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Water Availability Analysis

Robert Sinskey Vineyards Major Modification P19-00161
Planning Commission Hearing December 2, 2020

WATER AVAILABILITY ANALYSIS

ROBERT SINSKEY VINEYARDS

6320 Silverado Trail

Napa, California, 94558

APN 031-230-017

SUMMIT

CIVIL STRUCTURAL WATER|WASTEWATER ELECTRICAL PLANNING

Project No. 2019156
November 5, 2019
Updated: February 19, 2020

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LIST OF ENCLOSURES

PROJECT OVERVIEW

Robert Sinskey Vineyards, located at 6320 Silverado Trail in Napa, CA (APN 031-230-017), is applying for a use permit modification to UP# P09-00480-MOD to increase the number of full-time employees to 35 (previously 10), part-time employees to 7 (previously 5), and adding 125 by-appointment tasting room visitors to their 132 public visitors per day (257 total tasting room visitors per day). Up to 75 of these 257 tasting room visitors may have pairings during their tasting. There are no proposed changes to the approved wine production of 143,000 gallons per year. The winery site is located in an agricultural area of Silverado Trail and on an 11.8-acre parcel that includes 5.1 acres of vineyards. The winery, tasting room, and vineyards are located on this parcel. The winery property is not located in the 100-year floodplain. The existing winery and hospitality facility is located at the base of the surrounding hill that the vineyard is occupying. Due to this hill, the parcel has slopes ranging from substantially flat to upwards of 55%, with most of the hillside having slopes greater than 20%. Please refer to Enclosure A for an Overall Site Plan showing the general layout of the project components.

There are three existing wells onsite. For domestic water use, these wells are rotated as needed and provide water for winery processes, the tasting room, and are capable of providing water for landscape and vineyard irrigation. Combined, all three wells can conservatively produce 72 gallons per minute (gpm) (Table 1). Additionally, a fourth well is located at the border of an adjacent parcel (APN 032-070-027) that is also owned by the Sinskey Family that can provide water if necessary (excluded from this analysis).

Table 1: Existing well capacities.

Source	Primary Use	Status	Capacity (gpm)
Well 1	Domestic/Process/Irrigation	Active	12
Well 2	Domestic/Process/Irrigation	Active	30-40
Well 3	Domestic/Process/Irrigation	Active	30
		TOTAL	72-82

Summit Engineering has prepared the following Water Availability Analysis to demonstrate that the increased water consumption associated with the proposed increase in employees and tasting room visitation should not exceed the water allocation for the property.

EXISTING WATER DEMAND

Existing water uses on the property are based on the following:

- Winery process water demand for 143,000 gallons per year of wine production
- Winery domestic water demand
- Winery landscaping water demand (provided by treated, constructed wetland effluent)
- Vineyard irrigation water demand (provided by treated, constructed wetland effluent)

<u>WINERY PROCESS WATER DEMAND</u>

Water demand for wine production is expected to correlate to the process wastewater (PW) generated at the facility. The projected winery process water demand is calculated in Table 2.

Table 2: Existing and projected winery process water demand.

Parameter	Value	Units
Existing Annual Production	143,000	gallons wine/year
PW Generation Rate [a]	5.0	gallons PW/gal wine
Annual PW Flow	715,000	gallons PW/year
Total Annual Winery PW Demand	2.2	acre-ft water/year
Average PW Flow	1,960	gallons PW/day
Peak PW Flow	3,910	gallons PW/day
Notes:		
a. Generation rate based on observations by Robert Sinskey Vineyards.		

EXISTING DOMESTIC WATER DEMAND

The existing domestic water demand from the winery facility is determined based on a maximum of 15 employees and 132 peak daily tasting visitors, of which 75 visitors may have pairings with their tasting. The facility is permitted to have several types of marketing events, with the largest being a twice per year event with 150 visitors each. Sanitary sewage (SS) generation and winery domestic water demand are expected to be equivalent, and as such prescribed sewage flows are used to calculate estimated domestic water demand. The existing annual domestic water demand for the winery is outlined in Table 3.

Table 3: Existing winery domestic water demand.

Use Type	Number (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Frequency (days/year)	Annual Water Use (gal/year)
FT Employee [a]	10	15	150	365	54,750
PT Employee	5	15	75	90	6,750
Tasting Visitors w/ Pairings [b]	75	6	450	365	164,250
Tasting Visitors w/o Pairings [b]	57	3	171	365	62,415
5 Days per Week Event [c]	50	6	300	260	78,000
Marketing Event (every other week) [c]	50	10	500	28	14,000
Marketing Event (monthly) [c]	80	6	480	12	5,760
Marketing Event (biannual) [c]	150	3	450	2	900
Total Annual Winery Domestic Water Demand (Gallons)					**386,830**
Total Annual Winery Domestic Water Demand (ac-ft/year)					**1.19**
Average Daily Water Use (GPD)[d]					**846**
Notes:					
a. Peak number of employees and visitors assumed every day to be conservative.					
b. Tasting is assumed to occur 365 days per year (48,180 visitors per year). Per capita water demand is based on the Guidelines for Estimating Non-Residential Water Usage in Napa County’s Water Availability Analysis Guidance Document.					
c. Per capita water demand is based on the Guidelines for Estimating Non-Residential Water Usage in Napa County’s Water Availability Analysis Guidance Document. Food service is excluded for the biannual event. All other events may have food services as detailed in the conditions of approval for UPVMM #P11-00441-VMM					
d. Average daily water use excludes any event visitors					

WINERY LANDSCAPE WATER DEMAND

Treated water from the constructed wetland system is currently used to meet the landscaping water demand at Robert Sinskey Vineyards. There is no change in landscaping associated with the proposed Use Permit modification. Landscape irrigation occurs from mid-May to the first of December which is approximately 29 weeks/year. Landscape demand for the winery is estimated by Robert Sinskey Vineyards to be approximately 5,500 gallons/week which corresponds to an annual demand of 0.5 acre-ft/year (Table 4). Napa County Water Availability Analysis (WAA) guidelines for estimating non-residential water usage estimates 0.5 acre-ft/100,000 gallons of wine. The facility's vineyard irrigation demand corresponds to a rate of 0.35 acre-ft/100,000 gallons of wine, which is near Napa County's standard criteria.

Table 4: Existing and projected winery landscape water demand.

Parameter	Value	Units
Weekly Landscape Water Demand [a]	5,500	gallons/week
Number of Weeks Landscape Demand Exists	29	Weeks/year
Total Annual Winery Landscape Water Demand	0.5	acre-ft/year
Notes:		
a. Demand based on historical observations from Robert Sinskey Vineyards.		

VINEYARD IRRIGATION DEMAND

Treated water from the constructed wetland system is currently used to meet the irrigation water demand for the 5.1 acres of vineyards at Robert Sinskey Vineyards. Vineyard irrigation is therefore not directly supplied by the groundwater aquifer. There is no change in vineyard irrigation associated with the proposed Use Permit modification. Facility irrigation records were used to determine the existing vineyard irrigation demand of approximately 137,500 gallons of water/year (0.4 acre-ft/year) (Table 5). The facility's vineyard irrigation demand corresponds to a rate of 0.08 acre-ft/acre/year across its 5.1 acres of vineyard. Although this demand is less than the Napa County Water Availability Analysis (WAA) estimates for non-residential water usage (0.2 to 0.5 acre-ft/acre/year), the reduced water demand is due largely to the vineyard spacing at Robert Sinskey Vineyards. Because the vineyards are planted along the hillslope, they are spaced at greater distances which reduces the density of vines per acre and the corresponding water demand.

Table 5: Existing and projected vineyard irrigation water demand.

Parameter	Value	Units
Number of Vines [a]	2,500	vines
Water Demand per Vine per Week [a]	5	5 gallons/vine/week
Number of Weeks of Demand [a]	11	weeks/year
Total Annual Winery Landscape Water Demand	0.4	acre-ft/year
Notes:		
a. Irrigation estimates from historical observations at Robert Sinskey Vineyards.		

PROPOSED WINERY WATER DEMAND

There are no proposed changes to the operation of the facility that would increase winery process or irrigation water use. Therefore, all existing water demand will remain unchanged, with the only additional demand associated with increased in employees and by-appointment tasting room visitors.

The proposed domestic water demand from the winery facility is determined based on the proposed maximum of 42 employees, 132 daily tasting visitors, 125 by-appointment tasting room visitors, and visitors for each of the marketing events. Of the 257 total daily tasting visitors, 75 are allowed pairings with their tasting. Sanitary sewage (SS) generation and winery domestic water demand are expected to be equivalent, and as such prescribed sewage flows are used to calculate estimated domestic water demand. The proposed annual domestic water demand for the winery is outlined in Table 6.

Table 6: Proposed winery domestic water demand.

Use Type	Number (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Frequency (days/year)	Annual Water Use (gal/year)
FT Employee [a]	35	15	525	365	191,625
PT Employee	7	15	105	90	9,450
Tasting Visitors w/ Pairings [b]	75	6	450	365	164,250
Tasting Visitors w/o Pairings [b]	182	3	546	365	199,290
5 Days per Week Event [c]	50	6	300	260	78,000
Marketing Event (every other week) [c]	50	10	500	28	14,000
Marketing Event (monthly) [c]	80	6	480	12	5,760
Marketing Event (biannual) [c]	150	3	450	2	900
Total Annual Winery Domestic Water Demand (Gallons)					**663,280**
Total Annual Winery Domestic Water Demand (ac-ft/year)					**2.04**
Average Daily Water Use (GPD)[d]					**1,626**

Notes:

a. Peak number of employees and visitors assumed every day to be conservative.

b. Tasting is assumed to occur 365 days per year (93,805 visitors per year). Per capita water demand is based on the Guidelines for Estimating Non-Residential Water Usage in Napa County's Water Availability Analysis Guidance Document.

c. Per capita water demand is based on the Guidelines for Estimating Non-Residential Water Usage in Napa County's Water Availability Analysis Guidance Document. Food service is excluded for the biannual event. All other events may have food services as detailed in the conditions of approval for UPVMM #P11-00441-VMM

d. Average daily water use excludes any event visitors

TOTAL PROPOSED WATER DEMAND

The total water demand for the project with the increase in employees and visitation, along with the same marketing events and irrigation uses, is expected to be 4.2 acre-ft/year (Table 7). This represents an increase of 0.8 acre-ft/year when compared to the existing water demand of 3.4 acre-ft/year (Table 8).

Table 7: Total Projected Annual Water Demand

Source of Demand	Gallons per day	Gallons per year	Acre-feet per year
Winery Production	1,960	715,000	2.2
Winery Domestic Use	1,626	663,280	2.0
Vineyard Irrigation [a]	0	0	0.0
Landscape Irrigation [a]	0	0	0.0
Total	**3,586**	**1,378,280**	**4.2**
Notes:			
a. Irrigation water is supplied from treated, constructed wetland effluent. Total irrigation demand is estimated to be only 0.9 ac-ft/year, which represents 41% of the total process water being treated by the wetlands.			

Table 8: Existing and Proposed Water Demand Comparison

Source of Demand	Existing (ac-ft)	Proposed (ac-ft)	Difference (ac-ft)
Winery Production	2.2	2.2	0.0
Winery Domestic Use	1.2	2.0	0.8
Vineyard Irrigation	0.0	0.0	0.0
Landscape Irrigation	0.0	0.0	0.0
Total	3.4	4.2	0.8

TIER I ANALYSIS: WATER USE CRITERIA

An estimate of the average annual groundwater recharge for the Robert Sinskey Vineyards parcel is being provided since most of this parcel (9.65 acres) is located outside of the Napa Valley Floor area where water use criterion has been established as 1.0 acre-ft/acre/year (Enclosure A). The remaining 2.17 acres of the parcel lies within the boundary of the Napa Valley Floor subarea and assigned a water use allotment of 1.0 acre-ft/acre/year (as defined by Napa County's WAA Guidance Document).

Luhdorff & Scalmanini Consulting Engineers (LSCE) previously prepared a Hydrogeologic Conceptualization and Characterization of Conditions for Napa County regarding the groundwater and hydrogeology of the Napa Valley, including a detailed study of the anticipated rainfall recharge in several watersheds. LSCE used a mass balance approach to provide groundwater recharge estimates for several watersheds within Napa County. The Robert Sinskey Vineyards parcel is located within the LSCE defined "Napa River at Napa" watershed which LSCE estimates to have an average annual recharge rate equal to 17% of annual precipitation. The next nearest watershed delineated by LSCE is the "Napa River near Conn Creek" watershed which has an estimated average annual recharge rate of 21% of annual precipitation. For Robert Sinskey Vineyards the annual average groundwater recharge rate is assumed to be 17% of the annual precipitation due its location within the Napa

River at Napa watershed. A brief discussion of annual precipitation and hillside slopes is included below.

The average annual precipitation was estimated to be 33.79 inches/year from precipitation normals for Yountville from the National Oceanic and Atmospheric Administration climate database for the period between 1981-2010 (Enclosure B). The Yountville station is the closest precipitation monitoring station to the site (less than 2.5 miles).

Another consideration for the area of the parcel not in the Napa Valley Floor (NVF) is that a large portion is on steep hillsides. The site slope ranges from substantially flat to upwards of 55%. To account for the reduced infiltration expected from land sloped at greater than 25%, a site slope analysis was prepared for the portion of the parcel not within the NVF and was based on digital elevation models downloaded from the USGS National Map. The site area not within the NVF with slopes greater than 25% is approximately 4.64 acres, which will be removed from the parcel acreage when calculating recharge. Therefore, the total land area outside of the NVF available for recharge is approximately 5.01 acres.

Utilizing the watershed's rainfall recharge fraction of 17%, according to the LSCE groundwater characterization, the anticipated annual recharge for a typical year would be calculated as:

$$\begin{aligned} &Typical\ Annual\ Recharge \\ &= \left(Area\ outside\ NVF\ (acres) * Precipitation\ \left(\frac{ft}{year}\right) * Recharge\ Fraction\ (\%)\right) \\ &= \left(5.01\ acres * \frac{33.79\,\frac{in}{year}}{12\,\frac{in}{ft}} * 17\%\right) \\ &= 2.40\ \frac{acre\text{-}ft}{year} \end{aligned}$$

WATER AVAILABILITY

Given the estimated recharge of 2.40 acre-ft/year for the area of the parcel not within the NVF and the 2.17 acre-ft/year of availability from the area within the NVF, the total sustainable water availability for the parcel is estimated to be 4.6 acre-ft/year. The total estimated water demand of 4.2 acre-ft/year represents 91% of the anticipated 4.6 acre-ft/year of groundwater recharge for the project site. This leaves additional capacity to supplement irrigation water with groundwater if needed. However, groundwater cannot be the sole source of irrigation supply. This would cause the total water demand to exceed the site's groundwater recharge rate.

TIER II ANALYSIS: WELL INTERFERENCE

A Tier II analysis is required for parcels not located within the "Napa Valley Floor" per the WAA guidelines, but is included because this parcel lies partially outside of the Napa Valley Floor. This analysis is included to estimate any potential 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 feet 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. Additionally, because Wells 2 and 3 are so close to each other (see Enclosure A), a combined flow analysis was done to determine if these wells could be operated at maximum capacity at the same time. This combined well analysis used the principal of superposition to estimate the total well drawdown effect at the border. Because this combined well analysis is meant to be a feasibility check the pump time was set to 8 hours per day (0.33 days) instead of 24 hours which is used in all single well analysis. 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 10 to 30 ft/day for project site (Water Availability Analysis Figure F-3)
- Specific Storage range of 1.5x 10^{-5} to 3.1x 10^{-4} (1/ft) (Water Availability Analysis table F3)

The Theis equation can be seen below along with an example calculation, for the domestic well.

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

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

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

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

Example for Well 1 on the drawdown effect on possible wells on adjacent properties, with the pumping time estimated based on the amount of time the well is anticipated to run to meet the daily demand (conservatively set to 24 hours/day):

$$u = \frac{(59\ \text{ft})^2 \times (1.50\ \text{X}\ 10^{-5})}{4 \times 10 \frac{\text{ft}}{\text{day}} \times 75\ \text{ft} \times 1\ \text{day}} = 1.74 \times 10^{-5}$$

With this value of u, W(u) =10.42

$$\text{Drawdown} = \frac{12 \frac{\text{gal}}{\text{min}} \times\ 0.1337 \frac{\text{cuft}}{\text{gal}} \times 1{,}440 \frac{\text{min}}{\text{day}}}{4\pi\ \times 10 \frac{\text{ft}}{\text{day}} \times 75\ \text{ft}} \times 10.42 = 2.55\ \text{ft}$$

The table below shows a summary of the worst-case scenario of drawdown results for the onsite wells closest to neighboring non-project parcels (Table 9). More detailed tables can be found in Enclosure C, Tier II Well Drawdown Calculation Tables.

Table 9: Well Drawdown Calculations

Well	Use	Max Rated Flow Rate (gpm)	Radius (ft)	Duration (day)	Drawdown (ft)
Well 1	Domestic/Process/Irrigation	12	59	1	**2.55**
Well 2	Domestic/Process/Irrigation	40	87	1	**7.85**
Well 3	Domestic/Process/Irrigation	30	154	1	**5.21**
Well 2 and Well 3	Domestic/Process/Irrigation	60 (30/30)	87/154	0.33	**9.75**
Max Well 2 and Well 3	Domestic/Process/Irrigation	70 (40/30)	87/154	0.33	**11.50**

RESULTS

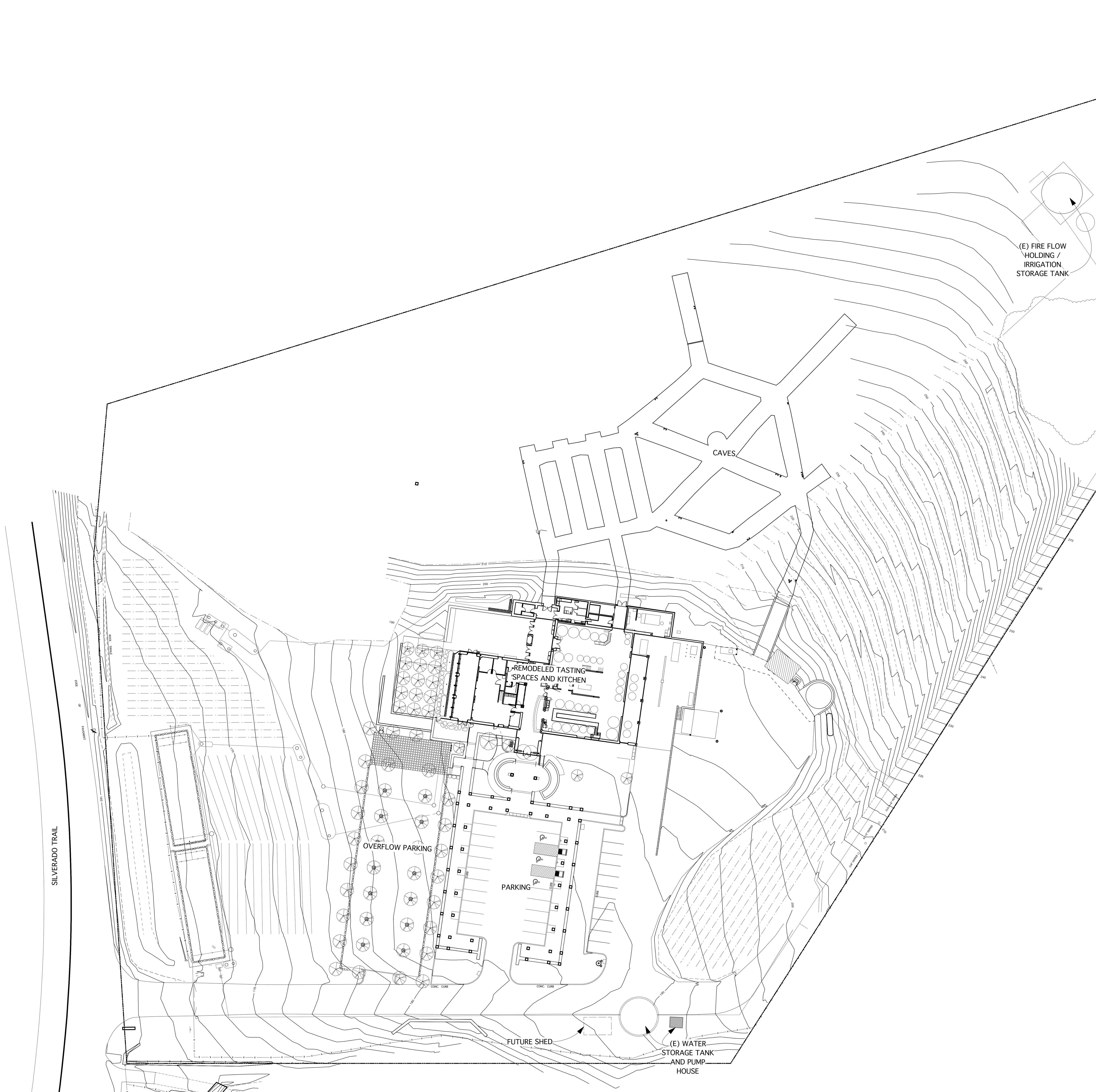
Using very conservative estimates for aquifer thickness, specific storage, and hydraulic conductivity, based on values from the Water Availability Analysis guidelines adopted by Napa County, none of the wells should produce a drawdown greater than 10 feet on any existing or future wells that could be 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 feet, no significant drawdown impact is expected for wells on adjacent parcels. However, Wells 2 and 3 should not operate at maximum capacity simultaneously. When the two well flows are combined, they can create a drawdown at the parcel border that is greater than 10 ft (11.50 ft) due to their proximity to each other. However, these wells can theoretically operate at the same time if each one operates at less than or equal to 30 gpm (9.75 ft drawdown).

CONCLUSION

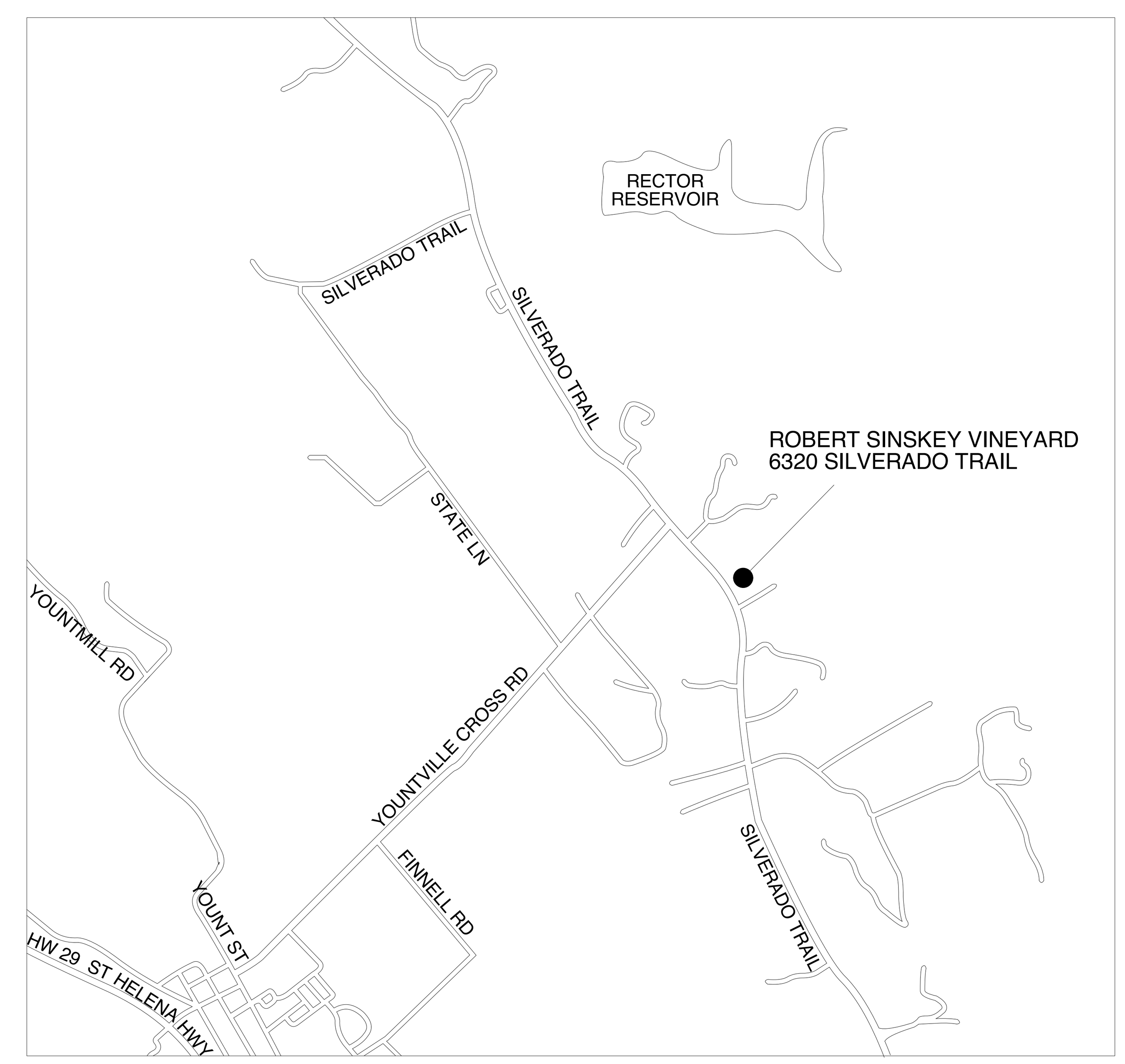
Robert Sinskey Vineyards is proposing to increase their water demand through a Use Permit modification to UP# P09-00480-MOD. The increased demand is associated with an increased number of employees and an increase to the amount of by-appointment tasting room visitors. The proposed total annual water demand for Robert Sinskey Vineyards is estimated to be 4.2 acre-ft/year, representing an increase of 0.8 acre-ft/year from the currently permitted water use. The Tier I analysis estimates the groundwater allotment for the project parcels is a total of 4.6 acre-ft/year, based on a site-specific recharge analysis. This water availability analysis establishes that the estimated groundwater demand for the facility represents 91% of the total water availability for the parcel per year. If ever required, there is expected to be an excess availability of groundwater (approximately 0.4 acre-ft/year) that can be used to supplement landscape and vineyard irrigation. The Tier II analysis reveals there are no significant aquifer drawdown impacts associated with any one well on the property. However, Wells 2 and 3 should not be operated at maximum capacity simultaneously.

ENCLOSURE A

OVERALL SITE PLAN
WELL LOCATIONS
NAPA VALLEY FLOOR BORDER



1 A0.1 EXISTING SITE PLAN
1" = 50'-0"



2 A0.1 VICINITY MAP
N.T.S.

Revision Date	I.D.

ARKIN · TILT ARCHITECTS
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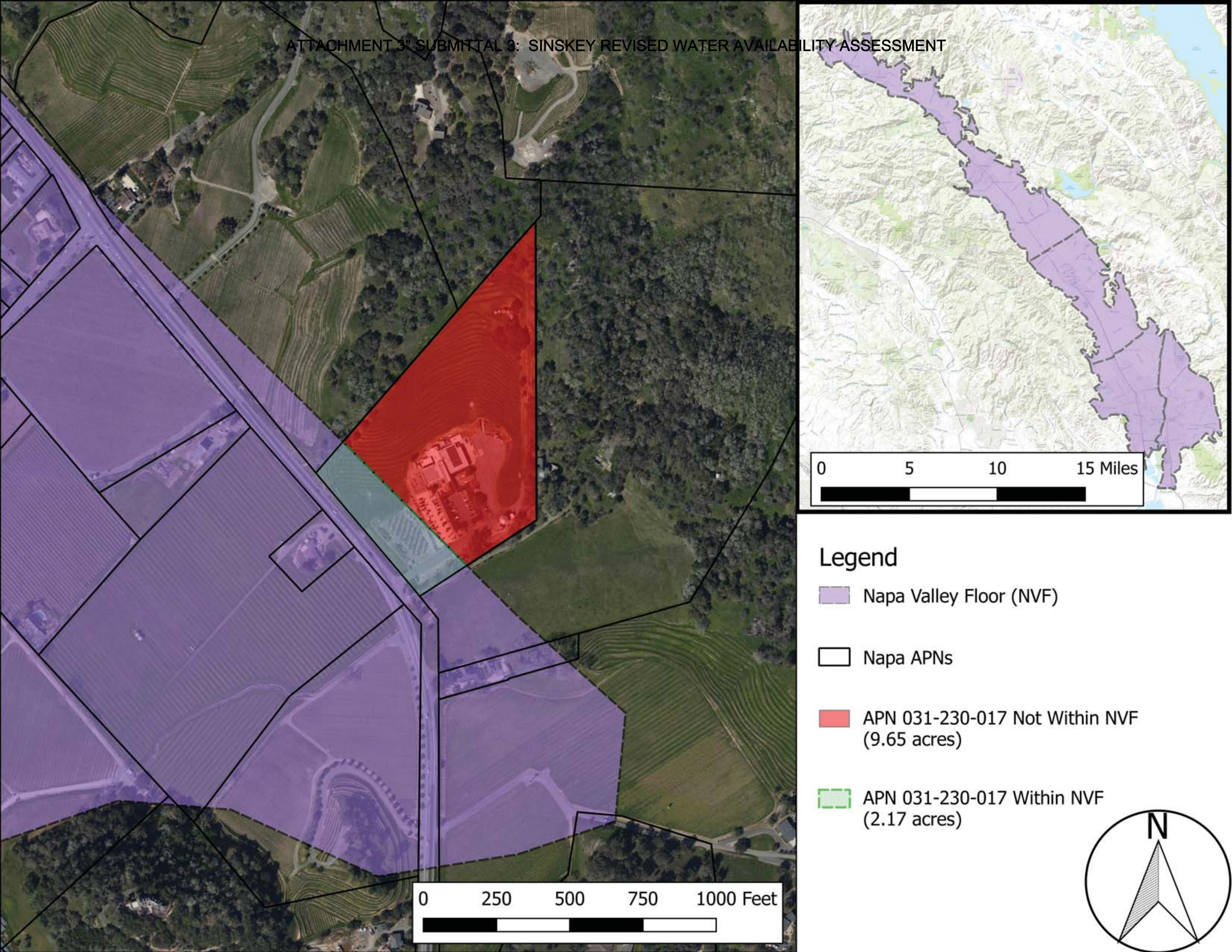
ROBERT SINSKEY VINEYARDS
6320 SILVERADO TRAIL
NAPA, CA 94558
A.P.N. # 031-230-017

EXISTING SITE PLAN

DATE: 08/14/2019
JOB: RSV
SCALE: 1" = 50'-0"
DRAWN: ATA
SHEET: A0.1

ATTACHMENT 3" SUBMITTAL 3: SINSKEY REVISED WATER AVAILABILITY ASSESSMENT


0
5
10
15 Miles
0
250
500
750
1000 Feet
Legend
Napa Valley Floor (NVF)
Napa APNs
APN 031-230-017 Not Within NVF (9.65 acres)
APN 031-230-017 Within NVF (2.17 acres)
N

ENCLOSURE B

NOAA CLIMATE NORMALS

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Summary of Monthly Normals
1981-2010
Generated on 08/13/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 95 ft. Lat: 38.3950° N Lon: -122.3567° W
Station: **YOUNTVILLE, CA US USC00049859**

Temperature (°F)																						
Mean							Cooling Degree Days Base (above)						Heating Degree Days Base (above)				Mean Number of Days					
Month	Daily Max	Daily Min	Mean	Long Term Max Std Dev	Long Term Min Std Dev	Long Term Avg Std Dev	55	57	60	65	70	72	55	57	60	65	Max >= 100	Max >= 90	Max >= 50	Max <= 32	Min <= 32	Min <= 0
01	58.1	36.6	47.4				3	2	1	-7777	0	0	240	301	393	547	0.0	0.0	28.4	0.0	6.9	0.0
02	62.8	38.8	50.8				8	2	-7777	-7777	0	0	125	175	258	398	0.0	0.0	27.7	0.0	2.8	0.0
03	66.7	41.6	54.2				59	38	18	3	0	0	86	126	199	339	0.0	0.0	30.8	0.0	0.9	0.0
04	71.5	42.6	57.1				92	59	26	8	2	-7777	31	58	115	246	0.0	0.5	29.8	0.0	0.0	0.0
05	78.9	47.4	63.2				255	198	121	38	6	3	3	7	23	96	0.0	2.7	30.8	0.0	0.0	0.0
06	84.4	50.8	67.6				378	318	229	99	28	16	0	-7777	1	21	0.7	7.1	30.0	0.0	0.0	0.0
07	85.9	52.7	69.3				443	381	288	139	35	16	0	0	-7777	6	0.9	6.8	31.0	0.0	0.0	0.0
08	86.5	52.4	69.5				448	386	293	143	38	18	0	0	-7777	5	0.5	8.8	31.0	0.0	0.0	0.0
09	84.8	50.5	67.7				379	319	232	107	38	21	0	-7777	2	28	1.5	7.4	30.0	0.0	0.0	0.0
10	78.5	45.8	62.2				227	172	101	28	5	3	6	13	35	117	0.0	1.8	31.0	0.0	0.0	0.0
11	66.5	40.7	53.6				43	23	7	1	-7777	-7777	85	125	199	343	0.0	0.0	29.7	0.0	1.8	0.0
12	58.6	36.4	47.5				2	1	-7777	-7777	0	0	234	295	387	542	0.0	0.0	30.3	0.0	9.4	0.0
Summary	73.6	44.7	59.2	0.0	0.0	0.0	2337	1899	1316	566	152	77	810	1100	1612	2688	3.6	35.1	360.5	0.0	21.8	0.0

-7777: a non-zero value that would round to zero

Empty or blank cells indicate data is missing or insufficient occurrences to compute value

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Summary of Monthly Normals 1981-2010

ATTACHMENT 3" SUBMITTAL 3: SINSKEY REVISED WATER AVAILABILITY ASSESSMENT

Generated on 08/13/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 95 ft. Lat: 38.3950° N Lon: -122.3567° W

Station: **YOUNTVILLE, CA US USC00049859**

Precipitation (in.)								
	Totals	**Mean Number of Days**				**Precipitation Probabilities Probability that precipitation will be equal to or less than the indicated amount**		
	Means	**Daily Precipitation**				**Monthly Precipitation vs. Probability Levels**		
Month	**Mean**	**>= 0.01**	**>= 0.10**	**>= 0.50**	**>= 1.00**	**0.25**	**0.50**	**0.75**
01	6.26							
02	6.84							
03	4.76							
04	1.86							
05	1.23							
06	0.16							
07	0.00							
08	0.06							
09	0.33							
10	1.48							
11	4.03							
12	6.78							
Summary	33.79	0.0	0.0	0.0	0.0	0.00	0.00	0.00

-7777: a non-zero value that would round to zero

Empty or blank cells indicate data is missing or insufficient occurrences to compute value

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Summary of Monthly Normals
1981-2010

Generated on 08/13/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 95 ft. Lat: 38.3950° N Lon: -122.3567° W
Station: **YOUNTVILLE, CA US USC00049859**

Growing Degree Units (Monthly)												
Base	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	229	302	439	511	718	828	909	913	829	687	408	234
45	93	167	286	362	563	678	753	758	679	532	260	99
50	21	57	151	215	408	528	598	603	529	377	130	22
55	3	8	59	92	255	378	443	448	379	227	43	2
60	1	-7777	18	26	121	229	288	293	232	101	7	-7777
Growing Degree Units for Corn (Monthly)												
50/86	129	180	261	322	447	509	569	566	509	438	249	135

Growing Degree Units (Accumulated Monthly)												
Base	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	229	531	970	1481	2199	3027	3936	4849	5678	6365	6773	7007
45	93	260	546	908	1471	2149	2902	3660	4339	4871	5131	5230
50	21	78	229	444	852	1380	1978	2581	3110	3487	3617	3639
55	3	11	70	162	417	795	1238	1686	2065	2292	2335	2337
60	1	1	19	45	166	395	683	976	1208	1309	1316	1316
Growing Degree Units for Corn (Monthly Accumulated)												
50/86	129	309	570	892	1339	1848	2417	2983	3492	3930	4179	4314

Note: For corn, temperatures below 50 are set to 50, and temperatures above 86 are set to 86.

-7777: a non-zero value that would round to zero.

Empty or blank cells indicate data is missing or insufficient occurrences to compute value.

ENCLOSURE C

TIER II WELL DRAWDOWN CALCULATION TABLES

SUMMIT ENGINEERING, INC.	ROBERT SINSKEY VINEYARDS Water Availability Tier II: Well Drawdown Analysis WELL 1	PROJECT NO. 2019156 BY: JM CHK: GG

Site Specific Parameters

Well Flow: 12 gpm

Radius of Influence: 59 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: 10 ft/day

High Hydraulic Conductivity: 30 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	10	3.60E-04	3.00E-04	4.00E-04	7.535	7.247	7.36	0.0094	1.80
Low S, Low h	**1.50E-05**	**10**	**1.74E-05**	**1.00E-05**	**2.00E-05**	**10.94**	**10.24**	**10.42**	**0.0133**	**2.55**
High S, High h	3.10E-04	30	1.20E-04	1.00E-04	2.00E-04	8.633	7.94	8.50	0.0036	0.69
Low S, High h	1.50E-05	30	5.80E-06	5.00E-06	6.00E-06	11.63	11.45	11.49	0.0049	0.94

Notes:

1) Adjust parameters highlighted 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

SUMMIT ENGINEERING, INC.	ROBERT SINSKEY VINEYARDS Water Availability Tier II: Well Drawdown Analysis WELL 2	PROJECT NO. 2019156 BY: JM CHK: GG

Site Specific Parameters

Well Flow:		Low End Specific Storage:	
40	gpm	1.50E-05	1/ft
Radius of Influence:		High End Specific Storage:	
87	ft	3.10E-04	1/ft
Aquifer Thickness		Low Hydraulic Conductivity:	
75	ft	10	ft/day
Pumping Time:		High Hydraulic Conductivity:	
1	day	30	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	10	7.82E-04	7.00E-04	8.00E-04	6.688	6.555	6.58	0.0279	5.37
Low S, Low h	**1.50E-05**	**10**	**3.78E-05**	**3.00E-05**	**4.00E-05**	**9.837**	**9.55**	**9.61**	**0.0408**	**7.85**
High S, High h	3.10E-04	30	2.61E-04	2.00E-04	3.00E-04	7.94	7.535	7.69	0.0109	2.10
Low S, High h	1.50E-05	30	1.26E-05	1.00E-05	2.00E-05	10.94	10.24	10.76	0.0152	2.93

Notes:
1) Adjust parameters highlighted 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

ATTACHMENT 3" SUBMITTAL 3: SINSKEY REVISED WATER AVAILABILITY ASSESSMENT

SUMMIT ENGINEERING, INC.	**ROBERT SINSKEY VINEYARDS** **Water Availability** **Tier II: Well Drawdown Analysis** **WELL 3**	**PROJECT NO.** **2019156** **BY:** **JM** **CHK:** **GG**

Site Specific Parameters

Well Flow:	Low End Specific Storage:
30 gpm	1.50E-05 1/ft
Radius of Influence:	High End Specific Storage:
154 ft	3.10E-04 1/ft
Aquifer Thickness	Low Hydraulic Conductivity:
75 ft	10 ft/day
Pumping Time:	High Hydraulic Conductivity:
1 day	30 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	10	2.45E-03	2.00E-03	3.00E-03	5.639	5.235	5.46	0.0174	3.34
Low S, Low h	**1.50E-05**	**10**	**1.19E-04**	**1.00E-04**	**2.00E-04**	**8.633**	**7.94**	**8.50**	**0.0271**	**5.21**
High S, High h	3.10E-04	30	8.17E-04	8.00E-04	9.00E-04	6.555	6.437	6.54	0.0069	1.33
Low S, High h	1.50E-05	30	3.95E-05	3.00E-05	4.00E-05	9.837	9.55	9.56	0.0101	1.95

Notes:
1) Adjust parameters highlighted 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

ATTACHMENT 3" SUBMITTAL 3: SINSKEY REVISED WATER AVAILABILITY ASSESSMENT

SUMMIT ENGINEERING, INC.	ROBERT SINSKEY VINEYARDS Water Availability Tier II: Well Drawdown Analysis WELL 2 AND WELL 3 COMBINATION	PROJECT NO. 2019156 BY: JM CHK: GG

Site Specific Parameters Well 2

Well Flow:	Low End Specific Storage:
30 gpm	1.50E-05 1/ft
Radius of Influence:	High End Specific Storage:
87 ft	3.10E-04 1/ft
Aquifer Thickness	Low Hydraulic Conductivity:
75 ft	10 ft/day
Pumping Time:	High Hydraulic Conductivity:
0.333333333 day	30 ft/day

Theis Drawdown Well 2

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	10	2.35E-03	2.00E-03	3.00E-03	5.639	5.235	5.50	0.0175	3.37
Low S, Low h	**1.50E-05**	**10**	**1.14E-04**	**1.00E-04**	**2.00E-04**	**8.633**	**7.94**	**8.54**	**0.0272**	**5.23**
High S, High h	3.10E-04	30	7.82E-04	7.00E-04	8.00E-04	6.688	6.555	6.58	0.0070	1.34
Low S, High h	1.50E-05	30	3.78E-05	3.00E-05	4.00E-05	9.837	9.55	9.61	0.0102	1.96

Site Specific Parameters Well 3

Well Flow:	Low End Specific Storage:
30 gpm	1.50E-05 1/ft
Radius of Influence:	High End Specific Storage:
154 ft	3.10E-04 1/ft
Aquifer Thickness	Low Hydraulic Conductivity:
75 ft	10 ft/day
Pumping Time:	High Hydraulic Conductivity:
0.333333333 day	30 ft/day

Theis Drawdown Well 3

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	10	7.35E-03	7.00E-03	8.00E-03	4.392	4.259	4.35	0.0138	2.66
High S, Low h	**1.50E-05**	**10**	**3.56E-04**	**3.00E-04**	**4.00E-04**	**7.535**	**7.247**	**7.37**	**0.0235**	**4.52**
High S, Low h	3.10E-04	30	2.45E-03	2.00E-03	3.00E-03	5.639	5.235	5.46	0.0058	1.11
High S, Low h	1.50E-05	30	1.19E-04	1.00E-04	2.00E-04	8.633	7.94	8.50	0.0090	1.74

Principle of Superposition, Total Well Drawdown: 9.75

Notes:
1) Adjust parameters highlighted 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

ATTACHMENT 3" SUBMITTAL 3: SINSKEY REVISED WATER AVAILABILITY ASSESSMENT

SUMMIT ENGINEERING, INC.	ROBERT SINSKEY VINEYARDS Water Availability Tier II: Well Drawdown Analysis MAX WELL 2 AND WELL 3 COMBINATION	PROJECT NO. 2019156 BY: JM CHK: GG

Site Specific Parameters Well 2

Well Flow:	Low End Specific Storage:
40 gpm	1.50E-05 1/ft
Radius of Influence:	High End Specific Storage:
87 ft	3.10E-04 1/ft
Aquifer Thickness	Low Hydraulic Conductivity:
75 ft	10 ft/day
Pumping Time:	High Hydraulic Conductivity:
0.333333333 day	30 ft/day

Theis Drawdown Well 2

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	10	2.35E-03	2.00E-03	3.00E-03	5.639	5.235	5.50	0.0233	4.49
Low S, Low h	**1.50E-05**	**10**	**1.14E-04**	**1.00E-04**	**2.00E-04**	**8.633**	**7.94**	**8.54**	**0.0362**	**6.98**
High S, High h	3.10E-04	30	7.82E-04	7.00E-04	8.00E-04	6.688	6.555	6.58	0.0093	1.79
Low S, High h	1.50E-05	30	3.78E-05	3.00E-05	4.00E-05	9.837	9.55	9.61	0.0136	2.62

Site Specific Parameters Well 3

Well Flow:	Low End Specific Storage:
30 gpm	1.50E-05 1/ft
Radius of Influence:	High End Specific Storage:
154 ft	3.10E-04 1/ft
Aquifer Thickness	Low Hydraulic Conductivity:
75 ft	10 ft/day
Pumping Time:	High Hydraulic Conductivity:
0.333333333 day	30 ft/day

Theis Drawdown Well 3

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	10	7.35E-03	7.00E-03	8.00E-03	4.392	4.259	4.35	0.0138	2.66
High S, Low h	**1.50E-05**	**10**	**3.56E-04**	**3.00E-04**	**4.00E-04**	**7.535**	**7.247**	**7.37**	**0.0235**	**4.52**
High S, Low h	3.10E-04	30	2.45E-03	2.00E-03	3.00E-03	5.639	5.235	5.46	0.0058	1.11
High S, Low h	1.50E-05	30	1.19E-04	1.00E-04	2.00E-04	8.633	7.94	8.50	0.0090	1.74

Principle of Superposition, Total Well Drawdown: 11.50

Notes:
1) Adjust parameters highlighted 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

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