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Water Availability Analysis and Water System Feasibility Report

Davis Estates, P14-00411
Planning Commission Hearing Date - October 3, 2018

WATER AVAILABILITY ANALYSIS

Davis Estates Winery

4060 Silverado Trail,
Calistoga, California 94515
APN 021-020-003

SUMMIT
CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER

Project No. 2017043
May 5, 2017
Revised: August 21, 2018

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LIST OF ENCLOSURES

DAVIS ESTATES WINERY
Napa, California
WATER AVAILABILITY ANALYSIS

PROJECT SUMMARY

Davis Estates located on Silverado Trail (APN 021-010-003) in Calistoga, Napa County California is proposing to increase the existing production capacity of 30,000 gallons of wine per year to 100,000 gallons of wine per year and increase employees and visitation. 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 Davis Estates Winery associated with the proposed increase in production capacity to 100,000 gallons of wine per year, including production, domestic wastewater from employees and visitors, vineyard and landscape irrigation, is estimated to be 10.39 acre-feet/year, which represents an increase of 2.17 acre-feet/year from the current water usage. Based on the Tier I analysis, the annual recharge estimated for the parcel is 280.4 acre-feet/year for a normal year or 162.6 acre-feet/year for a drought year. This water availability analysis establishes that the estimated water demand for the facility represents 8% of the total water availability for the parcel for a drought year, and 3% of the total water availability during an average year.

Davis Estates Winery utilizes treated process wastewater for reuse for vineyard irrigation, which has the potential to offset the water demand for vineyard irrigation and reduce the total parcel water demand.

SITE DESCRIPTION

The existing facility is located in a 114.32 acre parcel on the valley floor with vineyards and scattered residences or wineries to the north, south, and west. The eastern side of the property is forested. The topography of the site slopes to the west. Surface drainage flows overland to the southwest.

The existing winery facility consists of a winery building, three barns, a 4-bedroom primary residence and a 1-bedroom secondary residence, 10.72 acres of vineyards, 0.5 acres of landscape, has a winery process wastewater high rate treatment system, a sanitary sewage pre-treatment and disposal dripfield, and multiple tanks for domestic and process water supply as well as for irrigation and fire protection.

Water sources for the property consist of seven groundwater wells; Well 001 (#2) is used for domestic water, Well #3 is not operational, and Well #5 is operated by a windmill. The other wells (#1, 4, 6 and 7) are used for irrigation water supply.

The existing property lines, wells, water storage tanks, buildings, vineyards, roads, SS and PW treatment and disposal systems are located on the Overall Site Plan, located in Enclosure A.

WATER DEMAND

EXISTING WATER DEMAND

Current water use at the facility is based on the following needs:

- Process needs for production capacity of 30,000 gallons of wine per year
- Full Time Employees = 5 per day
- Tasting Visitors = 20 max per weekdays and 34 max per weekend day (cheese plate or similar included for 80% of guests, per facility feedback)
- Food & Wine Pairing Event Visitors = 50 max per event, 2 events per month
- Food & Wine Pairing Event Visitors = 100 max per event, 2 events per month
- Primary Residence = 4 bedrooms
- Secondary Residence = 1 bedroom
- The site previously contained a second 1 bedroom cottage, but that has been converted into a gardening shed without any plumbing
- Irrigation of 10.72 acres of vineyard
- Irrigation of 0.5 acres of landscape

PROPOSED WATER DEMAND

Water use at the facility will be based on the following needs:

- Process needs for production capacity of 100,000 gallons of wine per year
- Full Time Employees = 25 per day
- Tasting Visitors = Seasonal Distribution:
    - June 1 through September 30): 200 max per day
    - October 1 through November 30: 100 max per day
    - December 1 through January 31: 75 max per day
    - February 1 through May 31: 100 max per day
    - Cheese plate or similar provided for approximately 80% of guests, per existing facility experience
- Food & Wine Pairing Event Visitors = 100 max per event, 2 events per month
- Food & Wine Pairing Event Visitors = 200 max per event, 15 events per year
- Primary Residence = 4 bedrooms
- Secondary Residence = 1 bedroom
- Irrigation of 10.72 acres of vineyard
- Irrigation of 0.5 acres of 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	=	30,000 gal wine/year
PW generation rate	=	6 gal PW/gal wine[a]
Annual PW Flow	=	30,000 gal wine x 6 gal PW/gal wine
	=	180,000 gal PW/year
Average PW Flow	=	(180,000 gal PW/year) / (365 days)
	=	493 gal PW/day
Peak Month, Average Day PW Flow	=	(180,000 gal PW/year x 16.4[b] %)/(30 day)
	=	984 gal PW/day
Annual Production Water Demand	=	(180,000 gal water/yr) / (325,851 gal/ac-ft)
	=	0.55 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.

Based on typical flow data from wineries of similar size and characteristics, the projected process wastewater generation for wine production is calculated as follows:

Proposed Annual production	=	100,000 gal wine/year
PW generation rate	=	6 gal PW/gal wine[a]
Annual PW Flow	=	100,000 gal wine x 6 gal PW/gal wine
	=	600,000 gal PW/year
Average PW Flow	=	(600,000 gal PW/year) / (365 days)
	=	1,644 gal PW/day
Peak Month, Average Day PW Flow	=	(600,000 gal PW/year x 16.4[b] %)/(30 day)
	=	3,280 gal PW/day
Annual Production Water Demand	=	(600,000 gal water/yr) / (325,851 gal/ac-ft)
	=	1.84 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 180,000 gallons of water per year, or 0.55 ac-ft per year. The expected annual water use associated with the proposed production capacity is 600,000 gallons per year, or 1.84 ac-ft per year. Winery process water demand will continue to be provided by the existing domestic well 001 (#2). 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 supplied by the existing domestic well 001 (#2). The Sanitary Sewage generation rate is expected to be equivalent to the water demand for domestic uses. 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 1. Existing Domestic Water Use at Davis Estates Winery

Use Type	Maximum Quantity (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Number of Days (days/year)	Annual Water Use (gal/year)
Employee (full-time)	5	15	75	365	27,375
Tasting Visitors (weekday)	20	3	60	260	15,600
Tasting Visitors (weekend)	34	3	102	105	10,710
Tasting Cheese Plate (weekday)[a]	16	0.75	12	260	3,120
Tasting Cheese Plate (weekend)[a]	28	0.75	21	105	2,205
Food & Wine Pairing Event	50	15	750	24	18,000
Food & Wine Pairing Event	100	15	1,500	24	36,000
Sub Total Winery					**113,010**
Use Type	Maximum Quantity (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Number of Days (days/year)	Annual Water Use (gal/year)
4 Bedroom Primary Residence	4	120	480	365	175,200
1 Bedroom Secondary Residence	1	150	150	365	54,750
Sub Total Residences					**229,950**
				Total Water Use	**343,000**
				Total Water Use (ac-ft/yr)	**1.05**

a) Tasting cheese plate or similar small bite food pairing provided for approximately 80% of tasting visitors

Table 2. Proposed Domestic Water Use at Davis Estates Winery

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	25	15	375	365	136,875
Tasting Visitors (Jun 1 - Oct 31)	200	3	600	153	91,800
Tasting Visitors (Nov 1 - Nov 30)	100	3	300	30	9,000
Tasting Visitors (Dec 1 - Jan 31)	75	3	225	62	13,950
Tasting Visitors (Feb 1 - May 31)	100	3	300	120	36,000
Tasting Cheese Plate (Jun 1 - Oct 31)[a]	160	0.75	120	153	18,360
Tasting Cheese Plate (Nov 1 - Nov 30)[a]	80	0.75	60	30	1,800
Tasting Cheese Plate (Dec 1 - Jan 31)[a]	60	0.75	45	62	2,790
Tasting Cheese Plate (Feb 1 - May 31)[a]	80	0.75	60	120	7,200
Event	100	15	1,500	24	36,000
Event	200	15	3,000	15	45,000
Sub Total Winery					**398,775**
Use Type	Maximum Quantity (persons/day)	Water Demand (gal/person)	Daily Demand (gal/day)	Number of Days (days/year)	Annual Water Use (gal/year)
4 Bedroom Primary Residence	4	120	480	365	175,200
1 Bedroom Secondary Residence	1	150	150	365	54,750
Sub Total Residences					**229,950**
				Total Water Use	**628,725**
				Total Water Use (ac-ft/yr)	**1.93**

a) Tasting cheese plate or similar small bite food pairing provided for approximately 80% of tasting visitors

The estimated existing permitted annual domestic water use is 343,000 gallons per year, or 1.05 acre-feet per year. The expected annual domestic water use for the proposed marketing and visitation plan is 628,725 gallons per year, or 1.93 acre-feet per year. Refer to Enclosure B for wastewater generation and water demand estimates.

IRRIGATION WATER DEMAND

- Vineyard Irrigation

  Water from the agricultural well is used to irrigate 10.72 acres of vineyards. The total acreage of vineyard will remain the same. 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.

  10.72 acres x 0.5 ac-ft/acre/year = 5.36 ac-ft/yr = 1,746,561 gal/yr

  Vineyard irrigation demand is estimated to be 5.36 ac-ft per year of water demand.

- Landscape Irrigation

  The facility has approximately one acre (48,173 SF) of landscaped area with low to moderate water demand for irrigation of bushes, shrubs, trees and some smaller planter beds. The site landscape architect provided calculations that include the estimated water demand for irrigation based on Model Water Efficient Landscape Ordinance (MWELO) guidelines, and determined that the annual water use is 409,240 gallons or 1.26 acre-feet per year. The full calculations from the landscape architect are included in Enclosure B. This estimate represents the current and anticipated future conditions, as no changes to landscaping are proposed.

TOTAL WATER DEMAND

The total water demand at the facility associated with the proposed production increase is expected to be 10.39 ac-ft per year, which is equivalent to 3.8 million gallons per year.

Table 3. Total Projected Annual Water Demand

Water Use	Gallons per day	Gallons per year	Acre-Feet per year
Wine Production	1,650[a]	600,000	1.84
Domestic Use	1,723[b]	628,725	1.93
Vineyard Irrigation[c]	7,130	1,746,562	5.36
Landscape Irrigation[c]	1,671	409,240	1.26
Total	12,174	3,384,527	10.39

[a] Based on 100,000 gallons of wine per year, process wastewater generation rate of 6 gallons of PW per gallon of wine, and 365 days per year
[b] Estimated daily average based on the annual use
[c] Estimated assuming 245 days of irrigation (March through October).

Based on the proposed increase in production, employees, and visitation there is an overall increase in projected water demand of about 2.17 ac-ft/year (see Table 4).

Table 4. Projected Water Demand Comparison

Water Use	Existing (ac-ft)	Proposed (ac-ft)	Difference (ac-ft)
Wine Production	0.55	1.84	1.29
Domestic Use	1.05	1.93	0.88
Vineyard Irrigation	5.36	5.36	0.0
Landscape Irrigation	1.26	1.26	0.0
Total	8.22	10.39	2.17

TIER I ANALYSIS: WATER USE CRITERIA

A Tier I analysis is required for all parcels located within the "All Other Areas" in the Water Availability Analysis guidelines from May 2015. Since a portion of Davis Estates Winery is not located within the Napa Valley floor or MST areas, a Tier I analysis is required. This analysis is intended to estimate the annual recharge during average and dry years.

ESTIMATED RECHARGE

- Method

  This analysis will include the estimated annual amount of infiltration from rainwater on the Davis Estates Winery site. To determine the amount of infiltration onsite, the infiltration rates of the soils were established by the USDA Web Soil Survey (See Enclosure D). These infiltration rates account for soils that are on a steep slope. The mid-point of the infiltration rate range provided by the USDA for each soil type was assumed for analysis. Impervious areas (including buildings) and wastewater ponds were assumed to have an infiltration rate of 0.0 in/hr.

  The rainfall during average and dry years was determined from NOAA data (Enclosure E) for the number of days each year that have precipitation totals of more than 0.1"/day, 0.5"/day, and 1.0"/day. If the daily infiltration (in/day) for the soil is greater than 1" per day, all rain that falls on it is assumed to be infiltrated. If the soil's infiltration rate is between 0.5"/day and 0.99"/day, then it was assumed that it will infiltrate its maximum rate during a 1" storm. During a storm of 0.5"/day to 0.99"/day, the soil was assumed to only infiltrate 0.5" of the storm to be conservative. During a rain event of 0.1" to 0.49", this soil type would infiltrate all of the rain. The example calculation below is for the annual infiltration of “Boomer Gravelly Loam” (0.72 in/day infiltration rate) during an average rain year.

  $$\text{Infiltration During} > 1\text{" Event} = 0.72\ \text{in/day} \cdot 13.4\ \text{days/year} = 9.65\ \text{inches of infiltration}$$

  $$\text{Infiltration During } 0.5 \text{ to } 0.99\text{" Event} = 0.5\ \text{in/day} \cdot 12.5\ \text{days/year} = 6.25\ \text{inches of infiltration}$$

  $$\text{Infiltration During } 0.1\text{" to } 0.49\text{" Event} = 5.0\ \text{inches of infiltration}$$

  $$\text{Total Yearly Infiltration} = (9.65\ \text{in} + 6.25\ \text{in} + 5.0\ \text{in}) \cdot 1\text{ft}/12\text{ft} \cdot 42.77\ \text{acres} = 74.6\ \text{ac} - \text{ft/year}$$

  The full amount of yearly infiltration for each soil type can be found in Enclosure F Tier 1 analysis, infiltration calculation tables.

- Results

  Based on this analysis, it was estimated that the site will infiltrate approximately 280.4 ac-ft/year during an average year and 162.6 ac-ft/year during a 10-year drought (See Enclosure F). These numbers do not account for the amount of water the vegetation will uptake (evapotranspiration). The

amount of water use each year was conservatively estimated to be 10.39 ac-ft/year. Assuming that the vegetation uptake is 90% (a very conservative assumption) of the infiltrated water during a drought year, the site should still recharge more water (16.26 ac-ft/year) to the aquifer than the site water demand. This shows that the water use onsite should be less than what will be recharged to the aquifer from rain.

WATER AVAILABILITY

The total estimated water demand of 10.39 acre-feet/year represents 8% of the water availability estimated for the facility during a 10 year drought period (125.9 acre-feet/year), and 3% of the water availability estimated for the facility during an average year (320.4 acre-feet/year).

TIER II ANALYSIS: WELL INTERFERENCE

A Tier II analysis is required for all parcels located within the "All Other Areas" in the Water Availability Analysis guidelines from May 2015. 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 wells (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 well or well that is drilled in the future within a 500 feet range from the property wells.

There are 7 wells on the parcel, as indicated on the attached Site Plan (Enclosure A). The existing domestic well 001 (#2) was drilled in 2007, has a depth of 440 feet with a 56 foot seal, a yield of 12.7 gpm for an 8 hour test, and is not within 500 feet of the property line. Well #3 is not in use, and well #5 is used to operate an existing windmill. Wells # 1 and 2 are separated by more than 500 ft. from a property line, and therefore are not included in this analysis. The other wells that are within 500 ft. of the property line and are used for irrigation operate at the following flowrates: 40 gpm (Well #4), 50 gpm (Well #6), 90 gpm (Well #7).

- 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 range of 10 to 140 ft/day (Water Availability Analysis table F4)
  - 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:

$$u = \frac{(220 \text{ ft})^2 \times (1.50 \text{ X } 10^{-5})}{4 \times 10 \frac{\text{ft}}{\text{day}} \times 75 \text{ ft} \times 1\text{day}} = 2.42 \times 10^{-4}$$

With this value of u, W(u) = 7.77

$$\text{Drawdown} = \frac{50 \frac{\text{gal}}{\text{min}} \times \ 0.1337 \frac{\text{cuft}}{\text{gal}} \times 1{,}440 \frac{\text{min}}{\text{day}}}{4\pi \ \times 10 \frac{\text{ft}}{\text{day}} \times 75 \text{ ft}} \times 7.77 = 7.94 \text{ ft}$$

The table below shows a summary of the worst case scenario of drawdown results for the onsite wells that are within 500 ft. of the property line. More detailed tables can be found in Enclosure G Tier II, well drawdown calculation tables.

Table 4. Well Drawdown Calculations

	Well Flow Rate (gpm)	Distance to Property Line (ft)	Estimated Drawdown (ft)
Well #4	40	250	6.13
Well #6	50	220	7.94
Well # 7	90	380	12.24

- 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, only one of the wells, Well #7, should produce a drawdown greater than 10 feet on any existing or future wells that could be adjacent to the property. If a significant impact is encountered at an offsite well due to interference from Well #7, the pumping rate could be reduced to approximately 70 gpm to reduce the anticipated drawdown to 10 feet. 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.

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.

WATER CONSERVATION

The facility utilizes treated winery process wastewater for vineyard irrigation to offset the irrigation demand from the existing wells. This reuse measure has the potential to offset 34% of the vineyard irrigation demand for the parcel with the proposed production increase, by using recycled water for vineyard irrigation (1.84 acre-feet/year of PW effluent used as part of the total 5.36 acre-feet/year for vineyard irrigation).

CONCLUSION

Total annual water demand at Davis Winery Estates, associated with the proposed increase in production capacity to 100,000 gallons of wine per year, is estimated to be 10.39 acre-feet/year, representing an increase in 2.17 acre-feet /year from the current water uses. Based on the Tier I analysis, the annual recharge estimated for the parcel is 320.4 acre-feet/year for a normal year or 125.9 acre-feet/year for a drought year. This water availability analysis establishes that the estimated water demand for the facility represents 8% of the total water availability for the parcel for a drought year, and 3% of the total water availability for the parcel for an average year.

ENCLOSURE A

OVERALL SITE PLAN

(E) 5,000 GALLON PW EFFLUENT STORAGE TANKS, TYP OF 2

(E) 100,000 GAL VINEYARD IRRIGATION TANK

(E) WELL #7

(E) 2,500 GAL IRRIGATION TANK

ROAD PARTIALLY UNPAVED

APN 021-010-003

(E) WELL #6

(E) WELL #1

(E) WELL #3

100' SETBACK, TYP

(E) WINERY

(E) WELL 001 (#2)

(E) 100,000 GAL FP STORAGE TANK

(E) 3,000 GAL DOMESTIC WATER STORAGE TANK, TYP OF 4

(E) 5,000 GAL PROCESS WATER STORAGE TANK, TYP OF 4

(E) WELL #4

APPROXIMATE PROPERTY LINE, TYP

(E) MAIN RESIDENCE

(E) WELL #5

(E) 100,000 GAL VINEYARD IRRIGATION STORAGE TANK, TYP OF 2

(E) 5,000 GALLON PW EFFLUENT STORAGE TANK

SILVERADO TRAIL

(E) PROCESS WASTEWATER PRETREATMENT AND (E) SANITARY SEWAGE PRETREATMENT AND DISPOSAL AREA

0 100 200

GRAPHIC SCALE IN FEET

SUMMIT

Summit Engineering, Inc
463 Aviation Blvd. Suite 200 • Santa Rosa, CA 95403
707-527-0775 • www.summit-sr.com

DAVIS ESTATES
4060 SILVERADO TRAIL
CALISTOGA, CA 94515
APN 021-010-003

DAVIS ESTATES USE PERMIT

OVERALL SITE PLAN

	2017-04-25 UP MOD RESUBMITTAL

DATE:	2017-04-25
JOB NO:	2017043
SCALE:	AS SHOWN
DRAWN:	JA
CHECKED:	GG

SHEET **W1**

ENCLOSURE B

WASTEWATER GENERATION AND WATER DEMAND

LANDSCAPE MWELO CALCULATIONS

SUMMIT ENGINEERING, INC.	DAVIS ESTATES Wastewater Feasibility Study Existing Process Wastewater Flows	PROJECT NO. BY: CHK:	2017043 SW GG

PROCESS WASTEWATER

Annual Volume

Annual Production (projected)							=	12,500	cases wine/ye
Generation Rate (assumed)[a]							=	2.4	gal wine/case
Annual Production	12,500	cases wine/year	x	2.4	gal wine/case of wine		=	30,000	gal wine/year
Generation Rate (assumed)[b]							=	165	gal wine/ton g
Tons Crushed	30,000	gal wine/year	÷	165	gal wine/ton grapes		=	182	tons grapes/y
Process Wastewater (PW) Generation Rate[c]	(assumed)						=	6.00	gal PW/gal wi
Annual PW Flow	30,000	gal wine/year	x	6.00	gal PW/gal wine		=	***180,000***	***gal PW/year***

Average Day Flow

	180,000	gal PW/year	÷	365	days		=	*493*	*gal PW/day*
							=	***500***	***gal PW/day***

Average, Day Peak Harvest Month Flow

Assume:	1	16.4%	of the PW flows are accounted for during September						
	2	30	days in September						
Peak Flow	180,000	gal PW/year	x	16.4%			=	*984*	*gal PW/day*
			30	days					
							=	***990***	***gal PW/day***

a. 2.4 gallons of wine per case of wine
b. 165 Gal wine per ton of grapes is used as a wine industry standard
c. 6.0 gal of PW per gallon wine produced over the course of 1 year is based on the average of data from approximately 16 wineries

SUMMIT ENGINEERING, INC.	DAVIS ESTATES WINERY Wastewater Feasibility Study Proposed Process Wastewater Flows	PROJECT NO. BY: CHK:	2017043 SW GG

PROCESS WASTEWATER

Annual Volume

Annual Production (projected)							=	41,667	cases wine/ye
Generation Rate (assumed)[a]							=	2.4	gal wine/case
Annual Production	41,667	cases wine/year	x	2.4	gal wine/case of wine		=	100,000	gal wine/year
Generation Rate (assumed)[b]							=	165	gal wine/ton g
Tons Crushed	100,000	gal wine/year	÷	165	gal wine/ton grapes		=	606	tons grapes/y
Process Wastewater (PW) Generation Rate[c]	(assumed)						=	6.00	gal PW/gal wi
Annual PW Flow	100,000	gal wine/year	x	6.00	gal PW/gal wine		=	***600,000***	***gal PW/year***

Average Day Flow

	600,000	gal PW/year	÷	365	days		=	*1,644*	*gal PW/day*
							=	***1,650***	***gal PW/day***

Average, Day Peak Harvest Month Flow

Assume:	1	16.4%	of the PW flows are accounted for during September						
	2	30	days in September						
Peak Flow	600,000	gal PW/year	x	16.4%			=	*3,280*	*gal PW/day*
				30	days				
							=	***3,280***	***gal PW/day***

a. 2.4 gallons of wine per case of wine
b. 165 Gal wine per ton of grapes is used as a wine industry standard
c. 6.0 gal of PW per gallon wine produced over the course of 1 year is based on the average of data from approximately 16 wineries
d. Peak week tonnage was based on input from winery (for existing production)

SUMMIT ENGINEERING, INC.	DAVIS ESTATES Wastewater Feasibility Study Existing Sanitary Sewage Flows	PROJECT NO. 2017043 BY: SW CHK: GG

SANITARY SEWAGE

Average Weekday Day w/o Event						Notes
Employee (full-time)	5	x 15 gpcd	=	75	gal/day	
Tasting Visitors (weekday)	20	x 3 gpcd	=	60	gal/day	
Tasting Visitors (weekend)	0	x 3 gpcd	=	0	gal/day	Weekday
Tasting Cheese Plate (or similar)	16	x 0.75 gpcd	=	12	gal/day	Based on 80% of tasting visitors, per facility
Food & Wine Pairing Event	0	x 15 gpcd	=	0	gal/day	No event included
4 Bedroom Primary Residence	4	x 120 gpcd	=	480	gal/day	
1 Bedroom Secondary Residence	1	x 150 gpcd	=	150	gal/day	
Sub Total Winery			=	777	gal/day	
			=	***780***	***gal/day***	

Weekend Day Peak Event						Notes
Employee (full-time)	5	x 15 gpcd	=	75	gal/day	
Tasting Visitors (weekday)	0	x 3 gpcd	=	0	gal/day	Weekend
Tasting Visitors (weekend)	34	x 3 gpcd	=	102	gal/day	
Tasting Cheese Plate (or similar)	28	x 0.75 gpcd	=	21	gal/day	Based on 80% of tasting visitors, per facility
Food & Wine Pairing Event	50	x 15 gpcd	=	750	gal/day	Peak event, 50 guests
4 Bedroom Primary Residence	4	x 120 gpcd	=	480	gal/day	
1 Bedroom Secondary Residence	1	x 150 gpcd	=	150	gal/day	
Sub Total Winery			=	1,578	gal/day	

DESIGN FLOW	=	**1,578**	**gal/day**

SUMMIT ENGINEERING, INC.	DAVIS ESTATES WINERY Wastewater Feasibility Study Proposed Sanitary Sewage Flows	PROJECT NO. 2017043 BY: SW CHK: GG

Average Day w/o Event						Notes
Employee (full-time)	25	x	15 gpcd	=	375 gal/day	
Tasting Visitors	100	x	3 gpcd	=	300 gal/day	
Tasting Cheese Plate (or similar)	80	x	0.75 gpcd	=	60 gal/day	Based on 80% of tasting visitors, per facility
Event Visitors	0	x	15 gpcd	=	0 gal/day	No event included
4 Bedroom Primary Residence	4	x	120 gpcd	=	480 gal/day	
1 Bedroom Secondary Residence	1	x	150 gpcd	=	150 gal/day	
Sub Total Winery				=	1,365 gal/day	
				=	***1,400 gal/day***	

Peak Tasting Day with Event						Notes
Employee (full-time)	25	x	15 gpcd	=	375 gal/day	
Tasting Visitors	200	x	3 gpcd	=	600 gal/day	200 max per day for any season
Tasting Cheese Plate (or similar)	160	x	0.75 gpcd	=	120 gal/day	Based on 80% of tasting visitors, per facility
Event Visitors	100	x	15 gpcd	=	1,500 gal/day	Peak event, 100 guests
4 Bedroom Primary Residence	4	x	120 gpcd	=	480 gal/day	
1 Bedroom Secondary Residence	1	x	150 gpcd	=	150 gal/day	
Sub Total Winery				=	3,225 gal/day	
					3,300 gal/day	

DESIGN FLOW = **3,300 gal/day**

1) Events with more than 100 guests will utilize portable toilets and offsite catering

Appendix A

Maximum Applied Water Allowance - Calistoga 6/29/15

The following calculations will help you determine your site specific water budget and establish a planting mix that will allow you to meet your water budget. Your Estimated Total Water Use must be less than your Maximum Applied Water Allowance.

Maximum Applied Water Allowance (MAWA)

MAWA = (ETo) (0.62)[(0.7x LA) + (0.4 x SLA)]

Where:
ETo = Annual Net Reference Evapotranspiration (inches)
0.7 = ET Adjustment Factor
LA = Landscaped Area (square feet)
0.62 = Conversion factor (to gallons per square foot)
SLA = Portion of the landscape area identified as Special Landscape Area (square feet)
0.4 = the additional ET adjustment factor for Special Landscape Area (1.0 - 0.6 = 0.4)

A.) Net Evapotranspiration Calculation

44.10 *(Annual ETo)*						
37.50 *(Annual Rainfall)*	x	.25	=	9.38 *(Effective Rainfall)*		
Net ETo Calculation = Annual ETo - Effective Rainfall					=	34.73

B.) Adjusted Landscape Area Calculation

48173 *(Landscaped Area)*	x 0.7 *Adjustment Factor*		=	33721.1
0 *(Special Landscaped Area)*	x 0.4 *Adjustment Factor*		=	0
		Sum of Adjusted Landscape Area	=	33721.1

MAWA = 34.73 x 0.62 x 33721.1 = 725,998 gallons/year

Estimated Total Water Use (ETWU)

A.) Net Evapotranspiration Calculation

Net ET Calculation = Annual ETo - Effective Rainfall					=	34.73

B.) Adjusted Landscape Area Calculation

42489 *(Low water use plant sqft)*	x 0.3		=	12746.7
5684 *(Moderate water use plant sqft)*	x 0.6		=	3410.4
0 *(High water use plant sqft)*	x 1.0		=	0
		Sum of Adjusted Landscape Area	=	16,157

ETWU = 34.73 x 0.62 x 16,157 / 0.85 = 409,240 gallons/year

TRUE

Irrigation Efficiency Factor

Percent of total landscape Irrigated with Drip	
0-25%	0.71
26-50%	0.75
51-75%	0.80
76-100%	0.85

"I have complied with the criteria of the Model Water Efficient Landscape Ordinance and applied them accordingly for the efficient use of water in the irrigation design plan."
-Lindsay Merget, Streamline Irrigation Design and Compliance

Hydrozone Information Table

Hydrozone	Zone or Valve #	Type	Irrigation Method	Area (sf)	% of Total Landscape Area
Low	1	Plants	Drip	824	2%
Moderate	2	Plants	Drip	96	0%
Low	3	Vines	Drip	330	1%
Low	4	Trees	Drip	2,000	4%
Moderate	5	Trees	Drip	2,000	4%
Low	6	Trees	Drip	644	1%
Low	7	Plants	Drip	1,000	2%
Moderate	8	Plants	Drip	520	1%
Low	9	Plants	Drip	2,608	5%
Very Low	10	Trees	Drip	3,800	8%
Low	11	Plants	Drip	2,992	6%
Moderate	12	Plants	Drip	304	1%
Low	13	Plants	Drip	1,900	4%
Extra	14			-	0%
Moderate	15*	Plants	Drip	32	0%
Low	16	Plants	Drip	1,600	3%
Low	17	Plants	Drip	4,259	9%
Low	18	Plants	Drip	1,252	3%
Moderate	19	Trees	Drip	1,200	2%
Low	20	Trees	Drip	2,000	4%
Extra	21			-	0%
Very Low	22	Trees	Drip	11,250	23%
Moderate	23	Vines	Drip	32	0%
Moderate	24	Plants	Drip	750	2%
Moderate	25	Plants	Drip	750	2%
Extra	26			-	0%
Low	27	Plants	Drip	3,000	6%
Low	28	Vines	Drip	72	0%
Very Low	29	Trees	Drip	400	1%
Low	30	Vines	Drip	108	0%
Very Low	31	Trees	Drip	1,250	3%
Extra	32			-	0%
Very Low	33	Trees	Drip	1,200	2%
			Total (sf)	48,173	100%

Summary Hydrozone Table

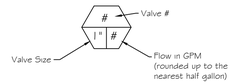
Hydrozone		Area (sf)	% of Total Landscape Area
High Water Use		0	0.00%
Moderate Water Use		5,684	11.80%
Low Water Use		42,489	88.20%
	Total:	48,173	100%

*Valve 15: adjust # emitters for plant water needs

Appendix Item - Plant List by Valve

Valve #	Symbol	Plant Name	Water Use	Qty	Size
1	ERI KAR	Erigeron karvinskianus	L	26	1 gal
1	PEN BLU	Penstemon 'Blue Bedder'	L	32	1 gal
1	SIN PRO	Zinnia 'Profusion Deep Salmon'	L	32	4" pot
1	STI TEN	Stipa tenuissima	L	32	1 gal
1	NEP BLU	Nepeta faassenii 'Blue Wonder'	L	26	1 gal
2	AST DUM	Aster dumosus 'Purple Dome'	M	24	1 gal
3	PAR TRI	Parthenocissus tricuspidata	L	33	5 gal
4	PIS CHI	Pistacia chinensis	L	2	72" box
5	TRE TBD	Tree TBD	H	2	60" box
6	QUE A47	Quercus agrifolia	VL	4	48" box
6	QUE A60	Quercus agrifolia	VL	1	60" box
6	SHR T24	Arbutus marina	L	4	48" box
7	ARC L15	Arctostaphylos 'Louis Edmunds'	L	6	15 gal
7	ARC H24	Arctostaphylos	L	4	24" box
8	PER TBD	Perennials TBD	M	104	1 gallon
9	ARC BAK	Arctostaphylos 'Louis Edmunds'	L	6	15 gal
9	ARC DOU	Arctostaphylos 'John Dourley'	L	3	15 gal
9	ARC HUR	Arctostaphylos 'Dr. Hurd'	L	4	15 gal
9	ARC SEN	Arctostaphylos 'Sentinel'	L	5	15 gal
9	ARC MIS	Arctostaphylos 'Pacific Mist'	L	16	5 gal
10	OLE SEV	Olea Europaea 'Sevillano'	VL	4	Field Dug
10	OLE TUS	Olea 'Frantoio'	VL	22	Field Dug
11	NEP BLU	Nepeta faassenii 'Blue Wonder'	L	136	1 gal
11	PEN BUN	Pennisetum alopecuroides 'Little Bunny	L	288	1 gal
12	AGA ACA	Agastache 'Acapulco Orange'	M	76	1 gal
13	ARC MIS	Arctostaphylos 'Pacific Mist'	L	15	5 gal
13	ARC BAK	Arctostaphylos 'Louis Edmunds'	L	2	15 gal
13	ARC HUR	Arctostaphylos 'Dr. Hurd'	L	2	15 gal
15	HEL LEM	Helianthus 'Lemon Queen'	L	8	5 gal
16	OLE LIT	Olea europaea 'Little Ollie'	VL	28	15 gal
16	RHA JOH	Rhamnus alaternus	L	15	15 gal
17	NEP BLU	Nepeta faassenii 'Blue Wonder'	L	133	1 gal
17	AGA AC2	Agastache 'Acapulco Orange'	L	174	1 gal
17	SAL GRE	Salvia greggii	L	108	1 gal
17	SAL M12	Salvia leucantha	L	148	5 gal
17	TEU COS	Teucrium cossonii	VL	211	1 gal
18	LAV GRO	Lavandula intermedia	L	128	1 gal
18	ROS IRE	Rosmarinus officinalis	L	17	5 gal
19	MOR FRU	Morus alba	M	12	48" box
20	PIS C84	Pistacia chinensis	L	2	84" box
22	OLE TUS	Olea europaea	VL	18	24" box
23	WIS COO	Wisteria sinensis	M	4	15 gal
23	PAR TR0	Parthenocissus tricuspidata	L	4	5 gal
24	MYR C15	Myrica californica	M	28	15 gal
25	MYR CAL	Myrica californica	M	20	24" box
27	PLU ROY	Plumbago auriculata	L	30	5 gal
28	PAR TR0	Parthenocissus tricuspidata	L	18	5 gal
29	VIP SPR	Viburnum tinus	M	41	15 gal
30	PAR TR1	Parthenocissus tricuspidata	L	27	5 gal
31	QUE A72	Quercus agrifolia	VL	2	72" box
31	ARB MUL	Arbutus marina	L	2	48" box
33	OLE FRA	Olea 'Frantoio'	VL	6	Field Dug

Irrigation Legend	
Symbol	Description
ACC	Controller - Hunter ACC99D Two Wire or equal with solar sync
	Ball Valve - 2" Sch. 80 PVC
MV	Hunter Master Valve with ICD-100
FM	Flow Meter
FS	Hunter Flow Sync FC1-208 with ICD-SEN sensor decoder
	Main Line - 2" Sch 40 PVC
	Lateral Line - Sch. 40 PVC - 1" for drip valves
	Controller wire - Two Wire System in 1" conduit
	Chase - 4" Solid SDR 35 pipe
HB	Hose Bib (Galvanized riser to brass hose bib mounted on RWD 4/4
	Drip Head - PVC Lateral to drip line connection
	Remote control valve - Irritrol 700 or equal



CLAUDIA SCHMIDT
LANDSCAPE DESIGN
P.O. BOX 42
ST. HELENA CALIF 94574
TELEPHONE 707 963 8771
FACSIMILE 707 963 7781
EMAIL: plant1@pacbell.net

DAVIS ESTATES
4060 SILVERADO TRAIL
CALISTOGA, CA

Streamline
irrigation design and compliance
509 Washington Street - Unit B
Calistoga, CA 94515
(707) 974-0652

Date 6/29/2015
Drawn By LM
Checked By
Project No.

Date	Issue
6/27/14	Landscape Submittal
6/29/15	Irrigation Revision

IRRIGATION PLAN -
WELO CALCS,
HYDROZONE TABLE &
IRRIGATION LEGEND

SCALE: AS NOTED

Sheet L3.7
of 6

ENCLOSURE C

WELL LOGS AND PUMP TEST

QUADRUPLICATE
For Local Requirements

Page ___ of ___
Owner's Well No. ___
Date Work Began ___, Ended ___
Local Permit Agency ___
Permit No. ___ Permit Date ___

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0948386

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

GEOLOGIC LOG

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

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	10	
10	30	
30	70	
70	90	
90	110	
110	150	
150	170	
170	190	
190	210	
210	230	
230	250	
250	270	
270	290	
290	310	
310	330	
330	370	
370	390	
390	410	
410	430	
430	450	

RECEIVED
JUL 23 2009
DEPT. OF
ENVIRONMENTAL MANAGEMENT

TOTAL DEPTH OF BORING 450 (Feet)
TOTAL DEPTH OF COMPLETED WELL 440 (Feet)

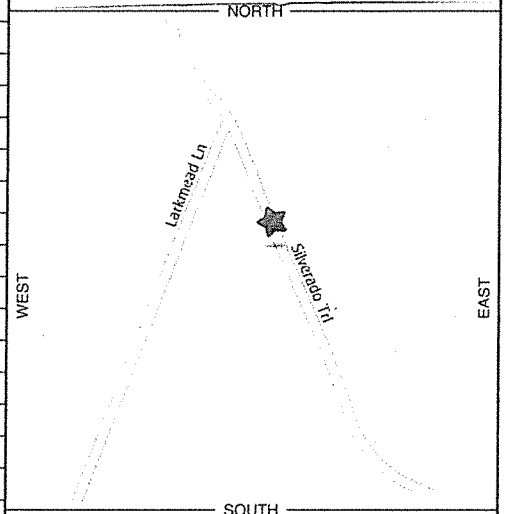
WELL OWNER

Name ___
Mailing Address ___
CITY ___ STATE ___ ZIP ___

WELL LOCATION

Address ___
City ___
County ___
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Lat ___ DEG. ___ MIN. ___ SEC. N
Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH



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

ACTIVITY (✓)

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

USES (✓)

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 50 (Ft.) & DATE MEASURED 9/15/09
ESTIMATED YIELD * 15 (GPM) & TEST TYPE est
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN 400 (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	12 1/4	✓				PVC	5	200	
50	110	07/0		✓			PVC	5	200	Factory
110	130	07/0	✓				PVC	5	200	
130	170	07/0		✓			PVC	5	200	Factory
170	190	07/0	✓				PVC	5	200	
190	230	07/0		✓			PVC	5	200	Factory

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	✓			
50	440				#3 gravel 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 Morgan & Williams, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

978 El Centro Ave., Yuba, CA 94559
ADDRESS CITY STATE ZIP

Signed ___ 10/15/09 ___
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Phone: (707) 823-3191 **Fax:** (707) 317-0057 **Email:** rayswelltesting@gmail.com
Address: 4031 Shadowhill Dr, Santa Rosa Ca 95404 **CA Lic. #:** 903708

Well Yield Pump Test for water supply permit: Alluvial Soils

The following test was performed for:

Davis Family Estate
4060 Silverado Trail
Calistoga Ca 94515

The subject well is owners Well #2

Water flow rate measurements were determined with a container and stopwatch. Flow rates were confirmed with a water meter. Water levels were measured with a Solinst water level sounding probe.

Please contact **Ray's Well Testing Service, Inc**. with any questions: 707 823 3191

Respectfully submitted,

Nick Brasesco

Ray's Well Testing Service Inc.
Phone Number: 707 823 3191

Water System Name: Owners Well #2. Davis Family Estate
Water System Number:

Page1 **8 -Hour Pump Test Form with Recovery Data** **Static Water Level:** 98.7'

Address: 4060 Silverado Trail, Calistoga Ca 94515

Date	Time	Interval	Water Level	GPM	Water color:	Odor:
12/05/12	08:15:00 AM	10 Mins	98.7'	20	Light yellow/gray	No
12/05/12	08:25:00 AM	10 Mins	161'	20	Light yellow	No
12/05/12	08:35:00 AM	10 Mins	209'	20	Light yellow	No
12/05/12	08:45:00 AM	10 Mins	271'	20	Light yellow	No
12/05/12	08:55:00 AM	10 Mins	315.3'	20	Light yellow	No
12/05/12	09:05:00 AM	10 Mins	355.6'	20	Light yellow	No
12/05/12	09:15:00 AM	10 Mins	400'	14.7	Clear	No
12/05/12	09:25:00 AM	10 Mins	400'	14.4	Clear	No
12/05/12	09:35:00 AM	10 Mins	400'	14.2	Clear	No
12/05/12	09:45:00 AM	10 Mins	400'	14	Clear	No
12/05/12	09:55:00 AM	10 Mins	400'	13.8	Clear	No
12/05/12	10:05:00 AM	10 Mins	400'	13.7	Clear	No
12/05/12	10:15:00 AM	20 Mins	400'	13.6		
12/05/12	10:35:00 AM	20 Mins	400'	13.4	Clear	No
12/05/12	10:55:00 AM	20 Mins	400'	13.2	Clear	No
12/05/12	11:15:00 AM	30 Mins	400'	13	Clear	No
12/05/12	11:45:00 AM	30 Mins	400'	12.7	Clear	No
12/05/12	12:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	12:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	01:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	01:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	02:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	02:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	03:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	03:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	04:15:00 PM	30 Mins	400'	12.7	Clear	No

Page 2 **8 -Hour Pump Test Form with Recovery Data**

Address: 4060 Silverado Trail, Calistoga Ca 94515

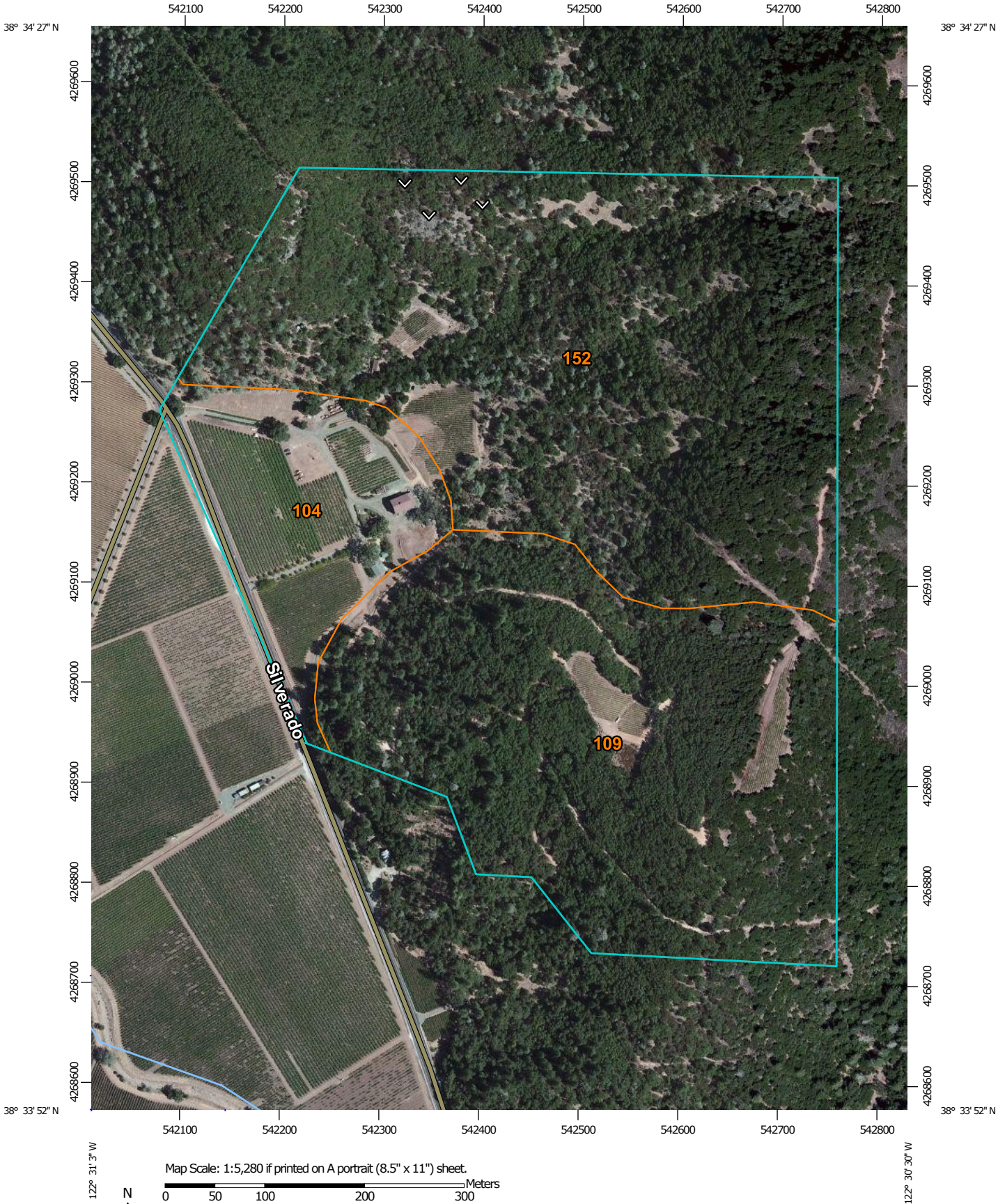
Date	**Time**	**Interval**	**Water Level**
12/05/12	04:30:00 PM	15 Mins	298.5'
12/05/12	04:45:00 PM	15 Mins	203.5'
12/05/12	05:00:00 PM	15 Mins	156'
12/05/12	05:15:00 PM	15 Mins	131.6'
12/05/12	05:30:00 PM	15 Mins	117.5'
12/05/12	05:45:00 PM	15 Mins	109.6'
12/05/12	06:00:00 PM	15 Mins	104.5'
12/05/12	06:15:00 PM	15 Mins	102.1'
12/05/12	06:45:00 PM	30 Mins	100'
		30 Mins	
		30 Mins	
		30 Mins	
		30 Mins	
		30 Mins	

Water level recovered 99.57% in 2.5 hours. Test concluded at 6:45pm.
Water levels recorded as feet below surface.
Water temp during the test was 80 degrees Fahrenheit.
Performance of pump: 20 GPM @ 110 PSI @ 100', 20 GPM @ 85 PSI @ 160'

ENCLOSURE D

USDA WEB SOIL SURVEY

Soil Map—Napa County, California



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Napa County, California
Survey Area Data: Version 7, Sep 25, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 2, 2010—Feb 17, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Napa County, California (CA055)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
104	Bale clay loam, 0 to 2 percent slopes	13.3	12.7%
109	Boomer gravelly loam, 30 to 50 percent slopes	40.2	38.2%
152	Hambright rock-Outcrop complex, 30 to 75 percent slopes	51.7	49.1%
Totals for Area of Interest		**105.3**	**100.0%**

Napa County, California

104—Bale clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hdk4
Elevation: 20 to 400 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 220 to 270 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Bale and similar soils: 85 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bale

Setting

Landform: Alluvial fans, flood plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from rhyolite and/or alluvium derived from igneous rock

Typical profile

H1 - 0 to 24 inches: clay loam
H2 - 24 to 60 inches: stratified gravelly sandy loam to loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B

Minor Components

Clear lake

Percent of map unit: 3 percent
Landform: Depressions

Data Source Information

Soil Survey Area: Napa County, California
Survey Area Data: Version 7, Sep 25, 2014

Napa County, California

109—Boomer gravelly loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hdk9
Elevation: 600 to 5,500 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 54 to 55 degrees F
Frost-free period: 210 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Boomer and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boomer

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 44 inches: clay loam, gravelly clay loam
H2 - 4 to 44 inches: weathered bedrock
H3 - 44 to 59 inches:

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C

Data Source Information

Soil Survey Area: Napa County, California
Survey Area Data: Version 7, Sep 25, 2014

Napa County, California

152—Hambright rock-Outcrop complex, 30 to 75 percent slopes

Map Unit Setting

National map unit symbol: hdlp
Elevation: 200 to 3,000 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 220 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Hambright and similar soils: 50 percent
Rock outcrop: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hambright

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from basic volcanic rock

Typical profile

H1 - 0 to 12 inches: very stony loam
H2 - 12 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Very shallow rocky (R015XD127CA)

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Free face
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from igneous, metamorphic and sedimentary rock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Data Source Information

Soil Survey Area: Napa County, California
Survey Area Data: Version 7, Sep 25, 2014

ENCLOSURE E

NOAA RAINFALL DATA

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

Elev: 400 ft. Lat: 38.596° N Lon: 122.601° W

Station: **CALISTOGA, CA US GHCND:USC00041312**

Summary of Monthly Normals 1981-2010

Generated on 04/20/2017

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

Temperature (°F)

	Mean						Cooling Degree Days Base (above)						Heating Degree Days Base (below)				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
1	59.5	37.3	48.4	2.3	3.4	2.0	6	3	1	-7777	0	0	211	269	360	515	0.0	0.0	28.9	0.0	8.3	0.0
2	62.9	39.0	50.9	3.4	2.9	2.2	19	10	4	-7777	0	0	132	180	257	394	0.0	0.0	27.3	0.0	4.3	0.0
3	67.2	40.4	53.8	4.7	2.6	3.1	57	36	16	3	-7777	-7777	94	135	208	350	0.0	0.0	30.8	0.0	2.7	0.0
4	72.4	41.9	57.1	4.3	2.9	3.2	109	75	39	10	2	1	44	70	125	245	-7777	0.8	30.0	0.0	1.6	0.0
5	78.7	46.3	62.5	4.2	2.4	2.8	242	189	121	48	15	9	9	18	44	125	0.4	3.2	31.0	0.0	0.5	0.0
6	85.9	50.4	68.1	3.5	2.0	2.1	395	335	249	125	46	28	-7777	1	5	31	1.3	9.4	30.0	0.0	0.1	0.0
7	91.4	52.5	72.0	2.7	1.8	1.9	525	463	370	219	90	56	0	0	-7777	3	3.9	17.6	31.0	0.0	0.0	0.0
8	90.7	52.1	71.4	2.1	1.6	1.4	508	446	353	201	76	44	0	0	-7777	2	3.4	16.4	31.0	0.0	0.0	0.0
9	87.9	50.2	69.1	3.5	1.7	2.0	422	362	275	140	47	26	-7777	1	3	19	1.7	12.7	30.0	0.0	-7777	0.0
10	79.3	45.4	62.3	3.5	1.9	2.1	238	185	115	40	11	6	10	19	42	122	0.5	3.8	31.0	0.0	0.3	0.0
11	66.4	40.4	53.4	4.4	2.6	2.6	49	29	11	2	-7777	-7777	97	137	209	350	0.0	0.0	29.8	0.0	3.5	0.0
12	58.5	36.4	47.4	2.9	3.9	2.2	5	2	1	0	0	0	239	298	389	544	0.0	0.0	28.4	0.0	10.0	0.0
Summary	75.1	44.4	59.7	3.5	2.5	2.3	2575	2135	1555	788	287	170	836	1128	1642	2700	11.2	63.9	359.2	0.0	31.3	0.0

@ Denotes mean number of days greater than 0 but less than 0.05.
-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

Elev: 400 ft. Lat: 38.596° N Lon: 122.601° W

Station: **CALISTOGA, CA US GHCND:USC00041312**

Summary of Monthly Normals 1981-2010

Generated on 04/20/2017

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

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	.25	.50	.75
1	8.16	10.8	8.8	4.8	2.6	3.01	6.97	11.33
2	7.79	10.4	8.5	4.7	2.8	3.72	6.35	10.94
3	5.77	9.4	7.4	4.3	2.0	3.03	4.24	7.85
4	2.39	6.1	4.3	1.5	0.7	0.66	1.73	3.11
5	1.40	3.7	2.4	0.8	0.3	0.08	0.75	1.79
6	0.22	1.1	0.6	0.2	-7777	0.00	0.02	0.27
7	0.03	0.1	0.1	-7777	0.0	0.00	0.00	0.00
8	0.05	0.2	0.1	-7777	0.0	0.00	0.00	0.00
9	0.32	1.3	0.8	0.3	0.1	0.00	0.13	0.30
10	2.11	4.1	3.1	1.6	0.7	0.85	1.60	3.44
11	4.75	7.6	5.6	3.5	1.8	1.49	3.76	7.61
12	7.88	10.9	8.9	5.6	3.3	3.22	5.82	12.82
Summary	40.87	65.7	50.6	27.3	14.3	16.06	31.37	59.46

@ Denotes mean number of days greater than 0 but less than 0.05.
-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 04/20/2017

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

Elev: 400 ft. Lat: 38.596° N Lon: 122.601° W

Station: **CALISTOGA, CA US GHCND:USC00041312**

Growing Degree Units (Monthly)												
Base	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	263	307	428	515	698	844	990	973	871	693	403	236
45	126	175	276	365	543	694	835	818	721	538	258	109
50	38	73	145	224	388	544	680	663	571	384	134	32
55	6	19	57	109	242	395	525	508	422	238	49	5
60	1	4	16	39	121	249	370	353	275	115	11	1
Growing Degree Units for Corn (Monthly)												
50/86	151	183	269	335	440	523	595	587	534	445	250	137

Growing Degree Units (Accumulated Monthly)												
Base	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	263	570	998	1513	2211	3055	4045	5018	5889	6582	6985	7221
45	126	301	577	942	1485	2179	3014	3832	4553	5091	5349	5458
50	38	111	256	480	868	1412	2092	2755	3326	3710	3844	3876
55	6	25	82	191	433	828	1353	1861	2283	2521	2570	2575
60	1	5	21	60	181	430	800	1153	1428	1543	1554	1555
Growing Degree Units for Corn (Monthly)												
50/86	151	334	603	938	1378	1901	2496	3083	3617	4062	4312	4449

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

M indicates the value is missing

-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 F

TIER I ANALYSIS: INFILTRATION CALCULATION TABLES

SUMMIT ENGINEERING, INC.	DAVIS ESTATES WINERY Water Availability Tier I: Infiltration Calculation	PROJECT NO. 2017043 BY: SW CHK: GG

Average Year Rain Events

Daily Rainfall	Rainfall (Days/Year)	Average Rainfall (in/day)	Annual Rainfall (in/year)
1" or More	14.30	1.69	24.13
0.5" to 0.99"	13.00	0.75	9.75
0.1" to 0.49"	23.30	0.30	6.99
Total	50.60		40.87

Annual Rain Volume (ac-ft/year) = 389.4

Soil Type	Slope	Infiltration Rate (in/hr)	Infiltration Rate (in/day)	Area (Acres)	Infiltration > 1 in/day	Infiltration ≥ 0.5 in/day	Infiltration ≥ 0.1 in/day	Total Infiltration (ft./year)	Annual Infiltration (ac-ft/year)
Impervious	N/A	0	0	2.37	0	0	0	0.00	0.0
Bale Clay Loam	0-2	1.28	30.72	14.21	40.9	0.00	0.0	3.41	48.4
Boomer Gravelly Loam	30-50	0.03	0.72	42.77	10.30	6.50	7.0	1.98	84.8
Hambright Rock Outcrop	30-75	0.99	23.76	54.97	40.9	0.00	0.0	3.41	187.2
TOTAL				**114.32**					**320.4**

Notes:

1. Total Annual Rainfall should represent the annual median precipitation for the site
2. Annual Rainfall for the respective daily rainfall (in) bracket, is estimated based on the days of rainfall and the average inches of rain for those days
3. Impervious area is based on currently built structures
4. Annual Rain Volume is estimated based on the total acres of the parcel and total annual rainfall
5. Soil Infiltration Rates are obtained from the USDA soil data for the respective soil type for the parcel
6. Annual Infiltration Volume for each soil type is based on the infiltration capacity of the soil and a conservative estimate of the inches of rain that could infiltrate the soil during a rain event

Drought Year Rain Events

Daily Rainfall	Rainfall (Days/Year)	Average Rainfall (in/day)	Annual Rainfall (in/year)
1" or More	5.61	1.69	9.49
0.5" to 0.99"	5.10	0.75	3.83
0.1" to 0.49"	9.15	0.30	2.75
Total	19.86		16.06

Annual Rain Volume (ac-ft/year) = 153.0

Soil Type	Slope	Infiltration Rate (in/hr)	Infiltration Rate (in/day)	Area (Acres)	Infiltration > 1 in/day	Infiltration ≥ 0.5 in/day	Infiltration ≥ 0.1 in/day	Total Infiltration (ft./day)	Annual Infiltration (ac-ft/year)
Impervious	N/A	0	0	2.37	0	0	0	0.0	0.0
Bale Clay Loam	0-2	1.28	30.72	14.21	16.1	0.00	0.0	1.3	19.0
Boomer Gravelly Loam	30-50	0.03	0.72	42.77	4.04	2.55	2.7	0.8	33.3
Hambright Rock Outcrop	30-75	0.99	23.76	54.97	16.1	0.00	0.0	1.3	73.6
TOTAL				**114.32**					**125.9**

Notes:

1. Total Annual Rainfall should represent the annual 0.1 precipitation probability level.
2. Rainfall (days/year) is estimated based on the % decrease in Annual Rainfall (39%)
3. Annual Rainfall for the respective daily rainfall (in) bracket, is estimated based on the days of rainfall and the average inches of rain for those days
4. Impervious area is based on currently built structures
5. Annual Rain Volume is estimated based on the total acres of the parcel and total annual rainfall
6. Soil Infiltration Rates are obtained from the USDA soil data for the respective soil type for the parcel
7. Annual Infiltration Volume for each soil type is based on the infiltration capacity of the soil and a conservative estimate of the inches of rain that could infiltrate the soil during a rain event

ENCLOSURE G

TIER II ANALYSIS: WELL DRAWDOWN CALCULATION TABLES

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

Site Specific Parameters

Well Flow:
varies

Radius of Influence:
380 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:
140 ft/day

Theis Drawdown

Well 04

Well Flowrate:
40 gpm

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	1.49E-02	1.00E-02	2.00E-02	4.038	3.355	3.70	0.0157	3.02
Low S, Low h	**1.50E-05**	**10**	**7.22E-04**	**7.00E-04**	**8.00E-04**	**6.688**	**6.555**	**6.66**	**0.0283**	**5.44**
High S, High h	3.10E-04	140	1.07E-03	1.00E-03	2.00E-03	6.332	5.639	6.29	0.0019	0.37
Low S, High h	1.50E-05	140	5.16E-05	5.00E-05	6.00E-05	9.326	9.144	9.30	0.0028	0.54

Contact:
Gina Giacone
gina@summit-sr.com
(707) 636-9162

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

WATER SYSTEM FEASIBILITY REPORT

Davis Estates Winery

4060 Silverado Trail,
Calistoga, California 94515
APN 021-020-003

SUMMIT

CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER

Project No. 2017043
May 2, 2017

TABLE OF CONTENTS

LIST OF ENCLOSURES

Enclosure A: Overall Site Plan

Enclosure B: Well Logs and Pump Test

Enclosure C: Operation & Maintenance Costs

DAVIS ESTATES
Calistoga, California
WATER SYSTEM FEASIBILITY

PROJECT OVERVIEW

Davis Estates located on Silverado Trail (APN 021-010-003) in Calistoga, Napa County California is proposing to increase the existing production capacity of 30,000 gallons of wine per year to 100,000 gallons of wine per year and increase onsite employees and visitor serving functions. Summit has prepared the following Water System Feasibility Analysis, which evaluates the capacity of the existing transient non-community water system to provide sufficient water to meet the facility demands.

The existing public water system (CA-2801057) is capable of meeting the facility demands and consolidation feasibility with another existing water system is not required because this is an existing system.

SITE DESCRIPTION

The existing facility is located on the valley floor with vineyards and scattered residences or wineries to the north, south, and west. The eastern side of the property is forested. The topography of the site slopes to the west. Surface drainage flows overland to the southwest.

The existing property lines, wells, water storage tanks, buildings, vineyards, roads, SS and PW treatment systems and SS disposal system are located on the Overall Site Plan, located in Enclosure A.

WATER SYSTEM DESCRIPTION

Water Source

Water sources for the property consist of seven groundwater wells located on the property as indicated on the site plan (Enclosure A). The groundwater source for the public water system is Well 001 (#2) only, which is located on the same parcel as the winery and residences it serves (APN 021-010-003). The remaining six wells on the parcel are not part of the public water system and are only used for vineyard irrigation, as well as windmill operation.

The existing domestic well was drilled in 2007, has a depth of 440 ft with a 56 ft annular seal. An 8-hour pump rest was performed by Ray's Well Testing Service in December 2012 on Well 001. A sustained yield of 12.7 gpm was observed after eight hours of continuous pumping. This well yield equates to 6,096 gpd if operating continuously for 8 hours in a day (see Enclosure B for pump test results).

Water Quality

As addressed in the currently approved public water system permit, arsenic is the only constituent testing above the primary maximum contaminant level (MCL). Additionally, manganese and total dissolved solids (TDS) were the only constituents testing above the secondary MCL.

Water Treatment

Two treatment trains (process and domestic) are proposed for the different facility uses. Due to high capital and maintenance costs associated with arsenic treatment, arsenic treatment is only provided for domestic/potable uses. The facility has a dual plumbed system with separate potable domestic use and process water systems. Where process water is used (winery equipment areas, hose bib stations, etc.) appropriate signage has been displayed. The signs are displayed in viewable areas informing the public that the water is "non-potable" and not intended for human consumption.

- Process Water Treatment – Designated process water is filtered through an NS13 automatic sediment filter for removing particles and sediment down to three microns in size. Following filtration the water is softened through a Kinetico K-2060 softener. The softening system's resin bed allows for the exchange of hard ions to soft ions in the water stream. The filtered/softened water flows into four 5,000 gallon water storage tanks. Following storage, the treated designated process water is pumped through a UV disinfection system prior to use throughout the winery.
- Potable Domestic Water Treatment – Designated domestic use potable water is injected with chlorine followed by greensand (GS) media filtration. The injected chlorine is used to oxidize soluble iron and manganese, and to convert arsenic III to arsenic V. Following the GS media filter, the oxidized water passes through a granulated activated carbon (GAC) filter for removal of residual chlorine remaining in the water stream. After the GAC filter, water flows through two metsorb media filters for arsenic removal. The final treatment step involves softening of the arsenic free water through a Kinetico K-2060 water softener. Treated potable water flows into four 3,000 gallon domestic water storage tanks. Following storage, the treated water is pumped through a UV disinfection system prior to use throughout the winery.

WATER DEMAND

The proposed UP modifications are to increase wine production capacity to 100,000 gallons per year, and increase the number of employees and visitors. The domestic potable water demand increase is expected to correlate to the estimated wastewater generation flows for sanitary sewer. The existing transient non-community water system would be upgraded to a non-transient, non-community water system based on the proposed increase in employees and visitors.

Proposed Water Uses

Projected domestic water use at the facility is based on the following needs:

- Process water for production capacity of 100,000 gallons of wine per year (provided by independent water supply system)
- Full Time Employees = 25 per day
- Tasting Visitors = 200 max per day, with a cheese plate or similar included for approximately 80% of guests
- Food & Wine Pairing Event = 100 max per event, 2 events per month
- Food & Wine Pairing Event = 200 max per event, 15 events per year

Domestic Water Demand

Domestic water use at the facility is determined based on the total number of employees, daily visitors and event guests. Food pairing is proposed for private tasting visitors and for events with no more than 50 visitors. Sanitary Sewage generation rates are expected to be equivalent to the water demand for domestic uses. Sanitary sewage generated at events larger than 100 visitors will be managed using portable toilets; however, the water system would need to provide sufficient water to meet the event demands. Using Napa County standards, the proposed domestic water demand for the winery facility is estimated as follows:

Average Day w/o Event							
Employee (full-time)	25	x	15	gpcd	=	375	gal/day
Tasting Visitors	100	x	3	gpcd	=	300	gal/day
Tasting Cheese Plate (or similar)	80	x	0.75	gpcd	=	60	gal/day
Event Visitors	0	x	15	gpcd	=	0	gal/day
4 Bedroom Primary Residence	4	x	120	gpcd	=	480	gal/day
1 Bedroom Secondary Residence	1	x	150	gpcd	=	150	gal/day
Total					=	1,365	gal/day
					=	*1,400*	*gal/day*
Peak Tasting Day with Event							
Employee (full-time)	25	x	15	gpcd	=	375	gal/day
Tasting Visitors	200	x	3	gpcd	=	600	gal/day
Tasting Cheese Plate (or similar)	160	x	0.75	gpcd	=	120	gal/day
Private Event Visitors	200	x	10	gpcd	=	2,000	gal/day
4 Bedroom Primary Residence	4	x	120	gpcd	=	480	gal/day
1 Bedroom Secondary Residence	1	x	150	gpcd	=	150	gal/day
Total					=	3,725	gal/day
						3,800	*gal/day*

The expected water use for the proposed increase in employees and visitors is 3,800 gpd on a peak day with the largest event. It is assumed that two different events will not occur on the same day.

MAXIMUM DAILY DEMAND (MDD)

The MDD is determined based on the peak projected water demand for domestic water as follows:

Domestic Potable Demand	=	3,800 gpd
Peaking Factor	=	2.2
MDD	=	3,800 gpd x 2.2
	=	8,360 gpd
Existing Storage Onsite	=	12,000 gallons

The facility has an estimated peak water demand of 3,800 gpd. The domestic Well 001 (#2), with a capacity of 12.7 gpm, should provide sufficient water supply to meet the domestic peak water demand when operating for 8 hours per day at 7.9 gpm. The existing four 3,000 gallon tanks provide a total storage capacity of 12,000 gallons for domestic water supply, which is sufficient to accommodate the estimated MDD.

WATER SYSTEM MANAGEMENT

Davis Estates owns and operates the winery water system and is responsible for all finances, operations, compliance requirements, and establishment of policies. The facility's domestic water system will be upgraded and classified as non-transient, non-community and is managed by employees of the winery. Maintenance personnel at the winery are responsible for routine inspection and operations of the water system and treatment equipment. The winery supervisor/operator will have direct responsibility for operation and maintenance of the water system. As a non-transient non-community water system requires a D1 certified operator, the facility will train and certify a staff member accordingly. Major repairs, replacements and other engineering and professional services are contracted out.

WATER SYSTEM FINANCIAL ASSESMENT

Davis Estates is not currently encumbered by any judgements, liens, or other financial liability that would prevent the operation of the winery's water system. The annual operation and maintenance cost of the winery water system is expected to be $25,800 per year (see Enclosure C). The operating and maintenance costs of the system are covered by the income from retail wine sales. There will be no expected primary financial impacts since the current water system should have sufficient supply capacity to meet the increase in water demand.

A public water system permit amendment application to indicate the change in classification to non-transient, a lead and copper worksheet, radiological worksheet, chemical sampling, distribution operator information, and the appropriate plan check fee will be submitted once this Use Permit modification is approved.

ENCLOSURE A

OVERALL SITE PLAN

(E) 5,000 GALLON PW EFFLUENT STORAGE TANKS, TYP OF 2

(E) 100,000 GAL VINEYARD IRRIGATION TANK

(E) WELL #7

(E) 2,500 GAL IRRIGATION TANK

ROAD PARTIALLY UNPAVED

APN 021-010-003

(E) WELL #6

(E) WELL #1

(E) WELL #3

100' SETBACK, TYP

(E) WINERY

(E) WELL 001 (#2)

(E) 100,000 GAL FP STORAGE TANK

(E) 3,000 GAL DOMESTIC WATER STORAGE TANK, TYP OF 4

(E) 5,000 GAL PROCESS WATER STORAGE TANK, TYP OF 4

(E) WELL #4

APPROXIMATE PROPERTY LINE, TYP

(E) MAIN RESIDENCE

(E) WELL #5

(E) 100,000 GAL VINEYARD IRRIGATION STORAGE TANK, TYP OF 2

(E) 5,000 GALLON PW EFFLUENT STORAGE TANK

SILVERADO TRAIL

(E) PROCESS WASTEWATER PRETREATMENT AND (E) SANITARY SEWAGE PRETREATMENT AND DISPOSAL AREA

0 100 200

GRAPHIC SCALE IN FEET

SUMMIT

Summit Engineering, Inc
463 Aviation Blvd. Suite 200 • Santa Rosa, CA 95403
707-527-0775 • www.summit-sr.com

DAVIS ESTATES
4060 SILVERADO TRAIL
CALISTOGA, CA 94515
APN 021-010-003

DAVIS ESTATES USE PERMIT

OVERALL SITE PLAN

	2017-04-25 UP MOD RESUBMITTAL

DATE:	2017-04-25
JOB NO:	2017043
SCALE:	AS SHOWN
DRAWN:	JA
CHECKED:	GG

SHEET **W1**

ENCLOSURE B

WELL LOGS AND PUMP TEST

QUADRUPLICATE
For Local Requirements

Page ___ of ___
Owner's Well No. ___
Date Work Began ___, Ended ___
Local Permit Agency ___
Permit No. ___ Permit Date ___

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 0948386

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

GEOLOGIC LOG

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

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	10	
10	30	
30	70	
70	90	
90	110	
110	150	
150	170	
170	190	
190	210	
210	230	
230	250	
250	270	
270	290	
290	310	
310	330	
330	370	
370	390	
390	410	
410	430	
430	450	

RECEIVED
JUL 23 2009
DEPT. OF
ENVIRONMENTAL MANAGEMENT

TOTAL DEPTH OF BORING 450 (Feet)
TOTAL DEPTH OF COMPLETED WELL 440 (Feet)

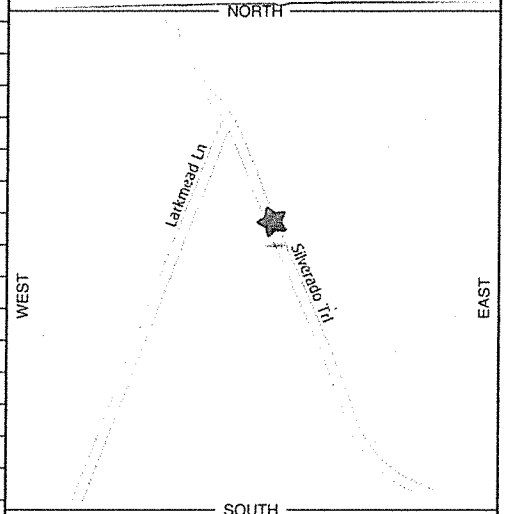
WELL OWNER

Name ___
Mailing Address ___
CITY ___ STATE ___ ZIP ___

WELL LOCATION

Address ___
City ___
County ___
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Lat ___ DEG. ___ MIN. ___ SEC. N
Long ___ DEG. ___ MIN. ___ SEC. W

LOCATION SKETCH



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

ACTIVITY (✓)

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

USES (✓)

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

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 50 (Ft.) & DATE MEASURED 9/15/09
ESTIMATED YIELD * 15 (GPM) & TEST TYPE est
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN 400 (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	12 1/4	✓				PVC	5	200	
50	110	07/0		✓			PVC	5	200	Factory
110	130	07/0	✓				PVC	5	200	
130	170	07/0		✓			PVC	5	200	Factory
170	190	07/0	✓				PVC	5	200	
190	230	07/0		✓			PVC	5	200	Factory

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	✓			
50	440				#3 gravel 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 Morgan & Williams, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

978 El Centro Ave., Yuba, CA 94559
ADDRESS CITY STATE ZIP

Signed ___ 10/15/09 ___
C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 05-03

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Phone: (707) 823-3191 **Fax:** (707) 317-0057 **Email:** rayswelltesting@gmail.com
Address: 4031 Shadowhill Dr, Santa Rosa Ca 95404 **CA Lic. #:** 903708

Well Yield Pump Test for water supply permit: Alluvial Soils

The following test was performed for:

Davis Family Estate
4060 Silverado Trail
Calistoga Ca 94515

The subject well is owners Well #2

Water flow rate measurements were determined with a container and stopwatch. Flow rates were confirmed with a water meter. Water levels were measured with a Solinst water level sounding probe.

Please contact **Ray's Well Testing Service, Inc**. with any questions: 707 823 3191

Respectfully submitted,

Nick Brasesco

Ray's Well Testing Service Inc.
Phone Number: 707 823 3191

Water System Name: Owners Well #2. Davis Family Estate
Water System Number:

Page1 **8 -Hour Pump Test Form with Recovery Data** **Static Water Level:** 98.7'

Address: 4060 Silverado Trail, Calistoga Ca 94515

Date	Time	Interval	Water Level	GPM	Water color:	Odor:
12/05/12	08:15:00 AM	10 Mins	98.7'	20	Light yellow/gray	No
12/05/12	08:25:00 AM	10 Mins	161'	20	Light yellow	No
12/05/12	08:35:00 AM	10 Mins	209'	20	Light yellow	No
12/05/12	08:45:00 AM	10 Mins	271'	20	Light yellow	No
12/05/12	08:55:00 AM	10 Mins	315.3'	20	Light yellow	No
12/05/12	09:05:00 AM	10 Mins	355.6'	20	Light yellow	No
12/05/12	09:15:00 AM	10 Mins	400'	14.7	Clear	No
12/05/12	09:25:00 AM	10 Mins	400'	14.4	Clear	No
12/05/12	09:35:00 AM	10 Mins	400'	14.2	Clear	No
12/05/12	09:45:00 AM	10 Mins	400'	14	Clear	No
12/05/12	09:55:00 AM	10 Mins	400'	13.8	Clear	No
12/05/12	10:05:00 AM	10 Mins	400'	13.7	Clear	No
12/05/12	10:15:00 AM	20 Mins	400'	13.6		
12/05/12	10:35:00 AM	20 Mins	400'	13.4	Clear	No
12/05/12	10:55:00 AM	20 Mins	400'	13.2	Clear	No
12/05/12	11:15:00 AM	30 Mins	400'	13	Clear	No
12/05/12	11:45:00 AM	30 Mins	400'	12.7	Clear	No
12/05/12	12:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	12:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	01:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	01:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	02:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	02:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	03:15:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	03:45:00 PM	30 Mins	400'	12.7	Clear	No
12/05/12	04:15:00 PM	30 Mins	400'	12.7	Clear	No

Page 2 **8 -Hour Pump Test Form with Recovery Data**

Address: 4060 Silverado Trail, Calistoga Ca 94515

Date	**Time**	**Interval**	**Water Level**
12/05/12	04:30:00 PM	15 Mins	298.5'
12/05/12	04:45:00 PM	15 Mins	203.5'
12/05/12	05:00:00 PM	15 Mins	156'
12/05/12	05:15:00 PM	15 Mins	131.6'
12/05/12	05:30:00 PM	15 Mins	117.5'
12/05/12	05:45:00 PM	15 Mins	109.6'
12/05/12	06:00:00 PM	15 Mins	104.5'
12/05/12	06:15:00 PM	15 Mins	102.1'
12/05/12	06:45:00 PM	30 Mins	100'
		30 Mins	
		30 Mins	
		30 Mins	
		30 Mins	
		30 Mins	

Water level recovered 99.57% in 2.5 hours. Test concluded at 6:45pm.
Water levels recorded as feet below surface.
Water temp during the test was 80 degrees Fahrenheit.
Performance of pump: 20 GPM @ 110 PSI @ 100', 20 GPM @ 85 PSI @ 160'

ENCLOSURE C

OPERATION AND MAINTENANCE COSTS

DAVIS ESTATES

5-YEAR BUDGET PROJECTION

Non-Transient Noncommunity Water System

INFLATION FACTOR (%) - 3.5

PWS I.D. Number: 2801057

LINE	EXPENSES		Current Year	Year 2	Year 3	Year 4	Year 5
	OPERATIONS & MAINTENANCE						
1		Salaries and benefits	18,000.00	18,630.00	19,282.05	19,956.92	20,655.41
2		Contract operation and maintenance	2,000.00	2,070.00	2,142.45	2,217.44	2,295.05
3		Power and other utilities	2,000.00	2,070.00	2,142.45	2,217.44	2,295.05
4		Fees	500.00	517.50	535.61	554.36	573.76
5		Coliform monitoring	500.00	517.50	535.61	554.36	573.76
6		Chemical monitoring TNC	300.00	310.50	321.37	332.62	344.26
7		Treatment/Disinfection Equipment	400.00	414.00	428.49	443.49	459.01
8		Transportation	100.00	103.50	107.12	110.87	114.75
9		Media, Materials, supplies, and parts	200.00	207.00	214.25	221.74	229.50
10		Miscellaneous	300.00	300.00	300.00	300.00	300.00
11							
12		Total Operation and Maintenance	$24,300.00	$25,140.00	$26,009.40	$26,909.23	$27,840.55
13							
	GENERAL & ADMINISTRATIVE						
14		Engineering and professional services	1,000.00	1,035.00	1,071.23	1,108.72	1,147.52
15		Depreciation and amortization	0.00	0.00	0.00	0.00	0.00
16		Insurance	500.00	517.50	535.61	554.36	573.76
17							
18							
19		Total General and Administrative	$1,500.00	$1,552.50	$1,606.84	$1,663.08	$1,721.28
20							
	TOTAL EXPENSES		$25,800.00	$26,692.50	$27,616.24	$28,572.31	$29,561.84

Date: 4/21/2017

Contact:
Gina Giacone
gina@summit-sr.com
(707) 636-9162

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