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Wastewater Feasibility Study

Reynolds Family Winery P14-00344-MOD
Planning Commission Hearing Date November 1, 2017

BARTELT ENGINEERING

WASTEWATER DISPOSAL FEASIBILITY STUDY FOR THE REYNOLDS FAMILY WINERY 3266 SILVERADO TRAIL, NAPA COUNTY, CA 94558 APN 039-610-002

As required by Napa County Planning, Building and Environmental Services, this study outlines the feasibility of providing onsite wastewater disposal for a winery and tasting room addition to an existing winery building on the above referenced parcel located at 3266 Silverado Trail in Napa County, California.

PROJECT DESCRIPTION

It is our understanding that the project proposes to expand the existing full crush winery on the above referenced parcel with the intent of increasing the facility's wine production capability from 20,000 to 40,000 gallons of wine per year. Along with the proposed increase in wine production, the project proposes a moderate staffing and marketing plan. The project proposes five (5) full-time employees, two (2) part-time employees and two (2) seasonal (harvest) employees. The project also proposes to offer private tour and tasting appointments for a maximum number of forty (40) guests per day and 250 guests per week. Furthermore, the Applicant plans to offer two (2) food and wine pairing events per month for parties up to 24 persons and two (2) food and wine pairing events per month for parties up to 40 persons. Additionally, the Applicant intends to host four (4) wine club/release events per year for groups of up to 60 persons and two (2) 125 person large event at the winery.

Table 1 summarizes the proposed marketing plan:

TABLE 1: MARKETING PLAN SUMMARY

Guest Experience	Existing		Proposed	
	Frequency	Number of Persons	Frequency	Number of Persons
Private Tours & Tasting	Daily	10 per day	Daily	40 per day
Food & Wine Pairings	per month per month	0 per event 0 per event	2 per month 2 per month	24 per event 40 per event
Wine Club / Release Events	2 per year	40 per event	4 per year	60 per event
Large Events	1 per year	25 per event	2 per year	125 per event

As part of our work, representatives from Bartelt Engineering have reviewed the planned operational methods for the winery with our Client, reviewed the parcel files at Napa County Environmental Health, held conversations with Napa County Environmental Health staff, performed a reconnaissance of the site to view existing conditions and conducted a site evaluation on May 14, 2014 to evaluate the feasibility of installing a septic system to serve the proposed winery and tasting room Use Permit modification.

This study and the attached Use Permit Drawings will demonstrate that the proposed winery improvements and marketing plan can feasibly be developed and that the parcel can adequately dispose of all wastewater onsite.

WASTEWATER ANALYSIS

Winery Production Facility Process Wastewater Flow

The winery facility's production wastewater flow rates for harvest and non-harvest seasons can be calculated as follows:

Harvest Peak Winery Process Wastewater Flow =

$$\left(\frac{40{,}000 \text{ gallons of wine}}{\text{year}}\right) \times \left(\frac{1.5 \text{ gallons of water}}{1 \text{ gallon of wine}}\right) \times \left(\frac{1 \text{year}}{45 \text{ days of crush}}\right) =$$

Harvest Peak Winery Process Wastewater Flow = 1,333 gallons per day (gpd)

Non-Harvest Peak Winery Process Wastewater Flow =

$$\left(\frac{40{,}000 \text{ gallons of wine}}{\text{year}}\right) \times \left(\frac{4.5 \text{ gallons water}}{1 \text{ gallon of wine}}\right) \times \left(\frac{1 \text{ year}}{320 \text{ days}}\right) =$$

Non-Harvest Peak Winery Process Wastewater Flow = 562.5 use 563 gpd

Winery Production Facility and Tasting Room Sanitary Wastewater Flow

All plumbing fixtures in the winery production facility and tasting room will be water saving fixtures per the California Plumbing Code as adopted by the Napa County Building Division. The sanitary wastewater generated by full-time employees, part-time employees and seasonal (harvest) employees at the winery production facility and tasting room can be itemized as follows:

Employees:

- 5 Full-Time Employees x 15 gpd per employee = 75 gpd
- 2 Part-Time x 15 gpd per employee = 30 gpd
- 2 Harvest Season x 15 gpd per employee = 30 gpd

The sanitary wastewater generated by guests and event staff at the tasting room can be itemized as follows:

Guests[1,2]:

- Private Tours and Tasting with Food:
  - (40 guests per day) x (6 gpd per guest) = 240 gpd
- Food and Wine Pairings - Lunch:
  - (24 guests per event) x (11 gpd per guest) = 264 gpd per event
- Food and Wine Pairings - Dinner:
  - (40 guests per event) x (11 gpd per guest) = 440 gpd per event
- Wine Club / Release Events:
  - (60 guests per event) x (11 gpd per guest) = 660 gpd per event
  - (4 staff members per event) x (15 gpd per staff) = 60 gpd per event
- Large Events:
  - (125 guests per event) x (8 gpd per guest) x (50%)[3] = 500 gpd per event
  - (125 guests per event) x (3 gpd per guest)[4] = 375 gpd per event
  - (8 staff members per event) x (15 gpd per staff) = 120 gpd per event

> ***Note:*** *This feasibility study assumes that portable toilets are utilized during Large Events regardless of the season.*

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

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

Table 2 below outlines the proposed marketing event schedule. An "X" in each column represents which events can occur on the same day. For example, Private Tours and Tastings with Food can occur on the same day as Food and Wine Pairings – Dinner during both harvest and non-harvest seasons; however, no other events can occur on the same day when a Wine Club / Release Event or Large Event is scheduled regardless of the season.

[1] Volume rate accounts for 3 to 8 gpd per guest from the commercial kitchen and 3 gpd from restroom use
[2] Product represents a maximum value as events may occur during any season
[3] This feasibility study assumes that portable toilets are utilized by a percentage of the guests during the event regardless of the season noted.
[4] Wastewater flow generated by the proposed commercial kitchen use.

TABLE 2: HARVEST AND NON-HARVEST PROPOSED DAILY EVENT SCHEDULE

Event	Daily Occurrence							
	Harvest				Non-Harvest			
Private Tours and Tasting with Food	X	X			X	X		
Food and Wine Pairings - Lunch	X				X			
Food and Wine Pairings - Dinner		X				X		
Wine Club / Release Events			X				X	
Large Events				X				X

Using the marketing schedule outlined in Table 2, the greatest sanitary wastewater generating combination of events for a single day during the harvest and non-harvest seasons can be calculated. Table 3A below outlines the sanitary wastewater flows generated by employees and guests during a particular event in harvest and non-harvest seasons.

TABLE 3A: HARVEST AND NON-HARVEST SEASON DAILY SANITARY WASTEWATER FLOWS

	Employees	Private Tours and Tasting with Food	Food and Wine Pairings		Wine Club / Release Events	Large Events	Total
			Lunch	Dinner			
	Daily Occurrence (gpd)						
Harvest	135	240	264	·	·	·	639
	135	240	·	440	·	·	815
	135	·	·	·	720	·	855
	135	·	·	·	·	995[P]	1,130
Non-Harvest	105	240	264	·	·	·	609
	105	240	·	440	·	·	785
	105	240	·	·	720	·	1,065
	105	·	·	·	·	995[P]	1,100

Note: The superscript "P" denotes that portable toilets are required during event.

Table 3A shows that the greatest sanitary wastewater flow during harvest and non-harvest is generated during a Large Event. The greatest practical harvest and non-harvest season peak process and sanitary wastewater flows are summarized in the following table:

TABLE 3B: HARVEST AND NON-HARVEST SEASON PEAK WASTEWATER SUMMARY

Wastewater Source	Harvest (gpd)	Non-Harvest (gpd)
Process Wastewater	1,333	563
Sanitary Wastewater	995 (Large Event)	995 (Large Event)
Combined Wastewater	2,463	1,663

The greatest total proposed wastewater flow is the combination of the greatest winery facility's production flow and the winery production facility and tasting room sanitary wastewater flow that occurs in the same season and on the same day. Therefore, the project's wastewater treatment system will be designed for a treatment capacity of 2,470 gallons per day which is based on the flows outlined in the above table.

WASTEWATER EFFLUENT DISPOSAL METHOD

Proposed Process and Sanitary Wastewater Disposal System

The existing winery's sewage disposal system will be removed and disposed of properly offsite. Bartelt Engineering proposes to dispose of the winery facility's process and sanitary wastewater utilizing a new alternative sewage treatment system (ASTS) and disposing of the wastewater effluent via a Septic Tank Effluent (STE) Pressure Distribution (PD) system to a location within the existing onsite vineyards.

The winery facility's process wastewater treatment system will consist of several steps. The floors of the existing winery and the proposed winery storage area will be sloped so that all process wastewater is collected in trench drains and floor drains. The drains will be fitted with baskets to collect a majority of the larger debris. The winery process wastewater collected in the trench drains and floor drains will then gravity flow to a new trash tank fitted with filters to remove finer solids. From the trash tank, the process wastewater effluent will gravity flow and combine with the winery and tasting room sanitary wastewater effluent in a sump tank before being dose discharged to the disposal field.

The winery facility and tasting room sanitary wastewater will gravity flow to a series of septic tanks fitted with filters for solids removal. A grease trap will be installed for the proposed commercial kitchen and installed at the direction of the project Architect. From the septic tanks, sanitary wastewater effluent will gravity flow to a sump tank where it will be combined with the winery process wastewater effluent before being dose discharged to the disposal field and disposed of via a pressure distribution dispersal field as stated previously.

Combined Wastewater Effluent Pressure Distribution Disposal Field and Replacement Area

Based on the site evaluation performed by Bartelt Engineering on May 14, 2014, test pits 5F, 6F, 8F and 9F showed similar results and are acceptable for a pressure distribution (PD) dispersal type septic system and 100% replacement area. The site evaluation determined that the soil in the area of these test pits is Sandy Clay Loam (SCL). According to Napa County Standards, a hydraulic loading rate of 0.80 gal/sf/day is allowed for this soil type using an alternative sewage treatment system[5]. The maximum acceptable depth found during the site evaluation was approximately 59 inches. Napa County Standards require a minimum of 36 inches below the trench bottom to the limiting condition, unless an approved pretreatment device is provided, then the distance may be reduced to 24 inches. The maximum acceptable soil depth found at the site allows for 36 inches of useable soil beneath a 23 inch deep trench to the limiting condition. The test pits show that a trench can be constructed that allows for a lateral to be buried 9 inches below original grade provided that 6.5 inches of soil is placed on top of original grade to achieve finish grade. See Pressure Distribution System – Site Conditions Design Worksheet for trench design. Slopes within the disposal field area are less than 5% and the sidewall area is below the three (3) square feet per linear foot maximum. The minimum required lineal feet of trench for the PD system can be calculated as follows:

$$\text{Required Trench Length} = \left(\frac{\text{design flow rate}}{(\text{soil application rate}) \times (\text{effective surface area})} \right) =$$

$$\left(\frac{2{,}470 \ \frac{\text{gal}}{\text{day}}}{0.8 \frac{\text{gal}}{\text{day} \quad \text{ft}^2} \times \ 2.58 \frac{\text{ft}^2}{\text{lf}}} \right) = 1{,}196.7\pm, \text{ use } 1{,}200 \text{ linear feet}$$

Assuming an eight (8) foot trench spacing to fit within the existing vineyard rows, the required primary disposal field area is 9,792 square feet.

100% Replacement Area = 9,792 square feet

The project will provide 11,000 square feet for each disposal area for a grand total of 22,000 square feet.

To make the best use of the available disposal field area we recommend the system consist of six (6) subfields, each subfield containing two (2) laterals with each lateral being 100 feet long, for a total of 200 linear feet (lf) of trench per subfield and a system total of 1,200 lineal feet of leach line.

[5] Soil application rate is 0.80 gal/sf/day and 1.0 gal/sf/day for septic tank effluent (STE) and pre-treated effluent (PTE) alternative sewage treatment systems, respectively.

TANK SIZING

Existing Tanks

There are three (3) existing tanks currently being used by the winery's sewage disposal system; one (1) 1,200 gallon sanitary, one (1) 1,500 gallon process and one (1) 800 gallon sump tank. These tanks would be either removed or repurposed under the proposed design.

Proposed Tanks

Under the proposed design, the sanitary wastewater septic tank(s) should have a minimum hydraulic retention volume capacity of 3,000 gallons which is sized to provide a minimum of three (3) days of retention time during peak wastewater flow. The Napa County Sewage Ordinance requires that fixtures discharging food waste from the food preparation and dishwashing areas of commercial food facilities be connected to an approved grease interceptor prior to connection to an individual or private sewage disposal system. At this time, the project Architect favors a grease trap in lieu of an interceptor and therefore the Owner will provide a signed Grease Trap Agreement to the County. The proposed grease trap will be specified by the Mechanical Engineer.

The tanks will have a Zabel A300 filter or approved equal installed at the outlet to aid in the screening of suspended solids and the reduction of BOD in the wastewater effluent stream.

The proposed process wastewater septic tank(s) will have a minimum hydraulic retention volume capacity of 5,000 gallons which is sized to provide three and three-quarter (3-3/4) days of retention time during peak process wastewater flow.

The sump tank will have a volume capacity of 3,000 gallons to provide for greater than a day of combined septic and process wastewater peak flows capacity.

CONCLUSIONS

The parcel will be able to support the proposed 40,000 gallon winery and tasting room by disposing the combined process wastewater and the winery and tasting room's sanitary sewer wastewater effluent using a pressure distribution (PD) alternative sewage treatment system (ASTS) type dispersal system.

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

REFERENCES

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

Geoflow, Inc. *Wastewater Design, Installation and Maintenance Guidelines.* v1, 2007.

Napa County Department of Environmental Management. "Design, Construction and Installation of Alternative Sewage Treatment Systems." April 12, 2010.