“G”

Onsite Wastewater Disposal Feasibility
Sullivan Rutherford Estate
P19-00156-MOD

APPLIED
CIVIL ENGINEERING
INCORPORATED

September 23, 2019

Job No. 19-111

Kim Withrow, REHS
Environmental Health Division
Napa County Planning, Building and Environmental Services Department
1195 Third Street, Suite 210
Napa, CA 94559

Re: Onsite Wastewater Disposal Feasibility Study for the
Sullivan Rutherford Estate Winery Use Permit Modification Application
1090 Galleron Lane, St. Helena, California APN 030-070-010
P19-00156

Dear Ms. Withrow:

At the request of Sullivan Rutherford Estate we have evaluated the process and sanitary wastewater flows associated with the proposed Use Permit Modification (P19-00156). We have also analyzed the capacity of the existing process and sanitary wastewater system serving the winery facility to determine if it is adequate to serve the proposed changes in use.

Existing improvements on the property include the winery, a residence, an ag storage building, vineyard, a groundwater well, paved, dirt and gravel driveways and the utility infrastructure associated with this type of agricultural development.

The Use Permit Modification under consideration will change onsite vehicular circulation and parking, add a new building, increase the permitted annual wine production level and will also modify visitor and event allowances as described below:

- Wine Production:
  - 33,000 gallons of wine per year
  - Crushing, fermenting, aging and bottling

- Employees:
  - 20 full time employees

- Marketing Plan:
  - Daily Tours and Tastings by Appointment

        - 45 visitors per day maximum
        - 300 visitors per week maximum

    - Marketing Events #1
        - 12 per year
        - 25 guests maximum
        - Food prepared offsite by catering company or in new onsite kitchen
    - Marketing Events #2
        - 6 per year
        - 100 guests maximum
        - Food prepared offsite by catering company

Please see the Sullivan Rutherford Estate Winery Use Permit Modification Conceptual Site Plans prepared by Applied Civil Engineering (attached) for approximate locations of existing and proposed facilities.

The remainder of this letter describes the existing process and sanitary wastewater disposal system, its design capacity, peak flows associated with the proposed changes in use and our analysis and recommendations related to the system's ability to handle the anticipated wastewater flows.

Existing Septic System

The winery facility is serviced by one combined domestic and process waste septic system. According to permit records on file with Napa County and design documents prepared by Vanderwall Engineering, the septic system is a standard conventional type system. The system was designed to serve a 25,000 gallon per year winery with a peak flow of 1,283 gallons per day (gpd). Leach lines were designed based on a soil application rate of 0.50 gpd/sf of trench sidewall. Trenches have Infiltrator chambers that provide the equivalent of 3 sf of sidewall per lineal foot of trench. The trenches were designed such that they would have 36 inches of acceptable soil beneath the trench bottom based on an acceptable soil depth of 60" as observed in site evaluations performed by Napa County on February 23, 2012 and October 30, 2012.

The plans prepared by Vanderwall Engineering indicate there is one 2,500 gallon process waste septic tank and one 2,000 gallon sanitary sewer septic tank and one 1,200 gallon dose tank located near the west end of the existing winery building. Wastewater flows via gravity from the winery facility to the septic tanks and dosing tank then is pumped from the dosing tank to the leach field. The leach field consists of 864 lf of leach lines.

There is also a storm drain diversion valve that is used to divert runoff from the outdoor crush pad to the process waste septic tank or storm drainage system as appropriate.

Proposed Process Wastewater Design Flows

We have used the generally accepted standard that six gallons of winery process wastewater are generated for each gallon of wine that is produced each year and that 1.5 gallons of wastewater

are generated during the crush period for each gallon of wine that is produced. Based on the 33,000 gallon production capacity and the expectation that both white and red wine will be produced at the winery, we have assumed a conservative 45 day crush period. Using these assumptions, the annual, average daily and peak winery process wastewater flows are calculated as follows:

$$\text{Annual Winery Process Wastewater Flow} = \frac{33{,}000 \text{ gallons wine}}{\text{year}} \times \frac{6 \text{ gallons wastewater}}{1 \text{ gallon wine}}$$

Annual Winery Process Wastewater Flow = 198,000 gallons per year

$$\text{Average Daily Process Wastewater Flow} = \frac{198{,}000 \text{ gallons wastewater}}{\text{year}} \times \frac{1 \text{ year}}{365 \text{ days}}$$

Average Daily Winery Process Wastewater Flow = 542 gallons per day

$$\text{Peak Winery Process Wastewater Flow} = \frac{33{,}000 \text{ gallons wine}}{\text{year}} \times \frac{1.5 \text{ gallons wastewater}}{1 \text{ gallon wine}} \times \frac{1 \text{ year}}{45 \text{ crush days}}$$

Peak Winery Process Wastewater Flow = 1,100 gallons per day (gpd)

Proposed Winery Sanitary Wastewater Design Flows

The peak sanitary wastewater flow from the winery is calculated based on the number of winery employees, the number of daily visitors for tastings and the number of guests attending scheduled marketing events. In accordance with Table 4 of the Napa County "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a design flow rate of 15 gallons per day per employee and 3 gallons per day per visitor for tastings. Table 4 does not specifically address design wastewater flows for guests at marketing events. For events where food will be catered and prepared offsite we have conservatively assumed 5 gallons of wastewater per guest. For events where food will be prepared onsite we have assumed 15 gallons per guest, similar to a restaurant. Based on these assumptions, the peak winery sanitary wastewater flows are calculated as follows:

Employees

Peak Sanitary Wastewater Flow = 20 employees X 15 gpd per employee
Peak Sanitary Wastewater Flow = 300 gpd

Daily Tastings

Peak Sanitary Wastewater Flow = 45 visitors per day X 3 gallons per visitor
Peak Sanitary Wastewater Flow = 135 gpd

Marketing Events #1 (12 per year)

Peak Sanitary Wastewater Flow = 25 guests X 15 gallons per guest

Peak Sanitary Wastewater Flow = 375 gpd

Marketing Events #2 (6 per year)

Peak Sanitary Wastewater Flow = 100 guests X 5 gallons per guest
Peak Sanitary Wastewater Flow = 500 gpd

Total Peak Winery Sanitary Wastewater Flow

In order to manage the peak sanitary wastewater flows to the disposal field portable toilets will be used for all events with more than 25 guests in attendance and daily tours and tastings will not occur on marketing event days. Therefore, the worst-case peak winery sanitary wastewater flow is calculated based on 20 employees and a marketing event for 25 people. The peak flow for this scenario is calculated as follows:

Total Peak Winery Sanitary Wastewater Flow = 300 gpd + 375 gpd

Total Peak Winery Sanitary Wastewater Flow = 675 gpd

Combined Peak Wastewater Flow

Combined Peak Wastewater Flow = Peak Winery Process Wastewater Flow + Total Peak Winery Sanitary Wastewater Flow

Combined Peak Winery Wastewater Flow = 1,100 gpd + 675 gpd

Combined Peak Winery Wastewater Flow = 1,775 gpd

Existing Septic System Capacity

As noted above the permit for the existing system indicates a design flow of 1,283 gpd.

Proposed Design Flow vs Existing Capacity

The predicted Combined Peak Winery Wastewater Flow for the proposed winery operational characteristics (1,775 gpd) is more than the design capacity of the existing wastewater disposal system (1,283 gpd).

Recommendations

Option #1 – Expand Existing System
The recorded soil conditions and trench depth allow for a 0.67 ratio of trench length to flow (0.5 gpd/sf x 3 sf/lf = 1.5 gpd/lf or 0.67 lf/gpd). Therefore, if the existing system is augmented by adding 326 additional feet of trench (resulting in 1,190 lf total) the capacity will be increased to 1,775 gpd which will meet the needs of the proposed Use Permit Modification. The expansion must

also replace approximately 60 lineal feet of leach line that will be impacted by the new driveway alignment. Therefore, the total length of new leach line required is 326 lf plus 60 lf or 386 lf. The expansion can be accomplished by adding six new 72 foot long leach lines to match the existing leach line lengths as shown on the attached Wastewater Feasibility Study Exhibit (note exact location to be field verified prior to installation based on physically locating the existing leach lines).

Reserve Area

There is adequate reserve area in the vicinity of the existing reserve area, north of the existing septic system to accommodate a full replacement system for both the winery and the existing residence.

Option #2 – Convert Existing System to Pressure Distribution with Pre-Treatment

In this scenario the domestic and process waste streams would be pre-treated to a level of 30 mg/l BOD and 30 mg/l TSS and the existing leach field would be converted to a pressure distribution leach field by removing the existing infiltrator chambers and installing new pressure distribution leach lines. The new pressure distribution leach lines would be installed in 36 inch deep trenches to provide 24" minimum separate to limiting condition and 3 square feet of side wall per lineal foot of trench. Using an application rate of 0.8 gpd / sf and 3 sf per lf a total of 740 lf of trench would be required to accommodate the proposed design flow. There will be approximately 800 lf of trench left after portions are removed that are within five feet of the new driveway and therefore the converted system would have enough capacity to handle the proposed design flows.

Reserve Area

There is adequate reserve area in the immediately vicinity of the existing reserve area, north of the existing septic system to accommodate a full replacement system for both the winery upgraded system and the existing residence system.

Option #3 – Separate SS and PW Flows and Install New PW Treatment and Irrigation System

In this scenario the domestic waste stream would continue to flow to the existing leach field (domestic flows are estimated to be 675 gpd which is well within the capacity of the existing system which is 1,283 gpd).

The process wastewater would be collected separately, treated and disposed of via irrigation in the vineyard or landscape areas outside of all required setbacks. Based on the winery's planned production level and waste flows we recommend that treatment be achieved through the use of a package plant type system or other treatment system designed to accept winery process wastewater that is capable of meeting the following treatment requirements:

Parameter	Pre-treatment*	Post Treatment**
pH	3 to 10	6 to 9
BOD_5	500 to 12,000 mg/l	<160 mg/l
TSS	40 to 800 mg/l	<80 mg/l
SS	25 to 100 mg/l	<1 mg/l

* Reference California Regional Water Quality Control Board Central Coast Region General Waste Discharge Requirements Order No. R3-2008-0018 for winery process wastewater characteristics

** Required for discharge to land via surface irrigation by Napa County for samples taken at the discharge of the treatment unit.

Process Wastewater Disposal

We propose that disposal of the treated winery process wastewater be via irrigation of the onsite vineyard. For the purpose of this study we have assumed that the winery process wastewater will be applied to approximately two acres of vineyard that is located to the south of the new winery building and east of the new driveway and outside of the 100' well setback. This is a conservative assumption to simplify this analysis as more vineyard is available outside of the required setbacks and the treated water can also be used for landscape irrigation. The final irrigation area will be determined and incorporated into the final design with the installation permit application.

In order to accommodate differences in the timing of wastewater generation, irrigation demand, and limitations on wet weather application of treated wastewater a storage tank will be required. We have prepared a water balance calculation to size a tank that will temporarily store wastewater generated at the winery before it is applied to the vineyard. The water balance calculations assume a monthly winery process wastewater generation rate and a monthly vineyard irrigation schedule based on our past experience with projects of this type. The water balance further assumes that during the summer the treated wastewater will be used to offset the irrigation needs of the vineyard and in the winter application of treated winery process wastewater will be very limited (0.8" maximum per month) to prevent runoff. In the event that winter application is not possible due to extended wet weather patterns winery operations will have to be adjusted to work within the capacity of the storage tank(s) or the tank(s) will need to be emptied by hauling waste to an approved offsite disposal location. The water balance calculations show that the proposed land application area is large enough to accept all the wastewater generated each month throughout the year without carry over (see attached). To provide operational flexibility, we recommend that the storage tank(s) have a minimum capacity of at least 10,000 gallons so that a full weeks' worth of peak flow can be contained to allow flexibility in irrigation scheduling during the harvest period.

All application of treated winery process wastewater must comply with the requirements of the Napa County Process Wastewater Guidelines for Surface Drip Irrigation.

Reserve Area

There is adequate reserve area in the vicinity of the existing reserve area, north of the existing septic system to accommodate a full replacement system for both the domestic waste system. The process waste system does not require a reserve area.

Summary

The calculations presented above illustrate that the wastewater flows associated with the proposed Use Permit Modification will exceed the capacity of the existing wastewater system. However, there are several options for how to handle the planned increased flow rates which include adding to the existing system, converting the existing system to a pressure distribution system or handling the process waste separate from the domestic waste.

We trust that this provides the information you need to process the subject Use Permit Modification. Please feel free to contact us at (707) 320-4968 if you have any questions.

Sincerely,

Applied Civil Engineering Incorporated

By:

Michael R. Muelrath

Michael R. Muelrath RCE 67435
Principal

Copy:

Juan Pablo Torres-Padilla, Sullivan Rutherford Estate (via email)
Joshua Devore, Dickenson Peatman and Fogarty (via email)
Leslie Alspach, Pound Management (via email)

Attachments:

Sullivan Rutherford Estate Winery Use Permit Modification Conceptual Site Plans

Irrigation Storage Tank Water Balance

Month	Beginning Balance	Process Wastewater	Land Application Capacity	Ending Balance
January	0	9,900	43,444	0
February	0	9,900	43,444	0
March	0	9,900	43,444	0
April	0	7,920	43,444	0
May	0	7,920	32,670	0
June	0	9,900	81,675	0
July	0	19,800	81,675	0
August	0	35,640	49,005	0
September	0	35,640	49,005	0
October	0	29,700	32,670	0
November	0	11,880	43,444	0
December	0	9,900	43,444	0
		198,000	587,363	

Notes:

1. All values shown above for beginning balance, inflow, outflow and ending balance are in units of gallons.
2. See attached tables for detailed explanation of process wastewater and irrigation data presented in this table.
3. This water balance is based on the assumption that the tank is empy in August, just prior to crush.
4. This table is intended to illustrate waste disposal capability only. Where irrigation demand exceeds availble treated wastewater availability additional irrigation water will be provided by another source.

Winery Process Wastewater Generation Analysis

Annual Wine Production	33,000	gallons
Wastewater Generation Rate	6	gallons per gallon of wine
Annual Wasewater Generation	198,000	gallons
Crush Season Length	45	days
Wastewater Generated During Crush	1.5	gallons per gallon of wine
Peak Wastewater Generation Rate	1,100	gallons per day

Winery Process Wastewater Generation Table			
Month	Percentage of Annual Total	Monthy Flow (gallons)	Average Flow (gpd)
January	5.0%	9,900	319
February	5.0%	9,900	354
March	5.0%	9,900	319
April	4.0%	7,920	264
May	4.0%	7,920	255
June	5.0%	9,900	330
July	10.0%	19,800	639
August	18.0%	35,640	1,150
September	18.0%	35,640	1,188
October	15.0%	29,700	958
November	6.0%	11,880	396
December	5.0%	9,900	319
Total	100.0%	198,000	

Notes:

1. Wastewater generation rates and monthly proportioning are based on our past experience with similar projects.

Irrigation Schedule Analsysis

Vineyard Information:

Total acres of vines	2	acres
Vine Row Spacing (approx)	10	feet
Vine Spacing (approx)	4	feet (estimated)
Vine density	1,089	vines per acre (estimated)
Total Vine Count	2,178	vines

Irrigation Information:

Seasonal Irrigation[1]	150.0	gallons per vine (May through October)
Non-Irrigation Application	0.8	inches per month October through April

Irrigation Schedule					
Month	Monthly Percentage[2]	Irrigation per Vine (gallons)	Seasonal Irrigation (gallons)	Non-Seasonal Irrigation Application (gallons)	Total (gallons)
January		0.0	0	43,444	43,444
February		0.0	0	43,444	43,444
March		0.0	0	43,444	43,444
April		0.0	0	43,444	43,444
May	10%	15.0	32,670	0	32,670
June	25%	37.5	81,675	0	81,675
July	25%	37.5	81,675	0	81,675
August	15%	22.5	49,005	0	49,005
September	15%	22.5	49,005	0	49,005
October	10%	15.0	32,670	0	32,670
November		0.0	0	43,444	43,444
December		0.0	0	43,444	43,444
Total	100%	150.0	326,700	260,663	587,363

Notes:

1. Irrigation per vine is based on 0.5 acre-feet per acre of vines per WAA.
2. Monthly vineyard irrigation percentages are based on our past experience with projects of this type.
3. Non-Irrigation Application is for managing tank levels and assumes a maximum of 5 operational days per month based on historic weather data (Summit Engineering NBRID Capacity Study, 1996) and a saturated soil infiltration rate of 0.1 gallons per square foot per day uniformly over the entire area.