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Wastewater Feasibility Study

Boyd Family Vineyards P17-00379-UP
Planning Commission Hearing Date June 20, 2018

WASTEWATER FEASIBILITY STUDY

BOYD FAMILY VINEYARDS

4042 Big Ranch, Napa, California
APN 036-190-003

SUMMIT

CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER

Project No. 2017120
October 20, 2017

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LIST OF ENCLOSURES

PROJECT OVERVIEW

Boyd Family Vineyards is applying for a Use Permit for the Boyd Family Vineyards new winery facility to be located at 4042 Big Ranch Road, in Napa (APN: 036-190-003). The project site is located approximately 0.3 miles southwest of the Napa River, and 1.7 miles northeast of Highway 29/128. The project site extends over a gently sloping terrain along the valley floor, sloping northeast at approximately 3% or less towards the Napa River.

Boyd Family Vineyards is made up of a single 20.88 acre parcel, with approximately 13.68 acres of existing vineyard. The parcel has an existing residence with a guest cottage and garage, a barn, a shed, and a well pump house with a water supply tank. The Use Permit Application includes the construction of a new 4,200 square foot winery with a production capacity of 30,000 gallons per year. The new winery will require 2 full-time employees, with 6 full-time employees during crush and marketing events, and anticipates 15 maximum visitors per day with an average of 40 visitors per week. The existing sanitary sewer leach field system will continue to be used for disposal of the sewer from the exiting residence and guest house on the site. Summit Engineering has prepared the following Wastewater Feasibility Study outlining the process wastewater (PW) and sanitary sewage (SS) flows from the proposed winery and the associated treatment and disposal systems.

WINERY PROCESS WASTEWATER MANAGEMENT SYSTEM

To accommodate a proposed annual production of 30,000 gallons of wine, the new PW management system will include a gravity collection system with screens on floor drains for solids removal, a PW pump station, and treatment and disposal through one of the following alternatives:

1. PW Hold and Haul, with SS disposal through a pressure distribution (PD) leachfield.
2. Primary treatment and disposal through a PD leachfield (combined with SS).
3. Treatment through package treatment system and in-ground disposal via a subsurface drip dispersal system (combined or not with SS).
4. Treatment through a high rate package treatment system, storage of treated PW, and surface reuse for vineyard irrigation.

The PW management system will be designed and installed in accordance with the memorandum of understanding and all necessary Napa County Planning, Building and Environmental Services (PBES) and Regional Water Quality Control Board (RWQCB) criteria and permits.

PROCESS WASTEWATER CHARACTERISTICS

Process wastewater will consist primarily of wastewater collected at floor drains and trenches within the winery, receiving, crush, tank, and wash down areas. All exterior tank and process areas will be covered and graded to preclude stormwater from entering the PW collection system. No distillation will occur at the facility; hence there will be no stillage waste. Typical winery wastewater characteristics are as summarized below:

PROCESS WASTEWATER DESIGN FLOWS

Based on typical flow data from wineries of similar size and characteristics and corresponding process wastewater (PW) generation rates, projected flows are calculated as follows:

Annual Volume

Annual Production	=	30,000	gal wine/year
Generation Rate (assumed)[a]	=	165	gal wine/ton grapes
Tons Crushed	=	181	tons grapes/year
Process Wastewater (PW) Generation Rate [b]	=	6.00	gal PW/gal wine
Annual PW Flow	=	*180,000*	*gal PW/year*
Average Day Flow	=	***493***	***gal PW/day***

Napa County Peak Day Flow

Peak Harvest Day Flow (45 day harvest)	=	***1,000***	***gal PW/day***

Average, Day Peak Harvest Month Flow

The harvest month of September accounts for approximately 16.4 percent of the annual PW flow.

Peak Flow	=	*984*	*gal PW/day*
	=	***1,000***	***gal PW/day***

Notes:

a. 165 Gal wine per ton of grapes is used as a wine industry standard
b. 6.0 gal of PW per gallon wine produced over the course of 1 year is based on the average of data from approximately 16 wineries

The PW design flow will account for the most conservative approach; therefore 1,000 gpd will be used for preliminary system sizing as outlined below.

DISPOSAL METHODS

A Hold & Haul system will be utilized for disposal of PW, eliminating the need for vineyard removal associated with a PD system and 12" of fill. As a backup option, either a PD disposal system or a pre- treatment system will be utilized for treatment and disposal of PW, as presented in the following options.

OPTION 2: PD DISPOSAL SYSTEM

The PD system sized for disposal of PW in combination with SS flows would require a total area of 18,200 square feet. The system would require 2,900 LF of leachline, spaced 6.5 feet on center and with 12" of fill. An additional 200% reserve area is designated as a subsurface drip dispersal field, see Enclosure A.

$$\text{PD Leach Field Size} = \frac{1{,}315 \text{ gpd}^{a}}{1.33 \frac{\text{SF}}{\text{LF}} x \frac{0.35\ gal}{SF\ x\ day}} = 2{,}825 \text{ LF minimum}$$

[a] The total flow accounts for 350 gpd of SS and 1,000 gpd of PW

A total of 28 – 100 foot pressure distribution lines will provide a total of 2,900 lineal feet. With trench spacing at 6.5 feet on-center, a total of 18,200 SF of leachfield area for disposal of combined SS and PW flows. A 200% reserve area will be provided for via a subsurface drip system, sized accordingly to the system type as shown in Option 3. Reduced sizing requirements for an SS only PD disposal system can be found in the Sanitary Sewage Treatment and Disposal section, page 11.

SETTLING TANKS WITH EFFLUENT FILTER

Solids settling and digestion in the settling tanks helps to reduce BOD and TSS concentrations entering the disposal system or pre-treatment system, resulting in higher treatment unit performance, and reduced potential for clogging of the disposal field. An effluent filter will also be provided to remove additional suspended solids which do not settle out in the settling tank. The required settling tank size for the PW flows was evaluated based on Napa County PBES criteria, which requires 3 days min of settling capacity.

Volume = 3 HRT x Flow rate
Volume = 3 (1,000 gpd)
Volume = 3,000 gallons

A new 3,000 gallon precast concrete settling tank will be provided to remove solids and reduce BOD loads to the system.

pH CONTROL SYSTEM

A pH control system could be provided (if necessary) for neutralization of the winery PW, with dosing of neutralizing chemicals into the sump. The combination of naturally occurring alkalinity in source water and alkaline cleaning compounds used within wineries usually provides sufficient buffering to maintain pond pH above 6.5. Neutralizing chemicals should only be used when absolutely necessary. It is recommended that the

and a minimum 200% reserve area of 10,600 square feet (to accommodate both options of PW and SS flows combined, or PW flows only). Warning signs and/or fencing will be installed to indicate the boundaries of the drip field area. See Enclosure B for more details on the subsurface drip disposal field design.

OPTION 4: PACKAGE TREATMENT SYSTEM WITH SURFACE REUSE/DISPOSAL (PW ONLY)

PACKAGE TREATMENT SYSTEM

A package treatment plant would be provided with the following additional items as discussed in Option 3.

EFFLUENT STORAGE TANK

An effluent storage tank shall be sized to accommodate approximately 15 days of storage during the winter months, to account for a prolonged rain event, when irrigation with treated PW effluent is prohibited.

FLOW MEASUREMENT

An additional flow measurement device will be provided to measure the discharge flows to the irrigation system.

FILTER

A filter will be provided to screen secondary effluent prior to irrigation.

IRRIGATION DISPOSAL AREA

The proposed vineyard and landscape areas should provide adequate capacity for reuse and disposal (through percolation) of PW effluent from the package treatment plant. Reuse/disposal of effluent will be via drip irrigation of approximately 1 acre of vineyard/landscape. The irrigation demand of the vineyards and landscaping exceeds the estimated annual process wastewater volume. To meet the additional irrigation demand the treated PW can be supplemented with well water. The irrigation demand is the lowest during the wet weather season (November through April) and application rates during this period should be less than 1 inch per month. An air gap or separate plumbing will be installed for the existing irrigation system plumbing to prevent cross-contamination with treated effluent applied to the irrigation distribution network. See Enclosure D for the PW irrigation balance.

SANITARY SEWAGE CHARACTERISTICS

SS will consist primarily of wastewater generated from restrooms, laboratories, and tasting room facilities. Typical SS characteristics are summarized below:

TABLE 2.TYPICAL SANITARY SEWER CHARACTERISTICS

Characteristic	Units	Raw Wastewater[1] Range
BOD_s	mg/L	110 - 220
Grease	mg/L	50-100
Total Suspended Solids (TSS)	mg/L	100 - 220
Volatile Suspended Solids	mg/L	80 - 165
Total Dissolved Solids (TDS)	mg/L	250 - 500
Nitrogen	mg/L	20 - 40
Nitrate	mg/L	0
Phosphorous	mg/L	4 - 8
Alkalinity ($CaCO_3$)	mg/L	50 - 100
Chloride	mg/L	30 - 50
Sulfate	mg/L	20 - 30

[1]Typical composition of untreated domestic wastewater, Metcalf & Eddy, "Wastewater Engineering, Third Edition", 1991

Uniform Plumbing Code Method:

$$Volume = 1{,}125 + 0.75 \times Flow\ Rate$$

$$Volume = 1{,}125 + 0.75 \times 315\ gpd$$

$$Volume = 1{,}362\ gallons$$

A 1,500 gallon precast concrete septic tank will be provided for solids removal prior to in-ground disposal of SS flows.

OPTION 1: PD DISPOSAL SYSTEM (SS ONLY)

PD DISPOSAL SYSTEM - SS

The PD system sized for disposal of the SS flows would require a total area of 4,550 square feet based on the soils evaluation information previously noted (See Calculations below). An additional 200% reserve area is designated as a subsurface drip dispersal system for combined PW and SS flows, see Enclosure A.

$$\text{PD Leach Field Size} = \frac{350\ \text{gpd}^{a}}{1.33\frac{\text{SF}}{\text{LF}} x \frac{0.35\ gal}{SF\ x\ day}} = 752\ \text{LF minimum}$$

[a] The total flow accounts for 350 gpd of SS

A total of 7 – 100 foot pressure distribution lines will provide a total of 800 lineal feet. With trench spacing at 6.5 feet on-center, a total of 4,550 SF of leach field area for disposal of SS flows will be provided. 12 inches of fill will be required over all lines.

OPTION 2: PD DISPOSAL SYSTEM (SS & PW)

PD DISPOSAL SYSTEM - SS & PW

The PD system sized for disposal of the SS in combination with PW flows would require a total area of 18,200 square feet (See Option 1 of PW management system). An additional 200% reserve area is designated as a subsurface drip dispersal system for combined PW and SS flows, see Enclosure A.

OPTION 3: PACKAGE TREATMENT PLANT SYSTEM WITH SUB-SURFACE DRIP DISPOSAL

See Option 3 of PW Management System for combined treatment and sub-surface drip disposal details.

OTHER CONSIDERATIONS

ODOR CONTROL

There should be no noxious odors from a properly designed and operated treatment system. See Alternative Courses of Action for operation alternatives.

ENCLOSURE A

VICINITY MAP

OVERALL SITE PLAN

WASTEWATER SITE PLAN

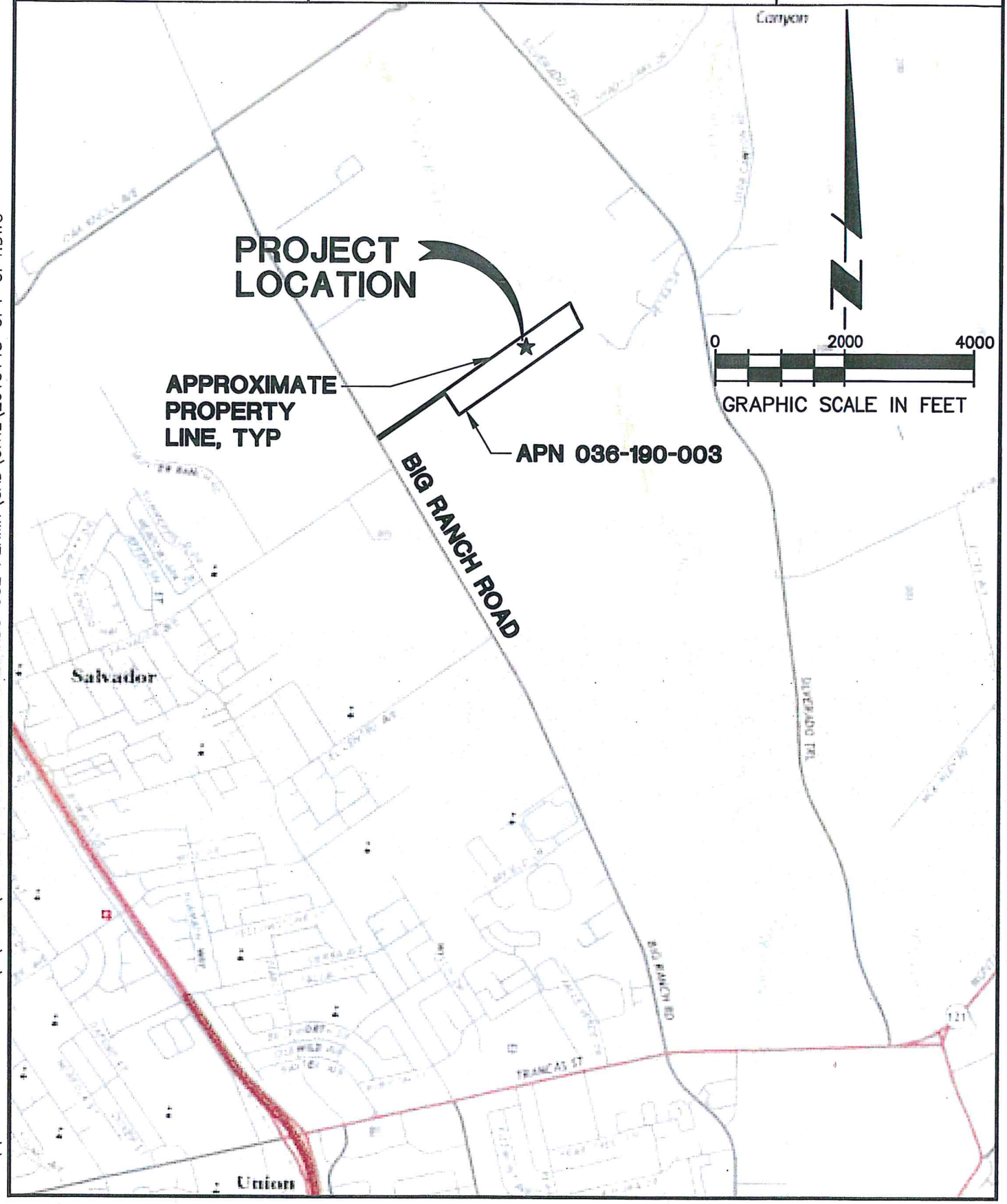
WASTEWATER SYSTEM SCHEMATIC

SUMMIT

BOYD FAMILY VINEYARDS
4042 BIG RANCH ROAD
NAPA, CA 94558
APN 036-190-003

USE PERMIT ASSISTANCE

PROJECT NO. 2015148
DATE 2015-XX-XX1
SHT NO ____ OF ____
BY JA CHK INITIALS2



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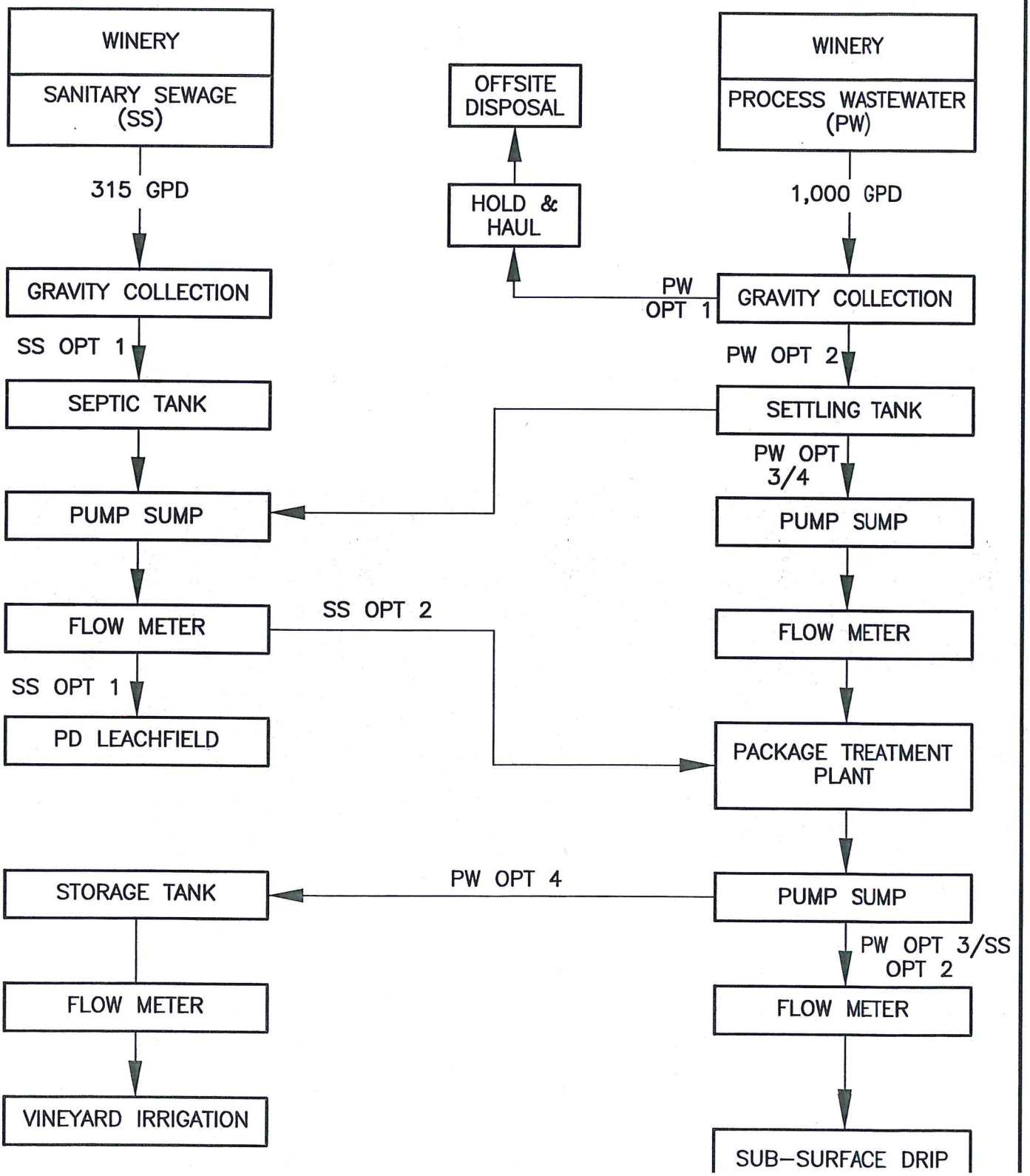
Summit Engineering, Inc
463 Aviation Blvd., Suite 200 • Santa Rosa, CA 95403 • 707-527-0775 • www.summit-sr.com

SUMMIT

BOYD VINEYARDS
4042 BIG RANCH
NAPA, CA
APN 036-190-003

PW & SS TREATMENT SCHEMATIC

PROJECT NO. 2015148
DATE 10-09-15
SHT NO 1 OF 1
BY CL CHK GG



ENCLOSURE B

SANITARY SEWAGE FLOW ESTIMATES

PROCESS WASTEWATER FLOW ESTIMATES

PD & SUBSURFACE DRIP DISPOSAL FIELD SIZING

IRRIGATION HOLDING TANK SIZING

IRRIGATION BALANCE

CLIMATE DATA

SUMMIT ENGINEERING, INC.	BOYD VINEYARDS Wastewater Feasibility Study Sanitary Sewage Flows Estimate	PROJECT NO. 2015148 BY: CL CHK: JR

SANITARY SEWAGE

Peak Tasting Day Harvest				
Employee (full-time)	6 x	15 gpcd	=	90 gal/day
Tasting Visitors	15 x	3 gpcd	=	45 gal/day
Maximum Marketing Visitors	30 x	6 gpcd		180 gal/day
Total			=	**315 gal/day**

Portable toilets will be provided for marketing events resulting in more than 45 total visitors on-site

SUMMIT ENGINEERING, INC.	BOYD VINEYARDS Wastewater Feasibility Study Process Wastewater Flows Estimate	PROJECT NO. 2015148 BY: CL CHK: JR

PROCESS WASTEWATER

Annual Volume

Annual Production (projected)				=	12,500	cases wine/year
Generation Rate (assumed)[a]				=	2.4	gal wine/case of wine
Annual Production	12,500 cases wine/year	x	2.4 gal wine/case of wine	=	30,000	gal wine/year
Generation Rate (assumed)[b]				=	165	gal wine/ton grapes
Tons Crushed	30,000 gal wine/year	÷	165 gal wine/ton grapes	=	182	tons grapes/year
Process Wastewater (PW) Generation Rate[c]	(assumed)			=	6.00	gal PW/gal wine
Annual PW Flow	30,000 gal wine/year	x	6.00 gal PW/gal wine	=	***180,000***	***gal PW/year***

Average Day Flow

	180,000 gal PW/year	÷	365 days	=	***493***	***gal PW/day***

Napa County Peak Day Flow

Length of Harvest				=	45	days
Peak Flow	30,000 gal wine/year 45 days	x	1.5	=	***1,000***	***gal PW/day***
				=	***1,000***	***gal PW/day***

Average, Day Peak Harvest Month Flow

Assume:
1. 16.4% of the PW flows are accounted for during September
2. 30 days in September

Peak Flow	180,000 gal PW/year 30 days	x	16%	=	***984***	***gal PW/day***
				=	***1,000***	***gal PW/day***

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	BOYD VINEYARDS Wastewater Feasibility Study Process Wastewater Flow Estimates	PROJECT NO. 2015148 BY: CL CHK: JR

DESIGN CRITERIA

FULL PRODUCTION

Production Level	12,500	cases/year	
Annual Production	30,000	gal wine/year	
Crush Period	45	day	* per PBES criteria
Annual PW Flow	180,000	gal PW/year	
Average PW Flow	493	gal PW/day	
PW Generation Rate	6.0	gal PW/gal wine	
Peak Harvest Day	1,000	gal PW/day	* per PBES criteria
PW Flows accounted during September	16.4	%	
Average Day Peak Harvest Month	1,000	gal PW/day	

DESIGN PROCESS WASTEWATER FLOWS

Month	PW Monthly Percentage of Annual Flow[a] (%)	Total PW Flow[a] (Mgal)
August	10.5%	0.019
September	16.4%	0.030
October	12.9%	0.023
November	7.4%	0.013
December	6.4%	0.012
January	6.6%	0.012
February	7.2%	0.013
March	7.6%	0.014
April	6.8%	0.012
May	6.4%	0.012
June	5.6%	0.010
July	6.2%	0.011
Total	**100%**	**0.180**

[a] Assumption of monthly percentage of annual flow based on average of PW flow data for similar small wineries

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	BOYD VINEYARDS Wastewater Feasibility Study PD & Subsurface Drip Disposal Field Sizing	PROJECT NO. 2015148 BY: CL CHK: JR

Option 1: PD System (SS only - Primary)

Design Flow	=	1,315	gal/day	
Depth to Groundwater or other limit	=	55	inches	Based on TP 1, 2 and 3
Depth of Fill	=	5	inches	
Rock below pipe	=	8	inches	
Sidewall area (orifices up)	=	1.33	sf/lf	
Application	=	0.35	gal/sf/day	Moderate sandy clay per Napa Guidelines (pits 1,2,3)
Lineal Feet required	=	2825	lf	
Proposed Lineal Feet installed	=	2900	lf	
Leachline length	=	100	ft	
Trench spacing On-Center	=	6.5	ft	
Primary Area required	=	18,202	square feet	

Option 2: Subsurface Drip System (PW only or PW & SS comingled - Primary & Reserve)

Sizing based on Geoflow guidelines

Design Flow	=	1,315	gal/day		
Depth to Groundwater or other limit	=	36	inches *minimum		
Application	=	0.25	gal/sf/day		Moderate clay & sandy clay per Napa County Guidelines, with pretreatment
Square Footage required	=	5,260	sf		
Primary Area required	=	53	x	100	
	=	5,300	square feet		
200% Reserve Area Required	=	106	x	100	
	=	10,600	square feet		
	=	0.24	acres		
Total Area	=	15,900	square feet		
	=	0.37	acres		

SUMMIT ENGINEERING, INC.	BOYD VINEYADS Wastewater Feasibility Study PW Effluent Storage Tank Sizing (Option 3)	PROJECT NO. 2015148 BY: CL CHK: JR

PW EFFLUENT STORAGE TANK

Min. Tank Volume=	20,680 gallons	
Tank Volume =	13,535 gallons	(Can be split into multiple tanks)
Useable Tank Volume =	12,459 gallons	(provides 15 days of storage at average peak harvest month flows)
Actual Tank Height =	16 ft	
Useable Tank Height =	14 ft	Accounting for 2 feet of freeboard
Tank Diameter =	12 ft	Based on CST aqua store tank capacities
Inside Diamter =	12.308 ft	
Unit Volume =	846 gal/ft	

Month	Initial Volume (gal)	Total Inflow (gal)	Divert Volume[a] (gal)	Final Volume (gal)	Final Depth (ft)
August	0	18,900	18,900	0	0.0
September	0	29,520	29,520	0	0.0
October	0	23,220	23,220	0	0.0
November	0	13,320	7,500	5,820	6.9
December	5,820	11,520	7,500	9,840	11.6
January	9,840	11,880	6,500	15,220	18.0
February	15,220	12,960	7,500	**20,680**	24.4
March	20,680	13,680	34,360	0	0.0
April	0	12,240	12,240	0	0.0
May	0	11,520	11,520	0	0.0
June	0	10,080	10,080	0	0.0
July	0	11,160	11,160	0	0.0
TOTAL	**51,560**	**180,000**	**180,000**		

[a] Monthly volume of effluent to be used for onsite irrigation or reuse.

SUMMIT ENGINEERING, INC.	BOYD VINEYARDS Wastewater Feasibility Study PW Irrigation Balance	PROJECT NO. 2015148 BY: CL CHK: JR

Applied Irrigation Area Vineyard 1.00 acres

Total Area Available for Irrigation Vineyard acres

Month	Reference ET[a]	Turfgrass Crop Coefficient[b]	Vineyard Crop Coefficient[c]	Turfgrass ET[d]	Vineyard ET[d]	100 year Precipitation[e]	Irrigation Demand[f]		Operating Days per Month[g]	Percolation Capacity[h]		Assimilative Capacity[i]		Effluent Applied[j]		Excess Capacity
	(in)			(in)	(in)	(in)	(in)	(Mgal)	(d)	(in)	(Mgal)	(in)	(Mgal)	(Mgal)	(in)	(Mgal)
August	6.5	0.9	0.5	5.6	2.9	0.2	2.8	0.075	31	11.46	0.311	14.2	0.386	0.019	0.70	0.37
September	5.1	0.7	0.3	3.8	1.3	0.9	0.4	0.012	30	11.09	0.301	11.5	0.313	0.030	1.09	0.28
October	3.4	0.8	0.1	2.6	0.2	4.0	0.0	0.000	16	5.91	0.161	5.9	0.161	0.023	0.86	0.14
November	1.8	0.7	0.0	1.2	0.0	10.4	0.0	0.000	14	5.17	0.141	5.2	0.141	0.008	0.28	0.13
December	0.9	0.6	0.0	0.6	0.0	11.3	0.0	0.000	5	1.85	0.050	1.8	0.050	0.008	0.28	0.04
January	1.2	0.6	0.0	0.8	0.0	16.1	0.0	0.000	6	2.22	0.060	2.2	0.060	0.007	0.24	0.05
February	1.7	0.6	0.0	1.1	0.0	15.3	0.0	0.000	5	1.85	0.050	1.8	0.050	0.008	0.28	0.04
March	3.4	0.8	0.0	2.6	0.0	11.5	0.0	0.000	12	4.44	0.121	4.4	0.121	0.034	1.27	0.09
April	4.8	1.0	0.2	5.0	0.8	3.8	0.0	0.000	13	4.80	0.131	4.8	0.131	0.012	0.45	0.12
May	6.2	1.0	0.6	5.9	3.6	1.5	2.1	0.058	16	5.91	0.161	8.0	0.218	0.012	0.42	0.21
June	6.9	0.9	0.7	6.1	4.9	0.4	4.5	0.123	17	6.28	0.171	10.8	0.294	0.010	0.37	0.28
July	7.4	0.9	0.6	7.0	4.8	0.1	4.7	0.127	30	11.09	0.301	15.8	0.428	0.011	0.41	0.42
Total	**49.4**			**42.1**	**18.5**	**75.4**	**14.5**	**0.4**	**195.0**	**72.1**	**2.0**	**86.6**	**2.4**	**0.18**	**6.6**	**2.17**

(a) Average monthly reference evapotranspiration rates, see Climate Data Worksheet.
(b) Kc coefficients for pasture from Table 1, "Landscape Irrigation System Evaluation and Management"- University of California Cooperative Extension, April 2009
(c) Kc coefficients for vineyards from Table 5-12, Irrigation with Reclaimed Municipal Wastewater - A Guidance Manual, 84-1 wr, SWRCB.
(d) ET=ETo x Kc. A weighted value is determined on the basis of the available irrigated acreage of vineyard and pasture.
(e) Precipitation, 10-year rainfall event, see Climate Data Worksheet.
(f) Irrigation Demand = ET-Precipitation, inches. A weighted value is determined on the basis of the available irrigated acreage of vineyard and pasture.
(g) Number of operating days per month based on estimated irrigation days available based on 24-hr post storm criteria for a 100-year return period. Summit Engineering, NBRID Capacity Study, April 1996.
(h) Design percolation rate is a maximum of.75 inches per day for the number of operating day per month. Per USDA soil survey, predominant soil type is bale loam.
Sizing perc rate based on clay soils. Pretreated loading rates for non-shrink clay soils adjusted by a 0.04 safety factor to account for typical slow rate land application design methodology.
(i) Assimilative capacity is the sum of irrigation demand and percolation applied.
(j) Effluent applied depths exceeding 1 inch/month could result in ponding; if ponding occurs, additional disposal area may be required for expansion

Percolation Adjustment		
Hourly Percolation Rate	0.385	in/hr
15	24	hr/day
Daily Percolation Rate	9.24	in/day
Land Application Safety Factor	0.04	
Adjusted Percolation Rate	0.37	in/day

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	BOYD VINEYARDS WASTEWATER FEASIBILITY STUDY Climate Data	PROJECT NO. 2015148 BY: CL CHK: JR

Month	Days	Average Temp[a] (F)	Reference Evapotranspiration[b] (in)	Pan Evaporation[c] (in)	Lake Evaporation[d] (in)	Average Precipitation[e] (in)	10-Year Precipitation[f] (in)	100-Year Precipitation[f] (in)
August	31	71.0	6.5	12.06	9.3	0.08	0.1	0.2
September	30	68.6	5.1	8.67	6.7	0.41	0.6	0.9
October	31	62.5	3.4	5.72	4.4	1.84	2.8	4.0
November	30	53.4	1.8	2.48	1.9	4.83	7.3	10.4
December	31	47.6	0.9	1.66	1.3	5.22	7.9	11.3
January	31	47.9	1.2	1.53	1.2	7.46	11.3	16.1
February	28	51.4	1.7	2.15	1.7	7.10	10.7	15.3
March	31	54.1	3.4	3.79	2.9	5.31	8.0	11.5
April	30	58.6	4.8	5.82	4.5	1.74	2.6	3.8
May	31	63.6	6.2	8.90	6.9	0.68	1.0	1.5
June	30	68.8	6.9	11.00	8.5	0.17	0.3	0.4
July	31	71.6	7.4	13.22	10.2	0.04	0.1	0.1
Total	**365**		**49.4**	**77.0**	**59.3**	**34.9**	**52.6**	**75.4**

[a] Average monthly temperature observed between 1931 and 2001 for Saint Helena, Napa, CA from NOAA

[b] Average monthly reference evaporation rates for Zone 8, Inland San Fransisco Bay Area, typical rainfall year, CIMIS, DWR, 2001. See www.itrc.org.

[c] Average monthly pan evaporation rates observed at Lake Berryessa, between 1957 and 1970. See http://www.calclim.dri.edu/ccda/comparative/avgpan.html

[d] Pan evaporation rates adjusted by a factor of 0.77 to determine lake evaporation.

[e] Average monthly rainfall observed between 1931 and 2001 for Saint Helena, Napa, CA from NOAA

[f] Average monthly rainfall adjusted by the ratio of 10-yr and 100-yr wet year return storm identified by Pearsons Log III Distribution (St Helena)

ENCLOSURE C

SITE EVALUATION DATA

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 #:	
APN:	030-190-03
(County Use Only) Reviewed by:	Date: 09/29/15

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner: Boyd Vineyards	☐ New Construction ☒ Addition ☐ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address: 4042 Big Ranch	☐ Residential - # of Bedrooms: Design Flow : gpd
City: Napa State: CA Zip: 94558	☒ Commercial – Type: Sanitary Waste: 135 gpd Process Waste: 1,461 gpd
Site Address/Location: 4042 Big Ranch Napa, CA 94558	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name: Summit Engineering, Inc	Evaluator's Name: Claudia Llerandi, E.I.T.	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 463 Aviation Boulevard, Ste 200		Telephone Number: 707-527-0775
City: Santa Rosa State: CA Zip: 95403		Date Evaluation Conducted: 09/23/15

Primary Area	**Expansion Area**
Acceptable Soil Depth: 55 in. Test pit #'s: 1, 2, 3	Acceptable Soil Depth: 43 in. Test pit #'s: 4 through 12
Soil Application Rate (gal. /sq. ft. /day): 0.2	Soil Application Rate (gal. /sq. ft. /day): 0.25
System Type(s) Recommended: PD leachfield	System Type(s) Recommended: Subsurface drip w/pretreatment
Slope: 1 %. Distance to nearest water source: +100 ft.	Slope: 1 %. 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)
Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

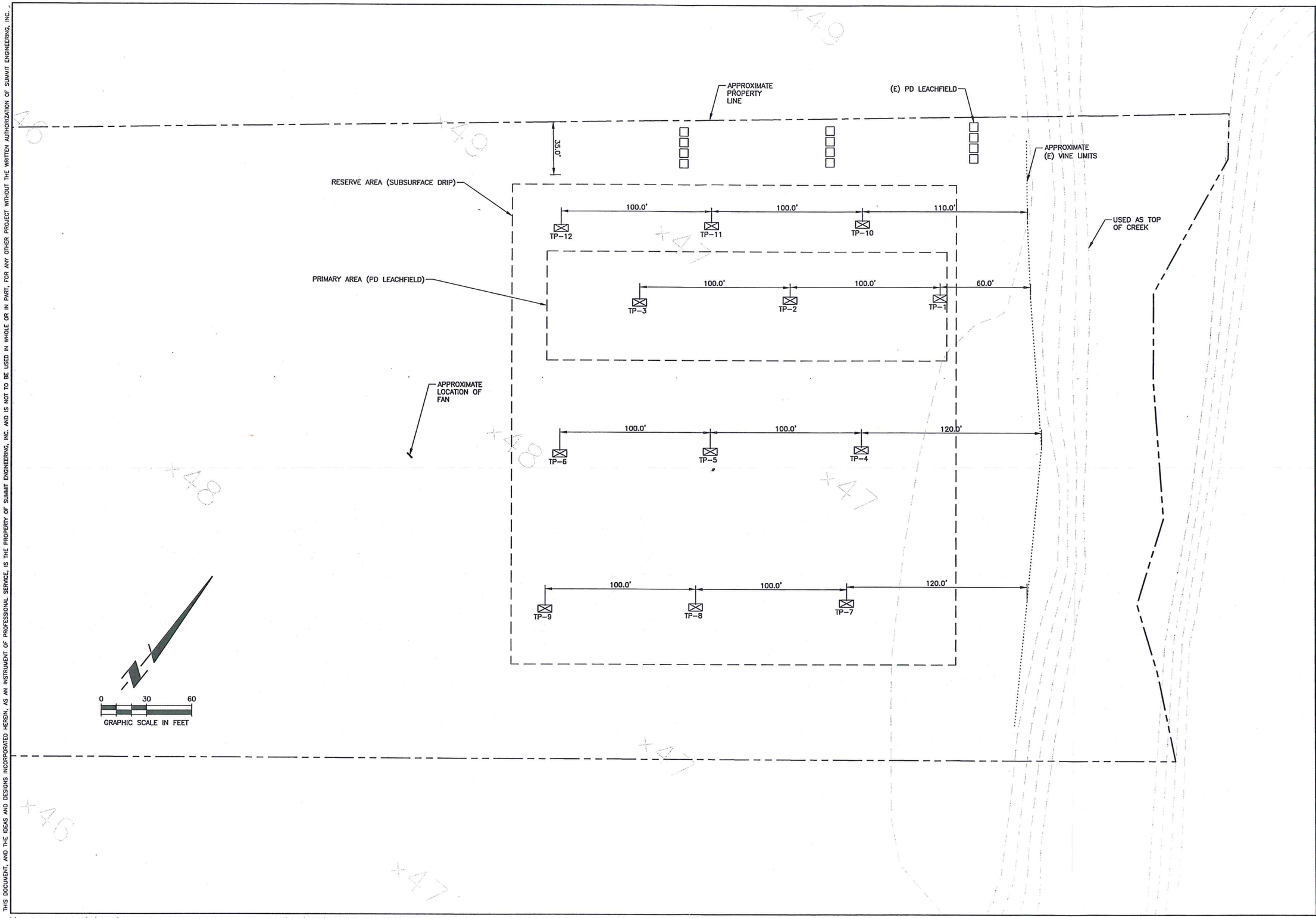
Site constraints/Recommendations:

A pressure distribution system with 12 inches of fill is proposed in the vicinity of test pits #1, 2 and 3 as the primary disposal area. A subsurface drip system with pretreatment is proposed in the vicinity of test pits 4 through 12. Soil was consistent throughout the area evaluated and was found to be clay and sandy clay with moderate texture. No mottling was found in any of the test pits evaluated.

Test Pit # 1

Test Pit #	Horizon Depth (inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
						Side Wall	Ped	Wet			
1	55		0-5	SC	M,SB	VH	VF	VS,VP	C, F/M	F, F/M	NONE
2	55		0-5	SC	M,SB	VH	VF	VS,VP	C, F/M	F, F/M	NONE
3	50	G	0-5	SC	M,SB	VH	VF	VS,VP	F, F/M	F, F/M	NONE
	70		0-5	SC	S,SB	H	F	P,S	C, F/M	F, F/M	NONE
4	36		0-5	C	W/M,SB	ExH	Ex	VS,VP	F, F/M	F, F/M	NONE
5	48		0-5	SC	M,SB	VH	VF	VS,VP	C, F/M	F, F/M	NONE
6	39		0-5	C	W/M,SB	ExH	Ex	VS,VP	F, F/M	F, F/M	NONE
7	41		0-5	SC	M,SB	VH	VF	P,S	F, F/M	F, F/M	NONE
8	40		0-5	SC	M,SB	VH	VF	VS,VP	C, F/M	F, F/M	NONE
9	37		0-5	C	W/M,SB	ExH	Ex	VS,VP	F, F/M	F, F/M	NONE
10	43		0-5	SC	M,SB	VH	VF	VS,VP	F, F/M	F, F/M	NONE
11	48		0-5	SC	M,SB	H/VH	F/VF	S/VS,P/VP	C, F/M	F, F/M	NONE
12	48		0-5	SC	M,SB	H	F	S/P	C, F/M	F, F/M	NONE

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=Diffuse >5"	S=Sand LS=Loamy Sand SL=Sandy Loam SCL=Sandy Clay Loam SC=Sandy Clay CL=Clay Loam L=Loam C=Clay SiC=Silty Clay SiCL=Silty Clay Loam SiL=Silt Loam Si=Silt	W=Weak M=Moderate S=Strong G=Granular Pl=Platy Pr=Prismatic C=Columnar AB=Ang. Blocky SB=Subang.Blocky M=Massive SG=Single Grain C=Cemented	L=Loose S=Soft SH=Slightly H=Hard VH=Very ExH= Extrm Hard	L=Loose VFRB=Very F Friable FRB=Friable F=Firm VF=Very Firm Ex= Extrm. Firm	NS=NonSticky SS=Slightly Sticky S=Sticky VS=Very Sticky NP=Non Plastic SP=Slightly Plastic P=Plastic VP=Very Plastic	Quantity: F=Few C=Common M=Many Size: VF=Very Fine F=Fine M=Medium C=Medium VC=Very Coarse	Quantity: F=Few C=Common M=Many Size: F=Fine M=Medium C=Coarse Contrast: ExC=Extrm. Coarse	Quantity: F=Few C=Common M=Many Size: F=Fine M=Medium C=Coarse Contrast: Ft=Faint D=Distinct P=Prominent



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BOYD FAMILY VINEYARDS
4042 BIG RANCH ROAD
NAPA, CA 94558
APN 036-190-003

USE PERMIT ASSISTANCE

TEST PIT LOCATIONS

XX-XX-XXXX2	PERMIT SUBMITTAL

DATE:	XX-XX-XXXX1
JOB NO:	2015148
SCALE:	AS SHOWN
DRAWN:	JA
CHECKED:	INITIALS2

SHEET **UP5**

OWNER/APPLICANT:
BOYD FAMILY VINEYARDS
4042 BIG RANCH ROAD
NAPA, CA 94558

(E) POND

APN 036-190-002

BIG RANCH ROAD

(P) 20' DRIVEWAY WITH 2' SHOULDERS

APPROXIMATE PROPERTY LINE

(E) DRIVEWAY

(P) PARKING

(E) GARAGE

(E) COTTAGE

(E) 100% RESERVE AREA FOR A MOUND FOR EXISTING RESIDENCE/COTTAGE (APPROXIMATE LOCATION)

ASSUMED TOP OF BANK

(E) RESIDENCE/COTTAGE PD LEACHFIELD (APPROXIMATE LOCATION)

100' SETBACK

14'±

1283'±

(E) VINEYARD

(P) DRIVEWAY

(P) WINERY

APN 036-190-007

1764'±

377'±

477'±

685'±

3593'±

30'±

102'±

59'±

91'±

59'±

46'±

61'±

(P) PD LEACH FIELD AREA (21,000 SF AVAILABLE)

APN 036-190-003

2306'±

30'±

SEE SHEET UP3

50' SETBACK FROM (E) CULVERT

(E) PUMP HOUSE

(E) WELL

(P) SUBSURFACE DRIP AREA (112,000 SF AVAILABLE)

APPROXIMATE 100-YEAR FLOOD BOUNDARY, TYP

NAPA RIVER

(E) MAIN RESIDENCE

APN 036-190-019

(E) DRAINAGE SWALE

0 150 300

GRAPHIC SCALE IN FEET

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OVERALL PROPOSED SITE PLAN

2017-10-20 USE PERMIT SUBMITTAL

DATE:	2017-09-20
JOB NO:	2017120
SCALE:	AS SHOWN
DRAWN:	JA
CHECKED:	TCS
SHEET	UP2

APN 036-190-002

ASSUMED TOP OF BANK

NAPA RIVER

(E) RESIDENCE
PD LEACHFIELD

50' SETBACK

APPROXIMATE PROPERTY LINE, PER NAPA COUNTY GIS

(E) DRIVEWAY

(E) RESIDENCE

(E) GARAGE

(E) COTTAGE

(E) BARN

APN 036-190-003

RESERVE AREA AVAILABLE (SUBSURFACE DRIP) 112,000 SF

PRIMARY AREA AVAILABLE (PD LEACHFIELD) 21,000 SF

TP-12 TP-11 TP-10
TP-3 TP-2 TP-1
TP-6 TP-5 TP-4
TP-9 TP-8 TP-7

100' SETBACK

50' SETBACK

(E) DRAINAGE

(E) GARAGE

(E) 100' WELL SETBACK

(E) SHED

(E) WATER TANK

(E) PUMP HOUSE

APPROXIMATE BASE FLOOD ELEVATION CONTOUR, TYP

(E) POND

APN 036-190-019

51

50

50

0 80 160
GRAPHIC SCALE IN FEET

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USE PERMIT ASSISTANCE

WASTEWATER SITE PLAN

2017-10-20	PERMIT SUBMITTAL

DATE:	2017-09-20
JOB NO:	2017120
SCALE:	AS SHOWN
DRAWN:	JA
CHECKED:	CP

SHEET **UP4**