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Wastewater Feasibility Study

Benjamin Ranch Winery, Use Permit Application No. P13-00371-UP
Planning Commission Hearing, September 16, 2020

BARTELT ENGINEERING

ONSITE WASTEWATER DISPERSAL FEASIBILITY STUDY FOR THE BENJAMIN RANCH WINERY 8895 CONN CREEK ROAD, NAPA COUNTY APN 030-120-016

As required by Napa County Planning, Building and Environmental Services (PBES), this study outlines the feasibility of providing onsite wastewater disposal for a potential winery and Visitor Center on the above referenced parcel located at 8895 Conn Creek Road, Napa County, California.

PROJECT DESCRIPTION

The project proposes the installation of a Visitor Center, commercial kitchen, and full crush winery on a 54.64± acre parcel with the intent of the facility having the capability of producing 475,000 gallons of wine per year. The parcel is currently developed with a vineyard manager's office, 47.5± acres of vineyard, miscellaneous structures associated with vineyard operations and access roads. The project also proposes a Lot Line Adjustment increasing the parcel size to 63.97± acres. Refer to the attached Use Permit drawings for the existing and proposed development.

Along with the proposed wine production at the site, the project proposes a moderate staffing and marketing plan which includes the following for the proposed winery: thirty (30) year around full-time employees, five (5) seasonal dayshift (harvest) employees and five (5) seasonal swing shift (harvest) employees and the following for the proposed Visitor Center: fifteen (15) year around full-time employees and five (5) part-time employees. One (1) additional year around full-time employee is added to account for the Vineyard Manager. The project proposes to offer private tours and tastings for a maximum number of 400 guests per day. The project also proposed to offer the following marketing events: Dinnertime Wine Marketing Events for a maximum of 24 guests that may occur on Friday and Saturday nights, plus up to 4 events monthly occurring on days other than Friday and Saturday – no more than 1 dinnertime wine marketing event may occur on any given day, food may be prepared on-site; Lunchtime Wine Marketing Events for a maximum of 16 guests that may occur Monday through Sunday up to a monthly maximum of 15 lunchtime events - no more than 1 lunchtime wine marketing event may occur on any given day, food may be prepared on-site; Large Events for a maximum of 150 guests that may occur Monday through Sunday up to an annual maximum of 8 large events – no more than 2 large events may occur in a given month – no more than 1 large event may occur on any given day, food to be catered; and participation in the Auction Napa Valley. In no case shall the daily combined tours and tastings and marketing visitation exceed 400 guests.

Table 1 summarizes the proposed marketing plan:

TABLE 1: MARKETING PLAN SUMMARY

Guest Experience Proposed	Frequency Proposed	Number of Guests Proposed
Dinnertime Wine Marketing Events	14 per month	24 per event
Lunchtime Wine Marketing Events	15 per month	16 per event
Large Events	8 per year	150 per event
Auction Napa Valley	annual	150 per event
Private Tours & Tastings	Daily	up to 400 per day

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 June 5, 2013 to evaluate the feasibility of installing an onsite wastewater dispersal system to serve the proposed winery and Visitor Center.

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.

WATER USE ANALYSIS

Bartelt Engineering has completed a Water Availability Analysis (WAA) for the proposed winery. According to the Water Availability Analysis, the proposed parcel configuration would be allotted 63.97± acre-feet of water per year. The Water Availability Analysis estimates that the proposed water uses for the entire parcel (vineyard and winery production of 475,000 gallons of wine per year) will be approximately 40.52± acre-feet of water per year (see the Water Availability Analysis prepared by Bartelt Engineering for more information on the proposed water use).

WASTEWATER ANALYSIS

Winery Production Process Wastewater Flow

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

Harvest Peak Winery Process Wastewater Flow =

$$\left(\frac{475{,}000\ \text{gallons of wine}}{\text{year}}\right)\times\left(\frac{1.5\ \text{gallons of water}}{1\ \text{gallon of wine}}\right)\times\left(\frac{1\ \text{year}}{61\ \text{days of crush}}\right)=$$

Harvest Peak Winery Process Wastewater Flow = 11,680 gallons per day (gpd)

Non-Harvest Peak Winery Process Wastewater Flow =

$$\left(\frac{475{,}000 \text{ gallons of wine}}{\text{year}}\right)\times\left(\frac{4.5 \text{ gallons water}}{1 \text{ gallon of wine}}\right)\times\left(\frac{1 \text{ year}}{304 \text{ days}}\right)=$$

Non-Harvest Peak Winery Process Wastewater Flow = 7,031 gpd

Sanitary Wastewater Flow

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

Winery Employees:

- 30 Year Around Full-Time Employees x 15 gpd per employee = 450 gpd
- 5 Seasonal Dayshift (Harvest) Employees x 15 gpd per employee = 75 gpd
- 5 Seasonal Swing Shift (Harvest) Employees x 15 gpd per employee = 75 gpd

Vineyard Manager:

- 1 Year Around Full-Time Employees x 15 gpd per employee = 15 gpd

Visitor Center Employees:

- 15 Year Around Full-Time Employees x 15 gpd per employee = 225 gpd
- 5 Part-Time Employees x 15 gpd per employee = 75 gpd

The sanitary wastewater generated by guests at the Visitor Center can be itemized as follows:

Guests[1]:

- Dinnertime Wine Marketing Events:
  - (24 guests per event) x (15 gpd per guest) = 360 gpd per event
- Lunchtime Wine Marketing Events:
  - (16 guests per event) x (15 gpd per guest) = 240 gpd per event
- Large Events:
  - (150 guests per event) x (3 gpd per guest) x 75% usage rate = 338 gpd per event
  - (10 event staff) x (15 gpd per event staff) = 150 gpd per event
- Private Tours and Tasting:
  - (400 guests per day) x (3 gpd per guest) x 60% usage rate= 720 gpd

> ***Note:*** *This feasibility study assumes that portable toilets, offsite meal preparation and catering services are utilized during Large events regardless of the season and 75% of the event guests are assumed to use the winery restrooms during these events.*

[1] Wastewater generation rate for guests includes 15 gpd for non-catered events and 3 gpd for catered events.

Kitchen Sanitary Wastewater Flow

During proposed "Food and Wine Pairings", meal preparation is proposed to occur in the winery commercial kitchen. Kitchen waste consisting primarily of fats, oils and grease (FOG) as well as organic material would be generated during these events. Per PBES requirements, grease interceptors are required to be plumbed to a commercial kitchen with an onsite wastewater treatment system.

Wastewater generated during the "Food and Wine Pairings" is calculated per PBES requirement which includes a generation rate of 15 gpd per guest. This generation rate consists of 5 gallons of kitchen waste from meal preparation/clean-up and 10 gallons from guest restroom use. The sanitary wastewater flow generated from kitchen waste is calculated below:

Kitchen Waste:

- Wine Marketing Events – Lunch or Dinner:
  - (24 guests per event) x (5 gpd per guest) = 120 gpd

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, Visitor Center and commercial kitchen 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, Visitor Center and commercial kitchen sanitary wastewater flows during the months of December through July (non-harvest).

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

TABLE 2A: HARVEST AND NON-HARVEST SEASON DAILY SANITARY WASTEWATER FLOWS

	Daily Occurrence							
	Harvest				Non-Harvest			
Winery Employees	600	600	600	600	450	450	450	450
Vineyard Manager	15	15	15	15	15	15	15	15
Visitor Center Employees	300	300	300	300	300	300	300	300
Dinnertime Marketing Event	360				360			
Lunchtime Marketing Event		240				240		
Large Event			488				488	
Private Tours and Tastings	677	691	450	720	667	691	450	720
Total Flow (gpd)	1,952	1,846	1,853	1,635	1,792	1,696	1,703	1,485

Design Wastewater Flows

The greatest practical harvest and non-harvest season peak process and sanitary wastewater flows are summarized in the following Table 2B:

TABLE 2B: HARVEST AND NON-HARVEST SEASON PEAK WASTEWATER SUMMARY

Wastewater Source	Harvest		Non-Harvest
	(gpd)		(gpd)
Sanitary Wastewater	Winery	615	465
	Visitor Center	1,337	1,327
Process Wastewater	11,680		7,031

WASTEWATER EFFLUENT DISPERSAL METHODS

Bartelt Engineering proposes several options for the dispersal of wastewater generated by the winery production facility, Visitor Center, and commercial kitchen. 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. Refer to the associated Use Permit Drawings for location of the proposed treatment and dispersal methods.

Proposed Preferred Wastewater Option

Under the preferred option, separate wastewater conveyance, treatment and dispersal systems are proposed. Process wastewater would be pretreated then surface applied as vineyard/landscape irrigation. Sanitary wastewater would also be pretreated then dispersed via a subsurface drip field

Proposed Seasonal Surface Drip Irrigation Process Wastewater Dispersal System

The proposed process wastewater treatment system will consist of several steps. The floors of the proposed winery buildings will be sloped so that all process wastewater is collected in trench drains and floor drains. The winery process wastewater collected in the trench drains and floor drains will then gravity flow into septic tanks fitted with filters to remove finer solids. From the septic tanks, the process wastewater effluent will gravity flow into a sump vault before being pumped to two (2) 15,000± gallon equalization tanks.

The process wastewater effluent in the equalization tanks will then be treated by a pretreatment system. After the winery process wastewater effluent has been treated, the treated effluent will then be stored in a storage tank from which it will be distributed via seasonal surface irrigation on a designated portion of the existing vineyards on the parcel.

Surface Drip Irrigation Wastewater Flow Balance

A process wastewater flow balance was determined by estimating the monthly wastewater produced (see Table I), the potential/available volume of treated effluent that can be disposed of in the vineyard each month (see Table III), the average irrigation flow based on estimated vineyard irrigation practice (see Table IV) and sizing a storage tank to be able

to store excess treated wastewater effluent until it can be properly disposed of in the vineyard (see Table V). Precipitation data for a 10-year return period was used for the irrigation analysis (see Table II). The estimates for a 10-year return period were taken from Oakville 1W Weather Station data derived from 1948-1981 Normals.

The treated wastewater effluent storage tank should have a minimum volume of 126,000 gallons (see attached Table V) to provide for some storage of the treated effluent through the winter months when surface drip land application is minimal and to equalize differences between the wastewater generation rate and the irrigation application rate. Reference evapotranspiration rates and crop coefficients were used to calculate the irrigation demand for the existing vineyard (see Table III). Reference evapotranspiration rates and crop coefficients were obtained from the California Irrigation Management Information System website (http://wwwcimis.water.ca.gov) for the Oakville #77 weather station (attached). It was assumed that available groundwater in the root zone is depleted by May and that irrigation is primarily applied to the vines for the months of May 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 (onsite wells) is used to supply additional irrigation water.

The winery effluent surface irrigation drip dispersal area design is based on the use of 42.7± acres or approximately 44,300 existing grape vines located adjacent to the winery. The dispersal area will need to be verified once all dispersal field setbacks are determined.

Furthermore, all dispersal field areas will need to be labeled with signage indicating the use of treated effluent for irrigation in accordance with Napa County Environmental Health standards.

Winery and Visitor Center Sanitary Wastewater Dispersal Systems

Due to the distance (380± feet) between the winery and the Visitor Center, the project's preferred option proposes two (2) sanitary wastewater dispersal systems, one (1) dedicated to the winery and one (1) dedicated to the Visitor Center.

The winery and Visitor Center sanitary wastewater would gravity flow to a series of septic tanks fitted with filters for solids removal. Kitchen waste would flow into a grease interceptor prior to entering the septic tanks. From the septic tanks, sanitary wastewater effluent will gravity flow to a recirculation/blend tank where the effluent would be pretreated through an approved pretreatment system. Pretreated effluent is proposed to be dispersed through a subsurface drip field(s) by means of a timed-dose pumping system.

Sanitary Wastewater Effluent Subsurface Drip Dispersal Field and Replacement Area

Based on the site evaluation performed by Bartelt Engineering on June 5, 2013, test pits #1 through #6 showed similar results and are acceptable for a subsurface drip dispersal type septic system and 200% replacement area. The site evaluation determined that the soil in the area of these test pits is Clay Loam/Sandy Clay/Sandy Clay Loam. For the evaluated soil types, Napa County and GeoFlow Incorporated recommend a soil hydraulic loading

rate[2,3] of 0.6 gal/sf/day. The maximum acceptable depth found during the site evaluation was approximately 40 inches. Napa County Standards require a minimum of 24 inches of useable soil below the drip lines. The maximum acceptable soil depth found at the site allows for 34 inches of useable soil beneath drip emitters buried 6 inches below the ground surface. The required dispersal field area can be calculated as follows:

Winery Dispersal Field

$$\text{Dispersal Field Area} = \left(\frac{615\ \text{gal}}{\text{day}}\right) \times \left(\frac{\text{day ft}^2}{0.6\,\text{gal}}\right) = 1{,}025 \text{ square feet; use } 1{,}040 \text{ square feet}$$

The dispersal field area is based on two (2) foot lateral spacing between drip lines and two (2) foot emitter spacing.

The required number of emitters is calculated as follows:

$$\text{Required Number of Emitters} = 1{,}040 \text{ square feet} \times \frac{1\,\text{emitter}}{4 \text{ square feet}} = 260 \text{ emitters}$$

To make the best use of the available dispersal field area we recommend the system consist of 4 lines that are 130 feet long for a total of 520 lineal feet of drip line. This layout provides 260 emitters.

Visitor Center Dispersal Field

$$\text{Dispersal Field Area} = \left(\frac{1{,}337\ \text{gal}}{\text{day}}\right) \times \left(\frac{\text{day ft}^2}{0.6\,\text{gal}}\right) = 2{,}228 \text{ square feet; use } 2{,}240\pm \text{ square feet}$$

The dispersal field area is based on two (2) foot lateral spacing between drip lines and two (2) foot emitter spacing.

The required number of emitters is calculated as follows:

$$\text{Required Number of Emitters} = 2{,}240 \text{ square feet} \times \frac{1\,\text{emitter}}{4 \text{ square feet}} = 560 \text{ emitters}$$

To make the best use of the available dispersal field area we recommend the system consist of 8 lines that are 140 feet long for a total of 1,120 lineal feet of drip line. This layout provides 560 emitters.

A suitable dispersal and replacement area adjacent to the Visitor Center will need to be evaluated.

[2]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.
[3] Referenced from *Table 1 Drip Loading Rates Considering Soils Structure* of The Subsurface Drip Dispersal and Reuse Design, Installation and Maintenance Guidelines prepared by GeoFlow Incorporated.

TANK SIZING

All septic and grease interceptor tanks should be sized to provide a minimum of two days retention time during peak wastewater flow. Based on discussions with the manufacturers of pretreatment systems, the equalization tank should be sized for a minimum of one and a half (1.5) days of peak flow capacity. The irrigation storage tank should be sized based on vineyard irrigation demands and flow balance calculations, see enclosed spreadsheets for preliminary calculations on treated wastewater flows and irrigation demands. All septic and grease interceptor tanks should 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.

CONCLUSIONS

The parcel will be able to support the proposed 475,000 gallon winery and Visitor Center by utilizing a pretreatment system to treat the process wastewater effluent and dispose of treated effluent through surface drip irrigation to the vineyard and disposing of the sanitary sewer effluent through onsite subsurface drip dispersal fields utilizing an approved pretreatment system to pretreat the sanitary sewer effluent.

The above calculations should assist you in processing the subject Use Permit Application. Full design calculations and construction plans will be completed after approval of the Use Permit currently 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. "Regulations for Design, Construction and Installation of Alternative Sewage Treatment Systems." http://www.countyofnapa.org/WorkArea/DownloadAsset.aspx?id=4294980363, October 28, 2013.

Telsco Industries. "Turf Irrigation Manual." By James A. Watkins. 1987.

U.S. Department of Health, Education and Welfare, Public Health Service Publication. *Manual of Septic-Tank Practice.* 1967.

U.S. Environmental Protection Agency. "Onsite Wastewater Treatment Systems Manual." February 2002.