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Water Availability Analysis

Fontanella Family Winery Major Modification P18-00431
Planning Commission Hearing November 20, 2019

July 8, 2019

MEMORANDUM

TO: Emily Hedge
County of Napa
Planning, Building & Environmental Services
1195 Third Street, Suite 210
Napa, CA 94559

FROM: 

Matthew O'Connor, PhD, CEG #2449
President, O'Connor Environmental, Inc.

SUBJECT: P18-00431; Fontanella Family Winery Major Modification
Water Availability Analysis Addendum

This Addendum addresses requested additional information in your letter to Jeffrey and Karen Fontanella dated May 20, 2019 pertaining to the Water Availability Analysis (OEI, November 28, 2018; revised March 20, 2019) for this project. The May 20th letter asks for clarification on the following:

The Water Availability Analysis. Page 8 notes that the water use estimates based on the County's Guidance Document are approximately twice the actual metered amount. In the analysis of the "Dry Water Year", the calculation based on the County estimates results in a proposed demand that exceeds the estimated recharge rates. In addition to the existing data, provide the Total Proposed Demand based on the actual metered numbers and update the Dry Water Year comparison.

Using the actual metered water use rates from the parcel wells in conjunction with the existing estimate of the proposed increase in water use associated with the Use Permit modification request results in a total estimated proposed use of 2.52 ac-ft/yr on the project parcel (compared to 5.15 ac-ft/yr using the standard county rates. Itemization of uses is provided in Table A1 below which can be compared with Table 14 in the WAA. The breakdown of uses between Winery Production, Winery Employee, and Winery Visitation & Event Use is not available from the metering data, therefore we retained the original estimates for Winery Employee and Winery Visitation & Event Use and calculated a new Winery Production Use from the total metered winery use data.

Using the metered rates for the project parcel in conjunction with the existing County standard rates for the additional parcels in the project recharge area results in a total estimate of proposed use for the project recharge area of 15.38-ac-ft/yr which can be compared with Table 2 in the WAA (Table A2).

Comparing these revised use estimates with the existing recharge estimates reveals that demand represents 35% and 88% of recharge on the project parcel during average and dry water years respectively (Table A3). Using the metered rates for the project parcel, the comparison for the project recharge area still shows demand being higher than recharge during dry water years. This is not necessarily cause for

concern as it is relatively common for demand to exceed recharge during dry year conditions, and a more appropriate measure of sustainable use is the comparison to average year or long-term average conditions since short-term deficits during dry years are expected to be balanced by surpluses during average or wet conditions. Also, the analysis shows a significant surplus within the recharge areas during average water years and when considering only the project parcel, the analysis shows a modest surplus even during dry years.

Table A1: Estimated existing and proposed water demand for the project parcel using metered rates.

	Irrigation Use ac-ft/yr	Residential Use ac-ft/yr	Winery Production Use ac-ft/yr	Winery Employee Use ac-ft/yr	Winery Visitation & Event Use ac-ft/yr	Total Use ac-ft/yr
Existing Use	1.10	0.70	0.57	0.05	0.04	**2.46**
Proposed Use	1.10	0.70	0.57	0.07	0.28	**2.72**
Proposed Increase	0.00	0.00	0.00	0.02	0.24	**0.26**

Table A2: Estimated existing and proposed water demand for the project recharge area using metered rates for the project parcel.

	Irrigation Use ac-ft/yr	Residential Use ac-ft/yr	Winery Use ac-ft/yr	Total Use ac-ft/yr
Existing Use	4.30	8.54	2.28	**15.12**
Proposed Use	4.30	8.54	2.54	**15.38**

Table A3: Total annual Water Use in the project recharge area and on the project parcel (using metered rates for the project parcel) compared with average and dry year groundwater recharge.

	Total Proposed Demand (ac-ft/yr)	Average Water Year (2010)			Dry Water Year (2014)		
		Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge	Recharge (ac-ft/yr)	Recharge Surplus (a c-ft/yr)	Demand as % of Recharge
Rechage Area	15.4	36.8	21.4	42%	13.8	-1.6	111%
Project Parcel	2.7	7.7	5.0	35%	3.1	0.4	88%

Please do not hesitate to contact myself (mattoconnor@sonic.net) or my colleague Jeremy Kobor (jeremyk@oe-i.com) if you have further questions or concerns regarding the Water Availability Analysis or this addendum.

Water Availability Analysis
APN 050-010-018

Prepared for:

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Fontanella Family Winery
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Prepared by:

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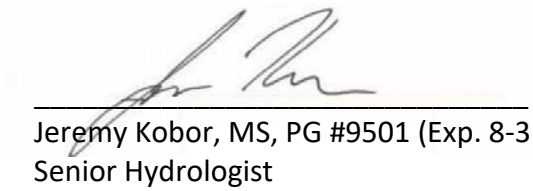

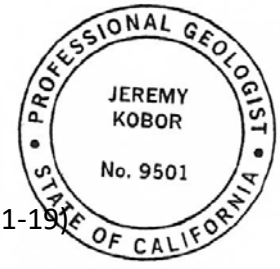

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Jeremy Kobor, MS, PG #9501 (Exp. 8-31-19)
Senior Hydrologist

Submitted November 28, 2018
Revised March 20, 2019

Contents

Introduction & Background

The Fontanella Family Winery is seeking a Use Permit modification to allow for increased visitation at its existing winery located at 1721 Patrick Road (APN 050-010-018) which is located about a mile west of the western edge of the Napa city limits. 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: estimates of existing and proposed water uses within the project recharge area, compilation of drillers' logs from the area and characterization of local hydrogeologic conditions, and performance of Tier 1 and Tier 2 screening criteria including estimates of groundwater recharge relative to proposed uses and the potential for well or spring interference.

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. Hydrogeologic interpretations are based on the drillers' reports made available to us through the California Department of Water Resources, available geologic maps and hydrogeologic studies and professional judgment. This analysis is based on limited available data and relies significantly on interpretation of data from disparate sources of disparate quality.

Hydrogeologic Conditions

Overview

The project parcel is located in the headwaters of the Browns Valley Creek watershed in the hills west of Napa (Figure 1). The parcel and surrounding areas are underlain by a large block of Late Cretaceous Sandstone, shale, and conglomerate of the Great Valley Sequence (map unit Kgvu) (Figure 2). This unit primarily consists of thin beds of quartz-biotite wacke separated by layers of mudstone with minor pebble conglomerate (Graymer et al., 2007). The Kgvu is bounded by two parallel northwest-southeast trending faults about a mile west and a mile east of the project parcel which separate rocks of the Great Valley Sequence from volcanic rocks of the Sonoma Volcanics and the Donnel Ranch Volcanics (Figure 2). An outcrop of Sonoma Volcanics (map unit Tsr) also occurs about 1,300 northwest of the project parcel.

In general, rocks of the Great Valley Sequence have a very low primary porosity and groundwater occurs primarily in fractures. These materials are considered low-yielding and wells typically produce only a few gallons per minute owing to the highly deformed and well-lithified nature of the rocks (LSCE, 2013).

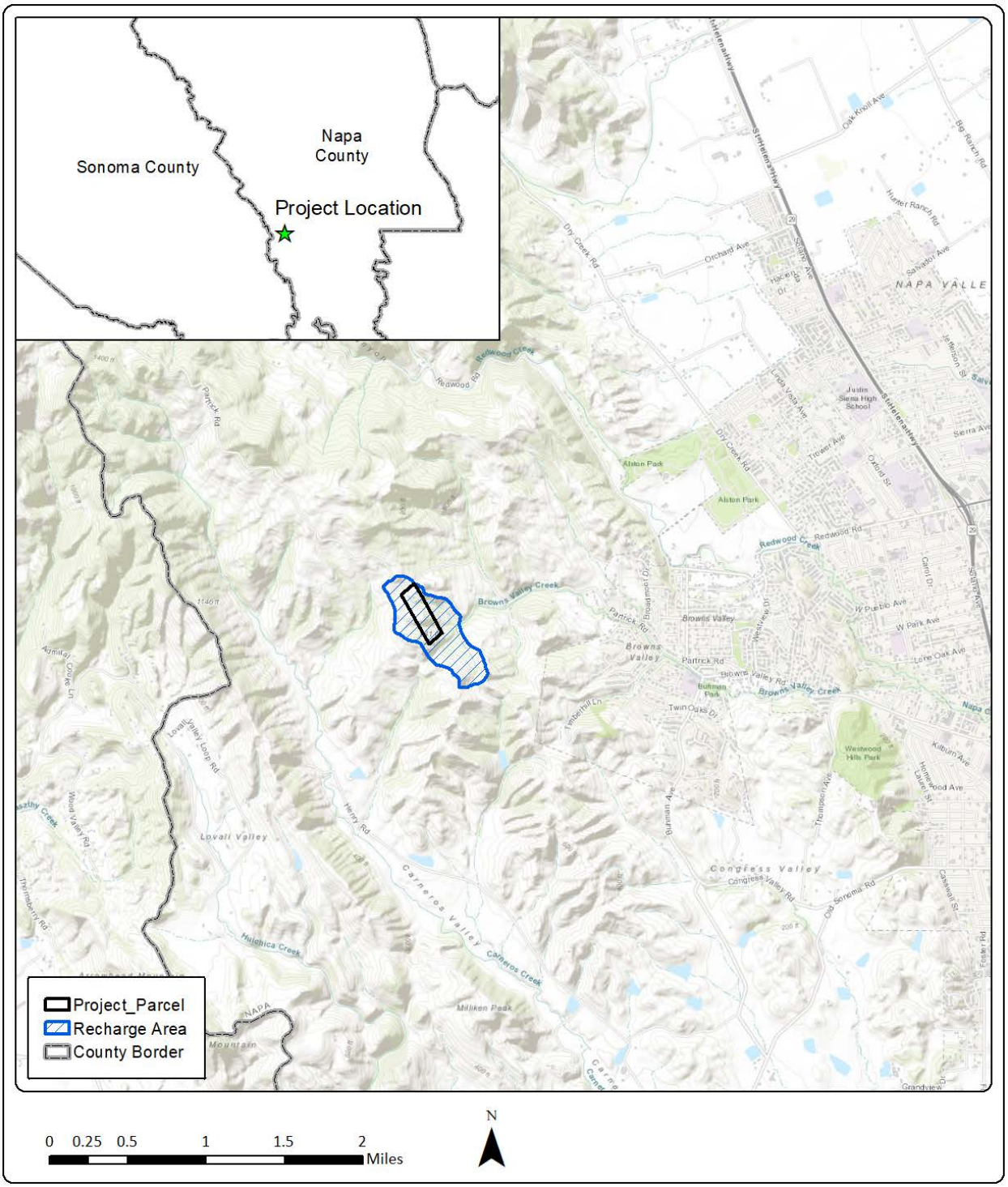


Figure 1: Project location map.

Well and Spring Data

Well Completion Reports for wells near the project parcel were obtained from the California Department of Water Resources (Table 1). A subset of these logs was compiled (Appendix A) and georeferenced based on parcel and location sketch information (Figure 2). The project parcel has two wells. The well serving the winery (Well WW) is located in the northwest portion of the parcel and is underlain by map unit Kgvu. Well WW was completed in 2000 to a depth of 158-ft. At the time of completion, the well had a static water level of 4-ft and an estimated yield of 38 gallons per minute (gpm). The geologic log for the well indicates that the well intersected brown clay in the upper 22-ft and alternating layers of shale and sandstone in the remainder of the bore hole. A pump test was conducted on this well in September of 2005 (Appendix B). The well was pumped for 8 hours at pumping rates ranging from 37.5 gpm to 75 gpm. The pre-test water level was not recorded; however, a stable pumping water level of 140-ft was recorded over the final 4 hours of the test.

The irrigation well (Well IW) is located in the southeast portion of the parcel and is also underlain by map unit Kgvu. Well IW was completed in 2012 to a depth of 217-ft. At the time of completion, the well had a static water level of 20-ft and an estimated yield of 20 gallons per minute (gpm). The geologic log for the well indicates that the well intersected brown clay and shale in the upper 30-ft and blue shale with streaks of broken sandstone in the remaining 187-ft. No pump test information was available for this well.

There is also a perennial spring on the parcel located adjacent to the irrigation well. This spring provides domestic water to the residence on the parcel and to the residence on the adjacent parcel to the east. No official spring discharge measurements were available, however based on communication with the project applicant, the total spring flow ranges from about 5 gallons per minute in the dry season to 12 gallons per minute in the rainy season.

Seven additional wells were located within the Kgvu unit. These wells were completed to depths of 220 to 600 feet and had static water levels at the time of completion of 34 to 142 feet. Four of the seven wells were unsuccessful (dry holes) and estimated yields in the remaining wells were highly variable ranging from 1 to 75 gpm. The geologic logs indicate a variety of rock types with the most common being gray shale, clay, and sandstone.

The presence of multiple dry holes and the highly variable well yields for successful wells indicate that groundwater conditions within the Great Valley Sequence vary significantly over relatively short distances. The presence of a perennial spring, groundwater elevation wells relatively near ground surface, and the relatively high well yields at the two wells on the project parcel indicate that the local groundwater resources are likely more plentiful than those of the Great Valley Sequence in general.

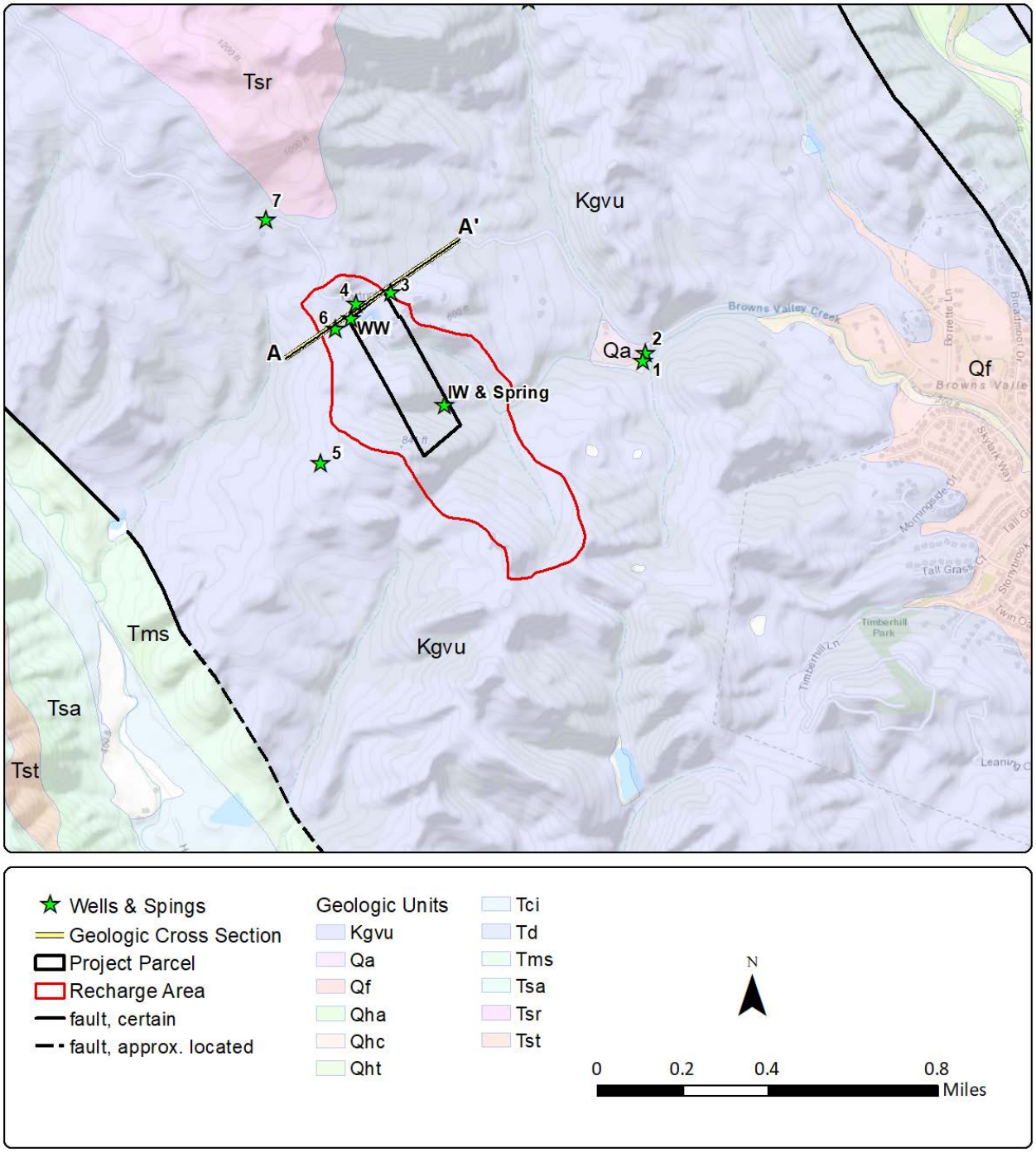


Figure 2: Surficial geology and locations of wells located near the project parcel. Surficial geology from the Geologic Map of Eastern Sonoma and Western Napa Counties (Graymer et al., 2007)

Table 1: Well completion details for wells on and near the project parcel

Well Number	WW	IW	1	2	3	4	5	6	7
Year Completed	2000	2012	1991	1991	1999	2007	2004	2004	2010
Depth (ft)	158	217	220	300	367	360	600	360	578
Estimated Yield (gpm)	38	20	Dry Hole	Dry Hole	75	1.5	Dry Hole	Dry Hole	1
Static Water Level (ft)	4	20	-	-	34	-	-	-	142
Top of Screen (ft)	38	37	-	-	27	60	-	-	118
Bottom of Screen (ft)	158	217	-	-	367	360	-	-	558
Casing Diameter (in)	5	5	-	-	5	6	-	-	5
Geologic Unit	Kgvu	Kgvu	Kgvu	Kgvu	Kgvu	Kgvu	Kgvu	Kgvu	Kgvu

Well Water Level Data

Water level measurements at the two project parcel wells have been collected at approximately monthly intervals since late-2015/early-2016 (Figure 3). These measurements indicate that groundwater elevations fluctuate seasonally with maximum water levels (minimum depth to water) occurring around March/April of each year and minimum water levels (maximum depth to water) occurring around September/October of each year. The seasonal fluctuations at both wells range from about 23 to 38-ft. Although the water level records span a relatively short timeframe, the data suggests relatively stable groundwater conditions over time. The Well Completion Report for the winery well indicates a static water level of 4-ft in June of 2000 which is similar to the recent June water levels which range from 9 to 16-ft. The Well Completion Report for the irrigation well indicates a static water level of 20-ft in September of 2012 which is also similar to the recent September water levels which range from 20 to 28-ft. The close relationship between seasonal fluctuations in groundwater levels and seasonal rainfall patterns suggests that the aquifer responds to recharge over relatively short time scales.

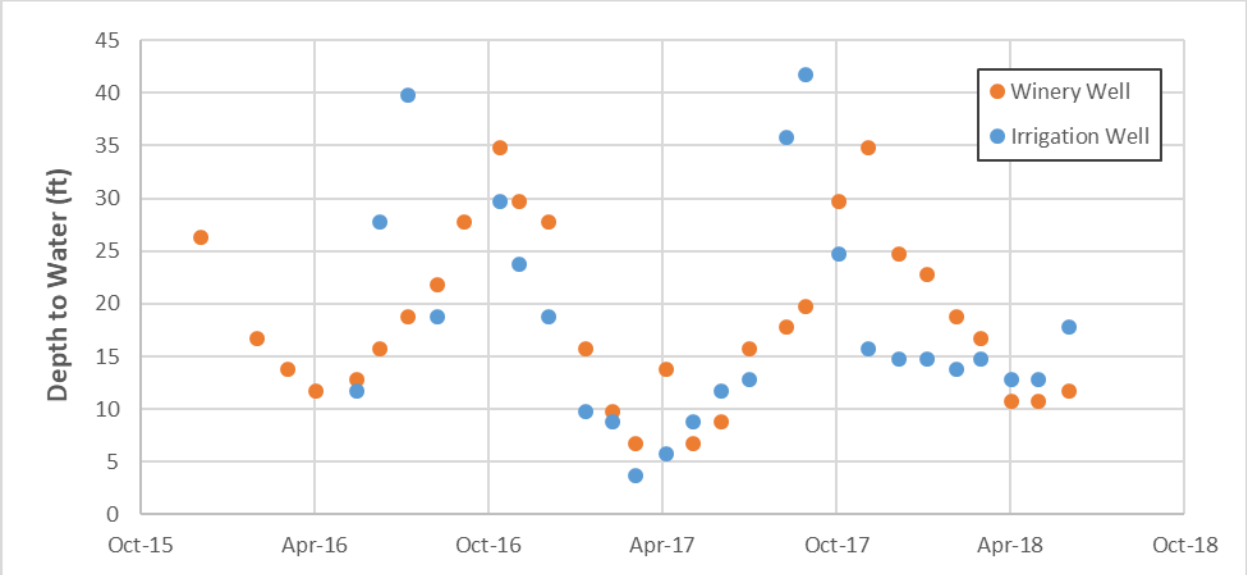


Figure 3: Water level measurements at the Winery Well (WW) and the Irrigation Well (IW) (see Figure 2 for locations).

Geologic Cross-Section

A geologic cross-section oriented southwest to northeast was developed within the vicinity of the project parcel (Figure 4). Groundwater elevations interpolated from the most recent measurement at the winery well (well WW) and from the water level at well 3 at the time of well completion indicate that groundwater occurs at relatively shallow depths in the vicinity of the project parcel and that groundwater flows mimic the surface topography at the site.

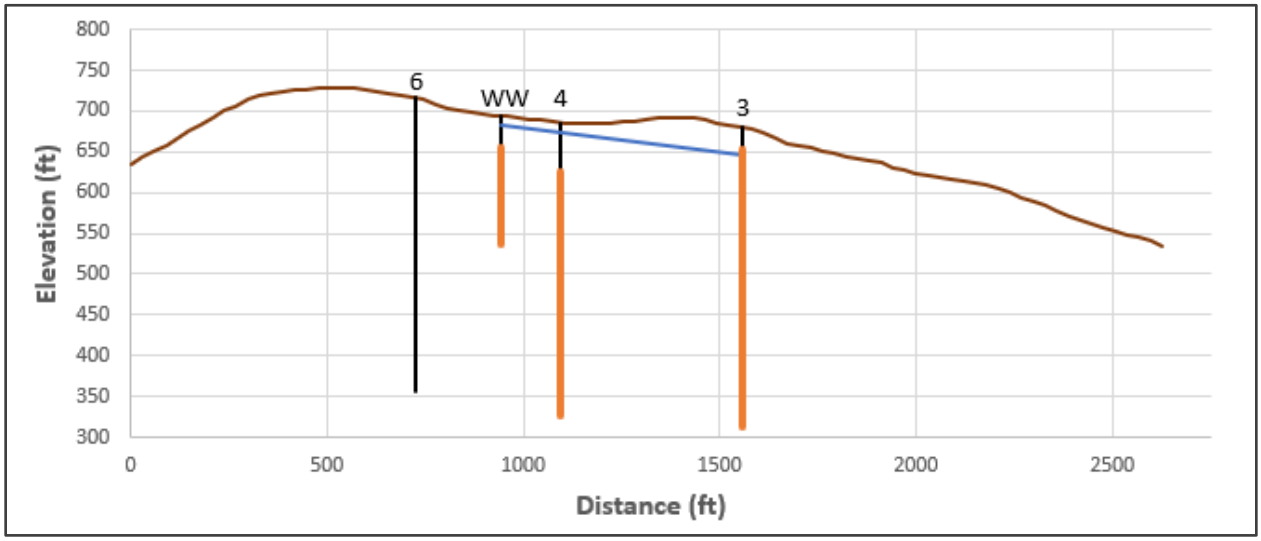


Figure 4: Hydrogeologic cross section A - A' through the vicinity of the project parcel (see Figure 2 for location). Black lines indicate wells, orange lines indicate screened intervals (where known), and the blue line indicates groundwater elevations interpolated from elevations at well WW and well 3.

Project Aquifer

The area in the vicinity of the project parcel is underlain by rocks of the Great Valley Sequence (map unit Kgvu). Given the uniformity of bedrock conditions and lack of mapped faults in the immediate vicinity of the project parcel, the project recharge area was defined based on surface topography and drainage patterns. A small stream flows through the project parcel and joins a second small stream about 600-ft southeast of the project parcel below which the stream is named Browns Valley Creek. The project recharge area was defined as the 138-acre drainage area above this confluence (Figure 2). The geologic logs for the project parcel wells indicate the presence of clay to 22 to 30-ft, static water levels above the base of the clay, and water first encountered during drilling at greater depths than post-development static levels. These observations suggest that the project aquifer may be confined or semi-confined, on the other hand the relatively shallow static water levels (4 to 20-ft) and seasonal fluctuations in groundwater elevations may indicate unconfined conditions.

Groundwater Storage Volume

An estimate of the total available groundwater storage within the aquifer recharge area can be obtained as the product of the project recharge area, the saturated aquifer thickness, and the aquifer specific yield. This method of estimating aquifer storage is not always valid for describing water availability in confined aquifers, but it can be used for general interpretative and comparative purposes.

A saturated thickness of 154-ft was calculated based on the difference between the bottom of the screened interval and the static water level at the project winery well. This provides a minimum estimate of the saturated thickness; the Great Valley Sequence likely extends to significantly greater depths beneath the project recharge area. While specific yield values are unavailable for the Great Valley Sequence, the porosity of fractured bedrock such as the Kgvu is expected to lie between <1 and 10% (Freeze and Cherry, 1979; Weight and Sonderegger, 2000). To be conservative, we have used low-end estimates of specific yield of 1%. This results in an estimate of the available groundwater storage of 212.5 acre-ft. (154-ft x 0.01 x 138 acres).

Water Demand

Within the project recharge area, water demand was estimated for both the existing and proposed conditions. Existing water uses were determined using current and historical satellite imagery from Google Earth and proposed uses were provided by the applicant. Annual rates for the various uses were estimated primarily based on Napa County's Water Availability Analysis Guidance Document, dated May 2015 (Napa County, 2015) and use rates were also compared to measured uses on the parcel as metered with flow totalizers.

Existing Condition

In the existing condition, water is used on the project parcel for the 30,000 gallon per year Fontanella Winery, irrigation of about 5.4 acres of vineyard, and one single family residence. The winery is supplied by Well WW, vineyard irrigation is supplied by well IW, and the residence as well as the residence on the adjacent parcel to the east are supplied by the spring. Water uses on neighboring parcels within the project recharge area include the Mt. Veeder Springs winery, the Renteria Winery, irrigation of about 6.4 acres of vineyard, and residential use for two residences. The Renteria Winery on the adjacent parcel to the west of the project parcel is owned by Partrick Estate LLC.

Based on these uses, existing water demand within the project recharge area is estimated at 17.55 acre-ft/yr (Table 2). Of this, approximately 2.51 ac-ft/yr is winery use (Tables 3 to 11), 5.90 ac-ft/yr is irrigation use (Table 12), and 9.14 acre-ft/yr is residential use (Table 13). Only about 28% (4.89 ac-ft/yr) of the total use in the recharge area is associated with the project parcel with the remainder associated with adjacent parcels in the recharge area. The 4.89 ac-ft/yr demand for the project parcel includes 0.89 ac-ft/yr of winery use, 2.7 ac-ft/yr of irrigation use, and 1.3 ac-ft/yr of residential use (Table 14).

Water use on the project parcel has been metered with totalizers since 2015 (earlier for some uses). This data indicates that average annual winery water use was 0.66 ac-ft/yr, average annual irrigation water use was 1.1 ac-ft/yr, and average annual residential use was 0.70 ac-ft/yr for a total average annual use of 2.46 ac-ft/yr (Appendix C). This estimate is about half the estimate derived based on the May 2015 Water Availability Analysis Guidance Document. To be conservative we have retained the estimate based on standard use rates for the remainder of this report, however it should be noted that this estimate likely overstates the actual water use on the parcel by about a factor of 2.

Table 2: Estimated existing and proposed water demand for the project recharge area.

	Irrigation Use ac-ft/yr	Residential Use ac-ft/yr	Winery Use ac-ft/yr	Total Use ac-ft/yr
Existing Use	5.90	9.14	2.51	**17.55**
Proposed Use	5.90	9.14	2.77	**17.81**

Table 3: Estimated existing and proposed winery production water use for the Fontanella Winery.

Use Category	Annual Production (gal/yr)	Use per 100,000 gal of production	Annual Water Use (ac-ft/yr)
Winery Process Use	30,000	2.15	0.65
Winery Domestic Use	30,000	0.50	0.15
TOTAL			**0.80**

Table 4: Estimated existing and proposed winery production water use for the Mt. Veeder Springs Winery

Use Category	Annual Production	Use per 100,000 gal of	Annual Water Use (ac-ft/yr)
Winery Process Use	10,000	2.15	0.22
Winery Domestic Use	10,000	0.50	0.05
TOTAL			**0.27**

Table 5: Estimated existing and proposed winery production water use for the Renteria Winery

Use Category	Annual Production (gal/yr)	Use per 100,000 gal of production	Annual Water Use (ac-ft/yr)
Winery Process Use	18,000	2.15	0.39
Winery Domestic Use	18,000	0.50	0.09
TOTAL			**0.48**

Table 6: Estimated existing winery employee water use for the Fontanella Winery.

Work Category	# of Employees	# Work Days per Year	Use per Employee (gal/day)	Annual Water Use (ac-ft/yr)
Full-time	3	260	15	0.036
Part-time	2	130	15	0.012
TOTAL				**0.048**

Table 7: Estimated existing and proposed winery employee water use for the Mt. Veeder Springs Winery.

Work Category	# of Employees	# Work Days per Year	Use per Employee (gal/day)	Annual Water Use (ac-ft/yr)
Full-time	2	260	15	0.024
Part-time	0	130	15	0.000
TOTAL				**0.024**

Table 8: Estimated existing and proposed winery employee water use for the Renteria Winery.

Work Category	# of Employees	# Work Days per Year	Use per Employee	Annual Water Use (ac-ft/yr)
Full-time	3	260	15	0.036
Part-time	0	130	15	0.000
TOTAL				**0.036**

Table 9: Estimated existing winery event water use for the Fontanella Winery.

Visitor Category	# of Vistors	Use per Visitor (gal/day)	Annual Water Use (ac-ft/yr)
Visitors	890	15	0.041
TOTAL			**0.041**

Table 10: Estimated existing and proposed winery event water use for the Mt. Veeder Springs Winery.

Visitor Category	# of Vistors	Use per Visitor	Annual Water Use (ac-ft/yr)
Visitors	110	15	0.005
TOTAL			**0.005**

Table 11: Estimated existing and proposed winery event water use for the Renteria Winery.

Visitor Category	# of Vistors	Use per Visitor	Annual Water Use (ac-ft/yr)
Visitors	3,304	15	0.152
TOTAL			**0.152**

Table 12: Estimated existing and proposed irrigation water use within the project recharge area

Use Category	Number of Acres	Use per Acre (ac-ft/yr)	Annual Water Use (ac-ft/yr)
Irrigation (Project Parcel)	5.40	0.5	2.7
Irrigation (other)	6.40	0.5	3.2

Table 13: Estimated existing and proposed residential water use within the project recharge area.

Use Category	Count	Use Rate (ac-ft/yr)	Annual Water
Primary Residences	3	1	3.00
Additional Landscaping*	59.4	0.1	5.94
Pools	2	0.1	0.20
TOTAL			**9.14**

*Landscape Use estimate based on square footage of lawn and non-xeriscape landscaping estimated from aerial photography

Table 14: Summary of estimated existing and proposed water uses on the project parcel.

	Irrigation Use ac-ft/yr	Residential Use ac-ft/yr	Winery Production Use ac-ft/yr	Winery Employee Use ac-ft/yr	Winery Visitation & Event Use ac-ft/yr	Total Use ac-ft/yr
Existing Use	2.70	1.30	0.80	0.05	0.04	**4.89**
Proposed Use	2.70	1.30	0.80	0.07	0.28	**5.15**
Proposed Increase	0.00	0.00	0.00	0.02	0.24	**0.26**

Proposed Condition

In the proposed condition, winery production use, irrigation use, and residential use will remain unchanged. Winery employees will increase from three full-time and 2 part-time employees to 6 full-time employees. Winery visitation will increase from a maximum of 890 visitors per year to a maximum of 5,901 visitors per year. The proposed increase in employees and visitation results in a modest increase in the total proposed water use of 0.26 ac-ft/yr (Tables 15 & 16); the total water use in the recharge area increases from 17.55 to 17.81 ac-ft/yr (Table 2).

Table 15: Estimated proposed winery employee water use for the Fontanella Winery.

Work Category	# of Employees	# Work Days per Year	Use per Employee (gal/day)	Annual Water Use (ac-ft/yr)
Full-time	6	260	15	0.072
Part-time	0	130	15	0.000
TOTAL				**0.072**

Table 16: Estimated proposed winery event water use for the Fontanella Winery.

Visitor Category	# of Vistors	Use per Visitor	Annual Water Use (ac-ft/yr)
Visitors	5,901	15	0.272
TOTAL			**0.272**

Groundwater Recharge Analysis

The Soil Water Balance (SWB) model developed by the U.S. Geological Survey (Westenbroek et al., 2010) was used to produce a spatially distributed estimate of annual recharge in the project recharge area. This model operates on a daily timestep and calculates runoff based on the Natural Resources Conservation Service (NRCS) curve number approach and Actual Evapotranspiration (AET) and recharge based on a modified Thornthwaite-Mather soil-water-balance approach (Westenbroek et al., 2010).

This approach simulates potential recharge from infiltration of precipitation and does not account for the capacity of the project aquifer materials to accept recharge. Significant additional recharge may occur through streambed infiltration, and/or groundwater inflows from outside the defined project recharge area, however quantifying these recharge components is beyond the scope of this analysis.

Model Development

The project recharge area is approximately 138 acres and is underlain by the Great Valley Sequence as described in the Project Aquifer section above. The model was developed using a 10-meter resolution rectangular grid and water budget calculations were made on a daily time step. Key spatial inputs included a flow direction map developed from the USGS 30-meter resolution Digital Elevation Model (DEM), a land cover dataset developed from the CalVeg Dataset and modified based on the Napa County shapefile of agricultural areas and interpretation of 2016 aerial photography (Figure 5), a distribution of Hydrologic Soil Groups (A through D classification from lowest to highest runoff potential (not shown since all soils in the recharge area were Hydrologic Soil Group C), and Available Water Capacity (AWC) developed from the NRCS Soil Survey Geographic Database (SSURGO).

A series of model parameters were assigned for each land cover type/soil group combination including a curve number, dormant and growing season interception storage values, and a rooting depth (Table 17). Curve numbers were assigned based on standard NRCS methods. Interception storage values and rooting depths were assigned based on literature values and previous modeling experience. Infiltration rates for hydrologic soil groups A through D were applied based on Cronshey et al. (1986) (Table 18) along with default soil-moisture-retention relationships based on Thornthwaite and Mather (1957) (Figure 6).

Daily precipitation and daily minimum and maximum air temperature data were compiled for the Sonoma Weather Station (Figure 7) which is located approximately 4.9 miles west-southwest of the project parcel. This station was selected because it represents the best available climate station in proximity to the project site with a long and continuous period of record. Based on the PRISM dataset which describes the spatial variations in long-term precipitation for the continental U.S., the 1980 to 2010 mean annual precipitation at the Sonoma Weather Station was 31.12 inches versus 33.21 inches for the project recharge area (PRISM, 2010). The precipitation data was scaled by a factor of 1.07 to account for the difference in precipitation between the station location and the project recharge area. Water Year 2010 was selected to represent average water year conditions for the analysis because it represents a recent year with near long-term average precipitation conditions (28.21 inches at the scaled Sonoma Weather Station, equivalent to 94% of the long-term average). The model was also evaluated for water year 2014 to represent drought conditions. Water year 2014 precipitation was 16.56 inches at the scaled Sonoma Weather Station or approximately 50% of long-term average conditions.

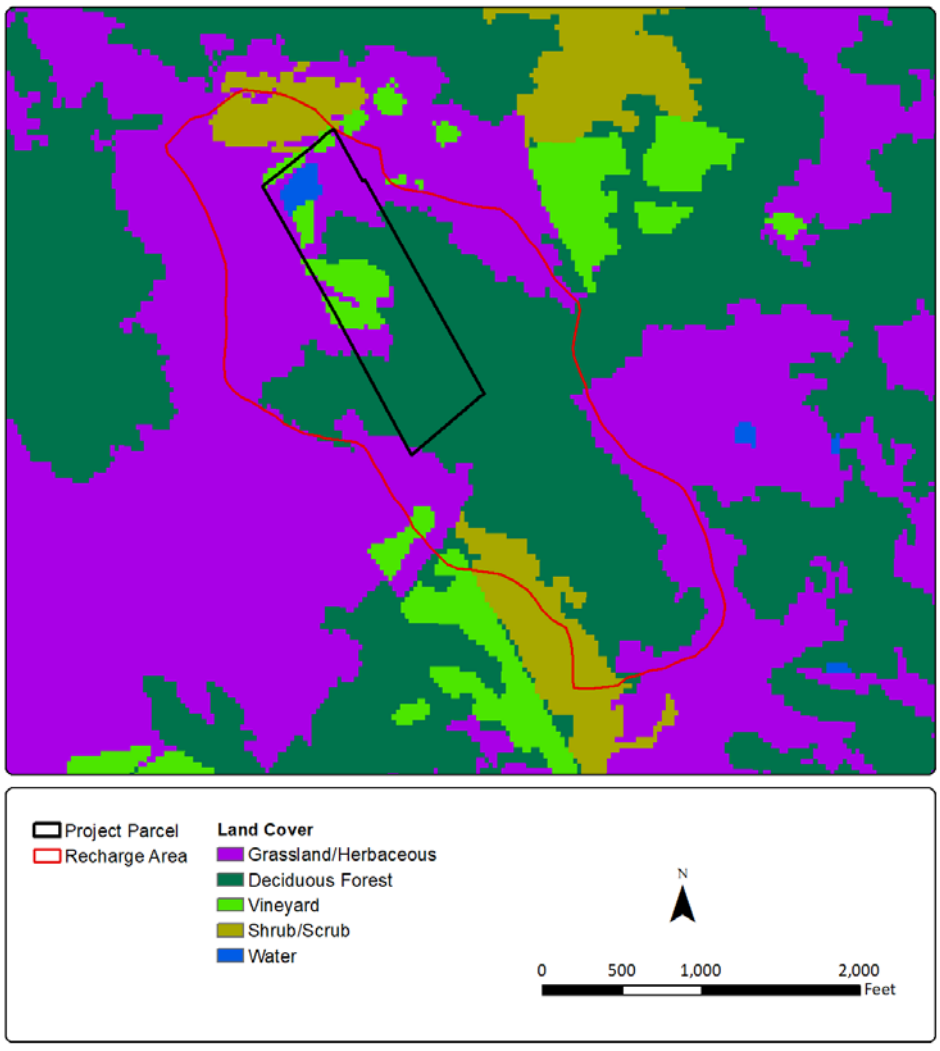


Figure 5: Land cover map used in the SWB model.

Table 17: Soil and land cover properties used in the SWB model.

Land Cover	Curve Number C Soils	Interception Storage Values Growing Season	Interception Storage Values Dormant Season	Rooting Depths (ft) C Soils
water	100	0.000	0.000	0.00
deciduous forest	70	0.050	0.020	4.90
shrub/scrub	65	0.080	0.015	2.70
grassland/herbaceous	71	0.005	0.004	1.00
vineyard	75	0.080	0.015	2.00

Table 18: Infiltration rates for NRCS hydrologic soil groups (Cronshey et al., 1986).

Soil Group	Infiltration Rate (in/hr)
A	> 0.3
B	0.15 - 0.3
C	0.05 - 0.15
D	<0.05

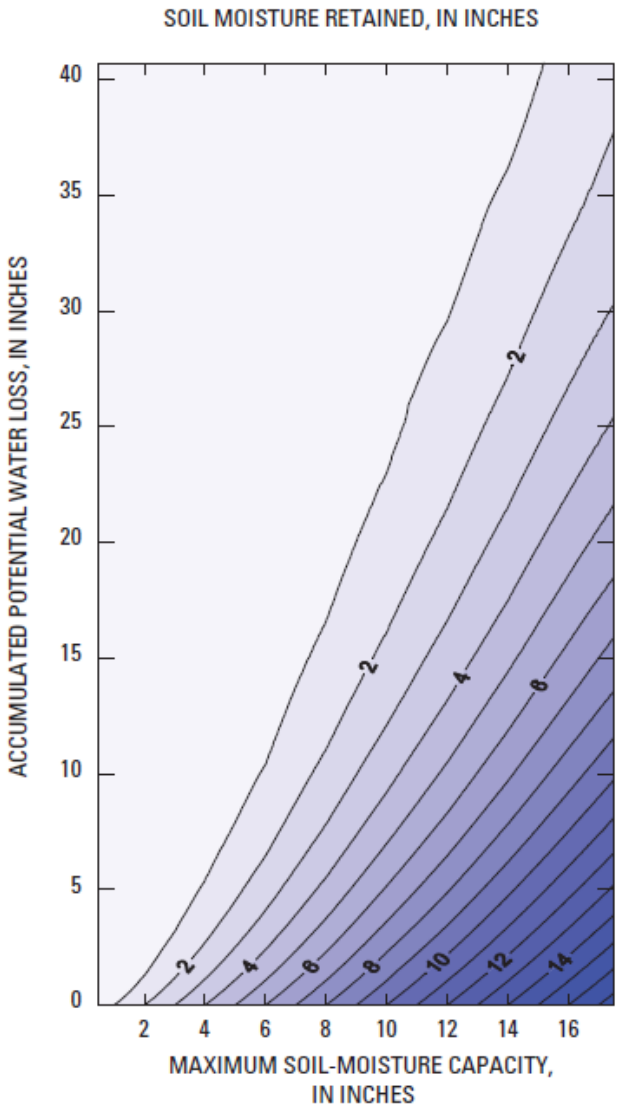


Figure 6: Soil-moisture-retention table (Thornthwaite and Mather, 1957).

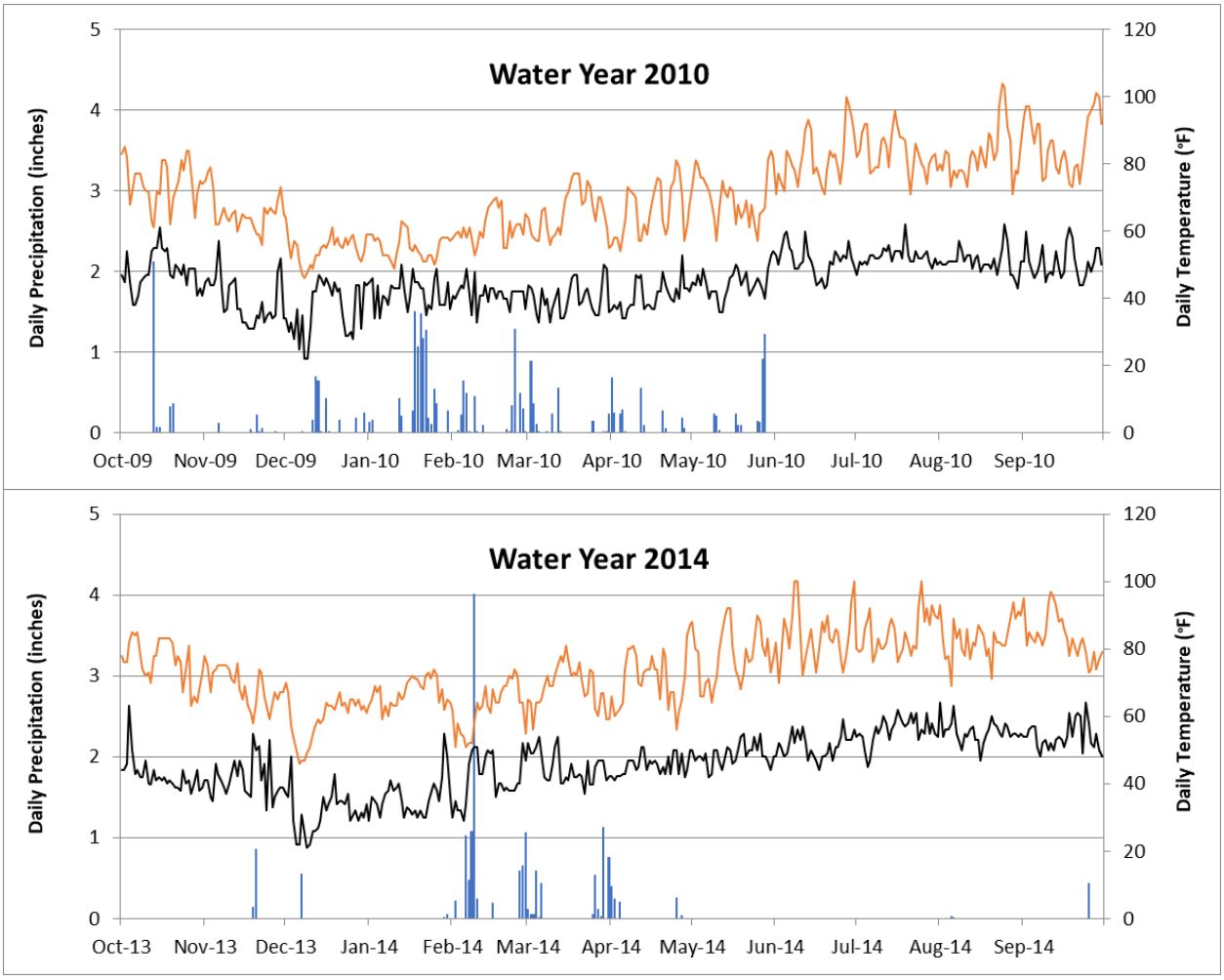


Figure 7: Daily precipitation (blue bars) and minimum (black lines) and maximum (red lines) air temperature used in the SWB model.

Results

The simulated Water Year 2010 (average water year) recharge results indicate that recharge varied across the project recharge area from 0.8 to 7.9 inches (Figure 8). Spatially averaged over the project recharge area, the 28.2 inches of precipitation were partitioned as follows: Actual Evapotranspiration (AET) = 20.0 inches, Runoff = 5.0 inches, and Recharge = 3.2 inches (Table 19). The simulated water year 2014 (dry water year) recharge results indicate that recharge varied across the project recharge area from close to zero to 4.1 inches (Figure 9). Spatially averaged over the project recharge area, 1.2 of the 16.6 inches of precipitation were recharged (Table 19). Recharge rates are slightly higher when spatially averaged over just the project parcel and were 3.5 inches during 2010 and 1.4 inches during 2014.

Recharge as a percentage of annual precipitation ranged from 11% in the average water year to 7% in the dry water year. Runoff as a percentage of annual precipitation was much lower in the dry water year (3%) compared to the average water year (18%). Groundwater recharge estimates can also be expressed as a total volume by multiplying the calculated recharge by the project aquifer recharge area of 138 acres. This calculation yields an estimate of total recharge of 13.8 acre-ft during the drought conditions of water year 2014 and of 36.8 acre-ft for the average water year of 2010.

A water budget estimate is available for the Napa Creek watershed which contains the project recharge area which is located in the headwaters of Browns Valley Creek (a tributary to Napa Creek). Comparison to this water budget is useful for determining the overall reasonableness of the results although one would not expect precise agreement owning to significant variations in climate, land cover, soil types, and underlying hydrogeologic conditions between the project recharge area and the Napa Creek watershed as a whole. This regional analysis estimated that mean annual recharge was equivalent to 11% of mean annual precipitation (LSCE, 2013). The simulated water year 2010 groundwater recharge for the project recharge area also represents approximately 11% of the precipitation which agrees closely with the regional estimate indicating that the results are reasonable.

Table 19: Summary of water balance results from the SWB model.

	WY 2010		WY 2014	
	inches	% of precip	inches	% of precip
Precip	28.2		16.6	
AET	20.0	71%	14.9	90%
Runoff	5.0	18%	0.5	3%
Recharge	3.2	11%	1.2	7%

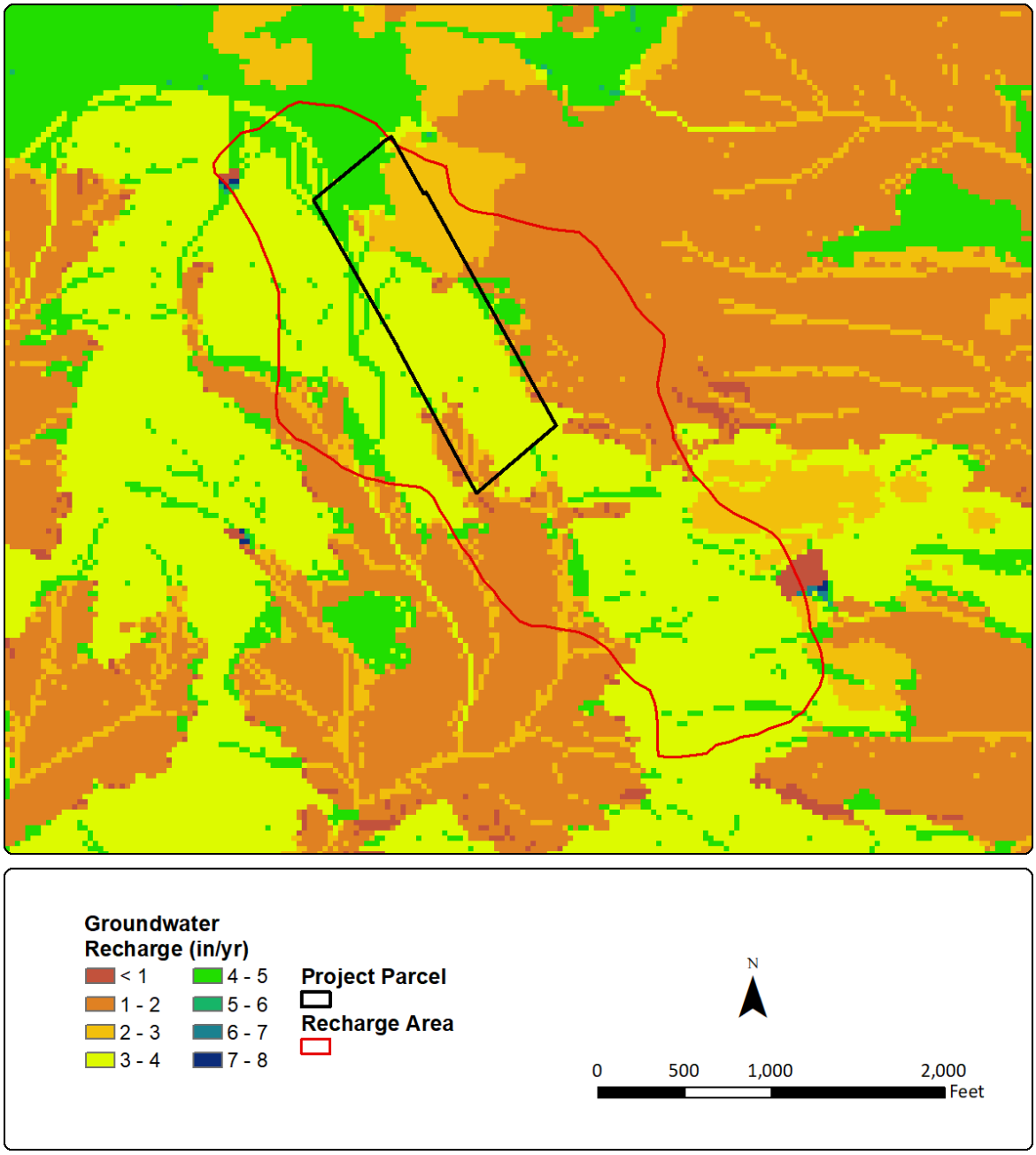


Figure 9: WY 2010 recharge simulated with the SWB model.

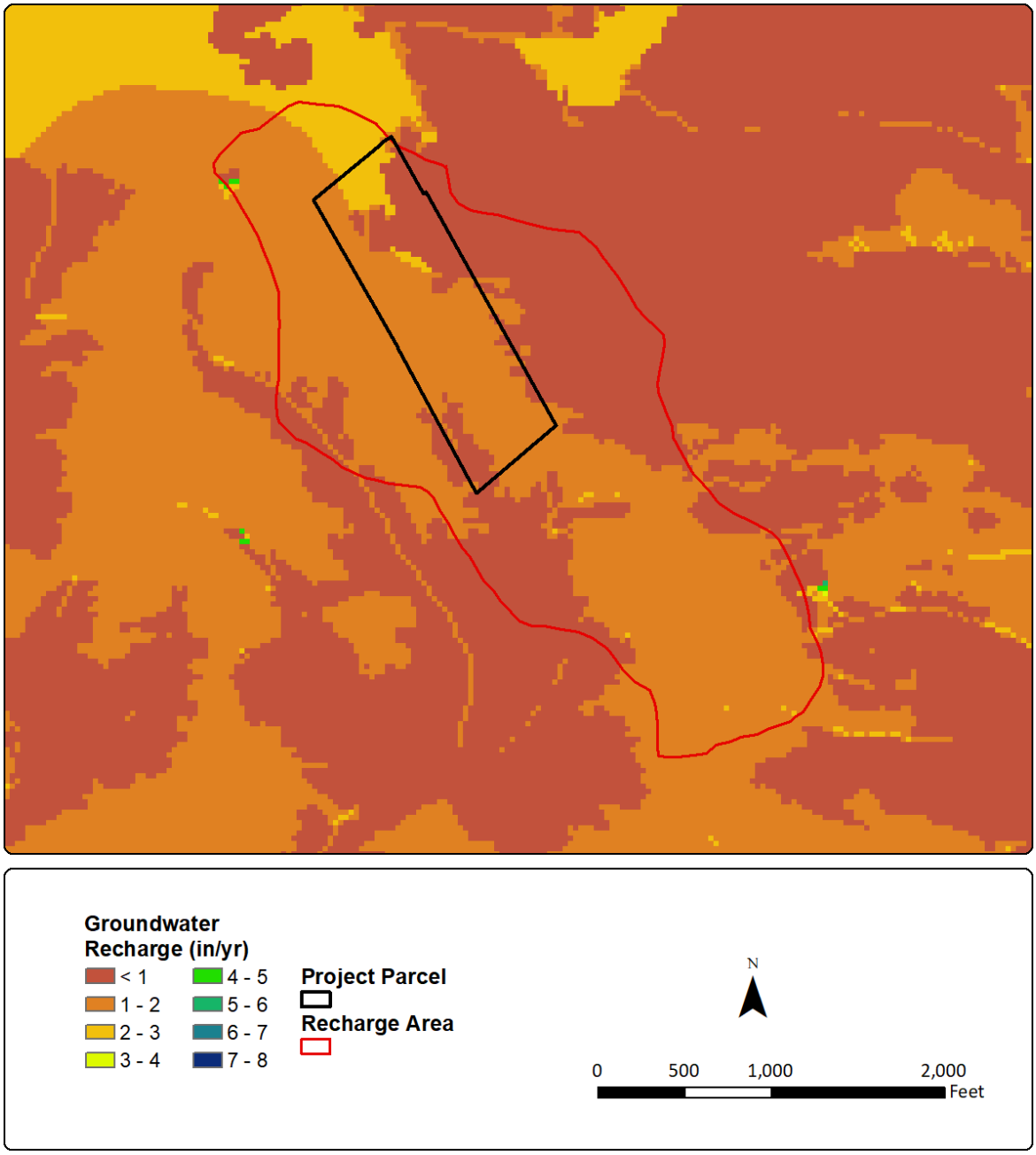


Figure 10: WY 2014 recharge simulated with the SWB model.

Tier I - Comparison of Water Demand and Groundwater Recharge

The total proposed groundwater use for the project recharge area is estimated to be 17.8 acre-ft/yr. Groundwater use in the project recharge area is equivalent to 48% of the estimated mean annual groundwater recharge of 36.8 acre-ft/yr indicating that sufficient groundwater resources are available to support the proposed project. Under drought conditions, groundwater use would be about 129% of the estimated dry water year recharge of 13.8 acre-ft/yr (Table 20). Groundwater sustainability is generally measured by average water year or long-term average conditions since recharge deficits during periods of drought are expected to balance with recharge surpluses during wetter periods. It is relatively common for water use to exceed recharge during periods of drought and this is not an indication of insufficient water supply.

Restricting the comparison to just the project parcel area of 26.4 acres indicates that the total proposed on-parcel groundwater use of 5.1 ac-ft/yr represents about 66% of the mean annual recharge of 7.7 ac-ft/yr (Table 20). Given the magnitude of the surpluses during average water years, the modest increase in groundwater use proposed by the project is unlikely to result in significant reductions in groundwater levels or depletion of groundwater resources over time. Also, our estimates of water use are conservative, and represent existing use rates on the project site to be about twice the metered use for 2016 and 2017.

Table 20: Total annual Water Use in the project recharge area and on the project parcel compared with average and dry year groundwater recharge.

		Average Water Year (2010)			Dry Water Year (2014)		
	Total Proposed Demand (ac-ft/yr)	Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge	Recharge (ac-ft/yr)	Recharge Surplus (a c-ft/yr)	Demand as % of Recharge
Rechage Area	17.8	36.8	19.0	48%	13.8	-4.0	129%
Project Parcel	5.1	7.7	2.6	66%	3.1	-2.0	166%

Tier II - Well and Spring Interference

The closest neighboring well to the winery well (Well WW) is Well 4 which is located about 195-ft to the north on the adjacent parcel (APN #050-010-013). This parcel is owned by the project applicants therefore the Tier II Well Interference Analysis is not required per County guidance. No water transfers occur or are planned to occur between these two adjoining parcels and no other active wells are located within 500-ft of the project winery well. Although not required, we attempted to estimate the drawdown at the adjacent parcel well based on County guidance, however use of the default aquifer parameters for the Great Valley Sequence presented in Tables F-3 and F-4 prohibit the equations applicability due to well function w(u) values exceeding 0.05

(Cooper & Jacob, 1946). Additionally, the available pump test data is not sufficiently detailed to allow for estimation of aquifer properties therefore no drawdown estimates are presented.

The closest spring to the project winery is the on-parcel spring that provides domestic water. This spring is located approximately 1,580-ft from the project winery well, therefore the spring interference analysis is not required per county guidance (distance greater than 1,500-ft).

Summary

Application of the Soil Water Balance (SWB) model to the project recharge area revealed that average water year recharge was approximately 3.1 inches/yr or 36.8 acre-ft/yr. During drought conditions, recharge was significantly lower at approximately 0.7 inches/yr or 13.8 acre-ft/yr. The total proposed Water Use for the project aquifer recharge area is estimated to be 17.8 acre-ft/yr. This represents 48% of the estimated mean annual recharge indicating that the project is unlikely to result in significant declines in groundwater elevations or depletion of groundwater resources over time and that the Tier I criteria for the project are met. No neighboring wells of different ownership are located within 500-ft of the project winery well and no springs are located within 1,500 of the well, therefore the Tier II screening criteria have been met and no further analysis is required.

References

Cooper, H.H. and C.E. Jacob, 1946. A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History. American Geophysical Union Transactions, vol. 27, pp. 526-534.

Cronshey, R., McCuen, R., Miller, N., Rawls, W., Robbins, S., and Woodward, D., 1986. Urban hydrology for small watersheds - TR-55 (2nd ed.), Washington, D.C., U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, Technical Release 55, 164 p.

Graymer, R.W., et al., 2007. Geologic Map and Map Database of Eastern Sonoma and Western Napa Counties, California. Pamphlet to accompany Scientific Investigations Map 2956. U.S. Department of the Interior U.S. Geological Survey.

Luhdorff and Scalmanini Consulting Engineers (LSCE) and MBK Engineers, 2013. Updated hydrogeologic conceptualization and characterization of conditions. Prepared for Napa County.

PRISM, 2010. 30 arcsecond resolution gridded total precipitation data for the conterminous United States, PRISM Climate Group, Oregon State University, www.prismclimate.org.

Thornthwaite, C.W., and Mather, J.R., 1957. Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance, Publications in Climatology, v. 10, no. 3, pgs 185-311.

Westenbroek, S.M., Kelson, V.A., Dripps, W.R., Hunt R.J., and Bradbury, K.R., 2010. SWB - A Modified Thornthwaite-Mather Soil-Water-Balance Code for Estimating Groundwater Recharge, U.S. Geological Survey Techniques and Methods 6-A31, 60 pgs.

APPENDIX A

WELL COMPLETION REPORTS

WW

Owner's Copy
Page 1 of 1

WELL COMPLETION REPORT
Refer to Instruction Pamphlet

Owner's Well No. _____ No. 781561

Date Work Began 6-15-00, Ended 6-19-00

Local Permit Agency Napa County Environmental Mgmt.

Permit No. 96-11458 Permit Date 2-29-00

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

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

DRILLING METHOD rotary FLUID air

DEPTH FROM SURFACE ft.	to ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	22	brown clay
22	45	shale
45	60	sandstone
60	120	shale
120	135	sandstone
135	260	shale & clay

TOTAL DEPTH OF BORING 260 (Feet)

TOTAL DEPTH OF COMPLETED WELL 158 (Feet)

WELL OWNER

Name Donald Cutler

Mailing Address 1717 Partrick Rd.

CITY Napa STATE CA ZIP 94558

WELL LOCATION

Address same

City _____

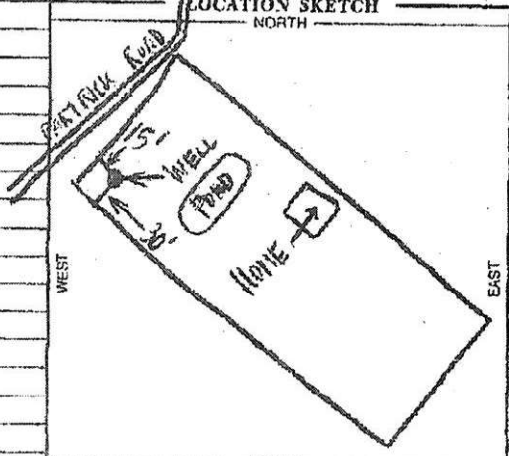
County Napa

APN Book 50 Page 010 Parcel 18

Township _____ Range _____ Section _____

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

LOCATION SKETCH



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

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR ___ Deepen ___ Other (Specify)

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

PLANNED USES (✓)

WATER SUPPLY X Domestic ___ Public X Irrigation ___ Industrial

MONITORING ___

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 35 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 4 (Ft.) & DATE MEASURED 6-19-00

ESTIMATED YIELD * 38 (GPM) & TEST TYPE air lift

TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN N/A (Ft.)

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

CASING (S)

DEPTH FROM SURFACE ft.	to ft.	BORE-HOLE DIA. (inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (inches)
0	25	10								
25	260	8								
0	38		X				PVC F480	5	SDR-21	
38	158			X			PVC F480	5	SDR-21	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE ft.	to ft.	TYPE: CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	20	X			concrete
20	24		X		chips
24	260			X	pea gravel

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other _____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

ADDRESS 2110 Penny Lane CITY Napa STATE CA ZIP 94559

Signed _____ (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 7-11-00

C-57 LICENSE NUMBER 439-746

DWR 188 REV. 11-97 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

~~PW~~ IW

ORIGINAL
File with DWR

Page ___ of ___
Owner's Well No.

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0947977

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.: 08N05W02
LATITUDE: 38 18 46
LONGITUDE: 122 22 24
APN/TRS/OTHER:

Date Work Began 8-30-12, Ended 9-10-12
Local Permit Agency Napa County
Permit No. E12-00489 Permit Date 8-21-12

GEOLOGIC LOG

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

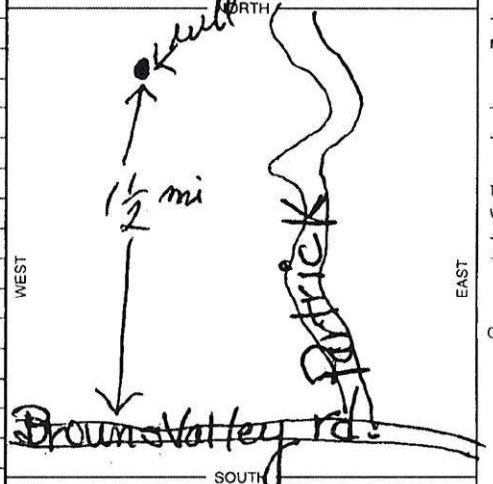
DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 30	brown clay & Shale
30 200	blue Shale, streaks of broken up Sandstone
200 217	blue Shale

TOTAL DEPTH OF BORING 220 (Feet)
TOTAL DEPTH OF COMPLETED WELL 217 (Feet)

WELL LOCATION

Address Same
City Same
County Napa
APN Book ___ Page ___ Parcel 050-010-018
Township ___ Range ___ Section ___
Lat ___ DEG. ___ MIN. ___ SEC. N
Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH



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

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

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 20 (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * 20 (GPM) & TEST TYPE AIR LIFT
TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN 2/0 (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 23	11"	X				PLASTIC	5"	200	
23 37	8"	X				"	"	"	
37 217	8"	FACT				PERF "	"	"	3/32

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 23	X			
23 217				WELL PACK #6

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

NAME Pulliam Well Drilling
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS 2877 Piedmont Av. CITY Napa STATE Ca. ZIP 94558
Signed Bill Pulliam
C-57 LICENSED WATER WELL CONTRACTOR
DATE SIGNED 9-26-12
C-57 LICENSE NUMBER 248677

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

OSP 03 78836

ORIGINAL
File with DWR

#1

Page ___ of ___

Owner's Well No. ___

Date Work Began 5-2-1991 , Ended 5-3-1991

Local Permit Agency Napa County Environmental Mgmt.

Permit No. ___ Permit Date ___

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 482426

DWR USE ONLY — DO NOT FILL IN
05N05W01F
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

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

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 : 20	brown clay
20 : 30	dark brown clay
30 : 31	gravel
31 : 85	shale
85 : 90	sandstone
90 : 130	50% shale/ 50% sandstone
130 : 180	shale
180 : 200	gravel
200 : 220	shale
	*Filled in test hole with cuttings from drilling process.

TOTAL DEPTH OF BORING 220 (Feet)

TOTAL DEPTH OF COMPLETED WELL ___ (Feet)

WELL OWNER

CITY ___ STATE ___ ZIP ___

WELL LOCATION

Address same

City ___

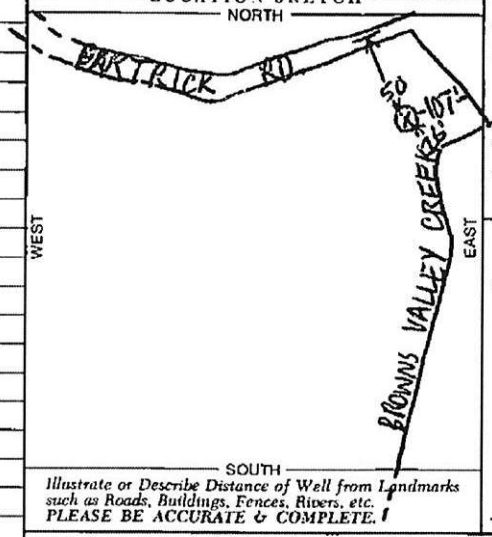
County Napa

APN Book 50 Page 040 Parcel 03

or Township 5 N. Range 5 W. Section Rancho Napa

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

LOCATION SKETCH



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

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

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

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

X "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Rotary (air) FLUID ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

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

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 220	8								20

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 220			x	shale

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

ADDRESS 2110 Penny Lane CITY Napa STATE CA. ZIP 94559

Signed Lloyd Huckfeldt
WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED 5-6-1991

C-57 LICENSE NUMBER 439-746

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

#2

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 364944

Notice of Intent No. _____
Local Permit No. or Date 2-12-1991

State Well No. _____
Other Well No. 05N05W01B

(2) LOCATION OF WELL (See instructions):
County Napa Owner's Well Number _____
Well address if different from above same
Township 5 N. Range 5 W. Section Rancho
Distance from cities, roads, railroads, fences, etc. Napa

A.P.# 50-040-03

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☑ Size:
Diameter of bore 9"
Packed from ft. to ft.

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

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

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

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

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ 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

(12) WELL LOG: Total depth 300 ft. Completed depth _____ ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
		TEST HOLE LOG
0	60	light brown clay
60	160	br. clay with embedded rock
160	220	soft lt. br. & gray shale (sm. grvl
220	300	soft gray shale
		*Filled in test hole with clay & shale cuttings from drilling process.

Work started 2-12-91 19__ Completed 2-14 19 91

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 Lloyd Huckfeldt (Well Driller)
NAME HUCKFELDT WELL DRILLING CO (Person, firm, or corporation) (Type or printed)
Address 2110 Penny Lane
City Napa ZIP 94559
License No. 439-746 Date of this report 2-20-1991

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

ORIGINAL
File with DWR

#3

Page 1 of 1

Owner's Well No. _____

Date Work Began 9-30-99, Ended 10-4-99

Local Permit Agency Napa County Environmental Mgmt.

Permit No. 96-10856 Permit Date 10-8-99

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 777411

DWR USE ONLY — DO NOT FILL IN
05N05W09
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

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

DRILLING METHOD rotary air FLUID _____

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	40	brown clay with embedded rock
40	45	gray clay
45	80	90% shale/ 10% clay
80	210	shale
210	215	sandstone
215	290	shale
290	320	60% shale/ 40% sandstone
320	385	shale
385	400	gray clay
187	287	screen PVC 5" .032 slot
287	307	blank PVC 5"
307	367	screen PVC 5" .032 slot

TOTAL DEPTH OF BORING 400 (Feet)

TOTAL DEPTH OF COMPLETED WELL 367 (Feet)

CITY STATE ZIP

WELL LOCATION

Address same

City Napa

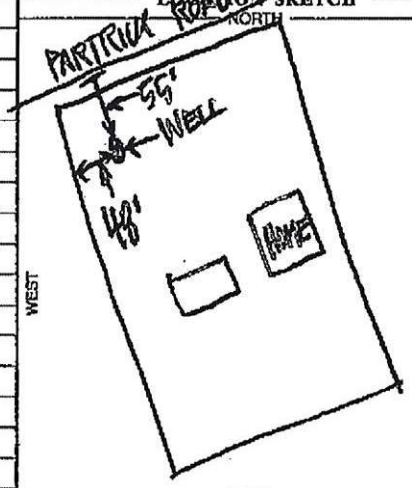
County Napa

APN Book 50 Page 010 Parcel 17

Township _____ Range _____ Section _____

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

LOCATION SKETCH



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

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

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

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
X Irrigation ___ Industrial

___ MONITORING
___ TEST WELL
___ CATHODIC PROTECTION
___ HEAT EXCHANGE
___ DIRECT PUSH
___ INJECTION
___ VAPOR EXTRACTION
___ SPARGING
___ REMEDIATION
___ OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 45 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 34 (Ft.) & DATE MEASURED 10-4-99

ESTIMATED YIELD * 75 (GPM) & TEST TYPE air lift

TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN N/A (Ft.)

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

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	25	10								
25	400	8								
0	27		X				PVC	5	SDR-21	
27	87			X			PVC	5	SDR-21	.032
87	187		X				PVC	5	SDR-21	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	23	X			concrete
23	367			X	pea gravel

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

2110 Penny Lane ADDRESS Napa CITY CA STATE 94559 ZIP

Signed _____ WELL DRILLER/AUTHORIZED REPRESENTATIVE

10-13-99 DATE SIGNED

439-746 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

#B #4

ORIGINAL
File with DWR

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0948382

Page ___ of ___
Owner's Well No. ___
Date Work Began 11/20/07, Ended 11/27/07
Local Permit Agency Napa
Permit No. E07-00852 Permit Date 11/16/07

DWR USE ONLY — DO NOT FILL IN
05N05W02
STATE WELL NO./STATION NO.
38/8/37 122/2/33
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD air FLUID versafoam

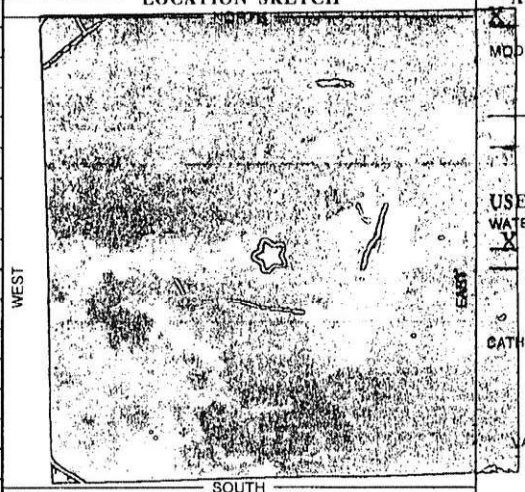
DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 to 20	brown clay
20 to 30	brown clay gray shale
30 to 50	gray shale
50 to 70	hard fract gray shale little white.
70 to 110	soft gray shale
110 to 130	hard gray shale
130 to 360	hard & soft gray shale

TOTAL DEPTH OF BORING 360 (Feet)
TOTAL DEPTH OF COMPLETED WELL 360 (Feet)

WELL LOCATION

CITY ___ STATE ___ ZIP ___
Address 1727 Partrick Road
City Napa
County Napa
APN Book 050 Page 010 Parcel 013
Township ___ Range ___ Section ___
Lat ___ DEG. ___ MIN. ___ SEC. N
Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH



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

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

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * 1-2. (GPM) & TEST TYPE test pump
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 to 53	123/4	X				F480	6	200	
53 to 60	97/8	X				F480	6	200	
60 to 80	9 7/8		X			F480	6	200	factory
80 to 100	9 7/8	X				F480	6	200	
100 to 120	97/8		X			F480	6	200	factory
120 to 140	97/8	X				F480	6	200	

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 to 53	X			
53 to 360				peagravel

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 ___ 12/19/07
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED

396352
C-57 LICENSE NUMBER

DWR 188 REV. 05-03 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM OSP 03 78836

State of California Well Completion Report No. 0948382

continue casing list:

140 - 160	9 7/8	Perf	F480	6"	200	factory
160 - 180	9 7/8	Blank	F480	6"	200	
180 - 200	9 7/8	Perf	F480	6"	200	factory
200 - 220	9 7/8	Blank	F480	6"	200	
220 - 240	9 7/8	Perf	F480	6"	200	factory
240 - 260	9 7/8	Blank	F480	6"	200	
260 - 280	9 7/8	Perf	F480	6"	200	factory
280 - 300	9 7/8	Blank	F480	6"	200	
300 - 320	9 7/8	Perf	F480	6"	200	factory
320 - 340	9 7/8	Blank	F480	6"	200	
340 - 360	9 7/8	Perf	F480	6"	200	factory

A.P.#050-010-013
1727 Partrick Road, Napa, CA 94558
Oscar Renteria

#5

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e012096

DWR USE ONLY — DO NOT FILL IN
05N05W02
STATE WELL NO./ STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. TW#1-'04

Date Work Began 4/27/2004, Ended 5/4/2004

Local Permit Agency Napa County Environmental Mgmt

Permit No. 96-12655 Permit Date 4/28/2004

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL — HORIZONTAL — ANGLE — (SPECIFY)

DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	35	BROWN CLAY
35	175	70%SHALE/ 30% CLAY
175	240	60% CLAY/ 40% SHALE
240	265	50% SHALE/ 50% CLAY
265	280	SANDSTONE
280	400	60% SHALE/ 40% CLAY
400	600	60% CLAY/ 40% SHALE
		BACKFILLED TEST HOLE WITH PEA GRAVEL
		TO 30'. INSTALLED CONCRETE TO 3'.
		TOPPED WITH NATURAL MATERIAL.

TOTAL DEPTH OF BORING 600 (Feet)

TOTAL DEPTH OF COMPLETED WELL (Feet)

WELL LOCATION

Address 1727 Partrick Road

City Napa CA

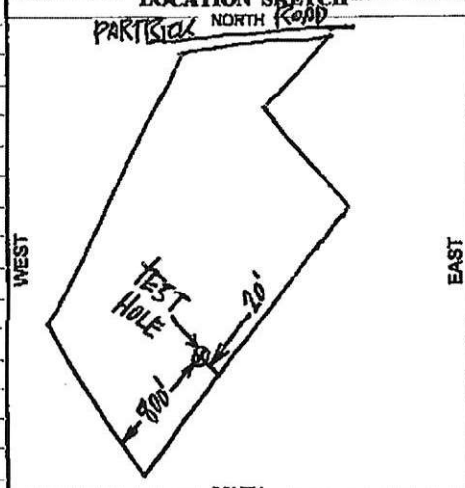
County Napa

APN Book 50 Page 010 Parcel 13

Township Range Section

Latitude DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH



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

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR

Deepen

Other (Specify)

DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG"

PLANNED USES (✓)

WATER SUPPLY

Domestic Public

Irrigation Industrial

MONITORING

TEST WELL ✓

CATHODIC PROTECTION

HEAT EXCHANGE

DIRECT PUSH

INJECTION

VAPOR EXTRACTION

SPARGING

REMEDIATION

OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL (Ft.) & DATE MEASURED

ESTIMATED YIELD * (GPM) & TEST TYPE

TEST LENGTH (Hrs.) TOTAL DRAWDOWN (Ft.)

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

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	600	9								

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	3			✓	SOIL
3	30	✓			CONCRETE
30	600			✓	PEA GRAVEL

ATTACHMENTS (✓)

— Geologic Log
— Well Construction Diagram
— Geophysical Log(s)
— Soil/Water Chemical Analysis
— Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

2110 Penny Lane ADDRESS — Napa CITY — CA STATE — 94559 ZIP

Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE — 05/11/04 DATE SIGNED — 439-746 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

#6

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e012097

DWR USE ONLY — DO NOT FILL IN
05N/05W/02
STATE WELL NO./ STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. TW#2-'04

Date Work Began 4/30/2004, Ended 5/4/2004

Local Permit Agency Napa County Environmental Mgmt

Permit No. 96-12659 Permit Date 5/3/2004

GEOLOGIC LOG

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

DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0 – 25	BROWN CLAY
25 – 40	85% CLAY/ 15% SHALE
40 – 70	GRAY SANDY CLAY
70 – 90	HARD SHALE
90 – 125	SANDSTONE
125 – 215	SHALE
215 – 240	SHALE & CLAY
240 – 260	SHALE
260 – 265	SANDSTONE
265 – 360	SHALE & CLAY
	BACKFILLED TEST HOLE WITH PEA GRAVEL TO 36'. INSTALLED BENTONITE CHIPS TO 28'. CONCRETE TO 3'. TOPPED WITH NATURAL MATERIAL.

TOTAL DEPTH OF BORING 360 (Feet)

TOTAL DEPTH OF COMPLETED WELL ___ (Feet)

WELL LOCATION

Address 1727 Partrick Road

City Napa CA

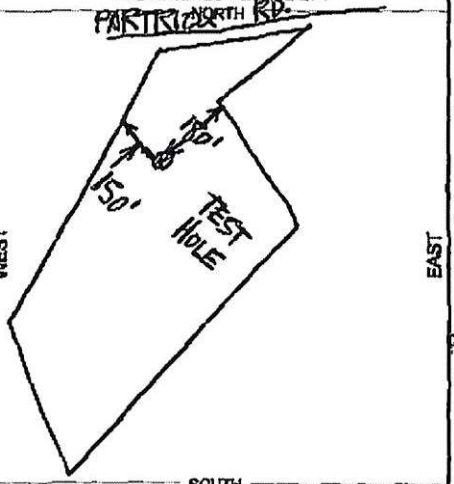
County Napa

APN Book 50 Page 010 Parcel 13

Township ___ Range ___ Section ___

Latitude ___ DEG. ___ MIN. ___ SEC. ___ DEG. ___ MIN. ___ SEC.

LOCATION SKETCH



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

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

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

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ✓
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 150 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD 1 (GPM) & TEST TYPE air lift

TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN N/A (Ft.)

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

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FULL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 – 360	9								

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE: CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 – 3			✓	SOIL
3 – 28	✓			CONCRETE
28 – 36		✓		CHIPS
36 – 360			✓	PEA GRAVEL

ATTACHMENTS (✓)

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

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

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

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

2110 Penny Lane ADDRESS — Napa CITY — CA STATE — 94559 ZIP

Signed ___ WELL DRILLER/AUTHORIZED REPRESENTATIVE — 05/06/04 DATE SIGNED — 439-746 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

#7

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. e0112807

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./ STATION NO.: 06N05W35 / 381858 / 1222242
LATITUDE / LONGITUDE
APN/TRS/OTHER

Owner's Well No. 3-2010
Date Work Began 7/7/2010, Ended 7/23/2010
Local Permit Agency Napa County Environmental Mgmt
Permit No. E10-00254 Permit Date 6/22/2010

GEOLOGIC LOG

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

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	20	BROWN CLAY
20	55	SHALE
55	135	50% SHALE / 50% CLAY
135	140	70% SHALE / 30% SANDSTONE
140	170	60% SHALE / 40% CLAY
170	190	HARD SANDSTONE & SHALE
190	245	60% SHALE / 40% CLAY
245	280	HARD SHALE
280	300	SHALE & CLAY
300	310	SANDSTONE
310	320	70% SHALE / 30% SANDSTONE
320	390	50% SHALE / 50% CLAY
390	430	HARD SHALE & SANDSTONE
430	450	SHALE & CLAY
450	480	HARD SHALE
480	520	SOFT SHALE & CLAY
520	580	HARD SHALE & CLAY
580	600	SHALE & CLAY
		CONTINUED CASING LAYOUT
358	378	BLANK PVC 5"
378	478	SCREEN PVC 5" .032 SLOT
478	498	BLANK PVC 5"
498	558	SCREEN PVC 5" .032 SLOT
558	578	BLANK PVC 5"

TOTAL DEPTH OF BORING 600 (Feet)
TOTAL DEPTH OF COMPLETED WELL 578 (Feet)

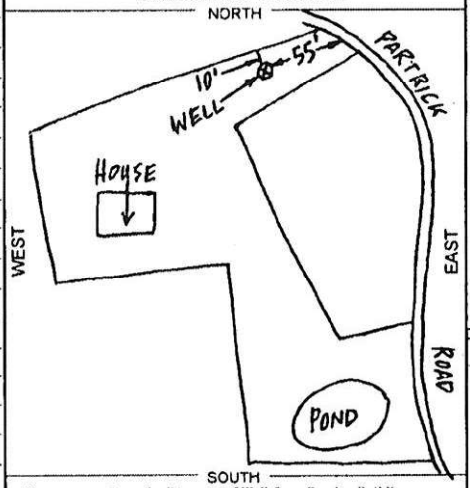
WELL OWNER

N
M
N
CITY

WELL LOCATION

Address 1781 Partrick Road
City Napa CA
County Napa
APN Book 050 Page 020 Parcel 004
Township ____ Range ____ Section ____
Latitude ____ DEG. MIN. SEC. ____ DEG. MIN. SEC.

LOCATION SKETCH



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

ACTIVITY (✓)

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

PLANNED USES (✓)

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER N/A (Ft.) BELOW SURFACE 1
DEPTH OF STATIC WATER LEVEL 142 (Ft.) & DATE MEASURED 8/3/2010
ESTIMATED YIELD * 1 (GPM) & TEST TYPE AIR LIFT
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN N/A (Ft.)
May not be representative of a well's long-term yield.

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	60	12								
60	600	10								
0	118		✓				PVC F480	5	SDR-21	
118	218			✓			PVC F480	5	SDR-21	.032
218	238		✓				PVC F480	5	SDR-21	
238	358			✓			PVC F480	5	SDR-21	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	4	✓			CONCRETE
4	53		✓		GROUT
53	600			✓	PEA GRAVEL

ATTACHMENTS (✓)

— Geologic Log
— Well Construction Diagram
— Geophysical Log(s)
— Soil/Water Chemical Analysis
— Other ____
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME HUCKFELDT WELL DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
2110 Penny Lane ADDRESS, Napa CITY, CA STATE, 94559 ZIP
Signed ____ WELL DRILLER/AUTHORIZED REPRESENTATIVE
08/03/10 DATE SIGNED
439-746 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

APPENDIX B

WINERY WELL PUMP TEST

Voshier Gregson INC
PUMP & WELL SERVICE

5365 NAPA-VALLEJO HIGHWAY
AMERICAN CANYON, CA 94503-9678
Napa (707) 226-9698 Vallejo (707) 642-9698
FAX (707) 226-1648

Report of Water Well Test

To: Jeff Fontanella
Venge Vineyards
P.O. Box 141
Oakville, CA 94562

Site: 1717 Partrick Road
Napa

Date/Time	Gallons per minute	Pumping Level	Psi	Flow Meter Reading
9-21-05 8:45 am	75		0	
9:45	75		0	
10:45	60		0	
11:45	60		0	
12:15 pm	50	140'	0	Pump surging
12:30	50	140'	20	Throttled back
12:45	50	140'	40	
1:45	43	140'	40	
2:30	37.5	140'	50	
2:45	37.5	140'	50	
3:45	37.5	140'	60	
4:45	37.5	140'	60	

These are the results after an 8 hour test using our pump and genset.
Gallons per minute produced at time of final test: 37.5
Recommended maximum pumping rate: 25 g.p.m.
Results of above reported test not warranteed beyond this date.
Pump used in test: 5 hp 230V 40 g.p.m.

GOULDS PUMPS

APPENDIX C

WATER USAGE FROM TOTALIZER READINGS

Fontanella Winery Well usage report			
DATE	**METER READING**	**USAGE**	per day
12.1.15	0		
1.28.16	13,986	13,986	245.4
3.1.16	24,823	10,837	361.2
3.31.16	39,898	15,075	247.1
5.12.16	50,839	10,941	260.5
6.6.16	67,720	16,881	675.2
7.6.16	90,053	22,333	744.4
8.5.16	113,620	23,567	785.6
9.2.16	141,380	27,760	925.3
10.10.16	190,800	49,420	1235.5
10.31.16	205,799	14,999	714.2
12.1.16	215,570	9,771	325.7
1.9.17	221,191	5,621	140.5
2.6.17	228,152	6,961	248.6
3.2.17	236,406	8,254	294.8
4.3.17	248,975	12,569	419.0
5.1.17	257,322	8,347	278.2
5.31.17	271,566	14,244	474.8
6.30.17	288,492	16,926	564.2
8.8.17	313,883	25,391	668.2
8.28.17	328,897	15,014	395.1
10.2.17	375,649	46,752	1230.3
11.2.17	426,124	50,475	1628.2
12.4.17	434,747	8,623	278.2
1.2.18	441,261	6,514	210.1
2.2.18	448,347	7,086	228.6
2.28.18	456,712	8,365	321.7
4.2.18	467,972	11,260	341.2
5.1.18	482,788	14,816	510.9
6.1.18	497,171	14,383	479.4

Fontanella Irrigation Well usage report			
DATE	**METER READING**	**USAGE**	per day
4.20.13	109,655		
4.23.13	115,219	5,564	1854.7
4.28.13	125,700	10,481	2096.2
6.3.13	169,910	44,210	1228.1
7.5.13	254,250	84,340	2635.6
9.9.13	401,245	146,995	2227.2
10.2.13	434,919	33,674	1464.1
11.5.13	467,628	32,709	962.0
1.31.14	507,858	40,230	462.4
5.29.14	557,727	49,869	422.6
7.1.14	705,495	147,768	4477.8
7.31.14	881,139	175,644	5854.8
10.9.14	937,324	56,185	802.6
7.2.15	995,950	58,626	220.4
10.20.15	1,233,190	237,240	2156.7
6.6.16	1,336,754	103,564	450.3
7.5.16	1,422,234	85,480	2947.6
8.5.16	1,468,185	45,951	1482.3
9.2.16	1,525,632	57,447	2051.7
10.10.16	1,612,943	87,311	2297.7
5.1.17	1,640,126	27,183	133.9
5.31.17	1,659,878	19,752	658.4
6.30.17	1,667,265	7,387	246.2
8.7.17	1,711,894	44,629	1174.4
8.28.17	1,722,768	10,874	517.8
10.2.17	1,823,389	100,621	2874.9
11.2.17	1,834,466	11,077	357.3
12.4.17	1,844,967	10,501	328.2
4.30.18	1,872,208	27,241	185.3
6.1.18	1,875,653	3,445	107.7

Source: Jeff Fontanella via email to Jeremy Kobor (OEI) 6-14-18