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Water Availability Analysis

Beaulieu Vineyards P17-00192-MOD
Planning Commission Hearing June 6, 2018

WATER AVAILABILITY ANALYSIS

Beaulieu Vineyards
1960 St. Helena Highway

Napa, California
APN 030-110-019

SUMMIT
CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER

Project No. 2017017
November, 2017

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BEAULIEU VINEYARDS
Napa, California
WATER AVAILABILITY ANALYSIS

PROJECT SUMMARY

Beaulieu Vineyards is applying for a Use Permit Modification for the existing winery facility to increase employees, visitation and marketing events, with no change to annual wine production capacity from the currently permitted 1,800,000 gallons per year. Summit has prepared the following Water Availability Analysis, which provides a comparison between the proposed water use and the available water capacity on the property.

Total annual water demand at Beaulieu Vineyards associated with the proposed increase in employees, visitation and events, including production, domestic, vineyard and landscape irrigation, is estimated to be 94.1 ac-ft per year, which represents an increase of 1.0 ac-ft per year from the current water usage. The site is located within the Napa Valley floor, so the water availability criterion is 1.0 acre-ft/acre-year for the project site. The Tier 1 analysis shows that the total project acreage (including adjacent vineyard parcels owned by Treasury Wine Estates, totaling 5 parcels) is approximately 141.2 acres, as summarized in the table below:

Table 1. Project Parcels and Use (including proposed lot line adjustment)

APN	Description	Vineyard Acres	Total Acres
030-110-028	Vineyard	17.4	19.5
030-110-026	Vineyard	50.9	54.8
030-110-027	Vineyard	0.0	5.1
030-110-019	Winery	26.7	47
030-110-015	PW Ponds	0.0	14.8
TOTAL		**95.0**	**141.2**

The overall annual water demand is anticipated to be 94.1 ac-ft per year, resulting in an overall water use of 0.66 ac-ft/ac-year, which is less than the allotted 1.0 acre-ft/acre/year.

The winery parcel average domestic water demand can be met with the existing domestic well (located on the Rutherford House parcel, APN: 030-110-021) operating for 24 hours per day at 23.2 gpm. This well is proposed to be replaced with a new well on the winery parcel. Vineyard irrigation will continue to be provided by separate agricultural wells.

SITE DESCRIPTION

The winery facility is located on a 13.46 acre parcel east of Highway 29 and north of highway 128 in an agricultural area with vineyards to the north, east, and west and residential properties to the south. The parcel is subject to a proposed lot line adjustment that will increase the total parcel size to 47 acres. The site topography slopes gradually downward to the east to the Napa River. Surface drainage flows overland to the east. Prior to the development of the winery, the property was used as agricultural land. No distillation occurs at the facility. An overall site plan for the facility is provided in Enclosure A.

The existing winery parcel (APN: 030-110-019) consists of three winery buildings, no onsite vineyards, minimal landscaping, a sanitary sewage leach field, and the facility utilizes a winery process wastewater pond on an adjacent parcel (APN: 030-110-015). Water sources for the project consist of three groundwater wells, which includes one domestic water supply well on the adjacent Rutherford parcel (APN: 031-110-021, not included in this project) that is to be replaced with a new well on the winery parcel. Irrigation water supply is provided by two agricultural wells on the adjacent parcel (APN: 030-110-028.

WATER DEMAND

EXISTING WATER DEMAND

Current water use at the facility and adjacent vineyard parcels also owned by Treasure Wine Estates is based on the following needs:

- Process needs for production capacity of 1,800,000 gallons of wine per year
- Full Time Employees = 86 per day
- Part Time Employees = 86 per day
- Tasting Visitors = 450 peak per day, without food pairings
- Lunch/Dinner Event Visitors = 150 max per event, 3 events per year
- Wine Society Event Visitors = 500 max per event, 4 events per year
- Winery/Employee Function = 250 max per event, 3 events per year
- Irrigation of 95 acres of vineyard
- Irrigation of minimal landscape (estimated based on Napa County WAA Guidelines)

PROPOSED WATER DEMAND

Anticipated water use at the facility and adjacent vineyard parcels will be based on the following needs:

- Process needs for production capacity of 1,800,000 gallons of wine per year
- Full Time Employees = 105 per day
- Part Time Employees = 35 per day
- Tasting Visitors = 550 peak per day, 25% of visitors with food pairings
- Private Tasting Visitors with meals = 50 max per event, 100 events per year
- Private Tasting Visitors with meals = 75 max per event, 30 events per year

- Private Tasting Visitors with meals = 100 max per event, 20 events per year
- Private Food and Wine Pairing = 40 max per event, 50 events per year
- Marketing Event Visitors = 250 max per event, 2 events per year
- Open House Event Visitors = 300 max per event, 2 events per year
- Wine Auction Event Visitors = 250 max per event, 2 events per year
- Irrigation of 95 acres of vineyard
- Irrigation of minimal landscape

WINERY PROCESS WATER DEMAND

Water demand for wine production is expected to correlate to the process wastewater (PW) generated at the facility. Based on typical flow data from wineries of similar size and characteristics, the approximate process wastewater generation for the current wine production is calculated as follows:

Existing Annual production	=	1,800,000 gal wine/year
PW generation rate	=	6 gal PW/gal wine[a]
Annual PW Flow	=	1,800,000 gal wine x 6 gal PW/gal wine
	=	10,800,000 gal PW/year
Average PW Flow	=	(10,800,000 gal PW/year) / (365 days)
	=	29,590 gal PW/day
Peak PW Flow	=	(10,800,000 gal PW/year x 16.4[b] %)/(30 day)
	=	59,040 gal PW/day
Annual Production Water Demand	=	(10,800,000 gal water/yr) / (325,851 gal/ac-ft)
	=	33.1 ac-ft water/year

[a] Generation rate based on industry standards and water data for similar wineries
[b] The harvest month of September accounts for approximately 16.4 percent of the annual water demand.

The approximate annual water use associated with the existing production capacity is 10,800,000 gallons of water per year, or 33.1 ac-ft per year. The proposed use permit modifications do not include changes to wine production capacity, therefore the expected annual water use is not anticipated to change, and is the same as calculated above. Winery process water demand will continue to be provided by the existing domestic well until the new well is drilled. Refer to Enclosure B for wastewater generation and water demand estimates.

DOMESTIC WATER DEMAND

Domestic water use at the facility is determined based on the total number of employees, visitors and event guests. Domestic water is currently supplied by the domestic well on the adjacent Rutherford house parcel,

and is proposed to be supplied by the domestic well to be drilled on the winery parcel. Sanitary Sewage generation is expected to be equivalent to the water demand for domestic uses, with the exception that for events with portable toilets the overall water demand must be supplied. Using Napa County Environmental Management's Table 4 from "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems", annual domestic water usage is estimated as follows:

Table 2. Existing Domestic Water Use at Beaulieu Vineyards

Use Type	Maximum Quantity (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Number of Days (days/year)	Annual Water Use (gal/year)
Full Time Employee	86	15	1,290	365	470,850
Part Time Employee	86	15	1,290	90	116,100
Tasting Visitors	450	3	1,350	365	492,750
Lunch/Dinner Visitors	150	15	2,250	3	6,750
Wine Society Event Visitors	500	15	7,500	4	30,000
Winery/Employee Function	250	15	3,750	3	11,250
				Total Water Use	**1,127,700**
				Total Water Use (ac-ft/yr)	**3.5**

Table 3. Proposed Domestic Water Use at Beaulieu Vineyards

Use Type	Maximum Quantity (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Number of Days (days/year)	Annual Water Use (gal/year)
Full Time Employee	105	15	1,575	365	574,875
Part Time Employee	35	15	525	90	47,250
Tasting Visitors	550	3	1,650	365	602,250
Tasting Food Plates Preparation	138	0.75	104	365	37,778
Private Tasting Visitors w/ meals	50	15	750	100	75,000
Private Tasting Visitors w/ meals	75	15	1,125	30	33,750
Private Tasting Visitors w/ meals	100	15	1,500	20	30,000
Private Food and Wine Pairing	40	15	600	50	30,000
Marketing Events	250	15	3,750	2	7,500
Open House	300	15	4,500	2	9,000
Wine Auction Event Visitors	250	15	3,750	2	7,500
				Total Water Use	**1,455,000**
				Total Water Use (ac-ft/yr)	**4.5**

The estimated existing annual domestic water use is 1,127,700 gallons per year, or 3.5 ac-ft per year. The expected annual domestic water use for the proposed marketing and visitation plan is 1,455,000 gallons per year, or 4.5 ac-ft per year. Refer to Enclosure B for wastewater generation and water demand estimates.

IRRIGATION WATER DEMAND

- Vineyard Irrigation

  Water from the agricultural well is currently used to irrigate 95 acres of vineyards. The total acreage of vineyard will remain the same as there are no proposed changes. Vineyard irrigation demand was estimated using a rate of 0.5 ac-ft per acre of vineyard. Napa County Water Availability Analysis Phase 1 standard rates for vineyard irrigation are 0.2 to 0.5 ac-ft/acre/year. The existing vineyard irrigation is estimated to be:

  95 acres x 0.5 ac-ft/acre/year = 47.5 ac-ft/yr = 15,478,000 gal/yr

  Vineyard irrigation demand is estimated to be 47.5 ac-ft per year of water demand for both existing and proposed conditions.

- Landscape Irrigation

  Water from the domestic water system is used to irrigate minimal landscaping on the winery parcel. The total acreage of landscape will remain the same. The water demand for landscape irrigation was calculated based on the Napa County Water Availability Analysis Phase 1 standard rates for winery landscape irrigation (0.5 ac-ft/year per 100,000 gallons of wine produced). This represents a very high estimate compared to the actual landscape irrigation demand due to the small portion of the parcel that contains landscaping.

  1,800,000 gallons of wine per year ÷ 100,000 gallons of wine x 0.5 ac-ft/acre/year
  = 9.0 ac-ft/yr = 2,923,500 gal/yr

  To be conservative, winery landscape irrigation demand is estimated to be 9.0 ac-ft per year of water demand.

TOTAL WATER DEMAND

The total water demand at the facility associated with the employee, marking and visitation increase is expected to be 94.1 ac-ft per year, which is equivalent to 30.6 million gallons per year.

Table 4. Total Projected Annual Water Demand

Water Use	Gallons per day	Gallons per year	Acre-Feet per year
Wine Production	29,590	10,800,000	33.1
Domestic Use	3,990	1,455,000	4.5
Vineyard Irrigation	63,175[a]	15,478,000	47.5
Landscape Irrigation	12,000[a]	2,928,500	9.0
Total	108,755	30,661,500	94.1

[a] Estimated assuming that during the months of November through February no irrigation is required.

Based on the proposed increase in production and employees there is an overall increase in projected water demand of about 1.0 ac-ft/year (see Table 4).

Table 4. Water Demand Comparison

Water Use	Existing (ac-ft)	Proposed (ac-ft)	Difference (ac-ft)
Wine Production	33.1	33.1	0.0
Domestic Use	3.5	4.5	1
Vineyard Irrigation	47.5	47.5	0.0
Landscape Irrigation	9.0	9.0	0.0
Total	93.1	94.1	1.0

Refer to Enclosure B for wastewater generation and water demand estimates.

TIER I ANALYSIS: WATER USE CRITERIA

The Tier I analysis criteria is required for all parcels located within the "Napa Valley Floor" in the WAA guidelines. Beaulieu Vineyards is located within the Napa Valley floor, therefore the screening criteria is based on 1.0 acre-ft/acre/year of water use, and a Tier I analysis estimating annual recharge during average and dry years is not required.

WATER AVAILABILITY

The total estimated water demand of 94.1 ac-ft/year represents 66% of the water allotment for the project. There are 3 wells currently serving the winery and vineyards, as indicated on the attached Site Plan (Enclosure A). The existing domestic well on the adjacent Rutherford parcel was rehabilitated in 2015, has a depth of 203 ft with a 60 foot tremie tube installed between the original 12 inch steel casing and a new 8 inch PVC casing , and an estimated yield of 210 gpm. A new domestic well to be drilled in 2017, has a proposed depth of 250 ft with a 50 ft seal, a 6 inch PVC casing, and anticipated yield of 100 gpm. Depth and well construction details are not available for the agricultural wells. Well information is in Enclosure C.

The domestic well will be required to supply sufficient water to meet the domestic demand. The average domestic water demand should account for 29,590 gal/day of process water and 3,860 gal/day of domestic water, for a total of 33,450 gal/day. The domestic well will be required to supply on average 23.2 gpm over 24 hours. Either the existing or proposed domestic well should have sufficient capacity to supply the potable water demand.

TIER II ANALYSIS: WELL INTERFERENCE

A Tier II analysis is not required for parcels located within the "Napa Valley Floor" in the WAA draft guidelines, unless substantial evidence indicates a potentially significant impact. This analysis is intended to estimate any interference between wells and springs that could affect their supply capacity due to water usage. The objective of the Tier II analysis is to determine if any well (existing or in the future) within 500 ft of the project's wells could be affected by the drawdown of the project's wells. The analysis was performed for all wells onsite that are within 500 feet of the property line, to cover any possibility of an existing neighboring well or future well within a 500 ft range from the existing property wells.

- Method

  Using the Theis equation as indicated in the WAA Napa County guidelines, the groundwater drawdown from all property wells to the edge of the parcel was determined. The assumed closest distance that any neighboring well could be located is the edge of the parcel. Due to the limited data on the aquifer, values that would yield a conservative drawdown estimate were selected from Napa County Water Availability Analysis guidelines.

  Assumptions:

  - Aquifer Thickness of 75 ft.
  - Hydraulic Conductivity moderate range of 50 to 80 ft/day for project site (Water Availability Analysis Figure F-3)
  - Specific Storage range of 1.5×10^{-5} to 3.1×10^{-4} (1/ft) (Water Availability Analysis table F3)

  The Theis equation can be seen below along with an example calculation.

$$\text{Theis Equation: Drawdown} = \frac{\text{Flow}}{(4\pi \times \text{Transmissivity})} \times W(u)$$

$$W(u) = \int_u^{\infty} \frac{1}{\omega} e^{-\omega} d\omega$$

$$u = \frac{(\text{Distance}^2 \times \text{Specific Storage})}{(4 \times \text{Transmissivity} \times \text{Time})}$$

$$\text{Transmissivity} = \text{Hydraulic Conductivity} \times \text{Aquifer Thickness}$$

Example for the domestic well drawdown effect on possible wells on adjacent properties:

$$u = \frac{(450\ \text{ft})^2 \times (1.50\ \text{X}\ 10^{-5})}{4 \times 50 \frac{\text{ft}}{\text{day}} \times 75\ \text{ft} \times 1\text{day}} = 2.03 \times 10^{-4}$$

With this value of u, W(u) =7.93

$$\text{Drawdown} = \frac{100 \frac{\text{gal}}{\text{min}} \times\ 0.1337 \frac{\text{cuft}}{\text{gal}} \times 1{,}440 \frac{\text{min}}{\text{day}}}{4\pi\ \times 50 \frac{\text{ft}}{\text{day}} \times 75\ \text{ft}} \times 8.90 = 3.24\ \text{ft}$$

The table below shows a summary of the worst case scenario of drawdown results for the two onsite wells closest to neighboring non-project parcels. More detailed tables can be found in Enclosure D, Tier II Well Drawdown Calculation Tables.

Table 5. Well Drawdown Calculations

	Well Flow Rate (gpm)	Distance to Property Line (ft)	Estimated Drawdown (ft)
New Domestic Well	100	450	3.24
Agricultural Well	100	220	3.82

Results

Using very conservative estimates for aquifer thickness, specific storage, and hydraulic conductivity, based on values from the Water Availability Analysis guidelines adopted by Napa County, none of the wells should produce a drawdown greater than 10 feet on any existing or future wells that could be adjacent to the property. The Water Availability Analysis guidelines establish a 10 foot drawdown as the default criteria to determine significant adverse effects. Since the wells estimated drawdown is less than 10 ft., no significant drawdown impact is expected for wells in adjacent parcels.

TIER III ANALYSIS: GROUNDWATER AND SURFACE WATER INTERACTION

Based on the screening criteria from the Water Availability Analysis guidelines from May 2015, a Tier III analysis is not required for either the Napa Valley Floor, MST or all other areas, unless substantial evidence determines the need for such analysis. Due to the lack of substantial evidence, no analysis is needed for Tier III.

CONCLUSION

Total annual water demand at Beaulieu Vineyards, associated with the existing production capacity of 1,800,000 gallons of wine per year and proposed increase to employees, tasting and visitation, is estimated to be 94.1 ac-ft per year, representing an increase of 1.0 ac-ft per year from the current water uses. Based on the Tier I analysis, the groundwater allotment for the parcels is a total of 141.2 ac-ft/year. This water availability analysis establishes that the estimated water demand for the facility represents 66% of the total water availability for the combined parcels per year. The facility utilizes treated process wastewater effluent to offset vineyard and landscape irrigation, which has the potential to reduce the parcel's water demand.

Contact:
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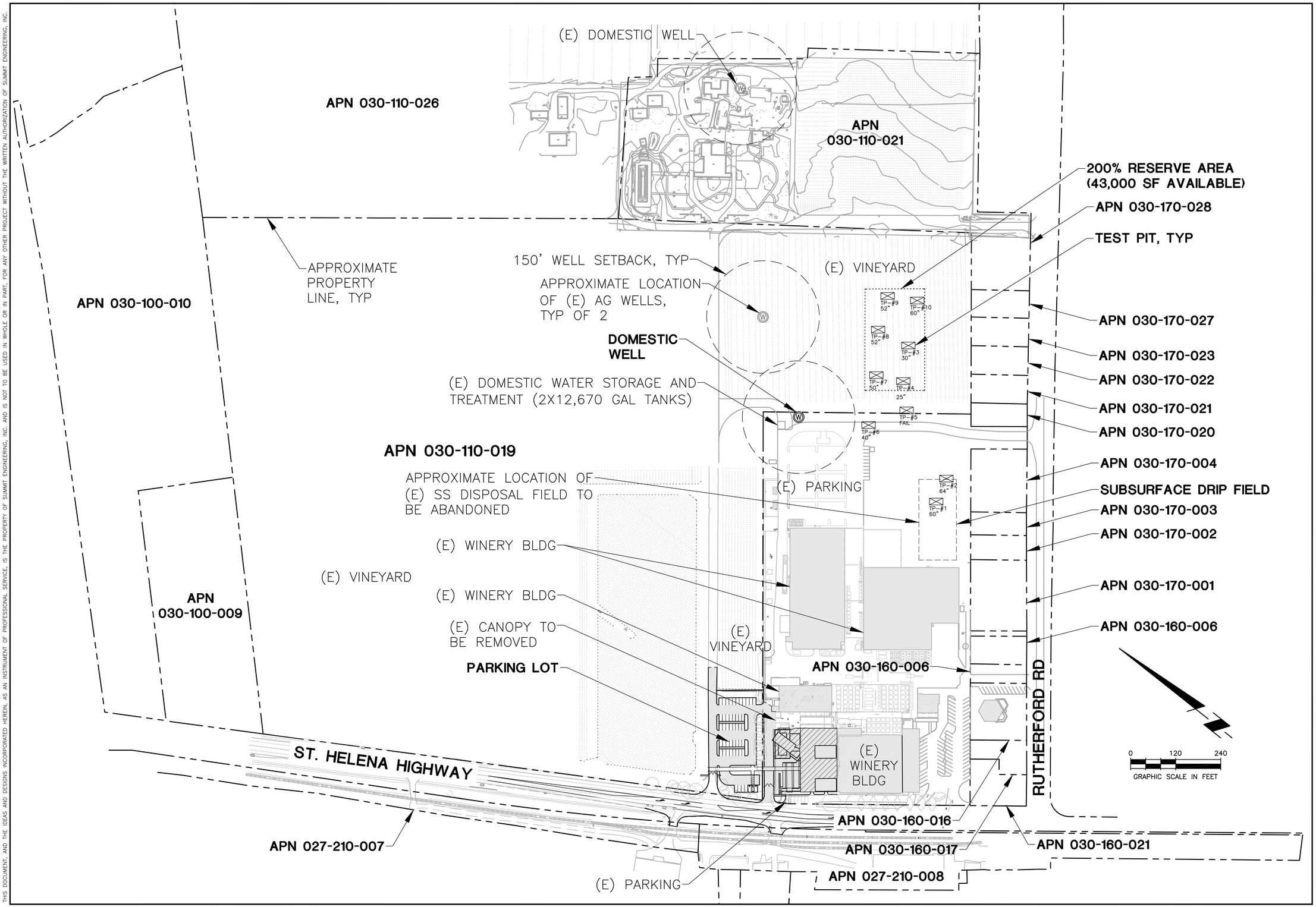
463 Aviation Blvd., Suite 200
Santa Rosa, CA 95403
707 527-0775
sfo@summit-sr.com

ENCLOSURE A

OVERALL SITE PLAN



SUMMIT

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BEAULIEU VINEYARDS
1960 ST. HELENA HIGHWAY
RUTHERFORD, CA 94558
APN 030-110-019

USE PERMIT APPLICATION

WATER & WASTEWATER SITE PLAN

	2017-09-15 USE PERMIT SUBMITTAL

DATE:	2017-04-17
JOB NO:	2017017
SCALE:	AS SHOWN
DRAWN:	JA
CHECKED:	CP

SHEET **UP4**

ENCLOSURE B

WASTEWATER GENERATION AND WATER DEMAND

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	BEAULIEU VINEYARDS WASTEWATER FEASIBILITY STUDY Existing Water Demand	PROJECT NO. 2017017 BY: SW CHK: GG

DOMESTIC WATER DEMAND

Average Day w/o Event - Non-harvest							Notes
Employee (full-time)	86	x	15	gpcd	=	1,290 gal/day	
Employee (part-time)	86	x	15	gpcd	=	1,290 gal/day	
Tasting Visitors	450	x	3	gpcd	=	1,350 gal/day	Peak visitation assumed (3,150 visitors/week)
Tasting Visitors food pairing	0	x	0.75	gpcd	=	0 gal/day	No food pairing with existing visitation
Total					=	3,930 gal/day	
					=	***3,930 gal/day***	

Peak Tasting Day Harvest W/Event							
Employee (full-time)	86	x	15	gpcd	=	1,290 gal/day	
Employee (part-time)	86	x	15	gpcd	=	1,290 gal/day	
Tasting Visitors	450	x	3	gpcd	=	1,350 gal/day	Peak visitation assumed (3,150 visitors/week)
Tasting Visitors food pairing	0	x	0.75	gpcd	=	0 gal/day	No food pairing with existing visitation
Promo Tasting w/ Meal[1]	0	x	15	gpcd	=	0 gal/day	
Total					=	3,930 gal/day	
					=	***3,930 gal/day***	

1) It is assumed that meal prep for marketing events is currently catered/prepared offsite

PROCESS WATER DEMAND

Average Day Flow	=	29,590	gal/day
Average, Day Peak Harvest Month Flow	=	59,040	gal/day

TOTAL WATER DEMAND

	Average		Peak	
	gal/day	gal/min[3]	gal/day	gal/min[3]
Domestic Water	3,930	2.7	3,930	2.73
Process Water	29,590	20.5	59,040	41.00
Total	33,520	23.3	62,970	43.73

Peaking Factor	=	1.5	
MDD (based on peak demand)	**=**	**94,455**	**gal/day**

3) Over 24 hours per day

For Reference:

	Peak Month	Reported Monthly Flow	Peak Month Ave Day	Design Estimate
2016 SWS Annual Report	July	2,057,852	66,382	62,970

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	BEAULIEU VINEYARDS WASTEWATER FEASIBILITY STUDY Water Demand	PROJECT NO. 2017017 BY: SW CHK: GG

PEAK DOMESTIC WATER DEMAND

Average Day w/o Event - Non-harvest							Notes
Employee (full-time)	105	x	15	gpcd	=	1,575 gal/day	
Employee (part-time)	35	x	15	gpcd	=	525 gal/day	
Tasting Visitors	550	x	3	gpcd	=	1,650 gal/day	Peak visitation assumed (3,850 visitors/week)
Tasting Visitors food pairing[1]	138	x	0.75	gpcd	=	104 gal/day	25% of tasting assumed to include food pairing
Total					=	3,854 gal/day	
					=	***3,860 gal/day***	

Peak Tasting Day Harvest W/Event							
Employee (full-time)	105	x	15	gpcd	=	1,575 gal/day	
Employee (part-time)	35	x	15	gpcd	=	525 gal/day	
Tasting Visitors	550	x	3	gpcd	=	1,650 gal/day	Peak visitation assumed (3,850 visitors/week)
Tasting Visitors food pairing[1]	138	x	0.75	gpcd	=	104 gal/day	25% of tasting assumed to include food pairing
Largest Open House Event	300	x	15	gpcd	=	4500 gal/day	
Total					=	8,354 gal/day	
					=	***8,360 gal/day***	

1) 25% of tasting visitors will receive a cheese plate or similar

PROCESS WATER DEMAND

Average Day Flow	=	29,590	gal/day
Average, Day Peak Harvest Month Flow	=	59,040	gal/day

TOTAL WATER DEMAND

	Average		Peak	
	gal/day	gal/min[2]	gal/day	gal/min[2]
Domestic Water	3,860	2.7	8,360	5.8
Process Water	29,590	20.5	59,040	41.0
Winery Landscape Irrigation	12,000	8.3	12,000	8.3
Total	45,450	31.6	79,400	55.1

Peaking Factor	=	2.25	
MDD (based on peak demand)	**=**	**178,650**	**gal/day**

2) Over 24 hours per day

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	BEAULIEU VINEYARDS WASTEWATER FEASIBILITY STUDY Summary Water & Wastewater Flows	PROJECT NO. 2017017 BY: SW CHK: GG

EXISTING DOMESTIC WATER USE

Use Type	Maximum Quantity (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Number of Days (days/year)	Annual Water Use (gal/year)
Full Time Employee	86	15	1,290	365	470,850
Part Time Employee	86	15	1,290	90	116,100
Tasting Visitors	450	3	1,350	365	492,750
Heublein Lunch/Dinner	150	15	2,250	3	6,750
Beaulieu Wine Society	500	15	7,500	4	30,000
Winery/Employee Function	250	15	3,750	3	11,250
				Total Water Use	**1,127,700**
				Average Annual Water use (gpd)	**3,090**
				Total Water Use (ac-ft/yr)	**3.5**

PROPOSED DOMESTIC WATER USE

Use Type	Maximum Quantity (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Number of Days (days/year)	Annual Water Use (gal/year)
Full Time Employee	105	15	1,575	365	574,875
Part Time Employee	35	15	525	90	47,250
Tasting Visitors	550	3	1,650	365	602,250
Tasting Food Plates Preparation	138	0.75	104	365	37,778
Private Tasting Visitors w/ meals	50	15	750	100	75,000
Private Tasting Visitors w/ meals	75	15	1,125	30	33,750
Private Tasting Visitors w/ meals	100	15	1,500	20	30,000
Private Food & Wine Pairing	40	15	600	50	30,000
Marketing Events	250	15	3,750	2	7,500
Open House	300	15	4,500	2	9,000
Wine Auction Event Visitors	250	15	3,750	2	7,500
				Total Water Use	**1,455,000**
				Average Annual Water use (gpd)	**3,990**
				Total Water Use (ac-ft/yr)	**4.5**

TOTAL EXISTING WAA

Water Use	Gallons per day	Gallons per year	Acre-Feet per year
Wine Production	29,590	10,800,000	33.1
Domestic Use	3,090	1,127,700	3.5
Vineyard Irrigation[1]	63,175	15,478,000	47.5
Landscape Irrigation[1]	12,000	2,928,500	9.0
Total	107,855	30,334,200	93.1

TOTAL PROPOSED WAA

Water Use	Gallons per day	Gallons per year	Acre-Feet per year
Wine Production	29,590	10,800,000	33.1
Domestic Use	3,990	1,455,000	4.5
Vineyard Irrigation[1]	63,175	15,478,000	47.5
Landscape Irrigation[1]	12,000	2,928,500	9.0
Total	108,755	30,661,500	94.1

WATER DEMAND COMPARISON

Water Use	Existing (ac-ft)	Proposed (ac-ft)	Difference (ac-ft)
Wine Production	33.1	33.1	0.0
Domestic Use	3.5	4.5	1.0
Vineyard Irrigation	47.5	47.5	0.0
Landscape Irrigation	9.0	9.0	0.0
Total	93.1	94.1	1.0

Available Acreage:
141.2 ac

1) Based on Napa County WAA Guidelines

ENCLOSURE C

WELL LOGS AND PUMP TEST

OAKVILLE PUMP SERVICE, INC.

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

Water System Service Report

Job Name: BV Well-001 / Production Well Date: 12-15-15
Rep: _____ Service Tech: Rob
Job Address: _____ City,State,Zip: _____
Phone: (Hm) _____ (Wk) _____ (Cel) _____
Description of Problem: Pump Replacement & Install of 8" casing into 12" steel casing. Motor/Pump length: 89" with nipple/checkvl. - Check valve to pump inlet: 54"

General Info
Pump Type:
- o 4" Submersible
- x 6" Submersible
- o Shallow Well Jet
- o Deep Well Jet
- o Centrifugal
- o Sump / Dewatering
- o Sewage

Application:
- o Residential
- o Pressure / Booster
- o Irrigation
- o Sump / Dewatering
- o Effluent Sewage

Pump(s) Info
Pump 1 / (Sub Motor Info)
MFR: Franklin
Model: 236603 8120
S/N: _____
Date Code: _____
HP: 15 Volt: 230 PH: 3
Protection: _____
Pump 2 / (Sub Pump Info)
MFR: Goulds
Model: 5CLC-010/6-Stage
S/N: _____
Date Code: _____
HP: 10 Volt: _____ PH: _____
Protection: _____

Well Info
Well Depth: 203' ft
Well Dia: 8" Mtrl: _____
SWL: _____ DWL: _____
Well Yield: _____ gpm
Pump Capacity: _____ gpm
Pump Setting: 168' ft Pump
Pipe Size: 3" Type: Boreline
PRV: _____ Stg: _____
Well Seal: Split / (Solid)
Well Seal: Sanitary / Unsafe
Above Grnd Height: _____ in
Check Vlvs @ Pump _____ ft
_____ ft _____ ft
Flow Sleeve Size: NONE in

Tank(s) Info
Storage Tank(s):
Type / Material: _____
Capacity: _____
Tanks #: _____
Inlet: _____ Outlet: _____
Location: _____
Fire Connection: _____
Pressure Tank(s):
- o Bladder / Diaphram
- o Galvanized

Mfr: _____ Model: _____
S/N: _____
Size: _____ gal
Location: _____

Power
Volts (off):
L1 - L2 230
L1 - L3 _____
L2 - L3 _____

Volts (run):
L1 - L2 _____
L1 - L3 _____
L2 - L3 _____

Meg Ohms:
L1 - G _____
L2 - G _____
L3 - G _____

Amperage
Hookup 1:
L1 33
L2 35
L3 37

Hookup 2:
L1 _____
L2 _____
L3 _____

Hookup 3:
L1 _____
L2 _____
L3 _____

Electrical Checklist	OK	OPEN	Grnded
Power Supply Line	□	□	□
Above Grnd Wiring	□	□	□
Wiring to Well Head	□	□	□
Down Hole	□	□	□
Motor Windings	□	□	□

	OK	Repair	Replace
Start Capacitor	□	□	□
Run Capacitor	□	□	□
Relay / Contactor	□	□	□
Start Switch	□	□	□
Wiring/Connections	□	□	□
Control Floats	□	□	□
_____	□	□	□
_____	□	□	□

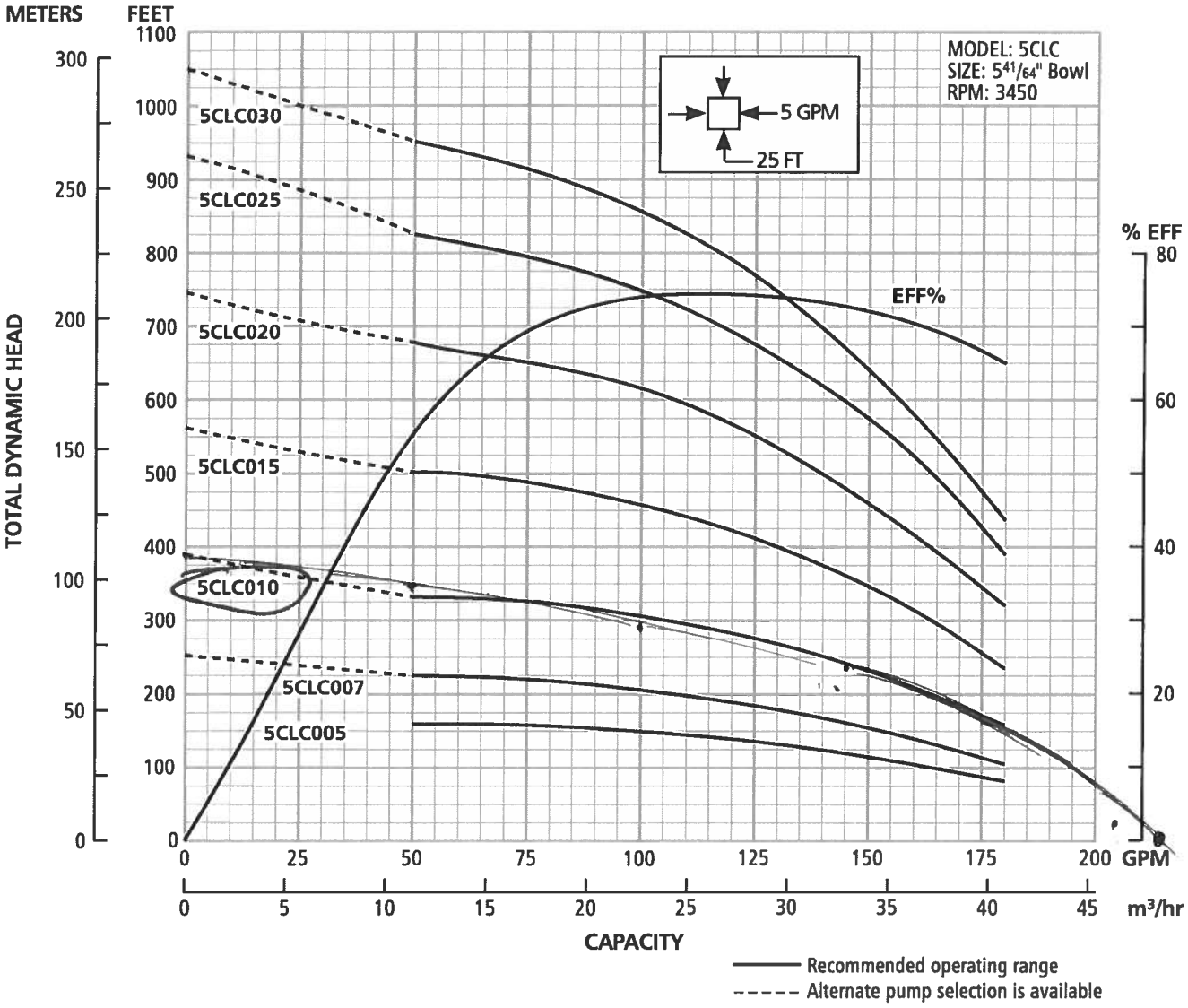
Hydraulic
Pressure Gauge: OK / Replace
Pressure Switch: OK / Replace
Switch Cut in: _____ out _____
Pressure Tank: OK / Replace
Tank Precharge: _____ PSI
Added: _____ PSI
Tank Cycle Time: _____ Min
Tank Drawdown: _____ gal
Check VLV: Ok / Rpr / Rplc
Foot VLV: Ok / Rpr / Rplc
Air Vol. Cntrl: Ok / Rpr / Rplc
PRV: Ok / Rpr / Rplc
Pressure Trdr Ok / Rpr / Rplc
_____ Ok / Rpr / Rplc

Electrical / Control Panel Protection
Types: □ Control Box □ Pressure Switch □ Simplex Panel □ Duplex Control Panel □ VFD □ Duplex VFD
□ Mag Starter / Contactor □ Other: _____
Application: □ On/Off Pressure □ On/Off Empty x On/Off Fill □ Constant Pressure □ Other: _____
Low Water Protection Device: _____ Breaker Size: 40-Amp Fuse Size/Type: _____
Low Voltage Stg: _____ High Voltage Stg: _____ Low Amp Stg: _____ High Amp Stg: _____
VUB Stg: _____ CUB Stg: _____ Time to Reset: _____ Overload Stg: _____ amps
Reset: Auto / Manual for: _____ Low Voltage Controls: Yes / No
Control Panel Internal Fusing (amps / type): _____ Transformer input: _____ Output: _____
Contactor Model: _____ Overload Model: _____

Wiring Layout
Incoming Wire Size/Material from Meter: _____ Size of Ground: _____ Size of Neutral: _____ Distance from Meter: _____
Electrical Controls Wire Size: _____ Pump Wire Size: _____ Pressure Switch Wire Size: _____
Wire Size for Control Floats: _____ Number of Control Wires Pulled _____

Model 5CLC 110 GPM

GOULDS PUMPS

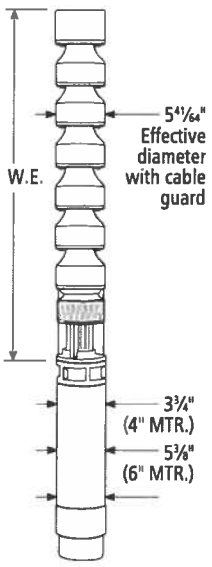


DIMENSIONS AND WEIGHTS

HP	Stages	W.E. Order Number	W.E. Length	W.E. Wt. (lbs.)
5	3	05CLC00544CTB	25.2	70
		05CLC00564CTB	27.5	75
7.5	4	05CLC00744CTB	29.8	83
		05CLC00764CTB	32.1	88
10	6	05CLC01064CTB	41.4	114
15	9	05CLC01564CTB	55.3	153
20	12	05CLC02064CTB	69.2	192
25	15	05CLC02564CTB	83.1	231
30	17	05CLC03064CTB	92.3	257

(All dimensions in inches and weights in lbs. Do not use for construction purposes.)

PLEASE NOTE:
- Order motors separately.
- For intermediate horsepower pumps consult factory.
- Solid line is recommended operating range. The dotted line (– – – –) signifies an alternate pump selection is available.
- Please specify all options changes in W.E. order number.



MATERIALS OF CONSTRUCTION

Part Name	Material
Shaft	ASTM A582 TYPE 416
Coupling	ASTM A582 S41600 CD
Suction Adapter	Ductile Iron ASTM A536
Discharge Bowl	ASTM A48 CL 30B
Bronze Bearings	ASTM B584
Discharge Bowl Bearing	ASTM B584
Taperlocks	ASTM A108 GR 101B
Bowl	ASTM A48 CL 30B
Upthrust Collar	Polyethylene
Impeller	ASTM B584
Fasteners	SAEJ429 GR 8
Cable Guard	ASTM A240 S 30400
Suction Strainer	ASTM A240 S 30400

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. xxxxxxx

Page 1 of 1

Owner's Well Number Well-001 (Production Well)

Date Work Began 12/14/2015 Date Work Ended 12/16/2015

Local Permit Agency Napa County

Permit Number _____ Permit Date _____

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify _____

Drilling Method _____ Drilling Fluid _____

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		Misc Notes:
		1.) Unknown Geologic Log - Well Re-casing
		2.) Original Casing 12" steel
		-Blank Casing 0-132'ft
		-Torch Cut Casing 132'ft to bottom
		-Unknown Sanitary Seal on existing 12" well
		3.) New 8" PVC Casing sticks up 4" above existing
		concrete pad.
		4.) 10" diameter x 12" height steel casing welded to
		24" steel plate and grouted into place and around
		around 8" PVC casing to seal out any water.
		5.) 3/4" tremie tube installed between 8" PVC
		and existing 12" steel casing. 60'ft length

Total Depth of Boring 205 Feet

Total Depth of Completed Well 203 Feet

Well Owner

Name BV Winery

Mailing Address _____

City Rutherford State CA Zip _____

Well Location

Address 1042 Rutherford Road (Hwy 128)

City Rutherford County Napa

Latitude _____ Deg. _____ Min. _____ Sec. N Longitude _____ Deg. _____ Min. _____ Sec. W

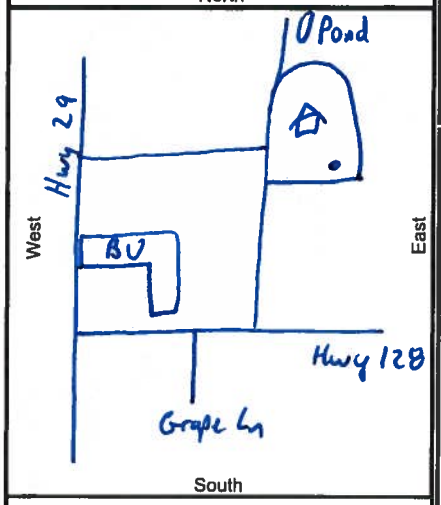
Datum _____ Dec. Lat. 38.463320 Dec. Long. -122.418946

APN Book 030 Page 110 Parcel 021

Township _____ Range _____ Section _____

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

- ○ New Well
- ◉ Modification/Repair
  - ○ Deepen
  - ● Other Re-case
- ○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

- ◉ Water Supply
  - ☑ Domestic ☑ Public
  - ☐ Irrigation ☑ Industrial
- ○ Cathodic Protection
- ○ Dewatering
- ○ Heat Exchange
- ○ Injection
- ○ Monitoring
- ○ Remediation
- ○ Sparging
- ○ Test Well
- ○ Vapor Extraction
- ○ Other _____

Water Level and Yield of Completed Well

Depth to first water _____ (Feet below surface)

Depth to Static Water Level 30 (Feet) Date Measured 12-23-15

Estimated Yield * 210 (GPM) Test Type Constant Rate

Test Length 48.0 (Hours) Total Drawdown 20 (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
1	0	none	Conducto	Low Carbon Steel	.25	10.75		
0	63	12	Blank	PVC SDR-17	.5	8.5		
63	163	12	Blank	PVC SDR-17	0.5	8.5	Milled Sl	0.032
163	283	12	Blank	PVC SDR-17	0.5	8.5		
183	203	12	Screen	PVC SDR-17	0.5	8.5	Milled Sl	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	Fluid Grout
50	205	Filter Pack	Herold-Smith
			Well-Pack

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 Rob Lutz

Person, Firm or Corporation

7855 Saint Helena Hwy South Oakville CA 94562

Address City State Zip

Signed _____ 12-21-2015 744958

C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ENCLOSURE D

TIER II ANALYSIS: WELL DRAWDOWN CALCULATION TABLES

SUMMIT ENGINEERING, INC.	BEAULIEU VINEYARDS Water Availability Tier II: Well Drawdown Analysis	PROJECT NO. 2017017 BY: SW CHK: GG

Site Specific Parameters

Well Flow:
100 gpm

Radius of Influence:
450 ft

Aquifer Thickness
75 ft

Pumping Time:
1 day

Low End Specific Storage:
1.50E-05 1/ft

High End Specific Storage:
3.10E-04 1/ft

Low Hydraulic Conductivity:
50 ft/day

High Hydraulic Conductivity:
80 ft/day

Theis Drawdown

Scenario	Specific Storage (1/ft):	Hydraulic Conductivity (ft/day)	Theis u value (unitless):	u_a, rounded down (unitless):	u_b, rounded up (unitless):	$W(u_a)$	$W(u_b)$	W(u), interpolated	Theis s value	Drawdown(ft)
High S, Low h	3.10E-04	50	4.19E-03	4.00E-03	5.00E-03	4.948	4.726	4.91	0.0104	2.00
Low S, Low h	**1.50E-05**	**50**	**2.03E-04**	**2.00E-04**	**3.00E-04**	**7.94**	**7.535**	**7.93**	**0.0168**	**3.24**
High S, High h	3.10E-04	80	2.62E-03	2.00E-03	3.00E-03	5.639	5.235	5.39	0.0071	1.38
Low S, High h	1.50E-05	80	1.27E-04	1.00E-04	2.00E-04	8.633	7.94	8.45	0.0112	2.16

Notes:
1) Adjust parameters highlightd in yellow for site specific aquifer/well conditions
2) Retrieve hydraulic conductivity from Napa WAA map; Specific Storage from well drilling lithology/soil type
3) 4 Extreme conditions (varying specific storage and hydraulic conductivity) are considered
4) Low specific storage and low hydraulic conductivity typically will result in max drawdown (highlighted in green)
5) Drawdown < 10 ft to eliminate significant impacts
6) Min and max Specific storage and conductivity values can be adjusted to be site specific