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## Wastewater Feasibility Study



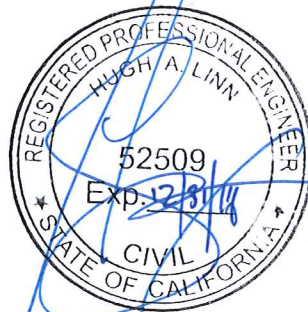
# WINERY WASTEWATER FEASIBILITY REPORT

FORTUNATI VINEYARDS  
986 SALVADOR AVENUE  
NAPA, CA 94558

APN 036-180-004

**PROPERTY OWNER:**

Gary Luchtel  
986 Salvador Avenue  
Napa, CA 94558



Project# 4115080.0  
February 8, 2016



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## **INTRODUCTION**

The Owner is applying to the County of Napa for a Winery Use Permit. The permit will allow a production of 12,000 gallons per year. The property is a 10.28 +/- acre parcel located at 986 Salvador Avenue, Napa (APN 036-180-004). Access to the property is an existing driveway connecting to Salvador Avenue.

Most of the property is relatively level, draining to the southeast. The property slopes range from 1- 5% and is currently used for vineyards. A single 3-bedroom residence exists in the southeastern area of the property. The existing septic system runs northwest of the residence into the lawn area behind the house. There is one well on the parcel, located south of the existing residence. The well will be for winery use. Appendix 1 contains a Site Location Map and a USGS Site Map showing the parcel topography, features and boundary. Appendix 2 contains a reduced version of the proposed winery plan set.

This report will evaluate the disposal of wastewater consisting of winery process wastewater, and winery domestic wastewater. The report will also identify a 200% reserve dispersal field for the existing residence.

## **SITE EVALUATION**

RSA+ conducted a site evaluation on the subject parcel on October 14, 2015. Appendix 3 contains a map of test pit locations and test pit logs for the site evaluation.

The site evaluation was conducted by Margaret Schneider of RSA+ and observed by Rebecca Setliff of Napa County Environmental Management.

Representative soil samples were analyzed in the field during the site evaluation. The soil sample results are shown in Appendix 3. Site evaluation test pit logs are shown in Appendix 3.



**DOMESTIC WASTEWATER CHARACTERISTICS**

The winery domestic wastewater system has been sized to accommodate the unit values in Table 2 below. The number of visitors and employees is based on information provided by the owner. The projected flow is based on Napa County Environmental Management guidelines. The following is a summary of the estimated flows from the proposed winery.

**Table 1**

Use	Source	Number	Projected Flow (gpd)	Total Flow No Event Day (gpd)	Total Flow Marketing Event Day (gpd)	Total Flow Wine Auction Day (gpd)
WINERY	Full-time employees	1	15	15	15	15
	Part-time employees	1	15	15	15	15
	Visitors	10	3	30	30	30
	Marketing Events (off-site catered)	30	10	0	300	0
	Charity Wine Auction Event (off-site catered)	100	10	0	0	1,000
	Event Staff	5	15	0	0	75
<b>Winery Subtotals</b>				60	360	1,135
<b>Grand Total</b>			<b>Total Peak Flow</b>	<b>60</b>	<b>360</b>	<b>1,135</b>

The number of visitors is based on a maximum expected daily visitor count. Any combination of events where the expected total guest count exceeds 30 persons in a single day will require the use of portable sanitation facilities.





### **WINERY DOMESTIC WASTEWATER - SUB SURFACE DRIP**

A septic system and dispersal field will be designed for the proposed winery. A HOOT treatment system and a new dispersal field are proposed.

Domestic wastewater from the proposed winery will flow into a new HOOT H-1000 system. After pretreatment in the HOOT H-1000, wastewater will be pumped to the proposed distribution field.

The subsurface drip field is sized to meet Napa County Environmental Management guidelines. The distribution field will be placed in the area of the site evaluation where the most limiting usable soil type was clay loam with a moderate subangular-blocky structure. A 6-inch fill will be added to meet Napa County requirements. The allowable application rate for clay loam is 0.6 gallons/square foot/day for pre-treated effluent. Peak daily domestic wastewater flow is 360 gallons/day.

$$\text{Dispersal Field Area(primary)} = \frac{360 \text{ gpd}}{0.6 \text{ gpd / SF}} = 600 \text{ square feet}$$

In addition to the primary dispersal area of 600 square feet, a 200% reserve area is required. The reserve area will be located north of the primary field where the soil application rate is also 0.6 gallons/square foot/day.

$$\text{Dispersal Field Area(reserve)} = \frac{(2) * 360 \text{ gpd}}{0.6 \text{ gpd / SF}} = 1,200 \text{ square feet}$$

The total requirement for winery domestic wastewater reserve dispersal area is 1,200 square feet. Total combined area required for the primary and reserve fields for the winery is 1,800 square feet.

### **RESIDENTIAL DOMESTIC WASTEWATER - SUB SURFACE DRIP**

The existing residential leachfield will be abandoned. Domestic wastewater from the existing residence will flow into the existing septic tanks and then into the new HOOT H-1000 system. After pretreatment in the HOOT H-1000, wastewater will be pumped to the proposed distribution field. Peak daily flow for the existing 3-bedroom house at 120 gallons/bedroom/day is 360 gallons per day.

$$\text{Dispersal Field Area(primary)} = \frac{360 \text{ gpd}}{0.6 \text{ gpd / SF}} = 600 \text{ square feet}$$

A 200% reserve area for the existing 3-bedroom residence will be provided. The reserve area will be located north of where the primary field the soil application rate is also 0.6 gallons/square foot/day.



$$\text{Dispersal Field Area (reserve)} = \frac{(2) * 360 \text{ gpd}}{0.6 \text{ gpd / SF}} = 1,200 \text{ squarefeet}$$

The total requirement for the residence domestic wastewater reserve dispersal field area is 1,200 square feet. The total combined area required for the primary and reserve fields for the existing residence is 1,800 square feet.

The system layout is shown on UP4 in Appendix 2.



**WINERY PROCESS WASTEWATER CHARACTERISTICS**

The following is a summary of the winery wastewater characteristics:

**Wine Production:** 12,000 gallons of wine per year  
 2.38 gallons of wine per case  
 5,042 cases/year

**Wastewater Production:** 5 gallons of wastewater/gallon of wine  
 60,000 gallons/year

**Peak Daily Waste Water Flow:** Crush Period = 30 days  
 Annual wine production x 1.5 / 30  
 600 gallons/day

**Average Daily Flow:** 60,000/365 = 164 gallons/day

**Monthly Wastewater Flows:**

**TABLE 2**

	% By Month	Waste/Month	
Sep	15%	9,000	Gal/Month
Oct	13%	7,800	Gal/Month
Nov	11%	6,600	Gal/Month
Dec	8%	4,800	Gal/Month
Jan	4%	2,400	Gal/Month
Feb	6%	3,600	Gal/Month
Mar	6%	3,600	Gal/Month
Apr	5%	3,000	Gal/Month
May	6%	3,600	Gal/Month
Jun	7%	4,200	Gal/Month
Jul	9%	5,400	Gal/Month
Aug	10%	6,000	Gal/Month
Totals	100%	60,000	Gal/Year

According to Napa County Environmental Management Sewage Treatment System Design Guidelines, winery process wastewater must be treated prior to surface discharge. Based on our experience, winery wastewater characteristics are as follows:





Characteristics	Units	Average
pH		3.5
BOD5	mg/l	6000
TSS	mg/l	500
Nitrogen	mg/l	20
Phosphorus	mg/l	10

Two options are presented below. These treatment train options may be modified for more desirable treatment processes prior to submitting construction plans. The following sections describe the process options in more detail. The proposed systems are shown in Appendix 2.

#### **OPTION 1 – HOLD AND HAUL**

Napa County Design Guidelines require a Hold and Haul volume equivalent to 7 days of peak process waste flow. This equates to 4,200 gallons of required storage for the proposed project at full production, a 5,000 gallon tank will be used. Wastewater would be hauled to a facility permitted to accept winery process wastewater.

For this option pre-cast concrete holding tanks or equivalent capacity fiberglass tanks would be used. A high water alarm beacon, powered by the electrical system in the winery, will be located on an exterior panel.

#### **OPTION 2 – SURFACE DRIP IRRIGATION – BIOMICROBICS SYSTEM**

The treatment goal is 160 mg/L BOD and 80 mg/L TSS. To meet this treatment goal a treatment train including a septic tank, treatment tank with High Strength Membrane Bio-Reactor (HSMBR) unit, and pump tank are proposed.

##### **Septic Tank**

The septic tank will serve to buffer peak flows and strengths from overwhelming the system and impairing treatment. A new tank will be provided. This tank will provide three days storage and will also serve to function as a primary settling basin. This tank will be 1,800 gallons.

##### **Treatment Tank**

The treatment tank will serve to treat wastewater flows using a High Strength Membrane Bio-Reactor (HSMBR) unit. This tank will be 8,000 gallons.

##### **Pump Tank**

The pump tank will serve to hold wastewater prior to distribution to the storage tank. This tank will house dual pumps. This tank will be 1,000 gallons.



### **Holding Tank and Dispersal Field**

To provide a preliminary estimate of the amount of storage tanks required, we have prepared a monthly water balance, as shown in Appendix 4. Monthly wastewater production is based on a percentage of the total annual wastewater production. The amount of water allowed to be applied is estimated by the typical vine water demand. The irrigation will be applied to areas of vineyards outside well setback requirements. The area proposed for irrigation is shown in Appendix 4. An area of 7.8 acres of vineyard has been used to calculate the storage capacity required. Based on monthly analysis no storage is required. However, a storage tank with a capacity of 10,000 gallons will be provided. This tank will have capacity for more than 60 days of average daily flows.

During the summer months all of the treated wastewater will be used for irrigation. During the wet winter months, a limited discharge will be consistent with landscape water demand and no discharge will occur within 48-hours of a forecasted rain event and also for 48-hours after a rain event. These irrigation scheduling constraints necessitate installing a tank to store excess water that cannot be discharged during the winter months. All stored water will then be used for irrigation during the summer months.

### **OPERATION AND MAINTENANCE**

The winery process and domestic wastewater systems will be fully automated and will be designed so minimal input from winery staff is required. Per Napa County guidelines, a Registered Civil Engineer, Registered Environmental Health Specialist, or Licensed Contractor will provide semi-annual monitoring and evaluation of the system. The contract with the responsible party will be provided prior to the final inspection for the system installed.

### **CONCLUSION**

This report demonstrates that enough dispersion area is available making a sub-surface drip system a feasible option for treating the Fortunati Vineyards Winery and residential domestic wastewater and that a Hold and Haul system is feasible for disposal of winery process wastewater. This report also demonstrates that it is feasible to treat the winery process wastewater on site and distribute this to the vineyard using drip irrigation.

The above methodology results in a design that meets the Napa County Environmental Management Design standards for the treatment of winery and domestic wastewater.



## Appendix 1

### Vicinity Map & USGS Site Map

# FORTUNATI VINEYARDS VICINITY MAP

NAPA COUNTY

CALIFORNIA



## VICINITY MAP

SCALE: 1" = 3000'

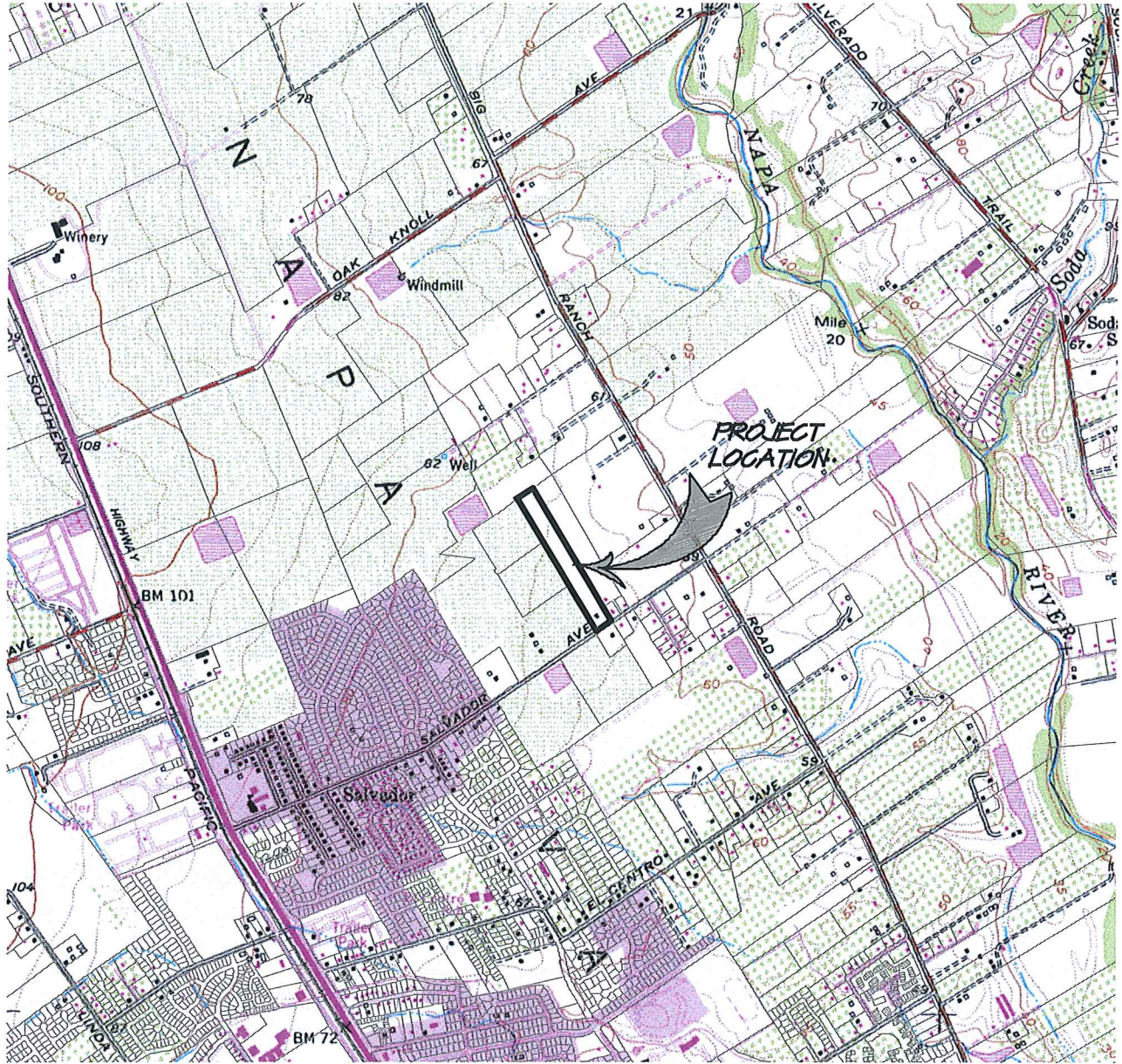
<b>RSA<sup>+</sup></b>	1515 FOURTH STREET
	NAPA, CALIF. 94559
	OFFICE   707   252.3301
+ www.RSAcivil.com +	

RSA<sup>+</sup> | CONSULTING CIVIL ENGINEERS + SURVEYORS + EST. 1980

OCTOBER 20, 2015 4115080.0 Exh-Vicinity Map.dwg



# FORTUNATI VINEYARDS USGS QUAD MAP



SCALE: 1"=2000'

<b>RSA<sup>+</sup></b>	1515 FOURTH STREET
	NAPA, CALIF. 94559
	OFFICE   707   252.3301
+ www.RSAcivil.com +	

RSA<sup>+</sup> CONSULTING CIVIL ENGINEERS + SURVEYORS + est. 1980

OCT 19, 2015 4115080.0 Exh-USGS Map.dwg

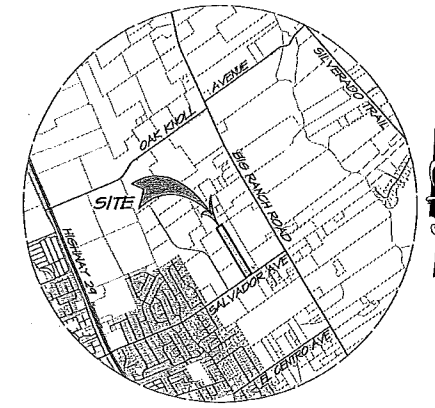




## Appendix 2

### Reduced Use Permit Plan Set

# FORTUNATI VINEYARDS USE PERMIT PLANS



**VICINITY MAP**  
SCALE: 1" = 3000'

**PROJECT INFORMATION**

OWNER: GARY & ELLEN LUCHTEL  
106 SALVADOR AVENUE  
NAPA, CA 94559

SITE ADDRESS: 106 SALVADOR AVENUE  
NAPA, CA 94559

CIVIL ENGINEER: RSA+  
1515 FOURTH STREET  
NAPA, CA 94551

APN: 036-180-004

PARCEL AREA: 10.28 ACRES

EXISTING USE: VINEYARD

PROPOSED USE: VINEYARD

**BOUNDARY NOTES**

RECORD BOUNDARY SHOWN BASED ON FOUND MONUMENTS SET BY OTHERS.

**BENCHMARK NOTES**

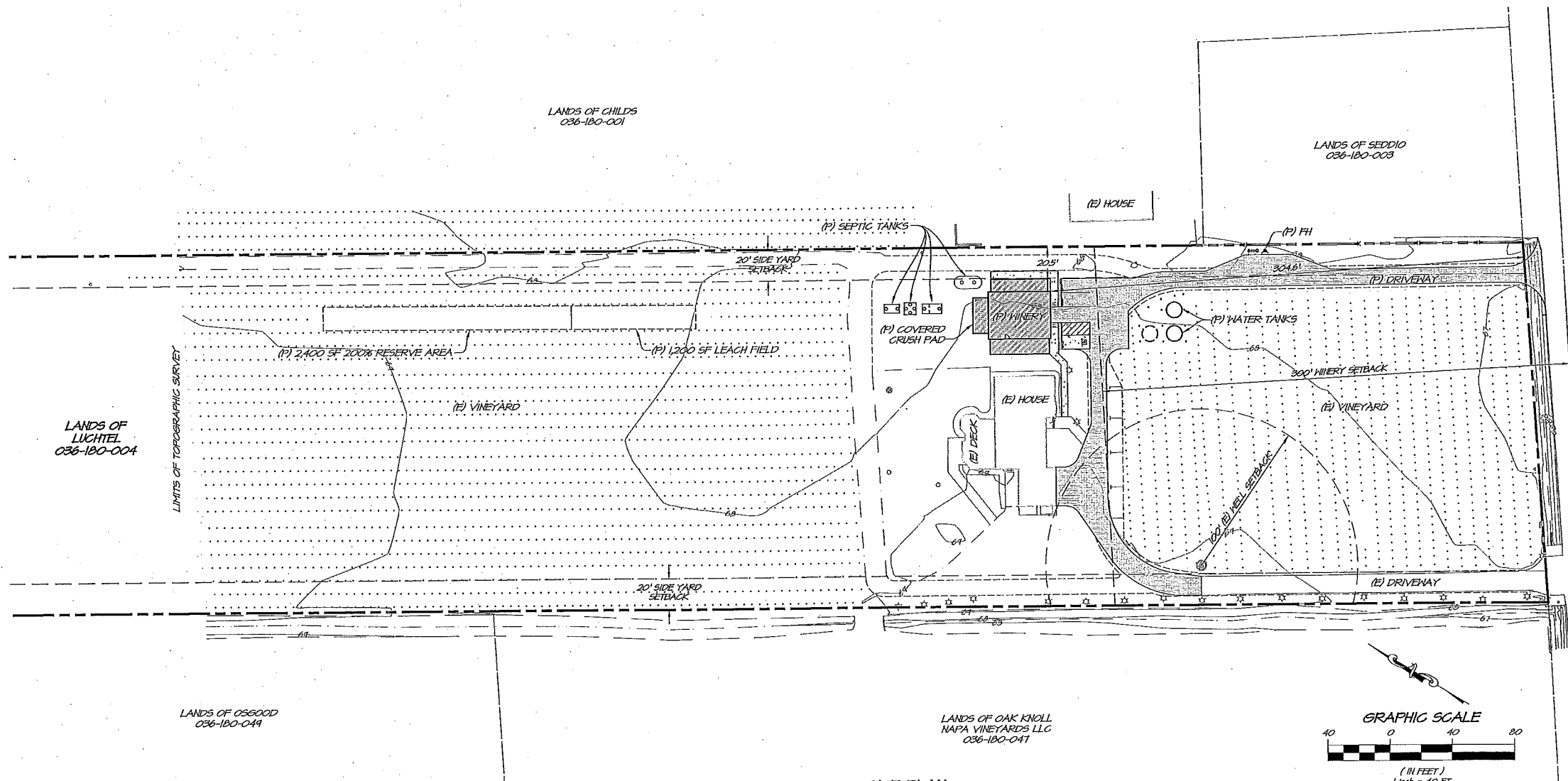
CITY OF NAPA BM# 2051, ELEVATION = 18.20'  
PUBLISHED ELEVATIONS = 71.8' (NVD) (M2) CONVERSION PER CORPSCON 6, 12.62'

**TOPOGRAPHY NOTES**

TOPOGRAPHY BASED ON A FIELD SURVEY PERFORMED BY RSA+ IN OCTOBER, 2015. CONTOURS ARE SHOWN EVERY ONE FOOT (1'), HIGHLIGHTED EVERY FIVE FEET (5').

**SHEET INDEX**

UP1	COVER SHEET
UP2	DEMOLITION & DIMENSION PLAN
UP3	GRADING & EROSION CONTROL PLAN
UP4	UTILITY PLAN



**SITE PLAN**  
SCALE: 1" = 40'

**ABBREVIATIONS**

AD	AREA DRAIN	MI	MANHOLE
BFG	BOTTOM FINISH GRADE	OC	ON CENTER
BM	BENCHMARK	OH	OVERHEAD
CL	CENTERLINE	P&E	PACIFIC GAS AND ELECTRIC
CO	CLEANOUT	PV	POST INDICATOR VALVE
CONF	CONFORM	PL	PROPOSED
CV	CHECK VALVE	R	RADIUS
DDCV	DOUBLE DETECTOR CHECK VALVE	ROW	RIGHT OF WAY
DI	DRAIN INLET	S	SLOPE (FEET/FOOT)
DS	DOWNSPOUT	S.A.D.	SEE ARCHITECT'S DRAWINGS
DH	DOMESTIC WATER	SD	STORM DRAIN
EG	EXISTING GRADE	SF	SQUARE FOOT/FEET
EP	EDGE OF PAVEMENT	S.L.A.D.	SEE LANDSCAPE ARCHITECT'S DRAWINGS
EX / (P)	EXISTING / FUTURE	SS	SANITARY SEWER
FDC	FIRE DEPARTMENT CONNECTION	SSCO	SANITARY SEWER CLEANOUT
FF	FINISH FLOOR	SSFM	SANITARY SEWER FORCE MAIN
FG	FINISH GRADE	SSD	SEE STRUCTURAL DRAWINGS
FL	FLOH LINE	STA	STATION
FN	FIRE WATER LINE	STD	STANDARD
GB	GRADE BREAK	TC	TOP OF CURB
HP	HIGH POINT	TH	TOP OF WALL
INV	INVERT	W	WATER LINE
LF	LINEAL FEET/FOOT	WM	WATER MEIER
LP	LOW POINT	WV	WATER VALVE

**SYMBOL LEGEND**

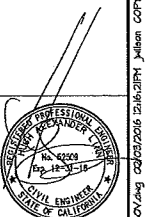
EXISTING		PROPOSED	
☆	LIGHT	SD	STORM DRAIN LINE
⊕	HOSE BIB	SS	SANITARY SEWER LINE
⊕	GAS RISER	SSFM	SANITARY SEWER FORCE MAIN
⊕	GAS VALVE	FW	FIRE WATER LINE
EV	ELECTRIC VAULT	NWL	NELL WATER LINE
○	TREE (AS NOTED)	FL	SLOPE AS SHOWN
△	SURVEY CONTROL STATION	FH	FIRE HYDRANT
ICV	IRRIGATION CONTROL VALVE	DI	DRAIN INLET
---	FLOORLINE	AD	AREA DRAIN
---	EDGE OF GRAVEL	SSCO	SANITARY SEWER CLEANOUT
---	PROPERTY LINE	X	EX TREE TO BE REMOVED
---	VINE ROW	---	SHALE FLOH LINE
		---	EDGE OF PAVEMENT
		---	SHOULDER

**CALL USA  
BEFORE EXCAVATING**

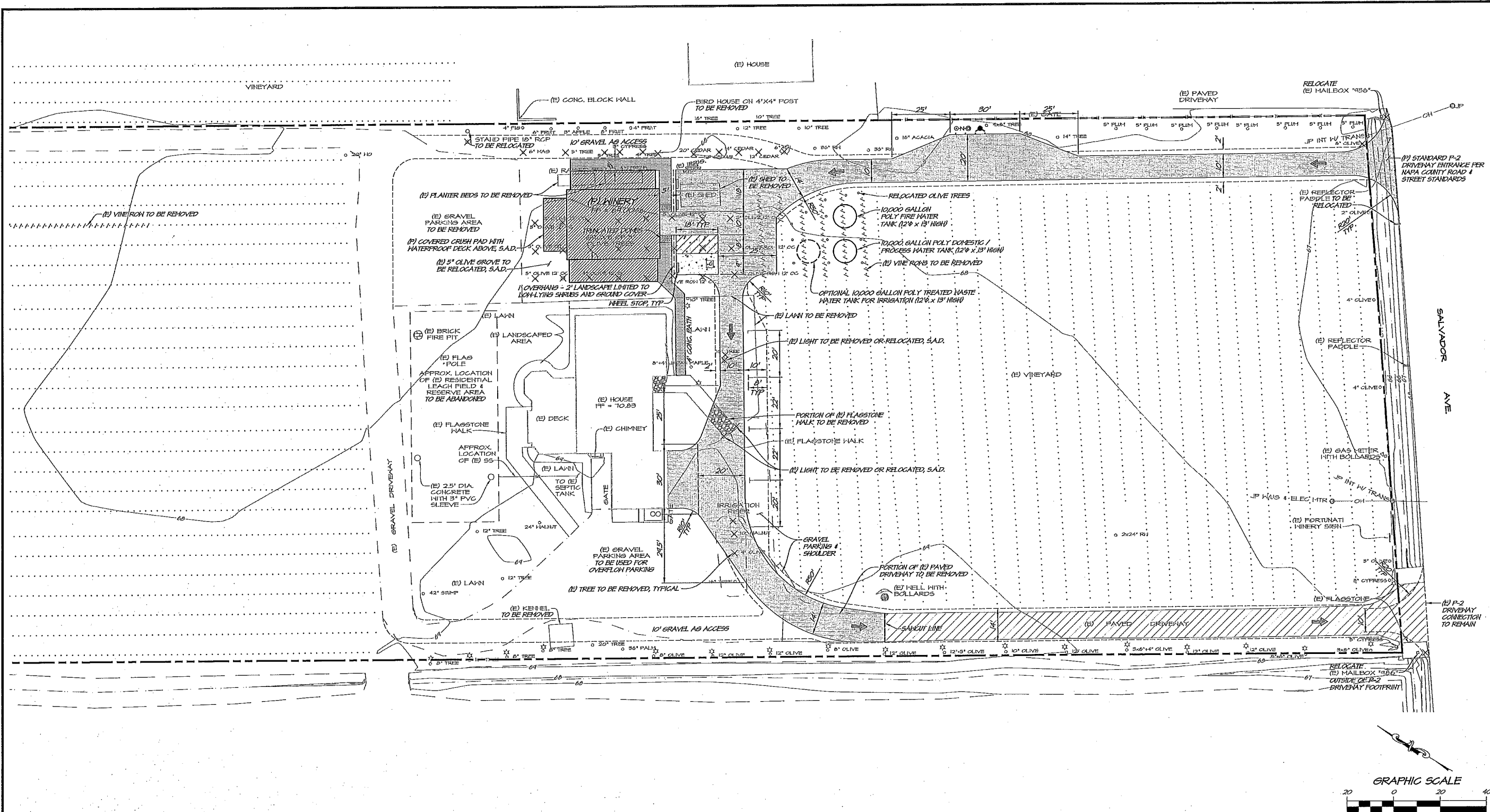


**48 HOURS IN ADVANCE  
1 (800) 642-2444**

**FORTUNATI VINEYARDS  
COVER SHEET  
NAPA COUNTY  
CALIFORNIA**



DATE	FEB 3, 2016
DRAWN	JFH
DESIGNED	PSH
CHECKED	BNF
JOB NO.	4110000
SHEET NO.	UP1
	1 OF 4 SHEETS



**EARTHWORK ESTIMATES**

LOCATION	CUT (C.Y.)	FILL (C.Y.)
DRIVEWAY - FG	15	80
WINERY - FF	15	105
PAVEMENTS	165	-
FOUNDATION	55	-
LEACH FIELD	-	45
SUBTOTAL	250	230
<b>NET CUT</b>	<b>20</b>	

EXCESS MATERIAL TO BE PLACED ON-SITE OR HAILED TO SITE WITH APPROVED NAPA COUNTY GRADING PERMIT

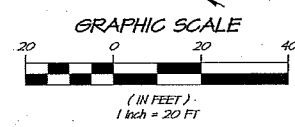
**TREE REMOVAL**

SPECIES	SIZE	QTY
CEDAR	12"	2
CEDAR	14"	1
CEDAR	20"	1
CYPRESS	3"	1
MAGNOLIA	6"	1
OLIVE*	4"	1
OLIVE*	5"	24
OLIVE*	6"	1
REDWOOD	6"	1
TREE	4"	1
TREE	5"	2
TREE	10"	1
HALIUT	10"	1
<b>TOTAL</b>		<b>38</b>

\* OLIVE TREES TO BE PROTECTED DURING REMOVAL AND REPLANTED ON SITE

**HATCH LEGEND**

- BROWN DOUBLE CHIPSEAL OVER 5" CLASS 2 AB, SUBGRADE PER GEOTECHNICAL ENGINEER
- BROWN DOUBLE CHIPSEAL OVER EXISTING AC DRIVEWAY
- 6" CONCRETE OVER 6" CLASS 2 AB OR PER STRUCTURAL ENGINEER
- 4" CONCRETE OVER 4" AB



NO.	DATE	REVISIONS

1515 FOURTH STREET  
NAPA, CALIF. 94559  
OFFICE (707) 252-3301  
WWW.RSACAL.COM

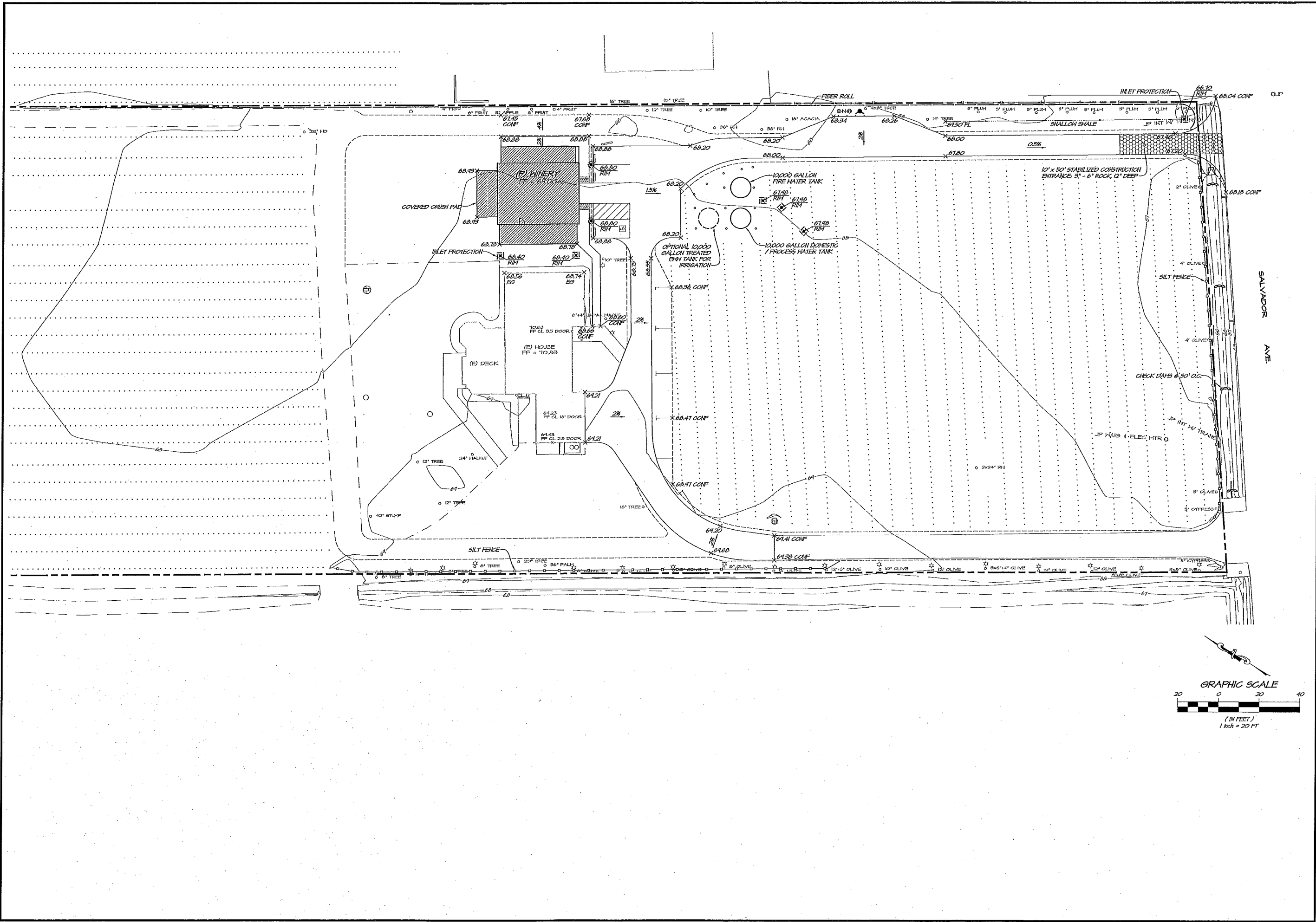
**RSAC**  
RSAC CONSULTING CIVIL ENGINEERS + SURVEYORS - 1982

**FORTUNATI VINEYARDS  
DEMOLITION & DIMENSION PLAN**  
NAPA COUNTY CALIFORNIA



DATE: FEB. 3, 2016  
DRAWN: JFW  
DESIGNED: FSK  
CHECKED: BWP  
JOB NO. 410200.0

SHEET NO.  
**UP2**  
2 OF 4 SHEETS



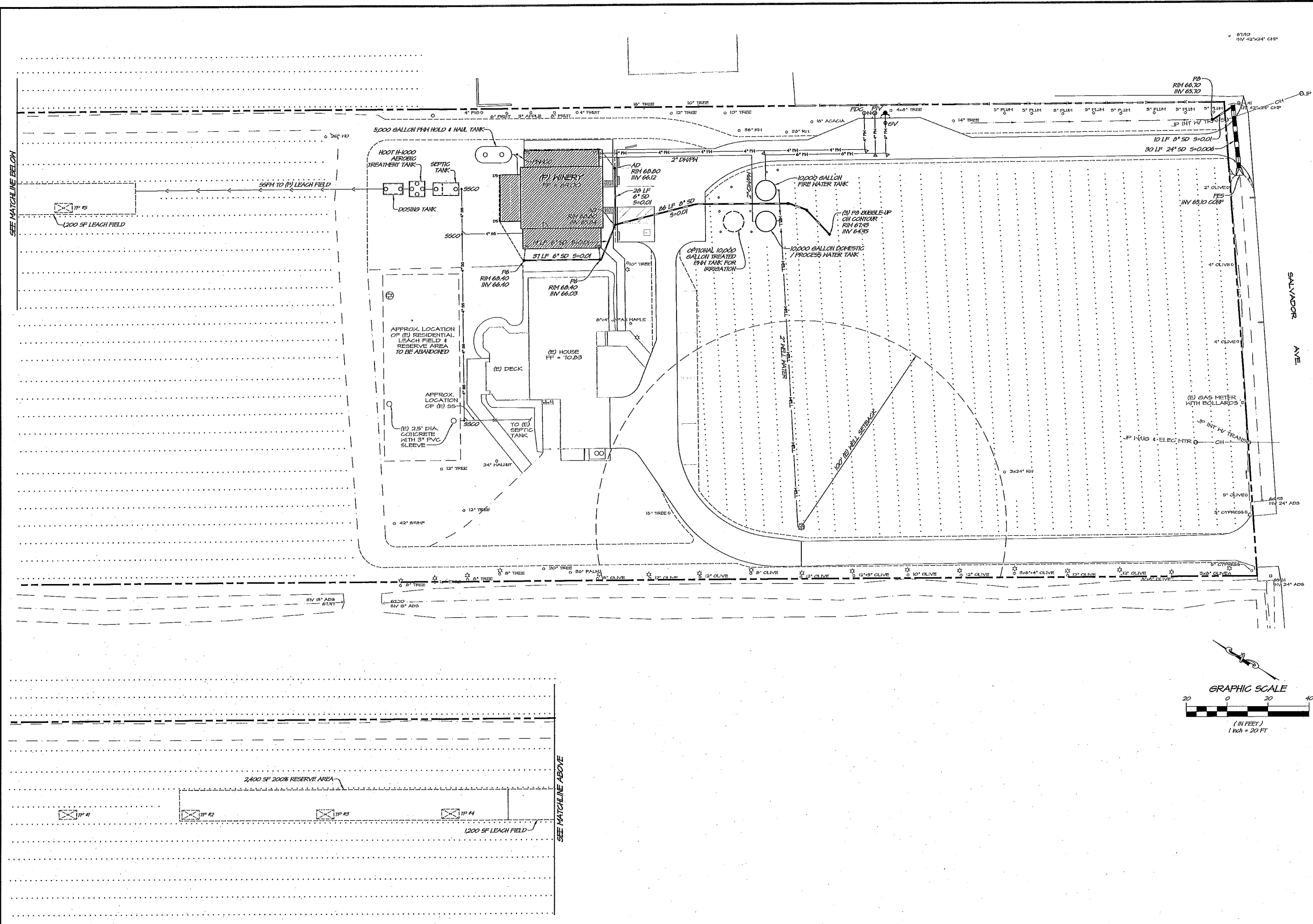
NO.	DATE	REVISIONS	BY	APPD

**RSA+**  
 1515 FOURTH STREET  
 NAPA, CALIF. 94959  
 OFFICE (707) 252-3301  
 www.rsainc.com

**FORTUNATI VINEYARDS  
 GRADING & EROSION CONTROL PLAN**  
 CALIFORNIA  
 NAPA COUNTY

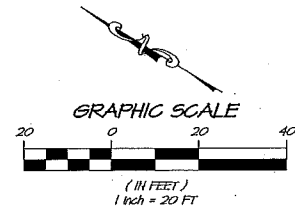


DATE	FEB 3, 2016
DRAWN	PSH
DESIGNED	PSH
CHECKED	BNF
JOB NO.	4100000
SHEET NO.	UP3
3 OF 4 SHEETS	



SEE MATCHLINE BELOW

SEE MATCHLINE ABOVE



NO.	DATE	REVISIONS	BY	APPD

1915 FOURTH STREET  
 NAPA, CALIF. 94959  
 OFFICE (707) 252-3301  
 www.rsacal.com

**RSA+**  
 CONSULTING CIVIL ENGINEERS + SURVEYORS

**FORTUNATI VINEYARDS  
 UTILITY PLAN**  
 CALIFORNIA  
 NAPA COUNTY

DATE	FEB 3, 2016
DRAWN	JWF
DESIGNED	PSH
CHECKED	BP
JOB NO.	4192000
SHEET NO.	UP4
	4 OF 4 SHEETS





## Appendix 3

### Site Evaluation Report

Permit Number: E15-00815  
 APN 036-180-004  
 RSA+ Project Number: 4115080.0

Date: October 16, 2015  
 Page 1 of 3

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 #: E15-00815	
APN: 036-180-004	
(County Use Only) Reviewed by:	Date:

**PLEASE PRINT OR TYPE ALL INFORMATION**

Property Owner Gary Luchtel / Ellen Reich-Luchtel			<input checked="" type="checkbox"/> New Construction <input type="checkbox"/> Addition <input type="checkbox"/> Remodel <input type="checkbox"/> Relocation
Property Owner Mailing Address 986 Savador Avenue			<input type="checkbox"/> Other:
City: Napa                                  State: CA                                  Zip: 94558			<input type="checkbox"/> Residential - # of Bedrooms:      Design Flow : gpd
Site Address/Location 986 Savador Avenue Napa, CA 94558			<input checked="" type="checkbox"/> Commercial – Type: Winery
			Sanitary Waste: 118 gpd                  Process Waste: gpd
			<input type="checkbox"/> Other:
			Sanitary Waste:                  gpd                  Process Waste: gpd

**Evaluation Conducted By:**

Company Name RSA*	Evaluator's Name Maggie Schneider	Signature (Civil/Engineer, R.E.H.S., Geologist/ Soil Scientist)
Mailing Address: 1515 Fourth Street		Telephone Number 707-252-3301
City Napa	State CA                                  Zip 94559	Date Evaluation Conducted

<b><u>Primary Area</u></b>	<b><u>Expansion Area</u></b>
Acceptable Soil Depth: 30in.    Test pit #'s: 5	Acceptable Soil Depth: 30in.    Test pit #'s: 1, 2, 3 & 4
Soil Application Rate (gal. /sq. ft. /day): 0.6	Soil Application Rate (gal. /sq. ft. /day): 0.6
System Type(s) Recommended: geoflow	System Type(s) Recommended: geoflow
Slope: 0-5%    Distance to nearest water source: >100ft	Slope: 0-5%    Distance to nearest water source: >100ft
Hydrometer test performed?    No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)	Hydrometer test performed?    No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)
Bulk Density test performed?    No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)	Bulk Density test performed?    No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)
Percolation test performed?    No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)	Percolation test performed?    No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)
Groundwater Monitoring Performed? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)	Groundwater Monitoring Performed? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)

Site constraints/Recommendations:

Test Pit # 1

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-30	C	<10	CL	M-SB	SH	FRB	SS	F/F	C/F	No
X	30-60										Yes
<b>Notes:</b>											

Test Pit # 2

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-30	C	<10	CL	M-SB	SH	FRB	SS	F/F	C/F	No
X	30-60										Yes
<b>Notes:</b>											

Test Pit # 3

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-30	C	<10	CL	M-SB	SH	FRB	SS	F/F	C/F	No
X	30-60										Yes
<b>Notes:</b>											

Test Pit # 4

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-30	C	>10%	CL	M-SB	SH	FRB	SS	F/F	C/F	No
X	30-60										Yes
<b>Notes:</b>											

Test Pit # 5

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-30	C	<10%	CL	M-SB	SH	FRB	SS	F/F	C/F	No
X	30-60										Yes
<b>Notes:</b>											

Test Pit # 6

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
<b>Notes:</b>											

# FORTUNATI VINEYARDS VICINITY MAP

NAPA COUNTY

CALIFORNIA



## VICINITY MAP

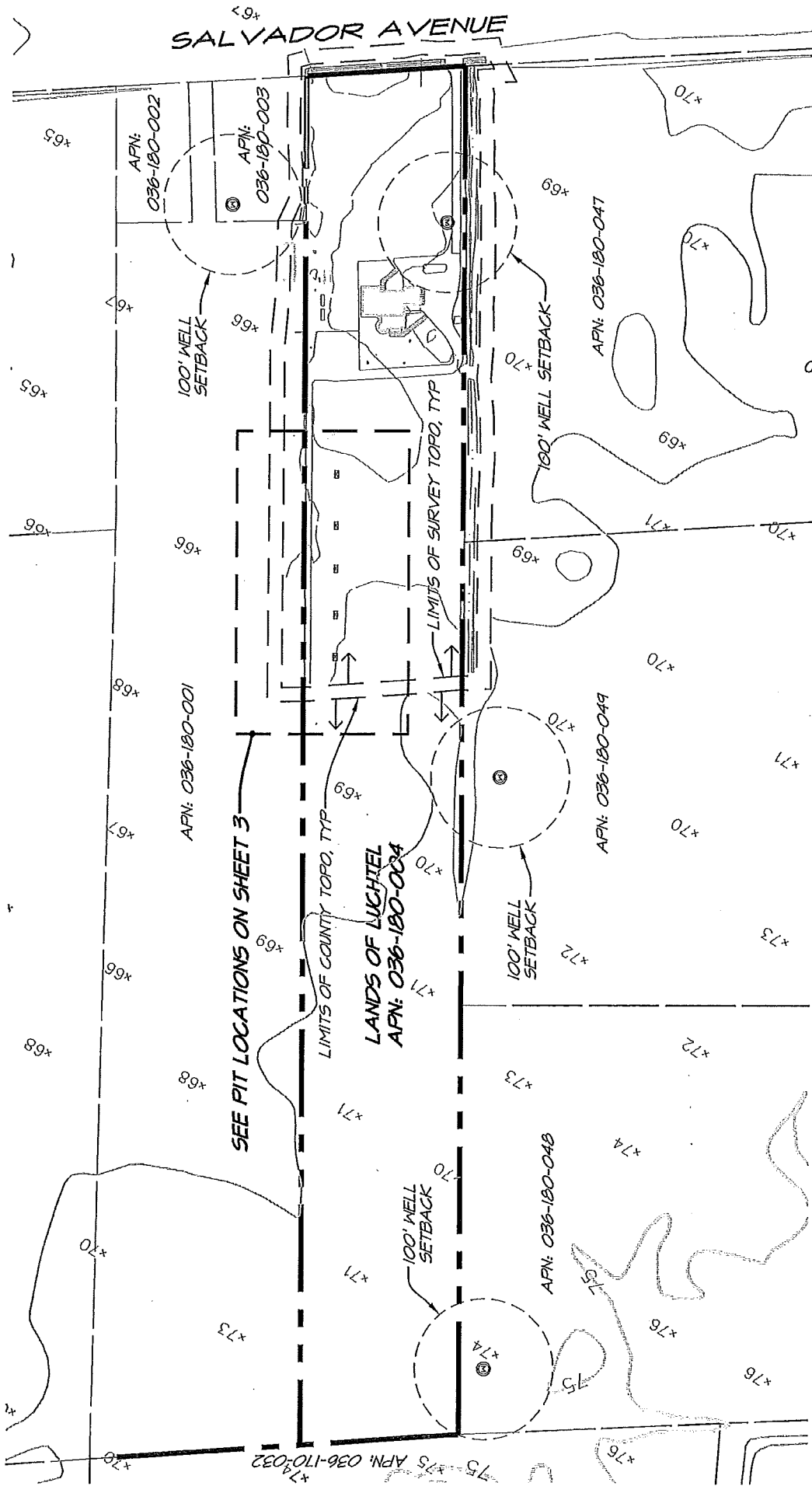
SCALE: 1" = 3000'

<b>RSA<sup>+</sup></b>	1515 FOURTH STREET
	NAPA, CALIF. 94559
	OFFICE   707   252.3301
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# FORTUNATI VINEYARDS PIT MAP



SITE EVALUATION DATE: OCTOBER 14, 2015  
 APN: 036-180-004  
 ADDRESS: 926 SALVADOR AVENUE  
 NAPA, CA 94558  
 ENV. HEALTH INSPECTOR: REBECCA SETLIFF



**RSA+**

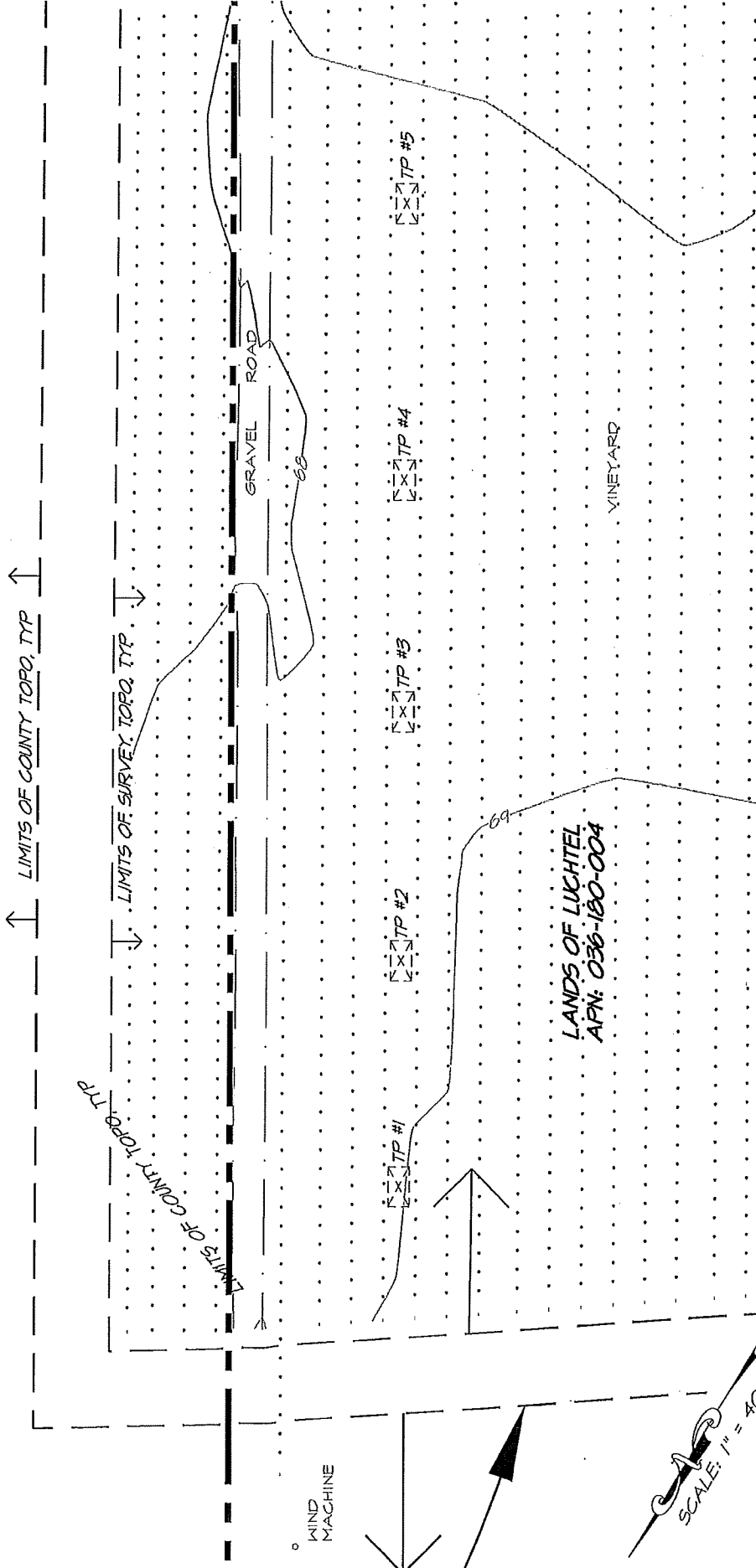
1515 FOURTH STREET  
 NAPA, CALIF. 94559  
 OFFICE | 707 | 252.3301  
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OCT. 20, 2015 4150800 Exh-Filmapp.dwg 2 OF 3

# FORTUNATI VINEYARDS PIT LOCATIONS

APN: 036-180-001



SITE EVALUATION DATE: OCTOBER 14, 2015  
 APN: 036-180-004  
 ADDRESS: 986 SALVADOR AVENUE  
 NAPA, CA 94558  
 ENV. HEALTH INSPECTOR: REBECCA SETLIFF

**LEGEND**  
 [Symbol] TP# TEST PIT  
 [Symbol] TP# NO GOOD

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## Appendix 4

### Water Balance for Irrigation and Storage, Irrigation Areas Exhibit

**FORTUNATI VINEYARDS**  
**Reclaimed Process Wastewater**  
**Water Balance for Irrigation and Storage**



Project Description		Annual Process Waste Flow Volume	
Project Number:	4115080.0	Wine Production:	12,000 gal/year
Project Name:	Fortunati Vineyards		
Prepared By:	Maggie Schneider	Annual Process Waste per Gallon Wine:	5 gal/year
Date:	January 12, 2016	Total Annual Process Waste Generated:	60,000 gal/year

Vineyard Irrigation Parameters		Landscape Irrigation Parameters	
Acres of irrigated vineyard:	7.80 acres	Crop type / name:	Native grass and trees
Row spacing:	7.0 feet	Total irrigated acres of crop:	0.00 acres
Vine spacing:	7.0 feet		
Total number of vines:	6,934 vines		
Water use per vine per month (peak):	26 gal		
Total peak monthly irrigation demand:	180,285 gal		

Monthly Process Wastewater Generation												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly process wastewater generated as % of annual total:	4%	6%	6%	5%	6%	7%	9%	10%	14%	14%	11%	8%
Monthly process wastewater generated [gallons]:	2,400	3,600	3,600	3,000	3,600	4,200	5,400	6,000	8,400	8,400	6,600	4,800

Monthly Vineyard Irrigation Water Use												
(Based on per-vine water use)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Beginning of month reclaimed water in storage [gallons] (This number brought forward from end of previous month)	0	0	0	0	0	0	0	0	0	0	0	0
Vineyard irrigation as % of peak month irrigation demand:	6%	6%	10%	100%	100%	100%	100%	100%	100%	100%	10%	10%
Irrigation per month per vine (gallons):	2	2	3	26	26	26	26	26	26	26	3	3
Total vineyard irrigation demand [gallons]:	10,817	10,817	18,029	180,285	180,285	180,285	180,285	180,285	180,285	180,285	18,029	18,029
Will vineyard be irrigated with reclaimed water this month?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Process wastewater generated this month, reclaimed for vineyard irrigation [gallons]	2,400	3,600	3,600	3,000	3,600	4,200	5,400	6,000	8,400	8,400	6,600	4,800
Remaining vineyard irrigation demand after using this month's process water [gallons]	8,417	7,217	14,429	177,285	176,685	176,085	174,885	174,285	171,885	171,885	11,429	13,229
Drawdown from storage for remaining vineyard irrigation [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
Well water required to satisfy remaining vineyard irrigation demand	8,417	7,217	14,429	177,285	176,685	176,085	174,885	174,285	171,885	171,885	11,429	13,229
Net storage after vineyard irrigation drawdown [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
This month's process wastewater, remaining after vineyard irrigation, available for landscape irrigation [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
<i>Water balance continues on next page for cover crop irrigation.</i>												

Monthly Landscape Irrigation Water Use												
(Based on evapotranspiration crop demand and irrigated area)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
This month's process wastewater, remaining after vineyard irrigation, available for landscape irrigation [gallons] (From sheet 1)	0	0	0	0	0	0	0	0	0	0	0	0
Reference ET (ET <sub>o</sub> ) (in/month) (see note 1)	1.03	1.53	2.93	4.71	5.82	6.85	7.21	6.44	4.87	3.53	1.64	1.17
Crop Coefficient (k <sub>c</sub> ) (see note 2)	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Crop water demand per acre [inches]	0.82	1.22	2.34	3.77	4.66	5.48	5.77	5.15	3.90	2.82	1.31	0.94
Crop water demand per acre [gallons]	22,374	33,235	63,645	102,310	126,422	148,795	156,615	139,889	105,786	76,678	35,624	25,415
Total crop water demand for irrigated area [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
Will landscape be irrigated with reclaimed water this month?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Process wastewater remaining after vineyard irrigation, reclaimed for landscape irrigation [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
Landscape irrigation water required from storage or other source [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
Drawdown from storage for landscape irrigation [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
Process wastewater generated this month, unused for irrigation, to be reclaimed and stored [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
Net end-of-month reclaimed water storage after all irrigation [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
<i>End of Water Balance</i>												

**Peak Monthly Storage = 10,000 gallons      Total Process Wastewater Reclaimed for Vineyard Irrigation = 60,000 gallons**

- Notes:  
1. Reference ET<sub>o</sub> from California Irrigation Management Information System  
2. Crop Coefficient from Table 1 of "Estimating Irrigation Water Needs of Landscape Plantings in California", University of California Cooperative Extension, August 2000.

# FORTUNATI VINEYARDS TREATED PROCESS WASTEWATER IRRIGATION AREA



SCALE: 1" = 2000'

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OCT 16, 2015 4115080.0 Exh-VineyardArea.dwg