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Wastewater Feasibility Study

Maxville Lake Winery P17-00225-MOD & Conservation Regulations
Exception P18-00189
Planning Commission Hearing August 1, 2018

WASTEWATER FEASIBILITY STUDY

FOR

MAXVILLE LAKE WINERY
4105 CHILES POPE VALLEY RD,
ST. HELENA, CA 94574
APN 025-020-023

SUMMIT
CIVIL STRUCTURAL WATER|WASTEWATER ELECTRICAL

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Project No. 2015052
February 17, 2017
Revised: August 31, 2017

LIST OF ENCLOSURES

SUMMIT

ENCLOSURE A

WASTEWATER MANAGEMENT SYSTEM DESCRIPTION

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WASTEWATER MANAGEMENT SYSTEM DESCRIPTION

MAXVILLE LAKE WINERY

St. Helena, Napa County, California

PROJECT DESCRIPTION

Maxville Lake Winery, previously known as Catacula Lake Winery is proposing a Use Permit Modification to the existing winery located at 4105 Chiles Pope Valley Rd in St. Helena, Napa County to increase production capacity as well as daily visitation. Proposed modifications to the use permit include increasing production capacity from 59,000 average gallons of wine per year on a 3 year average, with a peak of 65,000 gallons of wine per year, to 240,000 gallons of wine per year, and increasing the number of employees and visitors. The proposed production increase will generate additional process wastewater and sanitary sewage. The following wastewater handling, treatment, and disposal description analyzes the existing system and additional wastewater treatment components needed to accommodate the proposed wastewater flow increase.

Maxville Lake Winery is proposing to continue to treat the process wastewater (PW) through renovations to the existing aerated pond system, and the sanitary sewage (SS) though a new pretreatment and subsurface drip disposal system. Installation of the new SS system will be permitted and inspected by Napa County Planning, Building and Environmental Services (PBES), with the PW pond system being regulated by the Central Valley Regional Water Quality Control Board (CVRWQCB). The PW pond was previously regulated by Napa County under a Memorandum of Understanding with the San Francisco Bay RWQCB, although the facility is located within the Central Valley's jurisdiction. The regulatory bodies involved have decided that the production increase is an appropriate time to transfer responsibility for oversight of the facility to the appropriate Regional Board.

SITE DESCRIPTION

The property is located at 4105 Chiles Pope Valley Rd, northeast of the town of St. Helena and south of the town of Pope Valley. The parcel is long and narrow and runs from northwest to southeast along the floor of Pope Valley. The property is relatively flat, aside from the southern edge which runs along the hillside of the valley. The parcel (APN 025-020-023) is approximately 247.45 acres total which contains approximately 98 acres of vineyards.

The existing winery facility consists of one winery building on the south end of the parcel, vineyards on the north end of the parcel, Maxville Lake (previously known as Catacula Lake) in the center, and Maxwell Creek, which runs parallel to Chiles Pope Valley Rd across the middle of the parcel, from Maxville Lake to the north end of the parcel. The property currently has a pond for PW treatment, a pond for fire protection, and an Evapotranspiration – Infiltration (ETI) bed for disposal of sanitary sewage.

WINERY PROCESS WASTEWATER TREATMENT

PROCESS WASTEWATER CHARACTERISTICS

Process wastewater (PW) will consist primarily of wastewaters collected at floor drains and trenches within the winery, receiving, crush, tank, and wash-down areas. No sanitary wastewater will be discharged into the PW management system. Water treatment backwash will be sent to the pond system, but the flows and quality of the backwash is expected not to impact treatment of the winery waste. Exterior tank and process areas not under a roof shall be provided with automatic diversion capability for routing rainwater to the storm drainage system when those areas are not in use for process purposes. No distillation will occur at the facility; hence there will be no stillage waste. Typical winery PW characteristics are summarized below:

Table 1. Typical Winery Process Wastewater Characteristics

		Crushing Season	Non-crushing Season
Characteristic	Units	Range	Range
pH	--	2.5 - 9.5	3.5 - 11.0
Dissolved Oxygen	mg/L	0.5 - 8.5	1.0 - 10.0
BOD_5	mg/L	500 – 12,000	300 – 3,500
COD	mg/L	800 – 15,000	500 – 6,000
Grease	mg/L	5 - 30	5 - 50
Settleable Solids	mg/L	25 - 100	2 - 100
Nonfilterable Residue	mg/L	40 - 800	10 - 400
Volatile Suspended Solids	mg/L	150 - 700	80 - 350
Total Dissolved Solids	mg/L	80 – 2,900	80 – 2,900
Nitrogen	mg/L	1 - 40	1 - 40
Nitrate	mg/L	0.5 - 4.8	-
Phosphorous	mg/L	1 - 10	1 - 40
Sodium	mg/L	35 - 200	35 - 200
Alkalinity ($CaCO_3$)	mg/L	40 - 730	10 - 730
Chloride	mg/L	3 - 250	3 - 250
Sulfate	mg/L	10 - 75	20 - 75

PROCESS WASTEWATER CONVEYANCE, TREATMENT AND DISPOSAL

The PW treatment and disposal system will have the following components. Refer to the wastewater management system schematic in Enclosure C for a flow diagram of the SS management system.

1. Initial Screening – To be provided by existing strainers installed on the gravity collection system for solids removal prior to entering the settling tanks. Additions to the winery process areas should include new strainers and screens for solids removal prior to entering the gravity collection system.
2. Gravity collection system –Existing piping is assumed to be, and new piping will be compatible with PW and satisfy the Uniform Plumbing Code and local requirements.
3. Settling Tanks – There are two existing 1,500 gallon PW settling tanks that are used for primary treatment. A rotary screen is proposed to be installed for solids removal from the PW flows prior entering the aerated ponds. As an alternative to the rotary screen, an additional 21,000 gallons of settling capacity could be installed to provide 3 days of retention time, at estimated peak day flows.
4. Aerated Ponds – The existing aerated pond system consists of one pond with 0.40 MG capacity that will be regraded and improved to accommodate a capacity of 0.48 MG. Additionally, the existing fire protection pond (0.24 MG) will be converted to a wastewater pond or a second pond will be constructed with the same capacity. Biological stabilization will take place in the first facultative aerated pond, and the second pond will provide final polishing and storage of the effluent. Ponds #1 and #2 would provide sufficient residence times of 61 days and 30 days respectively, at average day peak harvest month flows, with a total retention time of approximately 91 days. Traditional facultative aerated ponds should provide 90 days of retention time to allow proper treatment and biological stabilization of the effluent. Refer to the pond water balance in Enclosure D, for flow estimates and retention times. The existing ponds would need to be lined to provide proper retention and treatment of the PW flows. The required aerators for the two aeration ponds will be sized to satisfy biochemical oxygen demand and oxygen dispersion requirements. Pond #1 will require approximately 12 HP of aeration and Pond #2 will require 3 HP of aeration (based on high speed surface aerators) to meet power to volume aeration recommendations. There are two existing 3 HP aerators which can be utilized. Additional 9 HP of aeration will be required for Pond #1.
5. Flow Measurement –A flow measurement device will be provided to measure the discharge flows from the second storage pond to the surface irrigation system.
6. Irrigation disposal – Final reuse (disposal) of effluent will be accomplished by irrigation of approximately 7 acres of existing vineyards. The vineyard irrigation demand exceeds the estimated annual reclaimed PW volume. Remaining irrigation demand will be supplied with water pulled from Maxville Lake. See the pond water balance in Enclosure D for proposed effluent storage and diversions to irrigation disposal.

OTHER CONSIDERATIONS

Odor Control

There have been no obnoxious odors from the existing system. No odors are anticipated from the proposed production increase.

Noise Control

There should be no intolerable noises associated with the proper operation of the treatment system.

Ground Water Contamination

No disposal of reclaimed wastewater will occur within 100 feet of the existing wells.

Irrigation/disposal of treated effluent is considered a beneficial use and is considered to be an effective means to protect groundwater quality. Water from Lake Maxville may be added to the treated PW in the storage pond when the pond capacity permits, to supplement the volume of water used for irrigation.

Surface Waters

All wastewater treatment facilities are and will be designed with sufficient drainage facilities to divert local runoff. Irrigation/disposal operations will be routinely monitored to ensure against surface runoff. Irrigation/disposal of PW effluent will be suspended for approximately 48 hours prior to, during and following any forecasted storms. Irrigation/disposal will be suspended as long as saturated soil conditions persist.

Protection

The aerated ponds are and will be fenced to restrict public access.

ALTERNATIVE COURSES OF ACTION

Although no operational difficulties are foreseen, the following additional courses of action would be available if necessary:

1. Ability to add pH control
2. Ability to add a supplemental oxygen source or for odor control
3. Provision of higher aeration capacity in Pond #1 and Pond #2
4. Additional stages of treatment with recirculation to increase effluent quality

The facultative aerated lagoons will be designed for retention of wastewater and rainwater through the

majority of the rainy season with minimal discharges to irrigation/disposal fields (based on a 100 year seasonable rainfall). Should there be a winter with more rainfall than the design condition, several operational procedures are available to compensate:

1. Additional water conservation at the winery
2. Light irrigation during periods between storms -- not exceeding the assimilative capacity of the soil
3. Pumping and truck transfer of treated and diluted wastewater to a sewage treatment plant or land disposal site

SOLID WASTES

Solid wastes from the winery include primarily pomace, seeds, and stems. The estimated quantities of these wastes (at ultimate capacity) are as follows:

$$Peak\ annual\ production = \frac{240{,}000\ gal\ wine/year}{165\ gal\ wine/ton} = 1{,}455\ tons/year$$

$$Ultimate\ Annual\ Solids\ Total = 35\% \times 1{,}455\ \frac{tons}{year} = 509\ tons$$

Based on a unit weight of 38 pounds per cubic foot, the annual volume of solids wastes would be:

$$509\ \frac{tons}{year} \times \frac{2{,}000\ lb}{1\ ton} \times \frac{1\ ft^3}{38\ lbs} \times \frac{1 yard^3}{27\ ft^3} = 992\ yard^3$$

$$\frac{992\ yard^3}{98\ acres} \times \frac{1\ acre}{4{,}840\ yard^2} \times \frac{36\ in}{yard} = 0.08\ inches$$

Solid wastes could be applied to the existing 98 acres of vineyard, which corresponds to a depth of approximately 0.08 inches per year. These organic solids can also be composted or hauled to an off-site composting location.

Solids, in the form of sludge, will also accumulate in the ponds requiring periodic removal every 5-10 years. Those highly decomposed solids can also be hauled to a solid waste disposal site.

SANITARY SEWAGE TREATMENT

SANITARY SEWAGE CHARACTERISTICS

Sanitary sewage at Maxville Lake Winery will consist of typical wastewater generated from restrooms, laboratory, and kitchen uses. Maxville Lake Winery proposes to increase employees up to 15 full time and 9 part time employees. The proposed marketing and visitation plan is as follows

- 20 Tasting visitors on an average week day (Monday to Thursday)
- 60 Tasting visitors on an average weekend day (Saturday and Sunday)
- 8 events per month with 30 visitors and meals prepared onsite (96 events per year)
- 2 events per month with 95 visitors and meals prepared onsite (24 events per year)
- 2 events per year with 75 visitors and meals prepared onsite
- 6 events per year with 100 visitors and meals prepared onsite

As a result, Sanitary Sewage (SS) flows would increase to 2,100 gpd on an average tasting day with a peak harvest event. SS flows will be handled separately from the Process Wastewater (PW) flows in a dedicated pre-treatment and subsurface disposal area. SS will be treated and disposed of using septic tanks, dosing tanks with controls, a pre-treatment system, and disposal through a subsurface drip system. Typical SS characteristics are summarized below:

Table 2. Typical Sanitary Sewage Characteristics

Characteristic	Units	Raw Wastewater Range[1]
BOD_5	mg/L	110 - 500
Grease	mg/L	50-100
Total Suspended Solids (TSS)	mg/L	100 - 220
Volatile Suspended Solids	mg/L	80 - 165
Total Dissolved Solids (TDS)	mg/L	250 - 500
Nitrogen	mg/L	20 - 40
Nitrate	mg/L	0
Phosphorous	mg/L	4 - 8
Alkalinity ($CaCO_3$)	mg/L	50 - 100
Chloride	mg/L	30 - 50
Sulfate	mg/L	20 - 30

[1] Typical composition of untreated domestic wastewater, Metcalf & Eddy, "Wastewater Engineering, Third Edition", 1991

SANITARY SEWAGE CONVEYANCE, TREATMENT AND DISPOSAL WITH REUSE

The SS treatment and disposal system will have the following components. Refer to the wastewater management system schematic in Enclosure C for a flow diagram of the SS management system.

1. Gravity Collection System –Designed to provide low maintenance and no infiltration or exfiltration. New piping will be compatible with sanitary sewage and satisfy Uniform Plumbing Code and local requirements.

2. (E) & (N) Septic Tanks with Effluent Filter –The existing 1,200 gallon septic tank will be supplemented with the addition of a new 6,000 gallon septic tank for solids removal prior to pre-treatment system. Removal of solids in the septic tanks helps to reduce BOD loads on the system, minimize the frequency of sludge removal in aerobic systems, and reduce the potential for clogging of the subsurface drip lines. The septic tanks will provide approximately 3 days of retention during peak flows. Effluent filters will also be provided to remove additional suspended solids which do not settle out in the tank.

3. (N) Grease Interceptor – A new 1,500 gallon precast concrete grease interceptor will be provided for removal of oil and grease from the kitchen prior to the septic tank and pretreatment system. Oil and grease removal reduces pump failure and clogging of treatment and disposal systems.

4. (N) SS sump –A new pump station with one set of duplex pumps will be installed for collection of the SS flows from the septic tanks and conveyance to the AdvanTex Treatment System.

5. (N) Pre-treatment System –AdvanTex Treatment System Package. Package pre-treatment systems have been widely utilized for SS treatment and have been very successful in performing consistent reliable treatment when properly designed and operated. Most manufacturers of these systems will provide performance guarantees of the equipment, given that the operational parameters are maintained within the initial design assumptions. The AX—MAX075 is a packed bed filter system that supports attached growth biological treatment. The package system also incorporates recirculation and dosing chambers of adequate size. A recirculation chamber will be provided for dilution and buffering of peak hydraulic and organic loads. The dosing chamber will provide metered dosing of the treated SS flows to the new subsurface drip system

6. (N) Flow Measurement – A new flowmeter will be provided for metering the flows dosed to the subsurface drip system to ensure the flows do not exceed the treatment capacity of the drip field.

7. (N) Subsurface Drip Headworks – A Geoflow automatic headworks system will be provided. This headworks system is a pre-assembled unit including the filter, valves, and pressure gauge in a utility box which is installed between the subsurface dosing tank and the subsurface drip disposal field.

8. (N) Subsurface Drip Disposal Field – 2,100 gpd of treated effluent will be discharged into a 7,000 square foot subsurface drip field. The proposed drip field will utilize subsurface drip tubing as manufactured by Geoflow. As an alternative to a 200% reserve area, additional treatment and disinfection would be provided to meet Title 22 treatment requirements to be able to reuse the

treated effluent for irrigation. This upgrade to the treatment system to meet Title 22 requirements would only be required if the proposed primary disposal area can no longer be used for SS disposal.

OTHER CONSIDERATIONS

Odor Control

There should be no obnoxious odors from a properly designed and operated system.

Noise Control

There should be no intolerable noises associated with the proper design and operation of the treatment system.

Solids Handling

Excess solid wastes generated from the septic tanks and pre-treatment system will be pumped and hauled for off-site regulated treatment and disposal.

Ground Water Contamination

No disposal of wastewater will occur within 100 feet of any existing wells.

Protection

Exposed wastewater treatment facilities will be posted with appropriate warning signs.

ALTERNATIVE COURSES OF ACTION

Although no operational difficulties are foreseen, the following additional courses of action would be available if necessary:

1) Ability to add pH control
2) Additional stages of treatment to increase effluent quality
3) Increased use of subsurface disposal area to increase discharge capacity

ENCLOSURE B

WASTEWATER MANAGEMENT SYSTEM DESIGN CRITERIA

SUMMIT

WASTEWATER MANAGEMENT SYSTEM DESIGN CRITERIA

MAXVILLE LAKE WINERY

St. Helena, Napa County, California

WINERY PROCESS WASTEWATER TREATMENT

Process wastewater (PW) is currently generated at the cellar, receiving, and fermentation locations at the existing winery. PW is currently treated in an existing facultative aerated pond. The conversion of the fire protection pond into a secondary pond or the construction of a new secondary pond should provide adequate treatment of PW for the planned production increase. If the fire protection pond is converted, additional fire protection storage will need to be installed at the facility. The renovated pond system will include a pond liner to limit infiltration of wastewater.

Pond #1 is approximately 0.40 MG and is proposed to be expanded to provide a capacity of 0.48 MG (by deepening the existing 12 ft. deep pond to 13 ft. deep) to meet the production increase. The fire protection pond is approximately 0.24 MG. The total proposed volume for the pond system is 0.72 MG. PW is screened and conveyed from the winery and processing areas to the aerated pond prior to ultimate disposal on the vineyard for irrigation. This study addresses the feasibility of renovating the existing ponds and process wastewater management system to treat the increased PW generated by the proposed production expansion to 240,000 gal wine/year.

Based on information from Maxville Lake Winery, and typical flow data from wineries of similar size and characteristics and corresponding process wastewater (PW) generation rates, projected flows are calculated as follows:

PROCESS WASTEWATER DESIGN FLOWS

Annual Volume

Annual production (projected)	=	240,000 gal wine/year
PW generation rate (assumed)	=	6.0 gal PW/gal wine
PW flow	=	240,000 gal wine x 6.0 gal PW/gal wine
	=	1,440,000 gal PW/year

Average Day Flow

1,440,000 gal PW/365 days	=	3,945 gal PW/day ≈ 4,000 gal PW/day

Average Day, Peak Month Flow

The harvest month of September accounts for approximately 16.4 percent of the annual PW flow.

$$\frac{1{,}440{,}000 \text{ gal PW} \times (0.164)}{30 \text{ day}} = 7{,}872 \text{ gal PW/day} \approx 7{,}900 \text{ gal PW/day}$$

Napa County Peak Day

$$\frac{240{,}000 \text{ gallons wine} \times 1.5}{60 \text{ day harvest}} = 6{,}000 \text{ gal PW/day}$$

The design flow rate will account for the most conservative approach, which is the Average Day, Peak Month flow method. The design flow rate shall be 7,900 gal PW/day.

POND SIZING

A total retention time of 90 to 120 days for an Average Day, Peak Month Flow is recommended for a facultative type pond system to provide required treatment with at least 60 days in the first pond.

The proposed wastewater management consists of one existing aerated pond and the conversion of the fire protection pond for use as a secondary pond. This pond configuration should provide more than adequate residence time for the proposed flows, as calculated below:

Average Day, Peak Month = 7,900 gal PW/day

Pond # 1

Total Volume = 0.48 Mgal

Detention Time = $\frac{480{,}000 \text{ gal}}{7{,}900 \text{ gal PW/day}}$ = 61 days

Pond # 2

Total Volume = 0.24 Mgal

Detention Time = $\frac{240{,}000 \text{ gal}}{7{,}900 \text{ gal PW/day}}$ = 30 days

Totals Pond #1 & Pond #2

Detention Time = 61 days +30 days = 91 days

Detention Time of approximately 91 days

AERATION REQUIREMENTS

Sizing parameters for the aerators are as follows:

BOD_5 Concentration (based on industry standard)	=	7,700 mg/l
Average Day Peak Month Harvest Flow	=	7,900 gal PW/day
Oxygen Requirement	=	1.0 lbs O_2/lb BOD
Oxygen Transfer Rate(Vertical Turbine Aerator)	=	1.8 lbs O_2/HP - hr
Power/Vol Ratio, Pond No. 1	=	0.10 – 0.30 HP/1,000 cu ft
Power/Vol Ratio, Pond No. 2	=	0.05 - 0.10 HP/1,000 cu ft
Pond No. 1 Volume	=	0.48 Mgal
Pond No. 2 Volume	=	0.24 Mgal

Aerated Pond # 1

BOD_5 Mass Loading:

$$\frac{(7{,}700\ mg/L)(7{,}900\ gal\ PW/day)(8.345\ lbs/gal)}{1{,}000{,}000\ gal/MG} = 508\ lbs\ BOD_5/day$$

Oxygen Requirements:

$$\frac{(1.0\ lbs\ O_2/lbs\ BOD_5)(508\ lbs\ BOD_5/day)}{(24\ hrs/day)} = 21.15\ lbs\ O_2/hr$$

Aerator Horsepower Required:

$$\frac{21\ lbs\ O_2/hr}{1.8\ lbs\ O_2/HP\text{-}hr} = 11.75\ HP$$

Use 12 HP (6 HP existing)

Check Power-to-Volume Ratio:

$$P\backslash V = \frac{12\ HP}{480{,}000\ gal} \times \frac{7.48\ gal}{cf} \times \frac{10^3}{1{,}000\ cf} = 0.19\ HP/1{,}000\ cf$$

P\V of 0.19 HP/1,000 cf is within the recommended range of 0.10 – 0.30. Oxygen transfer and mixing are expected to occur in the upper 3-4 feet of the pond as required in a facultative aerated lagoon system.

Aerated Pond #2

$$P\backslash V = \frac{3\ HP}{240{,}000\ gal} \times \frac{7.48\ gal}{cf} \times \frac{10^3}{1{,}000\ cf} = 0.09\ HP/1{,}000\ cf$$

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P/V of 0.09 HP/1,000 cf is within the recommended range of 0.05 – 0.10. Therefore, 3 HP of aeration is recommended for the secondary pond. Oxygen transfer and mixing are expected to occur in the upper 3-4 feet of the pond as required in a facultative aerated lagoon system.

SANITARY SEWAGE TREATMENT

SANITARY SEWAGE DESIGN FLOWS

The existing SS treatment system at Maxville Lake Winery consists of gravity collection of SS from the winery, pretreatment in septic tanks followed by disposal in an Evapotranspiration- Infiltration (ETI) bed. The original design of the ETI bed does not appear to meet current Napa County Code requirements (due to gravel depth, lateral pipe spacing, distribution box placement, etc.) and is proposed to be removed. The ETI bed was designed around a site evaluation conducted on June 15th, 1993 which showed acceptable soil to 66"-76" and similar clay loam soil types as discovered by the recent evaluation. It is proposed to replace the ETI bed with a new pre-treatment and subsurface drip disposal field. Upon removal of the ETI bed and construction of the subsurface drip disposal field, the depth of acceptable soil should be confirmed. The proposed SS system at Maxville Lake Winery will consist of typical wastewater generated from restroom, laboratory, and kitchen uses. Anticipated SS flows are projected as follows:

<u>Average Tasting Day w/o Event -Non Harvest</u>							
Employee (full-time)	15	x	15	gpcd	=	225	gal/day
Employee (part-time)	9	x	15	gpcd	=	135	gal/day
Tasting Visitors	20	x	3	gpcd	=	60	gal/day
Marketing Event Visitors	0	x	15	gpcd	=	0	gal/day
Total					=	420	gal/day
					=	***500***	***gal/day***
<u>Average Tasting Day w/o Event - Harvest</u>							
Employee (full-time)	15	x	15	gpcd	=	225	gal/day
Employee (part-time)	9	x	15	gpcd	=	135	gal/day
Tasting Visitors	60	x	3	gpcd	=	180	gal/day
Marketing Event Visitors	0	x	15	gpcd	=	0	gal/day
Total					=	540	gal/day
					=	***600***	***gal/day***
<u>Peak Tasting Day w/ Event - Harvest</u>							
Employee (full-time)	15	x	15	gpcd	=	225	gal/day
Employee (part-time)	9	x	15	gpcd	=	135	gal/day
Tasting Visitors	75	x	3	gpcd	=	225	gal/day
Marketing Event Visitors	100	x	15	gpcd	=	1,500	gal/day
Total					=	2,085	gal/day
					=	***2,100***	***gal/day***

The design flow rate will account for the most conservative approach, with a SS flow rate of 2,100 gal/day.

GRAVITY COLLECTION

The existing collection system is designed to provide low maintenance and no infiltration or exfiltration. SS generated at the facility is and will be routed to the septic tanks. New piping will be compatible with SS and satisfy Uniform Plumbing Code and local requirements.

SS SEPTIC TANK SIZING

The required septic tank size for the winery SS flows according to the Uniform Plumbing code is:

Volume = 1,125 + 0.75 x Flow rate
Volume = 1,125 + 0.75 (2,100 gpd)
Volume = 2,700 gallons
Volume = 3,000 gallons

Orenco Systems, Inc. recommends 3 days of septic tank volume for commercial SS systems prior treatment in an Advantex treatment system. Based on Orenco guidelines, the septic tank should be sized as shown below:

Volume = 3 x Flow rate
Volume = 3 x (2,100 gpd)
Volume = 6,300 gallons
Volume = 7,000 gallons

Because Orenco's guidelines result in a larger recommended volume, and we are proposing AdvanTex as the pretreatment option, a total volume of 7,200 gallons will be provided for septic tankage. The existing 1,200 gallon septic tank will be used with the addition of a new 6,000 gallon septic tank. The proposed septic tankage would provide approximately 3 days of retention during peak flows. An effluent filter will be added to the outlet of the new septic tank to reduce solids passage to the pump station, AdvanTex treatment, and subsurface drip system. Alternatively, the existing 1,200 gallon septic tank can be abandoned and a new 6,500 gallon septic tank added, meeting the Orenco guidelines specified above.

SS GREASE INTERCEPTOR SIZING

For the events where meals are prepared onsite (100 visitors or less), a generation rate of 15 gallons of SS per event attendee is assumed. Of the 15 gallons, 5 gallons are assumed to be associated with food preparation and clean-up and 10 gallons are assumed as a contribution from attendee restroom use. Therefore, the maximum flow associated with meal preparation generated is calculated as follows based on the largest 100 person onsite event:

100 meals/day x 5 gal WW/meal = 500 gpd

The projected maximum flow to be generated by the kitchen (food preparation) is 500 gpd. The grease interceptor is sized to provide 3 days of hydraulic retention time (HRT) as recommended by Orenco Systems, Inc.

Volume = 3 days HRT x Flow rate
Volume = 3 x (500 gpd)

Volume = 1,500 gallons

A new 1,500 gallon precast concrete grease interceptor will be provided for removal of oil and grease from the kitchen prior to the septic tank and pretreatment. Oil and grease removal reduces pump failure and clogging of treatment and disposal systems.

SS SUMP

A duplex pumping system will be installed in a new SS sump to convey SS to the AdvanTex Treatment System. The SS sump will collect wastewater from the septic tanks.

PRE-TREATMENT SYSTEM

Although several treatment systems may be evaluated for installation, the following section provides information related to the Advantex Treatment System. All treatment systems will require an effluent dosing chamber prior disposal to the subsurface drip system.

Advantex Treatment System

An AX-MAX075 system should be sufficient for treatment of the peak flows expected at the facility, based on the following design criteria:

Design Peak Flow	= 2,100 gpd
Hydraulic Loading Rate	= 50 gpd/SF (peak)
Treatment Media Surface Required	= 42 SF
Influent BOD	= 300 mg/L*
Influent Organic Loading	= 5.3 lbs BOD/day
Organic Loading Rate	= 0.08 lb BOD/SF/day (peak)
Treatment Media Surface Required	= 66 SF
Total Treatment Surface Provided	= 75 SF

* Based on expected septic effluent quality

The larger of the two loading rates (Organic and Hydraulic, above), drives the treatment surface area required and corresponds to the surface area provided by the AX-MAX75 treatment unit. Controls included will consist of timers with float switch override, high water alarms, and a duplex pump control panel. The AX-MAX75 treatment unit selection and components will be confirmed with the vendor prior to any permitting or construction of the SS treatment system.

FLOW MEASUREMENT

Two inline flow meters will be provided to measure flows during dosing and flushing cycles into and out of the subsurface drip field. One meter on the effluent feed line will measure dose volumes, and another meter on the flush return line will measure flushing volumes. A run-time meter will be provided to assist in flow measurement, and a dose counter will allow for monitoring of overall dosing and flushing cycles.

SUBSURFACE DRIP HEADWORKS

A Geoflow Wasteflow Automatic Headworks assembly will be provided between the dosing chamber and the subsurface disposal field. The headworks is a pre-assembled unit which includes a filter, valves, and pressure gauge.

SITE SOIL EVALUATION

The proposed subsurface drip system size is based on the soil evaluation performed by Summit Engineering, Inc. and Napa County PBES Registered Environmental Health Specialist (REHS) Darell Choate on August 2nd, 2017 at the location of the proposed SS primary disposal area. The soils observed onsite were sandy clay loam and clay. Based on the soils observed and Geoflow (the subsurface drip tubing manufacturer) guidelines, a hydraulic loading rate of 0.3 gal/SF/day is proposed for the design. This loading rate represents a compromise between the pretreated effluent (PTE) rate for sandy clay loam and clay according to Napa County guidelines; however it is the Geoflow application rate for pretreated effluent in clay soil of moderate structure. Acceptable soil was qualified in the primary area to a depth of 36 inches for TP-1, where up to 6" of fill will be placed to mitigate for the shallower soil. Geoflow drip line will be placed at existing grade with 6 inches of fill in the vicinity of TP-1, so that 3 feet of acceptable soil is provided below the driplines. The remaining primary area had acceptable soil depths to a minimum of 48", so drip lines will be placed 6-12" deep for the remaining test pits with more than 3 feet of acceptable soil below, and no fill required. Please refer to Enclosure E for the soil site evaluation report.

SUBSURFACE DRIP SYSTEM

The area required for disposal of the projected SS flows in a subsurface drip field system is calculated as follows:

Drip Field Size = $\frac{2{,}100 \text{ gpd}}{0.3 \text{ gal/SF/day}}$ = 7,000 SF

Proposed subsurface drip area = 70 LF x 100 LF = 7,000 SF

A subsurface distribution system with 7,000 SF of drip line should be adequate to handle the peak wastewater flow of 2,100 gpd. The total area of available soil observed during the site evaluation conducted on August 2nd, along with the footprint of the ETI bed is approximately 18,500 SF. Warning signs and/or fencing should be installed to indicate the boundaries of the drip field area.

Per Napa County PBES requirements, a suitable expansion area of 200% (14,000 SF) must also be identified. In lieu of a reserve area, Maxville Lake Winery proposes to improve the Advantex Treatment System to include tertiary filtration and disinfection to meet Title 22 standards for recycled water. The tertiary treated and disinfected SS would be reused for vineyard irrigation. The winery has 98 acres of vineyard that require irrigation, from which an approximate 7 acres would be irrigated with treated PW effluent. The remaining 91 acres would provide more than sufficient area for disposal of tertiary treated recycled SS effluent. Please refer to the Site Soil Evaluation Plan on Enclosure E for the locations of the primary area.

ENCLOSURE C

OVERALL SITE PLAN

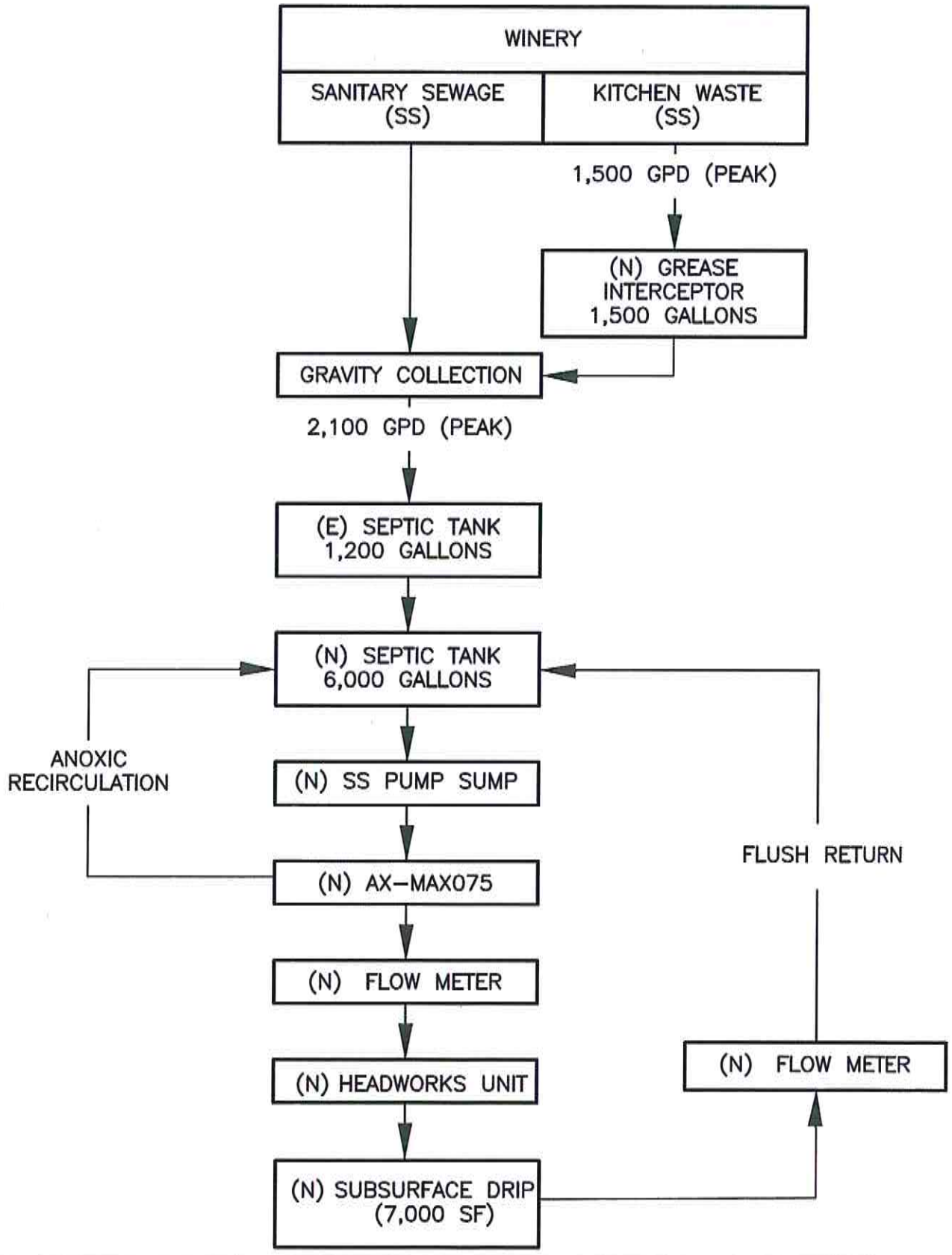
SS & PW MANAGEMENT SYSTEM SCHEMATICS

SUMMIT

MAXVILLE LAKE WINERY
4105 CHILES POPE VALLEY RD
ST.HELENA, CA
APN 025-020-023

SS TREATMENT SCHEMATIC

PROJECT NO. 2015052
DATE 2017-02-07
SHT NO 1 OF 1
BY CL CHK GG



PLOTTED ON: 9/14/2017 4:00 PM
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Summit Engineering, Inc
463 Aviation Blvd., Suite 200 • Santa Rosa, CA 95403 • 707-527-0775 • www.summit-sr.com

ENCLOSURE D

WASTEWATER DESIGN CALCULATIONS

EFFLUENT DISPERSAL BALANCES

SUMMIT

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Sanitary Sewage Flows	PROJECT NO. 2015052 BY: NM CHK: SW

PROPOSED SANITARY SEWAGE

WINERY

Average Tasting Day w/o Event -Non Harvest					
Employee (full-time)	15	x	15 gpcd	=	225 gal/day
Employee (part-time)	9	x	15 gpcd	=	135 gal/day
Tasting Visitors	20	x	3 gpcd	=	60 gal/day
Marketing Event Visitors	0	x	15 gpcd	=	0 gal/day
Total				=	420 gal/day
				=	***500 gal/day***
Average Tasting Day w/o Event - Harvest					
Employee (full-time)	15	x	15 gpcd	=	225 gal/day
Employee (part-time)	9	x	15 gpcd	=	135 gal/day
Tasting Visitors	60	x	3 gpcd	=	180 gal/day
Marketing Event Visitors	0	x	15 gpcd	=	0 gal/day
Total				=	540 gal/day
				=	***600 gal/day***
Peak Tasting Day w/ Event - Harvest					
Employee (full-time)	15	x	15 gpcd	=	225 gal/day
Employee (part-time)	9	x	15 gpcd	=	135 gal/day
Tasting Visitors	75	x	3 gpcd	=	225 gal/day
Marketing Event Visitors	100	x	15 gpcd	=	1,500 gal/day
Total				=	2,085 gal/day
				=	***2,100 gal/day***
Peak Day w/ Event - Harvest					
Employee (full-time)	15	x	15 gpcd	=	225 gal/day
Employee (part-time)	9	x	15 gpcd	=	135 gal/day
Tasting Visitors	0	x	3 gpcd	=	0 gal/day
Marketing Event Visitors	100	x	15 gpcd	=	1,500 gal/day
Total				=	1,860 gal/day
				=	***1,900 gal/day***
DESIGN FLOW				=	**2,100 gal/day**

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Sanitary Sewage Flows (Existing)	PROJECT NO. 2015052 BY: CL CHK: GG

EXISTING SANITARY SEWAGE

WINERY

Average Day w/o Event - Week day				
Employee (full-time)	6 x	15 gpcd	=	90 gal/day
Employee (part-time)	4 x	15 gpcd	=	60 gal/day
Tasting Visitors	10 x	3 gpcd	=	30 gal/day
Total			=	180 gal/day
			=	***200 gal/day***
Peak Tasting Day w/ Event - Weekend				
Employee (full-time)	6 x	15 gpcd	=	90 gal/day
Employee (part-time)	4 x	15 gpcd	=	60 gal/day
Tasting Visitors	30 x	3 gpcd	=	90 gal/day
Marketing Event Visitors	75 x	15 gpcd	=	1,125 gal/day
Total			=	1,365 gal/day
			=	***1,400 gal/day***

DESIGN FLOW = **1,400 gal/day**

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Design Criteria	PROJECT NO. BY: CHK:	2015052 CL GG

DESIGN CRITERIA

FULL PRODUCTION			
Production Level	104,167	cases/year	
Annual Production	240,000	gal wine/year	
Crush Period	60	day	* per PBES criteria
Annual PW Flow	1,440,000	gal PW/year	
Average PW Flow	4,000	gal PW/day	
PW Generation Rate	6.0	gal PW/gal wine	
Peak Harvest Day	6,000	gal PW/day	* per PBES criteria
PW Flows accounted during September	16.4	%	
Average Day Peak Harvest Month	7,900	gal PW/day	

PROPOSED POND VOLUME			**HRT**	(Based on peak harvest month flows)
Pond Cell # 1 Volume (aerated)	0.48	Mgal	61	days
Pond Cell # 2 Volume (aerated)	0.24	Mgal	30	days
Total Pond Volume	0.72	Mgal		
Total HRT	91	days		

PROPOSED POND VOLUME			**HRT**	(Based on average day flows)
Pond Cell # 1 Volume (aerated)	0.48	Mgal	120	days
Pond Cell # 2 Volume (aerated)	0.24	Mgal	60	days
Total Pond Volume	0.72	Mgal		
Total HRT	180	days		

DESIGN PROCESS WASTEWATER FLOWS

Month	PW Monthly Percentage of Annual Flow[a] (%)	PW Monthly Flow[a] (Mgal)
August	10.5%	0.151
September	16.4%	0.236
October	12.9%	0.186
November	7.4%	0.107
December	6.4%	0.092
January	6.6%	0.095
February	7.2%	0.104
March	7.6%	0.109
April	6.8%	0.098
May	6.4%	0.092
June	5.6%	0.081
July	6.2%	0.089
Total	**100%**	**1.440**

[a] Assumption of monthly percentage of annual flow based on average of PW flow data for similarly wineries

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Design Criteria	PROJECT NO. 2015052 BY: CL CHK: GG

DESIGN CRITERIA - EXISTING

Sizing Parameters

PW BOD Concentration[a]	7,700	mg/L
PW Peak Daily Flow	7,900	gal PW/day

[a] Influent BOD concentration based on average of PW data for similar wineries

Oxygen Requirement	1.0	lbs O_2/lb BOD	
Oxygen Transfer Rate	1.8	lbs O_2/HP - hr	* vert Turbine Aerator
Power/ Volume Ratio, Pond Cell No. 1	0.10 - 0.30	Hp/1,000 cu ft	
Power/ Volume Ratio, Pond Cell No. 2	0.05 - 0.10	Hp/1,000 cu ft	
Pond Cell No. 1 Volume	0.48	Mgal	
Pond Cell No. 2 Volume	0.24	Mgal	

Pond Cell #1 Aeration

BOD Mass Loading	508	lbs BOD/day
Aerator Run Time	24	Hrs/day
Oxygen Requirement	21	lbs O_2
Aerator Horsepower Required	12	HP
Existing Aerator Horsepower	6	HP
Future Aerator Horsepower	6	HP
Total Aeration	**12**	**HP**
Check Power-to-Volume Ratio	0.19	Hp/ 1,000 CF

P\V range desired is 0.10 to 0.30, this will enable oxygen transfer and mixing to occur within the upper 3-4 feet of the pond as required in a facultative aerated lagoon system.

Pond Cell #2 Aeration

Existing Aerator Horsepower	3	HP
Check Power-to-Volume Ratio	0.09	Hp/ 1,000 CF

P\V range desired is 0.05 to 0.10, this will enable oxygen transfer and mixing to occur within the upper 3-4 feet of the pond as required in a facultative aerated lagoon system.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Climate Data	PROJECT NO. BY: CHK:	2015052 CL GG

Month	Days	Average Temp[a] (F)	Reference Evapotranspiration[b] (in)	Pan Evaporation[c] (in)	Lake Evaporation[d] (in)	Average Precipitation[e] (in)	10-Year Precipitation[f] (in)	100-Year Precipitation[f] (in)
August	31	71.0	6.5	12.06	9.3	0.08	0.1	0.2
September	30	68.6	5.1	8.67	6.7	0.41	0.6	0.9
October	31	62.5	3.4	5.72	4.4	1.84	2.7	4.0
November	30	53.4	1.8	2.48	1.9	4.83	7.1	10.6
December	31	47.6	0.9	1.66	1.3	5.22	7.6	11.5
January	31	47.9	1.2	1.53	1.2	7.46	10.9	16.4
February	28	51.4	1.7	2.15	1.7	7.10	10.4	15.6
March	31	54.1	3.4	3.79	2.9	5.31	7.8	11.7
April	30	58.6	4.8	5.82	4.5	1.74	2.5	3.8
May	31	63.6	6.2	8.90	6.9	0.68	1.0	1.5
June	30	68.8	6.9	11.00	8.5	0.17	0.2	0.4
July	31	71.6	7.4	13.22	10.2	0.04	0.1	0.1
Total	**365**		**49.4**	**77.0**	**59.3**	**34.9**	**51.0**	**76.7**

[a] Average monthly temperature observed between 1971 and 2000 for Saint Helena, Napa, CA See http://ggweather.com/climate/ca.htm

[b] Average monthly reference evaporation rates for Zone 8, Inland San Fransisco Bay Area, typical rainfall year, CIMIS, DWR, 2001. See www.itrc.org.

[c] Average monthly pan evaporation rates observed at Lake Berryessa, between 1957 and 1970. See http://www.calclim.dri.edu/ccda/comparative/avgpan.html

[d] Pan evaporation rates adjusted by a factor of 0.77 to determine lake evaporation.

[e] Average monthly rainfall observed between 1971 and 2000 for Saint Helena, Napa, CA See http://ggweather.com/climate/ca.htm

[f] Average monthly rainfall adjusted by the ratio of 10-yr and 100-yr wet year return storm identified by Pearsons Log III Distribution (Oakville, St Helena)

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Design Criteria	PROJECT NO. 2015052 BY: CL CHK: GG

Pond No. 1

Bottom Width	36.0'	Bottom Radius	5.0'	Start Month	August
Bottom Length	78.0'	Top Radius	20.0'	Min. Depth	5.0'
Interior Side Slope (x:1)	2.0'	Depth	13.0'	Annual PW	1.44 Mgal
Length:Width	0.8	Freeboard	2.0'	Initial Depth	11.0'

Pond

Depth (ft)	Length (ft)	Width (ft)	Radius (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	78	36	5	2,787	0.00
1	82	40	6	3,248	0.02
2	86	44	7	3,688	0.05
3	90	48	8	4,205	0.08
4	94	52	10	4,753	0.11
5	98	56	11	5,389	0.15
6	102	60	12	5,999	0.19
7	106	64	13	6,638	0.24
8	110	68	14	7,307	0.29
9	114	72	15	8,006	0.35
10	118	76	17	8,734	0.41
11	122	80	18	9,493	0.48
12	126	84	19	10,281	0.55
13	130	88	20	11,098	0.63

Pond No. 2

Bottom Width	36.0'	Bottom Radius	5.0'	Start Month	August
Bottom Length	36.0'	Top Radius	20.0'	Min. Depth	5.0'
Interior Side Slope (x:1)	2.0'	Depth	12.0'	Annual PW	0.00 Mgal
Length:Width	0.8	Freeboard	2.0'	Initial Depth	6.0'

Pond

Depth (ft)	Length (ft)	Width (ft)	Radius (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	36	36	5	1,275	0.00
1	40	40	6	1,567	0.01
2	44	44	7	1,855	0.02
3	48	48	9	2,202	0.04
4	52	52	10	2,579	0.06
5	56	56	11	3,028	0.08
6	60	60	13	3,467	0.10
7	64	64	14	3,935	0.13
8	68	68	15	4,432	0.16
9	72	72	16	4,958	0.20
10	76	76	18	5,514	0.24
11	80	80	19	6,100	0.28
12	84	84	20	6,714	0.33

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Pond Water Balance	PROJECT NO. 2015052 BY: CL CHK: GG

Pond 2

Month	Initial Volume	Pond Evaporation	PW Inflow	100 Year Precipitation	Volume Change	Total Volume	Divert Volume	Final Volume	Final Pond Depth	Surface Area (based on initial volume)
	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(ft)	(ft^2)
August	0.481	-0.055	0.151	0.001	0.097	0.577	0.097	0.481	11.0	9,493
September	0.481	-0.040	0.236	0.006	0.202	0.683	0.202	0.481	11.0	9,493
October	0.481	-0.026	0.186	0.028	0.187	0.667	0.187	0.481	11.0	9,493
November	0.481	-0.011	0.107	0.074	0.168	0.648	0.168	0.481	11.0	9,493
December	0.481	-0.008	0.092	0.079	0.163	0.644	0.163	0.481	11.0	9,493
January	0.481	-0.007	0.095	0.114	0.201	0.681	0.201	0.481	11.0	9,493
February	0.481	-0.010	0.104	0.108	0.201	0.682	0.201	0.481	11.0	9,493
March	0.481	-0.017	0.109	0.081	0.172	0.653	0.172	0.481	11.0	9,493
April	0.481	-0.027	0.098	0.026	0.097	0.578	0.097	0.481	11.0	9,493
May	0.481	-0.041	0.092	0.010	0.061	0.542	0.061	0.481	11.0	9,493
June	0.481	-0.050	0.081	0.003	0.032	0.513	0.032	0.481	11.0	9,493
July	0.481	-0.060	0.089	0.001	0.029	0.509	0.029	0.481	11.0	9,493
Total		**-0.351**	**1.440**	**0.531**	**1.610**		**1.610**			

Pond 2

Month	Initial Volume	Pond Evaporation	PW Inflow	100 Year Precipitation	Volume Change	Total Volume	Divert Volume	Final Volume	Final Pond Depth	Surface Area (based on initial volume)
	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(Mgal)	(ft)	(ft^2)
August	0.102	-0.020	0.097	0.001	0.077	0.179	0.140	0.039	3.0	3,467
September	0.039	-0.009	0.202	0.004	0.196	0.236	0.196	0.040	3.0	2,239
October	0.040	-0.006	0.187	0.017	0.197	0.237	0.197	0.040	3.0	2,239
November	0.040	-0.003	0.168	0.044	0.210	0.250	0.200	0.050	3.6	2,239
December	0.050	-0.002	0.163	0.048	0.209	0.259	0.190	0.069	4.5	2,463
January	0.069	-0.002	0.201	0.069	0.267	0.336	0.190	0.146	7.5	2,820
February	0.146	-0.004	0.201	0.065	0.262	0.408	0.190	0.218	9.5	4,180
March	0.218	-0.010	0.172	0.049	0.211	0.429	0.190	0.239	10.0	5,233
April	0.239	-0.015	0.097	0.016	0.097	0.336	0.100	0.236	10.0	5,514
May	0.236	-0.024	0.061	0.006	0.043	0.280	0.080	0.200	9.0	5,514
June	0.200	-0.026	0.032	0.002	0.007	0.207	0.050	0.157	7.8	4,958
July	0.157	-0.027	0.029	0.000	0.001	0.158	0.057	0.102	5.9	4,330
Total		**-0.149**	**1.610**	**0.321**	**1.779**		**1.780**			

a Infiltration rate 1.0 x 10-6 cm/s through the pond liner

Pond Liner Permeability 1.00E-06 cm/s

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Irrigation & Effluent Application Rates	PROJECT NO. 2015052 BY: CL CHK: GG

Applied Irrigation Area

Vineyard	7.00	acres
Pasture	0.0	acres

Total Area Available for Irrigation

Vineyard	98.0	acres
Pasture	0.0	acres

Month	Reference ET[a]	Pasture Crop Coefficient[b]	Vineyard Crop Coefficient[c]	Pasture ET[d]	Vineyard ET[d]	Precipitation[e]	Irrigation Demand[f]		Operating Days per Month[g]	Percolation Capacity[h]		Assimilative Capacity[i]		Effluent Applied[j]		Excess Capacity
	(in)			(in)	(in)	(in)	(in)	(Mgal)	(d)	(in)	(Mgal)	(in)	(Mgal)	(Mgal)	(in)	(Mgal)
August	6.5	0.9	0.5	5.9	2.9	0.1	2.8	0.535	31	22.32	4.245	25.1	4.780	0.140	0.74	4.64
September	5.1	0.9	0.3	4.6	1.3	0.6	0.7	0.138	30	21.60	4.108	22.3	4.246	0.196	1.03	4.05
October	3.4	0.9	0.1	3.1	0.2	2.7	0.0	0.000	16	11.52	2.191	11.5	2.191	0.197	1.04	1.99
November	1.8	0.8	0.0	1.4	0.0	7.1	0.0	0.000	14	10.08	1.917	10.1	1.917	0.200	1.05	1.72
December	0.9	0.8	0.0	0.7	0.0	7.6	0.0	0.000	5	3.60	0.685	3.6	0.685	0.190	1.00	0.49
January	1.2	0.8	0.0	1.0	0.0	10.9	0.0	0.000	6	4.32	0.822	4.3	0.822	0.190	1.00	0.63
February	1.7	0.8	0.0	1.3	0.0	10.4	0.0	0.000	5	3.60	0.685	3.6	0.685	0.190	1.00	0.49
March	3.4	0.8	0.0	2.7	0.0	7.8	0.0	0.000	12	8.64	1.643	8.6	1.643	0.190	1.00	1.45
April	4.8	0.9	0.2	4.3	0.8	2.5	0.0	0.000	13	9.36	1.780	9.4	1.780	0.100	0.53	1.68
May	6.2	0.9	0.6	5.6	3.6	1.0	2.6	0.495	16	11.52	2.191	14.1	2.686	0.080	0.42	2.61
June	6.9	0.9	0.7	6.2	4.9	0.2	4.7	0.884	17	12.24	2.328	16.9	3.213	0.050	0.26	3.16
July	7.4	0.9	0.6	6.7	4.8	0.1	4.7	0.895	30	21.60	4.108	26.3	5.003	0.057	0.30	4.95
Total	**49.4**			**43.6**	**18.5**	**51.0**	**15.5**	**2.9**	**195.0**	**140.4**	**26.7**	**155.9**	**29.7**	**1.8**	**9.4**	**27.87**

(a) Average monthly reference evapotranspiration rates, see Climate Data Worksheet.
(b) Kc coefficients for pasture from Table 5-1, "Irrigation with Reclaimed Municipal Wastewater-A Guidance Manual"- California State Water Resources Control Board, July 1984 (San Joaquin Valley).
(c) Kc coefficients for vineyards from Table 5-12, Irrigation with Reclaimed Municipal Wastewater - A Guidance Manual, 84-1 wr, SWRCB.
(d) ET=ETo x Kc. A weighted value is determined on the basis of the available irrigated acreage of vineyard and pasture.
(e) Precipitation, 10-year rainfall event, see Climate Data Worksheet.
(f) Irrigation Demand = ET-Precipitation, inches. A weighted value is determined on the basis of the available irrigated acreage of vineyard and pasture.
(g) Number of operating days per month based on estimated irrigation days available based on 24-hr post storm criteria for a 100-year return period. Summit Engineering, NBRID Capacity Study, April 1996.
(h) Design percolation rate is a maximum of.75 inches per day for the number of operating day per month. Per USDA soil survey, predominant soil type is bale loam.
Sizing perc rate based on clay soils pretreated loading rates for non-shrink clay soils adjusted by a 0.04 safety factor to account for typical slow rate land application design methodology.
(i) Assimilative capacity is the sum of irrigation demand and percolation applied.
(j) Effluent applied depths exceeding 1 inch/month could result in ponding; if ponding occurs, additional disposal area may be required for expansion

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Sanitary Sewage Disposal	PROJECT NO. 2015052 BY: NM CHK: SW

ADVANTEX POD SIZING

Winery Influent Criteria

Peak Winery SS Flows	=	2,100	gal/day
Average Winery SS Flows	=	540	gal/day
Influent BOD_5	=	300	mg/L
Peak Influent organic loading	=	5.3	lbs BOD_5/day
Average Influent organic loading	=	1.4	lbs BOD_5/day

Textile Area

AX 20	=	20	SF
AX 100	=	100	SF
AX-MAX075-14	=	75	SF
AX-MAX125-21	=	125	SF
AX-MAX175-28	=	175	SF
AX-MAX225-35	=	225	SF
AX-MAX275-42	=	275	SF
AdvanTex HLR	=	25	gal/sf/day (avg)
		50	gal/sf/day (peak)
AdvanTex OLR	=	0.04	lb-BOD_5/SF/day (avg)
		0.08	lb-BOD_5/SF/day (peak)

AdvanTex Pod Sizing		Peak	Average	
Peak Design HLR	=	42	22	min sf
Peak Design OLR	=	66	35	min sf
No. AX 20's	=	4	2	
No. AX 100's	=	1	1	
AX-MAX075-14's	=	1	1	Select AX that meets min SF
AX-MAX125-21's	=	1	1	
AX-MAX175-28's	=	1	1	
AX-MAX225-35's	=	1	1	
AX-MAX275-42's	=	1	1	

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Maxville Lake Winery WASTEWATER FEASIBILITY STUDY Sanitary Sewage Disposal	PROJECT NO. 2015052 BY: CL CHK: GG

Drip System

Sizing based on Geoflow guidelines

Design Flow	=	2,100	gal/day
Depth to Groundwater or other limit	=	28	inches *minimum
Application	=	0.3	gal/sf/day (Based on soil type)
Square Footage required	=	7,000	sf
Primary Area required	=	70	x 100
	=	7,000	square feet
200% Reserve Area Required	=	140	x 100
	=	14,000	square feet
	=	0.32	acres
Total Area	=	21,000	square feet
	=	0.48	acres

ENCLOSURE E

SOIL SITE EVALUATION REPORT

SUMMIT

Napa County Department of Environmental Management

SITE EVALUATION REPORT

Please attach an 8.5" x 11" plot map showing the locations of all test pits triangulated from permanent landmarks or known property corners. The map must be drawn to scale and include a North arrow, surrounding geographic and topographic features, direction and % slope, distance to drainages, water bodies, potential areas for flooding, unstable landforms, existing or proposed roads, structures, utilities, domestic water supplies, wells, ponds, existing wastewater treatment systems and facilities.

Permit #:	OE17-00006
APN:	025-020-023
(County Use Only) Reviewed by:	Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner: Koko Nor Corporation	☐ New Construction ☐ Addition ☒ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address: 4105 Chiles Pope Valley Road	☐ Residential - # of Bedrooms: Design Flow : gpd
City: St. Helena State: CA Zip: 94574	☒ Commercial – Type: Sanitary Waste: 2,100 gpd Process Waste: gpd
Site Address/Location: 4105 Chiles Pope Valley Road, St. Helena, CA	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name: Summit Engineering Inc.	Evaluator's Name: Steve Worrell	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 463 Aviation Blvd. Ste 200		Telephone Number: 707-527-0775
City: Santa Rosa State: CA Zip: 95403		Date Evaluation Conducted: 8/2/17

Primary Area	Expansion Area
Acceptable Soil Depth: 28 in. Test pit #'s: TP1-TP6	Acceptable Soil Depth: in. Test pit #'s:
Soil Application Rate (gal. /sq. ft. /day): .3	Soil Application Rate (gal. /sq. ft. /day):
System Type(s) Recommended: Pretreatment & Subsurface drip	System Type(s) Recommended:
Slope: %. Distance to nearest water source: ft.	Slope: %. Distance to nearest water source: ft.
Hydrometer test performed? No ☒ Yes ☐ (attach results)	Hydrometer test performed? No ☐ Yes ☐ (attach results)
Bulk Density test performed? No ☒ Yes ☐ (attach results)	Bulk Density test performed? No ☐ Yes ☐ (attach results)
Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☐ Yes ☐ (attach results)

Site constraints/Recommendations:

A site evaluation was performed on August 2, 2017 with Napa County PBES representative Darell Choate. A total of ten test pits were evaluated, all of which had at least 28" of acceptable soil. From the onsite soil texturing, it was determined that the soils include both large pockets of sandy clay loam and clay, with subangular, blocky, weak to moderate structure. The proposed treatment system is pretreatment followed by subsurface drip disposal. According to Geoflow design loading rates for these soils, the application rate is .3 gal/SF/day for secondary treated effluent. This loading rate represents a compromise between the higher PTE application rate for sandy clay loam and the more conservative rate for clay. The primary area is outlined below, with TP5 being the most limiting soil, excluded from the proposed drip field. Upon removal of the ETI bed, this adjacent section of land is also considered suitable for drip disposal given the close proximity to TP1 and TP2, and data from the site evaluation on 6/15/93 that suggested adequate soil up to 66"-76". If necessary, 6" of fill can be added to ensure 36" of total depth below the driplines. Reserve will be provided by a Title 22 tertiary disinfection system.

Project Name: Maxville Lake Winery
Project No. 2015052
Location: 4105 Chiles Valley Road, St. Helena, CA
NC-PBES Representati Darell Choate

Test Pit #	Horizon Depth (inches)	Boundary	%Rock	Texture	Structure		Consistence			Pores	Roots	Mottling
					Grade	Shape	Side Wall	Ped	Wet			
1	0-10	G	0-10	CL	W	SB	SH	FRB	SS	C-F	C-F	None
	10-24	C	10-20	SIC	M	SB	SH	VF	SS	F-F	C-C	None
	24-36		40-50	C	M	SB	S	F	S	F-F	F-M	None
2	0-12		20-30	CL	W	SB	SH	FRB	SS	C-F	C-F	None
	12-25	G	5-10	SCL	W/M	SB	S	FRB	SS	C-F	F-F	None
	25-55			SCL	M	SB	H	F	SS	F-F	None	None
3	0-9	G	0-10	CL	W	SB	SH	FRB	SS	C-F	C-F	None
	9-25	C	10-20	SIC	M	SB	SH	VF	SS	F-F	C-C	None
	25-48		40-50	C	M	SB	S	FRB	S	F-F	F-M	None
4	0-18	G	0-10	CL	W	SB	SH	FRB	SS	C-F	C-F	None
	18-40	Too firm to sieve -Clay										None
	40-54			SCL	M	SB	H	F	SS	F-F	None	None
5	0-12	G	0-10	CL	W	SB	SH	FRB	SS	C-F	C-F	None
	12-35	C	10-20	SIC	M	SB	SH	VF	SS	F-F	C-C	28/C-D
	35-49		40-50	C	M	SB	S	FRB	S	F-F	F-M	
6	0-15	G	0-10	CL	W	SB	SH	FRB	SS	C-F	C-M	None
	15-34	G	Too firm to sieve -Clay								C-C	
	34-58			SCL	M	AB	H	F	SS	F-F	None	None
7	0-10	G	20	CL	W	SB	S	VFRB	NS	F-F	C-M	None
	10-34	C	15	SCL	W	SB	SH	FRB	SS	C-F	F-M	None
	34-48		5	SCL	W	SB	H	F	SS	F-F	None	None
8	0-17	G	20	CL	W	SB	S	VFRB	NS	F-F	C-M	None
	17-30		5-10	CL	M	SB	H	F	SS	F-F	F-M	None
	30-56		5	SCL	W	SB	H	F	SS	F-F	None	None
9	0-12	G	20	CL	W	SB	S	VFRB	NS	F-F	C-M	None
	12-47		15	SCL	W	SB	SH	FRB	SS	C-F	F-M	None
10	0-16	G	20	CL	W	SB	S	VFRB	NS	F-F	C-M	None
	16-40	C	30	SCL	W	SB	SH	FRB	SS	C-F	F-M	None
	40-54		40	CL								

A=Abrupt <1"	S=Sand	W=Weak	L=Loose	L=Loose	NS=NonSticky	Quantity:	Quantity:	Quantity:
C=Clear 1"-2.5"	LS=Loamy Sand	M=Moderate	S=Soft	VFRB=Very Friable	SS=Slightly Sticky	F=Few	F=Few	F=Few
G=Gradual 2.5"-5"	SL=Sandy Loam	S=Strong	SH=Slightly Hard	FRB=Friable	S=Sticky	C=Common	C=Common	C=Common
D=Diffuse >5"	SCL=Sandy Clay Loam	G=Granular	H=Hard	F=Firm	VS=Very Sticky	M=Many	M=Many	M=Many
	SC=Sandy Clay	Pl=Platy	VH=Very Hard	VF=Very Firm	NP=Non Plastic	Size:	Size:	Size:
	CL=Clay Loam	Pr=Prismatic	ExH= Extrm Hard	Ex= Extrm. Firm	SP=Slightly Plastic	VF=Very Fine	F=Fine	F=Fine
	L=Loam	C=Columnar			P=Plastic	F=Fine	M=Medium	M=Medium
	C=Clay	AB=Ang. Blocky			VP=Very Plastic	M=Medium	C=Coarse	C=Coarse
	SIC=Silty Clay	SB=Subang.Blocky				C=Coarse	VC=Very Coarse	
	SICL=Silty Clay Loam	M=Massive				VC=Very Coarse	Contrast:	
	SIL=Silt Loam	SG=Single Grain					FI=Faint	
	SI=Silt	C=Cemented					D=Distinct	
							P=Prominent	

TABLE 1

DRIP LOADING RATES CONSIDERING SOIL STRUCTURE.

Table 1 is taken from the State of Wisconsin code and was prepared by Jerry Tyler.
Provided for guidelines and budgeting purposes. Refer to your local regulations and qualified soil scientists to determine best loading rates.

Soil Textures	Soil Structure	Maximum Monthly Average **BOD_5<30mg/L TSS<30mg/L** (gallons/ft²/day)	Maximum Monthly Average **BOD_5>30mg/L TSS>30mg/L** (gallons/ft²/day)
Course sand or coarser	N/A	1.6	0.4
Loamy coarse sand	N/A	1.4	0.3
Sand	N/A	1.2	0.3
Loamy sand	Weak to strong	1.2	0.3
Loamy sand	Massive	0.7	0.2
Fine sand	Moderate to strong	0.9	0.3
Fine sand	Massive or weak	0.6	0.2
Loamy fine sand	Moderate to strong	0.9	0.3
Loamy fine sand	Massive or weak	0.6	0.2
Very fine sand	N/A	0.6	0.2
Loamy very fine sand	N/A	0.6	0.2
Sandy loam	Moderate to strong	0.9	0.2
Sandy loam	Weak, weak platy	0.6	0.2
Sandy loam	Massive	0.5	0.1
Loam	Moderate to strong	0.8	0.2
Loam	Weak, weak platy	0.6	0.2
Loam	Massive	0.5	0.1
Silt loam	Moderate to strong	0.8	0.2
Silt loam	Weak, weak platy	0.3	0.1
Silt loam	Massive	0.2	0.0
Sandy clay loam	Moderate to strong	0.6	0.2
Sandy clay loam	Weak, weak platy	0.3	0.1
Sandy clay loam	Massive	0.0	0.0
Clay loam	Moderate to strong	0.6	0.2
Clay loam	Weak, weak platy	0.3	0.1
Clay loam	Massive	0.0	0.0
Silty clay loam	Moderate to strong	0.6	0.2
Silty clay loam	Weak, weak platy	0.3	0.1
Silty clay loam	Massive	0.0	0.0
Sandy clay	Moderate to strong	0.3	0.1
Sandy clay	Massive to weak	0.0	0.0
Clay	Moderate to strong	0.3	0.1
Clay	Massive to weak	0.0	0.0
Silty clay	Moderate to strong	0.3	0.1
Silty clay	Massive to weak	0.0	0.0