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Wastewater Feasibility Study

Ellman Family Winery P18-00249-UP
Planning Commission Hearing Date October 2, 2019

BARTELT ENGINEERING

ONSITE WASTEWATER DISPERSAL FEASIBILITY STUDY FOR THE ELLMAN FAMILY WINERY 3286 SILVERADO TRAIL, NAPA COUNTY, CA APN 039-610-001

As required by Napa County Planning, Building and Environmental Services (PBES), this study outlines the feasibility of providing onsite wastewater dispersal for a potential winery and hospitality building on the above referenced parcel located at 3286 Silverado Trail, Napa, CA 94558.

PROJECT DESCRIPTION

The 13.52± acre parcel is currently experiencing residential improvements and a Track I Vineyard Replant; both of these projects are under separate permits. There are existing vineyard blocks not associated with the Track I project and one (1) existing well on the parcel that will be the potable water source for all the existing and proposed parcel improvements (residence, vineyard irrigation, and winery).

It is our understanding that the project proposes to construct a full crush winery on the above referenced parcel with the intent of the facility having the capability of producing 30,000 gallons of wine per year. Along with the proposed wine production at the site, the project proposes a modest staffing and marketing plan. The project proposes eight (8) full-time employees, one (1) part-time employee and one (1) seasonal (harvest) employee. The project also proposes to offer Private Tours and Tastings with Food for an average of 10 guests (maximum number of 15 guests) per day or 70 per week and two (2) Food and Wine Pairings (Lunch) per month for 10 guests. Additionally, the Applicant intends to host one (1) Wine Club Event per year for groups of up to 200 persons, one (1) Release Event per year for groups of up to 100 persons, and one (1) other 125 person Large Event per year at the winery with up to 15, 8, and 10 additional event staff, respectively.

Table 1 below summarizes the proposed marketing plan:

TABLE 1: MARKETING PLAN SUMMARY

Description	Current		Proposed	
	Frequency	Number of Persons	Frequency	Number of Persons
Private Tours & Tastings w/ Food	daily	0 per day	Daily (Per Week)	15 per day (max) (70 per week)
Food & Wine Pairings (Lunch)	0 per month	0 per event	2 per month	10 per event
Wine Club Event(s)	0 per year	0 per event	1 per year	200 per event (+15 Staff)
Release Event(s)	0 per year	0 per event	1 per year	100 per event (+8 Staff)
Large Event(s)	0 per year	0 per event	1 per year	125 per event (+10 Staff)

As part of our services, representatives from Bartelt Engineering have reviewed the planned operational methods for the winery with our Client, reviewed the parcel files at 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 October 6, 2015 to evaluate the feasibility of installing an onsite wastewater dispersal system to serve the proposed winery and hospitality building.

This study and the associated Use Permit Drawings will demonstrate that the proposed winery improvements, staffing and marketing plan can feasibly be developed and that all wastewater can be adequately treated and dispersed onsite.

WASTEWATER ANALYSIS

All plumbing fixtures in the winery production facility and hospitality building will be water saving fixtures per the 2016 California Plumbing Code as adopted by the Napa County Building Division.

Winery Production Process Wastewater Flow

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

Harvest Peak Day Winery PW Flow=

$$\frac{30{,}000 \text{ gallons of wine}}{\text{Year}} \times \frac{1.5 \text{ gallons of water}}{1 \text{ gallon of wine}} \times \frac{1 \text{ year}}{45 \text{ days of harvest}} =$$

Harvest Peak Winery PW Flow = 1,000 gallons per day (gpd)

Non-Harvest Peak Day Winery PW Flow=

$$\frac{30{,}000 \text{ gallons of wine}}{\text{Year}} \times \frac{4.5 \text{ gallons of water}}{1 \text{ gallon of wine}} \times \frac{1 \text{ year}}{320 \text{ days of non-harvest}} =$$

Non-Harvest Peak Winery Process Wastewater Flow = 421.9 gpd, use 422 gpd

Winery Sanitary Wastewater Flow

The sanitary wastewater (SW) generated at the winery (production facility) and hospitality building including full-time employees, part-time employees, seasonal (harvest) employees, guests, and additional marketing event staff can be itemized as follows:

Employees:

- (8 Full-Time Employees) x (15 gpd per employee) = 120 gpd
- (1 Part-Time Employee) x (15 gpd per employee) = 15 gpd
- (1 Seasonal (Harvest) Employee) x (15 gpd per employee) = 15 gpd

Guests[1,2,3]:

- Private Tours and Tastings with food:
  - (15 guests per day) x (6 gpd per guest) = 90 gpd
- Food and Wine Pairings (Lunch):
  - (10 guests per event) x (13 gpd per guest) = 130 gpd
- Wine Club Event:
  - (200 guests per event) x (3.0 gpd per guest) = 600 gpd per event
  - (200 guests per event) x (4.0 gpd per guest) x (50%)[3] = 400 gpd per event
  - (15 event staff) x (10.0 gpd per staff) = 150 gpd per event
  - Wine Club Event Total = 1,150 gpd per event
- Release Event:
  - (100 guests per event) x (3.0 gpd per guest) = 300 gpd per event
  - (100 guests per event) x (4.0 gpd per guest) x (50%)[3] = 200 gpd per event
  - (8 event staff) x (10.0 gpd per staff) = 80 gpd per event
  - Release Event Total = 580 gpd per event
- Large Event:
  - (125 guests per event) x (3 gpd per guest) = 375 gpd per event
  - (125 guests per event) x (4 gpd per guest) x (50%)[3] = 250 gpd per event
  - (10 event staff) x (10 gpd per staff) = 100 gpd per event
  - Large Event Total = 725 gpd per event

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 hospitality building SW flows during the months of September through October (harvest). The total proposed non-harvest season peak SW flow is the combination of the winery production facility and hospitality building SW flows during the months of November through August (non-harvest).

Table 2 below outlines the proposed marketing event schedule. Multiple "X's" in a column denote events that can occur on the same day. For example, Private Tours and Tastings with Food can occur on the same day as a Food and Wine Pairings (Lunch) during both harvest

[1] Volume rate accounts for 3 gpd to 8 gpd from the commercial kitchen and/or 3 to 6 gpd from restroom use
[2] Represents a maximum as event may occur during harvest or non-harvest seasons
[3] This feasibility study assumes that during Events 50% of the guests utilize the portable toilets provided resulting in 50% of the guests generating wastewater flows treated by the proposed wastewater dispersal system regardless of the season. Calculations rounded up to next whole integer.

and non-harvest seasons; however, no other events can occur on the same day when a Wine Club Event, Release Event, or Large Event is occurring regardless of season.

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

Event	Daily Occurrence							
	Harvest			Non-Harvest				
Private Tours & Tastings w/ Food	X	X	-	X	X	-	-	-
Food & Wine Pairings (Lunch)	-	X	-	-	X	-	-	-
Wine Club Event(s)	-	-	-	-	-	X	-	-
Release Event(s)	-	-	-	-	-	-	X	-
Large Event(s)	-	-	-	-	-	-	-	X

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

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

Event	Maximum Daily Flow Rate (GPD)						
	Harvest		Non-Harvest				
Employees	150	150	135	135	135	135	135
Private Tours & Tastings w/ Food	90	90	90	90	-	-	-
Food & Wine Pairings (Lunch)	-	130	-	130	-	-	-
Wine Club Event(s)	-	-	-	-	1,150	-	-
Release Event(s)	-	-	-	-	-	580	-
Large Event(s)	-	-	-	-	-	-	725
Total	**240**	**370**	**225**	**355**	**1,285**	**715**	**860**

Table 3A shows that the greatest SW flow during the harvest season is generated when a Release Event occurs whereas during the non-harvest season it is when a Large Event occurs. The greatest practical harvest and non-harvest season maximum PW and SW flows are summarized in Table 3B below:

Table 3B: Harvest and Non-Harvest Season Maximum Wastewater Flows

Wastewater Source	Harvest (gpd)	Non-Harvest (gpd)
Process Wastewater	1,000	422
Sanitary Wastewater	370	1,285
Combined Wastewater	1,370	1,707

The greatest total proposed wastewater flow is the combination of the greatest PW and SW flows that occur in the same season and on the same day. Therefore, the project's wastewater treatment system is proposed to be designed for 1,707 gpd which is based on the greatest combined wastewater flows outlined in Table 3B above.

WASTEWATER EFFLUENT DISPERSAL METHOD

Bartelt Engineering proposes to utilize a Pressure Distribution (PD) dispersal system with pretreatment for dispersal of wastewater onsite. The proposed improvements are discussed further in the following sections, as well as summarized in the attached wastewater treatment diagram. Refer to the associated Use Permit Drawings prepared by Bartelt Engineering for the location of the proposed primary and replacement areas.

The winery (production facility) and hospitality building's wastewater collection, conveyance and treatment system would consist of several steps. The proposed production facility's covered work area and floors will be sloped so that all PW is collected in trench drains and floor drains. The drains would be fitted with baskets to collect a majority of the larger debris. Collected PW in the trench drains and floor drains would gravity flow into an underground PW septic tank fitted with an effluent filter for solids removal. SW from the winery and hospitality building would flow by gravity into an underground SW septic tank fitted with an effluent filter for solids removal. Fats, oils and grease generated from the proposed commercial kitchen would flow by gravity to an underground grease interceptor tank and then flow by gravity to the SW septic tank.

From the underground SW and PW tanks, wastewater effluent would gravity flow or be pumped to a recirculation/dose tank or an equalization tank where it will be combined prior to being pretreated through an approved pretreatment system. The pretreated effluent would then be dispersed through a PD dispersal field by means of a dosing system.

Combined Wastewater Pressure Distribution Dispersal Field and Reserve Area

Based on the site evaluation performed by Bartelt Engineering on October 6, 2015, test pits #2B through #4B and #6B through #12B showed similar results. Test pits #2B, #6B, #7B, #10B and #11B are acceptable for an Alternative Sewage Treatment System (ASTS) PD dispersal field. Test pits #3B, #4B, #8B, #9B and #12B are acceptable for a 100% replacement area. The site evaluation determined the soils in the area of the favorable test pits to be Sandy Loam (SL) and Clay Loam (CL) type soils with an acceptable depth of 66 inches. Napa County recommends a soil hydraulic loading rate of 0.75 gal/sf/day for SL and CL soils when using an approved pretreatment system.[4]

Based on the available soil depth and Napa County requirements to pretreat the wastewater, a hydraulic loading rate of 0.75 gal/sf/day with 36 inches of suitable soil beneath the trench bottom is proposed. The trench design for the proposed PD system is as follows (from trench bottom to finish grade):

- 16 inches of drain rock from the trench bottom to the bottom of the distribution lateral;
- Two (2) inches of drain rock above the two (2) inch distribution lateral;
- 10 inches of native soil backfill; and,
- 2 inches of fill material.

[4]Soil application rate is 0.60 gal/sf/day and 0.75 gal/sf/day for septic tank effluent (STE) and pretreated effluent (PTE) ASTS, respectively.

The total recommended trench depth is 32 inches and the effective surface area is three (3) square foot (sf) per linear feet (lf). The total PD system length is calculated as follows:

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

$$= \frac{1{,}707 \ \frac{\text{gal}}{\text{day}}}{0.75 \ \frac{\text{gpd}}{\text{ft}^2} \ \text{x} \ 3.00 \ \frac{\text{ft}^2}{\text{lf}}} = 758.7\pm \text{ lf, use 800 lf}$$

To make the best use of the available dispersal field area we recommend a total system PD length of 800 linear feet. The system would consist of four (4) sub-fields, where each sub-field would consist of 200 lf of trench. Each sub-field would contain two (2) 100 lineal foot lateral.

Both the primary dispersal area and 100% replacement area showed similar test pit results. Based on a trench spacing of five (5) feet between trenches, the laterals would be at six and one-half (6½) feet on center. Each lateral would consist of 100 lineal feet of trench and an additional two (2) feet added to the end of each lateral to account for the balancing and purge valves. A total of 8 laterals would provide for 7 spaces between the first and last laterals. An additional 1.5 feet was added on for the width of the trench at the first and last lateral (9 inches on each end). The following calculation shows the minimum area required for the proposed dispersal field:

$$(100 + 4 \text{ lf}) \text{ x } \left(\frac{6.5 \text{ ft}}{\text{lateral spacing}} \text{ x 7 lateral spaces} + 1.5 \text{ ft} \right) = 4{,}888\pm \text{ SF}$$

Trench length and lateral spacing of the 100% replacement area would be similar to the primary dispersal field. Therefore, the area required for the 100% replacement area is approximately 4,888± square feet.

Alternative Combined Wastewater Subsurface Drip Dispersal Field and Reserve Area

Bartelt Engineering offers an alternative to the Pressure Distribution system described above for the combined production facility's process wastewater and winery's (production facility and hospitality building) sanitary wastewater. A subsurface drip dispersal system is proposed as an alternative solution to treat the combined process wastewater and the winery sanitary wastewater.

Under this alternative solution, pretreated PW and SW would be dispersed through a subsurface drip dispersal field. Based on the site evaluation performed by Bartelt Engineering on October 6, 2015, test pits #2B through #4B and #6B through #12B showed similar results. Test pits #2B, #6B, #7B, #10B and #11B are acceptable for an Alternative Sewage Treatment System (ASTS) subsurface drip dispersal field. Test pits #3B, #4B, #8B, #9B and #12B are acceptable for a 200% replacement area. The site evaluation determined the soils in the area of the favorable test pits to be Sandy Clay Loam (SCL) and Clay Loam (CL) type soils with an acceptable depth of 40 inches or greater. Napa County recommends a soil hydraulic loading rate of 1.0 and 0.75 gal/sf/day for SCL and CL soils when using an

approved pretreatment system, respectively[5].The proposed dripline manufacturer GeoFlow Incorporated, recommends a hydraulic loading rate of 0.6 gallons per square feet per day[6]. The subsurface drip field area is calculated based on the design flow and lower hydraulic loading rate, as shown below:

$$\text{Subsurface Drip Dispersal Field Area} = \frac{\text{design flow rate}}{\text{soil hydraulic loading rate}}$$

$$= \frac{1{,}707 \ \frac{\text{gal}}{\text{day}}}{0.60 \ \frac{\text{gal}}{\text{ft}^2 \text{ x day}}} = 2{,}845\pm \text{ sf}$$

Site slopes in the proposed subsurface drip field area range between 0% and 5%; therefore, the standard two (2) foot spacing recommended between drip lines per Napa County Standards will be utilized during the design process. The estimated greatest total subsurface drip area recommended is 2,845 square feet.

Per Napa County standards, a 200% subsurface drip replacement area and is provided and calculated below:

Replacement Area = 200% x 2,845 ft^2 = 5,690 ft^2.

Site slopes in the proposed replacement area range between 0% and 5%; therefore, an estimated minimum replacement subsurface drip field area of 5,690 square feet is recommended.

Existing Wastewater Dispersal Systems

At the time this feasibility study was written, residential improvements were currently underway on the subject parcel under separate permits. As a part of the residential improvements, a wastewater treatment system will serve the residential structures located on the west side of the parcel. The residential wastewater treatment system will remain separate from the proposed winery and is not part of this Use Permit Application.

TANK SIZING

Proposed Tanks

SW Septic Tank

Considering the design flows outlined in Table 3B above, the SW septic tank should have a minimum volume of 3,000 gallons which is sized to provide the minimum of two (2) days of hydraulic retention time during peak wastewater flow.

[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

[6] Hydraulic loading rate is based on *Table 1 Drip Loading Rates Considering Soil Structure* from The Subsurface Drip Dispersal and Reuse Design, Installation and Maintenance Guidelines prepared by GeoFlow Incorporated, October 2007.

PW Septic Tank

Considering the design flows outlined in Table 3B above, the PW septic tank should have a minimum volume of 3,000 gallons which is sized to provide a minimum of three (3) days of hydraulic retention time during peak wastewater flow.

Grease Interceptor Tank

The Napa County Sewage Ordinance requires that fixtures discharging food waste from 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 dispersal system. A grease interceptor tank will be required for the proposed commercial kitchen in the hospitality building and should have a minimum volume of 1,500 gallons which is sized according to Napa County Standards.

RECIRCULATION TANK/EQUALIZATION TANK

The type and size of tanks required by the pretreatment system will be determined upon approval of this Use Permit under consideration and during the construction phase of the proposed project. The tanks should have a minimum volume based on the pretreatment system manufacturer's recommendations.

Dose Tank

The dose tank should have a minimum volume of 2,000 gallons to provide for one (1) day of combined SW and PW peak flows before dosing effluent to the dispersal field.

WINE CAVE SETBACKS TO SEPTIC SYSTEMS

We have reviewed Napa County Environmental Health files to determine if there are any caves located within 400 feet of the proposed wastewater treatment system. Based on the Napa County Geographic Information System topographic maps and parcel boundary overlay, there are no caves located within 400 feet of the proposed wastewater treatment system.

OPERATION AND MAINTENANCE

Based on Napa County requirements, a service provider would be assigned prior to operation and final approval of the installed wastewater system outlined in this Use Permit. The Service Provider can be a Registered Civil Engineer, Registered Environmental Health Specialist, or Licensed Contractor. The PW pretreatment manufacturer can also provide operation and maintenance services for their own system.

CONCLUSIONS

Process and sanitary wastewater generated as a result of the proposed project, which includes a full crush winery and hospitality building, can feasibly be treated and dispersed onsite in accordance with Napa County PBES standards. Furthermore, there is suitable area onsite for a 100% replacement area. Full design calculations and construction plans will be completed after approval of the Use Permit Application under consideration.

ATTACHMENTS

Proposed Wastewater Treatment Diagram

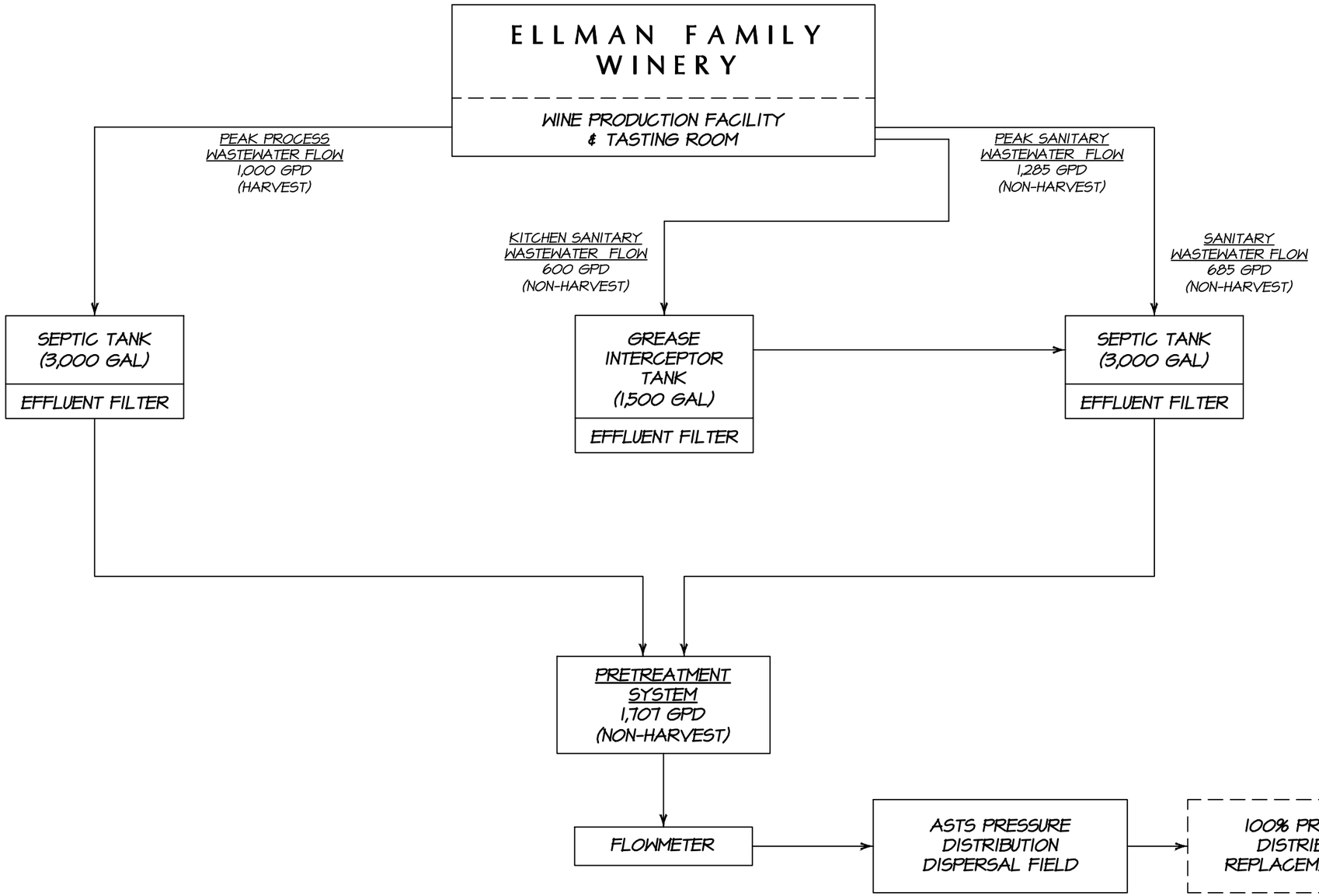
REFERENCES

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

Napa County Planning, Building and Environmental Services. "Napa County Onsite Wastewater Treatment Systems (OWTS) Technical Standards." Final Draft.

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.



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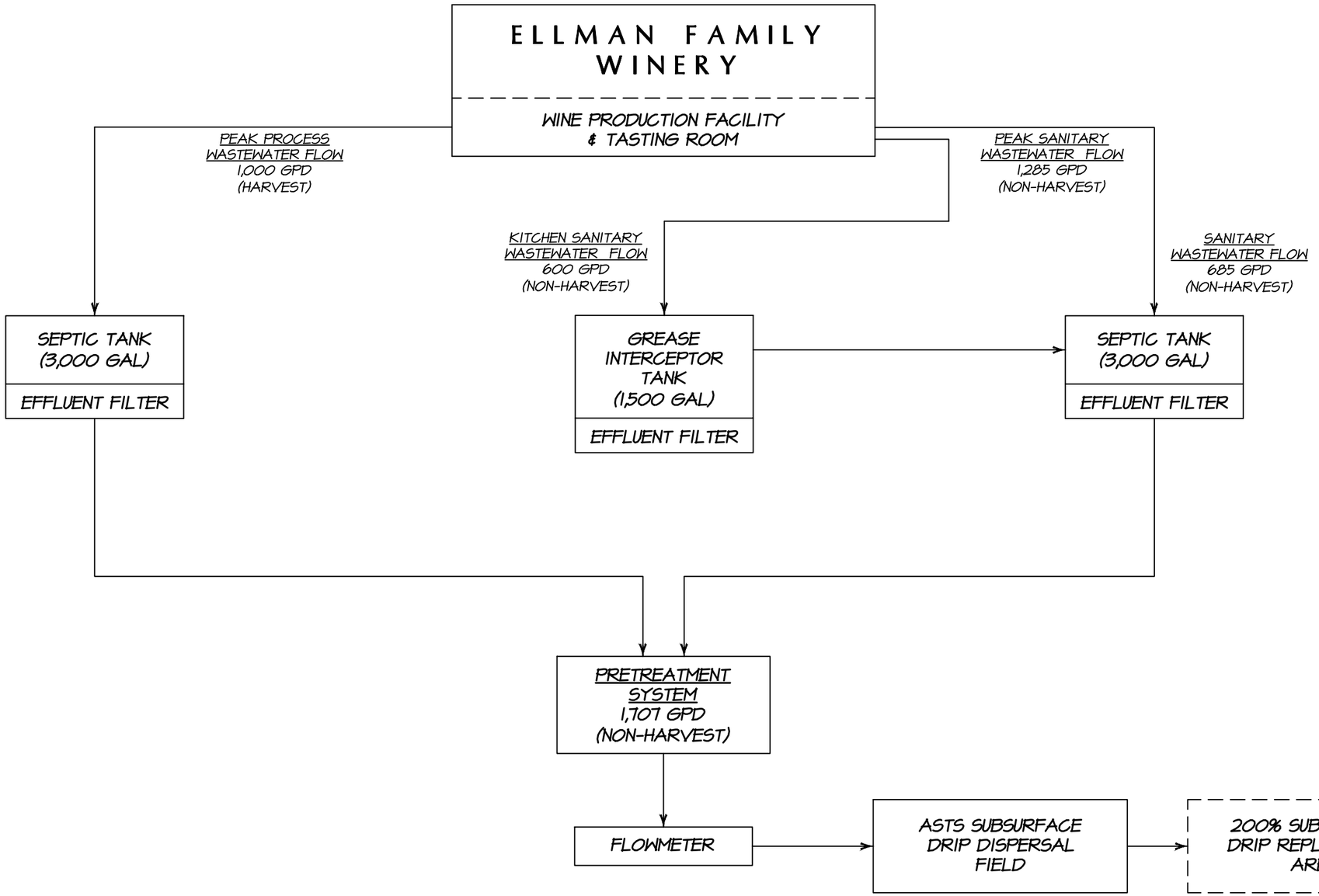
PROPOSED WASTEWATER TREATMENT DIAGRAM

NO SCALE

Ellman Family Winery
3286 Silverado Trail
Napa, CA 94558
APN 039-610-001
Job No. 15-12
September 2018
Sheet 1 of 2



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PROPOSED ALTERNATE WASTEWATER TREATMENT DIAGRAM

NO SCALE

Ellman Family Winery
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