“H”

Wastewater Feasibility Study

Ladera Vineyards Winery
Minor Modification P21-00294-MOD and Viewshed P22-00109
Planning Commission Hearing May 3, 2023

Wastewater Feasibility Study

for

Ladera Vineyards

3942 Silverado Trail N
Calistoga, Napa County, CA

LADERA
Napa Valley

Winery Use Permit Minor Modification
#P21-00294

Revised July 2022

SHERWOOD
DESIGN ENGINEERS

625 2ND STREET SUITE 202, PETALUMA, CA 94952
(415) 677-7300 | WWW.SHERWOODENGINEERS.COM

TABLE OF CONTENTS

ATTACHMENTS

1. Wastewater Calculations
2. Vicinity Map, Septic Site Evaluation Report
3. Neighboring Septic System Research

625 2ND STREET SUITE 202, PETALUMA, CA 94952
(415) 677-7300 | WWW.SHERWOODENGINEERS.COM

1.0 PROJECT SUMMARY

The project is proposing a minor modification to an existing winery Use Permit under the Napa County Streamlining Ordinance (Ordinance No. 1455). The existing winery is located at 3942 Silverado Trail North in Calistoga, CA. The project is proposing a moderate staff and event increase and is maintaining the existing wine production limit of 20,000 gallons annually. The project proposes removal of existing structures, a new Type III cave for barrel aging, fermentation, and production offices, as well as a remodel of the existing tasting room building. The existing driveway will remain and be improved to meet current jurisdictional requirements as well as additional parking areas added.

The project also proposes three full time and two part time staff members. Proposed visitation to the winery includes 30 maximum visitors for winery tours and tastings daily and 210 maximum visitors per week. Two semi-annual wine club events for up to 50 guests will be held approximately every six months. Food service at marketing events will include food and wine pairing dinners. All food service is to be catered and consistent with the definitions of "Tours and Tastings" and "Marketing of Wine" per the Napa County Code.

This study and the associated Use Permit Drawings will demonstrate that wastewater generated from the proposed projects can be treated and dispersed onsite per jurisdictional requirements.

1.1 SITE DESCRIPTION

The 7.44-acre subject parcel is located off Silverado Trail between Calistoga and St. Helena in the unincorporated area of Napa County. The south westerly portion of the subject parcel that borders the Silverado Trail is relatively flat with slopes less than five percent. The parcel then slopes upward away from Silverado Trail and consists primarily of dense woodland cover.

1.1.1 *Land Use*

The property sits at the border of the Napa Valley region which is predominantly Agricultural Preserve and Watershed (AP and AW) zoned parcels. These parcels consist of existing vineyards, wineries, and residences. The subject parcel is currently developed with an existing residence as well as an older winery and barn structures. An existing vineyard, landscaped areas, and driveway are also located within the flatter portion of the subject parcel. The current land use of the subject parcel is consistent with the proposed improvements summarized above.

1.1.2 *Water Use*

The site is serviced by two existing onsite wells. The existing wells are located within the Napa Valley Floor-Calistoga groundwater zone.

2.0 WASTEWATER DEMAND

2.1 EXISTING DEMANDS

Existing wastewater records were not available for the subject parcel and have not been quantified as part of this analysis.

2.2 PROPOSED DEMANDS

The proposed project will produce two (2) separate wastewater streams. Domestic wastewater is generated by the residence and employee break room and lavatory use as well as tasting/event visitor lavatory use. All catered meals will be prepared offsite and therefore kitchen wastewater will not be generated onsite. Process wastewater is generated by winemaking activities including but not limited to grape crushing, fermentation, and equipment cleaning/sanitization.

2.2.1 *Domestic Wastewater*

Domestic wastewater from the proposed project will be generated by employees and visitors as well as the existing residence. The existing residence is not occupied year-round; however, wastewater generation rates will be calculated based on the number of potential bedrooms. A bedroom generation rate of 120 gallons per bedroom is utilized to estimated domestic wastewater flows. Th existing residence will be retrofitted with low flow fixtures to reduce wastewater and water usage on the site. The existing residence contains three potential bedrooms. The domestic wastewater flow generated by the residence is estimated below:

3 bedrooms	x	120 gallons per bedroom per day	= 360 gallons per day (GPD)

Winery domestic wastewater flows are estimated based on the maximum day scenario to capture peak flows. A peak wastewater flow scenario would occur on a day with maximum visitation and an event. The tasting room is closed during days where an event is held.

0 daily visitors	x	3 gallons per visitor per day	= 0 gpd
5 staff members	x	15 gallons per employee per day	= 75 gpd
50 event guests	x	3 gallons per guest per day	= 150 gpd
		Total	= 225 gpd

The generation rates used in the calculations above are based on current Napa County Regulations[1].

The total domestic wastewater flow is the sum of the residential and winery domestic wastewater flows. Based on the itemized calculations above, the resulting **total domestic wastewater flow is calculated to be 585 gpd.** Refer to the attached wastewater calculations for both event and non-event day wastewater calculations.

2.2.2 *Winery Process Wastewater*

Winery process wastewater consists of non-domestic wastewater generated by winemaking activities. This primarily results from cleaning and sanitizing equipment, crushing grapes, and fermenting wine. The peak day scenario for winery process wastewater occurs during the harvest winemaking season. This typically spans from the end of August to the end of October. During this period, approximately 30 to 40 percent of annual wastewater flows are generated.

[1] Refer to Table II-1 Commercial Design Flowrates from the Napa County Onsite Wastewater Treatment Systems (OWTS) Technical Standards, Final Draft

Winery process wastewater is calculated based on the Regional Water Quality Control Board (RWQCB) General Waste Discharge Requirements for Winery Process Water. This study assumes a winemaking generation rate of six gallons of water used per gallon of wine produced. This generation rate is within the industry standard for sizing winery wastewater (WW) treatment systems. At a peak production level of 20,000 gallons per year (gpy), the total annual flow is calculated below:

20,000 gallons of wine per year x 6 gallons of WW/wine = 120,000 gpy

Assuming 35% of the total annual flow is produced over the harvest period, the average harvest flow is calculated below:

$$\frac{35\% \times 120{,}000 \text{ gallons per year}}{45 \text{ days}} = 933 \text{ gpd}$$

A peaking factor of 1.5 is applied to the calculated flow to provide a conservative estimate of flows during high peak usage. **The peak process wastewater design flow is calculated to be 1,400 gpd.**

Based on the permit production limit and the annual wastewater flow, the winery falls under Tier 2 requirements. The following table is from the Unofficial Adoption Copy which is the most recently published version of the forthcoming General Waste Discharge Requirements for Winery Process Water.

Table 1 RWQCB General Order Table 1

Table 1. Tier Determination

Tier	Facility process water flow (1) (gal/yr)
Exempt	<10,000
Tier 1	10,000 – 30,000
Tier 2	30,001 – 300,000
Tier 3	300,001 – 1,000,000
Tier 4	1,000,001 – 15,000,000

3.0 TREATMENT & DISPERSAL SYSTEM

3.1 EXISTING WASTEWATER SYSTEM

The project site includes an existing septic system that consists of a septic tank and conventional gravity leachfield. The existing septic system is proposed to be removed per Napa County Planning, Building, and Environmental Services (PBES) requirements as part of the proposed improvements.

3.2 DOMESTIC WASTEWATER SYSTEM

The domestic wastewater system for the winery and residence is proposed to include a subsurface drip dispersal system. A site evaluation was performed on November 17, 2021, by Christina Nicholson and Vincent Hart-Tinsley of Sherwood Design Engineers. Test pits were excavated by McCollum General Engineering and Maureen Shields-Bown of Napa County Environmental Health visited the site to inspect soil conditions. Test pits 1-8 showed suitable soil for the installation of a subsurface drip field and required replacement area within the areas observed during the site evaluation. The location of the test pits are shown on the Use Permit Minor Modification Drawings (see sheet C3.0). A copy of the Site Evaluation Report is included in Attachment 2.

Based on findings from the site evaluation, a subsurface drip dispersal field is proposed for the SW system. The drip field will be located near test pit 4 which has Sandy Loam soils and a suitable depth greater than 24 inches. A pretreatment system will be utilized to meet secondary effluent requirements prior to entering the drip field. The pretreatment system will include a septic tank, a recirculation/dosing tank and an Orenco Systems AdvanTex AX20 filter pod. This method of treatment and dispersal provides a small footprint. Design of the subsurface drip field will include landscaping to help with evapotranspiration of wastewater and will include beneficial plants to promote a diversified insect habitat. Below is a list of beneficial plants that could be incorporated into the insectary / subsurface drip field area.

Figure 1 Dispersal Field Plant Types

Name		Promotes Species	Type
Creek Dogwood	*Cornus sericea*	Bird, Butterfly	Winter Deciduous
California Wildrose	*Rosa californica*	Bird, Butterfly, Bee	Winter Deciduous
Cream Bush	*Holodiscus discolor*	Butterfly	Winter Deciduous
Dark Star Ceanothus	*Ceanothus 'Dark Star'*	Bee, Bird	Evergreen

Import soil fill will be utilized to cover the drip field and provide a cover depth of eight inches per Napa County PBES and Geoflow requirements to minimize leachfield trenching. The application rate for the drip field is based on GeoFlow's Application Rates for Sandy Loam Soil that includes 0.9 gallons per square foot per day (see table below).

Table 2 GeoFlow Application Rate Table

TABLE 1

DRIP LOADING RATES CONSIDERING SOIL STRUCTURE.

Table 1 is taken from the State of Wisconsin code and was prepared by Jerry Tyler. Provided for guidelines and budgeting purposes. Refer to your local regulations and qualified soil scientists to determine best loading rates.

Soil Textures	Soil Structure	Maximum Monthly Average **BOD_5<30mg/L TSS<30mg/L** (gallons/ft²/day)	Maximum Monthly Average **BOD_5>30mg/L TSS>30mg/L** (gallons/ft²/day)
Course sand or coarser	N/A	1.6	0.4
Loamy coarse sand	N/A	1.4	0.3
Sand	N/A	1.2	0.3
Loamy sand	Weak to strong	1.2	0.3
Loamy sand	Massive	0.7	0.2
Fine sand	Moderate to strong	0.9	0.3
Fine sand	Massive or weak	0.6	0.2
Loamy fine sand	Moderate to strong	0.9	0.3
Loamy fine sand	Massive or weak	0.6	0.2
Very fine sand	N/A	0.6	0.2
Loamy very fine sand	N/A	0.6	0.2
Sandy loam	Moderate to strong	0.9	0.2

Based on the peak daily flow and soil application rate, the required minimum required area for the drip field is calculated to be 650 sf. A summary of the configuration of the drip field is summarized below.

Table 3 Drip Field Design

Test Pit Location (primary area)	TP #4		
Soil Type	Sandy Loam		
Soil Application Rate	0.9	gal/sf/day	*Per GeoFlow*
Soil Depth	24 inches Subsurface		*Fill added*
System Type	Drip		
Field Size	650	sf	
Lateral Length	35	lf	
Lateral Spacing	2	ft	
Number of Laterals	10		
Total Area Provided	700	sf	
Number of Zones	1		

Area per Zone	700	sf	
Test Pit Location (replacement area)	TP #7 & 8		
Soil Type	Sandy Loam		
Soil Application Rate	0.9	gal/sf/day	*Per GeoFlow*
Soil Depth	24 inches		
System Type	Subsurface Drip		
200% Area	1,400	sf	

Adequate area is available for the primary area as well as the required 200% replacement area as shown on the associated Plans within the vicinity of suitable soil observed during the above referenced site evaluation. The subsurface drip field contains one zone that includes 10 lines each 35 lineal feet (lf) long. This provides a total area 700 sf.

SW Replacement Area

The replacement area is proposed near test pits 7 and 8 which also have a soil texture of Sandy Loam. The application rate is the same as the primary field. The 200% required area is determined to be 1,400 sf. Both primary and replacement areas will be located outside all Napa County PBES setback requirements as shown on the attached plans. Notes for minimizing trenching and earth disturbing activities are also shown on sheet C3.0.

3.3 WINERY PROCESS WASTEWATER SYSTEM

The winery process wastewater system is proposed to include a pretreatment system followed by surface dispersal on vineyard and landscape irrigation areas and will be designed per RWQCB and PBES requirements. A pressure distribution leachfield is proposed as the 100% replacement area.

The process wastewater treatment system will consist of an equalization tank (sized for three days storage minimum during harvest flows), a packaged treatment system (similar to Lyve Systems or Cloacina), a controls system, and a storage tank. This type of treatment system is the industry standard for winery wastewater treatment.

The storage tank will be sized to account for rainy days when treated wastewater is not permitted for surface application. Treated process wastewater will be used for surface drip irrigation on the 0.75 acres of vineyard and landscaped areas shown on sheet C3.0. Once a final utility plan has been developed and all setbacks have been determined, additional areas for landscape irrigation may be available.

A wastewater and irrigation balance will be performed following approval of the Use Permit Modification to establish the storage tank size and irrigation programming required. Underground treatment tanks are preferred and will be located outside an areas of cultural resource concern as identified by the project archaeologist.

PW Replacement Area

The replacement area is proposed to be PW leachfield located near the existing leachfield to minimize new trenching and near test pit 6 which is consistent with the soil profile described above under the Sanitary Wastewater Design. Below is a summary of the proposed PD leachfield for the PW system:

Table 2 PW PD Leachfield Design

TEST PIT INFORMATION		
Design Test Pits	6 & 7	
Soil Type	Sandy Loam	
Soil Application Rate	0.8	gal/sf/day
Min Soil Depth	60	in
System Type	Pressure Distribution	
TRENCH DESIGN		
Fill Over Leachfield	12	in
Backfill/native Soil Depth (12-18 in)	0	in
Depth above pipe (2 in)	2	in
Depth to groundwater (36 in min STE, 24 in max PTE)	36	in
	18	in
Trench width	18	in
Calculated sidewall	3.00	sf/lf
LEACHFIELD DESIGN		
Field Size	583	lf
Lateral Length	50	lf
Trench Spacing	5	ft
Lateral Spacing	5.8	
Number of Laterals	12	
Total LF provided	600	lf

A 600 lf PD Leachfield located within fill and is proposed for the replacement area.

4.0 CAVE SETBACKS

Per Napa County Code Section 13.28.040, the cave setbacks are achieved on this site and shown on sheet C0.0 for the subject and neighboring parcels. Based on the setbacks from the proposed cave location, only APN 021-030-002 falls within the setback location. Parcel research was conducted to determine the location of the septic system on this parcel via the Napa County Planning, Building and Environmental Services Electronic Document Retrieval website at countyofnapa.org. The septic system for this parcel is located outside the cave setback and is shown on sheet C0.0. The existing septic system for parcel 021-030-002 is shown in attachment 3.

625 2ND STREET SUITE 202, PETALUMA, CA 94952
(415) 677-7300 | WWW.SHERWOODENGINEERS.COM

5.0 CONCLUSION

The Use Permit Minor Modification is proposing a moderate increase to the staff and marketing plan. Winery production is not proposed to increase. The proposed wastewater improvements presented in this feasibility study will enhance the method of wastewater that is currently used by the facility which includes a combined conventional leachfield type system without pretreatment. The proposed wastewater improvements are shown on C3.0 of the Use Permit Minor Modification Drawings. The proposed wastewater treatment and dispersal methods will be constructed in areas outside cultural resource concern and above grade to the greatest extent possible.

625 2ND STREET SUITE 202, PETALUMA, CA 94952
(415) 677-7300 | WWW.SHERWOODENGINEERS.COM

Attachment 1:

Wastewater Calculations

SHERWOOD
DESIGN ENGINEERS

Design Parameters

Residence Domestic Wastewater

No.	Description	Generation Rate (gpd/bedroom)	Total (gpd)	*Notes*
3	Bedrooms in the main residence	120	360	*Residence will be retrofitted to be low flows*
Total Peak Daily Flow (Residence)			***360***	

Winery Domestic Wastewater

No.	Description	Generation Rate (gpd/person)	Total (gpd)	
0	Daily Visitors	3	0	
50	Event Guests	3	150	*During an event the tasting room will be closed*
5	Staff Members	15	75	
Total Peak Daily Flow (Winery)			***225***	

	Peak Daily Flow
Residence Domestic Wastewater	360 gpd
Winery Domestic Wastewater	225 gpd
Total Peak Daily Flow (all sources)	***585 gpd***

SHERWOOD
DESIGN ENGINEERS

Design Parameters

Residence Domestic Wastewater

No.	Description	Generation Rate (gpd/bedroom)	Total (gpd)	*Notes*
3	Bedrooms in the main residence	120	360	*Residence will be retrofitted to be low flows*
Total Peak Daily Flow (Residence)			***360***	

Winery Domestic Wastewater

No.	Description	Generation Rate (gpd/person)	Total (gpd)	
30	Daily Visitors	3	90	
0	Event Guests	3	0	*Represents a non-event day at the winery*
5	Staff Members	15	75	
Total Peak Daily Flow (Winery)			***165***	

	Peak Daily Flow
Residence Domestic Wastewater	360 gpd
Winery Domestic Wastewater	165 gpd
Total Peak Daily Flow (all sources)	***525 gpd***

SHERWOOD
DESIGN ENGINEERS

Design Parameters

Soil Conditions

Test Pit Location (primary area)	TP #4		
Soil Type	Sandy Loam		
Soil Application Rate	0.9	gal/sf/day	*Per GeoFlow*
Soil Depth	24 inches		*Fill added*
System Type	Subsurface Drip		
Field Size	650	sf	
Lateral Length	35	lf	
Lateral Spacing	2	ft	
Number of Laterals	10		
Total Area Provided	700	sf	
Number of Zones	1		
Area per Zone	700	sf	
Test Pit Location (replacement area)	TP #7 & 8		
Soil Type	Sandy Loam		
Soil Application Rate	0.9	gal/sf/day	*Per GeoFlow*
Soil Depth	24 inches		*Fill added*
System Type	Subsurface Drip		
200% Area	1,400		

Treatment Tank Sizing

Proposed Septic Tank Volume	1,500	gallons	
Total Septic Tank Volume	1,500	gallons	
Provided HRT	2.6	days	*2.5 days minimum per Orenco/County*
Recirculation Tank Volume	1,000	gallons	
Provided HRT	1.7	days	*1 day minimum per Orenco*
Dosing Tank Volume	1,000	gallons	
Provided HRT	1.7	days	*1.5 days minimum per Orenco/County*

Orenco AdvanTex Pretreatment System Sizing

Application Rate	20	gpd/sf	per Orenco for Commercial Design
Minimum Required Area	29.25	sf	
Number of AX20's Proposed	2		
Area per AX20	20	sf	
Total Area Provided	40	sf	

SHERWOOD
DESIGN ENGINEERS

Design Parameters

WINERY WASTEWATER FLOWS

Description	No.		Notes
Wine Production	20,000	gallons/year	
Wine Generation Rate	6	gallons of ww/ gallon of wine/year	
Annual Wastewater Production	120,000	gallons ww/year	
Length of Harvest	45	days	
Wastewater Produced During Harvest	35%		
Process Wastewater Flow	933	gallons/day	
Peaking Factor	1.5		
Peak Process Wastewater Flow	**1,400**	**gallons/day**	

SHERWOOD
DESIGN ENGINEERS

Design Parameters

TEST PIT INFORMATION

Design Test Pits	6 & 7	
Soil Type	Sandy Loam	
Soil Application Rate	0.8	gal/sf/day
Min Soil Depth	60	in
System Type	Pressure Distribution	

TRENCH DESIGN

Fill Over Leachfield	12	in
Backfill/native Soil Depth (12-18 in)	0	in
Depth above pipe (2 in)	2	in
Depth to groundwater (36 in min STE, 24 in max PTE)	36	in
	18	in
Trench width	18	in
Calculated sidewall	3.00	sf/lf

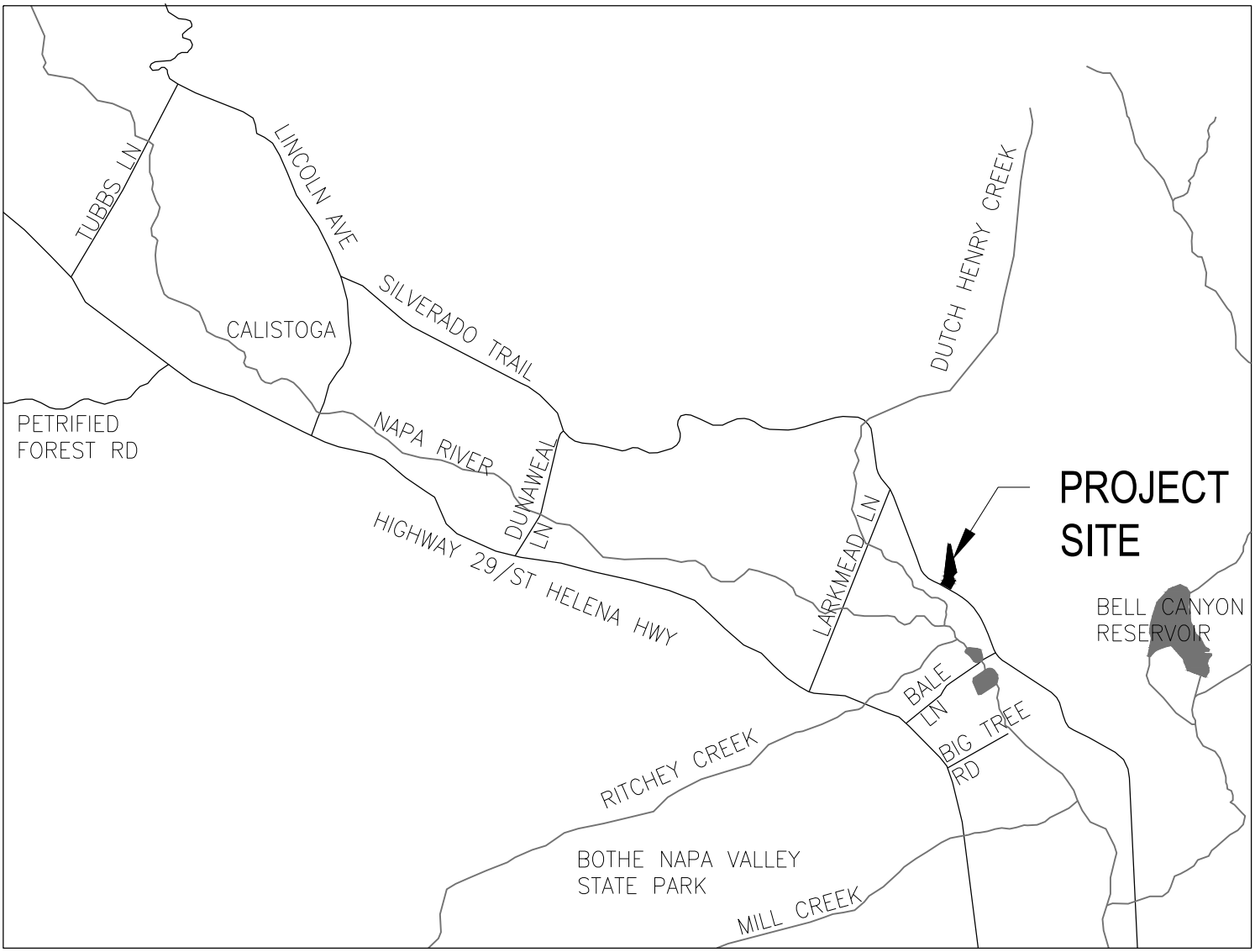
LEACHFIELD DESIGN

Field Size	583	lf
Lateral Length	50	lf
Trench Spacing	5	ft
Lateral Spacing	5.8	
Number of Laterals	12	
Total LF provided	600	lf

625 2ND STREET SUITE 202, PETALUMA, CA 94952
(415) 677-7300 | WWW.SHERWOODENGINEERS.COM

Attachment 2:

Vicinity Map, Site Evaluation Report



VICINITY MAP

NOT TO SCALE

SHERWOOD
DESIGN ENGINEERS
2548 Mission Street
San Francisco, CA 94110
www.sherwoodengineers.com

LADERA WINERY
CALISTOGA, CALIFORNIA

Napa County Division of Environmental Health

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 #:

APN: 021-030-043-000

(County Use Only)
Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner
LADERA WINERY

Property Owner Mailing Address
3942 SILVERADO TRAIL N

City State Zip
CALISTOGA CA 94515

Site Address/Location
3942 SILVERADO TRAIL N
CALISTOGA, CA 94515

☑ New Construction ☐ Addition ☐ Remodel ☐ Relocation
☐ Other:

☑ Residential - # of Bedrooms: 3 Design Flow : 450 gpd

☑ Commercial – Type:
Sanitary Waste: 315 gpd Process Waste: gpd

☑ Other:
Sanitary Waste: gpd Process Waste: 1,000 gpd

Evaluation Conducted By:

Company Name	Evaluator's Name	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Sherwood Design Engineers	Christina Nicholson, PE	*Christina Nicholson, PE*
Mailing Address: 625 2nd ST STE 202		Telephone Number 415-677-7300
City: Petaluma State: CA Zip: 94952		Date Evaluation Conducted: 11/17/2021

Primary Area

Acceptable Soil Depth: 67 & 70 in. Test pit #'s: 4 & 5

Soil Application Rate (gal. /sq. ft. /day): 0.8

System Type(s) Recommended: PRESSURIZED LEACH FIELD

Slope: 0-2 %. Distance to nearest water source: 100+ ft.

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: 52 & 48 in. Test pit #'s: 1 & 2

Soil Application Rate (gal. /sq. ft. /day): 0.8

System Type(s) Recommended: PRESSURIZED LEACH FIELD

Slope: 0-2 %. Distance to nearest water source: 100+ ft.

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:

A site evaluation was performed on November 17, 2021 by Christina Nicholson and Vincent Hart-Tinsley of Sherwood Design Engineers. Test pits were excavated by McCollum General Engineering using an excavator with a 24" bucket. Maureen Shields-Bown of Napa County Environmental Health visited the site to inspect soil conditions. Test pits 1-8 showed suitable soil for the installation of a Pressurized Leachfield within area tested with required replacement area.

Test Pit # 1 *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-44*		0-10	SCL	M, AB	SH	FRB	SS	M:VF M:F	C:F M:VF F:C	None
44-66	D	10-20	SCL	M, G	SH	FRB	SS	M:VF M:F	F:C	None

Slope = 0-2 %. Acceptable soil depth observed: 66 inches.

No refusal at 66 inches deep.
No Groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometer Method prepared by RGH Consultants, Inc dated Nov 27, 2021.

Test Pit # 2 *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-25		0-10	SL	M, AB	SH	FRB	SS	M:VF M:F	C:F M:VF F:C	None
25-65*	D	10-20	SL	M, G	SH	FRB	SS	M:VF M:F	F:C	None

Slope = 0-2 %. Acceptable soil depth observed: 65 inches.

No refusal at 65 inches deep.
No Groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometer Method prepared by RGH Consultants, Inc dated Nov 27, 2021.

Test Pit # 3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24		0-10	SCL	M, AB	SH	FRB	SS	M:VF M:F	C:F M:VF F:C	None
24-68	D	10-20	SCL	M, G	SH	FRB	SS	M:VF M:F	C:F M:VF F:C	None

Slope = 0-2 %. Acceptable soil depth observed: 68 inches.

No refusal at 68 inches deep.
No Groundwater observed.

Test Pit # 4 *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-27		0-10	SL	M, AB	SH	FRB	SS	M:VF M:F	F:M M:F M:VF	None
27-67*	D	10-20	SL	M, G	SH	FRB	SS	M:VF M:F	C:C	None

Slope = 0-2 %. Acceptable soil depth observed: 67 inches.

No refusal at 67 inches deep.
No Groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometer Method prepared by RGH Consultants, Inc dated Nov 27, 2021.

Test Pit # 5 *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-28		0-10	SL	M, AB	SH	FRB	SS	M:VF M:F	F:EXC M:F F:C M:VF	None
28-70*	D	10-20	SL	M, G	SH	FRB	SS	M:VF M:F	M:F C:C	None

Slope = 0-2 %. Acceptable soil depth observed: 70 inches.

No refusal at 70 inches deep.
No Groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometer Method prepared by RGH Consultants, Inc dated Nov 27, 2021.

Test Pit # 6

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-60		0-15	SL	M, AB	SH	FRB	SS	M:VF M:F	C:F M:VF F:C	None

Slope = 0-2 %. Acceptable soil depth observed: 60 inches.

No refusal at 60 inches deep.
No Groundwater observed.

Test Pit # 7 *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-62*		0-10	SL	M, AB	SH	FRB	SS	M:VF M:F	C:F M:VF F:C	None

Slope = 0-2 %. Acceptable soil depth observed: 62 inches.

No refusal at 62 inches deep.
No Groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometer Method prepared by RGH Consultants, Inc dated Nov 27, 2021.

Test Pit # 8 *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-54		0-10	SL	M, AB	SH	FRB	SS	M:VF M:F	C:F M:VF F:C	None

Slope = 0-2 %. Acceptable soil depth observed: 54 inches.

No refusal at 54 inches deep.
No Groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometer Method prepared by RGH Consultants, Inc dated Nov 27, 2021.

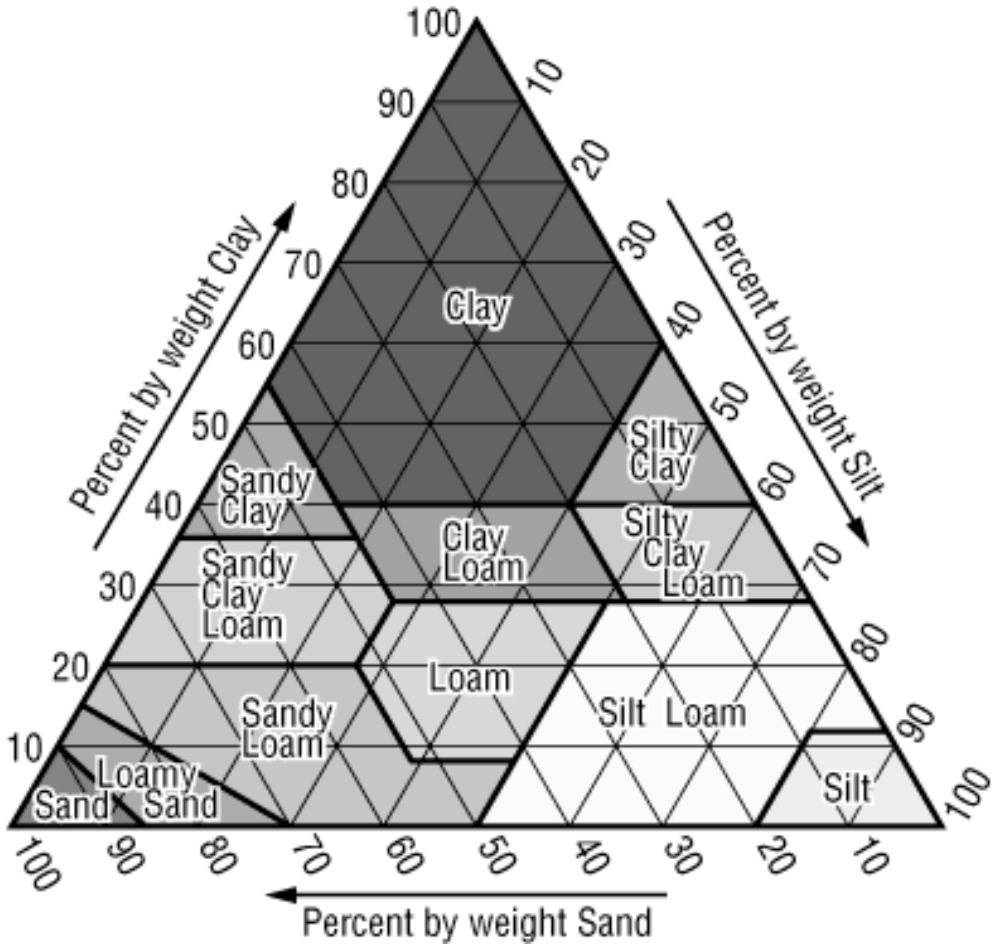
Test Pit #

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 **Pl**=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



ALTERNATIVE SEWAGE TREATMENT SYSTEM SOIL APPLICATION RATES

TEXTURE	STRUCTURE		Application Rate (Gal/ft^2/day)	
	Shape	Grade	STE[1]	PTE[1,2]
Coarse sand, sand, loamy coarse sand	Single grain	Structureless	1.0	1.2
Fine Sand, loamy fine sand	Single grain	Structureless	0.6	1.0
Sandy Loam, Loamy Sand	Massive	Structureless	0.35	0.5
	Platy	Weak	0.35	0.5
	Prismatic, blocky, granular	Weak	0.5	0.75
		Moderate, strong	0.8	1.0
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless		
	Platy	Weak, mod, strong		
	Prismatic, blocky, granular	Weak, Moderate	0.5	0.75
		Strong	0.8	1.0
Sandy clay, Silty clay loam, Clay Loam	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak, Moderate	0.35	0.5
		Strong	0.6	0.75
Clay, Silty clay	Massive	Structureless		
	Platy	Weak, mod, strong		
	Prismatic, blocky, granular	Weak		
		Moderate, strong	0.2	0.25

1: See Table 1 in the Design, Construction, and Installation of Alternative Sewage Treatment Systems.
2: A higher application rate for pretreated effluent may only be used when pretreatment is not used for one foot of vertical separation credit.

MINIMUM SURFACE AREA GUIDELINES TO DISPOSE OF 100 GPD OF SECONDARY TREATED EFFLUENT FOR SUBSURFACE DRIP DISPERSAL SYSTEMS

		Soil Absorption Rates		Design Application Rate (Gal/ft^2/day)	Total Area Required Sq. ft. /100 gallons per day
Soil Class	Soil Type	Est. Soil Perc. Rate minutes/in.	Hydraulic Conductivity inches/hr.		
I	Coarse sand	1-5	>2	1.400	71.5
I	Fine sand	5 - 10	1.5 - 2	1.200	83.3
II	Sandy loam	10 - 20	1.0 - 1.5	1.000	100.0
II	loam	20 - 30	0.75 - 1.0	0.700	143.0
III	Clay loam	30 – 45	0.5 - 0.75	0.600	167.0
III	Silt - clay loam	45 - 60	0.3 - 0.5	0.400	250.0
IV	Clay non-swell	60 - 90	0.2 - 0.3	0.200	500.0
IV	Clay - swell	90 - 120	0.1 - 0.2	0.100	1000.0

1. *For design purpose, the "Soil Type" category to be used in the above table shall be based on the most restrictive soil type encountered within two feet below the bottom of the drip line.*
2. *Dispersal field area calculation: Total square feet area of dispersal field = Design flow divided by loading rate.*

CONVENTIONAL SEWAGE TREATMENT SYSTEM SOIL APPLICATION RATES

TEXTURE	STRUCTURE		Application Rate (Gal/ft^2/day)
	Shape	Grade	STE
Coarse Sand, Sand, Loamy Coarse Sand	Single grain	Structureless	
Sandy Loam, Loamy Sand	Massive	Structureless	
	Platy	Weak, mod, strong	
	Prismatic, blocky, granular	Weak	0.33
		Moderate, strong	0.5
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless	
	Platy	Weak, mod, strong	
	Prismatic, blocky, granular	Weak	0.25
		Moderate, strong	0.33
Clay loam	Massive	Structureless	
	Platy	Weak, mod, strong	
	Prismatic, blocky, granular	Weak, moderate	0.25
		Strong	0.33
Sandy Clay, Silty Clay Loam	Massive	Structureless	
	Platy	Weak, moderate, strong	
	Prismatic, blocky, granular	Weak, moderate	
		Strong	0.25
Clay, Silty Clay	Massive	Structureless	
	Platy	Weak, mod, strong	
	Prismatic, blocky, granular	Weak	
		Moderate, strong	

= Conventional system prohibited

CONVENTIONAL SEWAGE TREATMENT SYSTEM SOIL APPLICATION RATES BASED ON PERCOLATION RATES

Percolation Rate (mpi)	Application Rate (STE)
<5 MPI	Prohibited
5 to 10 MPI	0.5
10-20 MPI	0.33
20-60 MPI	0.25
> 60 MPI	Prohibited

TABLE 1

DRIP LOADING RATES CONSIDERING SOIL STRUCTURE.

Table 1 is taken from the State of Wisconsin code and was prepared by Jerry Tyler.
Provided for guidelines and budgeting purposes. Refer to your local regulations and qualified soil scientists to determine best loading rates.

Soil Textures	**Soil Structure**	Maximum Monthly Average **BOD_5<30mg/L TSS<30mg/L** (gallons/ft^2/day)	Maximum Monthly Average **BOD_5>30mg/L TSS>30mg/L** (gallons/ft^2/day)
Course sand or coarser	N/A	1.6	0.4
Loamy coarse sand	N/A	1.4	0.3
Sand	N/A	1.2	0.3
Loamy sand	Weak to strong	1.2	0.3
Loamy sand	Massive	0.7	0.2
Fine sand	Moderate to strong	0.9	0.3
Fine sand	Massive or weak	0.6	0.2
Loamy fine sand	Moderate to strong	0.9	0.3
Loamy fine sand	Massive or weak	0.6	0.2
Very fine sand	N/A	0.6	0.2
Loamy very fine sand	N/A	0.6	0.2
Sandy loam	Moderate to strong	0.9	0.2
Sandy loam	Weak, weak platy	0.6	0.2
Sandy loam	Massive	0.5	0.1
Loam	Moderate to strong	0.8	0.2
Loam	Weak, weak platy	0.6	0.2
Loam	Massive	0.5	0.1
Silt loam	Moderate to strong	0.8	0.2
Silt loam	Weak, weak platy	0.3	0.1
Silt loam	Massive	0.2	0.0
Sandy clay loam	Moderate to strong	0.6	0.2
Sandy clay loam	Weak, weak platy	0.3	0.1
Sandy clay loam	Massive	0.0	0.0
Clay loam	Moderate to strong	0.6	0.2
Clay loam	Weak, weak platy	0.3	0.1
Clay loam	Massive	0.0	0.0
Silty clay loam	Moderate to strong	0.6	0.2
Silty clay loam	Weak, weak platy	0.3	0.1
Silty clay loam	Massive	0.0	0.0
Sandy clay	Moderate to strong	0.3	0.1
Sandy clay	Massive to weak	0.0	0.0
Clay	Moderate to strong	0.3	0.1
Clay	Massive to weak	0.0	0.0
Silty clay	Moderate to strong	0.3	0.1
Silty clay	Massive to weak	0.0	0.0

RGH CONSULTANTS
Experience is the difference

Santa Rosa Office
1305 North Dutton Ave.
Santa Rosa, CA 95401
P: 707-544-1072
F: 707-544-1082

Napa Office
1041 Jefferson St.
Napa, CA 94559
P: 707-252-8105
F: 707-544-1082

Middletown Office
P.O. Box 652
Middletown, CA 95461
P: 707-987-4602
F: 707-987-4603

Bouyoucos Hydrometer

Client:	**Sherwood Design Engineers**	**Sampled:**	**11/17/2021**
Project:	**Ladera**	**Received:**	**11/17/2021**
Project #:	**9360.3**	**Reported:**	**11/27/2021**
Client Project #:	**Not Stated**		

Sample Number	**TP-1**	**TP-2**	**TP-4**					
Depth	**H-1**	**H-2**	**H-2**					
A. Oven Dry Wt.	50.0	50.0	50.0					
B. Starting Time (hr:min)	12:23	12:21	12:19					
C. Temp. @ 40 sec. (F)	65.1	65.1	65.1					
D. Hydro Reading @ 40 sec.	28.5	26.5	24.0					
E. Composite Correction	-5.2	-5.2	-5.2					
F. True Density @ 40 sec. (D-E)	23.3	21.3	18.8					
G. Temp. @ 2 hrs. (F)	64.0	63.9	64.0					
H. Hydro Reading @ 2 hrs.	16.0	15.5	14.0					
I. Comp. Correction	-5.3	-5.3	-5.3					
J. True Density @ 2 hrs. (H-I)	10.7	10.2	8.7					
K. % Sand=100-((F/A) x 100)	**53.4**	**57.4**	**62.4**					
L. % Clay= ((J/A) x 100)	**21.4**	**20.4**	**17.4**					
M. % Silt= 100-(K+L)	**25.2**	**22.2**	**20.2**					
N. % Retained #10=	**22.3**	**20.3**	**25.4**					
Dry Wt. Before Wash + Tare	338.3	424.4	450.7					
Dry Wt. After Wash + Tare	139.5	173.8	196.3					
Dry Wt. Passing #10	198.8	250.6	254.4					
Tare Weight	82.5	110.0	109.6					
Dry Wt. Before Wash	255.8	314.4	341.1					
% Passing #10	77.7	79.7	74.6					
% #10	22.3	20.3	25.4					

RGH CONSULTANTS
Experience is the difference

Santa Rosa Office
1305 North Dutton Ave.
Santa Rosa, CA 95401
P: 707-544-1072
F: 707-544-1082

Napa Office
1041 Jefferson St.
Napa, CA 94559
P: 707-252-8105
F: 707-544-1082

Middletown Office
P.O. Box 652
Middletown, CA 95461
P: 707-987-4602
F: 707-987-4603

Bouyoucos Hydrometer

Client:	**Sherwood Design Engineers**	**Sampled:**	**11/17/2021**
Project:	**Ladera**	**Received:**	**11/17/2021**
Project #:	**9360.3**	**Reported:**	**11/27/2021**
Client Project #:	**Not Stated**		

Sample Number	**TP-5**	**TP-7**						
Depth	**H-2**	**H-1**						
A. Oven Dry Wt.	50.0	50.0						
B. Starting Time (hr:min)	12:17	12:15						
C. Temp. @ 40 sec. (F)	65.1	65.5						
D. Hydro Reading @ 40 sec.	23.5	25.0						
E. Composite Correction	-5.2	-5.1						
F. True Density @ 40 sec. (D-E)	18.3	19.9						
G. Temp. @ 2 hrs. (F)	63.9	63.9						
H. Hydro Reading @ 2 hrs.	14.0	15.0						
I. Comp. Correction	-5.3	-5.3						
J. True Density @ 2 hrs. (H-I)	8.7	9.7						
K. % Sand=100-((F/A) x 100)	**63.4**	**60.2**						
L. % Clay= ((J/A) x 100)	**17.4**	**19.4**						
M. % Silt= 100-(K+L)	**19.2**	**20.4**						
N. % Retained #10=	**21.2**	**23.3**						
Dry Wt. Before Wash + Tare	434.3	376.9						
Dry Wt. After Wash + Tare	178.7	153.4						
Dry Wt. Passing #10	255.6	223.5						
Tare Weight	110.0	85.4						
Dry Wt. Before Wash	324.3	291.5						
% Passing #10	78.8	76.7						
% #10	21.2	23.3						

RGH CONSULTANTS
Experience is the difference

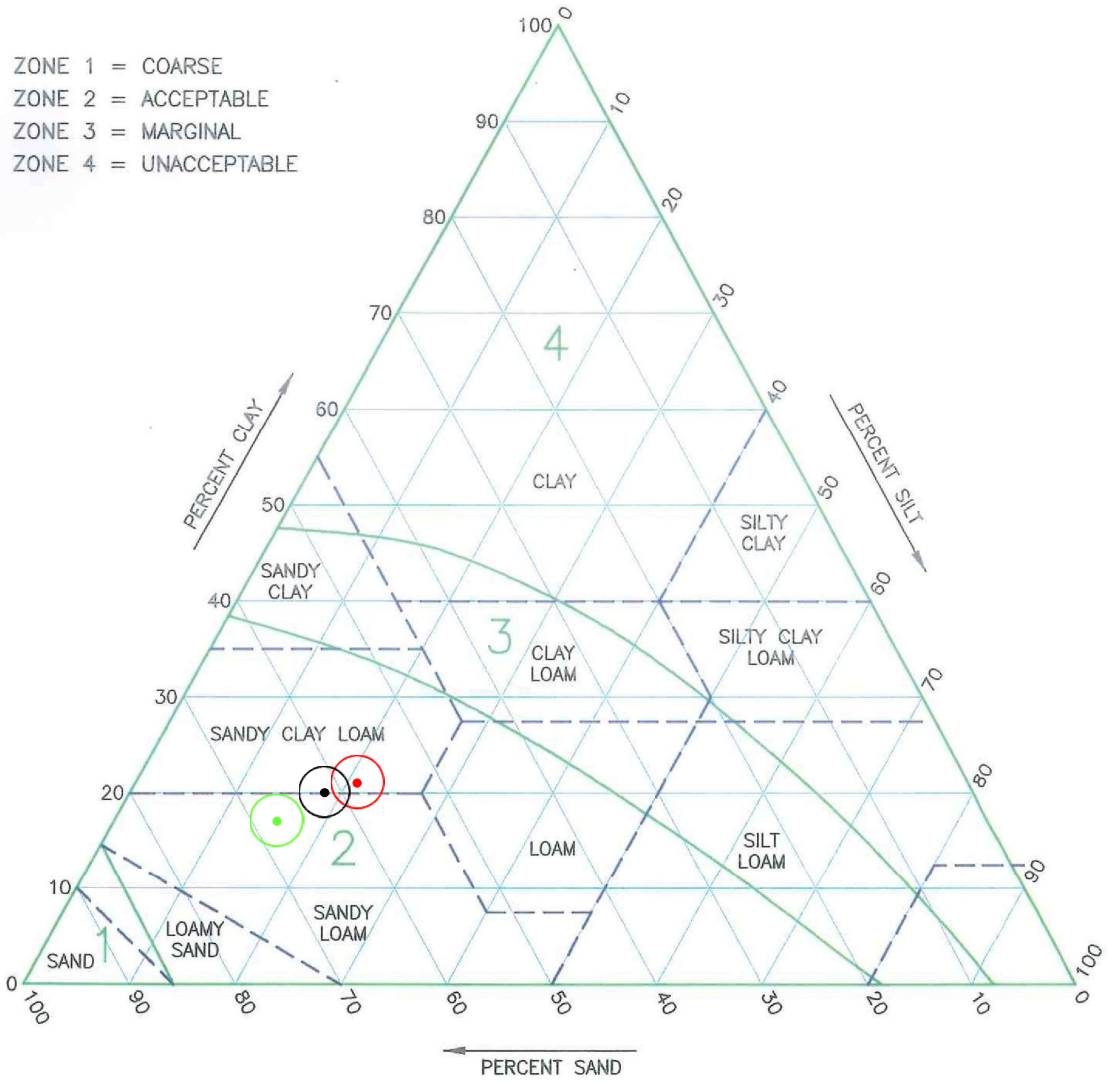
Santa Rosa Office
1305 North Dutton Ave.
Santa Rosa, CA 95401
P: 707-544-1072
F: 707-544-1082

Napa Office
1041 Jefferson St.
Napa, CA 94559
P: 707-252-8105
F: 707-544-1082

Middletown Office
P.O. Box 652
Middletown, CA 95461
P: 707-987-4602
F: 707-987-4603

Bouyoucos Hydrometer

Client:	**Sherwood Design Engineers**	**Sampled:**	**11/17/2021**
Project:	**Ladera**	**Received:**	**11/17/2021**
Project #:	**9360.3**	**Reported:**	**11/27/2021**
Client Project #:	**Not Stated**		



Legend

TP-1 @ H-1	TP-2 @ H-2
TP-4 @ H-2	

RGH CONSULTANTS
Experience is the difference

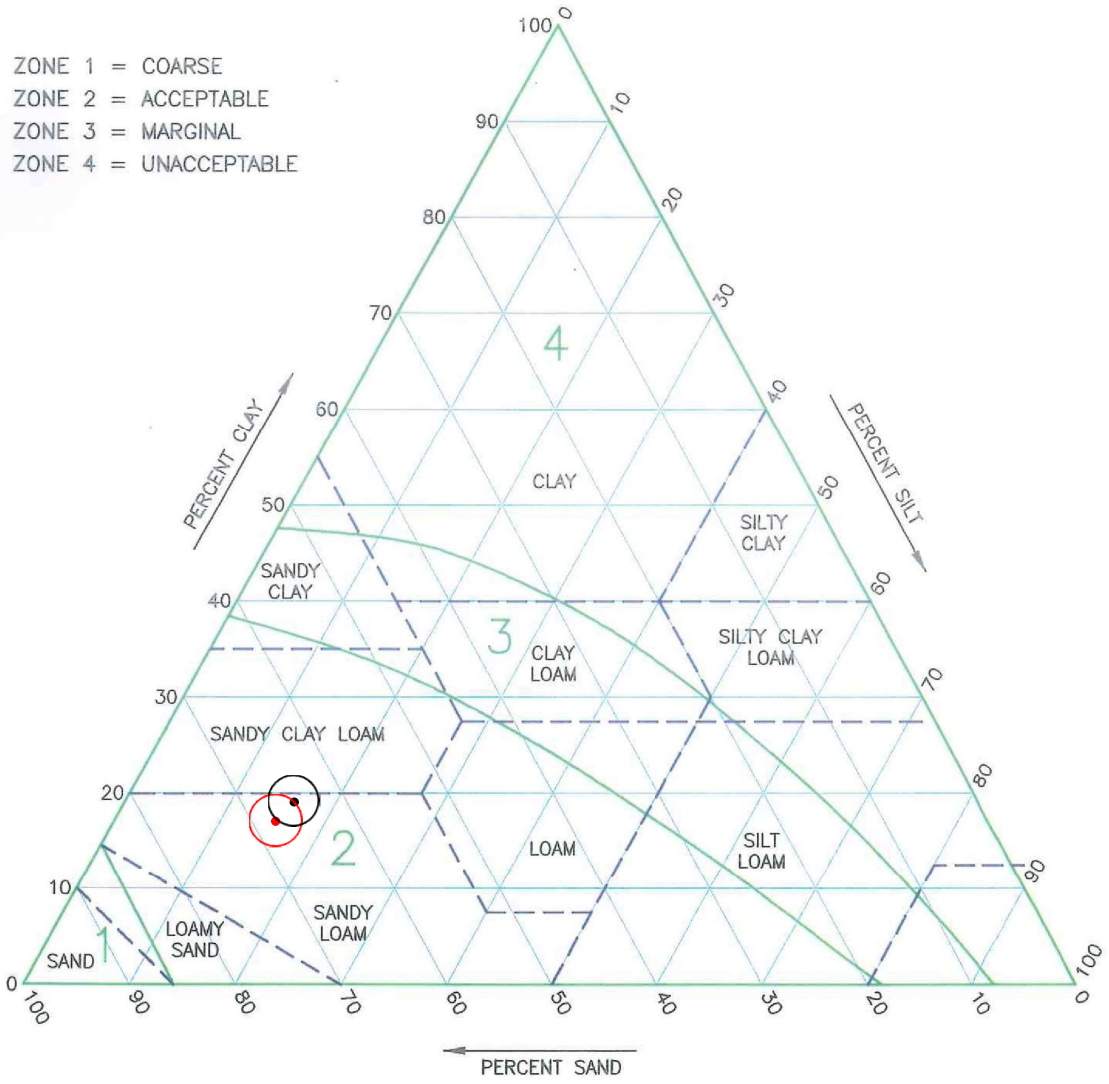
Santa Rosa Office
1305 North Dutton Ave.
Santa Rosa, CA 95401
P: 707-544-1072
F: 707-544-1082

Napa Office
1041 Jefferson St.
Napa, CA 94559
P: 707-252-8105
F: 707-544-1082

Middletown Office
P.O. Box 652
Middletown, CA 95461
P: 707-987-4602
F: 707-987-4603

Bouyoucos Hydrometer

Client:	**Sherwood Design Engineers**	**Sampled:**	**11/17/2021**
Project:	**Ladera**	**Received:**	**11/17/2021**
Project #:	**9360.3**	**Reported:**	**11/27/2021**
Client Project #:	**Not Stated**		



Legend

TP-5 @ H-2	TP-7 @ H-1

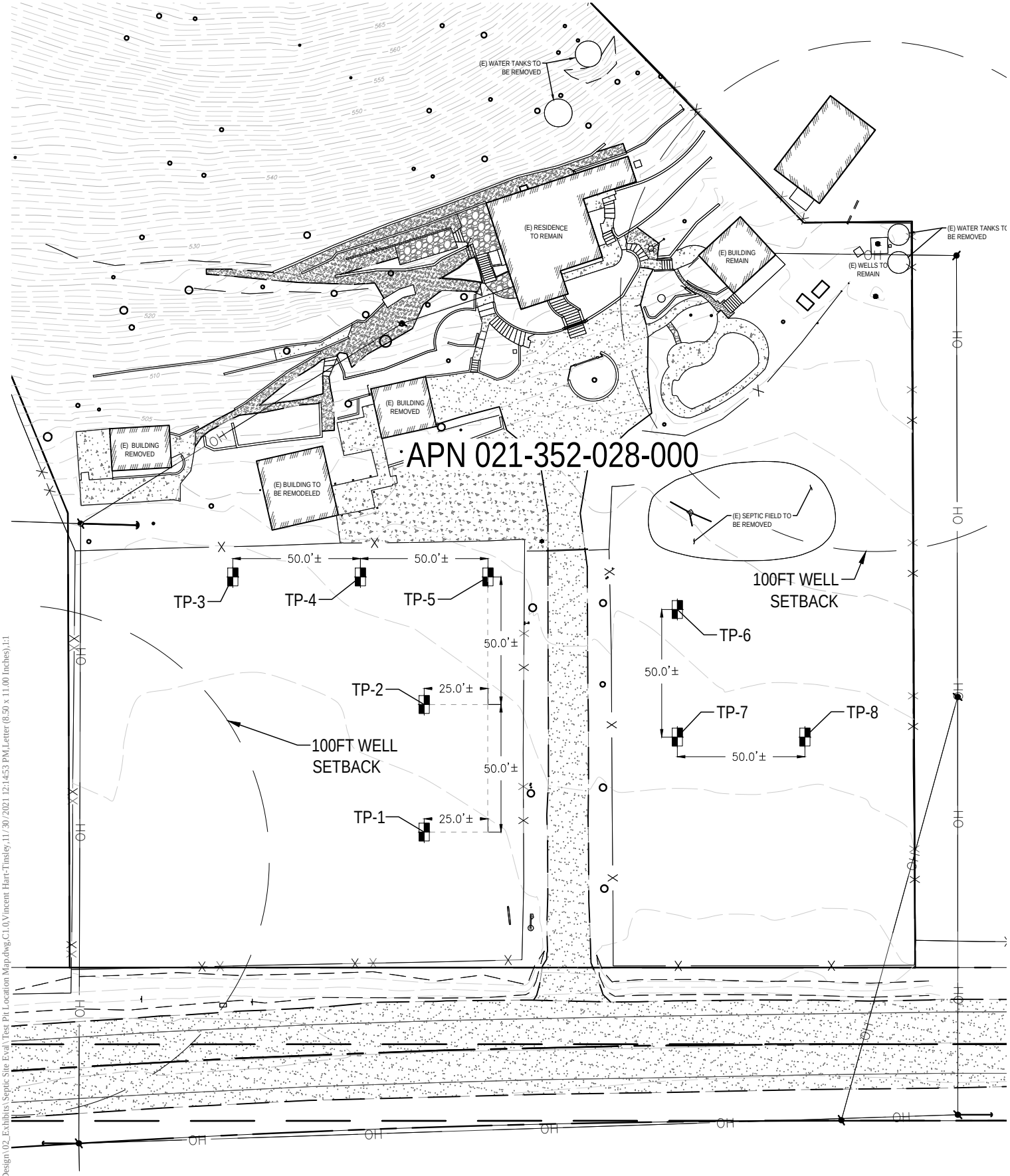
County of Napa

County of Napa | ITS Dept

Printed On: 11/18/2021

0 0.0275 0.055 0.11 mi

Disclaimer: This map was preparedfor informational purposes only. No liability is assumed for the accuracy of the data delineated hereon.



P:\2021\21-135_Ladera_Winery\03_Design\02_Exhibits\Septic Site Eval\Test Pit Location Map.dwg,C1.0,Vincent Hart-Tinsley,11/30/2021 12:14:53 PM,Letter (8.50 x 11.00 Inches),1:1

SHERWOOD DESIGN ENGINEERS
625 2nd Street, Suite 209
Petaluma, CA 94952
www.sherwoodengineers.com

TEST PIT LOCATION MAP

3942 SILVERADO TRAIL N
CALISTOGA, CA 94515

DEC, 2021

625 2ND STREET SUITE 202, PETALUMA, CA 94952
(415) 677-7300 | WWW.SHERWOODENGINEERS.COM

Attachment 3:

Neighboring Parcel Research

State of California

Well Completion Report

Form DWR 188 Submitted 7/17/2018

WCR2018-005573

Owner's Well Number | Date Work Began 04/13/2018 | Date Work Ended 04/23/2018

Local Permit Agency Napa County Planning Building and Environmental Services

Secondary Permit Agency | Permit Number E18-00145 | Permit Date 03/20/2018

Well Owner (must remain confidential pursuant to Water Code 13752)

Name ALPHA OMEGA, ROBIN BAGGETT

Mailing Address PO BOX 814

City RUTHERFORD State CA Zip 94573

Planned Use and Activity

Activity New Well

Planned Use Water Supply Domestic

Well Location

Address 3950 SILVERADO TR

City CALISTOGA Zip 94515 County Napa

Latitude ___ ___ ___ N Longitude ___ ___ ___ W

Deg. Min. Sec. Deg. Min. Sec.

Dec. Lat. 38.5630970 Dec. Long. -122.5110846

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 021-030-002-000

Township 08 N

Range 06 W

Section 10

Baseline Meridian Mount Diablo

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite

Total Depth of Boring 335 Feet

Total Depth of Completed Well 335 Feet

Water Level and Yield of Completed Well

Depth to first water 7 (Feet below surface)

Depth to Static Water Level 12 (Feet) Date Measured 04/23/2018

Estimated Yield* 50 (GPM) Test Type Air Lift

Test Length 14 (Hours) Total Drawdown 67 (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	10	Topsoil
10	40	40% GRAVEL, 30% SAND, 30% CLAY
40	80	40% LARGE GRAVEL, 40% SAND, 20% CLAY
80	120	50% GRAVEL, 40% SAND, 10% CLAY
120	260	80% SMALL & LARGE GRAVEL, 20% SAND
260	310	50% SHALE, 30% SAND, 20% SMALL GRAVEL
310	315	50% WHITE ROCK, 50% RED ROCK
315	335	60% SHALE, 25% SAND, 15% SMALL GRAVEL

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	60	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	60	180	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	
1	180	200	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	200	300	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	
1	300	320	Blank	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625			
1	320	335	Screen	PVC	OD: 6.625 in. | SDR: 21 | Thickness: 0.316 in.	0.316	6.625	Milled Slots	0	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	51	Cement	Other Cement	6 SACK CEMENT	
51	335	Filter Pack	Other Gravel Pack	3/8" Pea Gravel	

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	51	14
51	335	11

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: MC LEAN & WILLIAMS INC
Person, Firm or Corporation

878 EL CENTRO AVENUE (Address) | NAPA (City) | CA (State) | 94558 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 07/17/2018 (Date Signed) | 396352 (C-57 License Number)

Attachments

3950 Silverado Trail Well Location Map.pdf - Location Map

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

				N						W
Latitude Deg/Min/Sec					Longitude Deg/Min/Sec					

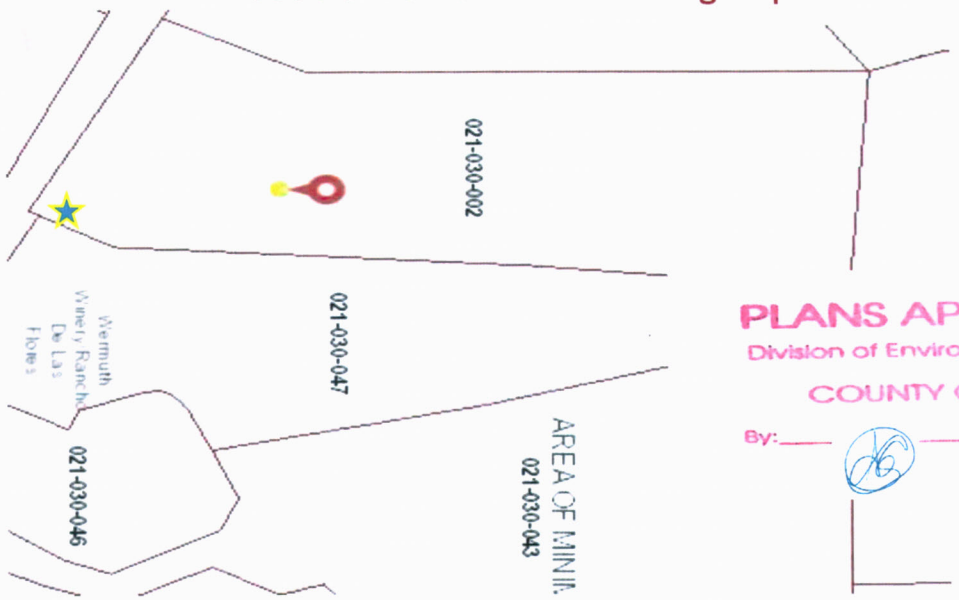
TRS:

APN:

E18-00145

Well Drilling & Pump Service
878 El Centro Ave. Napa Ca, 94558
Office 707-255-6450
Fax 707-255-6489
Lic. #396352

3950 Silverado Trail Calistoga Ap # 021-030-002



PLANS APPROVED
Division of Environmental Health
COUNTY OF NAPA
By: _____ Date: 03/20/18

PLANS APPROVED
Division of Environmental Health
COUNTY OF NAPA
By: ___ Date: 03/20/18

E18-00145

McLEAN & WILLIAMS
SINCE 1949

3950 Silverado Trail Calistoga Ap # 021-030-002 page 2 of 2