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Wastewater Feasibility Study

Mahoney Vineyards P14-00242
Planning Commission Hearing Date May18, 2016

WASTEWATER DISPOSAL FEASIBILITY STUDY

FOR THE

MAHONEY WINERY

LOCATED AT:
1134 Dealy Lane
Napa, CA 94559
NAPA COUNTY APN 047-090-007

PREPARED FOR:
Mahoney Vineyards
Care of: Francis Mahoney
1134 Dealy Lane
Napa, CA 94559
Telephone: (707) 253-9464

PREPARED BY:

APPLIED
CIVIL ENGINEERING
INCORPORATED

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Michael R. Muelrath 6/27/2014

Michael R. Muelrath R.C.E. 67435 Date

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INTRODUCTION

Francis and Kathleen Mahoney are applying for a Use Permit to construct and operate a new winery at their property located at 1134 Dealy Lane in Napa County, California. The subject property, known as Napa County Assessor's Parcel Number 047-090-007, is located along the northeast side of Dealy Lane approximately 0.4 miles northwest of the intersection of Dealy Lane and Old Sonoma Road.

The Use Permit application under consideration proposes the construction and operation of a new winery with the following characteristics:

- Wine Production:
  - 30,000 gallons of wine per year
  - Crushing, fermenting, aging and bottling

- Employees:
  - 2 full time employees

- Marketing Plan:
  - Daily Tours and Tastings by Appointment
    - 15 visitors per day maximum
    - 12 visitors per day average
  - Private Promotional Tastings with Meals
    - 10 per year
    - 30 guests maximum
    - Food prepared offsite by catering company
    - Portable toilets brought in for guest use
  - Auction Napa Valley, Release Event or Similar Event
    - 2 per year
    - 75 guests maximum
    - Food prepared offsite by catering company
    - Portable toilets brought in for guest use

Existing structures on the property include a single family residence, a winery warehouse / vineyard office building and an existing agricultural building. Domestic waste from these existing buildings is disposed of onsite via an Evapotranspiration Infiltration (ETI) Bed that is located immediately south of the existing residence. It is our understanding that the existing wine warehouse building is not being used for winery purposes at this time and thus no winery process waste is currently generated onsite.

Francis and Kathleen Mahoney have requested that Applied Civil Engineering Incorporated (ACE) evaluate the feasibility of disposing of the winery process wastewater as well as the domestic sanitary wastewater that will be generated by the proposed winery operations. The remainder of this report describes the onsite soil conditions, the predicted process and sanitary wastewater flows and outlines our recommendations for wastewater disposal.

SOILS INFORMATION

The United States Department of Agriculture Soil Conservation Service Soils Map for Napa County shows a majority of the property mapped as Haire loam, 2 to 9 percent slopes. A small portion of the site just west of the existing reservoir is mapped as Cole silt loam, 0 to 2 percent slopes.

A site specific soils analysis was conducted during our site evaluation performed in conjunction with Napa County on November 27, 2012. The site evaluation consisted of the excavation and observation of six test pits throughout the vineyard area located west of the existing ag building, two in the vineyard area located east of the existing ETI bed and one in the lawn area located west of the existing ETI bed. The test pits generally revealed variable depths of soil ranging from 18 inches to 36 inches with the upper horizon having a USDA soil texture classification of clay loam. The limiting condition that was observed was the presence of mottling which indicates a potentially elevated seasonal groundwater level. Based on our findings and in concurrence with Sheldon Sapoznik of Napa County we recommended groundwater monitoring be performed to verify seasonal groundwater levels in the vineyard located west of the exiting ag building (the other two areas were to be kept as reserve for the existing ETI bed). Monitoring wells were installed near the test pits located within the vineyard area west of the existing ag building and we have reviewed groundwater levels for the past two winters (2012-2013 & 2013-2014). Although both winters were relatively dry and did not provide enough rainfall to trigger a true groundwater monitoring window we found several times during each winter that perched groundwater was less than 24 inches from the ground surface. This site evaluation was not formally filed due to the lack of a true groundwater monitoring window.

PREDICTED WASTEWATER FLOW

The wastewater disposal system must be designed for the peak winery process wastewater flow and the peak sanitary wastewater flow from the proposed winery. The other existing structures on the property will continue to be served by the existing septic system.

Winery Process Wastewater

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 size of the winery and our understanding that both red and white wines will be produced we have assumed a 45 day crush period. Using these assumptions, the average and peak winery process wastewater flows are calculated as follows:

$$\text{Annual Winery Process Wastewater Flow} = \frac{30{,}000 \text{ gallons wine}}{\text{year}} \times \frac{6 \text{ gallons wastewater}}{1 \text{ gallon wine}}$$

Annual Winery Process Wastewater Flow = 180,000 gallons per year

$$\text{Average Daily Winery Process Wastewater Flow} = \frac{180{,}000 \text{ gallons}}{\text{year}} \times \frac{1 \text{ year}}{365 \text{ days}}$$

Average Daily Winery Process Wastewater Flow = 493 gallons per day (gpd)

$$\text{Peak Winery Process Wastewater Flow} = \frac{30{,}000 \text{ gallons wine}}{\text{year}} \times \frac{1.5 \text{ gallons wastewater}}{1 \text{ gallon wine}} \times \frac{1 \text{ year}}{45 \text{ crush days}}$$

Peak Winery Process Wastewater Flow = 1,000 gpd

Winery Sanitary Wastewater

The peak sanitary wastewater flow from the winery is calculated based on the number of winery employees, the number of daily visitors for tours and tastings and the number of guests attending private marketing events. In accordance with Table 4 of Napa County's "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 tours and tastings. Since portable toilets will be used for all marketing events they are not included in the peak daily wastewater design calculations. Based on these assumptions, the peak winery sanitary wastewater flows are calculated as follows:

Employees

Peak Sanitary Wastewater Flow = 2 employees X 15 gpd per employee

Peak Sanitary Wastewater Flow = 30 gpd

Daily Tours and Tastings

Peak Sanitary Wastewater Flow = 15 visitors per day X 3 gallons per visitor

Peak Sanitary Wastewater Flow = 45 gpd

Total Peak Winery Sanitary Wastewater Flow

As previously noted, all events will utilize portable sanitary facilities to minimize the load on the waste disposal system. Therefore, the total peak winery sanitary wastewater flow is based on employees and daily tours and tastings and is calculated as follows:

Total Peak Winery Sanitary Wastewater Flow = 30 gpd + 45 gpd

Total Peak Winery Sanitary Wastewater Flow = 75 gpd

RECOMMENDATIONS

Due to the high groundwater conditions observed onsite and the small flows associated with the proposed winery we recommend that the sanitary wastewater from the winery facility be collected in a holding tank that can be periodically pumped and hauled offsite for by a licensed sewage hauling company for treatment and disposal. The holding tank shall meet all septic tank setback requirements and shall provide a total minimum volume of 1,500 gallons as required by Napa County Code Section 13.52.030.

We recommend that the winery process wastewater be collected separate from the sanitary waste and that it be disposed of via a hold and haul system. The hold and haul system shall have enough capacity to store seven days of peak flow from the winery and the holding tank system must have a water level alarm in accordance with the requirements outlined in Napa County Code Section 13.52.035.

Based on our peak flow estimate the required holding tank volume is calculated as follows:

Required Holding Tank Volume = 1,000 gallons per day × 7 days

Required Holding Tank Volume = 7,000 gallons

We recommend that one or more below ground septic tanks with a combined capacity of at least 7,000 gallons be installed to provide the required storage volume. The holding tanks must be located outside of all required septic tank setbacks.

Required Reserve Area

Napa County Code does not require a reserve are for the sanitary waste holding tank system however it does require a reserve area for process wastewater hold and haul systems. This reserve area must be identified to accommodate a future onsite wastewater disposal system in the event that the process wastewater hold and haul system is no longer viable. Based on the onsite soil and groundwater conditions we recommend that this reserve system consist of pretreatment of the winery process wastewater and surface irrigation for final re-use / disposal.

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.

We propose that the process wastewater disposal reserve area be surface land application irrigation of the onsite vineyard. The existing vineyard on the winery property totals approximately 4.5 acres. For the purpose of this study we have assumed that the treated winery

process wastewater will be applied to approximately 0.4 acres of vineyard located in the southeast corner of the property which lies outside of the required stream and well setbacks.

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 assumes 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 non-rainy months the treated wastewater will be used to offset the irrigation needs and any water applied in excess of the vineyard irrigation demand will be used by the cover crop or will percolate into the soil. Furthermore, during the rainy months, 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 tanks or the tanks will need to be emptied by hauling waste to an approved offsite disposal location. The water balance calculations show that a minimum tank volume of 42,000 gallons would be required to hold excess treated wastewater that is generated during the rainy season (see Appendix 2).

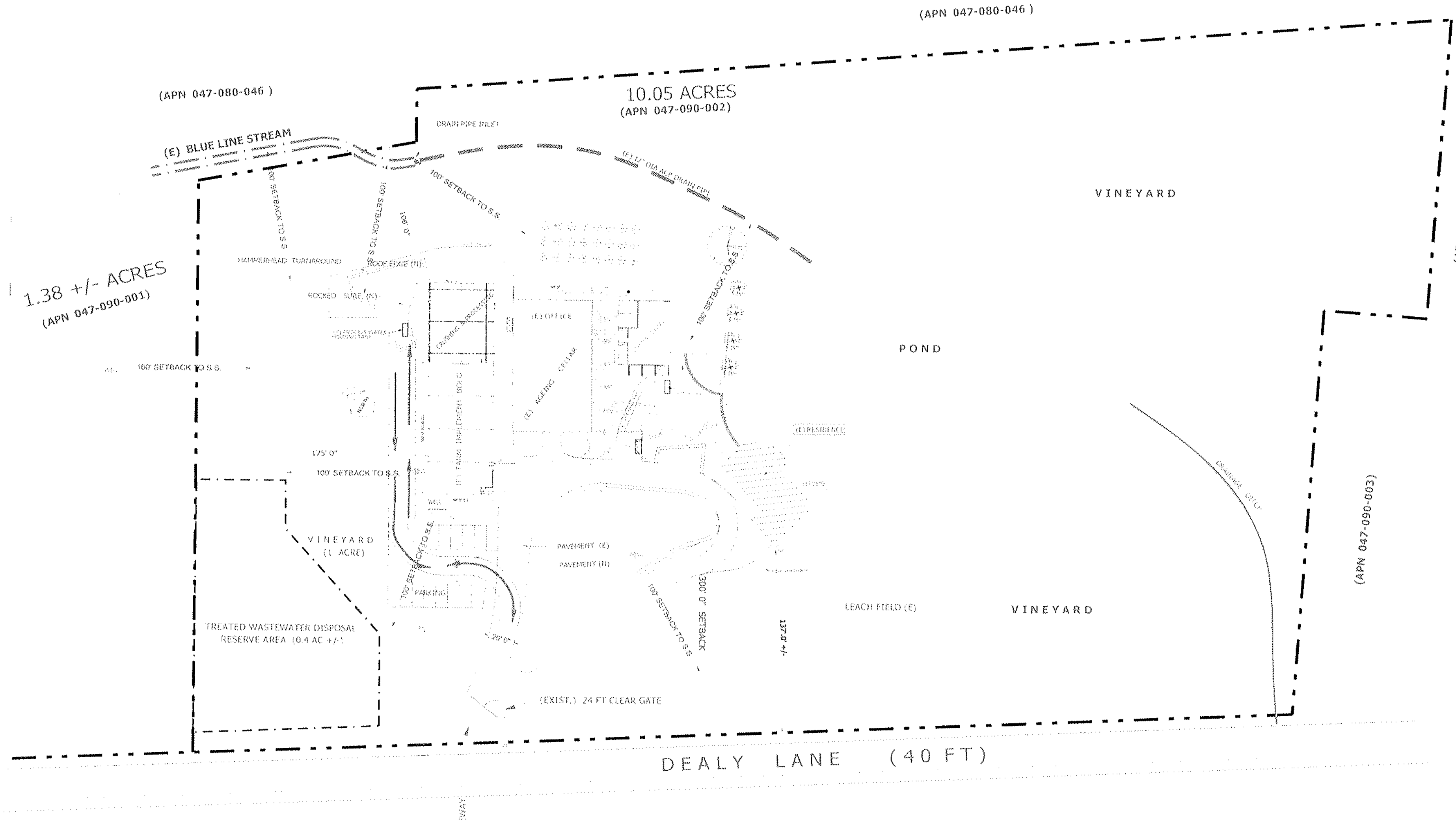
All application of treated winery process wastewater must comply with the requirements of the Napa County Process Wastewater Guidelines for Surface Drip Irrigation.

CONCLUSION

It is our opinion that the proposed winery sanitary wastewater disposal needs can be served by a holding tank system and that the winery process wastewater can similarly be handled by a hold and haul system. Reserve area for the process wastewater hold and haul system can be accommodated by pretreating the process wastewater and disposing of the treated effluent via land application within the designated onsite vineyard area. Full design calculations and construction plans for both the sanitary and process waste systems must be prepared in accordance with Napa County standards at the time of building permit application.

APPENDIX 1: Mahoney Vineyards Use Permit Conceptual Site Plan By Cassayre Engineering

Reduced to 8.5" x 11"


(APN 047-080-046)
(APN 047-080-046)
10.05 ACRES
(APN 047-090-002)
(E) BLUE LINE STREAM
DRAIN PIPE INLET
100' SETBACK TO S.S
VINEYARD
(APN 047-090-004)
1.38 +/- ACRES
(APN 047-090-001)
HAMMERHEAD TURNAROUND
ROCKED SURF (N)
(E) OFFICE
(E) AGEING CELLAR
(E) FARM IMPLEMENT BLDG
POND
100' SETBACK TO S.S.
175' 0"
100' SETBACK TO S.S.
(E) RESIDENCE
VINEYARD
(1 ACRE)
PAVEMENT (E)
PAVEMENT (N)
PARKING
300' 0" SETBACK
137' 0" +/-
LEACH FIELD (E)
VINEYARD
(APN 047-090-003)
TREATED WASTEWATER DISPOSAL
RESERVE AREA (0.4 AC +/-)
(EXIST.) 24 FT CLEAR GATE
DEALY LANE (40 FT)
(EXIST.) DRIVEWAY

CASSAYRE ENGINEERING

20 STAR DRIVE, NAPA, CA 94558 PH FAX (707) 255 3900

MAHONEY VINEYARDS

1331 DEALY LN NAPA, CA APN 047-090-002

RESEARCH WINERY SITE PLAN

PMC B-83,052

DATE 6-26-11

SCALE NOTED

UP-1

REGISTERED PROFESSIONAL ENGINEER P. M. CASSAYRE S-1701 STRUCTURAL STATE OF CALIFORNIA

APPENDIX 2: Water Storage Tank Water Balance Calculations

Irrigation Storage Tank Water Balance

Month	Beginning Balance	Process Wastewater	Land Application	Ending Balance
January	40,530	9,000	8,689	40,841
February	40,841	9,000	8,689	41,152
March	41,152	9,000	8,689	41,464
April	41,464	7,200	8,689	39,975
May	39,975	7,200	27,881	19,294
June	19,294	9,000	30,604	0
July	0	14,400	30,604	0
August	0	18,000	28,789	0
September	0	30,600	28,789	1,811
October	1,811	25,200	10,504	16,507
November	16,507	23,400	8,689	31,219
December	31,219	18,000	8,689	40,530
		180,000	209,303	

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. 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	30,000 gallons
Wastewater Generation Rate	6 gallons per gallon of wine
Annual Wasewater Generation	180,000 gallons
Crush Season Length	45 days
Wastewater Generated During Crush	1.5 gallons per gallon of wine
Peak Wastewater Generation Rate	1,000 gallons per day

Winery Process Wastewater Generation Table			
Month	Percentage of Annual Total	Monthy Flow (gallons)	Average Flow (gpd)
January	5.0%	9,000	290
February	5.0%	9,000	321
March	5.0%	9,000	290
April	4.0%	7,200	240
May	4.0%	7,200	232
June	5.0%	9,000	300
July	8.0%	14,400	465
August	10.0%	18,000	581
September	17.0%	30,600	1,020
October	14.0%	25,200	813
November	13.0%	23,400	780
December	10.0%	18,000	581
Total	100.0%	180,000	

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	0.4 acres	
Vine Row Spacing	8 feet	
Vine Spacing	6 feet	
Vine density	908 vines per acre (average)	
Total Vine Count	363 vines	

Irrigation Information:

Seasonal Irrigation[1]	50.0 gallons per vine (May through October)	
Non-Irrigation Application	0.8 inches	October through April
Non-Irrigation Application	2.4 inches	May through September

Irrigation Schedule

Month	Monthly Percentage[2]	Irrigation per Vine (gallons)	Irrigation (gallons)	Non-Irrigation Application (gallons)	Total (gallons)
January		0.0	0	8,689	8,689
February		0.0	0	8,689	8,689
March		0.0	0	8,689	8,689
April		0.0	0	8,689	8,689
May	10%	5.0	1,815	26,066	27,881
June	25%	12.5	4,538	26,066	30,604
July	25%	12.5	4,538	26,066	30,604
August	15%	7.5	2,723	26,066	28,789
September	15%	7.5	2,723	26,066	28,789
October	10%	5.0	1,815	8,689	10,504
November		0.0	0	8,689	8,689
December		0.0	0	8,689	8,689
Total	100%	50.0	18,150	191,153	209,303

Notes:

1. Irrigation per vine is based on 50 gallons per viney per year per property owner.
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 during winter based on historic weather data (Summit Engineering NBRID Capacity Study , 1996) and 15 operational days per month during the non-rainy season months and a saturated soil infiltration rate of 0.1 gallons per square foot per day uniformly over the entire area.