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Wastewater Feasibility Study



WASTEWATER FEASIBILITY REPORT

FOR THE

AMIZETTA WINERY USE PERMIT

PROJECT LOCATED AT

1089 GREENFIELD RD
ST. HELENA, CA 94574

COUNTY: NAPA
APN: 025-39-010

MARCH 7, 2019
REVISED JANUARY 25, 2021

PREPARED FOR REVIEW BY:

NAPA COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH
1195 THIRD STREET
NAPA, CA 94559



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I. INTRODUCTION

Amizetta Winery is requesting a Use Permit Major Modification to increase production and visitation for an existing winery on a ~21.5 acre parcel located at 1089 Greenfield Rd, St. Helena, by owner and applicant Perry Clark. Existing wine production is approved for 12,000 gallons, and is requested to be expanded to 20,000 gallons annually. The property will be improved as follows: minor improvements to the existing winery building, including construction of a commercial kitchen, construction of a new hospitality building, expansion of the existing cave; additional parking areas and road improvements, and construction of a new water tank.

This report has been prepared to evaluate the feasibility of handling the proposed increase of process and domestic wastewater on the parcel and in a manner following the requirements of the County Environmental Health Division.

Based on the proposed marketing plan for the winery, the maximum number of winery staff on-site on any given day is estimated to be five (5) full-time employees.

The proposed marketing plan allows for up to thirty (30) visitors per day in addition to winery special events. The following special events are proposed in the marketing plan:

- *Wine & Food Pairing Events - 8/Year with up to 15 guests each*
- *Large Marketing Events - 2/Year with up to 25 guests*

This report presents a preliminary plan for treating and dispersing the wastewater generated from the additional wine production and visitation.

All plumbing fixtures in the approved winery shall be low flow, water-saving fixtures per the Uniform Plumbing Code as adopted by the Napa County Building Department.

II. WINERY DOMESTIC WASTEWATER FLOW

A. Wastewater Generation

The domestic wastewater (DW) generated at Amizetta Winery is dependent on the daily number of employees and visitors present at the winery. The marketing plan, as presented in the Introduction of this report determines the maximum number of guests the winery is permitted to serve in one day, as well as the maximum number of permanent employees that the winery needs to functionally operate. In terms of wastewater generation, this gives the maximum number of people that will be contributing to the daily peak wastewater flow rate.

B. Estimating Wastewater Quantity

To calculate the daily peak DW flow rates generated at Amizetta Winery, the maximum



number of people present at the site, as well as the amount of wastewater each person will generate, must be estimated. The marketing plan proposes a total of 5 employees and 30 daily visitors (maximum). Napa County estimates the wastewater generated by visitors is 3 gallons per day per person, 15 gallons per day per event guest (on-site food prep), and 15 gallons per day per employee¹.

The peak effluent generated in a day will occur when the winery requires all part-time and full-time (five (5)) employees on staff, receives thirty (30) visitors in a single day, and hosts a 25-person event. Based on this combination, the peak daily domestic wastewater flow is **540 gallons per day** (see **Table 1**, below). For design purposes, this shall be taken as the maximum daily flow considered for storage and treatment requirements.

Source	Number	Projected Flow (gpd)	Total Flow No Event Day (gpd)	Total Flow Event Day (gpd)
Full-time employees	5	15	75	75
Visitors (30 max)	30	3	90	90
Private Event	25	15	0	375
Private Residence (bedrooms)*	2	120	240	240
Grand Total		Total Peak Flow	165	540

*Private Residence flows are included for reserve area sizing only

Table 1: Total Domestic Wastewater Flows

C. Estimating Wastewater Quality

The quality of domestic wastewater generated at a winery is similar to wastewater generated from a residence. The main effluent quality parameters that must be estimated from a winery’s wastewater are the 5-day Biochemical Oxygen Demand (BOD5) and the Total Suspended Solids (TSS). The BOD5 concentration is a measurement used to estimate the amount organic matter present in wastewater. The TSS concentration is a measure of solid particles that have not yet settled out of the wastewater. Several additional wastewater constituents must also be estimated, as they have a direct correlation with the treatment processes used to reduce BOD5 and TSS concentrations. Fats, oils, and grease (FOG) will likely be discharged to the sewer system, and can damage the biological processes that take place in wastewater treatment. The total dissolved solids (TDS) present in wastewater can be an indicator for cleaning agents, which can affect the pH balance and destroy the bacteria that reduce organic matter in wastewater. The pH value affects bacteria that consume organic matter in the wastewater. The dissolved oxygen (DO) level can tell wastewater treatment operators that the bacteria need more or less oxygen in order to consume and reduce organic matter present in the wastewater. In addition to oxygen, bacteria need nitrogen to fuel their consumption of organic matter. The total nitrogen concentration in wastewater will alert wastewater treatment operators to how much nitrogen they need to add to the wastewater in order for bacteria to most efficiently consume

¹ Napa County Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems, Appendix 1, Table 4.



organic matter. If a high level of wastewater treatment is required, it is important to know the type and amount of harmful bacteria and pathogens that are present in the effluent so the most appropriate form of disinfection can be applied. In domestic wastewater, fecal coliform is extremely prevalent, and is detrimental to human health. **Table 2** provides a description of the expected strength of each wastewater constituent.

Constituent	Unit	Domestic
FOG	Mg/L	31-164
BOD5	Mg/L	110-400
TSS	Mg/L	100-350
TDS	Mg/L	280-850
Nitrogen (total as N)	Mg/L	20-85
Total Coliform	MPN/100 mL	10 ⁷ -10 ⁸
Fecal Coliform	MPN/100 mL	10 ⁴ -10 ⁵

Table 2: Typical Domestic Wastewater Values

III. WINERY PROCESS WASTEWATER FLOW

A. Production Methods

Winery wastewater outflow and strength varies throughout the winemaking year. A typical winemaking year begins with harvest preparation and harvest. These events occur during the months of August, September, and October. The harvest season typically generates both the largest volume and maximum strength of process wastewater. A breakdown of the different winemaking phases are detailed below.

Harvest and Crush - As previously mentioned, a winery will harvest and crush its fruit during the months of August, September, and October. Once the grapes have reached maturity, the fruit will be separated from the stems, and crushed to collect the juice for fermentation. Floor drains typically collect the juice, stems, seeds, and skins that are washed off of the equipment in the crush process. Grate covers on the drains can prevent larger solids from entering the wastewater system, but seeds and skins can often enter the primary wastewater tank.

Fermentation - Juice from crush is collected and stored in tanks for fermentation. Yeast will be added to the juice in order for sugar to be converted to alcohol. The fermentation process can take anywhere from one to three weeks to complete. Once the fermentation process is complete, the wine will be drained from the tank into barrels for aging. Wine drained from the fermentation tanks will carry excess skins and seeds into the barrel. The remaining solids, known as pomace, will remain at the bottom of the tank. If desired by the winemaker, the pomace can be pressed to produce more wine with different characteristics for the blending process. The remaining solids will be disposed of at a solid waste facility. The empty fermentation tanks and pomace bins will be washed out with a combination of water and sodium hydroxide or potassium hydroxide. These additives can reduce the pH of the wastewater, and contribute to the total dissolved solids (TDS) concentration.



Clarification and Racking – Due to the excess grape skins and seeds carried over from the fermentation tanks, wine can have a high concentration of suspended solids directly after fermentation. These solids are called “lees” and are allowed to settle in the barrel during the aging process. To improve the clarity and quality of the wine, the liquid will be removed from the initial barrel, and placed in a new barrel that is free of settled solids. This process is called “racking” and will often occur several times through the wine aging process, which can last for several years. The first racking will most likely occur between the months of November and January. The lees that are washed out of barrels after the first racking are known as “gross lees.” Gross lees represent the largest solid particles collected during the racking process. Responsible wineries will de-water the gross lees, and dispose of the solids off-site. However, lees are often washed out of barrels and allowed to drain to the process wastewater system due to their high water content. Wastewater generated from this process will typically have very high total suspended solids (TSS) content, and a very high biological oxygen demand (BOD). Additionally, tartaric acid can be added to the wine to adjust the acidity. Process wastewater generated by racking after pH treatment can negatively affect the natural biological treatment process in the primary wastewater tanks. As clarification and racking are part of the process used to “age” wine, it is possible for wastewater to be generated by this phase year round.

Filtering and Bottling – Wine that has reached the end of its aging process will be filtered and bottled. This process can occur throughout the year due to wine types aging at different rates and the winery’s production schedule. The wine storage barrels will often be washed and reused. Equipment used for bottling will be washed on a daily basis. The wastewater strength at this stage of the wine making process is typically much lower than the previous three stages of winemaking.

B. Estimating Wastewater Quantity

As every individual winery incorporates differing winemaking methods and equipment, the actual annual wastewater produced varies for each winery. The amount of wine produced in one year is the most important part in estimating a specific winery’s wastewater generation. Once a winery determines the volume of wine they will produce, various factors can be applied to estimate the wastewater that will be generated from production. Furthermore, it is very important to estimate the peak volume of wastewater that can be generated in one day. Undersized storage tanks and pumps can lead to the costly failure of wastewater treatment systems, and halt the production process. Two methods are currently used by the local wastewater engineering consultants to determine both the annual and daily peak process wastewater flows generated from a winery. The Napa County Method is used to estimate the peak wastewater flow that could occur in one day during harvest. The Industry Method estimates the annual wastewater generation, then distributes a percentage of that flow to each month based on the seasonal behaviors of winemaking. The daily peak flow is then estimated by dividing the volume of wastewater generated during the peak month by the number of days in the month. The Industry Method generally produces a more realistic estimate of wastewater flows. This report will analyze and compare both methods to determine the volume of process wastewater produced, and will size the system based on the more conservative (higher) flow estimate.



Napa County Method

The Napa County Method focuses on determining the maximum daily flow a wastewater system would be required to treat. This method uses two base assumptions: the amount of process wastewater generated annually is only distributed during harvest period, and a multiplication factor of 1.5 is used for process waste generation. The harvest period, shown in **Table 3** below, is divided into days that grapes are crushed based on annual production in order to obtain a flow rate in gallons per day (GPD).

Table 3: Napa Method: Crush Days

Annual Wine Production (gallons)	# of Crush Days
<20,000	30
20,000-50,000	45
>50,000	60

Based on the projected wine production (20,000 gallons), the multiplication factor (1.5), and the number of crush days (45) that wastewater generation is distributed over, the Napa Method estimates a process wastewater (PW) peak harvest flow of **667 gallons per day** (see Appendix 1).

Industry Method

The Industry Method uses a ratio of 4-12 gallons of PW generated per gallon of finished wine produced to determine the annual PW volume produced. The ratio depends on the water conservation techniques utilized within each individual winery. In rare cases, if the winery is water conscious, the ratio can be as low as 4. For a typical winery, the ratio is higher. For Amizetta Winery, a value of 6 gallons of PW per gallon of wine is analyzed. The next step in estimating wastewater quantity is to determine the peak daily flow. The annual estimated PW is broken down into monthly percentage flows. This method attempts to consider the winery operations, which vary by month depending on the winemaking season. For example, with this method, the percentages increase for the harvest months and the percentages decrease for the non-harvest months.

Based on the proposed annual wine production of 20,000 gallons of wine and 6 gallons of PW generated per gallon of wine, the Industry Method estimates 120,000 gallons of PW produced annually. **Table 4** shows the percentage breakdown for monthly and daily flows. This table is located in the 'Wastewater Flow Generation' page of the Water Balance Spreadsheet, found in **Appendix 1**.



PW Generation Table			
Month	% of Annual	Monthly Flow	Average Daily Flow
January	4.0%	4,800	155
February	6.0%	7,200	257
March	6.0%	7,200	232
April	4.5%	5,400	180
May	6.0%	7,200	232
June	7.0%	8,400	280
July	8.5%	10,200	329
August	10.0%	12,000	387
September	16.0%	19,200	640
October	14.0%	16,800	542
November	10.5%	12,600	420
December	7.5%	9,000	290
Total	100.0%	120,000	329

Table 4: Monthly Process Wastewater Flows

Based on Table 4 above, the peak daily process waste flow using the industry method is estimated to be **640 gallons per day**. However, the more conservative County Method result of **667 gallons per day (rounded)** will be used as the basis of septic system design in this report.

C. Estimating Wastewater Quality

The effluent strength parameters for all wineries vary throughout the year as different processes take place in each stage of the winemaking process. Furthermore, the strength of effluent at each individual winery can vary due to differences in the winemaker’s technique and philosophy. The main effluent quality parameters that must be estimated from a winery’s wastewater are the 5-day Biochemical Oxygen Demand (BOD5) and the Total Suspended Solids (TSS), as the concentrations of these constituents are regulated by both the Bay Area Water Quality Control Board and Napa County. The BOD5 concentration is a measurement used to estimate the amount organic matter present in wastewater. The typical BOD5 concentration of raw winery wastewater is 5,000 mg/L. The TSS concentration is a measure of solid particles that have not yet settled out of the wastewater.

Several additional wastewater constituents must also be estimated, as they have a direct correlation with the treatment processes used to reduce BOD5 and TSS concentrations. The total dissolved solids (TDS) present in wastewater can be an indicator for the amount of additives used to clean winery equipment, which can affect the pH balance and destroy the bacteria that reduce organic matter in wastewater. The pH value affects bacteria that consume organic matter in the wastewater. The dissolved oxygen (DO) level can tell wastewater treatment operators that the bacteria need more or less oxygen in order to consume and reduce organic matter present in the wastewater. In addition to oxygen, bacteria need nitrogen to fuel their consumption of organic matter. The nitrogen concentration in wastewater will alert wastewater treatment operators to how much nitrogen they need to add to the wastewater in order for bacteria to most efficiently consume organic matter. Fortunately, the presence of fecal coliform’s and other pathogens are not detectable in process waste, and will not be considered a



constituent of concern. The following table provides a range of the expected strength of each wastewater constituent throughout the winemaking year.

Table 5: Typical Process Wastewater Values

Constituent	Unit	Peak Season ^a	Off Season ^b
PH		3.8-7.8	3.8-7.8
BOD5	Mg/L	5,000	1,000
TSS	Mg/L	57-3,950	12-400
TDS	Mg/L	315-1,240	214-720
Nitrate	Mg/L	0.63-362	0.23-53
Ammonia	Mg/L	2.25	
D.O.	Mg/L	2.3-6.3	2.3-6.3

^a Peak season is September through March

^b Off season runs from April to August

IV. SITE EVALUATION

A site evaluation is required to determine available on-site areas for subsurface dispersal of wastewater generated from the winery. Madrone Engineering completed a site evaluation on May 2, 2018 to locate acceptable soils for a proposed wastewater dispersal area on the property. Ten (10) test pits were excavated in the vineyard. The site evaluation denoting the test pit locations and soil findings can be found in **Appendix 2** of this report.

Soils on the site are marginal for septic use, as is typical in this area of the Napa Valley, but all Test Pits contained sufficient soil depth to support a subsurface drip system. The application (infiltration) rate of the soil in this location for this system type is recommended to be no greater than 0.60 gallons per square foot per day.

V. WASTEWATER TREATMENT SYSTEM - OPTION 1

The proposed Option 1 system design proposes to handle the domestic and process wastewater separately. Winery domestic waste would be treated and routed into an engineered sub-surface drip system, and process waste would be treated and reused in vineyard irrigation.

A. Domestic Wastewater System

The domestic wastewater from the winery is to be treated via a standard septic tank (primary treatment), an Orenco AX-20 unit (secondary treatment, described in Section V.C below) with final disposal via subsurface drip lines. The primary treatment system shall be equipped with effluent filters and will treat and remove settleable solids to acceptable concentration levels.

Following is a schematic of the proposed domestic wastewater treatment system:

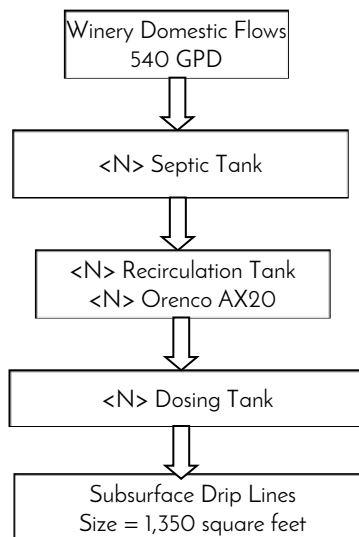


Figure 1: Domestic Wastewater Treatment System Schematic



B. Domestic Wastewater Disposal

The disposal area for the domestic wastewater is proposed to be located in the existing vineyard as identified in the site evaluation. Based on the soils within the vineyard, an application rate of 0.60 gal/ft²/day is used for the design of the Option 1 system.

Required Subsurface Drip Area:

$$\text{squarefeetofdispersal area: } \frac{540 \text{ gpd}}{0.60 \text{ gal/ft}^2} \times 1.5 = 1,350 \text{ ft}^2$$

Because existing slopes are steeper than 20%, the lines shall be spaced at 3 feet instead of 2 feet, which adds 50% to the required area. The primary disposal area shall consist of 1,350 square feet of subsurface drip line.

C. Domestic Wastewater Reserve Area

See discussion in Section VI.E.

D. Process Wastewater - Primary Treatment

Primary treatment provides partial removal of TSS and BOD through the gravitational settling of solids, as well as a small amount of biological treatment. Raw wastewater will flow via gravity from various sources throughout the site into a septic tank system. All septic tanks are to be equipped with an effluent filter. Within the septic tanks, solids will settle out of solution, and the remaining wastewater will continue to gravity flow to the next step of the treatment process. Detention time in the holding tank plays a large factor in reduction of TSS and BOD. In general, a longer detention time means more reduction of pollutants.

The strength of process wastewater is generally not reduced to the same extent as domestic wastewater. The reduction of BOD₅ is typically below 30%, and depends on the detention time.

To aid in BOD and TSS reduction, the semi-treated effluent will enter into a second tank with two areas: an aeration portion and a secondary settling portion. The BOD level shall be reduced by 95% to less than 300 mg/L and the TSS shall be reduced to less than 300 mg/L prior to entering secondary treatment system.

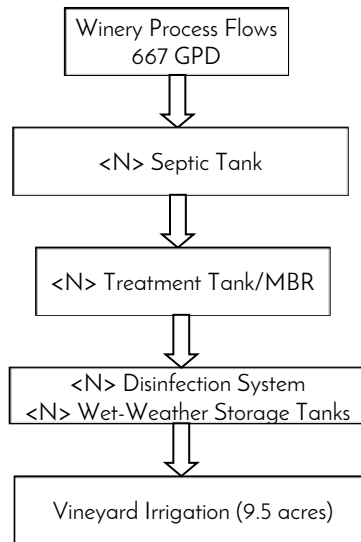


Figure 2: Process Wastewater Treatment System Schematic



E. Process Wastewater - Secondary Treatment

The semi-treated effluent from both domestic and process sources will enter into a secondary treatment system, consisting of a treatment tank and a BioBarrier MBR treatment unit. The BOD level shall be reduced to less than 30 mg/L and the TSS shall be reduced to less than 30 mg/L prior to entering the dosing tank. A disinfection system shall be provided that treats the water to the State of California Secondary-2.2 standard. Wet weather storage tanks with adequate space to hold at least seven days of peak flow (~4,700 gallons) shall be provided.

F. Process Wastewater - Primary Area

The disposal area for the combined process wastewater (recycled water) is proposed to be the existing vineyard (approximately 9.5 acres). Recycled water shall be used in vineyard areas that are outside required setbacks from wells, streams, and any other required setbacks.

VI. WASTEWATER TREATMENT SYSTEM - OPTION 2

The proposed Option 2 system design handles the combined domestic and process wastewater with a pretreatment system, and disperses effluent into sub-surface driplines.

A. Domestic Wastewater

The domestic wastewater from the winery is to be treated via a standard septic tank (primary treatment), a BioBarrier MBR unit (secondary treatment, described in Section VI.C below) with final disposal via subsurface drip lines. The primary treatment system shall be equipped with effluent filters and will treat and remove settleable solids to acceptable concentration levels.

B. Process Wastewater - Primary Treatment

Primary treatment provides partial removal of TSS and BOD through the gravitational settling of solids, as well as a small amount of biological treatment. Raw wastewater will flow via gravity from various sources throughout the site into a septic tank system. All septic tanks are to be equipped with an effluent filter. Within the septic tanks, solids will settle out of solution, and the remaining wastewater will continue to gravity flow to the next step of the treatment process. Detention time in the holding tank plays a large factor in reduction of TSS and BOD. In general, a longer detention time means more reduction of pollutants.

The strength of process wastewater is generally not reduced to the same extent as domestic wastewater. The reduction of BOD₅ is typically below 30%, and depends on the detention time.

C. Process & Domestic Wastewater - Secondary Treatment

The semi-treated effluent from both domestic and process sources will enter into a secondary treatment system, consisting of a treatment tank and a BioBarrier MBR treatment unit. The BOD level shall be reduced to less than 30 mg/L and the TSS shall be reduced to less than 30



mg/L prior to entering the dosing tank.

D. Process & Domestic Wastewater - Primary Area

The disposal area for the combined process & domestic wastewater is proposed to be located in the existing vineyard as identified in the site evaluation. Based on the soils within the vineyard, an application rate of 0.60 gal/ft²/day is used for the design of the Option 2 system.

Required Subsurface Drip Area:

$$\text{squarefeetofdispersal area: } \frac{1,207 \text{ gpd}}{0.60 \text{ gal/ft}^2} \times 1.5 = 3,020 \text{ ft}^2$$

Because existing slopes are steeper than 20%, the lines shall be spaced at 3 feet instead of 2 feet, which adds 50% to the required area. The primary disposal area shall consist of 3,020 square feet of subsurface drip line. Following is a schematic of the proposed wastewater treatment system:

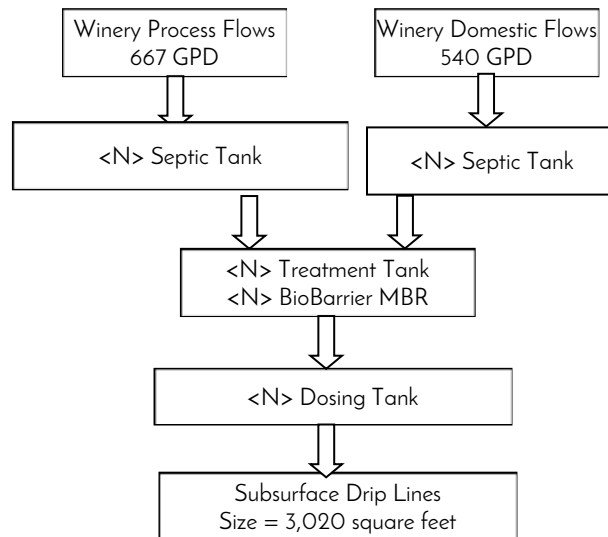


Figure 3: Combined Process & Domestic Wastewater Treatment System Schematic



E. Domestic and Process Wastewater Reserve Areas

In the event a reserve area is required, suitable area has been identified in Test Pits 4 through 10. Reserve area shall also be sized to accommodate the existing 2-bedroom residence on the parcel. Due to the limited depth of suitable soil, the recommended wastewater system type for the reserve area is a sub-surface drip engineered wastewater system. The application (infiltration) rate of the soil in this location for this system type is recommended to be 0.60 gallons per square foot per day. Using this application rate, we can calculate the required reserve area for both domestic and process wastewater as follows:

$$\text{square feet of reserve: } \frac{1,447 \text{ gpd}}{0.60 \text{ gal/ft}^2} = 2,412 \text{ ft}^2 \times 1.5 \times 200\% = 7,235 \text{ ft}^2$$

Please see Appendix 2 for a map showing the proposed reserve area for Option 2.

VII. CONCLUSION

Based on the analysis performed in this report, the Amizetta Winery project is feasible with regard to wastewater disposal. The parcel contains suitable soils and adequate available dispersal area to support the project from a wastewater treatment perspective. Please see the Use Permit Plans for the proposed sizes and location of the primary and reserve areas. Detailed calculations and construction plans will be submitted to the Napa County Department of Environmental Management for approval prior to the construction of the wastewater disposal system.



IX. APPENDIX

1. Water Balance Calculations
2. Site Evaluation Report



APPENDIX 1: WATER BALANCE CALCULATIONS

Project: Amizetta Vineyards
 1089 Greenfield Road
 St. Helena, CA 94574
 APN: 025-390-010

Project Description:

The following calculations are intended to estimate the process and domestic wastewater flows for Amizetta Vineyards.

Winery Process Wastewater Generation

Annual Wine Production	20,000	gallons
	2.4	gal/case
	8,333	cases
Wastewater Generation Rate	6	gal water/gal wine
Annual Process Wastewater	120,000	gal
Crush Length	45	days (<20k, 20k-50k, 50k+)
Wastewater Generation Rate (during crush)	1.5	gal water/gal wine
Daily Wine Production (during crush)	444	gal wine/day
Peak Daily Process Waste (County Method)	667	gal PW/day
Peak Daily Process Waste (Industry Estimation - see table below)	640	gal PW/day

PW Generation Table			
Month	% of Annual	Monthly Flow	Average Daily Flow
January	4.0%	4,800	155
February	6.0%	7,200	257
March	6.0%	7,200	232
April	4.5%	5,400	180
May	6.0%	7,200	232
June	7.0%	8,400	280
July	8.5%	10,200	329
August	10.0%	12,000	387
September	16.0%	19,200	640
October	14.0%	16,800	542
November	10.5%	12,600	420
December	7.5%	9,000	290
Total	100.0%	120,000	329

Domestic Wastewater Generation

Source	Number	Projected Flow (gpd)	Total Flow No Event Day (gpd)	Total Flow Event Day (gpd)
Full-time employees	5	15	75	75
Visitors (30 max)	30	3	90	90
Private Event	25	15	0	375
Private Residence (bedrooms)*	2	120	240	240
Grand Total		Total Peak Flow	165	540

*Private Residence flows are included for reserve area estimation only



APPENDIX 2:
SITE EVALUATION REPORT

1

Test Pit #

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-68	G	<10	SCL	M-SB	L	VFEB	SS	M-F	F-F	N/A

Test Pit #

2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-32	G	<10	SCL	S-SB	VH	FRB	S	M-F	F-F	N/A
32-54	Massive Clay									

Test Pit #

3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-38	G	<40	SCL	S-SB	H	FRB	S	M-F	F-F	N/A
38-47	Massive Clay									

4

Test Pit #

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-55	G	<10	SCL	M-SB	L	VFB	SS	M-F	F-F	N/A

5

Test Pit #

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-55	G	<10	SCL	M-SB	L	VFB	SS	M-F	F-F	N/A

6

Test Pit #

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-34	G	<20	SCL	M-SB	SH	FRB	SS	M-F	F-F	N/A
34-51	Massive Clay									

7

Test Pit #

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-35	G	<20	SCL	M-SB	L	FRB	SS	M-F	F-F	N/A
35-48	Massive Clay									C-F-Ft

8

Test Pit #

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-51	G	<30	SCL	M-SB	L	FRB	SS	M-F	F-F	N/A

9

Test Pit #

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-32	G	<30	SCL	M-SB	L	FRB	SS	M-F	F-F	N/A
32-50	Massive Clay									C-F-Ft

10

Test Pit #

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-28	G	<30	SCL	M-SB	SH	FRB	SS	M-F	F-F	N/A
28-50	Massive Clay									

Test Pit #

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			

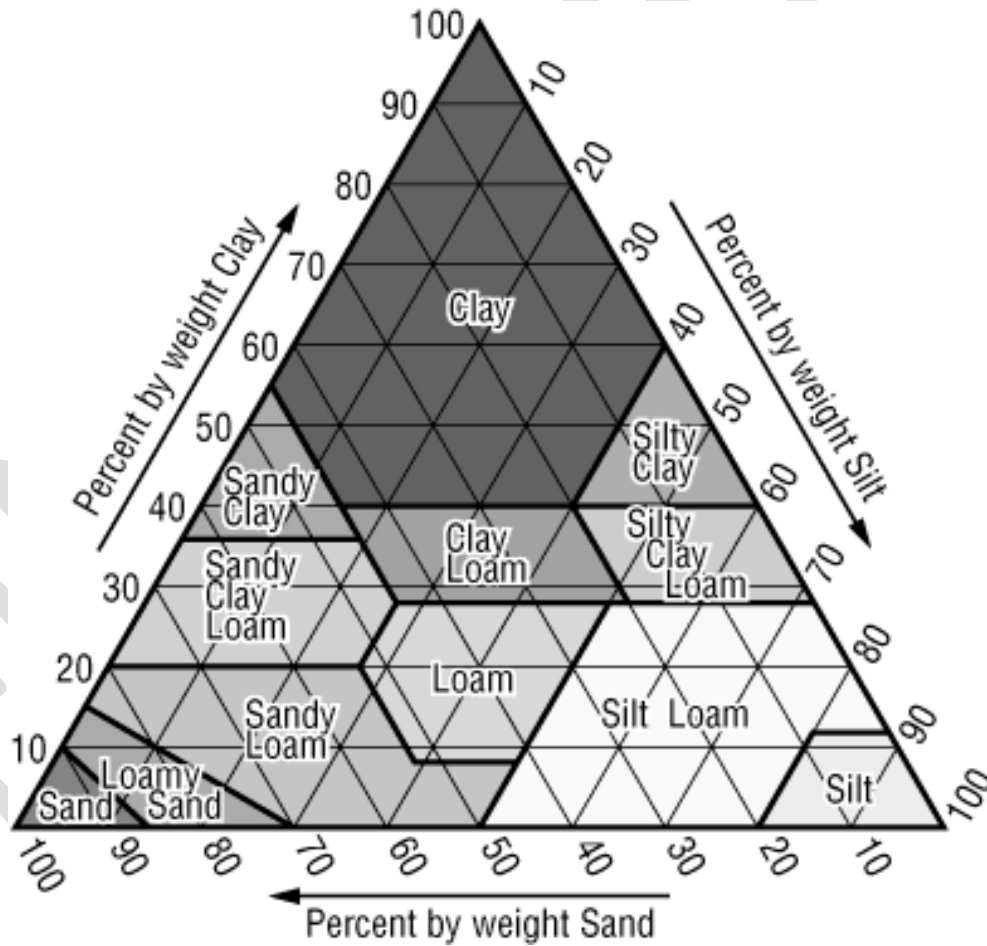
Test Pit #

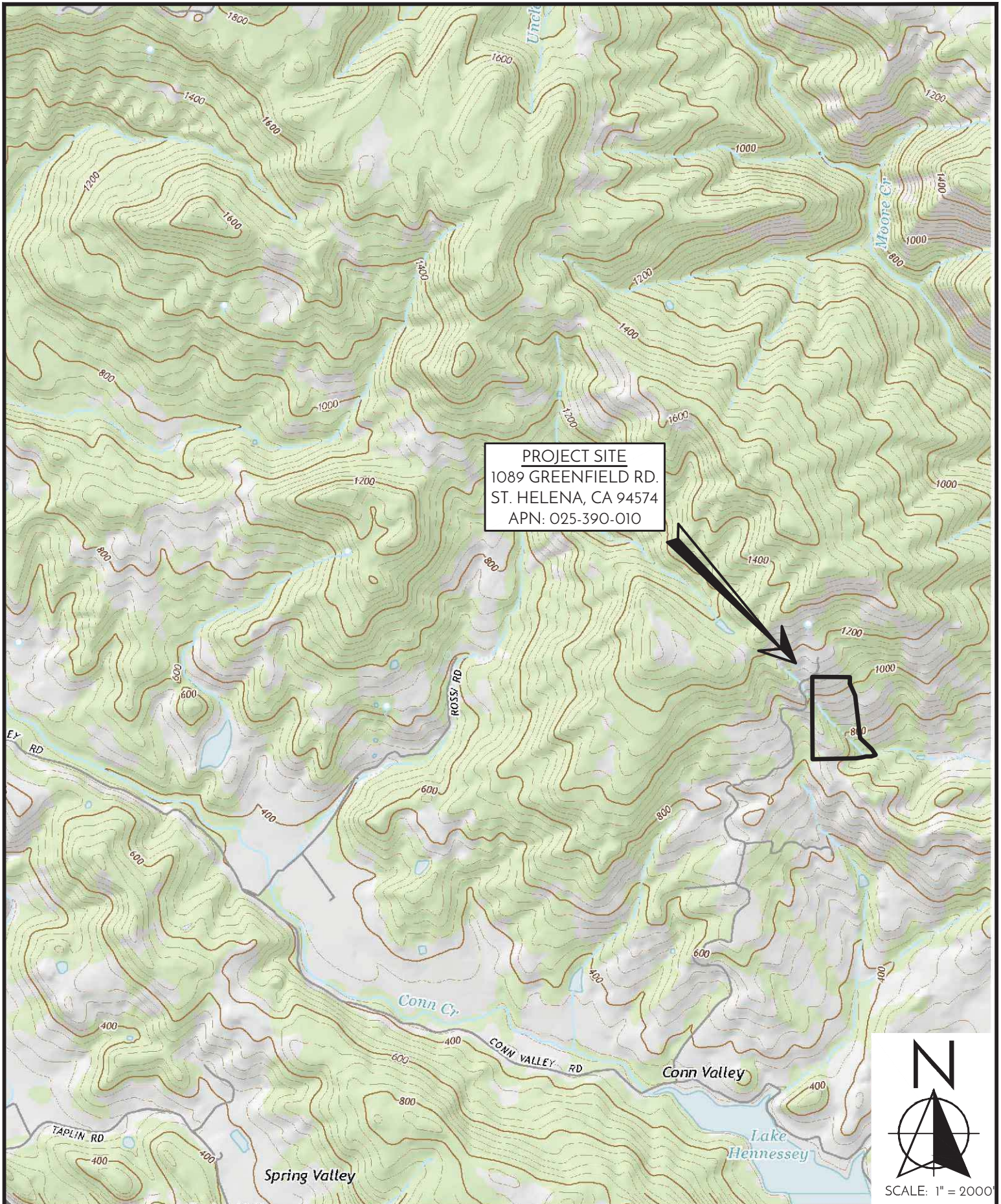
Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			

ABBREVIATIONS

Boundary	Texture	Structure	Consistence			Pores	Roots	Mottling
			Side Wall	Ped	Wet			
A =Abrupt <1" C =Clear 1"-2.5" G =Gradual 2.5"-5" D =Difuse >5"	S =Sand LS =Loamy Sand SL =Sandy Loam SCL =Sandy Clay Loam SC =Sandy Clay CL =Clay Loam L =Loam C =Clay SiC =Silty Clay SiCL =Silty Clay Loam SiL =Silt Loam Si =Silt	W =Weak M =Moderate S =Strong G =Granular PI =Platy Pr =Prismatic C =Columnar AB =Angular Blocky SB =Subangular Blocky M =Massive SG =Single Grain C =Cemented	L =Loose S =Soft SH =Slightly Hard H =Hard VH =Very Hard ExH =Extremely Hard	L =Loose VFRB =Very Friable FRB =Friable F =Firm VF =Very Firm ExF =Extremely Firm	NS =NonSticky SS =Slightly Sticky S =Sticky VS =Very Sticky NP =NonPlastic SP =Slightly Plastic P =Plastic VP =Very Plastic	Quantity: F =Few C =Common M =Many Size: VF =Very Fine F =Fine M =Medium C =Coarse VC =Very Coarse	Quantity: F =Few C =Common M =Many Size: F =Fine M =Medium C =Coarse VC =Very Coarse ExC =Extremely Coarse	Quantity: F =Few C =Common M =Many Size: F =Fine M =Medium C =Coarse Contrast: Ft =Faint D =Distinct P =Prominent

U.S.D.A. SOIL CLASSIFICATION TRIANGLE





PROJECT SITE
 1089 GREENFIELD RD.
 ST. HELENA, CA 94574
 APN: 025-390-010



SCALE: 1" = 2000'

1089 GREENFIELD RD.
 VICINITY MAP

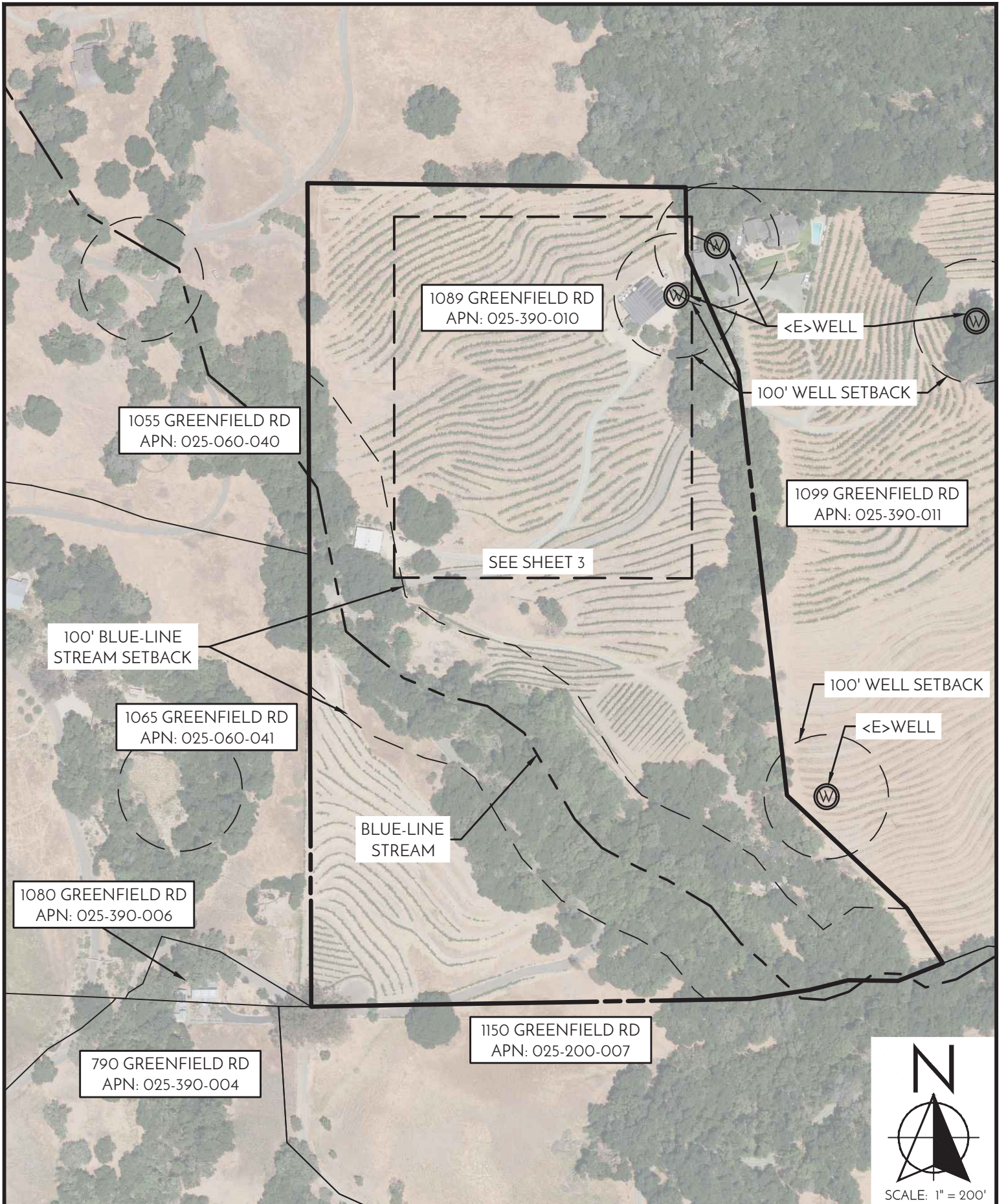


1485 MAIN ST., SUITE 302
 ST. HELENA, CA 94574
 (707) 302-6280

madrone
 engineering

DATE:	07/04/2018
SCALE:	1" = 2000'
JOB #	18.027
APN:	025-390-010

SHEET	1
OF	3



SCALE: 1" = 200'

1089 GREENFIELD RD OVERALL SITE MAP



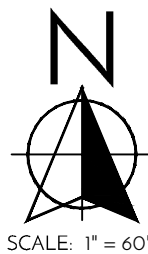
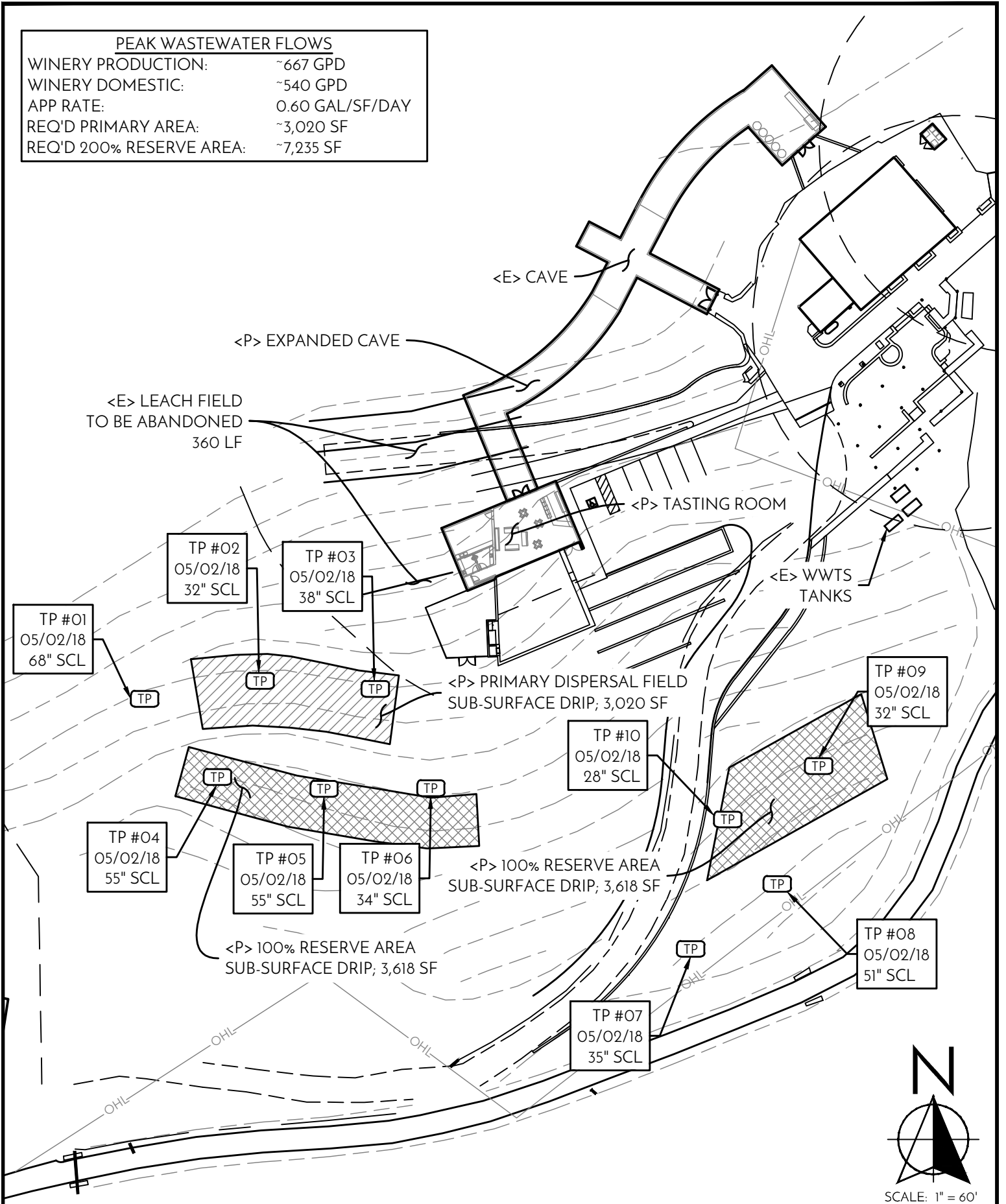
1485 MAIN ST., SUITE 302
ST. HELENA, CA 94574
(707) 302-6280

DATE:	07/04/2018
SCALE:	1" = 200'
JOB #	18.027
APN:	025-390-010

SHEET	2
OF	3

PEAK WASTEWATER FLOWS

WINERY PRODUCTION:	~667 GPD
WINERY DOMESTIC:	~540 GPD
APP RATE:	0.60 GAL/SF/DAY
REQ'D PRIMARY AREA:	~3,020 SF
REQ'D 200% RESERVE AREA:	~7,235 SF



**AMIZETTA VINEYARDS
TEST PIT MAP**



1485 MAIN ST, SUITE 302
ST. HELENA, CA 94574
(707) 302-6280

DATE:	01/21/2021	SHEET	3
SCALE:	1" = 60'	OF	3
JOB #	18.027		
APN:	025-390-010		