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Wastewater Feasibility Study

ONSITE WASTEWATER DISPOSAL FEASIBILITY STUDY

FOR THE

BEAUTIFUL DAY LLC WINERY

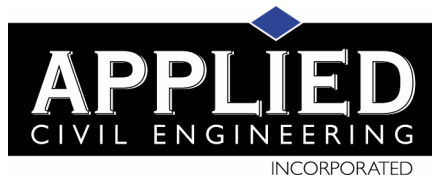
LOCATED AT:

4500 St. Helena Highway North
Calistoga, CA 94515
NAPA COUNTY APN 020-180-037

PREPARED FOR:

Beautiful Day LLC
Care of: Remi Cohen
1473 Yountville Cross Road
Yountville, CA 94599
Telephone: (707) 944-8642

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Job Number: 13-118
Original Date: June 10, 2015
Revision #1: August 27, 2015



8/27/2015

Michael R. Muelrath R.C.E. 67435

Date

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INTRODUCTION

Beautiful Day LLC is applying for a Use Permit to construct and operate a new winery at their property located at 4500 St. Helena Highway North in Napa County, California. The subject property, known as Napa County Assessor's Parcel Number 020-180-037, is located along the northeast side of St. Helena Highway North (State Route 29 / 128) approximately 750 feet northwest of the intersection of St. Helena Highway and Diamond Mountain Road.

The Use Permit application under consideration proposes the construction and operation of a new winery with the following characteristics:

- Wine Production:
 - 30,000 gallons of wine per year
 - Crushing, fermenting, aging and bottling
- Employees:
 - 10 employees max
- Marketing Plan:
 - Daily Tours and Tastings by Appointment
 - 75 visitors per day maximum (Friday – Sunday)
 - 40 visitors per day maximum (Monday – Thursday)
 - Marketing Events
 - 50 per year
 - 40 guests maximum
 - Food prepared offsite by catering company
 - Release Events
 - 2 per year
 - 100 guests maximum
 - Food prepared offsite by catering company
 - Portable toilets brought in for guest use
 - Wine Auction Event
 - 1 per year
 - 100 guests maximum
 - Food prepared offsite by catering company
 - Portable toilets brought in for guest use

Existing structures on the property include a single family residence, a pond, residential and agricultural accessory buildings that support the existing residential and agricultural uses on the property. All domestic wastewater from the residence and associated buildings is collected in septic tank located on the north side of the residence and disposed of in a leach field located north of the residence. Please see the Beautiful Day LLC Winery Use Permit Conceptual Site Plans for approximate locations of existing and proposed features.

Beautiful Day LLC has requested that Applied Civil Engineering Incorporated (ACE) evaluate the feasibility of disposing of the winery process wastewater as well as the domestic sanitary wastewater that will be generated by the proposed winery via a new onsite wastewater disposal system. The remainder of this report describes the onsite soil conditions, the predicted winery process and sanitary wastewater flows and outlines the conceptual design of an onsite wastewater disposal system.

SOILS INFORMATION

The United States Department of Agriculture Soil Conservation Service Soils Map for Napa County shows the entire property mapped as Bale loam, 0 to 2 percent slopes.

A site specific soils analysis was conducted during a site evaluation performed by ACE on April 10, 2015. The site evaluations consisted of the excavation and observation of eighteen test pits throughout the property. The test pits generally revealed variable depths of acceptable soil ranging from 6 inches to 66 inches with the upper horizon having a USDA soil texture classification of sandy clay loam. The limiting conditions that were observed were the presence of seasonally elevated groundwater tables and high gravel content subsoils.

Please refer to the Site Evaluation Report in Appendix 4 for additional details.

PREDICTED WASTEWATER FLOW

The onsite wastewater disposal system will be designed for the peak winery process wastewater flow and the peak sanitary wastewater flow from the proposed winery. The other existing structures on the property will continue to be served by the existing septic system.

Winery Process Wastewater

We have used the generally accepted standard that six gallons of winery process wastewater are generated for each gallon of wine that is produced each year and that 1.5 gallons of wastewater are generated during the crush period for each gallon of wine that is produced. Based on the size of the winery and our understanding that both red and white wines will be produced we have assumed a 45 day crush period. Using these assumptions, the average and peak winery process wastewater flows are calculated as follows:

$$\text{Annual Winery Process Wastewater Flow} = \frac{30,000 \text{ gallons wine}}{\text{year}} \times \frac{6 \text{ gallons wastewater}}{1 \text{ gallon wine}}$$

$$\text{Annual Winery Process Wastewater Flow} = 180,000 \text{ gallons per year}$$

$$\text{Average Daily Winery Process Wastewater Flow} = \frac{180,000 \text{ gallons}}{\text{year}} \times \frac{1 \text{ year}}{365 \text{ days}}$$

$$\text{Average Daily Winery Process Wastewater Flow} = 493 \text{ gallons per day (gpd)}$$

$$\text{Peak Winery Process Wastewater Flow} = \frac{30,000 \text{ gallons wine}}{\text{year}} \times \frac{1.5 \text{ gallons wastewater}}{1 \text{ gallon wine}} \times \frac{1 \text{ year}}{45 \text{ crush days}}$$

Peak Winery Process Wastewater Flow = 1,000 gpd

Winery Sanitary Wastewater

The peak sanitary wastewater flow from the winery is calculated based on the number of winery employees, the number of daily visitors for tours and tastings and the number of guests attending private marketing events. In accordance with Table 4 of Napa County's "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a design flow rate of 15 gallons per day per employee and 3 gallons per day per visitor for tours and tastings. Table 4 does not specifically address design wastewater flows for guests at marketing events. For marketing events that will have catered meals that are prepared offsite we have conservatively estimated 5 gallons of wastewater per guest. Based on these assumptions, the peak winery sanitary wastewater flows are calculated as follows:

Employees

Peak Sanitary Wastewater Flow = 10 employees X 15 gpd per employee

Peak Sanitary Wastewater Flow = 150 gpd

Daily Tours and Tastings

Peak Sanitary Wastewater Flow = 75 visitors per day X 3 gallons per visitor

Peak Sanitary Wastewater Flow = 225 gpd

Marketing Events with Catered Meals Prepared Offsite:

Peak Sanitary Wastewater Flow = 40 guests X 5 gallons per guest

Peak Sanitary Wastewater Flow = 200 gpd

Release and Wine Auction Events with Catered Meals Prepared Offsite:

Peak Sanitary Wastewater Flow = 100 guests X 5 gallons per guest

Peak Sanitary Wastewater Flow = 500 gpd

Total Peak Winery Sanitary Wastewater Flow

As previously noted, all events with more than 40 guests in attendance will utilize portable sanitary facilities to minimize the load on the septic system. Therefore, assuming that daily tours and tastings and a maximum of one marketing event may occur on the same day the total peak winery sanitary wastewater flow is based on employees, daily tours and tastings and a marketing event for 40 people and is calculated as follows:

Total Peak Winery Sanitary Wastewater Flow = 150 gpd + 225 gpd + 200 gpd

Total Peak Winery Sanitary Wastewater Flow = 575 gpd

RECOMMENDATIONS

Based on the anticipated wastewater flows, the proposed site layout and the finding of relatively shallow acceptable soil depths we recommend that the process and sanitary wastewater generated at the proposed winery be kept separate for treatment and disposal. The sanitary wastewater should be pretreated and disposed of onsite in a subsurface drip type septic system near the winery and the process wastewater should be pre-treated and disposed of via irrigation in the onsite vineyard area. This dual system will allow for a smaller subsurface drip system than if the two waste streams were combined. Furthermore, using the treated winery process wastewater for irrigation will offset groundwater demand and result in greater operational flexibility compared to utilizing the domestic waste subsurface drip disposal system for winery process wastewater disposal.

The conceptual designs of the two wastewater disposal systems are outlined in the following sections of this report.

Sanitary Wastewater Disposal Via Subsurface Drip Disposal Field

Required Disposal Field Area

The disposal field area is calculated based upon the design hydraulic loading rate for the soil conditions and the proposed design flow. In accordance with Table 9 of Napa County's "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a hydraulic loading rate of 0.6 gpd per square foot based on the findings of sandy clay loam soils in the planned disposal field area. Since the slope of the natural ground surface in the area of the proposed disposal field is less than 20% no adjustment is required for slope. Based on these design parameters, the required disposal field area is calculated as follows:

$$\text{Required Disposal Field Area} = \frac{\text{Peak Flow}}{\text{Soil Application Rate}}$$
$$\text{Require Disposal Field Area} = \frac{575 \text{ gpd}}{0.6 \text{ gpd per square foot}}$$

Required Disposal Field Area = 958 square feet

Available Disposal Field Area

Based on the proposed site layout and topographic map prepared by Albion Surveys, we have determined that there is enough area to install approximately 1,000 square feet of subsurface drip disposal field in the vicinity of Test Pits #16 and #17 near the proposed winery site. The conceptual layout of the disposal field is shown on the Beautiful Day LLC Winery Use Permit Conceptual Site Plans in Appendix 2.

Required Reserve Area – Winery and Other Existing Uses

Napa County code requires that an area be set aside to accommodate a future onsite wastewater disposal system in the event that the primary system fails or the soil in the primary area is otherwise rendered unsuitable for wastewater disposal. For subsurface drip type septic systems the reserve area must be 200% of the size of the disposal field area. Since there is not a reserve area already designated for the septic system that serves the existing residence the proposed reserve area must accommodate that system's reserve area requirements as well. According to the Napa County sewage permit, the existing residence has a total of five bedrooms.

The design flow for the reserve area is 575 gpd for the winery sanitary wastewater plus 750 gallons per day for the five bedroom residence for a total of 1,325 gpd. Based on these design parameters, the required reserve area is calculated as follows:

$$\text{Required Reserve Area} = 200\% \times \frac{\text{Peak Flow}}{\text{Soil Application Rate}}$$

$$\text{Require Reserve Field Area} = 200\% \times \frac{1,325 \text{ gpd}}{0.6 \text{ gpd per square foot}}$$

$$\text{Required Reserve Area} = 4,416 \text{ square feet}$$

Available Reserve Area

Based on the proposed site plan and topographic map prepared by Albion Surveys, we have determined that there is enough area to set aside for an additional 4,500 square feet of subsurface drip disposal field in the vicinity of Test Pits #1, #2, #9 and #10 as shown on the Beautiful Day LLC Winery Use Permit Conceptual Site Plans in Appendix 2.

Pretreatment and Septic Tank Capacity

Pretreatment must be provided to treat the winery sanitary wastewater to meet Napa County pretreated effluent standards (BOD < 30 mg/l, TSS < 30 mg/l). There are several options for pretreatment systems that are available to meet this requirement. The Applicant and Engineer will review options and select a suitable pretreatment system designed to meet this requirement prior to application for a sewage permit for the winery sanitary wastewater disposal system. Septic tanks will be sized in accordance with the requirements of the selected pretreatment system.

Process Wastewater Disposal Via Irrigation

Pretreatment

Based on the winery's planned production level and waste flows we recommend that treatment be achieved through the use of a package plant type system or other treatment system designed to accept winery process wastewater that is capable of meeting the following treatment requirements:

Parameter	Pre-treatment*	Post Treatment**
pH	3 to 10	6 to 9
BOD ₅	500 to 12,000 mg/l	<160 mg/l
TSS	40 to 800 mg/l	<80 mg/l
SS	25 to 100 mg/l	<1 mg/l

* Reference California Regional Water Quality Control Board Central Coast Region General Waste Discharge Requirements Order No. R3-2008-0018 for winery process wastewater characteristics

** Required for discharge to land via surface irrigation by Napa County for samples taken at the discharge of the treatment unit.

Process Wastewater Disposal

We propose that disposal of the treated winery process wastewater be via irrigation of the onsite vineyard. The existing vineyard on the winery property totals approximately 20.2 acres after completion of the winery project. For the purpose of this study we have assumed that the winery process wastewater will be applied to only 10 acres of vineyard. This is a conservative assumption to simplify this analysis as much more vineyard is available outside of the required stream and well setbacks (approximately 16.5 acres total). The final irrigation area will be determined and incorporated into the final design with the installation permit application.

In order to accommodate differences in the timing of wastewater generation, irrigation demand, and limitations on wet weather application of treated wastewater a storage tank will be required. We have prepared a water balance calculation to size a tank that will temporarily store wastewater generated at the winery before it is applied to the vineyard. The water balance calculations assumes a monthly winery process wastewater generation rate and a monthly vineyard irrigation schedule based on our past experience with projects of this type. The water balance further assumes that during the summer the treated wastewater will be used to offset the irrigation needs of the vineyard and in the winter application of treated winery process wastewater will be very limited (0.8" maximum per month) to prevent runoff. In the event that winter application is not possible due to extended wet weather patterns winery operations will have to be adjusted to work within the capacity of the storage tank(s) or the tank(s) will need to be emptied by hauling waste to an approved offsite disposal location. The water balance calculations show that the proposed land application area is large enough to accept all of the wastewater generated each month throughout the year without carry over (see Appendix 3). To provide operational flexibility, we recommend that the storage tank have a minimum capacity of approximately 10,000 to 20,000 gallons so that approximately one to two weeks' worth of peak flow can be contained to allow flexibility in irrigation scheduling during the harvest period.

All application of treated winery process wastewater must comply with the requirements of the Napa County Process Wastewater Guidelines for Surface Drip Irrigation.

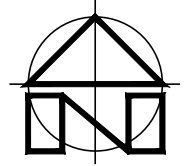
CONCLUSION

It is our opinion that the proposed winery sanitary wastewater disposal needs can be served by an engineered subsurface drip type onsite wastewater disposal system and the winery process wastewater can be pretreated and disposed of via irrigation within the onsite vineyard area. Full design calculations and construction plans should be prepared in accordance with Napa County standards at the time of building permit application.

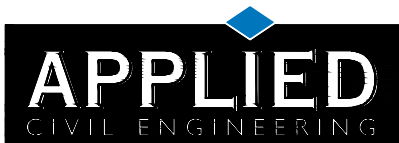
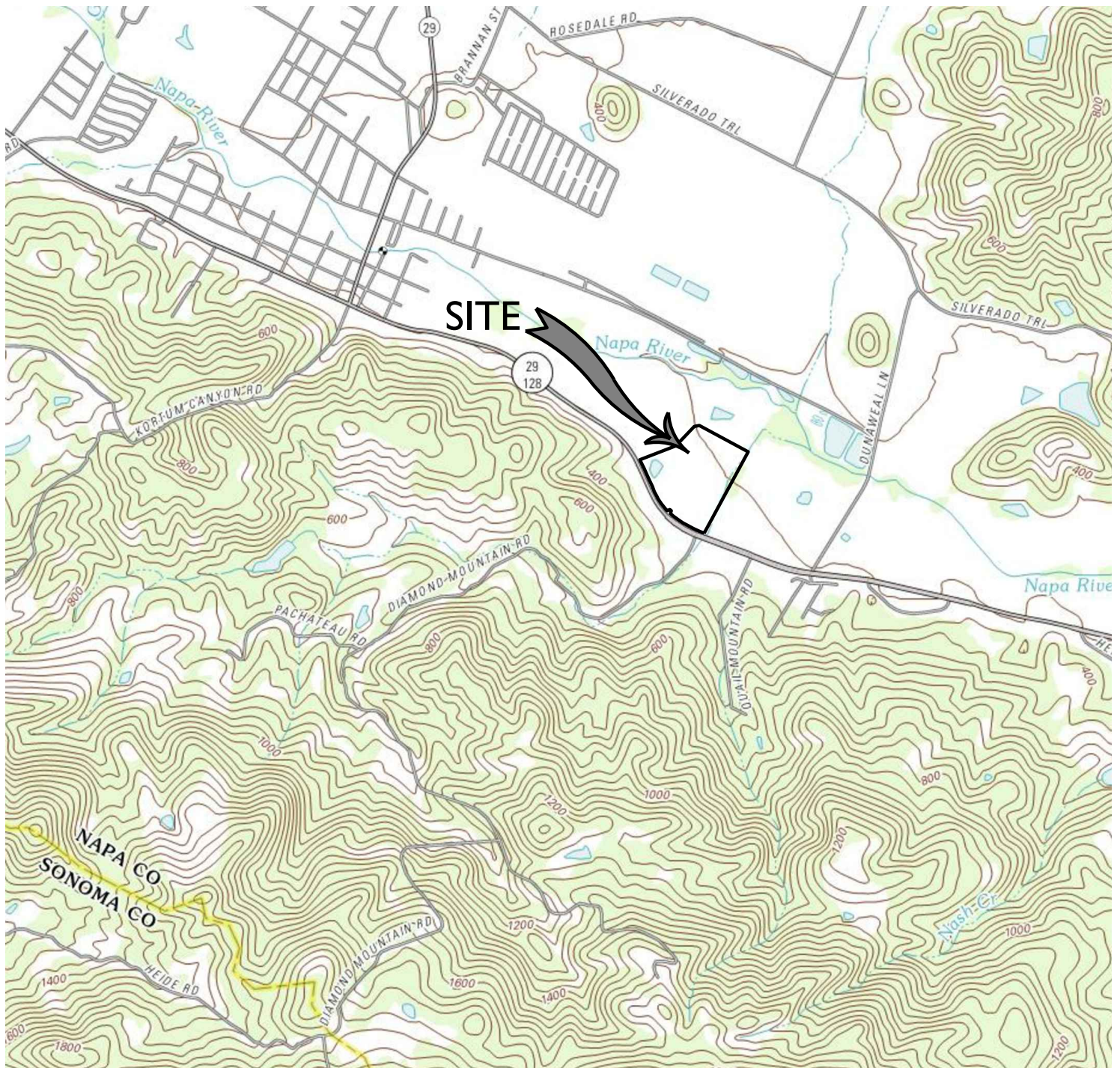
APPENDIX I: Site Topography Map

SITE TOPOGRAPHY MAP

REPRESENTS A PORTION OF THE
UNITED STATES GEOLOGICAL SURVEY 7.5 MINUTE QUADRANGLE
"CALISTOGA, CA"



SCALE: 1" = 2,000'



INCORPORATED

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BEAUTIFUL DAY LLC
4500 SAINT HELENA HIGHWAY
CALISTOGA, CA 94515
APN 020-180

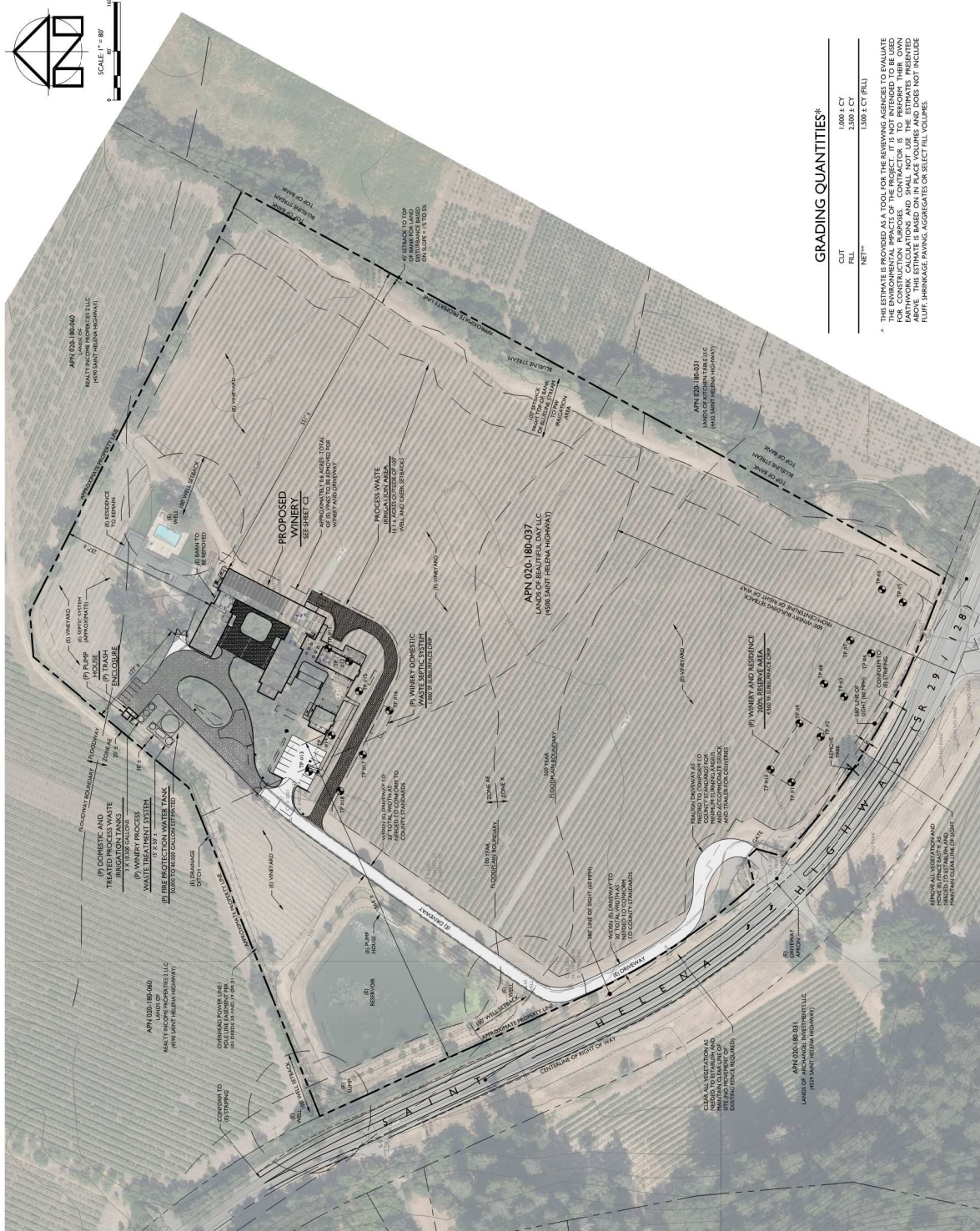
JOB NO. 13-118

AUGUST 2015

APPENDIX 2: Beautiful Day LLC Winery Use Permit Conceptual Site Plans
Reduced to 8.5" x 11"

BEAUTIFUL DAY LLC

WINERY USE PERMIT CONCEPTUAL SITE PLANS



OVERALL SITE PLAN
SCALE 1" = 80'



LOCATION MAP
SCALE 1" = 4,000'

PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:

BEAUTIFUL DAY LLC

1473 YOUNTVILLE CROSS ROAD

YOUNTVILLE, CA 94599

SITE ADDRESS:

4500 SAINT HELENA HIGHWAY

CALISTOGA, CA 94515

ASSESSOR'S PARCEL NUMBER:

003-180-037

PARCEL SIZE:

38.8 ± ACRES

PROJECT SIZE:

3.7 ± ACRES

ZONING:

AGRICULTURAL PRESERVE (AP)

DOMESTIC WATER SOURCE:

PRIVATE WELLS

FIRE PROTECTION WATER SOURCE:

STORAGE TANK

WASTEWATER DISPOSAL:

ON-SITE TREATMENT AND DISPOSAL

SHEET INDEX:

C1 OVERALL SITE PLAN

C2 WINERY SITE GRADING AND LAYOUT PLAN

C3 IMPERVIOUS SURFACE EXHIBIT

C4 STORMWATER CONTROL PLAN EXHIBIT

FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR THE AREA, THE PROJECT SITE IS LOCATED IN A SPECIAL FLOOD HAZARD AREA (SFHA) WITH A 1% ANNUAL CHANCE FLOOD (ACF) FLOOD HAZARD. THE APPROXIMATE FLOOD HAZARD BOUNDARY LINE IS SHOWN ON THIS PLAN. SEE FIRM FOR ADDITIONAL INFORMATION.

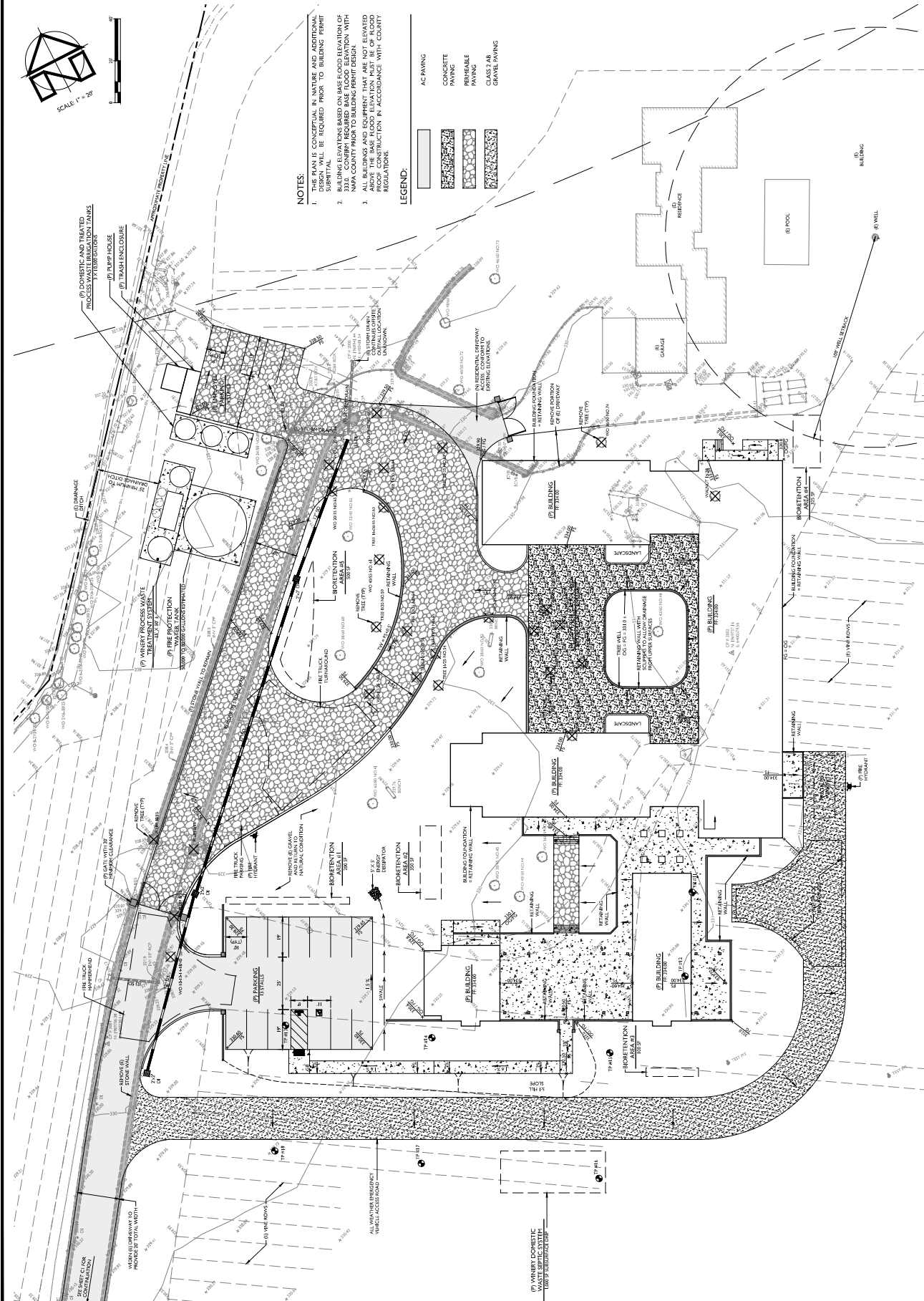
NOTES:

- PAVED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE MAP OF TOPOGRAPHY OF A PORTION OF THE COUNTY OF SAN FRANCISCO, CALIFORNIA, DATED APRIL 24, 2015. APPLIED CIVIL ENGINEERING INCORPORATED ASSURES THE ACCURACY OF THE TOPOGRAPHIC INFORMATION. THE ACCURACY OF THE TOPOGRAPHIC INFORMATION IS NOT GUARANTEED FOR ANY OTHER PURPOSES.
- AERIAL PHOTOGRAPHS WERE OBTAINED FROM THE SAN FRANCISCO EUTAW INSTITUTE (ESI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED 2014. THE PHOTOGRAPHS WERE OBTAINED FROM THE SAN FRANCISCO EUTAW INSTITUTE (ESI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED 2014. THE PHOTOGRAPHS WERE OBTAINED FROM THE SAN FRANCISCO EUTAW INSTITUTE (ESI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED 2014.
- CONTOUR INFORMATION ON SHEET C1 WAS TAKEN FROM THE MAPA COUNTY GIS DATABASE.
- CONTOUR INTERVAL:
SHEET C1: FIVE (5) FEET; HIGHLIGHTED EVERY TWENTY FIVE (25) FEET;
SHEET C2: ONE (1) FOOT; HIGHLIGHTED EVERY FIVE (5) FEET.
- BENCHMARK: NAVD 88
- TEST PITS ONE THROUGH SIXTEEN (TP #1-16) WERE EXCAVATED BY CLIFF LEDE AND WERE FOUND TO BE FREE OF OBSTRUCTIONS. THE RESULTS OF THE TEST PITS WERE USED TO DETERMINE THE LOCATION AND DEPTH OF THE EXISTING AND PROPOSED FOUNDATIONS. THE RESULTS OF THE TEST PITS WERE USED TO DETERMINE THE LOCATION AND DEPTH OF THE EXISTING AND PROPOSED FOUNDATIONS.
- THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

GRADING QUANTITIES*

CUT	1,000 ± CY
FILL	3,500 ± CY
NET**	1,500 ± CY (FILL)

* THIS ESTIMATE IS PROVIDED AS A TOOL FOR THE REVIEWING AGENCIES TO EVALUATE THE ENVIRONMENTAL IMPACTS OF THE PROJECT. IT IS NOT INTENDED TO BE USED FOR EARTHWORK CALCULATIONS AND SHALL NOT BE USED FOR THE PURPOSES OF EARTHWORK CALCULATIONS. THIS ESTIMATE IS BASED ON THE ASSUMPTIONS AND DOES NOT INCLUDE FLUCTUATING FLOODING, SLOPE STABILIZATION, OR SLOPE EROSION.



VINERY SITE GRADING AND LAYOUT CONCEPT PLAN

APPENDIX 3: Water Storage Tank Water Balance Calculations

Irrigation Storage Tank Water Balance

Month	Beginning Balance	Process Wastewater	Land Application	Ending Balance
January	0	9,000	217,219	0
February	0	9,000	217,219	0
March	0	9,000	217,219	0
April	0	7,200	217,219	0
May	0	7,200	189,486	0
June	0	9,000	212,355	0
July	0	13,500	227,601	0
August	0	17,694	199,287	0
September	0	30,006	155,727	0
October	0	27,000	321,763	0
November	0	23,400	217,219	0
December	0	18,000	217,219	0
		180,000	2,609,534	

Notes:

1. All values shown above for beginning balance, inflow, outflow and ending balance are in units of gallons.
2. See attached tables for detailed explanation of process wastewater and irrigation data presented in this table.
3. This water balance is based on the assumption that the tank is empty in August, just prior to crush.
4. Where irrigation demand exceeds available treated wastewater availability additional irrigation water will be provided by another source.

Winery Process Wastewater Generation Analysis

Annual Wine Production	30,000 gallons
Wastewater Generation Rate	6 gallons per gallon of wine
Annual Wastewater Generation	180,000 gallons
Crush Season Length	45 days
Wastewater Generated During Crush	1.5 gallons per gallon of wine
Peak Wastewater Generation Rate	1,000 gallons per day

Winery Process Wastewater Generation Table			
Month	Percentage of Annual Total	Monthly Flow (gallons)	Average Flow (gpd)
January	5.0%	9,000	290
February	5.0%	9,000	321
March	5.0%	9,000	290
April	4.0%	7,200	240
May	4.0%	7,200	232
June	5.0%	9,000	300
July	7.5%	13,500	435
August	9.8%	17,694	571
September	16.7%	30,006	1,000
October	15.0%	27,000	871
November	13.0%	23,400	780
December	10.0%	18,000	581
Total	100.0%	180,000	

Notes:

1. Wastewater generation rates and monthly proportioning are based on our past experience with similar projects.

Irrigation Schedule Analysis

Vineyard Information:

Total acres of vines	10 acres
Vine Row Spacing	10 feet
Vine Spacing	4 feet
Vine density	1,089 vines per acre (average)
Total Vine Count	10,890 vines

Irrigation Information:

Seasonal Irrigation¹ 100.0 gallons per vine (May through October)

Non-Irrigation Application 0.8 inches October through April

Irrigation Schedule					
Month	Monthly Percentage ²	Irrigation per Vine (gallons)	Irrigation (gallons)	Non-Seasonal Irrigation Application (gallons)	Total (gallons)
January		0.0	0	217,219	217,219
February		0.0	0	217,219	217,219
March		0.0	0	217,219	217,219
April		0.0	0	217,219	217,219
May	17.4%	17.4	189,486	0	189,486
June	19.5%	19.5	212,355	0	212,355
July	20.9%	20.9	227,601	0	227,601
August	18.3%	18.3	199,287	0	199,287
September	14.3%	14.3	155,727	0	155,727
October	9.6%	9.6	104,544	217,219	321,763
November		0.0	0	217,219	217,219
December		0.0	0	217,219	217,219
Total	100.0%	100.0	1,089,000	1,520,534	2,609,534

Notes:

1. Irrigation per vine is based on 0.33 acre-feet per acre of vines per Applicant.
2. Monthly vineyard irrigation percentages are based on CIMIS ET_o estimates for Zone 8.
3. Non-Irrigation Application is for managing tank levels and assumes a maximum of 5 operational days per month based on historic weather data (Summit Engineering NBRID Capacity Study, 1996) and a saturated soil infiltration rate of 0.1 gallons per square foot per day uniformly over the entire area.

APPENDIX 4: Site Evaluation Report and Test Pit Map

Please attach an 8.5" x 11" plot map showing the locations of all test pits triangulated from permanent landmarks or known property corners. The map must be drawn to scale and include a North arrow, surrounding geographic and topographic features, direction and % slope, distance to drainages, water bodies, potential areas for flooding, unstable landforms, existing or proposed roads, structures, utilities, domestic water supplies, wells, ponds, existing wastewater treatment systems and facilities.

Permit #: E15-00194

APN: 020-180-037

(County Use Only)

Reviewed by:

Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Beautiful Day LLC			<input checked="" type="checkbox"/> New Construction <input type="checkbox"/> Addition <input type="checkbox"/> Remodel <input type="checkbox"/> Relocation <input type="checkbox"/> Other:	
Property Owner Mailing Address 1473 Yountville Cross Road			<input type="checkbox"/> Residential - # of Bedrooms: Design Flow : gpd	
City Yountville	State CA	Zip 94599	<input checked="" type="checkbox"/> Commercial – Type: Winery Sanitary Waste: ~515 gpd Process Waste: ~1,000 gpd <input type="checkbox"/> Other: Sanitary Waste: gpd Process Waste: gpd	
Site Address/Location 4500 St. Helena Highway Calistoga, CA 94515				

Evaluation Conducted By:

Company Name Applied Civil Engineering Incorporated		Evaluator's Name Michael R. Muelrath, R.C.E. 67435	Signature (Civil Engineer, E.E.H.S., Geologist, Soil Scientist) <i>Michael R. Muelrath</i>
Mailing Address: 2074 West Lincoln Avenue		Telephone Number (707) 320-4968	NO. 67435 Exp. 12/31/2016
City Napa	State CA	Zip 94558	Date Evaluation Conducted April 10, 2015



Primary Area

Acceptable Soil Depth: 24 inches Test pit #'s: 11 through 18
 Soil Application Rate (gal. /sq. ft. /day): 0.6
 System Type(s) Recommended: Pretreatment and Subsurface Drip
 Slope: 0% to 2% Distance to nearest water source: 100' +
 Hydrometer test performed? No ☐ Yes ☒ (attach results)
 Bulk Density test performed? No ☒ Yes ☐ (attach results)
 Percolation test performed? No ☒ Yes ☐ (attach results)
 Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Expansion Area

Acceptable Soil Depth: 27 to 66 inches Test pit #'s: 1, 2, 3, 4, 5, 7, 8, 9 & 10
 Soil Application Rate (gal. /sq. ft. /day): 0.6 Drip, 0.33 Standard
 System Type(s) Recommended: Pretreatment and Subsurface Drip or Standard for SS Only
 Slope: 0% to 2% Distance to nearest water source: 100' +
 Hydrometer test performed? No ☐ Yes ☒ (attach results)
 Bulk Density test performed? No ☒ Yes ☐ (attach results)
 Percolation test performed? No ☒ Yes ☐ (attach results)
 Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Site constraints/Recommendations:

This site evaluation was performed to locate an area that is suitable to support a wastewater system for a future winery. The main constraints are the well, road and creek setbacks. In the vicinity of Test Pits #1 - #10 rocky alluvial deposits create the limiting soil condition. In the vicinity of Test Pits #11-#18 a shallow or perched water table creates the limiting soil condition.

Test Pits #11 - #18 are located near the proposed winery site and it appears that a shallow subsurface drip system could be designed to work with the soil conditions encountered in that area. The reserve area would be located in the vicinity of Test Pits #1 - #10 (avoiding Test Pit #6). Alternatively, a small standard system for the winery domestic waste only could be installed in the vicinity of Test Pits #1 & #10 or #3 & #4. Process waste can be pre-treated and either disposed of in a shallow subsurface drip system or via surface irrigation.

Test Pits #13 - #18 seemed to have a slightly higher clay content and therefore a sample was taken from Test Pit #13 for laboratory analysis to confirm soil texture (see attached).

Test Pit #1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
30-66		0-15	SCL	MSB	S	VFRB	SS	CF/CM/FC	FF	

Note: No standing water
Acceptable soil depth = 66"

Test Pit #2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-27	C	0-15	SCL	MSB	S	VFRB	SS	CF/FM	CF/FM/FC	NONE
27-36		>50							CF	

Note: No standing water
Acceptable soil depth = 27"

Test Pit #3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
30-66		0-15	SCL	MSB	S	VFRB	SS	FF/FM	FF	NONE

Note: No standing water
Acceptable soil depth = 66"

Test Pit #4

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
24-66		0-15	SCL	MSB	S	VFRB	SS	FF/FM	FF	

Note: No standing water
Acceptable soil depth = 66"

Test Pit #5

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-12	G	15-30	SCL	MSB	S	VFRB	SS	CF/FM	CF/FM	NONE
12-27	C	15-30	SCL	MSB	S	VFRB	SS	CF/FM	CF	NONE
27-36		>50								

Note: No standing water
Acceptable soil depth = 27"

Test Pit #6

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-6	G	0-15	SCL	MSB	S	VFRB	SS	CF/CM	FF/FM	NONE
6-42		>50								

Note: No standing water
Acceptable soil depth = 6"

Test Pit #7

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	C	0-15	SCL	MSB	S	VFRB	SS	FF/FM	FF/FM	NONE
30-66		>50						CF/FM	FF	NONE

Note: No standing water
Acceptable soil depth = 30"

Test Pit #8

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
30-66		0-15	SCL	MSB	S	VFRB	SS	FF/FM	FF	NONE

Note: No standing water
Acceptable soil depth = 66"

Test Pit #9

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-36	C	0-15	SCL	MSB	S	VFRB	SS	FF	FF	NONE
36-48		>50								

Note: No standing water
Acceptable soil depth = 36"

Test Pit #10

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-48	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
48-66		30-50	SCL	MSB	S	VFRB	SS	CF/FM	FF	NONE

Note: No standing water
Acceptable soil depth = 66"

Test Pit #11

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF	NONE
30+	TOO WET TO ANALYZE									

Note: Standing water at 42"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 30"

Test Pit #12

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF	NONE
30+	TOO WET TO ANALYZE									

Note: Standing water at 42"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 30"

Test Pit #13

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	SCL	MSB	S	FRB	SS	CF	FF/FM	NONE
24+	TOO WET TO ANALYZE									

Note: Standing water at 36"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 24"

Test Pit #14

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	SCL	MSB	S	FRB	SS	CF	FF/FM	NONE
24+	TOO WET TO ANALYZE									

Note: Standing water at 36"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 24"

Test Pit #15

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
30+	TOO WET TO ANALYZE									

Note: Standing water at 42"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 30"

Test Pit #16

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-27	G	0-15	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
27-36	G	15-30	SCL	MSB	S	VFRB	SS	CF/FM	FF/FM	NONE
36-42	TOO WET TO ANALYZE									

Note: Standing water at 42"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 36"

Test Pit #17

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	SCL	MSB	S	FRB	SS	CF	FF/FM	NONE
24+	TOO WET TO ANALYZE									

Note: Standing water at 32"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 24"

Test Pit #18

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	G	0-15	SCL	MSB	S	FRB	SS	CF	FF/FM	NONE
24+	TOO WET TO ANALYZE									

Note: Standing water at 34"

Acceptable soil depth = 24" – No mottling noted but recommend limiting acceptable soil depth to 24" as roots stop at 24" and soil was very moist below 24"

LEGEND

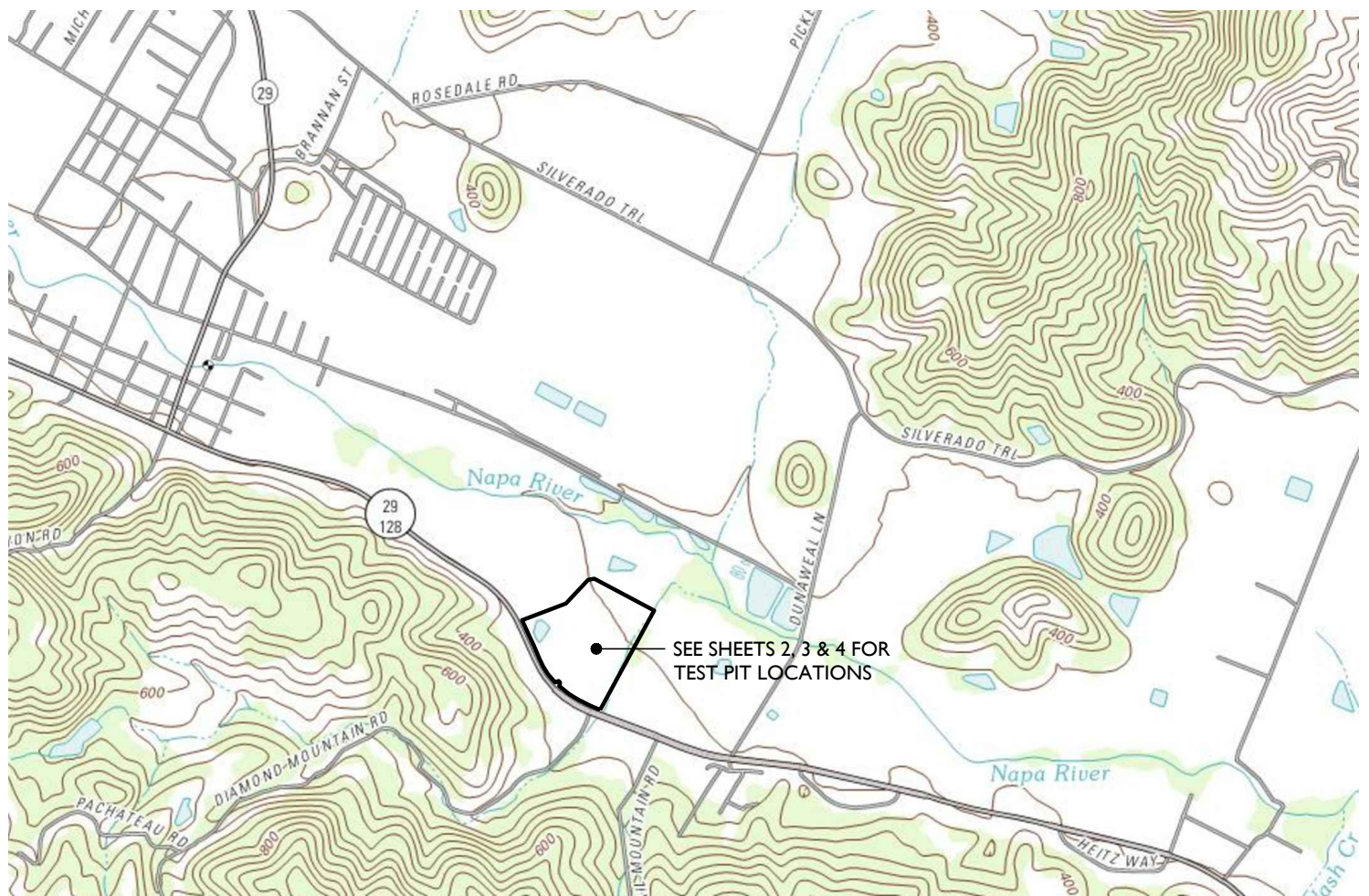
Boundary	Texture	Structure	Consistence			Pores	Roots	Mottling
A =Abrupt <1" C =Clear 1"- 2.5" G =Gradual 2.5"-5" D =Diffuse >5"	S =Sand LS =Loamy Sand SL =Sandy Loam SCL =Sandy Clay Loam SC =Sandy Clay CL =Clay Loam L =Loam C =Clay SiC =Silty Clay SiCL =Silty Clay Loam SiL =Silt Loam Si =Silt	W =Weak M =Moderate S =Strong	Side Wall	Ped	Wet	<u>Quantity:</u>	<u>Quantity:</u>	<u>Quantity:</u>
		G =Granular PI =Platy Pr =Prismatic C =Columnar B =Blocky AB =Angular Blocky SB =Subangular Blocky M =Massive SG =Single Grain CEM =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	F =Few C =Common M =Many <u>Size:</u> VF =Very Fine F =Fine M =Medium C =Coarse VC =Very Coarse	F =Few C =Common M =Many <u>Size:</u> F =Fine M =Medium C =Coarse VC =Very Coarse ExC =Extremely Coarse	F =Few C =Common M =Many <u>Size:</u> F =Fine M =Medium C =Coarse <u>Contrast:</u> Ft =Faint D =Distinct P =Prominent

Notes:

Structure is recorded as Modifier then Structure - for example, Moderate (M) Subangular Blocky (SB) is recorded as MSB

Pores and Roots are recorded as Quantity then Size – for example Few (F) Coarse (C) is recorded as FC

Mottling is recorded as Quantity then Size then Contrast – for example Few (F) Coarse (C) Distinct (D) is recorded as FCD

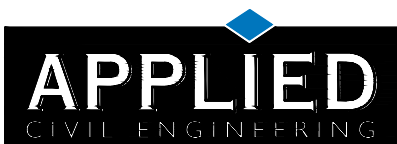


LOCATION MAP

SCALE: 1" = 2,000'

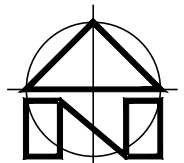
NOTES:

1. TEST PITS ONE THROUGH SIXTEEN (TP #1 - TP #16) WERE EXCAVATED BY CLIFF LEDE VINEYARDS ON APRIL 10, 2015 AND WERE WITNESSED BY MIKE MUELARTH OF APPLIED CIVIL ENGINEERING INCORPORATED AND REBECCA SETLIFF OF THE NAPA COUNTY PLANNING, BUILDING AND ENVIRONMENTAL SERVICES DEPARTMENT - ENVIRONMENTAL HEALTH DIVISION.
2. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE "ALTA / ACSM LAND TITLE SURVEY OF THE LAND DESCRIBED IN THE PRELIMINARY REPORT ORDER NO. 00098592-LT" PREPARED BY FIRST AMERICAN TITLE COMPANY OF NAPA DATED FEBRUARY 15, 2013 AND "LANDS OF DMS R, LLC" PREPARED BY TERRA FIRMA SURVEYS, INC., DATED MARCH 8, 2013 AND THE "MAP OF TOPOGRAPHY OF A PORTION OF THE LANDS OF BEAUTIFUL DAY, LLC" PREPARED BY ALBION SURVEYS INC., DATED APRIL 24, 2015. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
3. CONTOUR INTERVAL: FIVE (5) FEET, HIGHLIGHTED EVERY TWENTY FIVE (25) FEET
4. BENCHMARK: NAVD 88
5. AERIAL PHOTOGRAPHS WERE OBTAINED FROM THE SAN FRANCISCO ESTUARY INSTITUTE (SFEI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED JUNE 2014 AND MAY NOT REPRESENT CURRENT CONDITIONS.
6. ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0229E, EFFECTIVE SEPTEMBER 26, 2008, ALL OR A PORTION OF THE PROJECT SITE IS LOCATED IN A SPECIAL FLOOD HAZARD AREA SUBJECT TO INUNDATION BY THE 1% CHANCE ANNUAL FLOOD (100 YEAR FLOOD). THE APPROXIMATE FLOOD HAZARD BOUNDARY LINE IS SHOWN ON THIS PLAN. SEE FIRM FOR ADDITIONAL INFORMATION.

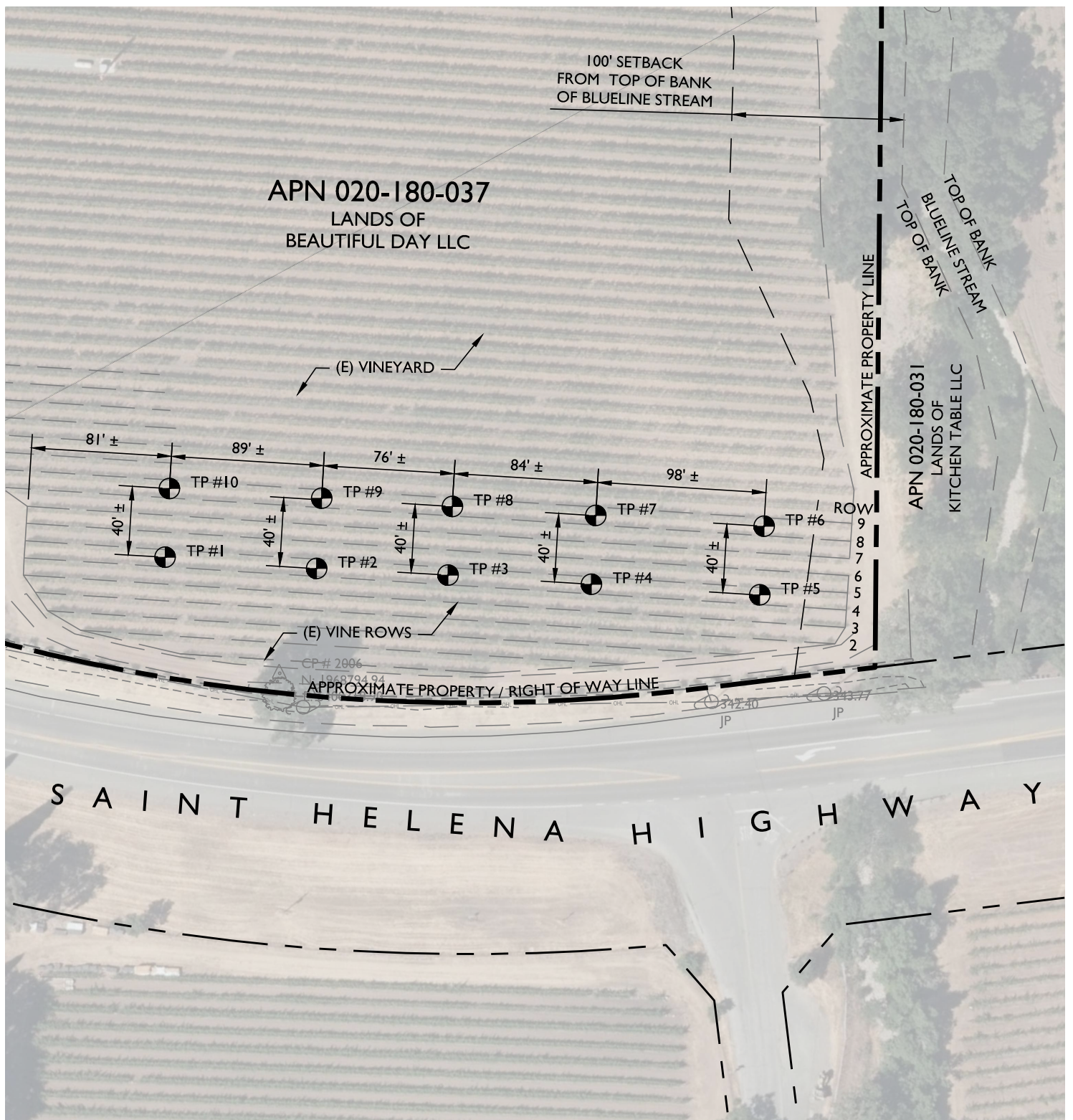


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APN 020-180-037

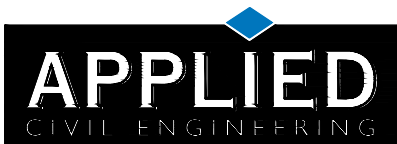


SCALE: 1" = 2,000'



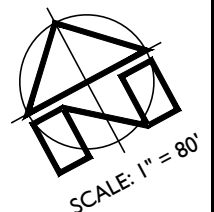
TEST PIT MAP

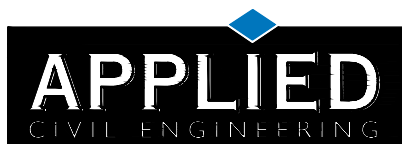
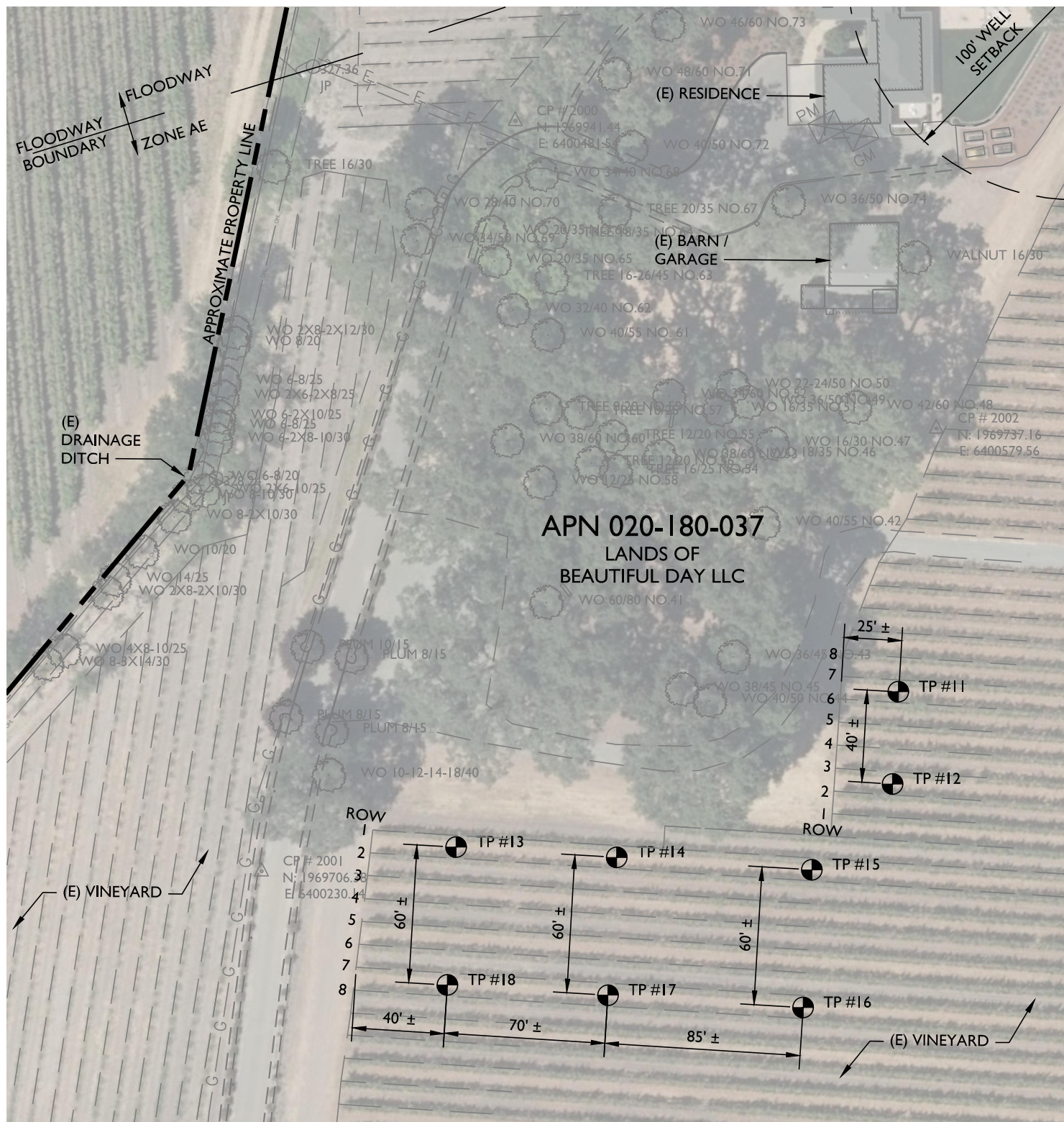
SCALE: 1" = 80'



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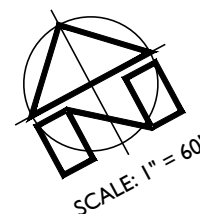
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Experience is the difference

June 1, 2015
File: 9260.13

Mr. Mike Muelrath
Applied Civil Engineering
2074 West Lincoln Ave.
Napa, CA 94558

**Subject: Laboratory Test Results
 Soil Texture Analysis by
 Bouyoucos Hydrometer Method
 4500 St. Helena Hwy**

Dear Mr. Muelrath:

This letter transmits the results of our laboratory testing performed for the subject project. We performed a Soil Texture Analysis by the Bouyoucos Hydrometry Method with the following results:

Size/Density	TP-13 @ 0-24"
+ #10 Sieve	25.9 %
Sand	48.2 %
Clay	25.6 %
Silt	26.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

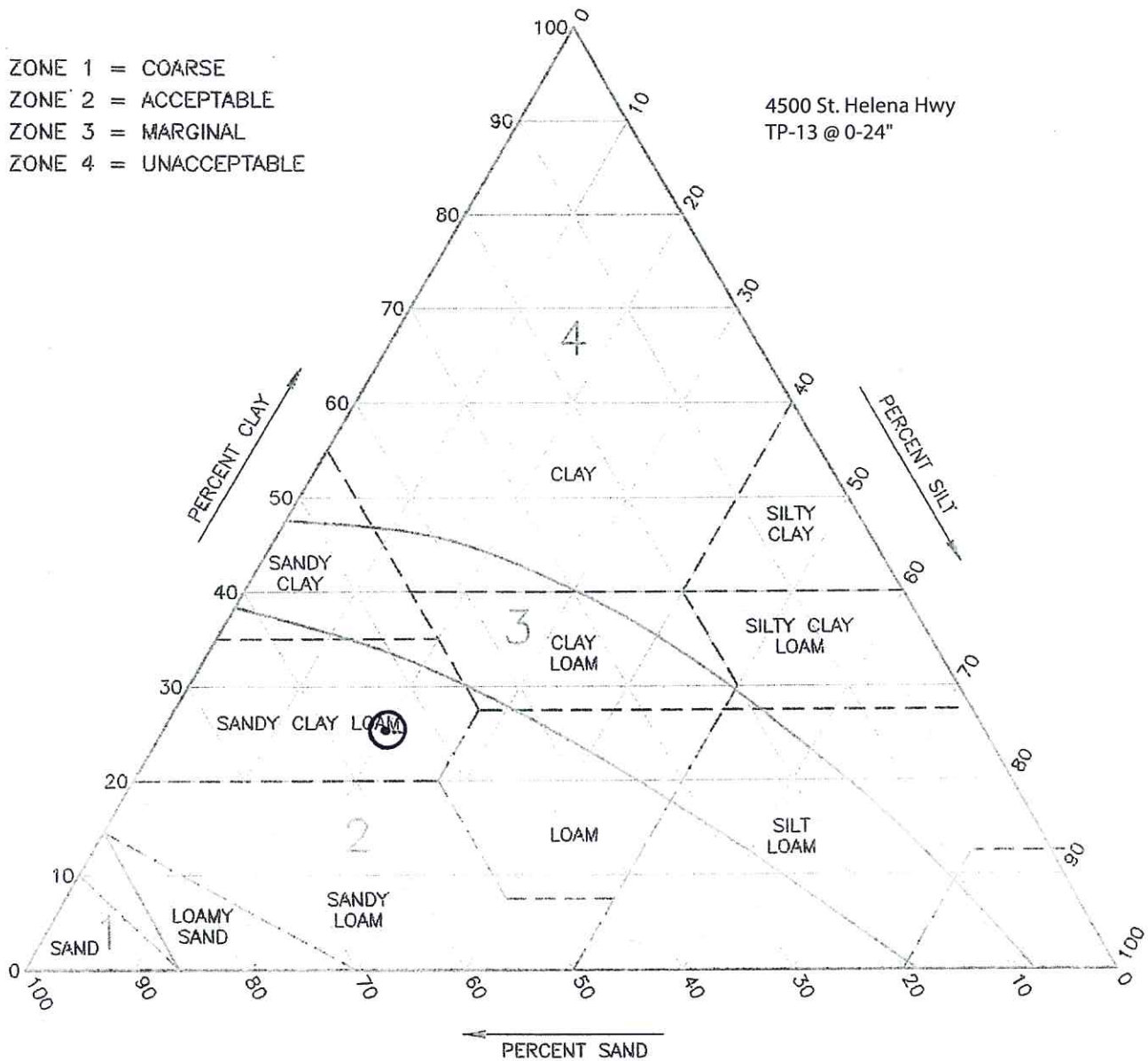
RGH GEOTECHNICAL

George Fotou
Laboratory Manager

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
 ZONE 2 = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

4500 St. Helena Hwy
 TP-13 @ 0-24"



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

Note:

For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis not necessary.