

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



O'Connor Environmental, Inc. <u>www.oe-i.com</u> (707) 431-2810 Hydrology & Hydraulics • Hydrogeology • Geomorphology P.O. Box 794, Healdsburg, CA 95448 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.

	Irrigation Use	Residential Use	Winery Production Use	Winery Employee Use	Winery Visitation & Event Use	Total Use
	ac-ft/yr	ac-ft/yr	ac-ft/yr	ac-ft/yr	ac-ft/yr	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 A1: Estimated existing and proposed water demand for the project parcel using metered rates.

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

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

Table A3: Total annual Water Use in the project recharge area and on the <u>project parcel</u> (using metered rates for 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	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.



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Water Availability Analysis APN 050-010-018

Prepared for:

Fontanella Family Winery 1721 Partrick Road Napa, CA 94558

Prepared by:



O'Connor Environmental, Inc. P.O. Box 794, 447 Hudson Street Healdsburg, CA 95448 www.oe-i.com

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



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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)





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

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

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). <u>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.</u> 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.

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

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

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 Winery Domestic Use	30,000 30,000	2.15 0.50	0.65 0.15
TOTAL	-		0.80

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

	Annual	Use per	Annual Water
Use Category	Production	100,000 gal of	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



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

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

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.

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





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

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

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

	# of	Use per	Annual Water
Visitor Category	Vistors	Visitor	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.

	# of	Use per	Annual Water
Visitor Category	Vistors	Visitor	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



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

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

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

*Landscape Use estima photography	te based on sc	juare footage o	f lawn and non	-xeriscape lan	dscaping estima	ted from ae
Table 14: Summary of e	estimated exist	ing and propos	ed water uses <u>o</u>	on the project	parcel.	
	Irrigation Use	Residential Use	Winery Production Use	Winery Employee Use	Winery Visitation & Event Use	Total Use
	ac-ft/yr	ac-ft/yr	ac-ft/yr	ac-ft/yr	ac-ft/yr	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 employe	e water use for the Fontanella Winery.
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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



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

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

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.



	Curve Number	Interception Storage Values		Rooting Depths (ft)
		Growing	Dormant	
Land Cover	C Soils	Season	Season	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 17: Soil and land cover properties used in the SWB model.

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

Soil Group	Infiltration Rate (in/hr)
А	> 0.3
В	0.15 - 0.3
С	0.05 - 0.15
D	<0.05



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

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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.

	WY	2010	WY	2014		
		% of		% of		
	inches	precip	inches	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%		

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



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 acreft/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, <u>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</u>.

		Avera	ige Water Year	(2010)	Dry	/ Water Year (2	014)
	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%

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

Tier II - Well and Spring Interference

The closest neighboring well to the winery well (Well WW) is Well 4 which is located about 195ft 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

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APPENDIX A

WELL COMPLETION REPORTS

KRAUSZ ST HELENA

2003

Owner's Copy WELL COMPLETION REPORT Page 1 of 1 Refer to Instruction Pamphlet №.781561 Owner's Well No. Date Work Began _6-15-00 ____, Ended ______6-19-00 LONGITUDE Local Firmit Agency Napa County Empironmental Mont Permit No. 96-11458 _ Permit Date __ 2-29-00 - GEOLOGIC LOG - WELL OWNER ORIENTATION (2) K VERTICAL HORIZONTAL ANGLE (SPECIFY) Name Donald Curler DRILLING DRILLING TOURIEY - FLUID air Mailing Address ____ 1717 Partrick Rd SURFACE Napa CA 94558 CITY Describe material, grain size, color, etc. FL. FI. WELL LOCATION 0 22 britan clay Address ____ same 22 45 shale City'_ 45 60 sandstone County ____ Napa 60 120 shale APN Book 50 Page 010 Parcel 18 120 135 sandstone Township ____ ____ Range ___ Section _ 135 260 shale & clay Latitude I NOATH Longitude MIN. WES DEC. SEC LOCATION SKETCH ACTIVITY (=) -NOATH MODIFICATION/REPAIR ____ Deepon Other (Specify) DESTROY (Dessibe Procedures and Meleria Under "GEOLOGIC LOE PLANNED USES (.... WATER SUPPLY . Irrigalion ____ Industria WEST EAST MONITORING ____ TEST WELL CATHODIC PROTECTION ____ HEAT EXCHANGE DIRECT PUSH INJECTION VAPOR EXTRACTION SPARGING. illustrate or Describe Distance of Wolf from Roady, Sinklings, Fonces, Ricers, etc. ond attach of man. Use additional paper if necessary. FLEASE BE ACCUMATE & COMPLETE. REMEDIATION . OTHER (SPECIFY) WATER LEVEL & YIELD OF COMPLETED WELL DEPTH OF STATIC 4 - (FL) & DATE MEASURED _6-19-00 ESTIMATED VIELD . 38 (GPM) & TEST TYPE air lift TOTAL DEPTH OF BORING _______ (Fort) TEST LENGTH _2 (Hrs.) TOTAL DRAWDOWN N/A (FL) TOTAL DEPTH OF COMPLETED WELL 158 (Feet) " May not be representative of a well's long-term yield. CASING (S) DEPTH FROM SURFACE ANNULAR MATERIAL DEPTH BORE FROM SURFACE HOLE TYPE (1) TYPE DUCTOR Firt PIPE SCREEN MATERIAL / INTERNAL GAUGE SLOT SIZE ELANK CE. BEN. (Inchos) FILTER PACK (TYPE/SIZE) DIAMETER OR WALL IF ANY (Inches) MENT TONITE GRADE FILL Ft. 10 FI. (inches) Ft 10 FL (1) 1-1 14) 0 20 25 0 . 1 10 20 X concrete 25 260 24 8 X chips 24 260 X pea oravel 0 38 PVC F480 SDR-21 X 54 38 158 **PVC F480** SDR-21 5 .032 X ATTACHMENTS (2) CERTIFICATION STATEMENT I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief. Geologic Log MAME HUCKPETION WELL, DRILLING (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED) Well Construction Diagram Geophysical Log(s) 94559 ZIP 2110 Penny Lane SolfWater Chemical Analyses ADURESS STATE Ċ Other 439-746 7-11-00 Signed WELL DRILLER/AUTHORIZED ATTACH ADDITIONAL INFORMATION. IF IT EXISTS. DATE SIGNED E-SZ LICENSE NUMBER

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL STATE OF CALIFORNIA File with DWR WELL COMPLETION REPORT Refer to Instruction Pamphlet Page ____ of No. 0947977 **Owner's Well No** 5 LATITUDE Date Work Began α Local Permit Agene APN/TRS/OTHER Permit No. Permit Id GEOLOGIC LOG ORIENTATION (≤) VERTICAL HORIZONTAL ANGLE SPEC DRILLING rotar FLUID MUC ~ 1 DEPTH FROM SURFACE DESCRIPTION teria, grain size Describe materia WEEL LOCATION OUN mo Addres City County' Parcel 050-0/0-0/8 APN Book Page Township 00 Section Range _ Lat N Long_ W DEG. MIN. SEC. DEG. MIN. SEC LOCATION SKETCH MODIFICATION/REPAIR 11 ____ Deepen Other (Specify) DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG") 5-1 1 10% USES (∠) m WATER SUPPLY Domestic ____ Public **NEST** EAST MONITORING TEST WELL CATHODIC PROTECTION HEAT EXCHANGE DIRECT PUSH . INJECTION Drown Statler VAPOR EXTRACTION SPARGING SOUTH Illustrate or Describe Distance of Well from Reads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE. REMEDIATION ... OTHER (SPECIFY) WATER LEVEL & YIELD OF COMPLETED WELL DEPTH TO FIRST WATER 20 (Ft.) BELOW SURFACE DEPTH OF STATIC 20 _ (FI.) & DATE MEASURED WATER LEVEL ESTIMATED YIELD . _ 20_ (GPM) & TEST TYPE AIA LEFT TOTAL DEPTH OF BORING **JLO**(Feet) TOTAL DEPTH OF COMPLETED WELL **J**/7(Feet) TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN 2/0 (FL.) .* May not be representative of a well's long-term yield. CASING (S) ANNULAR MATERIAL DEPTH FROM SURFACE DEPTH FROM SURFACE BORE-HOLE DIA. TYPE (≤) TYPE INTERNAL GAUGE SLOT SIZE SCREEN CON. DUCTOR MATERIAL / GRADE CE. BEN-BLANK FILTER PACK IF ANY (Inches) (Inches) DIAMETER OR WALL MENT TONITE FILL Ft. Ft THICKNESS Ft. to Ft. (TYPE/SIZE) to (Inches) (\leq) (\preceq) 1-X -11 0 0 27 LASTR 5 200 8" 23 × 11 WELL PACK #6 11 2.7 11 11 11 11 ATTACHMENTS (≤) CERTIFICATION STATEMENT I, the certify that this complete and curate to the est of my knowledge and belief. ersia ... Geologic Log ____ Well Construction Diagram NAME _ Geophysical Log(s) ___ Soil/Water Chemical Analyses Other Signe ATTACH ADDITIONAL INFORMATION, IF IT EXISTS. SIGNED UNICH LAND OSP 03 78836 DWR 188 REV. 05-03

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State of California Well Completion Report No/0948382

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Permit No. 96		EO	LOC	SIC	LOG Permit	Date 4/20	82004	P		^		•		_
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DEPTH FROM SURFACE	METHOD		20		ESCRIPTION									
Ft to FL					rial, grain, siz	e, color, etc	c.	Address 1727 P	W	ELL LC	CATI	ON-	917	NIF
	BROWN 70%SHA			60	AY			Address 1727 P	artrick Roa	ad				······································
and a second sec	60% CL/				Contraction of the Contraction o			City Napa CA County Napa						
	50% SH							APN Book 50	Page 01	0	Parcel	13		
and an	SANDST					-		Township			Sectio			
	60% SH							Latitude	IN SEC.			-	I DEG.	MIN. BEC.
400 600	60% CL				HOLE WITH	DEA OD		DEG. 1	CATION SI	SETCH-	•••	i	-A	CTIVITY (2) -
	secondary and construction				D CONCRET	and an and a second sec		PARTISI	2 NORTH	COMU		Control of		NEW WELL
					TURAL MATE				r -	/				PICATION/REPAIR
								/						Ofher (Specify)
					······					\mathbf{i}				DESTROY (Describe
										\mathbf{X}			FL	DESTROY (Describe rocedures and Materials Inder "GEOLOGIC LOG"
	ļ													NNED USES (∠) R SUPPLY
<u>}</u>								5.		/		5		Domestic Public
								Mess	ì	/		EAST	t	migation Inclustrial
								Hai						MONITORING
	[1 5	Top!					DIC PROTECTION
									ry .				1	DIRECT PUSH
								1 400	/			1		INJECTION
									/				VAPO	OR EXTRACTION
								<u> </u>						SPARGING
								Illustrate or Describe I Fences, Rivers, etc. and necessary. PLEASE H	Statance of Well f.	iraw Roads, Use additions	Buffdings al paper	ir i	c	THER (SPECIFY)
								necessary. PLEASE H	E ACCURATE	& COM	PLETE.			
	1								R LEVEL &					WELL
	ļ							DEPTH TO FIRST	WATER	— (FL) BE	LOW S	URFACE	E	
	ļ							DEPTH OF STATIC		FL) & DATE	MEASL	IRED		
li		200						ESTIMATED YIELD	•	(GPM)& '	IEST T	rpe		
TOTAL DEPTH OF					eet) (Taal)			TEST LENGTH					1.1	
TOTAL DEPTH OF	COMPLET	ED 4	BLA		(Feet)			May not be repr	esentative of	a well's l	ong-ter	nn ylei	d	
DEPTH	BORE -				C	ASING (S)			DEP	гн		ANNU	ILAR	MATERIAL
FROM SURFACE	HOLE	TYP				INTERNAL	GAUGE	SLOT SIZE	FROM SU	RFACE			T Y	PE
Fit to Fit	(inches)	BLANK	NOS H	E T	MATERIAL / GRADE	DIAMETER	OR WAL	L IF ANY	Ft to	FL	CE-	BEN-	E FILL	FILTER PACK (TYPE/SIZE)
		a 8	E	E		(inches)	TITURANES				(2)	(\mathbf{x})	(\mathbf{y})	
0 600	9			-					0	3	1			SOIL
						+			30	30 600	-		~	PEA GRAVEL
		-												· · · · · · · · · · · · · · · · · · ·
ATTACE	IMENTS (1.)			1 the instant	ioned contra th	at this roww	CERTIFICA				bellef	**********	
Well Co	nstruction Dia	gram			NAME H	UCKFELD	r well c	RILLING		,				
Contract of the second s	icaí Log(6) ar Chemical /	Analwa	5		2110 Pe	nny Lane	IN LUKPOR	ATION) (TYPED OR PR		ipa			CA	94559
Other					ADDRESS	-	lin	Huddatt		CITY	05/11/0	0100000	STATE	
ATTACH ADDITIONAL I		1			The second design of the local division of t	11. DRELLERVA	Contraction of the local division of the loc	the second s		Dź	TE SIG	NED		C-57 LICENSE NUMBER

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File with I						WELL	COMP Refer to In				TATE WELL		FION NO.
Page 1 of 1 Owner's	Well No.	TW#2	.'04						2097				
Date Work	Began	4/30/200	04			, Ended 5/4/2				LATITUDE		<u></u>	ONGITUDE
Local P	ermit A	zency N	lapa	Cal	inty	Environmer	ntal Mgmt			-] []]	11	1_1_	
Permi	it No. 98	-12659				Permi	it Date 5/3	/2004	<u>. </u>		APW/TR	S/OTHER	
						CLOG ——			r	TURIT C			
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DEPTH		DRILLING	5 RQ	IAb		DESCRIPTION	FLUID AIR						
Ft. to	FL					erial, grain, s		tc	j			~	
0	States - States	BROW		-					Address 1727 5	Partrick Road	ALATION		
25		85% C				and the subscription of th			City Napa CA	······································			·····
40	and the second data was not a second data and	GRAY		in the second	<u> </u>	<u>4Y</u>			County Napa				
90		SANDS				·····				Page 010			
125		SHALE		-					Latitude	Range	Section _		· · · · · · · · · · · · · · · · · · ·
215	240	SHALE	8 C	AY			·		DEG.			DEG.	
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		NATUR							16				
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-						······	······	· • ·····		/			HEAT EXCHANGE
													INJECTION
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	ATTACH Geologic	MENTS	(⊻)				minned and a	not this man		ATION STATEMEN to to the bost of my knowle			
6 –	Well Cor	struction D	lagrem			NAME_	HUCKFELD	T WELL C	DRILLÍNG	·····			······································
T -		zal Log(s) r Chemical	0000-	đa			ERSON, FIRM, C	OR CORPOR	ATTON) (TYPED OR PE	Napa		CA	94559
1 -	- Other			440		ADDRESS	3	Dr.	Hugh MAT	CITY		STATE	z ZIP
ATTACH AD	DITIONAL I	FORMATIC) N , IF I	r ext	STS.	Signed W	ELL DRILLERIA	UTHORIZED	REPRESENTATIVE		15/08/04		439-746 C-57 LICENSE NUMBER
DWR 188 REV.	11.97			IE A	nnr	TIONAL SPACE	IS MEEDED	USE NEXT	CONSECUTIVELY	II MAREDED FORM			

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		4	Al	M		#7	7											
ORIGINAL File with D		1				WELL		STATE O	F CALIFOR		REPOR	т 🗖	OWR US	E ONL	13	SI	NOT FILL IN	
Page 1 of 1		24					4	Refer to Inst	truction Po	amp	hlet		S	TATE W	ELL NO	STAT	ION NO.	4
Owner's N								No.	e011	12	807	3	818	58		12	2224	2
Date Work	Began	7/7/2010			,	Ended 7/2:	3/20	010				1	LATITUDE	1		LC	NGITUDE	
Local P	ermit Ag	gency Na	apa	Cou	inty	Environme	enta	al Mgmt				-			PN/TRS/			
Permit	No. E	0-00254	-			Perr	nit	Date 6/22	/2010			-		Ar	11/11/3/	JINER		
ORIENTAT	ON (⊻)		RTIC	AL	— нс	LOG	,	ANGLE		N			- 10011 /		n			
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0		BROWN						,,		Ad	Idress 1781 P	artrick R	WELL LC	CATI	ON-			
20	55	SHALE								Ci	ty Napa CA	<u>ALTICIALIA</u>	04.0					
55	135	50% SH	AL	E/5	0%	CLAY					ountyNapa							
135	140	70% SH	IAL	E/3	0%	SANDSTO	NE					Page (020	Parcel	004			
140		60% SH	-							APN Book 050 Page 020 Parcel 004 Township Range Section								
170	where the second second second	and the second second second second				E & SHALL	Ξ			Latitude								
190		60% S⊦			0%	CLAY		······		DEG. MIN. SEC. DEG. MIN. SEC.								
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280		SHALE	*****							MODIFICATION/REPAIR								
300		SANDS						-				10'-	and the second s	11:	P		Deepen Other (Specify	
310						SANDSTC	NE	:				WELL		1	FR		Other (Specify	
320		50% SH								ſ		Wr (g	ESTROY (Describe	e
390						NDSTON	-			1	HOUSE				11	5	Procedures and Mat Inder "GEOLOGIC	LOG"
430		SHALE									\ rfg		\		11		NNED USES (∠)
480		SOFT S			01	A.V.				ST			1		11 5		R SUPPLY Domestic	lic
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	000	OTIVILL	u c											-	11	CATHO	TEST WELL . DIC PROTECTION.	and the second second
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358	378	BLANK		PVC								1	1	>	A		DIRECT PUSH.	see
378	478	SCREE	NI	PVC	5"	.032 SLO	Т					1	POND			VAD	INJECTION .	
478	498	BLANK	۱	PVC	5"							L	Ċ		1	VAR	SPARGING	
498	558	SCREE				.032 SLO	Т				istrate or Describe l	SOUTH		Building	_1/		REMEDIATION	
558	578	BLANK		PVC	5"					Fe	nces, Rivers, etc. and cessary. PLEASE B	attach a man	b. Use addition	al paper		C	THER (SPECIFY).	
										nec						ETED	WELL	
													& YIELD				WELL 1	
										0	EPTH TO FIRST							
										DE	ATER LEVEL	2	- (Ft.) & DATE	MEAS	JRED _	8/3/2	.010	
											TIMATED YIELD							
TOTAL DE					– (Fe					TE	EST LENGTH 4	(Hrs.) *	TOTAL DRAV	VDOWN	N/A	(Ft.)		
TOTAL DE	PTH OF	COMPLET	red	WEL	l. <u>57</u>	<u>8</u> (Fe	et)				May not be repr	esentative	of a well's l	ong-le	rm yiel	<u>d.</u>		
	1													1	ANNI	ILAD	MATERIAL	
FROM SU	H	BORE - HOLE	T	PE (.	211		<u> </u>	ASING (S)				FROM	PTH SURFACE		AININ		PE	
		DIA.	¥	SCREEN	H H	MATERIAL	.1	INTERNAL	GAUGE		SLOT SIZE			CE-	BEN-		FILTER PAC	ĸ
Ft. to	Ft.	(Inches)	BLANK	CREI	E E	GRADE		DIAMETER (Inches)	OR WALL		IF ANY (Inches)	Ft.	to Ft.	2.10.000	TONIT	and the second	(TYPE/SIZE)	
0	60	12	-	s i	9 -							0	4	× (X)	(<u>×</u>)	(<u>~</u>)	CONCRETE	 =
60	60 600	<u>12</u> 10			++			*				4	53	<u> </u>	~		GROUT	
0	118		~		1.1	PVC F48	0	5	SDR-	21		53		1		~	PEA GRAV	EL
118	218			~	+	PVC F48		5	SDR-		.032		1					
218	238		~		$\uparrow \uparrow$	PVC F48		5	SDR-	21								escare Street a
238	358			1		PVC F48	0	5	SDR-	21	.032		1					
	ATTAC	IMENTS	(1)) —							CERTIFIC	ATION ST	ATEMEN	т —				
	Geologic	Log Instruction Di	iacro	m		I, the un	ders	igned, certify the	WELL D	RI	omplete and accura	te to the bes	t of my knowle	dge and	belief.			
		cal Log(s)	ayıa				(PER	SON, FIRM, O	RAORPOR	ATIO	N) (TYPED OR PF	RINTED)				~	94559	
-	- Soil/Wate	r Chemical	Ana	lysis		2110 ADDRE		nny Lane	Ala A	CITY STATE ZIP								
ATTACH AD	Other	NEORMATIC	N 14	FITEY	ISTS	- Signed			man 0	NN	unmar		-	08/03/	10		439-746 C-57 LICENSE NU	MBER
ALIAONAD		- second rice				11	WE	LL URILLER/A	UTHORIZED	KE	PRESENTATIVE		0	110 010				

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

APPENDIX B

WINERY WELL PUMP TEST

Oshier

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PUMP & WELL SERVICE



Napa (707) 226-9698 Vallejo (707) 642-9698

FAX (707) 226-1648

Report of Water Well Test

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

Site: 1717 Partrick Road

Date/Time Gallons per minute										
9-21-05 8:45 am 75 Pumping Level Psi	Flow Meter Reading									
9:45 75 0	Moler Keading									
10:45 50 0										
11:45 60 0										
12:15 pm 50 140' 0										
50 1/01	Pump surging									
50 140'	Throttled back									
43 140'										
2:45 37.5 140' 50										
3:45 .37 5 140' 50										
4:45 37 5 40' 60										
140' 50										
Gallons have at										
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.	



THE REAL PROPERTY AND ADD

APPENDIX C

WATER USAGE FROM TOTALIZER READINGS

Fontanella Winery Well usage report				Fontanella Irrigation Well usage report			
DATE	METER READING	USAGE	per day	DATE	METER READING	USAGE	per day
12.1.15	0			4.20.13	109,655		
1.28.16	13,986	13,986	245.4	4.23.13	115,219	5,564	1854.7
3.1.16	24,823	10,837	361.2	4.28.13	125,700	10,481	2096.2
3.31.16	39,898	15,075	247.1	6.3.13	169,910	44,210	1228.1
5.12.16	50,839	10,941	260.5	7.5.13	254,250	84,340	2635.6
6.6.16	67,720	16,881	675.2	9.9.13	401,245	146,995	2227.2
7.6.16	90,053	22,333	744.4	10.2.13	434,919	33,674	1464.1
8.5.16	113,620	23,567	785.6	11.5.13	467,628	32,709	962.0
9.2.16	141,380	27,760	925.3	1.31.14	507,858	40,230	462.4
10.10.16	190,800	49,420	1235.5	5.29.14	557,727	49,869	422.6
10.31.16	205,799	14,999	714.2	7.1.14	705,495	147,768	4477.8
12.1.16	215,570	9,771	325.7	7.31.14	881,139	175,644	5854.8
1.9.17	221,191	5,621	140.5	10.9.14	937,324	56,185	802.6
2.6.17	228,152	6,961	248.6	7.2.15	995,950	58,626	220.4
3.2.17	236,406	8,254	294.8	10.20.15	1,233,190	237,240	2156.7
4.3.17	248,975	12,569	419.0	6.6.16	1,336,754	103,564	450.3
5.1.17	257,322	8,347	278.2	7.5.16	1,422,234	85,480	2947.6
5.31.17	271,566	14,244	474.8	8.5.16	1,468,185	45,951	1482.3
6.30.17	288,492	16,926	564.2	9.2.16	1,525,632	57,447	2051.7
8.8.17	313,883	25,391	668.2	10.10.16	1,612,943	87,311	2297.7
8.28.17	328,897	15,014	395.1	5.1.17	1,640,126	27,183	133.9
10.2.17	375,649	46,752	1230.3	5.31.17	1,659,878	19,752	658.4
11.2.17	426,124	50,475	1628.2	6.30.17	1,667,265	7,387	246.2
12.4.17	434,747	8,623	278.2	8.7.17	1,711,894	44,629	1174.4
1.2.18	441,261	6,514	210.1	8.28.17	1,722,768	10,874	517.8
2.2.18	448,347	7,086	228.6	10.2.17	1,823,389	100,621	2874.9
2.28.18	456,712	8,365	321.7	11.2.17	1,834,466	11,077	357.3
4.2.18	467,972	11,260	341.2	12.4.17	1,844,967	10,501	328.2
5.1.18	482,788	14,816	510.9	4.30.18	1,872,208	27,241	185.3
6.1.18	497,171	14,383	479.4	6.1.18	1,875,653	3,445	107.7

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