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Wastewater Feasibility Study

Paraduxx Winery P18-00347-MOD
Planning Commission Hearing January 22, 2020

April 2019 - Revised
Job No. 08-17

BARTELT ENGINEERING

ONSITE WASTEWATER DISPERSAL FEASIBILITY STUDY FOR PARADUXX WINERY 7257 SILVERADO TRAIL, NAPA COUNTY, CA, NAPA COUNTY APN 031-170-019

As required by Napa County Planning, Building, Environmental Services Department (PBES), this study outlines the feasibility of providing onsite wastewater dispersal for an existing winery located at 7257 Silverado Trail, Napa County, CA 94558.

PROJECT DESCRIPTION

The 45.56± acre parcel is currently developed with an existing winery (hospitality building, fermentation building, and barrel buildings), 34.78± acres of vineyard, an access road, parking lots, a well, and an agricultural building. The project proposes to remodel the existing hospitality building and increase the annual wine production of the existing winery. Remodeling the existing hospitality building entails modifying interior spaces, upgrading the existing commercial kitchen, expanding the footprint by building an addition to the north, and adding a porch. It is also the intent of this project to increase the existing full crush facility's production capability of 200,000 to 300,000 gallons of wine per year. A very small reduction in vineyard area is anticipated as a result of the project. Refer to the associated Use Permit drawings for the details of the existing and proposed development conditions.

The current number of 41 employees, which includes 36 full-time employees and five (5) part-time employees, will remain constant; however, along with the proposed physical improvements and production increase described previously, the project proposes a modification to the winery's current visitation plan. The project proposes to increase private tour and tasting with food appointments to a maximum number of 144 guests per day (an average of 800 guests per week). The project also proposes to adjust the current marketing plan to offer three (3) small events for parties up to 24 guests each week with two (2) additional event staff. In addition, the marketing plan will be adjusted to accommodate 33 medium events for groups of up to 60 guests per year, five (5) open houses for groups of up to 125 guests per year, two (2) auction events for groups of up to 300 guests per year, and two (2) large events for groups of up to 400 guests per year with additional staff for each event type of up to four (4), ten (10), 20, and 30, respectively.

Table 1 summarizes the proposed staffing plan:

TABLE 1: STAFFING PLAN SUMMARY

Description	Number of Employees	Frequency
Full-time Employees	36	Daily
Part-time Employees	5	Daily

Table 2 summarizes the proposed visitation and marketing plans:

TABLE 2: VISITATION AND MARKETING PLANS SUMMARY

Description	Number of Guests	Event Staff	Frequency
Private Tours & Tasting w/ Food	144 per day	n/a	Daily
Small Event	24 per event	2 per event	3 per week
Medium Event	60 per event	4 per event	33 per year
Open House	125 per event	10 per event	5 per year
Auction Event	300 per event	20 per event	2 per year
Large Event	400 per event	30 per event	2 per year

As part of our services, representatives from Bartelt Engineering have reviewed the planned operational methods for the proposed winery, reviewed the parcel files available by Napa County PBES, held conversations with Napa County PBES staff, performed a reconnaissance of the site to view existing conditions, and conducted a site evaluation on November 21, 2008. The 2008 site evaluation was conducted to evaluate the feasibility of expanding an existing onsite wastewater dispersal system to serve a proposed production and hospitality plan expansion at that time and should be applicable to serve as the basis of design for this proposed expansion as well.

This study and the associated Use Permit Drawings are provided to demonstrate that the proposed production and marketing plan increases can feasibly be developed and that all wastewater can be adequately treated and dispersed onsite.

WASTEWATER ANALYSIS

All plumbing fixtures in the existing winery's production facility and hospitality building were to be updated to water saving fixtures per the California Plumbing Code as adopted by the Napa County Building Division during the previous 2012 Use Permit Modification. Any outstanding fixtures will be updated under this proposal. The hospitality building's addition will incorporate water saving fixtures.

Process Wastewater Flow

The winery production process wastewater (PW) flow rates for harvest and non-harvest seasons can be calculated as follows:

Harvest Peak Winery PW Flow=

$$\frac{300{,}000 \text{ gallons of wine}}{\text{year}} \times \frac{1.5 \text{ gallons of water}}{1 \text{ gallon of wine}} \times \frac{1 \text{ year}}{60 \text{ days of harvest}} = 7{,}500$$

Harvest Peak PW Flow = 7,500 gallons per day (gpd)

Non-Harvest Peak PW Flow=

$$\frac{300{,}000 \ \frac{\text{gallons of wine}}{\text{year}}}{} \times \frac{4.5 \ \frac{\text{gallons of water}}{\text{gallon of wine}}}{1} \times \frac{1 \ \text{year}}{305 \ \text{days of non-harvest}} = 4{,}427$$

Non-Harvest Peak PW Flow = 4,427 gpd

Sanitary Wastewater Flow

The sanitary wastewater (SW) generated from wine production and hospitality full-time employees, part-time employees, guests, food preparation, and additional event staff can be itemized as follows:

Employees:

- 36 Full-Time Employees x 15.0 gpd per employee = 540 gpd
- 5 Part-Time x 15.0 gpd per employee = 75 gpd

Guests:

- Private Tours and Tasting with Food:
  - (144 guests per day) x (3.0 gpd per guest)[1] = 432 gpd
  - (144 guests per day) x (2.0 gpd per guest)[2] = 288 gpd
- Small Event:
  - (24 guests per event) x (3.0 gpd per guest)[1] = 72 gpd
  - (24 guests per event) x (5.0 gpd per guest)[2] = 120 gpd
  - (2 event staff) x (15.0 gpd per event staff) = 30 gpd
- Medium Event:
  - (60 guests per event) x (3.0 gpd per guest)[1] = 180 gpd
  - (60 guests per event) x (0.0 gpd per guest)[2] = 0 gpd
  - (4 event staff) x (15.0 gpd per event staff) = 60 gpd
- Open House:
  - (125 guests per event) x (3.0 gpd per guest)[1] = 375 gpd
  - (125 guests per event) x (0.0 gpd per guest)[2] = 0 gpd
  - (10 event staff) x (15 gpd per event staff) = 150 gpd

[1] Sanitary wastewater generation rate

[2] Kitchen wastewater generation rate

- Auction Event:
  - (300 guests per event) x (3.0 gpd per guest) [1] = 900 gpd
  - (300 guests per event) x (0.0 gpd per guest) [2] = 0 gpd
  - (20 event staff) x (15 gpd per event staff) = 300 gpd
- Large Event:
  - (400 guests per event) x (3.0 gpd per guest) x (20%) [3] = 240 gpd
  - (400 guests per event) x (0.0 gpd per guest) [2] = 0 gpd
  - (30 event staff) x (15.0 gpd per event staff) = 450 gpd

> ***Note:*** *This feasibility study assumes that portable toilets are used by guests during a large event and that offsite meal preparation and catering services are utilized during a medium event, open house, auction event, and large event regardless of the season.*

Total Harvest Season and Non-Harvest Season Peak Sanitary Wastewater Flow

The total proposed harvest season peak SW flow is the combination of the winery production facility and tasting room SW flows during the months of August through November (harvest). The total proposed non-harvest season peak SW flow is the combination of the winery production facility and tasting room SW flows during the months of December through July (non-harvest).

Table 3 uses the marketing schedule to calculate the SW flows generated by employees and guests during daily event sequences in harvest and non-harvest seasons. Wastewater flows in the same column indicate which appointments and events may occur on the same day.

TABLE 3: HARVEST AND NON-HARVEST SEASONS' DAILY SANITARY WASTEWATER FLOWS

	Daily Occurrence								
	Harvest			Non-Harvest					
Employees	615	615	615	615	615	615	615	615	615
Tours and Tastings w/ Food	432	432	432	432	432	432	0	0	0
Small Event	0	222	0	0	222	0	0	0	0
Medium Event	0	0	240	0	0	240	0	0	0
Large Event	0	0	0	0	0	0	690	0	0
Open House	0	0	0	0	0	0	0	525	0
Auction Event	0	0	0	0	0	0	0	0	1,200
Total Flow (gpd)	1,047	1,293	1,293	1,047	1,293	1,293	1,305	1,020	1,815

Table 3 shows that the greatest SW flow during the harvest and non-harvest seasons is generated during a typical staffing day with an Auction Event.

[3] Percentage of facility restroom utilization by guests

Design Wastewater Flows

The greatest practical harvest and non-harvest season peak process and sanitary wastewater flows are summarized in the table below:

TABLE 4: HARVEST AND NON-HARVEST SEASONS' PEAK DAILY FLOW SUMMARY

Wastewater Source	Harvest (gpd)	Non-Harvest (gpd)
Process Wastewater	7,500	4,427
Sanitary Wastewater	1,287	1,815

Each wastewater source is addressed independently since the goal for the proposed condition is to maintain the existing wastewater systems scheme. The greatest PW daily flow occurs during the harvest season while the greatest SW daily flow occurs during the non-harvest season.

WASTEWATER TREATMENT AND DISPERSAL METHODS

Bartelt Engineering proposes several options for the dispersal of wastewater generated by the wine production process and hospitality events. A final treatment and dispersal option will be selected for installation following approval of the Use Permit Application. The proposed options are discussed further in the following sections as well as summarized in the attached wastewater treatment diagrams. Refer to the associated Use Permit Drawings for location of the existing and proposed treatment and dispersal methods.

Current Wastewater Systems

The current winery dispersal system was expanded in 2012 and consists of two (2) separate pressure distribution systems one for each wastewater stream. Process wastewater (PW) is dispersed using two (2) existing zones each containing four (4) subfields (for a total of eight (8) subfields) each having four (4) 100 linear feet of laterals totaling 3,200 linear feet. Sanitary wastewater (SW) is dispersed using one (1) existing zone containing four (4) subfields each having two (2) 100 linear feet of laterals totaling 800 linear feet. There is one (1) existing 20,000 gallon process wastewater septic tank and two (2) existing 4,000 gallon sanitary wastewater tanks. A Vacuum Bubble Technology aerator (VBT) was installed in the middle chamber of the process wastewater tank to aid in the reduction of BOD levels. The PW system uses an existing 3,000 gallon dose tank to deliver wastewater to the field for dispersal.

Proposed Preferred Separate Wastewater Pressure Distribution Fields Option

Under the preferred option, separate conveyance and dispersal systems are proposed to continue to be used for process and sanitary wastewater. Process wastewater will continue to be collected, aerated, and then dispersed using the existing process wastewater subsurface PD field; moreover, the existing sanitary wastewater subsurface PD field will be converted to process wastewater and expanded. Sanitary wastewater will continue to be collected and dispersed, without pretreatment, via a new PD field.

As summarized in Table 4 above, the separate process and sanitary wastewater systems will need to disperse a peak daily flow of 7,500 and 1,815 gpd, respectively. The existing

production facility's wastewater conveyance and dispersal system consists of several steps. The floors of the existing production facility (fermentation building, barrel buildings, and covered work areas) are sloped so that all PW is collected in trench drains and floor drains. The drains are fitted with baskets to collect a majority of the larger debris. Collected PW in the trench drains and floor drains gravity flow into an existing three (3) chamber 20,000 gallon fiberglass septic tank equipped with a Zabel effluent filter for solids removal and a VBT aerator in the middle chamber[4]. PW then gravity flows to an existing 3,000 gallon dose tank where it is dispersed through a PD system by means of a dosing system. SW collected in the winery (production and hospitality building) flows by gravity to two (2) 4,000 gallon concrete septic tanks. From the septic tank, the wastewater septic tank effluent (STE) is dispersed through a PD system by means of a dosing system.

Based on the site evaluation performed by Bartelt Engineering on November 21, 2008, test pits #3B thru #6B showed similar results and were used to identify the replacement field under the 2008 Use Permit. This Use Permit application proposes to extend the existing PD system dispersal field into that replacement area and identify a new replacement area. The site evaluation determined the acceptable soil depth in the area of these test pits to be 61 inches with Sandy Loam (SL) and Loamy Coarse Sand (LCS) type soils. Napa County recommends a soil hydraulic loading rate[5] of 0.80 gal/sf/day for the most restrictive soil type encountered or a minimum of 24 inches below the trench bottom with an approved pretreatment system. A pretreatment system is not proposed because soil depth is not a limiting factor and because maintaining similarity with the existing system is desired. The proposed trench design for the expansion and proposed (new) portions of the proposed PD systems will maintain the existing design and is as follows (from trench bottom to top):

- 10 inches of drain rock from trench bottom to the bottom of the distribution lateral
- Three (3) inches of drain rock above the two (2) inch distribution lateral
- Two (2) inches of native soil backfill above the drain rock
- 10 inches of acceptable fill soil cover above the native soil backfill

$$\text{Total Trench Length} = \frac{\text{design flow rate}}{\text{effective surface area x soil application rate}}$$

The total recommended trench depth from finish grade for both the expansion and the proposed (new) portions of the dispersal fields (process and sanitary) are 27 inches and the effective infiltrative surface area is two (2) square feet (ft^2) per lineal foot (lf).

[4] Refer to Paraduxx Winery Sanitary and Process Waste Septic System Expansion Plan dated 2013 prepared by Bartelt Engineering.

[5] Hydraulic loading rate is based on *Table III-2 Soil Hydraulic Loading Rates* from Napa County Onsite Wastewater Treatment Systems (OWTS) Technical Standards, Final Draft.

The required total trench length for each process and sanitary wastewater PD systems is calculated below:

$$\text{PW Total PD System Length} = \frac{7{,}500 \ \frac{\text{gal}}{\text{day}}}{0.80 \ \frac{\text{gpd}}{\text{ft}^2} \ \text{x} \quad 2 \quad \frac{\text{ft}^2}{\text{lf}}} = 4{,}687.5\pm \text{ lf, use } 4{,}700 \text{ lf}$$

$$\text{SW Total PD System Length} = \frac{1{,}815 \ \frac{\text{gal}}{\text{day}}}{0.80 \ \frac{\text{gpd}}{\text{ft}^2} \ \text{x} \quad 2 \quad \frac{\text{ft}^2}{\text{lf}}} = 1{,}134.4\pm \text{ lf, use } 1{,}200 \text{ lf}$$

The existing PD fields that disperse process and sanitary wastewater have a total lateral length of 3,200 and 800 linear feet, respectively, for a total combined length of 4,000 linear feet. This includes transitioning the existing 800 linear feet that disperses sanitary wastewater to disperse process wastewater. As a result, an additional 700 linear feet will be required to be installed to meet the 4,700 lf process wastewater field recommendation.

The proposed conversion of the existing sanitary wastewater field to disperse process wastewater will require minor adjustments. As discussed previously, the existing sanitary wastewater PD field has one (1) zone having four (4) subfields each having two (2) 100 linear feet laterals for a total of 800 linear feet. This zone will be transitioned and expanded to be used for the dispersal of process wastewater by revising the existing distribution box and supply laterals' configuration so that the proposed layout is similar to the existing process wastewater PD field (refer to the Current Wastewater Systems section above for description). The existing four (4) subfields will be converted to two (2) each having four (4) 100 linear feet laterals. Two (2) new subfields will be added each having four (4) 100 linear feet of laterals. At the conclusion of the transition and expansion, this new PD field zone will have four (4) subfields, each with four (4) 100 linear feet laterals for a total of 1,600 linear feet.

Based on the existing ground slope of less than 5%, the minimum required trench spacing is five (5) feet per Napa County standards; however, the proposed expansion will continue the existing field's layout of installing laterals between vine row spacing therefore the recommended spacing between distribution laterals is eight (8) feet. The proposed process wastewater field will require removing very few vines (0.03± acres of vineyard) as a result of providing access to the system's appurtenances. Ultimately, the process wastewater PD field layout will consist of three (3) zones with each zone having four (4) subfields consisting of four (4) 100 linear feet of lateral for a total of 4,800 linear feet. Effluent supplied to each zone will be controlled by replacing the existing 3-way valve with a manifold with three (3) solenoid valves. The three (3) existing distribution boxes will continue to supply effluent to each subfield within each zone.

Per Napa County standards, a 100% PD replacement area must be provided. Based on the site evaluation performed by Bartelt Engineering in 2008, the replacement area is proposed to be located in the vicinity south of the proposed sanitary wastewater PD field. The proposed sanitary wastewater PD field is south of test pits #5B and #6B which showed similar results to the test pits observed in the primary area and were already identified and approved as the existing replacement area under the 2012 improvement plans.

Replacement Area Based on LF = 100% x 4,700 lf = 4,700 lf, 4,800 lf recommended

$$(100 + 4 \text{ lf}) \times \left(\frac{8 \text{ ft}}{\text{lateral spacing}} \times \left[(12 \text{ subfields} \times \frac{4 \text{ laterals}}{\text{subfield}}) - 1 \right] + 1.5 \text{ ft} \right) = 40{,}352 \text{ sf}$$

The proposed sanitary wastewater will be dispersed in a new field as a result of the transition of the existing sanitary wastewater field to process wastewater field. As previously discussed, the trench design for the proposed sanitary wastewater dispersal field will be the same as the existing and proposed process wastewater trench resulting in a total sanitary wastewater PD system length of 1,200 lf.

Based on the existing ground slope of less than 5%, the minimum required trench spacing is five (5) feet per Napa County standards; however, the proposed sanitary wastewater field will continue the proposed and transitioned process wastewater field's layout of installing laterals between vine row spacing therefore the recommended spacing between distribution laterals is eight (8) feet. The proposed sanitary wastewater field will require removing very few vines as a result of providing access to the system's appurtenances. The sanitary wastewater PD field layout will consist of three (3) zones with each zone having two (2) subfields consisting of two (2) 100 linear foot laterals for a total of 1,200 linear feet. Effluent supplied to each zone will be controlled by a 3-way distributing valve (Orenco or similar).

Proposed Alternative Option

Alternative – Separate Pretreated Process Wastewater with Surface Drip Irrigation System and Sanitary Wastewater PD System

As summarized in the Table 4, the PW system is proposed to have a peak daily flow of 7,500 gpd. Under this alternative solution, PW collection, treatment, and dispersal consists of several steps. The floors of the existing winery are sloped so that all PW is collected in trench drains and floor drains. The drains are fitted with baskets to collect a majority of the larger debris. The winery PW collected in the trench and floor drains would then gravity flow to the proposed pretreatment system. Based on the location of the PW pretreatment system selected for installation, a pump station may be necessary to transfer collected PW from the winery facility to the pretreatment system. Examples of a pretreatment system include (but not limited to) Bio-Microbics, Cloacina, or Lyve Systems.

The pretreatment system selected for installation is anticipated to include an equalization (EQ) tank, screening equipment, pH adjustment system, primary treatment tank equipped with an aeration system, and a membrane or media filtration system. The PW pretreatment system must be capable of treating PW to an acceptable level for surface drip irrigation in vineyard/landscape areas per jurisdictional requirements. From the pretreatment system, PW effluent is proposed to be pumped to a storage tank prior to vineyard irrigation.

Process Wastewater Surface Drip Irrigation

A PW flow balance was determined by estimating the monthly PW produced (see Table I), the average irrigation flow based on reported vineyard irrigation demands (see Table II), and sizing a storage tank to be able to store excess treated PW effluent until it can be properly dispersed via surface drip irrigation throughout the vineyard (see Table III).

Based on the PW flow balance, the storage tank should have a minimum volume of 850,000 gallons (see Table III) to provide temporary storage of treated effluent through winter months when surface drip land application is minimal and to equalize differences between the wastewater generation rate and the irrigation application rate. It is assumed that available groundwater in the root zone is depleted by April and that irrigation is primarily applied to the vines for the months of April through October. In the months where the irrigation demand exceeds the amount of treated effluent that is available for irrigation, it is assumed that the entire irrigation requirement for the vines is not met or that another water source (existing onsite well) is used to supply additional irrigation water.

Vineyard areas where treated PW is dispersed through surface drip irrigation is based on the proposed 34.53± acres or approximately 35,300± grape vines located on the subject parcel. As it is under the Preferred Option, 0.25± acres of vineyard will be removed as a result of the hospitality parking lot and driveway improvements proposed to be removed under this alternative; however, unlike the Preferred Option, no additional vineyard is proposed to be removed since the SS and PW field area is not expanded under this option. The area for surface drip irrigation will need to be verified once all dispersal field setbacks are determined and a final vineyard irrigation plan has been developed. Furthermore, all surface drip dispersal field areas will need to be labeled with signage indicating the use of treated effluent for irrigation in accordance with PBES standards.

Sanitary Wastewater Pressure Distribution and Dispersal Field

The proposed sanitary wastewater will continue to be disbursed through the existing PD field without pre-treatment as it is currently. As summarized in Table 4, the SW is proposed to have a peak daily flow of 1,815 gpd. The existing PD field is more than capable of dispersing this volume rate. As in the preferred solution, the winery facility and tasting room SW would gravity flow to a septic tank fitted with filters for solids removal. Kitchen waste would flow into a grease interceptor prior to entering the septic tank. From the septic tank, SW effluent gravity flows to a dose tank where it is proposed to be dispersed through the existing PD field. An expansion to the existing SW field is not necessary but rather the existing PD field will be modified so that the effluent is evenly disbursed through the three (3) zones and subfields.

WASTEWATER TREATMENT TANK SIZING

Grease Interceptor

Meal preparation is proposed to occur in the hospitality building's proposed commercial kitchen during private tour and tastings with food and food and wine pairings appointments as well as a medium event. Kitchen waste consisting primarily of fats, oils, and grease (FOG) in addition to organic material would be generated during these events and require collection, retention, and onsite disposal rather than being removed by the catering service. Furthermore, PBES regulations require commercial kitchen fixtures be plumbed to a grease interceptor when an onsite wastewater treatment system is implemented.

The calculation for a grease interceptor tank size using the tours and tastings with food appointment numbers is a conservative estimate because the number of guests is a per day not peak hour value; therefore, the calculations for the other events are more appropriate when determining tank volume.

During Food and Wine Pairings, the kitchen is assumed to prepare at most three (3) meals per guest per hour with multi-service utensils. Hours of operation for the kitchen are also assumed to be less than eight (8) hours per day. The grease interceptor tank would be sized per the following formula[6]:

Grease Interceptor (KW flows only) = (Peak number of meals per hour) x (Wastewater flowrate) x (Retention time) x (Storage factor)

Grease Interceptor (KW flows only) = (24 guests x 3 meals/hour) x (5 gpd per meal) x (2.5) x (1)
= 900 gallons; 1,500 gallons recommended

Septic Tanks

The guidelines set forth under the Alternative Sewage Treatment Systems (ASTS) technical standards state that septic tanks are adequately sized to provide a minimum of three (3) days of hydraulic retention time during peak wastewater flows. Below is a breakdown of the minimum recommended septic tank volumes for the proposed options:

Preferred Option (PW only) = 20,000 gallons existing / 3 days
= 6,667 gallons; 7,500 gpd (2.7 days) existing

Preferred Option (SW only) = 3 days x 1,815 gpd
= 5,445 gallons; 8,000 gallons existing

Alternative Option (SW only) = 3 days x 1,815 gpd
= 5,445 gallons; 8,000 gallons existing

[6] The grease interceptor sizing formula, retention time, and storage factor are based on Napa County's Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems

PD Dosing Tanks

Below is a summary of each system's dosing tank volume:

Preferred Option (PW only) = 7,500 gpd / 12 subfields
= 625.00 gpd per subfield, 3,000 gallons existing

Preferred Option (SW only) = 1,815 gpd / 6 subfields
= 302.50 gpd per subfield, 4,000 gallons existing

Alternative Option (SW only) = 1,815 gpd / 6 subfields
= 302.50 gpd per subfield, 4,000 gallons existing

Process Wastewater Equalization Tank

Under the Alternative Option, the winery PW pretreatment system is proposed to be preceded by an EQ tank for buffering of peak flows. The proposed EQ tank is sized to provide a minimum of one (1) day of hydraulic retention time. A fine bubble diffused air system may be provided to keep PW adequately mixed prior to entering the primary treatment tank.

Alternative Option (PW flows only) = 1 days x 7,500 gpd
= 7,500 gallons, 8,000 gallons recommended

OPERATION AND MAINTENANCE

Per Napa County requirements, all Alternative Sewage Treatment Systems (ASTS), including winery wastewater treatment systems with pretreatment, are required to have a Service Provider. Paraduxx Winery currently has a Service Provider assigned to the existing system who will continue to provide services prior to operation and final approval of the installed wastewater system(s).

CONCLUSIONS

Process and sanitary wastewater generated as a result of the proposed project, which includes a full crush production facility and hospitality building with commercial kitchen, can feasibly be treated and dispersed onsite in accordance with Napa County PBES standards.

Full design calculations and construction plans will be completed after approval of the Use Permit under consideration.

ATTACHMENTS

Proposed Wastewater Treatment Diagrams

Table I – Process Wastewater Flow

Table II – Process Wastewater Irrigation

Table III – Process Wastewater Irrigation Storage Tank Balance

Site Evaluation(s)

REFERENCES

California Onsite Wastewater Association (COWA). "Pumping and Pressure Distribution Systems." May 1998.

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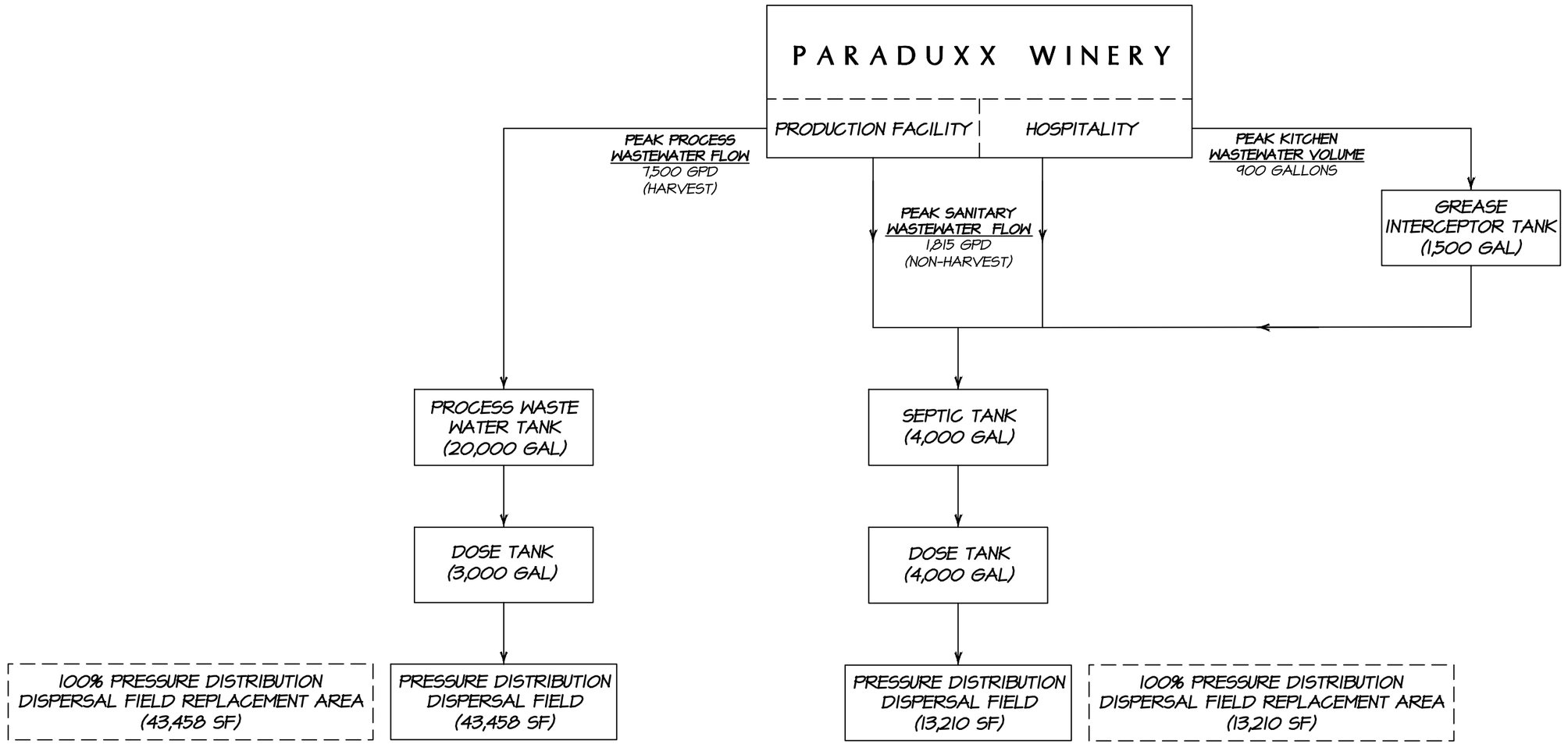

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PROPOSED PRESSURIZED DISTRIBUTION WASTEWATER TREATMENT DIAGRAM

NO SCALE

Paraduxx Winery
7257 Silverado Trail
Napa, CA 94558
APN 031-170-019
Job No. 08-17
April 2019 - Revised
Sheet 1 of 1

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Paraduxx Winery
Process Wastewater Flow
Table I

Total annual wine production (gallons):	300,000
Annual water usage per gallon of wine (gallons):	6
Annual process wastewater flow (gallons):	1,800,000
Annual Average process wastewater flow (gpd):	4,932
Harvest water usage per gallon of wine (gallons):	1.5
Length of Harvest (days):	60
Average Harvest process wastewater flow (gallons per day):	7,500
Non-harvest water usage per gallon of wine (gallons):	4.5
Length of Non-Harvest (days):	305
Average Non-harvest process wastewater flow (gallons per day):	4,427

MONTHLY PROCESS WASTEWATER FLOW (gallons/month):

ESTIMATED PROCESS WASTEWATER FLOW		
Month	Percent	Wastewater Flow
September	14.00%	252,000
October	14.00%	252,000
November (End of Harvest Season)	14.00%	252,000
December	5.50%	99,000
January	5.50%	99,000
February	5.50%	99,000
March	5.50%	99,000
April	5.50%	99,000
May	5.50%	99,000
June	5.50%	99,000
July	5.50%	99,000
August (Start of Harvest Season)	14.00%	252,000
TOTALS	100.0%	1,800,000

Notes:
> Wastewater monthly proportioning is based on general winery operations and a 60 day harvest period
>The annual water usage per gallon of wine is assumed to be 6 gallons

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Paraduxx Winery
Vineyard Process Wastewater Irrigation
Table II

Vineyard area (acres):	34.53
Row width (feet):	varies
Vine spacing (feet):	varies
Total number of irrigated vines:	35,300
Seasonal irrigation (June - September)	
Seasonal irrigation per vine (gallons/season):	47.6

ESTIMATED VINEYARD PROCESS WASTEWATER IRRIGATION

Month	Estimated Seasonal Percent (%)	Estimated Seasonal Irrigation (gal/vine)	Estimated Non-Seasonal Irrigation[1] (gal/vine)	Estimated Total Irrigation (gallons)
September	8.6%	4.1		143,971
October	0.0%	0.0		0
November	0.0%	0.0		0
December[1]	0.0%		0.00	0
January[1]	0.0%		0.00	0
February[1]	0.0%		0.00	0
March[1]	0.0%		0.00	0
April	0.0%	0.0		0
May	0.0%	0.0		0
June	14.8%	7.0		248,699
July	21.8%	10.4		366,155
August	54.8%	26.1		920,417
TOTAL	100.0%	47.6	0.0	1,679,242
				5.15 acre-feet

[1] *Total non-seasonal irrigation =*

*= (vineyard area) * (43,560 sq.-ft./acre) * (depth of irrigation/12 in./ft.) * (7.48 gal./cu.-ft.)*

Note:

> Vineyard irrigation values are based on irrigation data provided by Paraduxx Vineyard Management for the Paraduxx Winery from 2016-2017 seasons.

> Vineyard area and vine reduction is a result of hospitality parking lot and driveway improvements only. No further reduction due to SS & PW field expansion because under the Alternative Option field expansion is not proposed.

BARTELT ENGINEERING

Paraduxx Winery
Process Wastewater Irrigation Storage Tank Balance
Table III

ESTIMATED PROCESS WASTEWATER IRRIGATION TANK BALANCE				
Month	Beginning Balance (gallons)	Wastewater Flow (gallons)	Vineyard Irrigation (gallons)	Tank Volume (gallons)
September	0	252,000	143,971	108,029
October	108,029	252,000	0	360,029
November	0	252,000	0	252,000
December	252,000	99,000	0	351,000
January	351,000	99,000	0	450,000
February	450,000	99,000	0	549,000
March	549,000	99,000	0	648,000
April	648,000	99,000	0	747,000
May	747,000	99,000	0	846,000
June	846,000	99,000	248,699	696,301
July	696,301	99,000	366,155	429,146
August	429,146	252,000	920,417	0
	TOTALS	1,800,000	1,679,242	
	Average	150,000	139,937	453,042

Recommended Tank Storage (gallons): 850,000
Recommended Tank Storage (acre-feet): 2.61

Note:
> In months when the irrigation demand exceeds the beginning balance plus the wastewater flow it is assumed that the full irrigation demand is not met or that the additional irrigation water is supplied from an alternate source.

> Water balance calculations assume storage tank is empty at the beginning of November due to post-harvest irrigation.

> In months when the irrigation demand exceeds the beginning balance plus the wastewater flow it is assumed that the full irrigation demand is not met or that the additional irrigation water is supplied from an alternate source (ie. onsite well).

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 #: E08-00672
APN: 031-170-019
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Duckhorn Wine Company, c/o Courtney Dyar, Operations Manager	☐ New Construction ☐ Addition ☐ Remodel ☐ Relocation ☒ Other: Winery Expansion
Property Owner Mailing Address 1000 Lodi Lane	☐ Residential - # of Bedrooms: Design Flow : gpd
City State Zip St. Helena CA 94574	☒ Commercial – Type: Sanitary Waste: 880 gpd Process Waste: 4,918 gpd
Site Address/Location Paraduxx Winery 7257 Silverado Trail, Napa County	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Bartelt Engineering	Evaluator's Name Paul N. Bartelt, P.E.	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 1303 Jefferson Street, 200 B		Telephone Number (707) 258-1301
City State Zip Napa CA 94559		Date Evaluation Conducted November 21, 2008

Primary Area See below	Expansion Area See below
Acceptable Soil Depth: 60 in. Test pit #'s: 1B	Acceptable Soil Depth: 60 in. Test pit #' : 2B – 6B
Soil Application Rate (gal. /sq. ft. /day): 0.8	Soil Application Rate (gal. /sq. ft. /day): 0.8
System Type(s) Recommended: Pressure Distribution	System Type(s) Recommended: Pressure Distribution
Slope: 0-5 %. Distance to nearest water source: 500 ft.+	Slope: 0-5 %. Distance to nearest water source: 500 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:

See Septic System Feasibility Study prepared by Bartelt Engineering dated December 3, 2008 for septic system expansion recommendations.

Test Pit # 1B *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-60		30-50	SL	MSB	SH	VFRB	SS	FF/MVF	MF/MVF	None

Slope = 0-5 %. Acceptable soil depth: 60 inches. Depth of test pit limited by accessibility and equipment. Assigned soil application rate = 0.8 gal /sf /day for an alternative sewage treatment system.

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated December 1, 2008.

Test Pit # 2B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-18		30-50	SL	MSB	SH	VFRB	SS	FF/MVF	MF/MVF	None
18-64	C	30-50	LCS	WG	L	L	NS	MM/MF	MF/MVF	None

Slope = 0-5 %. Acceptable soil depth: 64 inches. Depth of test pit limited by accessibility and equipment. Assigned soil application rate = 0.8 gal /sf /day for an alternative sewage treatment system.

No groundwater observed.

Test Pit # 3B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-48		30-50	SL	MSB	SH	VFRB	SS	FF/MVF	MF/MVF	None
48-60	C	30-50	LCS	WG	L	L	NS	MM/MF	MF/MVF	None

Slope = 0-5%. Acceptable soil depth: 60 inches. Depth of test pit limited by accessibility and equipment. Assigned soil application rate = 0.8 gal /sf /day for an alternative sewage treatment system.

No groundwater observed.

Test Pit # 4B * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-42		<15	SL	MSB	SH	VFRB	SS	FF/MVF	MF/MVF	None
42-60	C	30-50	SL	MSB	SH	VFRB	SS	MM/MF	MF/MVF	None

Slope = 0-5%. Acceptable soil depth: 60 inches. Depth of test pit limited by accessibility and equipment. Assigned soil application rate = 0.8 gal /sf /day for an alternative sewage treatment system.

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated December 1, 2008.

Test Pit # 5B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24		30-50	SL	MSB	SH	VFRB	SS	FF/MVF	MF/MVF	None
24-65	C	30-50	LCS	WG	L	L	NS	MM/MF	MF/MVF	None
Slope = 0-5%. Acceptable soil depth: 65 inches. Depth of test pit limited by accessibility and equipment. Assigned soil application rate = 0.8 gal /sf /day for an alternative sewage treatment system.										
No groundwater observed.										

Test Pit # 6B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-34		<15	SL	MSB	SH	FRB	SS	MF/MVF	FC/MF	None
34-60	C	30-50	SL	WSB	L	L	SS	MF/MVF	FC/MF	None
Slope = 0-5%. Acceptable soil depth: 60 inches. Depth of test pit limited by accessibility and equipment. Assigned soil application rate = 0.8 gal /sf /day for an alternative sewage treatment system.										
No groundwater observed.										

Table of 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 LCS=Loamy Coarse Sand	**W**=Weak **M**=Moderate **S**=Strong _____ **G**=Granular **PL**=Platy **Pr**=Prismatic **C**=Columnar **AB**=Angular Blocky **SB**=Subangular Blocky _____ **M**=Massive **C**=Cemented	**L**=Loose **S**=Soft **SH**=Slighty 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	**Quantity:** **F**=Few **C**=Common **M**=Many **Size:** **VF**=Very Fine **F**=Fine **M**=Medium **C**=Coarse **VC**=Very Course	**Quantity:** **F**=Few **C**=Common **M**=Many **Size:** **F**=Fine **M**=Medium **C**=Coarse **VC**=Very Course **ExC**=Extremely Coarse **Contrast:** **Ft**=Faint **D**=Distinct **P**=Prominent

Attach additional sheets as needed

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, moderate, 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, moderate, 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/inch	Hydraulic Conductivity inches/hour		
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	Prohibited
Sandy Loam, Loamy Sand	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.33
		Moderate, strong	0.5
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.25
		Moderate, Strong	0.33
Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	0.25
		Strong	0.33
Sandy Clay, Silty Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	Prohibited
		Strong	0.25
Clay, Silty Clay	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak	Prohibited
		Moderate, strong	Prohibited

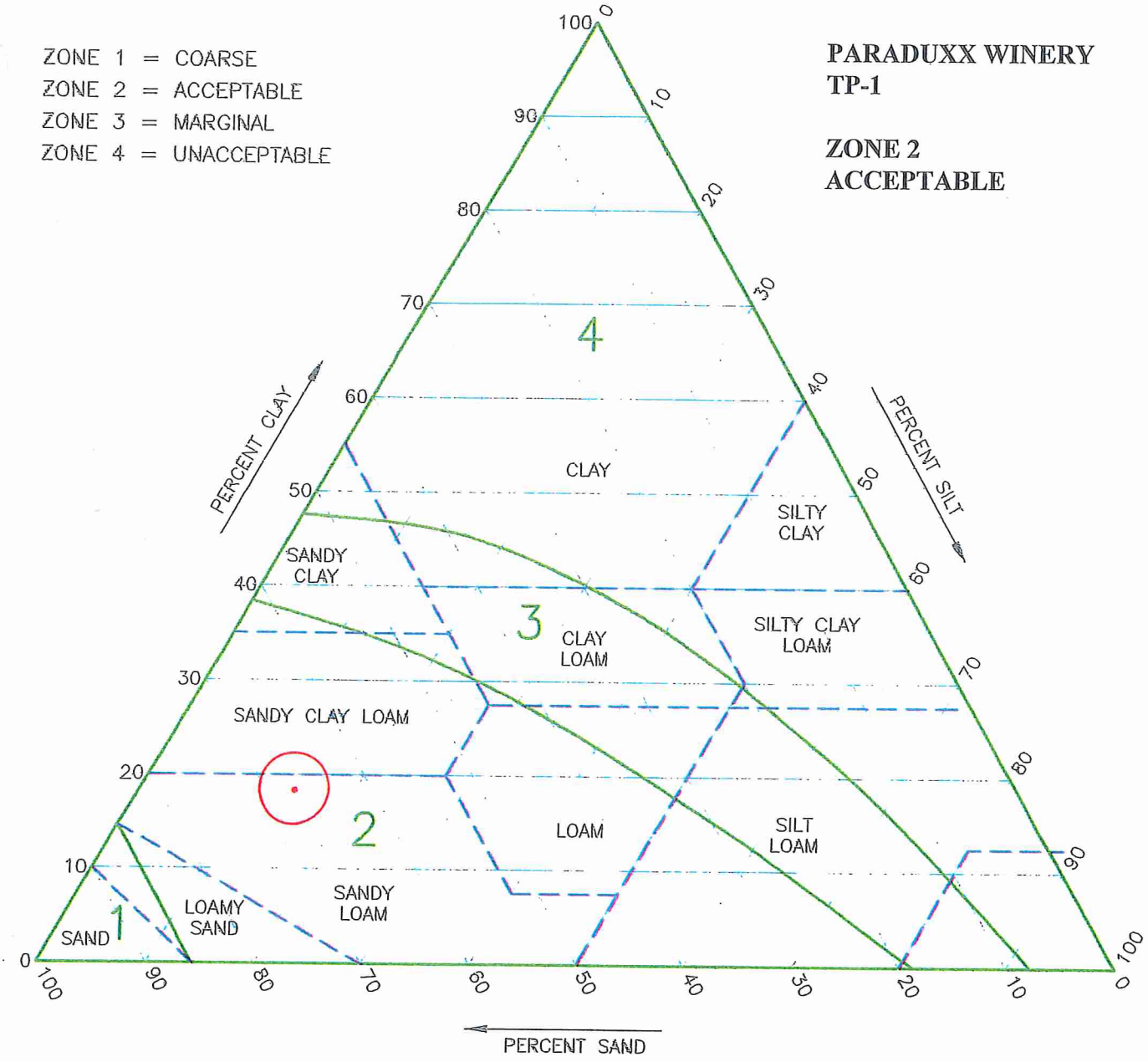
CONVENTIONAL SEWAGE TREATMENT SYSTEM SOIL APPLICATION RATES BASED ON PERCOLATION RATES	
Percolation Rate (mpi)	Application Rate (STE)
< 5 MPI	Prohibited
5 to 10 MPI	0.5
10-20 MPI	0.33
20-60 MPI	0.25
> 60 MPI	Prohibited

SOIL PERCOLATION SUITABILITY CHART

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

PARADUXX WINERY
TP-1

ZONE 2
ACCEPTABLE



Instructions:

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

Note:

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

R G H

Geotechnical
Geological
And Laboratory Services

CONSULTANTS, INC.

File: 9147.11

December 1, 2008
Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
PARADUXX WINERY

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on December 24, 2008.

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-1
+ #10 Sieve	49.7 %
Sand	60.8 %
Clay	18.2 %
Silt	21.0 %
Db g/cc	--

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

Yours very truly,

RGH GEOTECHNICAL

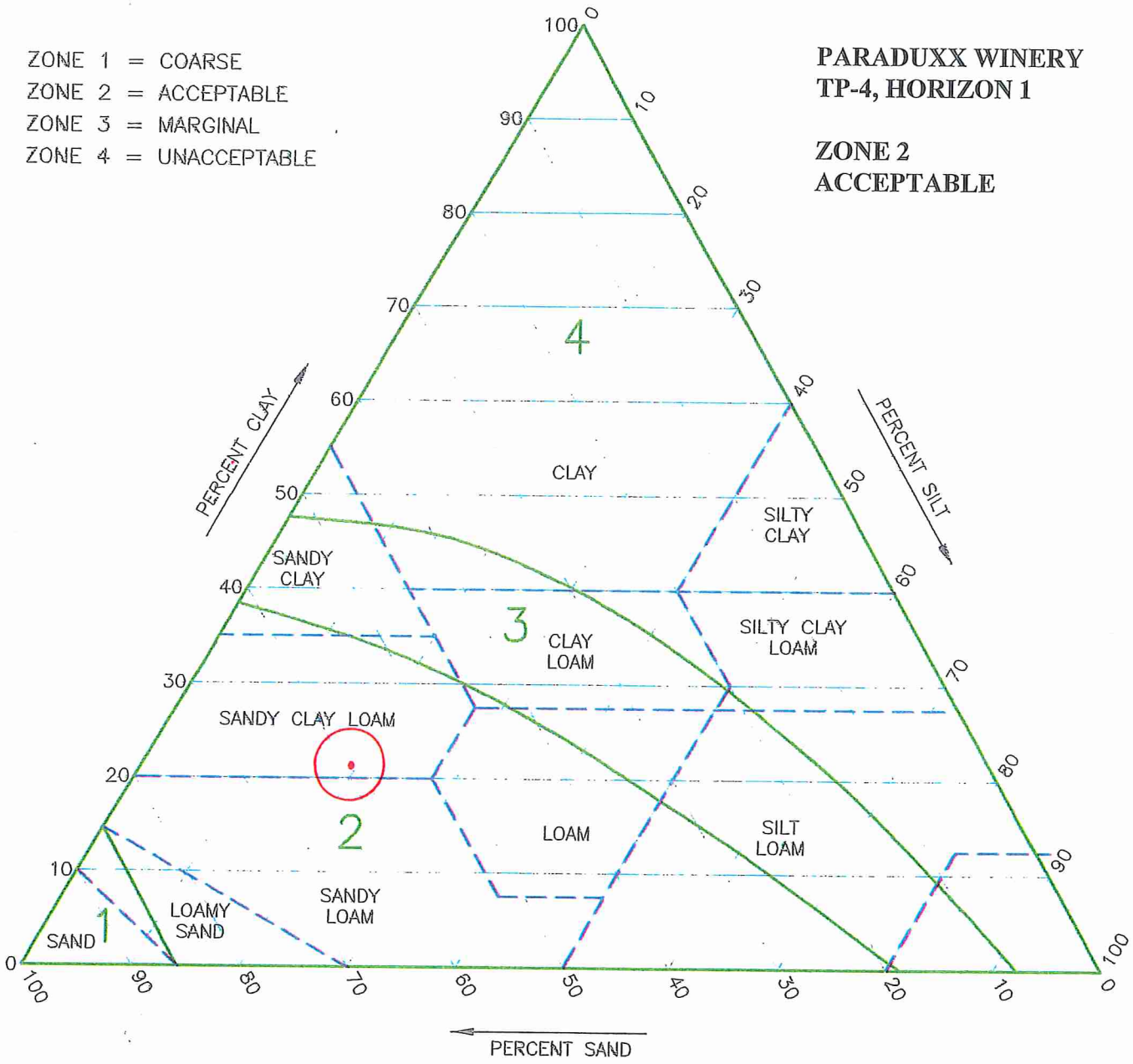
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

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

PARADUXX WINERY
TP-4, HORIZON 1

ZONE 2
ACCEPTABLE



Instructions:

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

Note:

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

R G H

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Soil Texture Analysis by
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PARADUXX WINERY

Dear Mr. Bartelt:

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We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

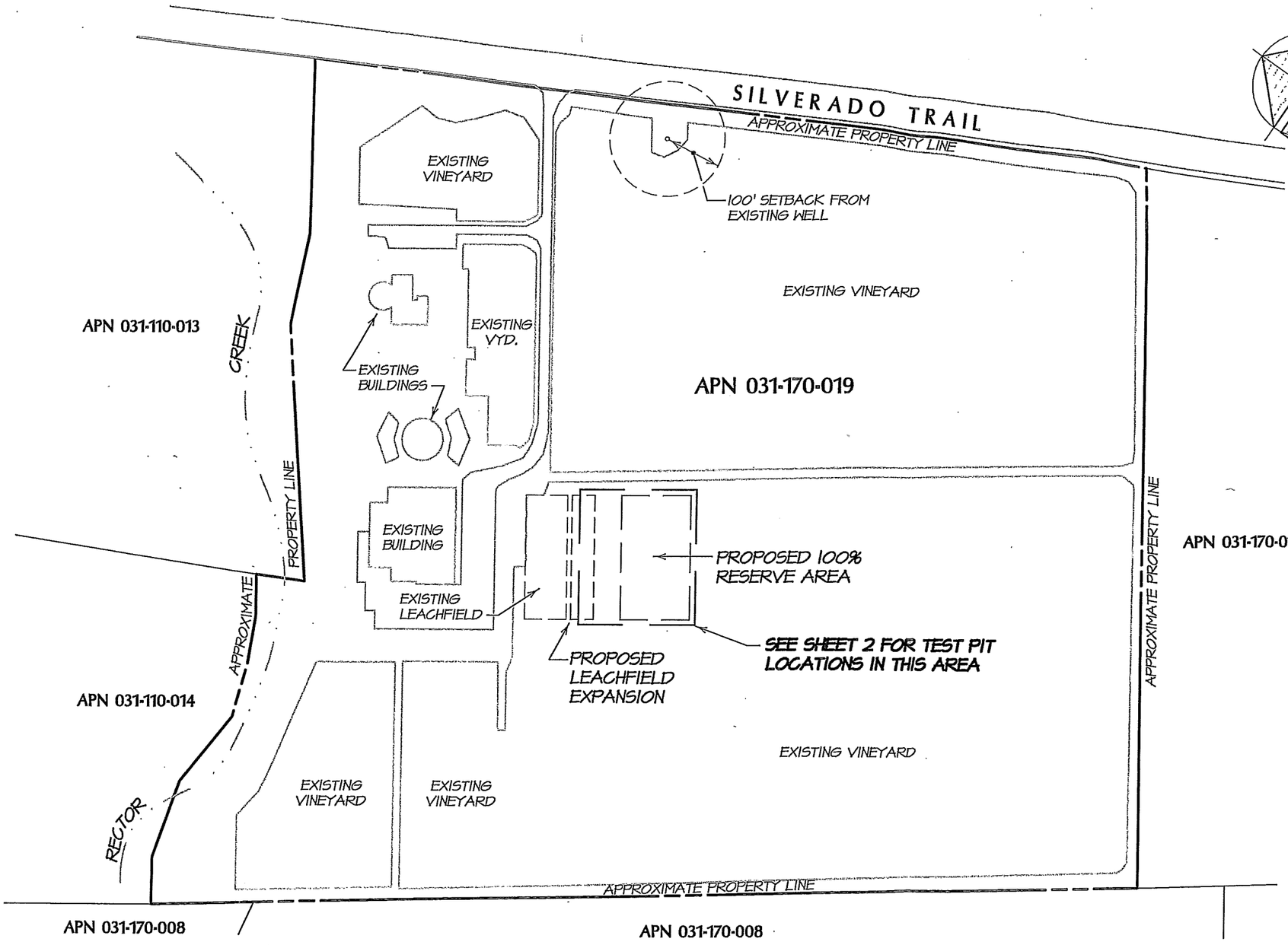
Size/Density	TP-4 HORIZON 1
+#10 Sieve	26.9 %
Sand	55.6 %
Clay	21.4 %
Silt	23.0 %
Db g/cc	--

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

Yours very truly,

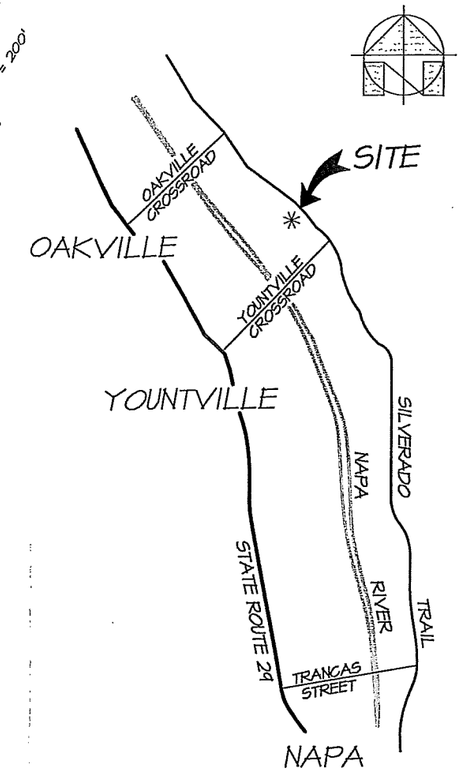
RGH GEOTECHNICAL

Tarance E. McCue
Senior Laboratory Advisor



OVERALL SITE MAP

SCALE: 1" = 200'



LOCATION MAP

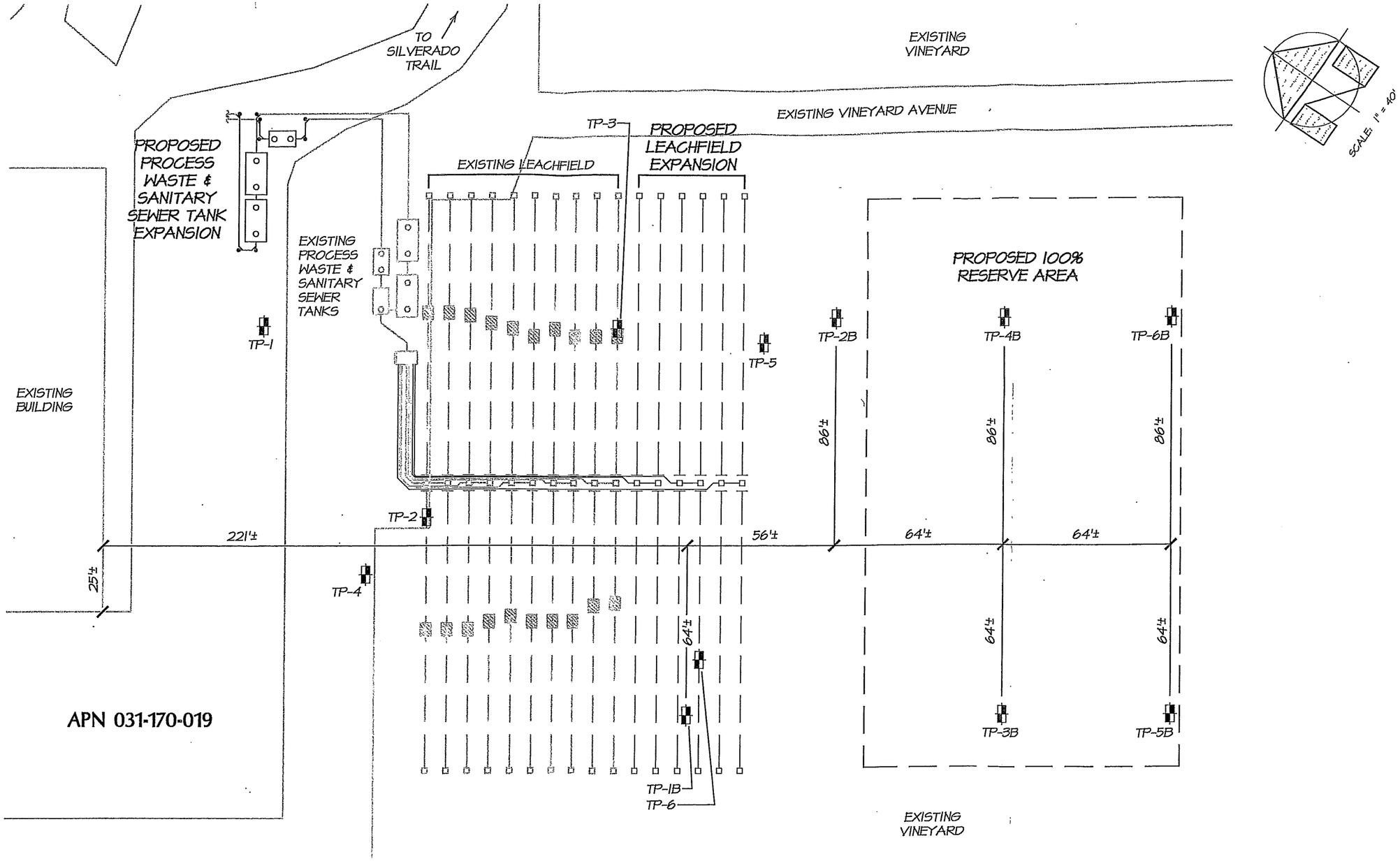
NO SCALE

SITE EVALUATION NOTES:

1. A SITE EVALUATION WAS PERFORMED FOR THIS PARCEL ON NOVEMBER 21, 2008. TEST PITS NO. 1B TO NO. 6B WERE DUG IN THE PRESENCE OF BOTH BARTELT ENGINEERING AND THE NAPA COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEMENT. THE SIX TEST PIT LOCATIONS ARE SHOWN HEREON.
2. TEST PITS NO. 1 TO NO. 6 WERE DUG ON DECEMBER 5, 2002 BY SUMMIT ENGINEERING INC.
3. ALL LOCATIONS, DIMENSIONS & DESCRIPTIONS ARE APPROXIMATE AND MAY NOT BE USED FOR CONSTRUCTION.

BARTELT engineering
civil engineering · land planning
1303 jefferson street, 200 B, napa, ca 94559
(707) 258-1301 · fax (707) 258-2926

Paraduxx Winery
7257 Silverado Trail
Napa County, California
December 2008
Job No. 08-17
Sheet 1 of 2



TEST PIT LOCATION MAP

SCALE: 1" = 40'

BARTELT engineering
civil engineering · land planning
1303 jefferson street, 200 B, napa, ca 94559
(707) 258-1301 · fax (707) 258-2926

SITE EVALUATION NOTES:

1. A SITE EVALUATION WAS PERFORMED FOR THIS PARCEL ON NOVEMBER 21, 2008. TEST PITS NO. 1B TO NO. 6B WERE DUG IN THE PRESENCE OF BOTH BARTELT ENGINEERING AND THE NAPA COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEMENT. THE SIX TEST PIT LOCATIONS ARE SHOWN HEREON.
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Paraduxx Winery
7257 Silverado Trail
Napa County, California
December 2008
Job No. 08-17
Sheet 2 of 2

Gr 55

NAPA COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
REQUEST FOR SITE EVALUATION INSPECTION

ENVIRONMENTAL HEALTH DEPT. USE ONLY

FEE: $348.00

DATE: 12/4/02

RECEIPT: 25574

BY: cg 92-14509

PARCEL NUMBER: 31-170-019

JOB ADDRESS: 7257 Silverado Trl

OWNER: Paraduxx Vynds.

TEST CONDUCTED BY: Summit

TYPE OF TEST: FIELD ANALYSIS ____

To be run on 12/5 at 11:00 am/pm

PERCOLATION TEST ____

To be run on ____ from ____ am/pm to ____ pm

PURPOSE OF TEST: HOUSE: ____ WINERY: X OTHER: ____

PROJECTED WASTEWATER FLOWS: 156,000 / YEAR 3900 gpd

****

PERCOLATION TEST INSPECTION RESULTS

Pre-soak checked? yes ____ no ____ Length of pre-soak: ____

Checked by: ____ Date: ____

Rate at time of inspection: ____ Stabilized perc rate: ____

Gravel and Pipe Used? yes ____ no ____ If so, take the perc rate ____ x .6 = ____ in/hr

****

TYPE OF SYSTEM APPROVED

STANDARD SYSTEM (72" RESERVE AREA)

Acceptable soil to: 70" / Assigned perc range: 1-3 / 3-6 / (6-12)

Depth of trenches: 30" / Rock under pipe: 12" / Cover over rock: 12"

Lineal feet of leachline required: 2600' / Plot plan received: ~~NEED~~ REC'D 1/22/03

~~NEED 3/19/03 MAP~~ REC'D 3/19/03

Slope: 25% / Surface drainage problems: NO

Additional information: LARGE BOULDERS AT 60" IN HOLES #1 & 4, AREA OK TO 70"

UNABLE TO REMOVE BOULDERS W/EXCAVATOR / ENGINEER MAY PROPOSE P.D.

SPECIAL DESIGN SYSTEM DUE TO THE FOLLOWING - Size constraints: ____

Perc rate too slow: ____ /Perc rate too fast: ____ /Steep slope: ____

Insufficient soil depth: ____ /High seasonal groundwater: ____

Acceptable soil for special design: ____ /Other problems: ____

E.H. Specialist Daniel Quarre / C.S. Date 12/5/02 3/19/03

FIELD ANALYSIS

TEXTURE (In the proposed trench zone)

CLAY CONTENT

Core Hole	1	2	3	4	5	6
Low (<12)						
Mod (12-27)	X	X	X	X	X	X
High (27-40)						
High (>40)						

SAND CONTENT

Core Hole	1	2	3	4	5	6
High (>50)						
Mod (20-50)	X	X	X	X	X	X
Low (<20)						

GRAVEL, COBBLE, STONE CONTENT

Core Hole	1	2	3	4	5	6
Very High (>60)						
High(35-60)	X	X	X	X	X	X
Mod (15-35)						
Low (<15)						

* *

STRUCTURE

SOIL DENSITY WHEN PICKED (Circle whether wet or dry)

Core Hole	1	2	3	4	5	6
pick sluffs or caves soil in	X	X	X	X		
pick bites and soil sluffs						
pick bites/ little or no soil sluffs						

CONSISTENCE (Circle w or d)

Core Hole	1	2	3	4	5	6
Easy	X	X	X	X	X	X
Moderate						
Hard						

STRUCTURE

Core Hole	1	2	3	4	5	6
Granular	X	X	X	X	X	X
Blocky						
Prism						
Platy						
Massive						
Cemented						

MODIFIER CHARACTERISTICS

1) Soil Survey Name: RIVERWASH, BOONER-FORWARD-FELTA COMPLE CORTINA VERY STONY LOAM, TALE CLAY LOAM

2) Horizon Boundaries: Diffuse X Gradual ___ Abrupt ___

3) Topography: Concave ___ +/- FLAT Convex ___ / Aspect: ___

4) Vegetation: Type VINEYARD Condition: DRY

* *

CORE HOLE RECORD

HOLE #1 EST. PERC

0 to 15" GRAVELLY, SANDY CLAY LOAM VERY 6-12"

15" to 60" COBBLY, GRAVELLY SANDY CLAY LOAM 6-12"

___ to ___

Roots: 42"
Color: bright / dull
Water Table: NO
Dug: easy / hard / dusty / smear
Acceptable Soil To: 60"

* LARGE BOULDERS AT 60" *

HOLE #2 EST. PERC

0 to 70" SAME AS #1

___ to ___

___ to ___

Roots: 48"
Color: bright / dull
Water Table:
Dug: easy / hard / dusty / smear
Acceptable Soil To: 70"

HOLE #3 EST. PERC

0 to 70" SAME AS #1

___ to ___

___ to ___

Roots: 50"
Color: bright / dull
Water Table:
Dug: easy / hard / dusty / smear
Acceptable Soil To: 70"

CORE HOLE RECORD 3/19/03

HOLE #4 EST. PERC

0 to 70" SAME AS #1

___ to ___

___ to ___

Roots: 50"
Color: bright / dull
Water Table:
Dug: easy / hard / dusty / smear
Acceptable Soil To: 70"

LARGE BOULDERS AT 60"

HOLE #5 EST. PERC

0 to 72" SAME AS #1

___ to ___

___ to ___

Roots: 40"
Color: bright / dull
Water Table:
Dug: easy / hard / dusty / smear
Acceptable Soil To: 72"

3/19/03

HOLE #6 EST. PERC

0 to 72" SAME AS #1

___ to ___

___ to ___

Roots: 48"
Color: bright / dull
Water Table:
Dug: easy / hard / dusty / smear
Acceptable Soil To: