPT NO. 9782 BY Jhe

NAPA COUNTY HEALTH DEPARTMENT  
DIVISION OF ENVIRONMENTAL HEALTH

APPLICATION & PERMIT TO CONSTRUCT A WATER WELL

NAME [Redacted] ADDRESS [Redacted]  
NAME M. S. Beard & Williams Inc (Well Driller) ADDRESS 878 El Centro (Job Location) DATE 9/21/81

TYPE OF WORK: NEW WELL  RECONDITIONING \_\_\_\_\_ DEEPENING \_\_\_\_\_  
TYPE I PERMIT  DESTROY \_\_\_\_\_ OTHER \_\_\_\_\_  
TYPE II PERMIT \_\_\_\_\_

PROPOSED USE: DOMESTIC  IRRIGATION \_\_\_\_\_ INDUSTRIAL \_\_\_\_\_ MUNICIPAL \_\_\_\_\_  
TEST WELL  OTHER \_\_\_\_\_ HOT WATER \_\_\_\_\_

Sewage Disposal on site (existing or proposed) Public \_\_\_\_\_ Individual \_\_\_\_\_ Private   
Distance from well to any part of nearest sewage disposal system None feet.  
(Sketch of site to accompany application) County road setback \_\_\_\_\_ feet from centerline.

TYPE OF EQUIPMENT TO BE USED: Rotary  Cable \_\_\_\_\_ Hand Dug \_\_\_\_\_ Other \_\_\_\_\_

WORKER'S COMPENSATION COVERAGE: (Check one of the following)

- A certificate of current Worker's Compensation Insurance coverage is presently on file with this office.
- A certificate of current Worker's Compensation Insurance is being filed with this application.
- I certify that in the performance of the work for which this permit is issued I shall not employ any person in any manner so as to become subject to the Worker's Compensation laws in California.

[Signature]  
Signature of Applicant

9/21/81  
Date

CASING

CONSTRUCTION:

Total Depth 525 Ft. Depth of Casing 480  
Surface Seal to 21 Ft.  
Any Stratas Sealed: Yes \_\_\_\_\_ No   
If yes, depth of stratas: \_\_\_\_\_  
From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft./From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft.  
Perforations:  
From 240 Ft. to 480 Ft./From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft.  
From \_\_\_\_\_ Ft. to \_\_\_\_\_ Ft.

WATER LEVELS

First Water at \_\_\_\_\_ Ft. Static level at 80 Ft.

WELL TESTS

How performed Air jet  
Yield 165 GPM with 140 Ft. Drawdown after 1 1/2  
Hrs. Annular space depth 21 Ft./Thickness 2"  
\_\_\_\_\_ in. Diameter of casing 8 Material steel  
Gravel Pack: Yes  No \_\_\_\_\_ Conductor Casing:  
Yes \_\_\_\_\_ No  Sealed with: Concrete   
Grout \_\_\_\_\_ Neat Cement \_\_\_\_\_ Pudd. Clay \_\_\_\_\_  
Other \_\_\_\_\_ Chlorination by: Owner   
Pump Co. \_\_\_\_\_ Driller \_\_\_\_\_  
Water Temp. \_\_\_\_\_

WELL LOG

(Formation; described by color, size of material, structure)

Ft.	to	Ft.	
0	-	5	Top soil.
5	-	160	Gray rock.
160	-	200	Brown Hard rock.
200	-	285	Brown rock with black rock.
285	-	300	Red volcanic rock.
300	-	425	Gray rock.
425	-	525	Red volcanic with brown and black rock.

**R E C E I V E D**  
DEC 3 1981  
DIVISION OF ENVIRONMENTAL HEALTH

CONTRACTOR'S STATEMENT: I, O. D. Williams, contractor for the above work, hereby certify that the above was installed according to all applicable rules and regulations covered by this permit, and that the information is true and correct to the best of my knowledge.

[Signature]  
Contractor's Signature

**APPENDIX B**  
**WELL 1 PUMPING TEST**  
IMBODEN PUMP (2019)

# IMBODEN PUMP

SINCE 1946

1030 PUEBLO AVENUE • NAPA, CALIFORNIA 94558  
(707) 252-6493 • LIC. # 404594  
FAX (707) 226-1580

## WELL TEST & REPORT

DATE: 10/27/19

OWNER: HAGAFEN CELLARS

ADDRESS: 4160 SILVERADO TRAIL

WELL LOCATION:

PARCEL#:

WELL DEPTH: 198'

DIAMETER: 8"

CASING: STEEL

PUMP SETTING: 184'

PUMP HP: 2

DROP PIPE: 1 1/4" PVC SCH 80

POWER & VOLTAGE: 460

DROP CABLE: 10-4

PUMP MODEL: 25GS20 GOULDS

TANK SIZE & MODEL: 10,500

WATER LEVEL AT START OF TEST: 93'

GPM: 28

WATER LEVEL AT END OF TEST: 128'

GPM: 25

LENGTH OF TEST: 2 HOUR 0 MINUTES

**\*\*THIS TEST IS BASED ON THE WELL PRODUCTION AS OF THE DAY OF THE TEST ONLY. THE WELL MAY PRODUCE MORE OR LESS WATER THROUGHOUT THE YEAR.\*\***

RESPECTFULLY,  
IMBODEN PUMP

DATE: 10/27/19

OWNER: HAGAFEN CELLARS

ADDRESS: 4160 SILVERADO TRAIL

<u>TIME</u>	<u>WATER LEVEL</u>	<u>BACK PRESSURE</u>	<u>WATER COLOR</u>	<u>SAND</u>	<u>GPM</u>
<u>10:00am</u>	<u>93'</u>	<u>75psi</u>	<u>CLOUDY</u>	<u>NO</u>	<u>28</u>
<u>10:15am</u>	<u>108'</u>	<u>75psi</u>	<u>CLOUDY</u>	<u>NO</u>	<u>28</u>
<u>10:30am</u>	<u>120'</u>	<u>75psi</u>	<u>CLOUDY</u>	<u>NO</u>	<u>28</u>
<u>10:45am</u>	<u>125'</u>	<u>85psi</u>	<u>CLEAR</u>	<u>NO</u>	<u>25</u>
<u>11:00am</u>	<u>128'</u>	<u>85psi</u>	<u>CLEAR</u>	<u>NO</u>	<u>25</u>
<u>11:15pm</u>	<u>128'</u>	<u>85psi</u>	<u>CLEAR</u>	<u>NO</u>	<u>25</u>
<u>11:30pm</u>	<u>128'</u>	<u>85psi</u>	<u>CLEAR</u>	<u>NO</u>	<u>25</u>
<u>11:45pm</u>	<u>128'</u>	<u>85psi</u>	<u>CLEAR</u>	<u>NO</u>	<u>25</u>
<u>12:00pm</u>	<u>128'</u>	<u>85psi</u>	<u>CLEAR</u>	<u>NO</u>	<u>25</u>

REMARKS:

**APPENDIX C**

**WELL 1 INSPECTION**

DR WELL (2024)

# Wellbore Video Report

**Dr. Well, Water Well Services, Inc.**

P.O. Box 1685 Fair Oaks, CA. 95628

Phone: (916) 536-9319 Fax: (916) 962-7381 Web: www.drwaterwell.com

Company: Imboden Pump Invoice No: \_\_\_\_\_ Run No.: 1  
 Address: 1030 Pueblo Ave Well Number: \_\_\_\_\_  
 City: Napa State: CA Zip: 94558 Survey Date: Mar 4, 2024  
 Requested By: Mike P.O.: \_\_\_\_\_ Well Owner: Hagafen Cellars  
 Copy To: \_\_\_\_\_ Camera: CCV Color Flip Camera - Short L.H.  
 Reason For Survey: General Inspection Zero Datum: Top of Casing  
 Operator: Brittney Schwedler Lat.: 38.36381 Long.: -122.28968 Sec: \_\_\_\_\_ Twp: \_\_\_\_\_ Rge: \_\_\_\_\_  
 Location: 4160 Silverado Trial, Napa Depth: \_\_\_\_\_ Van: 6  
 Casing I.D. At Surface: 8.25" I.D. Reference: Measured Casing Corrosion: Moderate

(NOTE: Latitude and Longitude values determined using a recreational GPS accurate to about +/- 45'. SEC, TWP and RGE then determined using the TRS conversion program, accuracy not guaranteed.)

SELECTED WELLBORE SNAPSHOTS	TRUE DEPTHS (SideScan - Feet)	WELLBORE / CASING INFORMATION
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>17'</p>  </div> <div style="text-align: center;"> <p>41'</p>  </div> </div>	<p>17'</p> <p>41'</p> <p>125'</p> <p>200'</p>	<p>Casing Ends</p> <p><b>Static Water Level (SWL)</b></p> <p>Downview Of Borehole</p> <p>Fill, Bottom, End of Survey</p>
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>125'</p>  </div> <div style="text-align: center;"> <p>200'</p>  </div> </div>		
		<p>Recommendations:</p> <p>Arilift</p> <p>RE-T.V.</p>