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Wastewater Feasibility Study

Nickel & Nickel Winery, Use Permit Major Modification
Application No. P17-00400-MOD
Planning Commission Hearing, September 16, 2020

WASTEWATER FEASIBILITY STUDY

NICKEL & NICKEL WINERY

8164 St. Helena Hwy, Oakville, CA

APN: 031-010-003

SUMMIT

CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER

Project No. 2016131

August 2019

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LIST OF ENCLOSURES

PROJECT OVERVIEW

Nickel & Nickel is applying for a Use Permit modification for improvements to an existing winery facility located at 8164 St. Helena Highway, in Oakville (APN 031-010-003). The project site abuts the west side of the Napa River, and is approximately 0.7 miles north of Oakville Grade Road. The project site extends over a gently sloping terrain along the valley floor, sloping northeast at approximately 3% or less towards the Napa River.

The Nickel & Nickel site is located on a single parcel. A lot line adjustment for the winery and adjacent vineyard parcels (provided by RSA+) shows that the total parcel acreage is approximately 34.64 acres. The winery parcel has seven existing winery buildings, onsite vineyards, landscaping, a sanitary sewage leach field, and a process wastewater treatment and irrigation storage pond. The Use Permit Application includes the expansion of the existing winery facility in order to produce 225,000 gallons of wine per year. The expanded winery will require 67 full-time employees, 6 part time employees during harvest, and anticipates a maximum of 260 tasting visitors per day. Additional visitors are also proposed for private events, as outlined in the sanitary sewage (SS) management system section.

The existing SS and process wastewater (PW) systems serving the winery will be replaced by a new treatment and disposal system; the PW and SS systems will either continue to be separated or will be combined. Summit Engineering has prepared the following Wastewater Feasibility Study outlining the proposed PW and SS flows, and associated treatment and disposal systems.

WINERY PROCESS WASTEWATER MANAGEMENT SYSTEM

To accommodate a proposed annual production of 225,000 gallons of wine, the new PW management system will include the existing gravity collection system within the winery, screened floor drains for solids removal, a PW pump station, and treatment and disposal through one of the following alternatives:

1. Treatment through the existing aerated facultative pond treatment system and irrigation disposal via a surface drip system, separate from the SS disposal system.
2. Commingled treatment through a high rate package treatment system designed to create tertiary effluent, disinfection to meet Title 22 reuse standards, and surface reuse for landscape irrigation.

PROCESS WASTEWATER CHARACTERISTICS

Process wastewater will consist primarily of wastewater collected at floor drains and trenches within the winery, receiving, crush, tank, and wash down areas. All exterior tank and process areas will be covered and graded to preclude stormwater from entering the PW collection system. Typical winery wastewater characteristics are summarized below:

TABLE 1.TYPICAL WINERY PROCESS WASTEWATER CHARACTERISTICS

Characteristic	Units	Crushing Season Range	Non-crushing Season Range
pH	--	2.5 - 9.5	3.5 - 11.0
Dissolved Oxygen	mg/L	0.5 - 8.5	1.0 - 10.0
BOD_s	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 DESIGN FLOWS

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

Annual Volume

Annual Production	=	225,000	gal wine/year
Generation Rate (assumed)[a]	=	165	gal wine/ton grapes
Tons Crushed	=	1,364	tons grapes/year
Process Wastewater (PW) Generation Rate [b]	=	6.00	gal PW/gal wine
Annual PW Flow	=	*1,350,000*	*gal PW/year*
Average Day Flow	=	***3,700***	***gal PW/day***

Napa County Peak Day Flow

Peak Harvest Day Flow (60 day harvest)	=	***5,625***	***gal PW/day***

Average Day Peak Harvest Month Flow

The harvest month of September accounts for approximately 32% percent of the annual PW flow according to existing flow records and winery practices.

Peak Flow	=	*14,400*	*gal PW/day*
	=	***14,400***	***gal PW/day***

Average Day Peak Week Crush Flow

Tons Crushed [c]	=	*955*	*tons/peak week*
Generation Rate (assumed)	=	*225*	*gal PW/ton*
Peak Flow	=	*21,477*	*gal PW/day*
	=	***21,500***	***gal PW/day***

Notes:

a. 165 Gal wine per ton of grapes is used as a wine industry standard
b. 6.0 gal of PW per gallon wine produced over the course of 1 year is based on the average of data from approximately 16 wineries.
c. Assumes 30% of total annual tonnage is crushed in one week.

The PW design flow will be based on the average day peak harvest month flow, with equalization tankage provided to manage peak week crush flows. Therefore 14,400 gpd will be used for preliminary system sizing as outlined below.

PROCESS WASTEWATER CONVEYANCE, TREATMENT, AND DISPOSAL

The owner intends to implement one of two options for PW treatment and disposal at Nickel & Nickel. The first option would utilize the existing aerated facultative pond system for PW treatment and storage prior to vineyard irrigation disposal. The second option is to install a new high rate package treatment system that would treat the combined PW and SS to Title 22 tertiary disinfected standards, and dispose of the effluent through surface landscape irrigation. The installed system will be in accordance with all necessary Napa County Planning, Building, and Environmental Services (PBES) criteria and permits, and Regional Water Quality Control Board standards for the Title 22 option. Adequate pond capacity and vineyard irrigation disposal area is available for PW disposal system, as demonstrated in the Pond Water Balance (Enclosure B).

The proposed process wastewater systems would consist of the components listed below. Refer to Enclosure A for the PW management system schematic and Overall Site Plan.

Gravity Collection

The new gravity collection system will be designed to provide low maintenance and no infiltration or exfiltration. Piping to be compatible with PW and satisfy Uniform Plumbing Code and local requirements. Screening will be provided by screened baskets and strainers installed on the trench drains and floor drains within the winery. Screen opening sizes should be approximately 1/8 inch for interior and exterior drains. This is similarly assumed for existing gravity collection piping and screening. Backwash from the water treatment system will not be disposed of through the PW system without approval from the package treatment system provider.

Existing Pump Tank/Sump

A duplex pump station will transfer screened PW collected in the conveyance system to the process wastewater pond system or package treatment system prior to disposal.

Flow Measurement

An inline flow measurement device (if not already provided) will measure flows from the PW pump station to either the facultative pond or the package treatment system.

OPTION 1: FACULTATIVE POND TREATMENT SYSTEM WITH VINEYARD IRRIGATION REUSE

pH Control System

A pH control system could be provided (if necessary) for neutralization of the winery PW, with dosing of neutralizing chemicals into the pump station. The combination of naturally occurring alkalinity in source water and alkaline cleaning compounds used within wineries usually provides sufficient buffering to maintain pH above 6.5. Neutralizing chemicals should only be used when absolutely necessary. It is recommended that the pH be monitored for a year, especially through one harvest season. If at the end of the one year monitoring period it has been demonstrated that pH control is necessary (or sooner if conditions warrant), a pH control system could be added within the sump.

Existing Pond Treatment System

The existing pond treatment system includes an existing 1.7 million gallon earthen lined pond with floating brush aerators to provide mixing and introduce dissolved oxygen into the pond. A total of 25 HP of surface brush aerators are currently installed, and an additional 10 HP (35 HP total) will be required to provide oxygen for the proposed peak day flow. Ponds have been widely utilized for PW and have been very successful in delivering consistent reliable effluent quality when properly designed and operated. The pond at Nickel & Nickel would provide a very long hydraulic retention time up to 118 days at proposed peak flows, as it is also used for irrigation water storage for up to 6.1 acre-feet per year of surface water diverted from the Napa River.

Existing Irrigation Reuse Pumps

Conveys treated effluent from the pond to the landscape and vineyard irrigation systems, on a manual basis as determined by the site landscape and vineyard management crews.

Existing Flow Measurement

Flow measurement devices are provided to measure the irrigation reuse flow to the irrigation system.

Vineyard Irrigation Disposal

Final reuse (disposal) of effluent will continue to be accomplished through drip irrigation of a minimum of 12 acres of vineyard. Refer to the pond water balance in Enclosure B for proposed application rates to the disposal areas and pond storage volumes. The irrigation demand is the lowest during the wet season (November through April) and application rates during this period should be less than approximately 0.5 inches per month to prevent runoff or ponding. The treated PW will not be recycled for winery use, but may be used for landscape irrigation with proper signage indicating the use of recycled water.

OPTION 2: PACKAGE TREATMENT SYSTEM WITH SURFACE REUSE/DISPOSAL (PW and SS)

pH Control System

A pH control system will likely be required by the package treatment plant system manufacturer for neutralization of the winery PW, with dosing of neutralizing chemicals into the equalization tank. A pH control system that meets the package treatment plant manufacturer influent requirements will be installed upstream of the treatment plant.

Package Treatment System

Package treatment systems (activated sludge systems, membrane bioreactors, etc.) have been utilized for PW and have been very successful in delivering consistent and reliable effluent quality when properly designed and operated. Most manufacturers of these systems will provide performance guarantees for the treatment, given that the operational parameters are maintained within the initial design assumptions. A membrane bioreactor sized to handle the combined PW and SS loading is proposed under this option, with disinfection to provide tertiary disinfected effluent quality. If required, depending on the package treatment system selected, an equalization tank may be provided to equalize PW flow and quality prior to treatment through the package treatment system. The existing PW pond would continue to be used for irrigation storage, but not for PW

treatment with this option.

Effluent Storage Tank

An effluent storage tank shall be sized to accommodate approximately 15 days of storage during the winter months, to account for a prolonged rain event, when irrigation with treated PW effluent is prohibited.

Flow Measurement

An additional flow measurement device will be provided to measure the discharge flows to the irrigation system.

Turbidity Monitoring

A continuous effluent turbidity monitoring system will be included as part of the package treatment system to meet Title 22 effluent standards.

Irrigation Disposal Area

Reuse/disposal of effluent will be via drip irrigation of the onsite landscape area and vineyards (minimum 12 acres). The irrigation demand from the vineyards far exceeds the estimated annual process wastewater volume that is generated. To meet the additional irrigation demand, the treated PW and SS can be supplemented with well water. The irrigation demand is the lowest during the wet weather season (November through March) and application rates during this period should be less than 0.5 inches per month. An air gap or separate plumbing will be installed for the existing irrigation system plumbing to prevent cross-contamination with treated effluent applied to the irrigation distribution network. See Enclosure B for the PW irrigation balance.

SOLID WASTES

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

$$Peak\ annual\ production = \ 225{,}000\ gal\ wine\ \times \frac{1\ ton}{165\ gal} = 1{,}364\ tons$$

$$Ultimate\ Annual\ Total = \ 35\% \times \ 1{,}364\ tons = 478\ tons$$

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

$$478\ tons\ \times \frac{2{,}000\ lb}{1\ ton} = 956{,}000\ lb$$

$$956{,}000 \text{ lbs} \times \frac{1\ ft^3}{38\ lb} \times \frac{1\ yd^3}{27\ ft^3} = 932\ yd^3$$

These organic solids will be hauled to an off-site composting location, or can be composted and land applied to the existing vineyards. The depth of solid waste land application from peak annual production is approximately 0.58 feet per acre, or .36 inches over the available 19 acres of vineyard.

SANITARY SEWAGE MANAGEMENT SYSTEM

Nickel & Nickel intends to install a new sanitary sewage (SS) wastewater management system in accordance with all necessary Napa County Planning, Building, and Environmental Services (PBES) criteria and permits, and Regional Water Quality Control Board requirements for Title 22 recycled water. SS flows will be treated in a package treatment plant and disposed of via surface irrigation. PW flows might also be commingled in the same package treatment plant, which will be sized to accommodate both PW and SS peak flows (see page 5).

The proposed SS management system will include an SS collection system, existing septic tank with effluent filter (as required by the package treatment plant manufacturer), a pump station, flowmeter, membrane bioreactor, disinfection system, and surface irrigation disposal. The proposed SS management system will be sized for a peak daily wastewater flow of approximately 5,600 gpd, with the optional sizing to include 14,400 gpd of PW production.

SANITARY SEWAGE CHARACTERISTICS

SS will consist primarily of wastewater generated from winery restrooms, laboratories, and tasting room facilities. Typical SS characteristics are summarized below:

TABLE 2.TYPICAL SANITARY SEWER CHARACTERISTICS

Characteristic	Units	Raw Wastewater Range[1]
BOD_5	mg/L	133 - 400
Oil and Grease	mg/L	51 - 153
Total Suspended Solids (TSS)	mg/L	130 - 389
Volatile Suspended Solids	mg/L	101 - 304
Total Dissolved Solids (TDS)	mg/L	374 – 1121
Nitrogen	mg/L	23 - 69
Nitrate	mg/L	0
Phosphorous	mg/L	3.7 - 11
Chlorides	mg/L	39 - 118
Sulfate	mg/L	24 - 72

[1]Typical composition of untreated domestic wastewater, Metcalf & Eddy, “Wastewater Engineering, Fifth Edition”, 2014

WINERY SANITARY SEWAGE DESIGN FLOWS

The proposed SS management system at Nickel & Nickel will treat and dispose of wastewater generated from the winery restrooms, laboratories, and tasting room facilities. In addition to regular tasting visitors, Nickel & Nickel will host catered private marketing events and industry & community events as follows:

Private Marketing Events

Marketing Events	3 events/wk	@	25	visitors/event
Special Events	4 events/yr	@	100	visitors/event
Industry Special Event	1 event/yr	@	250	visitors/event
Industry Special Event	1 event/yr	@	450	visitors/event
Industry Special Event	2 events/yr	@	900	visitors/event
Industry Special Event	1 event/yr	@	1,000	visitors/event

The SS management system will be designed to handle wastewater generated from 100 person events, which will occur 4 times per year. The larger special events (exceeding 100 guests) will occur on days with minimal to no production, when the winery tasting room is closed, and with different staffing levels. These larger events are meant to recognize the reoccurring events approved via temporary event permits, and that have taken place for at least the last ten years.

Peak SS generation is evaluated for two separate conditions. The first includes a 100 visitor marketing event, a maximum of 260 tasting visitors (20% of which will also receive a meal, in line with the winery's existing entitlement), and a maximum of 67 total employees at the winery and 6 part time employees during harvest. The second includes a maximum of 40 employees, and wastewater associated with onsite food preparation for a 1,000 person event, where food service consists of passed hors d'oeuvres and is estimated at 5 GPCD. Nickel & Nickel is proposing to provide portable toilets and offsite catering for events with more than 100 people.

For tasting visitors, the peak flow is estimated using 3 gpcd for wine tasting with hors d'oeuvres. For marketing event visitors, the peak flow is estimated using 15 gpcd for catered food pairings, with all food preparation and cleanup (dishwashing) done in onsite commercial kitchen. The estimated peak day harvest flows are provided below.

Peak Day 1 – Harvest and Marketing Event

Employee (full-time)	67	x	15	gpcd	=	1,005	gpd
Employee (part-time)	6	x	15	gpcd	=	90	gpd
Tasting Visitors (80% of total)	208	x	3	gpcd	=	624	gpd
Onsite meals with 20% of Tastings	52	x	15	gpcd	=	780	gpd
Marketing Visitors (100 person event)	100	x	15	gpcd	=	1,500	gpd
Total					=	**3,999**	**gpd**

Peak Day 2 – Non-Harvest Marketing Event							
Employee (full-time)	40	x	15	gpcd	=	600	gpd
Employee (part-time)	0	x	15	gpcd	=	0	gpd
Tasting Visitors (80% of total)	0	x	3	gpcd	=	0	gpd
Onsite meals with 20% of Tastings	0	x	15	gpcd	=	0	gpd
Marketing Visitors (food prep)	1,000	x	5	gpcd	=	5,000	gpd
Total					=	5,600	**gpd**
Design Flow					=	**5,600**	**gpd**

The SS management system will be designed to handle a peak daily SS flow of 5,600 gpd from winery operations, tasting visitors and marketing and special events. This represents a special event day with minimal production, no tasting room visitation, and portable toilet facilities for event guests. Backwash from the water treatment system will not be disposed of through the SS system without confirmation from the package treatment system manufacturer.

KITCHEN SS DESIGN FLOWS

For promotional tasting events where meals are prepared onsite (100 guests maximum), a generation rate of 5 gallons per meal is assumed. Therefore, the maximum flow associated with meal preparation is calculated as follows:

$$1{,}000\ meals \times \frac{5\ gal\ WW}{1\ meal} = 5{,}000\ gallons$$

An SS flow of 5,000 gallons will be used to size the kitchen grease interceptor.

SANITARY SEWAGE CONVEYANCE, TREATMENT AND DISPOSAL

The SS treatment and disposal system will have the components described below. Refer to Enclosure A for the SS management system schematic and Overall Site Plan.

Gravity Collection

The new gravity collection systems will be designed to provide low maintenance and no infiltration or exfiltration. Piping shall be compatible with sanitary sewer and satisfy Uniform Plumbing Code and local requirements.

Grease Interceptor

The maximum flow generated by the kitchen is projected to be 5,000 gpd. The grease interceptor shall be sized to provide 3 days of retention, based on typical commercial design guidelines. A minimum 15,000 gallon

grease interceptor will be installed to provide the recommended 3-day retention for peak events.

Septic Tanks with Effluent Filter

Solids settling and digestion in the septic tanks helps to reduce BOD and TSS concentrations entering the pretreatment and disposal system, reducing the potential for damage and fouling of the membrane. An effluent filter will also be provided to remove additional suspended solids which do not settle out in the septic tank. The required septic tank size for the SS flows was evaluated based on the Uniform Plumbing Code, as follows:

Uniform Plumbing Code Method:

$$Volume = 1{,}125 + 0.75 \times Flow\ Rate$$

$$Volume = 1{,}125 + 0.75 \times 5{,}600\ gpd$$

$$Volume = 5{,}325\ gallons$$

A minimum 3,500 gallon septic tank will be provided, in addition to the existing 2,000 gallon septic tank, for solids removal prior to the package treatment system. Additional septic tank capacity will be provided if required by the selected pre-treatment manufacturer, or alternatively if septic tank pre-treatment is not required by the manufacturer it will be omitted and the existing 2,000 gallon tank will remain.

Package Treatment System

Package treatment systems (typically membrane bioreactors) have been widely utilized for SS prior to Title 22 surface reuse, and have been very successful in delivering consistent reliable effluent quality when properly designed and operated. Most manufacturers of these systems will provide performance guarantees for the treatment, given that the operational parameters are maintained within the initial design assumptions. A membrane bioreactor is proposed for the treatment of SS at Nickel & Nickel, with the optional commingling of PW being considered as well (see Option #2 for PW on page 5). If required, depending on the package treatment system selected, an equalization tank may be provided to equalize SS flow and quality prior to treatment through the package treatment system.

Disinfection

Ultraviolet light or chemical disinfection (chlorine, peracetic acid, etc.) will be provided to meet tertiary disinfected effluent standards for surface irrigation reuse. The disinfection system will be tied into the package treatment controls so that effluent will not be disposed of in the case of failure of the disinfection system.

Effluent Storage Tank

An irrigation/effluent storage tank will be provided to store disinfected effluent prior to onsite reuse. The effluent storage tank will be tied into the existing landscape irrigation system, with air-gap separations and/or backflow prevention installed for supplemental makeup water to the irrigation system.

Flow Measurement

Additional flow measurement devices will be provided to measure the influent and effluent flows to the package treatment system.

Irrigation Reuse

Treated effluent will be used to offset landscape irrigation demand. The estimated total water use for the site landscaping is approximately 1,617,000 gallons per year, compared to the anticipated 840,000 gallons per year of SS generation. Any excess reuse water that is available will be disposed of via surface drip irrigation in the vineyard. A total of 19 acres of vineyard is available for disposal, which provides significantly more irrigation disposal area than would be required for irrigation disposal.

OTHER CONSIDERATIONS

ODOR CONTROL

There should be no noxious odors from a properly designed and operated treatment system. See Alternative Courses of Action for operation alternatives.

GROUNDWATER CONTAMINATION

The nearest water well to the PW and SS treatment and disposal systems will be a minimum of 100 feet. No disposal of wastewater effluent will occur within 100 feet of any existing wells. Irrigation with or disposal of treated PW effluent is considered a beneficial use and is an effective means to protect groundwater quality. Well water and permitted surface water diversion from the Napa River may supplement treated PW and SS for irrigation when capacity permits. Disinfected tertiary treated SS will be used for irrigation as described above, and in accordance with Title 22 recycled water criteria.

WATER TREATMENT SYSTEM BACKWASH

Currently, backwash from existing water treatment systems discharges to the ground, and not to any wastewater treatment systems. Upgrades to the existing water treatment systems, or the installation of new systems, will maintain disconnection from any wastewater collection, treatment, or disposal system.

PROTECTION

Exposed wastewater treatment facilities should be posted with appropriate warning signs. The treatment areas will be protected to restrict access and potential damage to the system, and any irrigation reuse areas will be appropriately signed.

ALTERNATIVE COURSES OF ACTION

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

- Additional stages of treatment to increase effluent quality
- Increased use of irrigation/disposal area to increase discharge capacity

- The effluent storage tank would be designed for retention of treated effluent for approximately 15 days during the rainy season, allowing for minimal discharges to irrigation fields. Should there be a winter with more rainfall than the design condition, several operational procedures are available to compensate:
    - Additional water conservation at winery
    - Light irrigation during periods between storms – not exceeding the assimilative capacity of the soil
    - Increased irrigation during the months of planned irrigation as long as there is acceptable soil percolation capacity
    - Temporary pumping and truck transfer of treated and diluted wastewater to an approved treatment plant.

ENCLOSURE A

VICINITY MAP

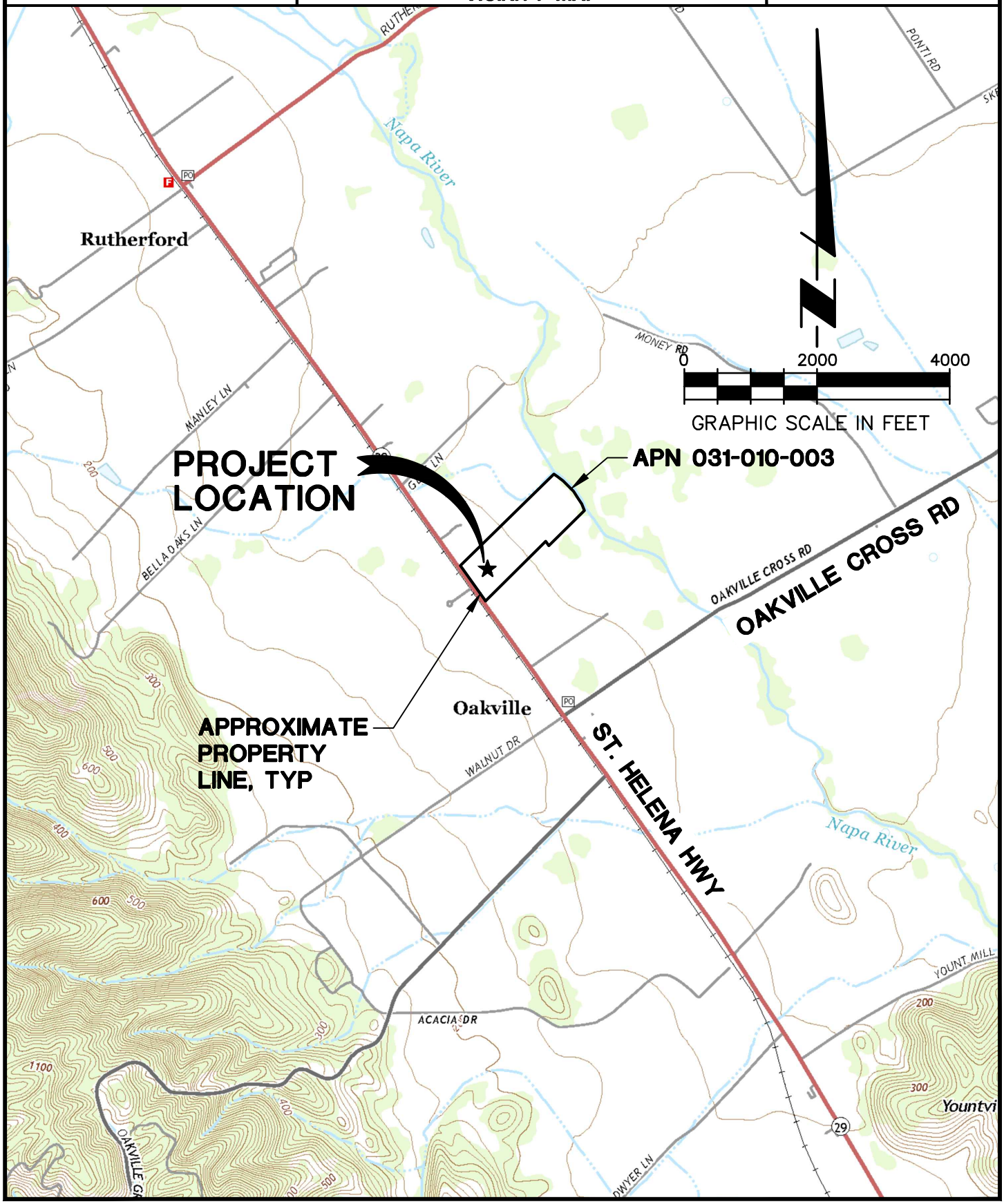
OVERALL SITE PLAN

WASTEWATER SYSTEM SCHEMATIC

SUMMIT

NICKEL & NICKEL WINERY
8164 ST. HELENA HWY
OAKVILLE, CA 94558
APN 031-010-003
VICINITY MAP

PROJECT NO. 2016131
DATE 2017-06-30
SHT NO 1 OF 1
BY JA CHK MS



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ABBREVIATIONS:

AC	ASPHALT CONCRETE	LL	LOWER LEVEL
APPROX	APPROXIMATE	NCRSS	NAPA COUNTY ROAD & STREET STANDARDS
BLDG	BUILDING		
℄	CENTERLINE	PD	PLANTER DRAIN
DI	DRAIN INLET	PIP	PROTECT IN PLACE
DS	DOWNSPOUT	PW	PROCESS WASTE
DG	DECOMPOSED GRANITE	SD	STORM DRAIN
(E)	EXISTING	SS	SANITARY SEWAGE
FF	FINISH FLOOR	TD	TRENCH DRAIN
FH	FIRE HYDRANT	TYP	TYPICAL
GB	GRADE BREAK	UL	UPPER LEVEL
LIDF	LOW IMPACT DEVELOPMENT FACILITY		

OWNER:
FAR NIENTE WINE ESTATES, LLC
8164 ST. HELENA HIGHWAY
OAKVILLE, CA 94558

APPLICANT:
GREG ALLEN
8164 ST. HELENA HIGHWAY
OAKVILLE, CA 94558

0 80 160
GRAPHIC SCALE IN FEET

APN 031-010-002

VISITOR PARKING [27 SPACES]
(E) GLEASON BARN
ACCESSIBLE PARKING, TYP
CANOPY OVER (E) BOTTLING AREA
(E) TRASH ENCLOSURE
(E) PROPANE TANK
(E) FH, TYP OF 4
(E) DOMESTIC WELL
100' WELL SETBACK
(E) WHITE BARN
(E) BUILDING
SEE SHEET UP2
(E) WATER & FIRE PROTECTION STORAGE TANKS
(E) SS SEPTIC & PUMP TANKS
(E) PW PUMP SUMP
GENERATOR PAD
(E) MECHANICAL BARN
(E) NORTH FERMENTATION BUILDING
(E) SOLAR PANEL ARRAY
(E) PW TREATMENT POND
APN 031-010-009
2030±
246'±
497'±
653±
APN 027-280-050
600' SETBACK
STATE HIGHWAY 29
324'
SEE SHEET UP4
FEMA 100 YEAR FLOODPLAIN BOUNDARY
APN 031-010-003
215±
220±
FEMA FLOODWAY BOUNDARY
COMBINED DOMESTIC & PROCESS WASTEWATER PACKAGE TREATMENT PLANT
EMPLOYEE PARKING [44 SPACES]
1557'±
SOLAR PANEL ARRAY CANOPY
VINEYARD ACCESS ROAD
TRASH ENCLOSURE
PRODUCTION EXPANSION
FH, TYP OF 2
DRIVEWAY
SEE SHEET UP3
SEASONAL PARKING/ EVENT SETUP
CANOPY OVER (E) CRUSH PAD
2144±
140±
145±
(E) RESIDENCE
(E) OFFICE BUILDING
(E) SS LEACHFIELD
(E) SOUTH FERMENTATION BUILDING
APPROXIMATE PROPERTY LINE, TYP
APPROXIMATE LOCATION (N) DOMESTIC/ IRRIGATION WELL
APN 031-020-001
APN 031-020-003
100' WELL SETBACK
APPROXIMATE LOCATION OF (E) WELL

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NICKEL & NICKEL WINERY
8164 ST. HELENA HIGHWAY
OAKVILLE, CA 94558
APN 031-010-003

USE PERMIT APPLICATION

OVERALL SITE PLAN

2017-11-09	PERMIT SUBMITTAL
2018-08-31	PERMIT RESUBMITTAL
2018-10-09	PERMIT RESUBMITTAL
2018-12-18	PERMIT RESUBMITTAL

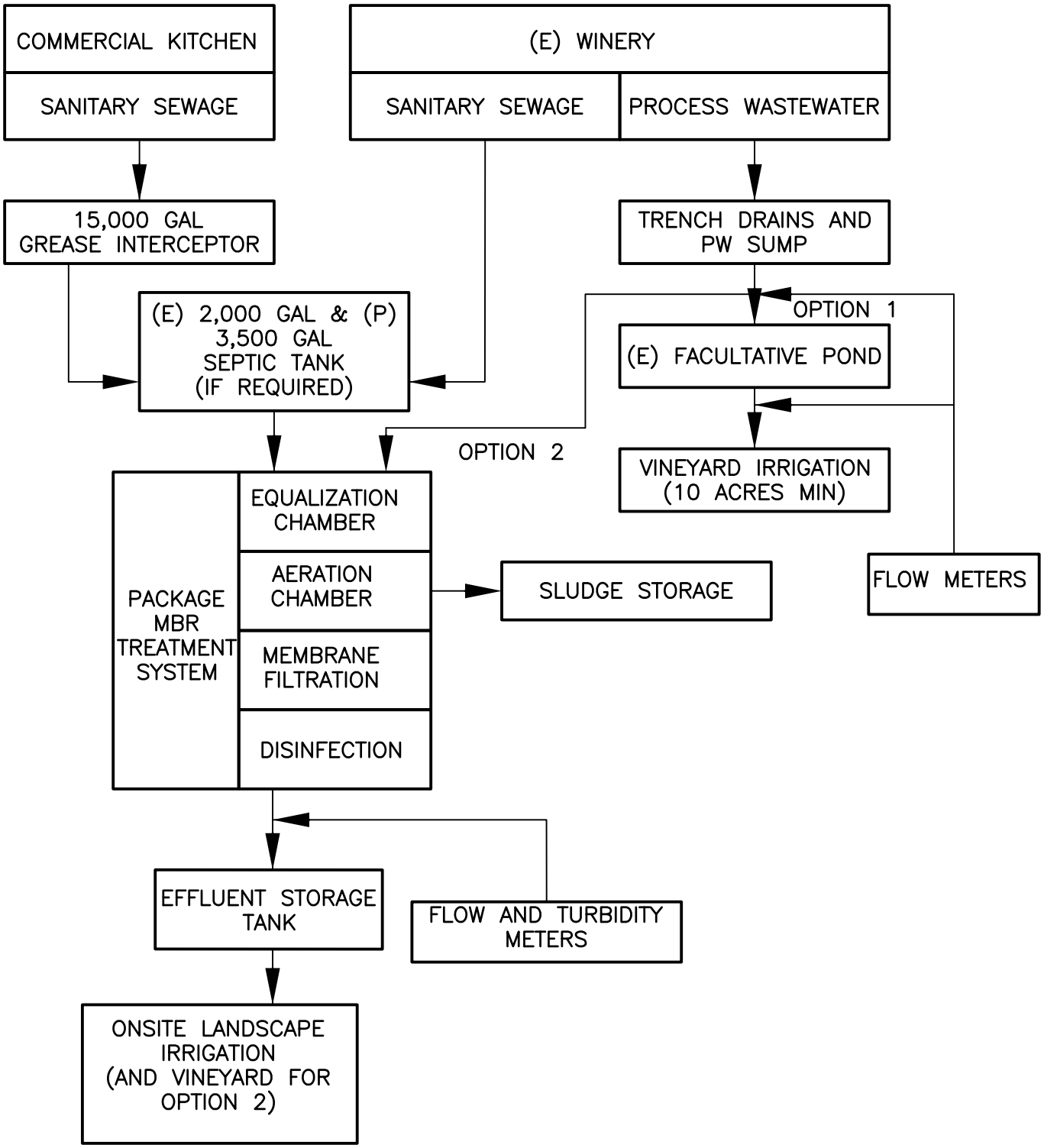
DATE:	2017-11-09
JOB NO:	2016131
SCALE:	AS SHOWN
DRAWN:	JA
CHECKED:	MS
SHEET	UP1

SUMMIT

NICKEL & NICKEL WINERY
8164 ST. HELENA HIGHWAY
OAKVILLE, CA
APN 031-010-003

WASTEWATER FLOW SCHEMATIC

PROJECT NO. 2016131
DATE 2019-08-22
SHT NO 1 OF 1
BY SW CHK GG



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ENCLOSURE B

SANITARY SEWAGE FLOW ESTIMATES

PROCESS WASTEWATER FLOW ESTIMATES

PW POND WATER BALANCE

SUMMIT ENGINEERING, INC.	NICKEL & NICKEL Wastewater Feasibility Study Existing Process Wastewater Flows	PROJECT NO. BY: CHK:	2016131 SW GG

PROCESS WASTEWATER

Annual Volume

Annual Production (projected)						=	52,083	cases wine/year
Generation Rate (assumed)[a]						=	2.4	gal wine/case of wine
Annual Production	52,083	cases wine/year	x	2.4	gal wine/case of wine	=	125,000	gal wine/year
Generation Rate (assumed)[b]						=	165	gal wine/ton grapes
Tons Crushed	125,000	gal wine/year	÷	165	gal wine/ton grapes	=	758	tons grapes/year
Process Wastewater (PW) Generation Rate[c]						=	6.00	gal PW/gal wine
Annual PW Flow	125,000	gal wine/year	x	6.00	gal PW/gal wine	=	***750,000***	***gal PW/year***

Average Day Flow

	750,000	gal PW/year	÷	365	days	=	*2,055*	*gal PW/day*

Napa County Peak Day ***2,100*** ***gal PW/day***

Length of Harvest						=	60	days
Peak Flow	125,000 60	gal wine/year days	x	1.5		=	***3,125***	***gal PW/day***

Average Day Peak Harvest Month Flow

Assume:	1	32.0%	of the PW flows are accounted for during September					
	2	30	days in September					
Peak Flow		750,000	gal PW/year	x	32.0%	=	*8,000*	*gal PW/day*
				30	days			

Average Day of Peak Week

Assume:	1	304	tons produced during peak week (40% of total)					
	2	225	gallons of PW per ton of grapes during peak week					
	3	5	days processing per week					
Flow per Week		304	tons	x	225 gal PW/ton	=	68,400	gal PW/week
Average Flow of Peak Week		68,400	gal PW/week	÷	5 days/week	=	*13,680*	*gal PW/day*

DESIGN FLOW = ***8,000*** ***gal PW/day***

a. 2.4 gallons of wine per case of wine
b. 165 Gal wine per ton of grapes is used as a wine industry standard
c. 6.0 gal of PW per gallon wine produced over the course of 1 year is based on the average of data from approximately 16 wineries
d. Peak week tonnage was based on input from winery for peak daily flow (for existing production)

SUMMIT ENGINEERING, INC.	NICKEL & NICKEL Wastewater Feasibility Study Proposed Process Wastewater Flows (175,000 gallons)	PROJECT NO. BY: CHK:	2016131 SW GG

PROCESS WASTEWATER

Annual Volume

Annual Production (projected)						=	93,750	cases wine/year
Generation Rate (assumed)[a]						=	2.4	gal wine/case of wine
Annual Production	93,750	cases wine/year	x	2.4	gal wine/case of wine	=	225,000	gal wine/year
Generation Rate (assumed)[b]						=	165	gal wine/ton grapes
Tons Crushed	225,000	gal wine/year	÷	165	gal wine/ton grapes	=	1,364	tons grapes/year
Process Wastewater (PW) Generation Rate[c]						=	6.00	gal PW/gal wine
Annual PW Flow	225,000	gal wine/year	x	6.00	gal PW/gal wine	=	***1,350,000***	***gal PW/year***

Average Day Flow

	1,350,000	gal PW/year	÷	365	days	=	*3,699*	*gal PW/day*

Napa County Peak Day ***3,700*** ***gal PW/day***

Length of Harvest						=	60	days
Peak Flow	225,000 60	gal wine/year days	x	1.5		=	***5,625***	***gal PW/day***

Average Day Peak Harvest Month Flow

Assume:	1	32.0%	of the PW flows are accounted for during September
	2	30	days in September

Peak Flow	1,350,000 30	gal PW/year days	x	32.0%		=	*14,400*	*gal PW/day*

Average Day of Peak 10-day Period

Assume:	1	955	tons during peak 10-day period
	2	225	gallons of PW per ton of grapes during peak week
	3	10	days peak processing period

Flow per Week	955	tons	x	225	gal PW/ton	=	214,773	gal PW/peak period
Average Flow of Peak Week	214,773	gal PW/week	÷	10	days/period	=	*21,477*	*gal PW/day*

DESIGN FLOW = ***14,400*** ***gal PW/day***

a. 2.4 gallons of wine per case of wine
b. 165 Gal wine per ton of grapes is used as a wine industry standard
c. 6.0 gal of PW per gallon wine produced over the course of 1 year is based on the average of data from approximately 16 wineries
d. Peak week tonnage was based on input from winery (for existing production), increased to 7 days per week

SUMMIT ENGINEERING, INC.	NICKEL & NICKEL Wastewater Feasibility Study Existing Sanitary Sewage Flows	PROJECT NO. 2016131 BY: SW CHK: GG

SANITARY SEWAGE FLOW BREAKDOWN

Average Day w/o Event								Notes
Employee (full-time)	21	x	15	gpcd	=	315	gal/day	Current Entitlement
Employee (part-time)	6	x	15	gpcd	=	90	gal/day	Current Entitlement
Employee (Vinescape)	5	x	15	gpcd	=	75	gal/day	On separate septic system; not currently offices
Tasting Visitors (80% of total)	40	x	3	gpcd	=	120	gal/day	Current Entitlement and discussion w/ Greg Allen
Onsite meals with 20% of Tastings[a]	10	x	15	gpcd	=	150	gal/day	Current Entitlement and discussion w/ Greg Allen
Total					=	**750**	**gal/day**	

Peak Day w/ Full Event								
Employee (full-time)	21	x	15	gpcd	=	315	gal/day	Current Entitlement
Employee (part-time)	6	x	15	gpcd	=	90	gal/day	Current Entitlement
Employee (Vinescape)	0	x	15	gpcd	=	0	gal/day	On separate septic system; not currently offices
Tasting Visitors (80% of total)	60	x	3	gpcd	=	180	gal/day	Current Entitlement and discussion w/ Greg Allen
Onsite meals with 20% of Tastings[a]	15	x	15	gpcd	=	225	gal/day	Current Entitlement and discussion w/ Greg Allen
Special Event[b]	25	x	15	gpcd	=	375	gal/day	3x per week marketing event
Total					=	**1,185**	**gal/day**	

[a] Meals prepared and served onsite for 20% of current visitors, per Client

[b] Portable restrooms provided for all events with more than 25 people

DESIGN FLOW	=	**1,185**	**gal/day**

SUMMIT ENGINEERING, INC.	NICKEL & NICKEL Wastewater Feasibility Study Proposed Sanitary Sewage Flows	PROJECT NO. 2016131 BY: SW CHK: GG

SANITARY SEWAGE FLOW BREAKDOWN

Average Day w/o Event									Notes
Employee (full-time)	67	x	15	gpcd	=	1,005	gal/day		Entitlement request
Employee (part-time)	6	x	15	gpcd	=	90	gal/day		Entitlement request
Employee (Vinescape)	0	x	15	gpcd	=	0	gal/day		No Change
Tasting Visitors (80% of total)	165	x	3	gpcd	=	495	gal/day		1,440 per week, 80% tasting only
Onsite meals with 20% of Tastings[a]	42	x	15	gpcd	=	630	gal/day		1,440 per week, 20% with meal
Total					=	**2,220**	**gal/day**		
Large Event (1000 person)									
Employee (full-time)	40	x	15	gpcd	=	600	gal/day		Event employees only
Employee (part-time)	0	x	15	gpcd	=	0	gal/day		
Employee (Vinescape)	0	x	15	gpcd	=	0	gal/day		
Tasting Visitors (80% of total)	0	x	3	gpcd	=	0	gal/day		Tasting Room Closed
Onsite meals with 20% of Tastings[a]	0	x	15	gpcd	=	0	gal/day		Tasting Room Closed
Special Event[b]	1000	x	5	gpcd	=	5,000	gal/day		Food production only
						5,600			
Peak Day w/ Event									
Employee (full-time)	67	x	15	gpcd	=	1,005	gal/day		
Employee (part-time)	6	x	15	gpcd	=	90	gal/day		
Employee (Vinescape)	0	x	15	gpcd	=	0	gal/day		
Tasting Visitors (80% of total)	208	x	3	gpcd	=	624	gal/day		
Onsite meals with 20% of Tastings[a]	52	x	15	gpcd	=	780	gal/day		
Special Event[b]	100	x	15	gpcd	=	1,500	gal/day		25 marketing guests 3x per week
Total					=	**3,999**	**gal/day**		

[a] Meals prepared and served onsite for approximately 20% of tasting guests, per Client

[b] Portable restrooms provided for all events with more than 100 people

DESIGN FLOW	=	**5,600**	**gal/day**

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	NICKEL & NICKEL WASTEWATER FEASIBILITY STUDY Design Criteria	PROJECT NO. 2016131 BY: SW CHK: GG

DESIGN CRITERIA

FULL PRODUCTION

Annual Production	225,000	gal wine/year	
Crush Period	60	day	* per PBES criteria
Annual PW Flow	1,350,000	gal PW/year	
Average PW Flow	3,699	gal PW/day	
PW Generation Rate	6.0	gal PW/gal wine	* Standard rate used to be conservative. Generation rate for 2015 was 4.4 gal PW/gal wine
Napa County Peak Day Flow	5,625	gal PW/day	* per PBES criteria
PW Flows accounted during September	32.0	%	* 32% used for sizing peak day based on winery feedback, but 16.4 used in water balance based on
Average Day Peak Harvest Month	14,400	gal PW/day	typical wineries

EXISTING POND VOLUME	**Volume (MG)**	**HRT (days)**	
		September (Peak PW)	**February**
Pond Volume (aerated)	1.70	118	490

DESIGN PROCESS WASTEWATER FLOWS

Month	PW Monthly Percentage of Annual Flow[a] (%)	Total PW Flow[a] (Mgal)	Monthly PW Flow (gpd)
August	10.5%	0.142	4,580
September	16.4%	0.221	7,380
October	12.9%	0.174	5,620
November	7.4%	0.100	3,330
December	6.4%	0.086	2,790
January	6.6%	0.089	2,880
February	7.2%	0.097	3,480
March	7.6%	0.103	3,310
April	6.8%	0.092	3,060
May	6.4%	0.086	2,790
June	5.6%	0.076	2,520
July	6.2%	0.084	2,700
Total	**100%**	**1.350**	

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

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	NICKEL & NICKEL WASTEWATER FEASIBILITY STUDY PW Design Criteria	PROJECT NO. 2016131 BY: SW CHK: GG

DESIGN CRITERIA - EXISTING

Sizing Parameters

PW BOD Concentration[a]	7,700	mg/L
PW Peak Daily Flow	14,400	gal PW/day

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

Oxygen Requirement	1.5	lbs O_2/lb BOD	
Oxygen Transfer Rate	1.8	lbs O_2/HP - hr	* Brush Aerator
Power/ Volume Ratio	0.10 - 0.30	Hp/1,000 cu ft	
Pond Volume	1.70	Mgal	

Pond Aeration

BOD Mass Loading	925	lbs BOD/day
Aerator Run Time	24	Hrs/day
Oxygen Requirement	58	lbs O_2
Aerator Horsepower Required	32	HP
Proposed Aerator Horsepower	35	HP
Check Power-to-Volume Ratio	0.154	Hp/ 1,000 CF

P\V range desired is 0.10 to 0.20, 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	NICKEL & NICKEL WASTEWATER FEASIBILITY STUDY Climate Data	PROJECT NO. 2016131 BY: SW CHK: 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	2.8	4.0
November	30	53.4	1.8	2.48	1.9	4.83	7.3	10.4
December	31	47.6	0.9	1.66	1.3	5.22	7.9	11.3
January	31	47.9	1.2	1.53	1.2	7.46	11.3	16.1
February	28	51.4	1.7	2.15	1.7	7.10	10.7	15.3
March	31	54.1	3.4	3.79	2.9	5.31	8.0	11.5
April	30	58.6	4.8	5.82	4.5	1.74	2.6	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	0.3	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**	**52.6**	**75.4**

[a] Average monthly temperature observed between 1931 and 2001 for Saint Helena, Napa, CA from NOAA

[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 1931 and 2001 for Saint Helena, Napa, CA from NOAA

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

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	NICKEL & NICKEL WASTEWATER FEASIBILITY STUDY Pond Worksheet	PROJECT NO. 2016131 BY: SW CHK: GG

Pond No. 1

Bottom Width		Bottom Radius	30.0'	Start Month	August
Bottom Length		Top Radius	40.0'	Min. Depth	5.0'
Interior Side Slope (x:1)	2.0	Depth	14.0'	Annual PW	1.35 Mgal
Length:Width	N/A	Freeboard	2.0'	Initial Depth	7.0'

Depth (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	7,618	0.000
1	11,199	0.070
2	13,178	0.162
3	14,848	0.266
4	16,346	0.383
5	17,787	0.511
6	19,167	0.649
7	20,547	0.797
8	21,950	0.956
9	23,384	1.126
10	24,850	1.306
11	26,351	1.498
12	27,911	1.701
13	29,492	1.916
14	31,066	2.142

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	NICKEL & NICKEL WASTEWATER FEASIBILITY STUDY Pond Water Balance	PROJECT NO. 2016131 BY: SW CHK: GG

					Pond					
Month	**Initial Volume**	**Pond Evaporation**	**PW Inflow**	**100 Year Precipitation**	**Volume Change**	**Total Volume**	**Divert Volume**	**Final Volume**	**Final Pond Depth**	**Volume Check**	**Surface Area**
	(Mgal)	**(Mgal)**	**(Mgal)**	**(Mgal)**	**(Mgal)**	**(Mgal)**	**(Mgal)**	**(Mgal)**	**(ft)**	**(Mgal)**	**(ft^2)**
August	0.797	-0.119	0.142	0.003	0.026	0.823	0.250	0.573	5.4	0.000	20,547
September	0.573	-0.076	0.221	0.017	0.162	0.735	0.250	0.485	4.7	0.000	18,339
October	0.485	-0.048	0.174	0.077	0.204	0.689	0.100	0.589	5.5	0.000	17,355
November	0.589	-0.022	0.100	0.202	0.280	0.869	0.100	0.769	6.8	0.000	18,477
December	0.769	-0.016	0.086	0.218	0.289	1.058	0.100	0.958	8.0	0.000	20,271
January	0.958	-0.016	0.089	0.312	0.385	1.343	0.100	1.243	9.6	0.037	21,950
February	1.243	-0.025	0.097	0.297	0.369	1.612	0.160	1.452	10.7	0.306	24,264
March	1.452	-0.047	0.103	0.222	0.278	1.730	0.160	1.570	11.3	0.424	25,901
April	1.570	-0.075	0.092	0.073	0.090	1.660	0.200	1.460	10.8	0.354	26,819
May	1.460	-0.111	0.086	0.028	0.004	1.463	0.250	1.213	9.4	0.157	26,051
June	1.213	-0.127	0.076	0.007	-0.044	1.170	0.200	0.970	8.0	0.000	23,970
July	0.970	-0.139	0.084	0.002	-0.054	0.916	0.119	0.797	6.9	0.000	21,950
Total		**-0.821**	**1.350**	**1.460**	**1.989**		**1.989**			**1.278**	

Pond water balance was evaluated as a unit (not per cell) since the cells are separated by baffles and water level in the pond will change uniformly for all cells.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	NICKEL & NICKEL WASTEWATER FEASIBILITY STUDY Irrigation & Effluent Application Rates	PROJECT NO. 2016131 BY: SW CHK: GG

Applied Irrigation Area

Vineyard	12.00	acres
Pasture	0.0	acres

Total Area Available for Irrigation

Vineyard	19.0	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	0.2	2.8	0.899	31	3.72	1.213	6.5	2.112	0.250	0.77	1.86
September	5.1	0.9	0.3	4.6	1.3	0.9	0.4	0.143	30	3.60	1.174	4.0	1.317	0.250	0.77	1.07
October	3.4	0.9	0.1	3.1	0.2	4.0	0.0	0.000	16	1.92	0.626	1.9	0.626	0.100	0.31	0.53
November	1.8	0.8	0.0	1.4	0.0	10.4	0.0	0.000	14	1.68	0.548	1.7	0.548	0.100	0.31	0.45
December	0.9	0.8	0.0	0.7	0.0	11.3	0.0	0.000	5	0.60	0.196	0.6	0.196	0.100	0.31	0.10
January	1.2	0.8	0.0	1.0	0.0	16.1	0.0	0.000	6	0.72	0.235	0.7	0.235	0.100	0.31	0.13
February	1.7	0.8	0.0	1.3	0.0	15.3	0.0	0.000	5	0.60	0.196	0.6	0.196	0.160	0.49	0.04
March	3.4	0.8	0.0	2.7	0.0	11.5	0.0	0.000	12	1.44	0.470	1.4	0.470	0.160	0.49	0.31
April	4.8	0.9	0.2	4.3	0.8	3.8	0.0	0.000	13	1.56	0.509	1.6	0.509	0.200	0.61	0.31
May	6.2	0.9	0.6	5.6	3.6	1.5	2.1	0.693	16	1.92	0.626	4.0	1.319	0.250	0.77	1.07
June	6.9	0.9	0.7	6.2	4.9	0.4	4.5	1.478	17	2.04	0.665	6.6	2.143	0.200	0.61	1.94
July	7.4	0.9	0.6	6.7	4.8	0.1	4.7	1.524	30	3.60	1.174	8.3	2.698	0.119	0.37	2.58
Total	**49.4**			**43.6**	**18.5**	**75.4**	**14.5**	**4.7**	**195.0**	**23.4**	**7.6**	**37.9**	**12.4**	**1.989**	**6.1**	**10.38**

(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, 100-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

ENCLOSURE C

PACKAGE TREATMENT SYSTEM EXAMPLES

BACKGROUND

Cloacina is a manufacturer and purveyor of package wastewater treatment plants and equipment located on the Central Coast of California. Cloacina was founded by owners of an Operations, Maintenance and Mechanical company in response to the inability to locate industrial quality integrated package treatment systems.

APPROACH

Cloacina applies consistent designs into flexible applications. Packages can be supplied as a standalone unit, function with existing infrastructure or in phases to accommodate planned project growth.

Cloacina incorporates the following into each project design:

- **Project Evaluation**, working with the project team, Cloacina can design a solution specific to the initial and future needs.
- **Complete Integration**, supplied packages will be completely assembled and tested prior to shipping, including plumbing, mechanical, electrical and control equipment.
- **Quality**, all Cloacina manufactured tanks are stainless steel, all materials are non-ferrous and all equipment is of the highest quality.
- **Operation and Maintenance**, each design takes O&M into careful consideration. Accessibility, flexibility and ease of operation are evaluated as part of each package design.
- **Footprint**, Cloacina simplifies designs to keep the packages within a size to allow complete factory integration. Redundancy is accomplished by supplying spare critical equipment with flange or union fittings as well as quick electrical disconnects to allow facility staff to replace equipment.
- **Cost**, Cloacina evaluates each project for value engineering opportunities.

INTEGRATION

Cloacina package systems are completely factory integrated. Cloacina focuses on “closing gaps” in project designs to reduce necessary on-site civil and mechanical scope.

CONTROLS

Cloacina package systems are completely factory integrated. Cloacina focuses on “closing the gaps” in project designs to reduce necessary on-site civil and mechanical scope.

FACTORY PRECOMMISSIONING

Each package is factory tested to ensure the systems are fully functional prior to shipping. This approach significantly reduces the installation time and required technical ability of installer.

START-UP

Cloacina will provide a factory representative to perform start-up and commissioning of each package. This will include verification of proper installation and initial training of facility staff.

AFTERCARE

One year of remote support is provided with each project. A Cloacina Representative will monitor the performance of each project, check in with plant staff and generate routine reports related to plant performance and warranty.

ANTICIPATED PROCESS FLOW

This proposal is based on the process flow as outlined. Additional project details related to hydraulic loading, organic loading, effluent limitations, effluent disposal location, construction constraints, cost savings and any factor that alters the process flow can result in changes to the proposed design and project costs shown below.

The unit will be design to treat domestic wastewater from a winery facility.

Wastewater will be pumped to a self-cleaning screen integrated into the supplied package.

Screened influent will flow directly into the Reactor Chamber, washed solids will discharge to a receptacle.

The Reactor Chamber will be designed to have 900 gallons of equalization capacity, ensuring retention time within the treatment system.

A single membrane cassette will be installed into the Reactor Chamber. A dedicated blower will be sized to supply the necessary air to the membrane cassette.

A separate blower will supply air to the aeration diffusers and sludge storage chamber. The Reactor Chamber will be supplied with a dissolved oxygen sensor to control the aeration blower and ensure desired operating parameters are met.

The Reactor Chamber will also be supplied with a mixing unit that will operate during the denitrification cycles.

Treated effluent will permeate through the membrane cassette to a Clear Well Tank supplied on the equipment skid.

As required, effluent stored in the Clear Well Tank will be pumped through the membrane cassette to perform a Clean in Place. This will be done on a routine interval according to the manufacturer's requirements.

Treated effluent will flow, by gravity from the Clear Well Tank to downstream disposal/storage.

Solids concentration within the secondary treatment system will be monitored by an on-line suspended solids meter located in the Reactor Chamber. A sludge wasting pump will remove a portion of activated sludge to an integrated 1,000 gallon Sludge Storage Chamber.

All provided equipment will be controlled by the Cloacina-supplied Motor Control Center (MCC) and Supervisory Control and Data Acquisition (SCADA) system.

DESIGN SPECIFICATIONS

Influent Parameters:

CONSTITUENT	CONCENTRATION LIMIT	UNIT
Influent Flow Average	3,500	GPD
Influent Flow MAX	4,500	GPD
Influent Flow PEAK (24 Hr)	5,500	GPD
Influent temperature	17	C
pH	6-8	N/A
(BOD5) Average	300	mg/L
Total Nitrogen	40	mg/L
Total Suspended Solids (TSS)	300	mg/L
Fats, Oils and Grease (FOG)	<50	mg/L

Anticipated Effluent Requirements:

CONSTITUENT	CONCENTRATION LIMIT	UNIT
BOD5	<10	mg/L
Total Suspended Solids (TSS)	<10	mg/L
Total Nitrogen	<10	mg/L
NH3	<5	mg/L
DO	>2	mg/L
Settleable Solids	<.1	mg/L
Turbidity	<.2	NTU
Total Coliform	<2.2	MPN/100ml

Package Dimensions:

The following are the anticipated dimensions for the package outlined above

DESCRIPTION	HEIGHT	WIDTH	LENGTH
TREATMENT PACKAGE: Package (Outside) with attached equipment and skid	8’	8’	16’
Treatment Train (Reactor, Sludge Storage Chambers)	8’	8’	11’
Equipment Skid		8’	5’

DESIGN PARAMETERS

Design Flow	GPM	GPD
Average	2.4	3,500
Maximum	3.1	4,500

Hydraulic Retention Time	ADF	MDF
Hours	13.8	10.8

Sludge Storage Chamber		
Length	3	Feet
Gallons	1,094	Gallons

Equalization Volume		
Gallons	898	Gallons

Aeration Chamber		
Length	8	Feet
Cubic Feet	270	ft3
Gallons	2,917	Gallons

Clear Well Volume		
Gallons	~100	Gallons

Equipment Skid		
Length	6	Feet
Width	8	Feet

F/M Ratio	
Average	0.06
Maximum	0.08

Mean Cell Residence Time	ADF	MDF
Days	25.6	19.9

Loading at MAX Daily Flow	mg/L	LBS/day
BOD	300	8.8
TSS	300	8.8
Nitrogen	40	1.2
NH3	15	0.4
P	5	0.1

STANDARD FEATURES

- 304 stainless steel tankage
- Supervisory Control and Data Acquisition (SCADA) package
- Influent screening
- Membrane cassette
- Sound attenuated blower
- Modular medium bubble diffusers
- UV disinfection
- All sensory equipment and internal pumps are mounted on Cloacina's Slide Rail System®
- Above-ground installation
- Human Machine Interface

CONTROLS

To ensure proper plant operation and performance, maintain equipment operating strategy, provide daily records and real time monitoring capabilities, the following controls equipment will be provided by Cloacina as part of the MEMPAC-M package:

PROCESS	EQUIPMENT	QUANTITY
Influent	Flow Meter	1
Reactor Chamber	Level Transducer	1
Reactor Chamber	Dissolved Oxygen (DO) probe	1
Reactor Chamber	Mixed Liquor Suspended Solids (MLSS) meter	1
Effluent	Clear Well Tank Level Transducer	1
Effluent	Permeate Flow Meter	1
Sludge Storage Chamber	Level Transducer	1
Disinfection	UV Controller	1
Power	Control panel	1
Controls	Touchscreen controls computer (HMI)	1
Controls	Controls probe backwash solenoid	1

*This equipment list is preliminary for proposal purposes. The final equipment selections will be detailed in the Equipment Submittal Package for the Client's approval.

EQUIPMENT

PROCESS	EQUIPMENT	QUANTITY
MEMPAC-M Train	Stainless Steel Tank (8'W, 8'H, 11'L)	1
MEMPAC-M Train	Stainless Steel Equipment Skid (8'W, 5'L)	1
Access Platform	Stairs and platform.	1
Headworks	Self-Cleaning Screen (2mm)	1
Reactor Chamber	Sound Attenuated Blower (50 cfm) (80 dba 5')	1
Reactor Chamber	Diffuser Grid (4 OTT D-REX Diffusers)	1
Reactor Chamber	Anoxic Mixer	1
Reactor Chamber	Waste Sludge Pump	1
Effluent	FibrePlate FPC400 Cassette	1
Effluent	FibrePlate FPM400 Modules	1
Effluent	Permeate Pump	1
Effluent	Clear Well Storage Tank (~100 gallon)	1
Effluent	CIP Chemical Pump	2
Disinfection	Validated, In-pipe UV Unit	1

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Contact:
Gina Giacone
gina@summit-sr.com
(707) 527-0775

SUMMIT ENGINEERING, INC.
463 Aviation Blvd., Suite 200
Santa Rosa, CA 95403
707 527-0775
sfo@summit-sr.com