“H”

Wastewater Feasibility Study

Hard Six Cellars Winery P16-00333 & Use Permit Exception to Conservation Regulations P19-00315
Planning Commission Hearing October 16, 2019

DELTA CONSULTING & ENGINEERING
OF ST. HELENA

WASTEWATER FEASIBILITY REPORT

FOR THE

HARD SIX CELLARS
USE PERMIT

PROJECT LOCATED AT

1755 S. FORK DIAMOND MOUNTAIN ROAD
CALISTOGA, CA 94515

COUNTY: NAPA
APN: 020-100-014

INITIAL SUBMITTAL: MAY 16, 2016
REV #1: JANUARY 18, 2019

PREPARED FOR REVIEW BY:

NAPA COUNTY PLANNING, BUILDING
AND ENVIRONMENTAL SERVICES
1195 THIRD STREET
NAPA, CA 94559

1104 ADAMS STREET, SUITE 203 – ST. HELENA, CALIFORNIA 94574
707-963-8456 TELE + WWW.DELTACIVIL.COM

TABLE OF CONTENTS

I. INTRODUCTION

Hard Six Cellars is applying to the County of Napa for a Use Permit to construct and operate a new winery for production and hospitality purposes. The proposed project includes a winery cave for wine storage. This report has been prepared to evaluate the feasibility of treating and disposing domestic and process wastewater flows from the proposed development.

The project's development plan consists of the following uses which contribute wastewater from the proposed development:

- Production Capacity: 20,000 gallons per year
- Employees: Three full-time, one part-time, two harvest
- Daily Visitors: Average 80 per week / Maximum of 16 per day
- Wine Club/Release Events: Four per year with a maximum of 75 guests per event
- Single Auction Event: One per year with a maximum of 125 guests

To limit the size of the proposed wastewater treatment system, the wine club/release event shall use portable toilets and outside catering. Additionally, the single auction event shall use portable toilets and a shuttle bus system to limit vehicular traffic.

This report outlines the design parameters and equipment layout for a new combined process and domestic wastewater treatment system with dispersal to land via a sub-surface drip system. In addition, this revision #1 update was prepared to incorporate an additional site evaluation into the proposed design in order to update the location of the wastewater distribution area.

II. SITE EVALUATIONS

A site evaluation was conducted by Delta Consulting & Engineering and witnessed by Maureen Shields-Bown on November 16, 2015 (E15-00901). The site evaluation excavated four (4) test pits to analyze the in-situ soils and their ability to accommodate a new wastewater treatment system. Soils consisted of a Sandy Loam surface layer underlain by Ash Tuff. The Sandy Loam layer varies in depth from 30"-60" below the surface in the areas explored on-site. Due to the variable depth, 30" was used as the limiting condition for design purposes. Based on these findings, the site was determined to have adequate soil properties and depth to distribute treated wastewater from the proposed development via drip dispersal. The distribution area was intended to be located in the area of test pits #1, #2, and #3 from the November 16, 2015, site evaluation. The site evaluation report denoting the test pit locations and soil findings is on file at Napa County and can be found in *Appendix 2* of this report**.**

Subsequent to the November 16, 2015, site evaluation, a special plant study determined that a portion of the proposed primary and reserve distribution field is located within the zone of a special plant species. As such, a second site evaluation was completed on November 20, 2018 (E18-00894), in order to relocate the distribution field outside of the special plant zone. The second site evaluation can be found in *Appendix 2.*

This report has been modified to incorporate a recently completed second site evaluation and relocate the distribution field (primary and reserve) from the special plant zone.

Due to the existence of the special plant, a second site evaluation of was conducted on November 20, 2018, and witnessed by Avi Soma, Napa County Environmental Management. The site evaluation consisted of three (3)

test pits; test pits #1 and #2 were located on the slope above test pits #1, #2, and #3 from the November 16, 2015, site evaluation and test pit #3 was located in a redwood grove in a different area. See the site evaluation permit E18-00894 for the pit locations. The primary and one of the reserve areas is proposed to be located in the vicinity of test pits #1 and #2 from the November 20, 2018, site evaluation. The second research area is proposed to be located in the vicinity of test pit #3 from the November 20, 2018, site evaluation.

III. WASTEWATER GENERATION

A. Domestic Wastewater Generation

The estimated peak domestic wastewater (DW) generated at the Hard Six Cellars is dependent on the number of employees and visitors present at the winery on a given day. The marketing plan presented above determines the daily maximum number of guests and employees the winery is permitted to have on-site. Portable restrooms will be used for events.

In terms of wastewater generation, the maximum number of persons per day determines the peak domestic wastewater flow per day. Based on the proposed visitation plan and Napa County Regulations[1], the following are estimates for DW design flows:

Employees (max):	6 x 15 gallons/day = 90 gallons/day
Tasting Visitors (max):	16 x 3 gallons/day = 48 gallons/day
Peak Domestic Daily Flow:	**138 gallons/day**

B. Process Wastewater Generation

As each 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 wastewater generation. Once a winery determines their annual production level, various factors can be applied to the production level to estimate the amount of wastewater which may be generated from production.

Two methods are currently used by the local wastewater engineering consultants to estimate the annual and daily peak process wastewater flows generated from a winery. The Napa County Method is used to estimate the peak daily wastewater flow during harvest. The Industry Method utilizes the annual wine production, applies a multiplier to estimate an annual wastewater production level, then distributes a percentage of that flow to each month based the seasonal behaviors of winemaking. The daily peak flow is then estimated by dividing the volume wastewater generated during the peak month by the number of days in that month. The Industry Method generally produces a more realistic estimate of wastewater flows.

Both methods are used below to estimate the peak daily flow rate. Due to its more conservative estimate, the Industry Method's daily peak flow rate will be used for design purposes.

1. Napa County Method
   The Napa County Method focuses on determining the maximum daily flow a wastewater treatment system would be required process and distribute. This method uses two input variables: the annual wine production level in gallons and a 'harvest period'. The harvest period, shown in *Table 1* below, is divided into days that grapes are crushed based on the annual production in order to obtain a peak flow rate in gallons per day (GPD):

[1] Napa County Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems, Appendix 1, Table 4, 2006.

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

Table 1: Napa County Method - Crush Days

Based on the projected wine production of 20,000 gallons, a multiplication factor of 1.5, and a harvest period of thirty (30) days, The Napa County Method estimates a daily peak flow of *1,000 gallons*.

2. Industry Method

The Industry Method applies a multiplier of between four to twelve gallons of PW generated per gallon of finished wine produced to determine the estimated total 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 the new winery, a value of 8 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 projected annual wine production level of 20,000 gallons and 8 gallons of PW generated per gallon of wine, the Industry Method estimates 160,000 gallons of PW produced annually. *Table 2* below shows the percentage breakdown for monthly and daily flows. This table is located in the 'Wastewater Flow Generation' page on the Water Balance Spreadsheet, found in *Appendix 1*.

Month	Day/mo	Estimated % of PW	Monthly PW Flow (gallons)	Average Daily Flow (gallons)	Month
Jan	31	6%	9,600	310	Jan
Feb	28	6%	9,600	340	Feb
Mar	31	7%	11,200	360	Mar
Apr	30	7%	11,200	370	Apr
May	31	7%	11,200	360	May
Jun	30	6%	9,600	320	Jun
Jul	31	6%	9,600	310	Jul
Aug	31	10%	16,000	520	Aug
Sep	30	16%	25,600	850	Sep
Oct	31	16%	25,600	830	Oct
Nov	30	7%	11,200	370	Nov
Dec	31	6%	9,600	310	Dec
	TOTAL	100%	160,000		
			Peak Average Daily Flow:	850 gpd	
				Sep	

Table 2: Estimated Process Wastewater Flows per Industry Method

Based on *Table 2* above, based on the Industry Method the peak process daily wastewater flow is 850 gallons per day.

In estimating the peak day process wastewater generation by the winery, the County Method (1,000 gpd) will be used for this study.

IV. WASTEWATER TREATMENT SYSTEM

The domestic wastewater and process wastewater generated from the winery will be treated through primary settling, aeration, and a two-stage Orenco Advantex filtration system. Treated wastewater will be dispersed by a sub-surface drip system. A description of the wastewater treatment and dispersal is provided below. Please see the Wastewater Field Exhibit in *Appendix 3* for the proposed location of the treatment equipment and primary and reserve dispersal fields for the system.

A. Primary Treatment

Primary treatment provides partial removal of Total Suspended Solids (TSS) and Bio-Chemical Oxygen Demand (BOD) reduction through the gravitational settling of solids and mechanical filtration. Wastewater will flow via gravity from various sources throughout the winery into two underground septic tanks (one for winery domestic waste and one for winery process waste). Within the septic tanks, heavy solids will settle out of solution and allow the remaining graywater to gravity flow to the next step of the treatment process. Additionally, each septic tank will be equipped with an effluent filter at the tank outlet to provide further screening of solids.

Domestic Wastewater - 1,200 Gallon Septic Tank

Domestic wastewater septic tanks are typically sized to provide three days of storage at the peak daily flow rate. Based on the daily peak flow of 138 gallons, the minimum septic tank size should be 414 gallons. However, Napa County requires domestic wastewater storage tanks to have a minimum storage capacity of 1,200 gallons.

Process Wastewater - 2,000 Gallon Septic Tank

In advanced PW treatment systems, the primary settling system mainly used to reduce TSS, as detention time does not provide a significant reduction in BOD. Because of the high organic content in the wastewater, dissolved oxygen is rapidly depleted, resulting in anaerobic conditions. A primary settling system that provides too many days of storage can disrupt the efficiency of downstream treatment components. As such, the primary settling tank is sized to provide approximately 2.0 days of storage during peak loading conditions. Based on the daily peak PW flow of 1,000 gallons, a 2,000-gallon septic tank will provide 2.0 days of storage.

B. Secondary Treatment

After removal of heavy solids through the primary treatment process, domestic and process waste effluent will combine and enter the secondary treatment phase. The expected BOD and TSS concentrations of the combined wastewater entering the secondary treatment system are 5,000 mg/L and 500 mg/L, respectively. Secondary Treatment shall consist of additional above and below ground tanks for nutrient and pH balance, aeration, secondary settling, and media filtration. The Secondary Treatment system is required to reduce BOD and TSS concentrations below 30 mg/L prior to entering the dosing tank for the sub-surface drip dispersal system.

Nutrient Addition and pH Balance

Process wastewater is characterized by low pH and nitrogen concentrations. Optimal levels of both constituents are important for the biological processes that reduce BOD in the aeration stage of treatment. The addition of domestic wastewater can help raise the pH and nitrogen concentrations, but does not

typically bring the wastewater to optimal levels. At Hard Six Cellars, it is anticipated that magnesium hydroxide and liquid urea will be required to facilitate optimal pH and nitrogen concentrations, respectively. The above noted substances will be automatically added to the wastewater in the aeration tank. The substances will be stored in above ground holding tanks not to exceed 500 gallons. The equipment and chemicals for this treatment process are typically provided, operated, and monitored by Heritage Systems, Inc., a water and wastewater quality contracting firm located in Napa, California.

2,500 Gallon Aeration Tank

Process and domestic wastewater from the primary septic tanks will be combined into a single aeration tank. The aeration tank is a critical part of the treatment process. The tank will be outfitted with an aeration pump which supplies dissolved oxygen to the bacteria in the wastewater that will effectively reduce the BOD concentration. The aeration tank must be sized to provide adequate hydraulic retention time for biological activity to take place (8-24 hours). The amount of oxygen to be supplied is determined by the proposed reduction in BOD through this stage of treatment.

The 2,500-gallon tank will provide a hydraulic retention time of approximately 2.5 days at peak loading conditions. The aeration system is designed to reduce the BOD concentration from 5,000 mg/L to 500 mg/L. Because most aerators yield oxygen supply in pounds of oxygen (lbs O_2), the desired reduction in BOD_5 must be converted from mg/L to lbs of O_2 in order to select the appropriate aerator configuration. The conversion is shown below:

BOD (lbs/day) = (Daily Flow MGD) x (BOD mg/L) x (Conversion Constant 8.34 lbs/gal)
BOD (lbs/day) = (0.001 MGD) x (5,000 - 500 mg/L) x (8.34 lbs/gal)
BOD (lbs/day) = 37.1 lbs/day

From the calculation shown above, the bacteria will require approximately 37.1 lbs O_2 / day in order to consume the organic matter in the wastewater. The aerator configuration must be carefully selected to ensure that treatment goals are reached. For this project, the aeration is to be provided by an Orenco pump system fitted with Mazzei injectors and mixing nozzles. With this system, the Orenco pump circulates wastewater through a pipe within the tank. The Mazzei injector sucks air into this pipe to create and air and water mixture. The Mazzei mixing nozzle is installed on the pipe outlet at the bottom of the tank and mixes the air / water mixture throughout the aeration tank.

It is assumed that there will be no reduction of TSS in the aeration tank. A summary of the wastewater strength characteristics after the aeration tank is shown below:

BOD = 500 mg/L
TSS = 500 mg/L

Wastewater from the aeration tank will flow via gravity to the next stage of the treatment system.

2,500 Gallon Secondary Settling Tank

Secondary settling is an important part of a treatment system that involves aeration. The aerators in the settling tank keep solids suspended in solution as the air bubbles are forced through the wastewater. The secondary settling basins are typically sized to provide 2 days of hydraulic retention time. The 2,500-gallon tank for secondary settling will provide approximately 2.5 days of hydraulic retention time. There will be no baffle in the tank and the tank will be fitted with an effluent filter sized to screen solids larger than 1/64" in diameter. The secondary settling tank is expected to reduce the TSS by 20% through gravitational settling

and filter screening. The settling tank is also expected to provide a 10% reduction in BOD, as biological processes will continue to take place in the tank. A summary of the estimated wastewater strength characteristics after this stage of treatment are shown below:

BOD5 = 450 mg/L
TSS = 400 mg/L

Wastewater from the secondary settling tank will flow via gravity to the re-circulation tank.

2,000 Gallon Re-Circulation Tank

The 2,000-gallon re-circulation tank is a primary component of the Orenco Advantex filtration system. It circulates aerated wastewater through the Advantex filters and provides flow surge protection from overloading the filters. According to the manufacture's specifications, the re-circulation tank must be sized to provide storage volume of least 80% of the peak daily flow rate. This specification results in a minimum required tank size of 911 gallons. However, as the re-circulation tank is also a pump tank, it must follow Napa County guidelines to provide a minimum storage of at least 1.5 times the peak daily flow. Based on the Napa County guidelines, this results in a minimum required tank size of 1,707 gallons. A 2,000-gallon re-circulation tank is selected to provide adequate storage and surge protection.

Orenco Advantex Filtration System

To further reduce wastewater strength, an additional stage of biological treatment, used in conjunction with the re-circulation tank, will be included in the treatment system design. The Advantex textile filter, manufactured by Orenco Systems, is a fixed media filter designed to reduce BOD_5 and TSS in the effluent. Properly sized, Orenco Advantex units can reduce up to 90% of the BOD matter and TSS present in wastewater.

To maximize the treatment process and prevent fouling in the filter, Orenco recommends that a peak daily load of 0.08 pounds of BOD per square foot of filter area per day (lbs/ft^2/day) should not be exceeded. In order to calculate the expected load to the filter, the daily flow rate and influent wastewater concentration must be known. It is estimated that the aeration system will reduce the BOD in the wastewater to 450 mg/L. The conversion to pounds of BOD is estimated using the equation described in the aeration tank section above. The ratio between the actual and recommended BOD loading provides the minimum filter area required.

Organic Loading Rate
BOD (lbs/day) = (0.001 MGD) x (450 mg/L) x (8.34 lbs/gal)
BOD (lbs/day) = 3.7 lbs/day

Minimum Filter Area (ft^2) = Peak Daily Load lbs BOD/day / 0.08 lbs BOD/sqft/day
Minimum Filter Area (ft^2) = 3.7 lbs BOD/day / 0.08 lbs BOD/sqft/day
Minimum Filter Area (ft^2) = 46.35 ft^2

The meet the minimum filter area requirements, three Orenco Advantex AX-20 filters are recommended. Each AX-20 unit provides 20 ft^2 of filter area, for a total area of 60 ft^2. Due to the excess filter area of approximately 14 ft^2, it is assumed that the system will provide a 90% reduction in BOD and TSS under normal operating conditions.

A summary of the estimated wastewater strength concentrations after this stage of treatment are:

BOD = 45 mg/L
TSS = 40 mg/L

Because the BOD and TSS still exceed the minimum discharge standards threshold of 30 mg/L, a second (polishing) stage of filtration is required.

The second stage mirrors the design parameters of the first stage including the use of an additional 2,000-gallon re-circulation tank and an Advantex AX-20 unit. For second stage design, the minimum square footage required for the Advantex Filtration Unit is determined as follows:

Organic Loading Rate
BOD (lbs/day) = (0.001 MGD) x (45 mg/L) x (8.34 lbs/gal)
BOD (lbs/day) = 0.37 lbs/day

Minimum Filter Area (ft^2) = Peak Daily Load lbs BOD/day / 0.08 lbs BOD/ft^2/day
Minimum Filter Area (ft^2) = 0.37 lbs BOD/day / 0.08 lbs BOD/fr^2/day
Minimum Filter Area (ft^2) = 4.6 ft^2

For the second/polishing stage 4.6 ft^2 of filter area is required. The smallest unit manufactured by Orenco is the AX-20. Therefore, one AX-20 will be installed for the third/polishing stage of treatment.

A summary of the estimated wastewater strength characteristics after this stage of treatment are shown below:

BOD = 10 mg/L
TSS = 10 mg/L

The BOD and TSS constituents are now below the required concentration threshold for drip dispersal of 30 mg/L and can be dispersed into the sub-surface drip field. Treated wastewater will flow via gravity from the final treatment stage to the dosing tank.

2,000 Gallon Dosing Tank
The dosing tank collects and stores treated wastewater prior to distribution to the proposed dispersal field. At minimum, the tank must be sized to store 1.5 times the peak daily flow rate. Combined, the domestic (138 gpd) and process (1,000 gpd) wastewater is estimated to be 1,138 gpd. The minimum tank size for the wastewater system is 1,707 gallons. A 2,000-gallon tank equipped with duplex pumps is proposed for this project to provide additional surge protection and additional storage.

C. Subsurface Drip Dispersal: Primary & Reserve Area

The primary and one reserve dispersal areas for the combined wastewater will be located in the vicinity of test pits #1 and #2 from the November 20, 2018, site evaluation (E18-00894). The second reserve field will be located in the vicinity of test pit #3 from the November 20, 2018, site evaluation. Based on the Clay Loam soils found in the test pits #1 and #2, an application rate of 0.6 gal/ft^2/day was used to design the total area required for the primary and 200% reserve subsurface drip dispersal areas.

The dividing the daily peak flow rate of 1,138 gpd by the design application rate of 0.6 gal/ft^2/day results in a minimum dispersal area of approximately 1,897 ft^2. The drip field will be located on a ~25%-30% slope and the drip lines will be placed at 4-foot centers which will require a larger dispersal area. The available area for the dispersal area is approximately 200 feet (on contour) by 100 feet or 20,000 ft^2 and provides adequate

area for the primary and 200% reserve area with 4 foot spacing on the drip lines. In addition, test pit #3 from the November 20, 2018, site evaluation is available to provide reserve area.

Please see the Wastewater Field Exhibit located in *Appendix 3* for the location of the primary and reserve areas.

D. System Schematic

The following is a schematic of the combined domestic and process wastewater treatment system.

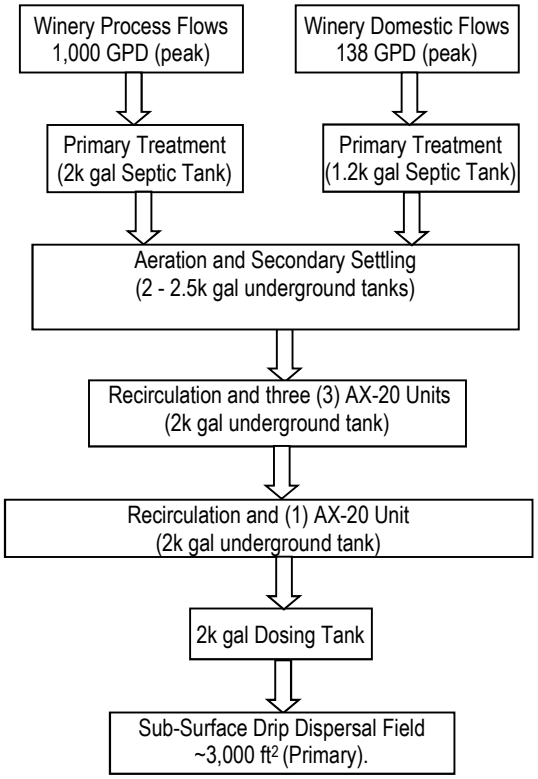


Figure 1: Combined DW + PW Wastewater Treatment System Schematic

V. CONCLUSION

Based on the analysis performed in this report, the Hard Six Cellars project is feasible with regard to wastewater dispersal. The parcel is more than adequate to support the project from a wastewater treatment perspective. See the Use Permit Plans for the proposed sizes and location of the primary and reserve areas for the system described above. Detailed calculations and construction plans will be submitted to the Napa County Environmental Health Division for approval prior to the construction of the final treatment and dispersal system.

VI. APPENDIX

1 Wastewater Flow Generation Calculations
2 Site Evaluation Report
3 Wastewater Field Exhibit

DELTA CONSULTING & ENGINEERING
OF ST. HELENA

APPENDIX 1

WASTEWATER GENERATION CALCULATIONS

Project: Hard Six Cellars
Wastewater Generation
Issue Date: 2019/01/18
Revision: 1

DELTA CONSULTING & ENGINEERING
OF ST. HELENA

Wastewater Flow Generation

Process Wastewater

Winery Production (WP) =	20,000	gallons (2.4 gallons/case)
	8,333	cases/year

Napa County Method: Estimated Peak Process Flows

Theoretical Peak PW generated during Harvest Period=	30,000	gallons
Harvest Period=	30	days
Process Wastewater (Harvest Period) =	1,000	gallons per day

Industry Method

PW Sizing Factor=	8	gallons PW / gallon of wine produced
Total Estimated PW Flows	160,000	**Gallons per year**

Month	Day/mo	Estimated % of PW	Monthly PW Flow (gallons)	Average Daily Flow (gallons)	Month
Jan	31	6%	9,600	310	Jan
Feb	28	6%	9,600	340	Feb
Mar	31	7%	11,200	360	Mar
Apr	30	7%	11,200	370	Apr
May	31	7%	11,200	360	May
Jun	30	6%	9,600	320	Jun
Jul	31	6%	9,600	310	Jul
Aug	31	10%	16,000	520	Aug
Sep	30	16%	25,600	850	Sep
Oct	31	16%	25,600	830	Oct
Nov	30	7%	11,200	370	Nov
Dec	31	6%	9,600	310	Dec
TOTAL		100%	160,000		

Peak Average Daily Flow:	850	gpd
	Sep	

Domestic Wastewater

Use Type	Maximum Quantity (persons)	Waste Flow (GPP)[1]	Days Contributed	Gallons per Day[2]	Annual DW Produced (gallons)
Visitors	16	3	365	48	17,520
Employees	6	15	365	90	32,850
Total Estimated DW Flows =				138	50,370

Average Daily DW Flows[2]= 138 gpd

[1] *GPP = gallons per person; Values From Napa County Department of Environmental Management*

[2] *Portable restrooms shall be used for all events*

Wastewater Summary

Use Type	Day
Process Waste	1,000
Domestic Waste	138
Total Estimated Wastewater Flows =	1,138 gpd

1104 Adams Street, Suite 203
St. Helena, California 94574
707-963-8456 + www.deltacivil.com

Project: Hard Six Cellars
Wastewater Generation
Issue Date: 2019/01/18
Revision: 1

DELTA CONSULTING & ENGINEERING
OF ST. HELENA

Visitation Information (Winery Estimates)

Month	Day/mo	Estimated % of DW*	Monthly DW Flow (gallons)	Average Daily PW Flow (gpd)
Jan	31	6%	3,022	97
Feb	28	6%	3,022	108
Mar	31	7%	3,526	114
Apr	30	7%	3,526	118
May	31	7%	3,526	114
Jun	30	6%	3,022	101
Jul	31	6%	3,022	97
Aug	31	11%	5,541	179
Sep	30	16%	8,059	269
Oct	31	15%	7,556	244
Nov	30	7%	3,526	118
Dec	31	6%	3,022	97
	TOTAL	100%	50,370	

Combined Annual Estimated Wastewater Flow Summary

			Percentage
Total Estimated PW Flows=	160,000	gallons/year	76%
Total Estimated DW Flows=	50,370	gallons/year	24%

Total Estimated Wastewater Flows=	210,370	**Gallons per year**

Combined Flow Breakdown

		PROCESS FLOWS		DOMESTIC FLOWS		COMBINED FLOW TOTALS			
Month	Day/mo	Monthly PW Flow (gallons)	Daily PW Flows (gallons)	Monthly DW Flow (gallons)	Daily DW Flows (gallons)	Total Monthly Flows (gallons)	Combined Annual Percentage Flow:	Month	Combined ADF (gpd)
Jan	31	9,600	310	3,022	97	12,622	6%	Jan	407
Feb	28	9,600	343	3,022	108	12,622	6%	Feb	451
Mar	31	11,200	361	3,526	114	14,726	7%	Mar	475
Apr	30	11,200	373	3,526	118	14,726	7%	Apr	491
May	31	11,200	361	3,526	114	14,726	7%	May	475
Jun	30	9,600	320	3,022	101	12,622	6%	Jun	421
Jul	31	9,600	310	3,022	97	12,622	6%	Jul	407
Aug	31	16,000	516	5,541	179	21,541	10%	Aug	695
Sep	30	25,600	853	8,059	269	33,659	16%	Sep	1,122
Oct	31	25,600	826	7,556	244	33,156	16%	Oct	1,070
Nov	30	11,200	373	3,526	118	14,726	7%	Nov	491
Dec	31	9,600	310	3,022	97	12,622	6%	Dec	407
	TOTAL	160,000		50,370		210,370	100%		

Peak Flow Month Breakdown by Each Flow Stream

Summary		Monthly Flows (gallons)			Daily Flows (gallons)			Percentage Breakdown	
Peak Type	Peak Month	Type Monthly Flows	Other Stream Flow	Total	Process	Domestic	Daily flow	Process	Domestic
From Peak DW Standpoint:	Sep	8,059	25,600	33,659	853	269	1,122	76%	24%
From Peak PW Standpoint:	Sep	25,600	8,059	33,659	853	269	1,122	76%	24%

Maximum Month:	Sep	33,659	1,122	16.0%	<---percentage of annual flow

1104 Adams Street, Suite 203
St. Helena, California 94574
707-963-8456 + www.deltacivil.com

DELTA CONSULTING & ENGINEERING
OF ST. HELENA

APPENDIX 2

SITE EVALUATION REPORTS

E15-00901: NOVEMBER 16, 2015
E18-00894: NOVEMBER 20, 2018

Napa County Department of Environmental Management

SITE EVALUATION REPORT

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 #:	E15-00901
APN:	020-100-014
(County Use Only) Reviewed by:	Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Wayne and Kara Fingerman	☒ New Construction ☐ Addition ☐ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 1085 Lodi Lane	☐ Residential - # of Bedrooms: Design Flow : gpd
City: St. Helena State: CA Zip: 94574	☒ Commercial – Type: Winery Due Diligence Sanitary Waste: 148 gpd Process Waste: 1,000 gpd
Site Address/Location 1755 South Fork Diamond Mountain Road Calistoga, CA 94515	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Delta Consulting & Engineering	Evaluator's Name Bryan Jackson, P.E.	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist) Bryan Jackson
Mailing Address: 1104 Adams Street, Suite 203		Telephone Number 707/963-8456
City: St. Helena State: CA Zip: 94574		Date Evaluation Conducted 11/16/2015

Primary Area	**Expansion Area**
Acceptable Soil Depth: 30 in. Test pit #'s: 1, 2, & 3	Acceptable Soil Depth: 30 in. Test pit #'s: 2, 3, & 4
Soil Application Rate (gal. /sq. ft. /day): 0.9	Soil Application Rate (gal. /sq. ft. /day): 0.9
System Type(s) Recommended: Sub-Surface Drip	System Type(s) Recommended: Sub-Surface Drip
Slope: 25 %. Distance to nearest water source: >100 ft.	Slope: 25 %. Distance to nearest water source: >100 ft.
Hydrometer test performed? No☒ Yes☐ (attach results)	Hydrometer test performed? No☒ Yes☐ (attach results)
Bulk Density test performed? No☒ Yes☐ (attach results)	Bulk Density test performed? No☒ Yes☐ (attach results)
Percolation test performed? No☒ Yes☐ (attach results)	Percolation test performed? No☒ Yes☐ (attach results)
Groundwater Monitoring Performed? No☒ Yes☐ (attach results)	Groundwater Monitoring Performed? No☒ Yes☐ (attach results)

Site constraints/Recommendations:

Test Pit # 1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
10"	C	20	SL	M-SB	L	FRB	NS	C/M	M/C	N/A
10-30"	C	20	SL	M-SB	L	FRB	NS	C/M	M/C	N/A

Test Pit # 2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
10"	C	35	SL	M-SB	L	FRB	NS	C/M	C/M	N/A
10-30"	C	35	SL	M-SB	L	FRB	NS	C/M	C/M	N/A
30-60"	C	45	SL	M-SB	L	FRB	NS	C/M	C/M	N/A
60+	ASH TUFF									

Test Pit # 3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
12"	C	20	SL	M-SB	L	FRB	NS	C/M	M/C	N/A
12-34"	C	20	SL	M-SB	L	FRB	NS	C/M	M/C	N/A
34-60"	ASH TUFF									

Attach additional sheets as needed

Test Pit # 4

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
8"	C	15	SL	M-SB	L	FRB	S	C/M	C/M	N/A
8-50"	C	15	SL	M-SB	L	FRB	S	C/M	C/M	N/A

Test Pit #

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

Test Pit #

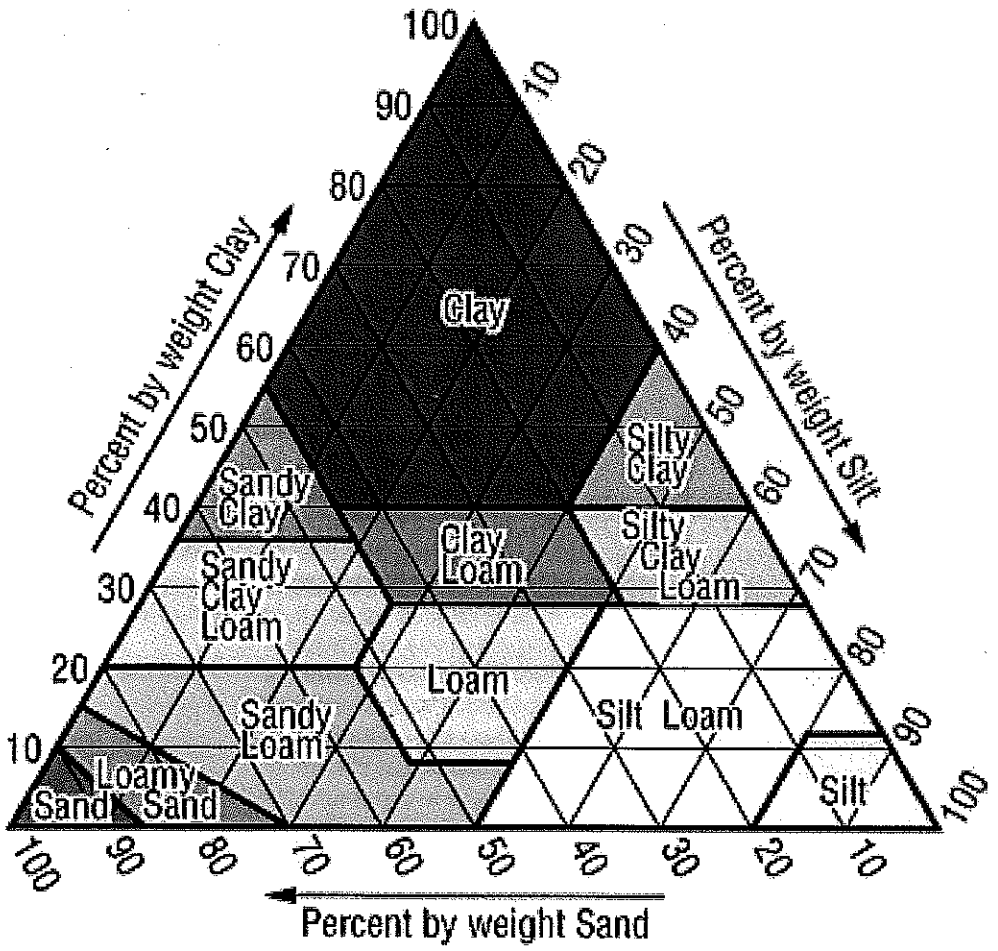
Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			

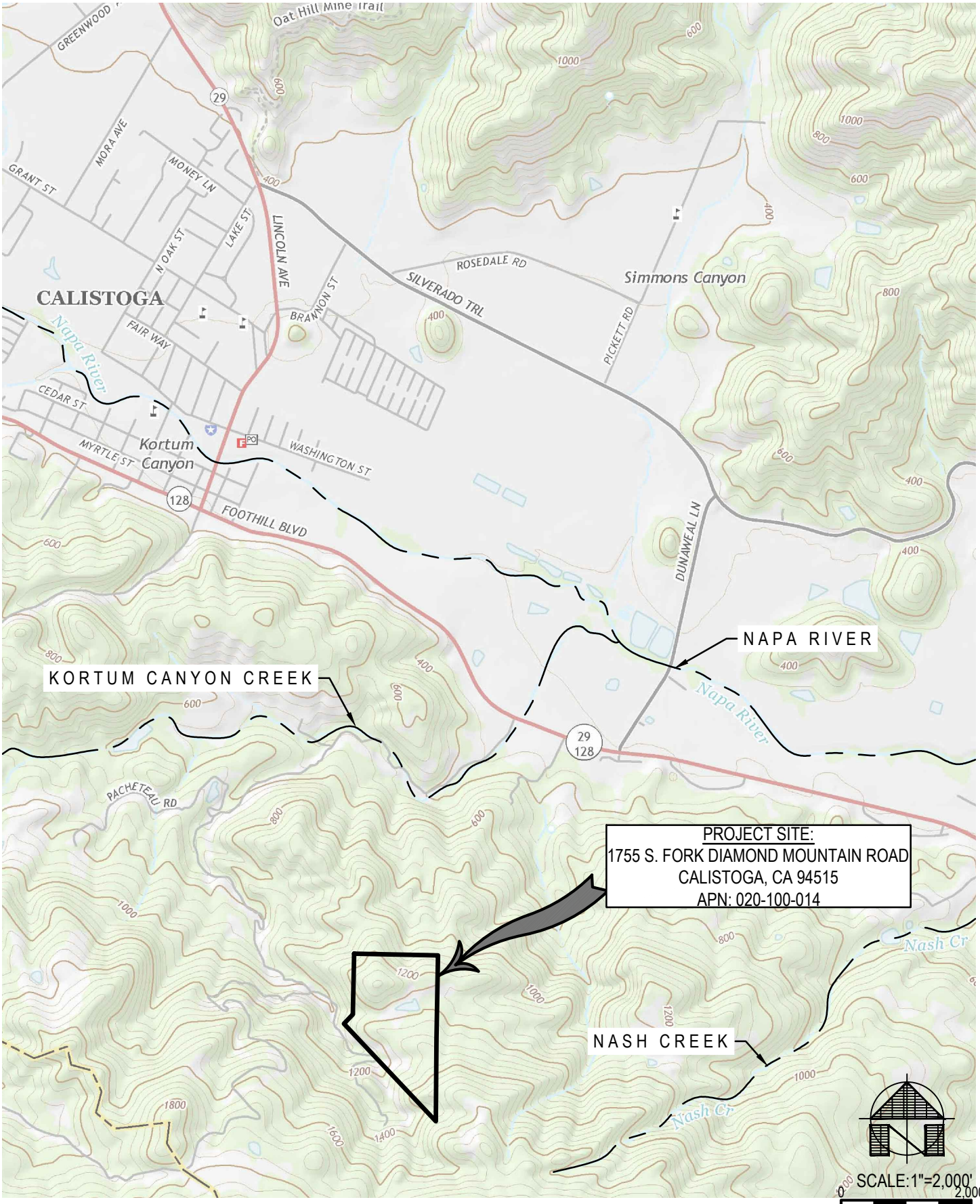
Attach additional sheets as needed

ABBREVIATIONS

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

U.S.D.A. SOIL CLASSIFICATION TRIANGLE





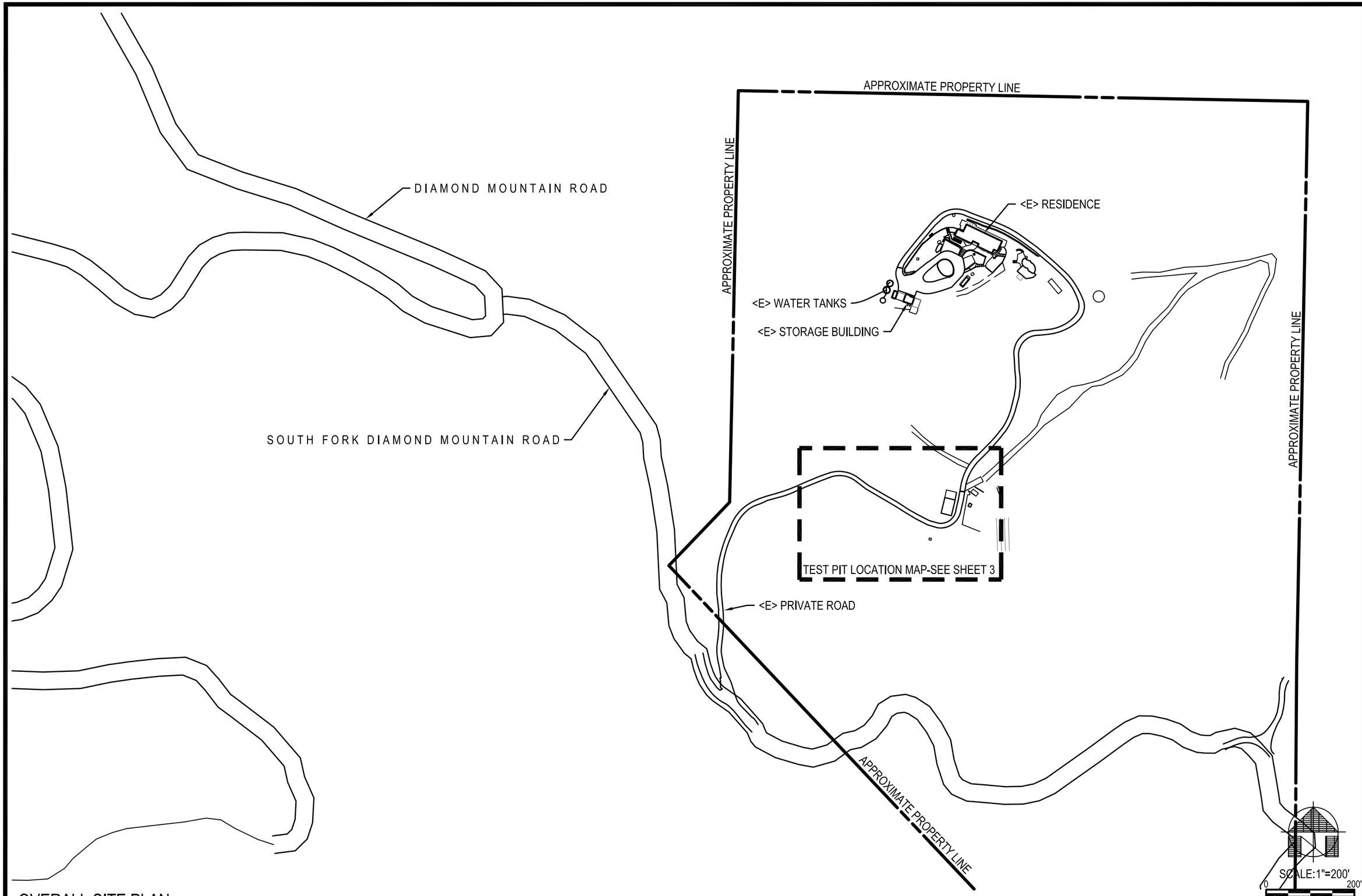
MAP IS FROM USGS 7.5 MIN SERIES MAP: CALISTOGA

SITE EVALUATION
VICINITY MAP

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE: 11/17/2015	JOB # N-116
SCALE: 1"=2,000'	APN: 020-100-014

SHEET 1 OF 3



OVERALL SITE PLAN

SITE EVALUATION
OVERALL SITE PLAN

CALISTOGA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE:	11/17/2015
SCALE:	1"=200'
JOB #:	N-116
APN:	020-100-014

11/16/2015
TP#4
50"/SL

TP

100.0'

130.0'

<E> EP

<E> EDR

<E> EDR

<E> EP

<E> EP

<E> EDR

<E> EDR

<E> CONCRETE PAD
TO BE DEMOLISHED

<E> BARN TO BE DEMOLISHED

<E> DI

<E> WELL

100.0' WELL SETBACK

<E> CULVERT

<E> WELL TO BE DEMOLISHED
PER NAPA COUNTY STANDARDS

<E> FENCE

11/16/2015
TP#3
34"/SL

42.0'

11/16/2015
TP#2
30"/SL

75.0'

58.0'

35.0'

27.0'

11/16/2015
TP#1
30"/SL

SCALE:1"=30'

0 30'

Scale in feet

TEST PIT LOCATION MAP

SITE EVALUATION
TEST PIT LOCATION MAP

CALISTOGA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE:	11/17/2015
SCALE:	1"=30'
JOB #:	N-116
APN:	020-100-014

Napa County Department of Environmental Management

SITE EVALUATION REPORT

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 #:	E18-00894
APN:	020-100-014
(County Use Only) Reviewed by:	Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Wayne and Kara Fingerman	☒ New Construction ☐ Addition ☐ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 1085 Lodi Lane	☐ Residential - # of Bedrooms: Design Flow : gpd
City: St. Helena State: CA Zip: 94574	☒ Commercial – Type: Sanitary Waste: 138 gpd Process Waste: 850 gpd
Site Address/Location 1755 South Fork Diamond Mountain Road Calistoga, CA 94515	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name **Delta Consulting & Engineering**	Evaluator's Name Dane Hoime, P.E.	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: **1104 Adams Street, Suite 203**		Telephone Number **707/963-8456**
City: **St. Helena** State: **CA** Zip: **94574**		Date Evaluation Conducted 11/20/2018

Primary Area	**Expansion Area**
Acceptable Soil Depth: 36 in. Test pit #'s: 1 & 2	Acceptable Soil Depth: 36 in. Test pit #'s: 3
Soil Application Rate (gal. /sq. ft. /day): 0.6	Soil Application Rate (gal. /sq. ft. /day): 0.9
System Type(s) Recommended: Sub-Surface Drip	System Type(s) Recommended: Sub-Surface Drip
Slope: 25 %. Distance to nearest water source: >100 ft.	Slope: 10 %. Distance to nearest water source: >100 ft.
Hydrometer test performed? No ☒ Yes ☐ (attach results)	Hydrometer test performed? No ☒ Yes ☐ (attach results)
Bulk Density test performed? No ☒ Yes ☐ (attach results)	Bulk Density test performed? No ☒ Yes ☐ (attach results)
Percolation test performed? No ☒ Yes ☐ (attach results)	Percolation test performed? No ☒ Yes ☐ (attach results)
Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Site constraints/Recommendations:

This site evaluation was performed to supplement the project's original site evaluation E15-00901. Both site evaluations have been conducted in support of a future winery project currently under Use Permit review P16-00333. A Special-Status Plant Survey for the winery use permit found special status plants in a portion of the future primary and reserve areas located per E15-00901. These special-status plants may not be disturbed by the future installation of a sub-surface drip distribution field. As such, additional test pits were required to relocate a portion of the future primary and reserve areas. Test Pits #1 and #2 in this site evaluation are located near the test pits evaluated in E15-00901 (see attached Test Pit Map), but out of the special status plant area (not shown on attached Test Pit Map). The Septic Feasibility Report for the winery use permit will be updated per the findings in this site evaluation. Test Pit #3 is located in a different area and is shown on the Overall Site Map attached to this report.

Test Pit # 1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-55"	D	15	CL	S-SB	S	FRB	NS	M/M	M/C	N/A

Test Pit # 2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-36"	D	15	CL	S-SB	S	FRB	NS	M/M	M/C	N/A

Test Pit # 3

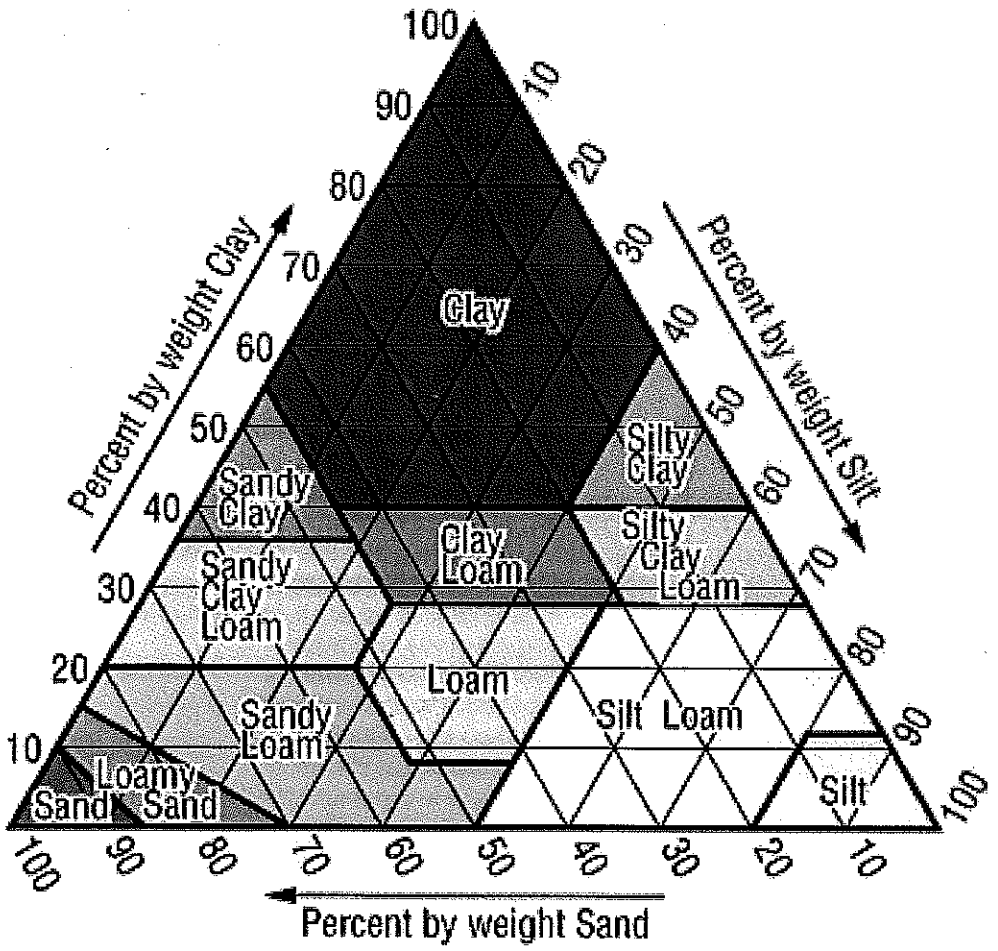
Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-36"	C	10	SL	M-SB	SH	VF	SS	C/M	M/C	N/A

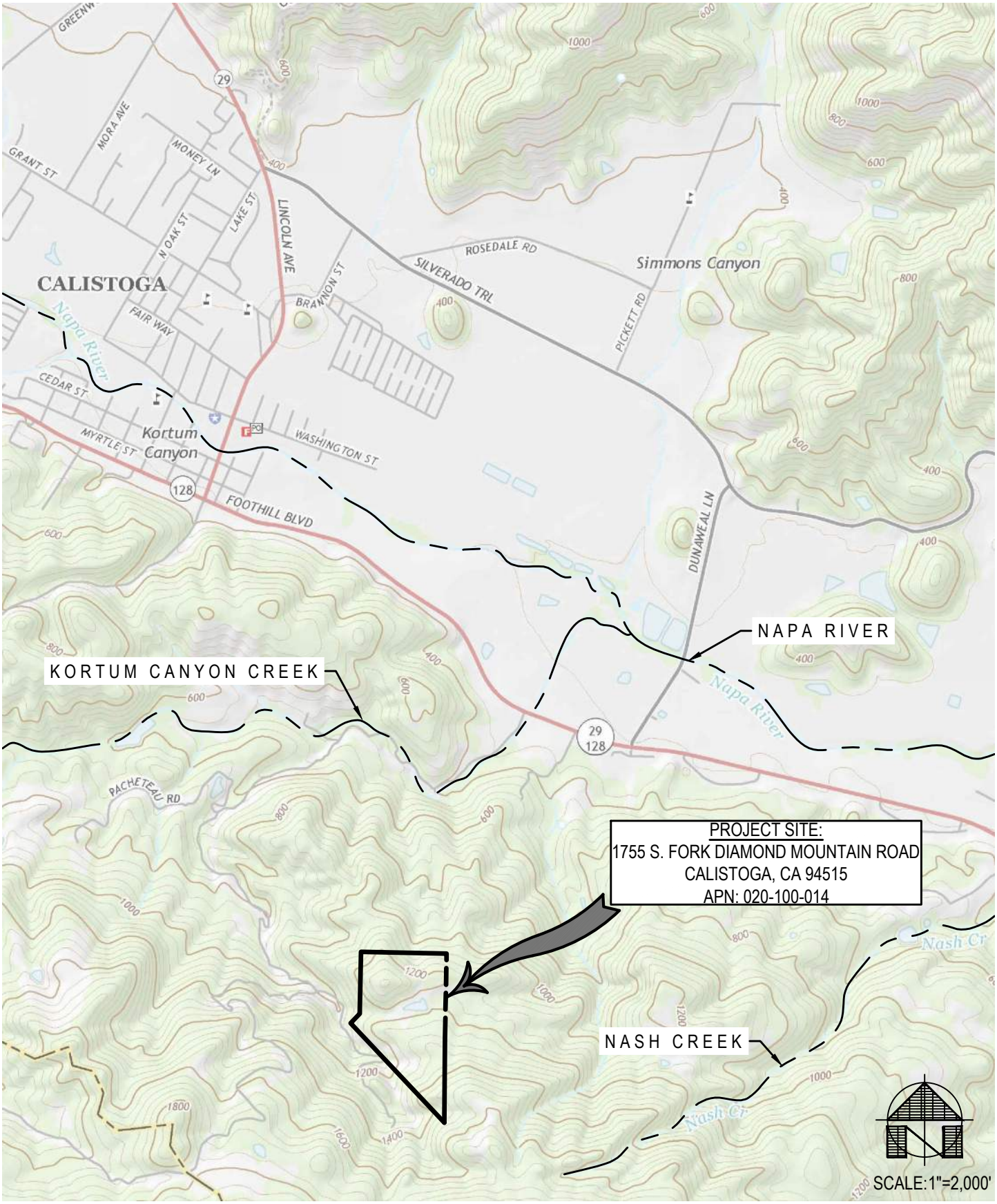
Attach additional sheets as needed

ABBREVIATIONS

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

U.S.D.A. SOIL CLASSIFICATION TRIANGLE





MAP IS FROM USGS 7.5 MIN SERIES MAP: CALISTOGA

0 2,000'

Scale in feet

SITE EVALUATION
VICINITY MAP

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE: 01/1 /2019	JOB # N-116
SCALE: 1"=2,000'	APN: 020-100-014

SHEET 1 OF 3

DIAMOND MOUNTAIN ROAD

SOUTH FORK DIAMOND MOUNTAIN ROAD

APPROXIMATE PROPERTY LINE

EXISTING RESIDENCE

EXISTING WATER TANKS

EXISTING STORAGE BUILDING

EXISTING DRIVEWAY

TEST PIT LOCATION MAP-SEE SHEET 3

EXISTING PRIVATE ROAD

11/20/2018
TP #6
36"/SL

APPROXIMATE PROPERTY LINE

APPROXIMATE PROPERTY LINE

SCALE:1" = 200'

0 200'

Scale in feet

OVERALL SITE PLAN

SITE EVALUATION
OVERALL SITE PLAN

CALISTOGA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 DAMS STREET, SUITE 203 - P.O. BOX ELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE:	01/10/2019
SCALE:	1"=200'
JOB #:	N-116
APN:	020-100-014

2 OF 3

E CONCRETE PAD
TO BE DEMOLISHED

E BARN TO BE DEMOLISHED

E DRIVE AY

100' ELL STBK

E ELL TO BE DEMOLISHED
PER NAPA COUNTY STANDARDS

11/16/2015
TP#3
34"/SL

11/16/2015
TP#2
30"/SL

11/16/2015
TP#1
30"/SL

11/20/201
TP#1
55"/CL

35.0' OI

11/20/201
TP#2
36"/CL

35.0' OI

VR

1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225

SCALE:1" = 30'

0 30'

Scale in feet

TEST PIT LOCATION MAP

SITE EVALUATION
TEST PIT LOCATION MAP

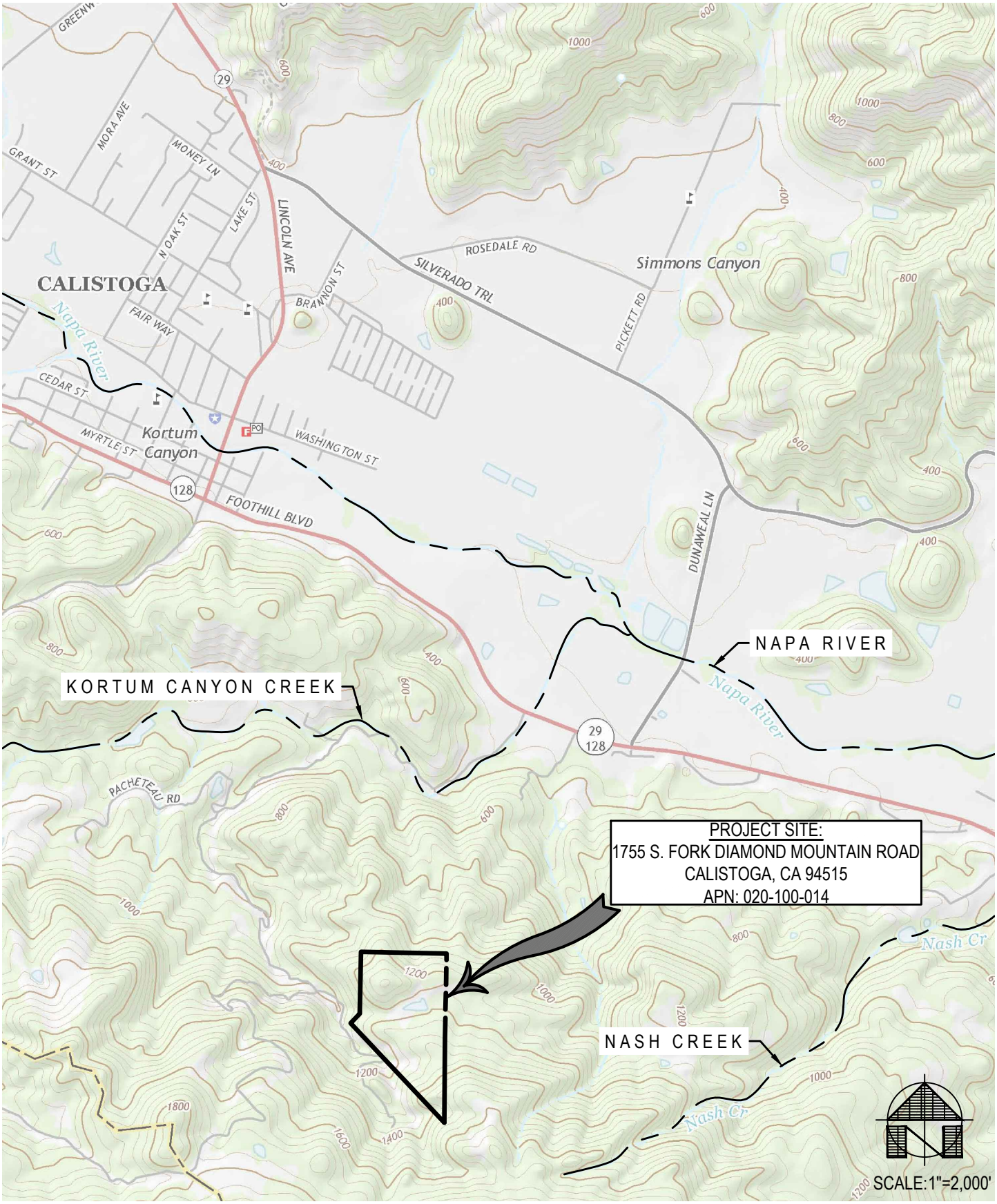
CALISTOGA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 DAMS TREET, UITE 203- T. ELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE:	01/1 /2019
SCALE:	1"=30'
JOB #:	N-116
APN:	020-100-014

APPENDIX 3

DISTRIBUTION FIELD EXHIBIT



MAP IS FROM USGS 7.5 MIN SERIES MAP: CALISTOGA

0 2,000'

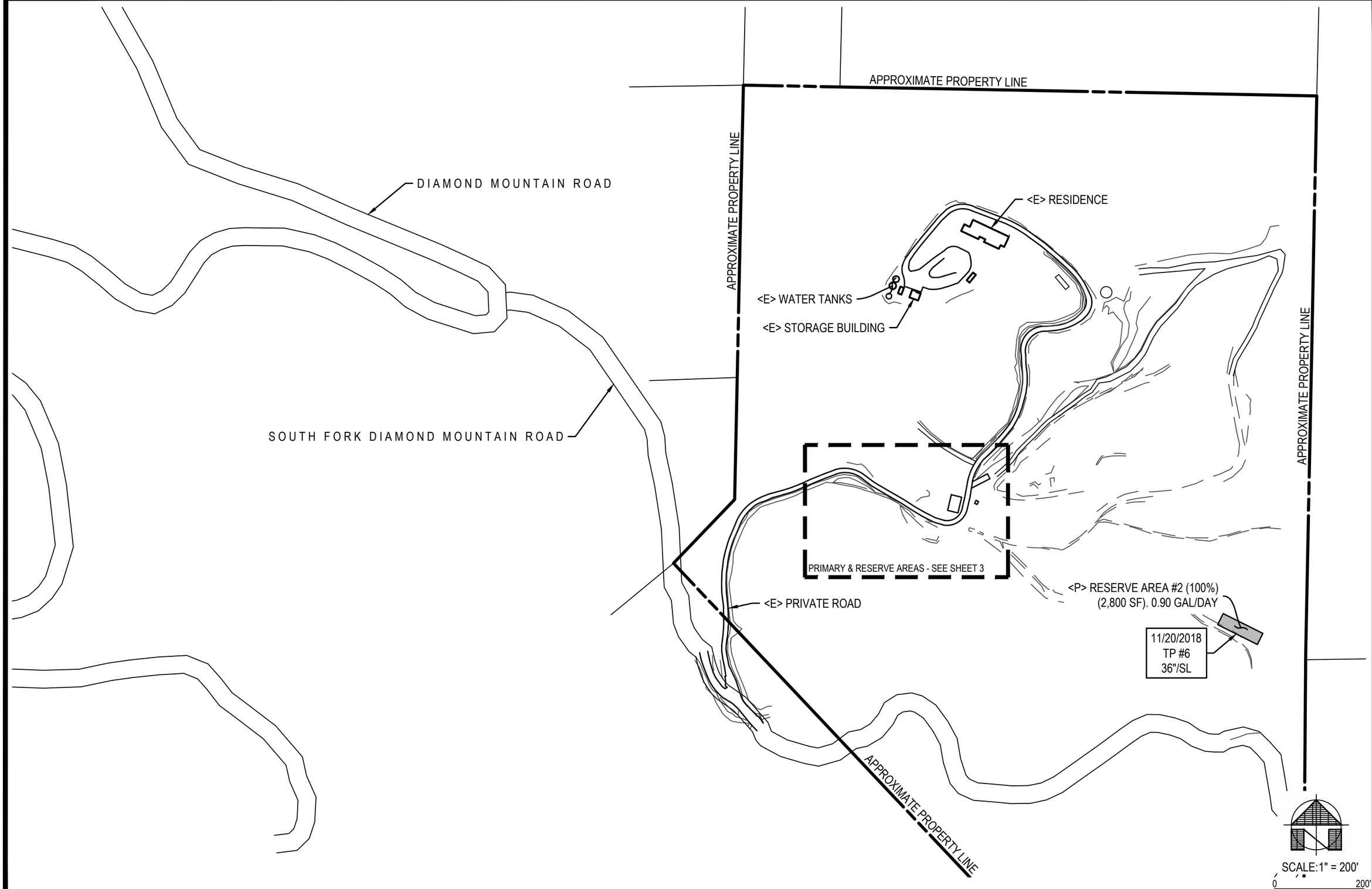
Scale in feet

SITE EVALUATION
VICINITY MAP

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE: 01/17/2019	JOB # N-116
SCALE: 1"=2,000'	APN: 020-100-014

SHEET 1 OF 3



OVERALL SITE PLAN

SITE EVALUATION
OVERALL SITE PLAN

CALISTOGA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 · ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE:	01/17/2019
SCALE:	1"=200'
JOB #:	N-116
APN:	020-100-014

<E> CALISTOGA CEANOTHUS AREA
(RARE PLANT) PER PLANT STUDY

<P> WINERY BUILDING

<P> ACCESSIBLE
PARKING SPACE

<P> NATIVE GRASS

<E> DI

<P> PARKING SPACES

<E> NAPA FALSE INDIGO AREA
(RARE PLANT) PER PLANT STUDY

100' WELL STBK

<P> FIRE PUMP HOUSE

<E> WELL TO BE DEMOLISHED
PER NAPA COUNTY STANDARDS

<P> 50,000 GALLON FIREWATER
STORAGE TANK (ABOVE GROUND)

11/16/2015
TP #3
34"/SL

11/16/2015
TP #2
30"/SL

11/16/2015
TP #1
30"/SL

11/20/2018
TP #5
55"/CL

11/20/2018
TP #6
36"/CL

35'

35'

35'

16'

16'

30'

240'

<E> CALISTOGA CEANOTHUS AREA
(RARE PLANT) PER PLANT STUDY

<E> VINEYARDS

<P> RESERVE AREA #1 (100%) (3,840 SF).
SEE SHEET 2 FOR RESERVE AREA #2

<P> PRIMARY AREA FOR WINERY SUB-SURFACE DRIP SYSTEM
PEAK DAILY FLOW = 1138 GALLONS. APPLICATION RATE 0.6
GALLONS/DAY (CLAY LOAM). TOTAL AREA PROVIDED = 3,840 SF.
5 DRIP LINES @ 240 FOR A TOTAL OF 600 LF (4 FT SPACING)

1165 1170 1175 1180 1185 1190 1200 1225

VR

SCALE:1" = 30'

0 30'
Scale in feet

PRIMARY & RESERVE AREAS

HARD SIX WINERY USE PERMIT
WASTEWATER FIELD EXHIBIT

CALISTOGA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE:	01/17/2019
SCALE:	1"=30'
JOB #:	N-116
APN:	020-100-014