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Wastewater Feasibility Study

Regusci Winery, Major Modification to Use Permit P16-00307
& Request for Exception to Road and Street Standards
Planning Commission Hearing Date, November 15, 2017

DELTA CONSULTING & ENGINEERING
OF ST. HELENA

WASTEWATER FEASIBILITY REPORT

FOR THE

REGUSCI WINERY
USE PERMIT MODIFICATION

LOCATED AT

5584 SILVERADO TRAIL
NAPA, CA 94558

COUNTY: NAPA
APN: 039-030-023

REPORT DATE: JUNE 7, 2016

PREPARED FOR REVIEW BY:

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I. PROJECT DESCRIPTION

The applicant, Regusci Winery, is applying to the County of Napa for a Use Permit Modification to increase wine production and winery visitation. This report has been prepared to evaluate the feasibility of the treating and dispersing the increased wastewater flows for both domestic and process wastewater. The owner of the winery desires to combine the process and domestic wastewater and reuse the treated wastewater as an irrigation source for on-site vineyards and landscaping.

Regusci Winery is located at 5584 Silverado Trail in Napa County, California, APN 039-030-023. The parcel is located approximately 5 miles north of the intersection of Trancas and Silverado Trail in Napa. The western side of the parcel, including the winery development area and the vineyards, falls within the Napa County Agricultural Preserve (AP) zoning boundary. The eastern side of the parcel falls with the Napa County Agricultural Watershed (AW) zoning boundary.

The proposed wastewater system includes a Lvye System, above ground tanks, above ground storage pond, pumping system and surface drip disposal. An application shall be submitted to the State Regional Water Quality Control Board for approval of the proposed treatment and disposal system. Construction documents shall be submitted to Napa County Environmental Division for approval in conjunction with the application to the State Regional Water Quality Control Board.

This report outlines the raw effluent parameters, the estimated wastewater generation, the proposed wastewater treatment system with final wastewater quality, and the treated wastewater disposal via surface drip irrigation system.

II. RAW WASTEWATER PARAMETERS

A. Winery Process Wastewater

1. Wastewater Generation

   As every individual winery incorporates differing winemaking methods and equipment, the actual annual wastewater produced varies for each winery. The amount of wine produced in one year is the most important part in estimating a specific winery's wastewater generation. Once a winery determines the volume of wine they will produce, various factors can be applied to estimate the wastewater that will be generated from production. Furthermore, it is very important to estimate the peak volume of wastewater that can be generated in one day. Undersized storage tanks and pumps can lead to the costly failure of wastewater treatment systems, and halt the production process. Specific wastewater generation estimates are provided in Section III below.

2. Production Methods

   Winery wastewater outflow and strength varies throughout the winemaking year. A typical winemaking year begins with harvest preparation and harvest. These events occur during the months of August, September, and October. The harvest season typically generates both the largest volume and maximum strength of process wastewater. A breakdown of the different winemaking phases are detailed below.

   i. Harvest and Crush – As previously mentioned, a winery will harvest and crush its fruit during the months of August, September, and October. Once the grapes have reached maturity, the fruit will be separated from the stems, and crushed to collect the juice for fermentation. Floor drains typically collect the juice, stems, seeds, and skins that are washed off of the equipment in the crush process. Grate covers on the drains can prevent larger solids from entering the wastewater system, but seeds and skins can often enter the primary wastewater tank.

ii. Fermentation – Juice from crush is collected and stored in tanks for fermentation. Yeast will be added to the juice in order for sugar to be converted to alcohol. The fermentation process can take anywhere from one to three weeks to complete. Once the fermentation process is complete, the wine will be drained from the tank into barrels for aging. Wine drained from the fermentation tanks will carry excess skins and seeds into the barrel. The remaining solids, known as pomace, will remain at the bottom of the tank. If desired by the winemaker, the pomace can be pressed to produce more wine with different characteristics for the blending process. The remaining solids will be disposed of at a solid waste facility. The empty fermentation tanks and pomace bins will be washed out with a combination of water and potassium hydroxide. These additives can reduce the pH of the wastewater, and contribute to the total dissolved solids (TDS) concentration.

iii. Clarification and Racking – Due to the excess grape skins and seeds carried over from the fermentation tanks, wine can have a high concentration of suspended solids directly after fermentation. These solids are called "lees" and are allowed to settle in the barrel during the aging process. To improve the clarity and quality of the wine, the liquid will be removed from the initial barrel, and placed in a new barrel that is free of settled solids. This process is called "racking" and will often occur several times through the wine aging process, which can last for several years. The first racking will most likely occur between the months of November and January. The lees that are washed out of barrels after the first racking are known as "gross lees." Gross lees represent the largest solid particles collected during the racking process. Responsible wineries will de-water the gross lees, and dispose of the solids off-site. However, lees are often washed out of barrels and allowed to drain to the process wastewater system due to their high water content. Wastewater generated from this process will typically have very high total suspended solids (TSS) content, and a very high biological oxygen demand (BOD). Additionally, tartaric acid can be added to the wine to adjust the acidity. Process wastewater generated by racking after pH treatment can negatively affect the natural biological treatment process in the primary wastewater tanks. As clarification and racking are part of the process used to "age" wine, it is possible for wastewater to be generated by this phase year round.

iv. Filtering and Bottling – Wine that has reached the end of its aging process will be filtered and bottled. This process can occur throughout the year due to wine types aging at different rates and the winery's production schedule. The wine storage barrels will often be washed and reused. Equipment used for bottling will be washed on a daily basis. The wastewater strength at this stage of the wine making process is typically much lower than the previous three stages of winemaking.

3. Estimating Wastewater Quality

The effluent strength parameters for all wineries vary throughout the year, as different processes take place in each stage of the winemaking process. Furthermore, the strength of effluent at each individual winery can vary due to differences in the winemaker's technique and philosophy. The main effluent quality parameters that must be estimated from a winery's wastewater are the 5-day Biochemical Oxygen Demand (BOD5) and the Total Suspended Solids (TSS), as the concentrations of these constituents are regulated by both the Bay Area Water Quality Control Board and Napa County. The BOD5 concentration is a measurement used to estimate the amount organic matter present in wastewater. The typical BOD5 concentration of raw winery wastewater is 7,700 mg/L. The TSS concentration is a measure of solid particles that have not yet settled out of the wastewater. Several additional wastewater constituents must also be estimated, as they have a direct correlation with the treatment processes used to reduce BOD5 and TSS concentrations. The total dissolved solids (TDS) present in wastewater can be an indicator for the amount of additives used to clean winery equipment, which can affect the pH balance and destroy the bacteria that consume organic matter in wastewater. The dissolved oxygen (DO) level can tell wastewater treatment operators that the bacteria need more or less oxygen in order to consume and reduce organic matter present in the wastewater. In addition to oxygen, bacteria need nitrogen to fuel their consumption of organic matter. The nitrogen concentration in wastewater will alert wastewater treatment operators to how much nitrogen they need to add to the wastewater in order for bacteria to most efficiently consume organic matter. Fortunately, the presence of fecal coliform and other pathogens are not detectable in process wastewater, and will not be considered a constituent of concern. The following table provides a range of the expected strength of each wastewater constituent throughout the winemaking year.

Typical Process Wastewater Constituent Values[1]

Constituent	Unit	Peak Season[a]	Off Season[b]
PH		3.8-7.8	3.8-7.8
BOD5	Mg/L	7,700	1,000
TSS	Mg/L	57-3,950	12-400
TDS	Mg/L	315-1,240	214-720
Nitrate	Mg/L	0.63-362	0.23-53
Ammonia	Mg/L	2.25	
DO	Mg/L	2.3-6.3	2.3-6.3

[a] Peak season runs from September through March
[b] Off season runs from April to August

B. Winery Domestic Wastewater

1. Wastewater Generation

The domestic wastewater (DW) generated a winery is dependent on the daily number of employees and visitors present at the winery. Generally, the first steps in the development of a new winery will involve a marketing plan that determines how many employees are needed to produce their wine. If the winery chooses to provide hospitality services such as wine tasting and private events, they will prepare a marketing plan which outlines the number of daily wine tasting visitors and the number of guests at a private event. The marketing plan allows the winery to estimate the peak number of visitors they expect to accommodate in a single day. In terms of wastewater generation, the sum of the employees plus the peak number visitors and guests, gives the maximum number of people that will be contributing to the daily peak wastewater generation. Specific wastewater generation estimates are provided in Section III below.

2. Estimating Wastewater Quality

[1] Tchobanoglous, George and Crites, Rob , *Small and Decentralized Wastewater Management Systems.* (McGraw-Hill, 1998) p 180-183.

The quality of domestic wastewater generated at a winery or a residence are typically similar. The main effluent quality parameters that must be estimated from domestic wastewater are the 5-day Biochemical Oxygen Demand (BOD5) and the Total Suspended Solids (TSS). Several additional wastewater constituents must also be estimated, as they have a direct correlation with the treatment processes used to reduce BOD5 and TSS concentrations, similar to the winery process wastewater as described above. In addition, domestic wastewater has fats, oils, and grease (FOG) that will likely be discharged to the wastewater system, and can damage the biological processes that take place in wastewater treatment. Fecal coliform is also extremely prevalent, and is detrimental to human health. The total dissolved solids (TDS) present can affect the pH balance and destroy the bacteria that consume organic matter in wastewater. If a high level of wastewater treatment is required, it is important to know the type and amount of harmful bacteria and pathogens that are present in the effluent so the most appropriate form of disinfection can be applied. The following table provides a description of the expected strength of each wastewater constituent.

Typical Domestic Wastewater Constituent Values[2]

Constituent	Unit	Domestic
FOG	Mg/L	31-164
BOD5	Mg/L	110-400
TSS	Mg/L	100-350
TDS	Mg/L	280-850
Nitrogen (total as N)	Mg/L	20-85
Total Coliform	MPN/100 mL	10^7-10^8
Fecal Coliform	MPN/100 mL	10^4-10^5

C. Summary of Expected Raw Wastewater Parameters

The following table addresses the design concentrations of the main constituents considered for discharge requirements. For monthly effluent generation, the peak month is September due to harvest water use.

Summary of Pertinent Wastewater Parameters

	BOD5 (mg/L)		TSS (mg/L)	
Peak Month	PW	DW	PW	DW
September	7,700	250	300	175

III. ESTIMATED WASTWATER GENERATION

A. Winery Process Wastewater

Two methods are currently used by local wastewater engineering consultants to determine both the annual and daily peak process wastewater flows generated from a winery. The Napa County Method is used to estimate the peak wastewater flow that could occur in one day during harvest. The Industry Method estimates the annual wastewater generation, then distributes a percentage of that flow to each month based on the seasonal behaviors of winemaking. The daily peak flow is then estimated by dividing the volume of wastewater generated during the peak month by the number of days in the month. The Industry Method

[2] Tchobanoglous, George and Crites, Rob , *Small and Decentralized Wastewater Management Systems.* (McGraw-Hill, 1998) p 180-183.

generally produces a more realistic estimate of wastewater flows. This report will analyze and compare both methods, and the method that provides the greatest peak daily wastewater flow will be used for the treatment design. The results of each method are shown below.

1. Napa County Method

   The Napa County Method is used to estimate the peak wastewater flow that could occur in one day during harvest. This method uses two base assumptions: the amount of process wastewater generated annually is only distributed during harvest period, and a multiplication factor of 1.5 is used for process wastewater generation. The harvest period is divided into the number of days that grapes are crushed, which is based on the annual wine production, in order to obtain a flow rate in gallons per day (GPD).

   Napa County Method: Crush Days

Annual Wine Production (gallons)	# of Crush Days
<20,000	30
20,000-50,000	45
>50,000	60

   Based on the projected wine production (50,000 gallons), the multiplying factor (1.5), and the number of crush days (45) that wastewater generation is distributed over, the Napa Method estimates a process wastewater (PW) peak harvest flow of **1,667 gallons per day**.

2. Industry Method

   The Industry Method uses a ratio of 2-12 gallons of process wastewater generated per gallon of finished wine produced to determine the annual process wastewater volume produced. The ratio depends on the water conservation techniques utilized within each individual winery. In rare cases, if the winery is water conscious, the ratio can be as low as 2. For a typical winery, the ratio is higher. For this winery, a value of 12 gallons of process wastewater generation per gallon of wine is analyzed. This volume of wastewater to be generated per gallons of wine produced provides a conservative estimate and the actual wastewater generated is likely to substantially less.

   The next step in estimating wastewater quantity is to determine the peak daily flow. The annual estimated process wastewater generation is broken down into monthly percentage flows. This method attempts to consider the winery operations which vary by month depending on the winemaking season. For example, with this method, the percentages increase for the harvest months and the percentages decrease for the non-harvest months.

   Based on the projected annual wine production level of 50,000 gallons of wine and 12 gallons of process wastewater generated per gallon of wine, the Industry Method estimates 600,000 gallons of process wastewater produced annually. The peak month of process wastewater generation is September, contributing 15% of the annual flow. The peak average daily flow in September is **3,000 gallons per day**. See "Wastewater Flow Generation Estimates" in Appendix 1 for the calculations used to estimate process wastewater flows.

B. Domestic Wastewater

To calculate the daily peak domestic wastewater flow generated, the maximum number of people present at the site, as well as the amount of wastewater each person will generate, must be estimated. The wastewater system shall serve the existing development in which domestic wastewater generation includes the winery, tasting room, vineyard management offices, general offices and residences.

The winery's projected marketing plan and employee count as proposed to Napa County is as follows:

- Employees: 16 per week day/7 per weekend day
- Daily visitors: 150 per day maximum/400 per week maximum
- Food & Wine Pairing: 12 guests per day, 4 days per week
- Small Events: 50 guests per event, 10 events per year
- Medium Events: 150 guests per event, 5 events per year
- Large Events: 200 guests per event, 1 event per year

When events involving more than 50 guests occur, the winery shall be closed to daily visitors. The proposed commercial kitchen shall be used to prepare food for all events and for food and wine pairing. All events shall utilize rented dishware which shall not be washed on-site.

In addition to the winery, there is the staff for the vineyard management, general offices, equipment maintenance shop and grounds who also contribute to wastewater generation.

- Vineyard Management Staff: 5 per week day
- Office Staff: 6 per week day
- Shop Staff: 3 per week day
- Grounds Staff: 4 per week day

Based on the wastewater generation tables provided by Napa County[3], it is estimated that wastewater generated per person will be as follows:

Wastewater Generation

Type	Gal/person/day
Employees	15
Wine Tasting guests	3
Food and Wine Pairing	5
Events	8

There are also four (4) existing residences located on the parcel which will also contribute to the domestic wastewater generation. Each residence shall use 150 gallons per day per bedroom[3] to estimate the wastewater generation.

The existing Caretaker's dwelling is located in the same building as the offices. This residence has four (4) bedrooms. This residence shall be connected to the proposed wastewater treatment system at the time of its construction.

[3] Napa County Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems, Appendix 1, Table 4, 2006

The other three (3) existing residences shall not be connected to the proposed wastewater system. At this time and to the best of the owner's knowledge, each existing wastewater system serving each residence is functioning properly. If any one of these system fails, the owner has a few options, including, but not limited to: 1) repair the system, 2) construct a new system, or 3) include the wastewater flows into the proposed treatment system presented in this report.

The proposed treatment system presented in this report shall include all residential wastewater flows, so that if the owner chooses to include the flows into the wastewater treatment system at a future time, the system is sized appropriately. The flows from the four (4) residences are as follows:

- Caretaker's Dwelling: 4 bedrooms at 150 gallons per day = 600 gallons per day
- Residence 1: 2 bedrooms at 150 gallons per day = 300 gallons per day
- Residence 2: 3 bedrooms at 150 gallons per day = 450 gallons per day
- Residence 3: 2 bedrooms at 150 gallons per day = 300 gallons per day

The peak effluent generated in a single day will occur on a weekday when the winery requires sixteen (16) employees on staff, holds an event with two hundred (200) guests with food served via the on-site commercial kitchen, when vineyard management office, office staff, shop staff and grounds staff requires the maximum of eighteen (18) employees combined, and when all residences are fully occupied. Based on this combination, the peak daily domestic wastewater flow is **<u>3,760 gallons per day</u>**. See "Wastewater Flow Generation Estimates" in Appendix 1 for the calculations used to estimate domestic wastewater flows.

C. Summary of Wastewater Generation

The process wastewater average peak daily flow from the month of September, based on the Industry Method, is 3,000 gallons per day. The domestic wastewater peak daily flow is 3,760 gallons per day. The total peak daily is the sum of these values, or **<u>6,7~~2~~0 gallons per day.</u>**
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IV. PROPOSED WASTEWATER TREATMENT SYSTEM

The proposed wastewater treatment system includes domestic and process wastewater septic tanks, combining the domestic and process wastewater into equalization tanks, a Lvye System and disinfection. The proposed disposal system is discussed in the next section. Please see the Site Plan in Appendix 2 for the location of the proposed treatment system components.

A. Primary Treatment – Domestic Wastewater

Primary treatment provides partial removal of TSS and BOD through the gravitational settling of solids. Raw wastewater will flow via gravity into a septic tank. Within the septic tank, solids will settle out of solution, and the remaining wastewater will continue to the next step of the treatment process. Detention time in the septic tank plays a large factor in reduction of TSS and BOD. In general, a longer detention time means more reduction of pollutants.

The domestic wastewater will be separated into two wastewater streams for the primary treatment stage. Sanitary sewage from toilets, sinks, etc from the existing offices, existing tasting rooms, existing shop, and existing Caretaker's Dwelling will drain via gravity to a series of underground septic tanks. Wastewater from the proposed commercial kitchen will drain via gravity to a grease interceptor for the removal of fats, oils and grease. Solids will be removed from the tanks as necessary by the contracted operations and maintenance contractor. The effluent from the septic tanks and grease interceptor will flow via gravity to an underground lift station and be pumped into the Equalization Tanks for the next stage of treatment. Sizes of the required septic tanks, grease interceptor and lift station shall be determined as part of the construction plans for the proposed wastewater system.

B. Primary Treatment – Process Wastewater

The primary treatment stage for the process wastewater consists of gravitational settling of solids, similar to the domestic wastewater primary treatment, plus the addition of mechanical removal of solids. The process wastewater will be collected by floor drains within the existing Production Building, existing Barrel Building and other existing wine processing areas. The floor drains will be fitted with sediment removal baskets designed to prevent solids larger than 3/32" diameter from entering the primary treatment system. The process wastewater will pass through the sediment removal baskets and drain via gravity to an underground septic tank. As some of the existing wine processing areas area uncovered, a new automatic diversion valve will installed to prior to the septic tank. Solids will be removed from the tanks as necessary by the contracted operations and maintenance contractor. The effluent from the septic tank will flow via gravity to a lift station. The lift station will pump the effluent through an in-line filter screen and into the Equalization Tanks for the next stage of treatment. Sizes of the required septic tank and lift station shall be determined as part of the construction plans for the proposed wastewater system. The in-line filter screen will be installed for additional solids removal prior to the process wastewater entering the Equalization tanks. The in-line filter is designed to function with the flow rate and pressure from the lift station pump and will filter out solids with a diameter larger than 1/16". The solids collected from the floor drain filter baskets and the in-line screen must be manually cleaned and disposed by winery staff.

C. Equalization

The Equalization Tanks are used to combine the process and domestic wastewater streams. The tanks shall be above ground and sized for a minimum of 1.5 day's storage at the peak flow rate. The size of the equalization tanks shall be determined as part of the construction plans for the proposed wastewater system and shall be located inside the two of the three existing silos. If, during the construction design phase, it is found to not be possible to place the tanks in the existing silos, they shall be located above ground near the Lyve System. Please see the Site Plan in Appendix 2 for the location of the existing silos and Lyve System. The equalization tanks will be equipped with coarse bubble diffusers that introduce oxygen into the wastewater and mix the wastewater to create a uniform solution. If required, additives will be supplied to the equalization tank to maintain optimal pH and nitrogen levels for the treatment process. The additive solutions will be supplied from two small above ground tanks.

D. Lyve System

The equalization tank will pump wastewater into the proposed Lyve System. Please see the Site Plan in Appendix 2 for the location of the Lyve System. Lyve Systems manufactures above ground activated sludge treatment units capable of treating variable quantities of wastewater. Lyve Systems use energy efficient biological processes to reduce the 5-Day Biochemical Oxygen Demand (BOD5) and Total Suspended Solids (TSS) present in wastewater. Lyve Systems are specifically designed to reduce high strength winery wastewater to levels acceptable by local and state water quality standards. Multiple Lyve Systems have been installed in Napa Valley Wineries over the last several years. Most notably, the Lyve Systems installed at Alpha Omega Winery, Chappellet Winery, and Darioush Winery allow the treated wastewater to be reused for landscape and vineyard irrigation.

The Lyve System treatment process builds upon the traditional activated sludge process used in many Publically Owned Treatment Works (POTW). As high strength wastewater enters the Lyve System, it is mixed with a controlled amount of bacteria rich sludge. The wastewater and sludge are mixed using oxygen diffusers that allow the bacteria population to thrive and consume all the organic matter contributing to the BOD5 concentration present in wastewater. After sufficient time is given for the bacteria to consume the organic matter, the wastewater mix is transferred to a stilling basin. At this point in the process, the bacteria have conglomerated into groups heavy enough to settle out of solution. The bacteria rich settled solids form a sludge that can be reused in the treatment process. Periodically, excess sludge will build up and must be transferred to a separate above ground sludge holding tank. The size of the sludge tank shall be determined as part of the construction plans for the proposed wastewater system and it shall be located inside one of three existing silos. If, during the construction design phase, it is found to not be possible to place the tank in the existing silos, it shall be located above ground near the Lyve System. Please see the Site Plan in Appendix 2 for the location of the existing silos and Lyve System. When the sludge levels in the holding tank exceed a pre-determined volume, it must be hauled off-site to an approved municipal treatment system.

Treated effluent that is separated from the sludge in the stilling basin is transferred to a separate area for the final step of the Lyve System treatment process. A membrane bio-reactor (MBR) using micro-filters clarifies the wastewater by removing solids as small as one micron from the wastewater stream. The MBR uses a vacuum pump to pull effluent through a series of micro-filters into a holding tank for final distribution of the treated effluent. After this stage of the treatment process, the wastewater has been purified to California Title 22 standards for recycled water. The Membrane Bioreactor, the final treatment process within the Lyve Systems, has been certified by the Regional Water Quality Control Board (RWQCB) to meet Title 22 water quality standards. Please see Appendix 3 for a copy of this letter and other Lyve System information.

E. Disinfection

Although the Lvye System treats the wastewater to meet Title 22 water quality standards, disinfection must be provided in order to expand the use of the wastewater beyond only vineyard irrigation. At the time of the writing of this report, it has not been determined what the final use of the recycled water shall be beyond vineyard irrigation. The owner's goal is to use the recycled water in as many areas as can be permitted. Therefore, this report proposes to treat the wastewater to Disinfected Tertiary Recycled Water standards. The final determination of the disinfection standards that shall be met will be described in the Report of Waste Discharge to be submitted to and approved by the State at a later date.

To reach the goal of meeting the Disinfected Tertiary Recycled Water standard, the waste stream will be treated with Peracetic Acid (PAA) for disinfection. PAA oxidizes the outer cell membranes of microorganisms. As the outer cell membranes are destroyed, the bacteria loses is capacity to reproduce, and dies. PAA can be applied for the deactivation of a large variety of pathogenic microorganisms. It also deactivates viruses and spores. PAA is an organic peroxide compound with the formula CH_3CO_3H. It is environmentally friendly as it hydrolyzes to acetic acid and hydrogen peroxide in water. It is a broad-spectrum biocide with a fast reaction time (minutes rather than hours) and leaves no harmful by-products. PAA is a strong oxidant and disinfectant with oxidation potential higher than that of chlorine or chlorine dioxide. PAA is available in the form of equilibrium mixture which also contains hydrogen peroxide, acetic acid (vinegar) and water as shown by the following equation:

$CH_3CO2H + H_2O_2$ « $CH_3CO3H + H_2O$
Acetic Acid + Hydrogen Peroxide « Peracetic Acid + Water

Additional Benefits of PAA:

- Replaces chlorine, sodium hypochlorite, is a low-capital alternative to UV, chlorine dioxide and ozone.
- PAA decomposes into biodegradable components and does not create chlorinated compounds or harmful disinfection by-products.
- Has been shown to lower fecal coliforms counts quickly in effluent to satisfy discharge limits.
- Disinfection performance not impacted by variability in nitrite or ammonia concentrations.
- Can pass fish toxicity tests, showing no harm to aquatic life.
- With proper dose, it does not alter the water quality that affects the discharge limits.
- In most applications, it does not require quenching of PAA residual.

The disinfection capabilities of PAA are not largely affected by organic compounds that might still be present in the wastewater. However, pH and temperature do influence peracetic acid's ability to destroy bacteria. PAA is most effective when the pH value is 7. Fortunately, the target pH level of the water leaving the Lyve System will range between 7.0 – 7.2. At a temperature of 15°C (59°F) and a pH value of 7, five times more PAA is required to affectively deactivate pathogens than at a pH value of 7 and a temperature of 35°C (95°F)[4]. Because the Lyve System does not control temperature, the water temperature shall be carefully monitored in order to determine the amount of PAA that is required for disinfection. PAA disinfects on contact and is dosed directly into the effluent stream within the Lyve System at a rate of 3mls per 5 gallons of treated effluent. A static mixer is incorporated in to the effluent line to ensure adequate mixing. The target dose rate is 10 ppm of active Peracetic Acid.

Heritage Systems from Napa, California, shall provide maintenance and operation of the PAA system. Heritage's maintenance shall ensure the PAA tank does not run empty, and provide sampling and testing to ensure the recycled wastewater meets the appropriate treatment standards prior to irrigation.

F. Lyve System Monitoring

All controls and monitoring shall be provided by the equipment in the control room located in the treatment unit. This includes system touch screens for operation, alarms, video cameras, and video monitors. The entire treatment plant is accessible and operable via the internet. This allows either the manufacturer in New Zealand or the on-site system operator to monitor, assess operating conditions, make adjustments including flow rates and nutrient or chemical additions, and respond to alarm conditions. If an alarm condition occurs, the local system operator shall be notified via text message, email, and a remote visual/audible alarm.

Once the treatment unit is operational and the bacteria population has matured, the system operates with few adjustments. As the winemaking season progresses and BOD loading demand fluctuates, the operator may adjust the flow rate to increase nutrients for the bacteria. As for daily operation, a pressure transducer shall be located within the Equalization tank. This transducer is connected to a pump controller located in the treatment unit's Control Room. This controller shall provide start/stop of the system and remote alarms (text message, email, and remote visual/audible alarm) 24 hours a day, seven days a week.

In addition, a Hach digital pH probe will monitor the pH of the influent into the selector zone in the treatment

[4] http://www.lenntech.com/processes/disinfection/chemical/disinfectants-peracetic-acid.htm

unit. Lime slurry (SLS45) shall be injected into the influent line to raise pH to maintain levels between pH 7.0-7.2. The lime slurry is a non-hazardous product and will be stored on-site within a secondary containment tank.

A Hach NH4D sc Ammonium Sensor shall monitor the Ammonia Nitrogen levels in the Aeration basin. As a general rule, the biological process requires five pounds of Ammonia Nitrogen for every 100 pounds of BOD that is metabolized. Ammonia Nitrogen in the form of liquid urea will be metered into the system at the appropriate rate. Liquid urea in the form of UAN 32 liquid fertilizer is a non-hazardous product; regardless, the liquid urea shall be stored on-site within a secondary containment tank.

The level of suspended solids in the aeration basin shall be monitored using a Hach Solitax immersion probe and Hach sc200 Analyzer. Information gathered from the suspended solids probe will assist the system operator in maintaining the optimum nutrients are available to the micro-organism ratio within the Lyve System.

The settling ability and sludge levels in the aeration basin shall be simulated using the Lyve Auto-Settlometer. The Settlometer is programmed to video record the standard 30 minute settlometer test. Information from testing will assist the system operator in determining the optimum return sludge and waste sludge flow rates in order to maintain optimum processing conditions. Hach Sonatax Sludge level probes shall monitor the level of sludge blanket in the clarifier.

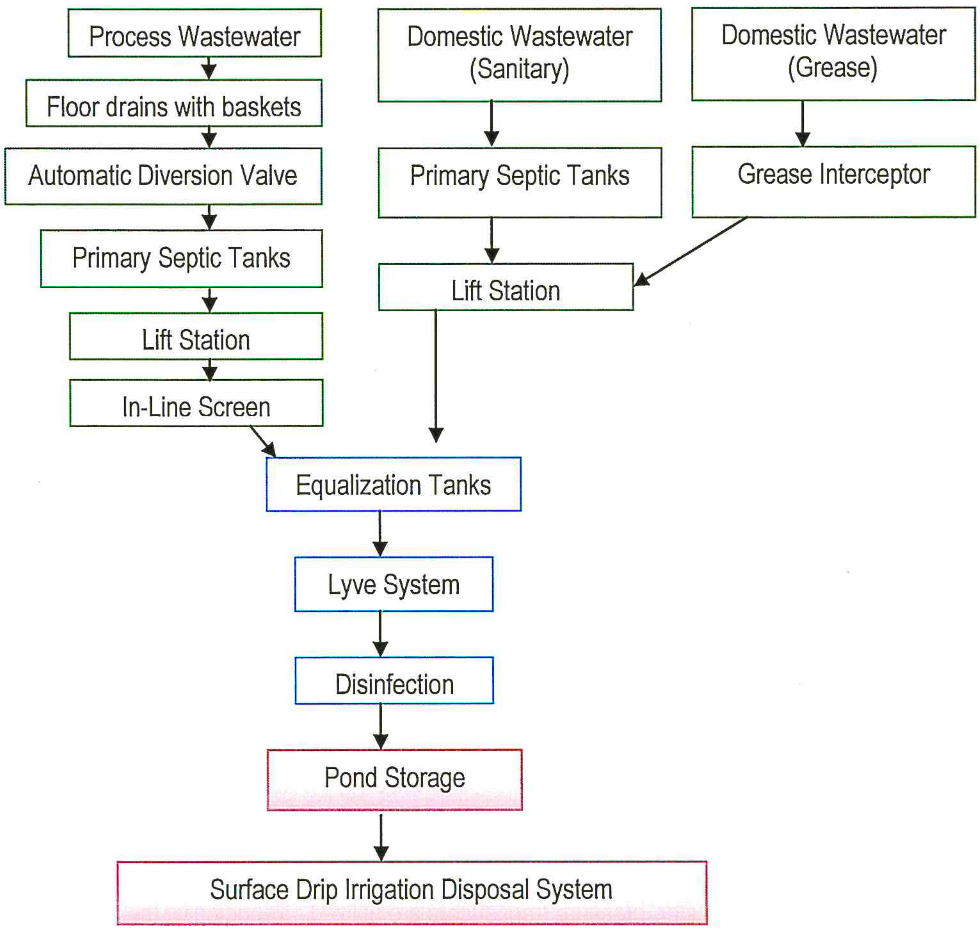
A single Solitax Turbidity monitor shall monitor the level of turbidity in the overflow weir in the clarifier. If the condition of the clarified effluent reaches unacceptable levels, the system shall begin to recycle the treated effluent via returning the treated effluent to the equalization tank. If this condition occurs, the local system operator and Lyve System technicians shall be notified via text message, email, and a visual/audible alarm.

Internet based video surveillance of the top of the Aeration basin and Clarifier shall allow the local system operator and Lyve Systems technicians to monitor process conditions remotely. Various foam and surface scum accumulation can indicate process changes and information gathered from this visual observation allows for timely response and adjustment if required.

To monitor sludge levels in the digester, pressure transducers are utilized. Periodically, the air mixing will cease to allow for sludge settlement. The clarified layer formed as a result of the settling will be decanted from the digester and returned to the equalization tank for reprocessing.

G. Wastewater Treatment System – Overall Schematic

The following is a schematic of the overall wastewater treatment system:



V. PROPOSED WASTEWATER DISPOSAL SYSTEM

The primary disposal system for the treated wastewater is a surface drip irrigation system, which shall be designated as a "recycled water irrigation system". An analysis has been completed to determine the feasibility of surface drip irrigation as an appropriate method of disposal, as well as minimum water storage requirements.

A. Recycled Water Use Overview

Water reuse is essential to reducing the water demand placed on local and regional water resources. Water reuse projects and planning provide multiple important water quality, water supply, and wastewater disposal benefits for communities including:

- Augmentation and improved reliability of local water supplies
- Reduction of the mass pollutants discharged to State waters
- Reduction in the size or deferral of the need for additional wastewater export facilities.

These benefits ensure sustainable wastewater and winery practices.

B. Storage and Irrigation Pond

After treatment and disinfection, the recycled water shall be stored in an above ground pond prior to disposal via surface drip irrigation.

The proposed pond shall be used as the main source for the parcel's vineyard irrigation. The proposed pond shall store the recycled water and shall be supplemented with the parcel's well water to ensure an adequate volume of water for irrigation. The proposed pond shall hold a volume of approximately 1 acre-foot, or 325,851 gallons, and shall cover approximately 0.25 acres of land. See the Site Plan in Appendix 2 for the location of the proposed pond.

C. Wet Weather Storage

The proposed pond shall also provide the required wet weather storage for surface drip irrigation, as surface drip irrigation disposal is not allowed 48 hour prior to, during, or 48 hours after a storm event. The following parameters were analyzed to determine the necessary storage required for the continued operation of the system during rain events.

1. The estimated total monthly wastewater generated by the winery
2. The estimated number of available application days per month

Based on these parameters, a minimum of 75,000 gallons of storage must be provided to hold the recycled water before, during, and after storm events. See "Wet Weather Storage Information" in Appendix 1. As the pond shall provide 1 acre-foot, or 325,851 gallons, of storage, it shall be sufficient to also provide the required wet weather storage. The controls that activate the filling of the pond with well water will be designed so that during the wet weather months, the filling from the well will be minimized to allow for an increased amount of recycled water to be stored.

If, due to continued rain events, release to the vineyards is prohibited, and the pond approaches its maximum volume, the wastewater operator will need to do the following:

1. Halt all process and domestic wastewater generating activities.
2. Contact an approved septic hauler to empty the septic tanks and pond.

D. Primary Disposal System

The winery has approximately 38 acres of vineyards, broken into nine (9) blocks. Six (6) blocks, blocks 1 through 5, and 8, will be irrigated from the pond. Three (3) blocks, blocks 6, 7 and 11, are located near the parcel's main well, Well #2. At this time, these three blocks will not be irrigated from the pond, due to the required 100 foot setback from the well to recycled water surface drip irrigation systems. It is the goal that in the near future, as technology progress, that these three blocks will be added to the pond irrigation system.

The six (6) blocks that shall receive recycled water from the proposed pond cover approximately 34.5 acres. According to vineyard management irrigation records, the vineyards are irrigated from April through October. The peak monthly irrigation use occurs in August and is 805,331 gallons. The annual irrigation water use is 3,038,975 gallons. The total wastewater generated is estimated to be 1,047,856 gallon per year. See "Wastewater Flow Generation Estimates" and "Water Use Estimates" in Appendix 1. See the "Vineyard Block Plan" in Appendix 2 for the locations of the vineyard blocks.

A water balance analysis has been completed on to estimate the various factors that contribute to the volume of the pond each month. The factors include:

- Volume of recycled water to be stored
- Water used for vineyard irrigation
- Evaporation of water
- Precipitation
- Volume of water added for vineyard irrigation

Based on the water balance analysis, it was determined that the vineyard will require irrigation during the winter months in order to dispose of the wastewater generated. Irrigation will not occur 48 hour prior to, during, or 48 hours after a storm event. See "Pond Water Balance" in Appendix 1.

If the pond approaches its maximum volume, the wastewater system operator will need to do one or more of the following:

1. Work with the vineyard management company to irrigate the vineyards to dispose of the excess recycled water.
2. Halt all process and domestic wastewater generating activities.
3. Adjust the system that controls how the pond is filled with well water.

VI. CONCLUSION

This report has determined that the following items shall be constructed and/or installed in order for the winery to treat the process wastewater and domestic wastewater generated:

1. Primary Treatment System – Septic tanks, grease interceptors, and solids filtration screens
2. Secondary Treatment System – Equalization Tanks and Lyve System
3. Disinfection System – Storage tanks for materials and disinfection mixing equipment within the Lyve System
4. Disposal System – Water storage pond, irrigation control, drip lines, pumping equipment

The primary treatment system will collect and treat process and domestic wastewater separately to provide adequate hydraulic retention time and filtration of solids. The wastewater streams will be combined in equalization tanks to provide preliminary treatment, surge buffering, and a uniform wastewater stream entering the Lyve System. The Lyve System shall provide treatment to reduce constituents of concern, including BOD, and TSS. Coliform shall be treated via disinfection within the Lyve System. After the treated wastewater has been disinfected, it will be stored in an above ground pond for irrigation. This water shall only be distributed to pre-designated vineyard blocks via surface drip irrigation, and shall not be distributed to any area through spray nozzles or sprinkler heads. An analysis of the vineyard irrigation water use, the wastewater generation has been conducted which confirms that recycling wastewater by means of irrigation is an appropriate and an environmentally sound decision for this winery.

Based on the analysis performed in this report, the Regusci Winery project is feasible with regard to wastewater treatment and disposal. The parcel is more than adequate to support the project from a wastewater treatment perspective. A Report of Waste Discharge will be submitted to the State Regional Water Quality Control Board for approval of the proposed treatment and disposal system. Detailed calculations and construction plans will be submitted to the Napa County Environmental Health Division for approval prior to construction.

VII. APPENDIX

1. Wastewater Flow, Water Use and Pond Balance Spreadsheet
2. Site Plans
    a. Site Plan
    b. Vineyard Block Plan
3. Lyve System Information

APPENDIX 1

Wastewater, Water Use and Pond Balance Spreadsheet

Domestic Wastewater

Winery	Maximum Quantity (persons)	Waste Flow (GPP)[1]	Days Contributed	Gallons per Day	Annual DW Produced (gallons)
Guests/day	150	3	365	450	
Max Guests/week	400	3	52		62,400
Food & Wine Pairing[4]	12	5	208	60	12,480
Small Events[3]	50	8	10	400	4,000
Medium Events[3]	150	8	5	1,200	6,000
Large Events[3,6]	200	8	1	1,600	1,600
Winery Staff (weekdays)[6]	16	15	260	240	62,400
Winery Staff (weekends)	7	15	105	105	11,025
			Peak Estimated Winery DW Flows[6] =	1,840	159,905

Other on-site Staff	Maximum Quantity (persons)	Waste Flow (GPP)[1]	Days Contributed (5 days/wk)	Gallons per Day	Annual DW Produced (gallons)
Vineyard Management Staff	5	15	260	75	19,500
Office Staff	6	15	260	90	23,400
Shop Staff	3	15	260	45	11,700
Grounds Staff	4	15	260	60	15,600
			Peak Estimated Staff DW Flows =	270	70,200

Residential	Bedrooms	Waste Flow (GPD)[2]	Days Contributed	Gallons per Day	Annual DW Produced (gallons)
Caretaker's Dwelling	4	150	365	600	219,000
Residence 1[5]	2	150	365	300	109,500
Residence 2[5]	3	150	365	450	164,250
Residence 3[5]	2	150	365	300	109,500
			Peak Estimated Residential DW Flows =	1,650	602,250

Total Peak Estimated DW Flows =	3,760	832,355
Average Estimated Daily DW flow =	2,280	

Assumptions and notes:

1) GPP = gallons per person; Values From "Napa County Regulations for Design, Construction and Installation of Alternative Sewage Treatment Systems", Appendix 1, Table 4, 2006
2) GPD = gallons per day per bedroom, no low-flow devices; Value From "Napa County Regulations for Design, Construction and Installation of Alternative Sewage Treatment Systems", Appendix 1, Table 4, 2006
3) Events shall utilize rented dishware which shall not be washed on-site.
4) Food and Wine Pairing is a addition to normal tasting wastewater flow for those guests and will only occur 4 days per week.
5) Residential flows for Residences 1 through 3 shall not be connected to the system at this time. The flows are included in the peak daily DW flow so that if the owner chooses to include these flows into the proposed wastewater treatment system at a future time, the system is sized appropriately.
6) The large event and weekday winery staff are used to estimate the peak DW flows. This combination provides the peak wastewater generation.

Estimated Average Monthly and Daily DW Flow

Month	Day/mo	Winery Estimated % of DW[2]	Winery Monthly DW Flow (gallons)	Winery Average Daily DW Flow (GPD)	Other Staff DW (GPD)[1]	Residential (GPD)	Total Average Daily DW Flow (GPD)[3]	Month	Total Monthly DW Flow (gallons)
Jan	31	3%	4,797	155	270	1,650	2,075	Jan	61,887
Feb	28	3%	4,797	171	270	1,650	2,091	Feb	56,397
Mar	31	3%	4,797	155	270	1,650	2,075	Mar	61,887
Apr	30	8%	12,792	426	270	1,650	2,346	Apr	68,232
May	31	8%	12,792	413	270	1,650	2,333	May	69,612
Jun	30	13%	20,788	693	270	1,650	2,613	Jun	75,958
Jul	31	13%	20,788	671	270	1,650	2,591	Jul	77,878
Aug	31	13%	20,788	671	270	1,650	2,591	Aug	77,878
Sep	30	15%	23,986	800	270	1,650	2,720	Sep	79,426
Oct	31	12%	19,189	619	270	1,650	2,539	Oct	76,279
Nov	30	6%	9,594	320	270	1,650	2,240	Nov	65,034
Dec	31	3%	4,797	155	270	1,650	2,075	Dec	61,887
	TOTAL	100%	159,905		70,200	602,250			832,355

Estimated Total Peak Daily DW Flow:	3,760	gpd
Estimated Total Annual DW Flow:	832,355	gpy

Assumptions and notes:

1) DW generated by "other staff" is based upon peak flow for 100% of the year.
2) Percent of annual DW volume generated each month is based of the winery visitation and employees only
3) Total average Daily DW flow is the sum of the DW generated by the winery visitation, winery employees, other staff, and

Combined Annual Estimated Wastewater Flow Summary

			Percentage
Total Estimated PW Flows=	600,000	gallons/year	42%
Total Estimated DW Flows=	832,355	gallons/year	58%

Total Estimated Wastewater Flows=	**1,432,355**	**Gallons per year**

Combined Flow Breakdown

		PROCESS FLOWS		DOMESTIC FLOWS		COMBINED FLOW TOTALS			
Month	Day/mo	Monthly PW Flow (gallons)	Average Daily PW Flows (gallons)	Monthly DW Flow (gallons)	Average Daily DW Flows (gallons)	Total Monthly Flows (gallons)	Combined Annual Percentage Flow:	Month	Combined ADF (gpd)
Jan	31	30,000	970	61,887	2,075	91,887	6%	Jan	3,045
Feb	28	30,000	1,070	56,397	2,091	86,397	6%	Feb	3,161
Mar	31	36,000	1,160	61,887	2,075	97,887	7%	Mar	3,235
Apr	30	36,000	1,200	68,232	2,346	104,232	7%	Apr	3,546
May	31	36,000	1,160	69,612	2,333	105,612	7%	May	3,493
Jun	30	36,000	1,200	75,958	2,613	111,958	8%	Jun	3,813
Jul	31	36,000	1,160	77,878	2,591	113,878	8%	Jul	3,751
Aug	31	78,000	2,520	77,878	2,591	155,878	11%	Aug	5,111
Sep	30	90,000	3,000	79,426	2,720	169,426	12%	Sep	5,720
Oct	31	90,000	2,900	76,279	2,539	166,279	12%	Oct	5,439
Nov	30	72,000	2,400	65,034	2,240	137,034	10%	Nov	4,640
Dec	31	30,000	970	61,887	2,075	91,887	6%	Dec	3,045
	TOTAL	600,000		832,355		1,432,355	100%		

Water Use Estimates

Vineyard Irrigation Water Use

Average of 2013 through 2015 Actual Use

Month	Day/mo	Monthly % of Annual Water Use	Monthly Water Use (hours)	Monthly Water Use (gallons)	Month
Jan	31	0%			Jan
Feb	28	0%			Feb
Mar	31	0%			Mar
Apr	30	4%	26	105,856	Apr
May	31	6%	54	110,075	May
Jun	30	24%	158	751,790	Jun
Jul	31	17%	133	499,725	Jul
Aug	31	26%	187	805,331	Aug
Sep	30	20%	141	699,977	Sep
Oct	31	3%	27	66,221	Oct
Nov	30	0%			Nov
Dec	31	0%			Dec
	TOTAL	100%	725	3,038,975	

Peak Monthly Vineyard Irrigation Water Use:	805,331	gpm	Aug
Annual Vineyard Irrigation Water Use:	3,038,975	gpy	

Assumptions and notes:

1) Irrigation values obtained from records provided by vineyard management.
2) Irrigation values only include vineyard blocks 1 through 5 and 8. These are the only blocks that shall receive recycled water for irrigation from the proposed pond.

Water Use and Wastewater Flow Generation Summary

Month	Total Monthly WW flow	Vineyard Irrigation Water use
Jan	91,887	0
Feb	86,397	0
Mar	97,887	0
Apr	104,232	105,856
May	105,612	110,075
Jun	111,958	751,790
Jul	113,878	499,725
Aug	155,878	805,331
Sep	169,426	699,977
Oct	166,279	66,221
Nov	137,034	0
Dec	91,887	0
Total	1,432,355	3,038,975

Historical Local Annual Average Precipitation, Evaporation, and Temperatures

	Information Source	Location
Rainfall	Western Regional Climate Center	Napa
Pan Evaporation	Western Regional Climate Center	Lake Berryessa, CA
Temperatures	California Department of Water Resources	Napa State Hospital

Pond footprint:	12,000	ft^2
Surface Area at Inside Top of Berm[1]:	8,800	ft^2 (assumes 6' wide berm)
Surface Area at Water Surface when Pond full:	8,000	ft^2 (assumes 1' freeboard and 2:1 slope)
Surface Area at 3' below Water Surface[2]:	5,500	ft^2 (assumes 2:1 slope)

	Precipitation					Evaporation		
Month	Avg Rainfall (in)	10-Year Rainfall[a] (in)	Monthly Percentage	Calculated No Rain Days	10-Year Rainfall into Pond (gallons)	PAN Evaporation (in)	Lake Evaporation[b] (In)	Pond Evaporation (gallons)
Jan	4.73	6.62	20.5%	10	36,324	1.53	1.18	4,039
Feb	3.58	5.01	15.5%	10	27,492	2.15	1.66	5,676
Mar	2.84	3.98	12.3%	15	21,810	3.79	2.92	10,005
Apr	1.84	2.58	8.0%	15	14,130	5.82	4.48	15,364
May	0.67	0.94	2.9%	31	5,145	8.90	6.85	23,494
Jun	0.17	0.24	0.7%	30	1,306	11.00	8.47	29,038
Jul	0.01	0.01	0.0%	31	77	13.22	10.18	34,898
Aug	0.04	0.06	0.2%	31	307	12.06	9.29	31,836
Sep	0.29	0.41	1.3%	30	2,227	8.67	6.68	22,887
Oct	1.41	1.97	6.1%	31	10,828	5.72	4.40	15,100
Nov	2.58	3.61	11.2%	15	19,813	2.48	1.91	6,547
Dec	4.87	6.82	21.1%	10	37,399	1.66	1.28	4,382
	23.03	32.24	100.0%		176,858	77.00	59.29	203,266

Notes:
[1]Surface area used for "Rainfall into Pond"
[2]Surface area used for "Pond Evaporation" and assumes average depth of pond
[a]10-Year Rainfall Is the Month Average Rainfall multiplied by 1.4
[b]PAN Evaporation Rates Adjusted By A Factor Of 0.77 To Determine Lake Evaporation

Standard daily pan evaporation is measured using the four-foot diameter Class A evaporation pan. The pan water level reading is adjusted when precipitation is measure to obtain the actual evaporation. Most Class A pans are installed above ground, allowing effects such as radiation on the side walls and heat exchanges with the pan material. These effects tend to increase the evaporation totals. The amounts can then be adjusted by multiplying the totals b 0.70 or 0.80 to more closely estimate the evaporation from naturally existing surfaces such as a shallow lake, wet soil or other moist natural surfaces.

Wet Weather Storage Information

Minimum Storage Volume:	75,000	gallons
Distribution System?	Combined	

Month	Day/mo	Estimated # Available Application Days[1]	Total WW Generated (gallons)	Average WW Daily Flow (g/d)	Volume to be Irrigated[3]	Available Storage[2] (days):	Storage Met:
Jan	31	10	91,887	3,045	80,000	24.6	ok
Feb	28	10	86,397	3,161	75,000	23.7	ok
Mar	31	15	97,887	3,235	75,000	23.2	ok
Apr	30	15	104,232	3,546	105,856	21.1	ok
May	31	31	105,612	3,493	110,075	21.5	ok
Jun	30	30	111,958	3,813	751,790	19.7	ok
Jul	31	31	113,878	3,751	499,725	20.0	ok
Aug	31	31	155,878	5,111	805,331	14.7	ok
Sep	30	30	169,426	5,720	699,977	13.1	ok
Oct	31	31	166,279	5,439	66,221	13.8	ok
Nov	30	15	137,034	4,640	75,000	16.2	ok
Dec	31	10	91,887	3,045	80,000	24.6	ok

1) Application Days is a function of the particular month's percentage of annual rainfall. See "Calculated No Rain Days" on the "Precipitation & Evaporation" page.

2) Available Storage assumes pond is empty at beginning of month. Pond shall provide the number of days storage shown. If the sum of Available Application Days and Available Storage Days is greater than the number of days in the month, adequate storage is provided.

3) Volume to be irrigated is based on the irrigation needs of the vineyards and the pond water balance. See "Pond Water Balance" page.

Pond Water Balance

Pond Max Volume:	325,851	gallons (1 ac-ft)
Pond Average Volume:	225,000	gallons

Month	Pond Volume at Beginning of Month (gallons)	Recycled Water In (gallons)	Water Out via Vineyard Irrigation (gallons)[2]	Evaporation Out (gallons)[1]	Precipitation In (gallons)[1]	Pond Volume (gallons)	Water In from Well (gallons)[3]	Pond Volume at End of Month (gallons)	Pond Depth Check
Oct	75000	166,279	66,221	4,039	36,324	207,343	0	207,343	Pond Volume OK
Nov	207,343	137,034	75000	5,676	27,492	291,194	0	291,194	Pond Volume OK
Dec	291,194	91,887	80000	10,005	21,810	314,886	0	314,886	Pond Volume OK
Jan	314,886	91,887	80000	15,364	14,130	325,540	0	325,540	Pond Volume OK
Feb	325,540	86,397	75000	23,494	5,145	318,588	0	318,588	Pond Volume OK
Mar	318,588	97,887	75000	29,038	1,306	313,743	0	313,743	Pond Volume OK
Apr	313,743	104,232	105,856	34,898	77	277,297	0	277,297	Pond Volume OK
May	277,297	105,612	110,075	31,836	307	241,306	0	241,306	Pond Volume OK
Jun	241,306	111,958	751,790	22,887	2,227	-419,187	644,187	225,000	Pond Volume OK
Jul	225,000	113,878	499,725	15,100	10,828	-165,119	390,119	225,000	Pond Volume OK
Aug	225,000	155,878	805,331	6,547	19,813	-411,187	636,187	225,000	Pond Volume OK
Sep	225,000	169,426	699,977	4,382	37,399	-272,535	347,535	75,000	Pond Volume OK
TOTAL	3,039,897	1,432,355	3,423,975	203,266	176,858		2,018,028		

Assumptions and notes:

1) See "Precipitation & Evaporation" page for details on these values.

2) Vineyard irrigation requirement during April through October provided by vineyard management company. Vineyard irrigation volumes during November through March is required to release excess recycled water from the pond.

3) During peak vineyard irrigation months, water from the well will be required to supplement the pond to provided sufficient water for irrigation.

APPENDIX 2

Site Plans

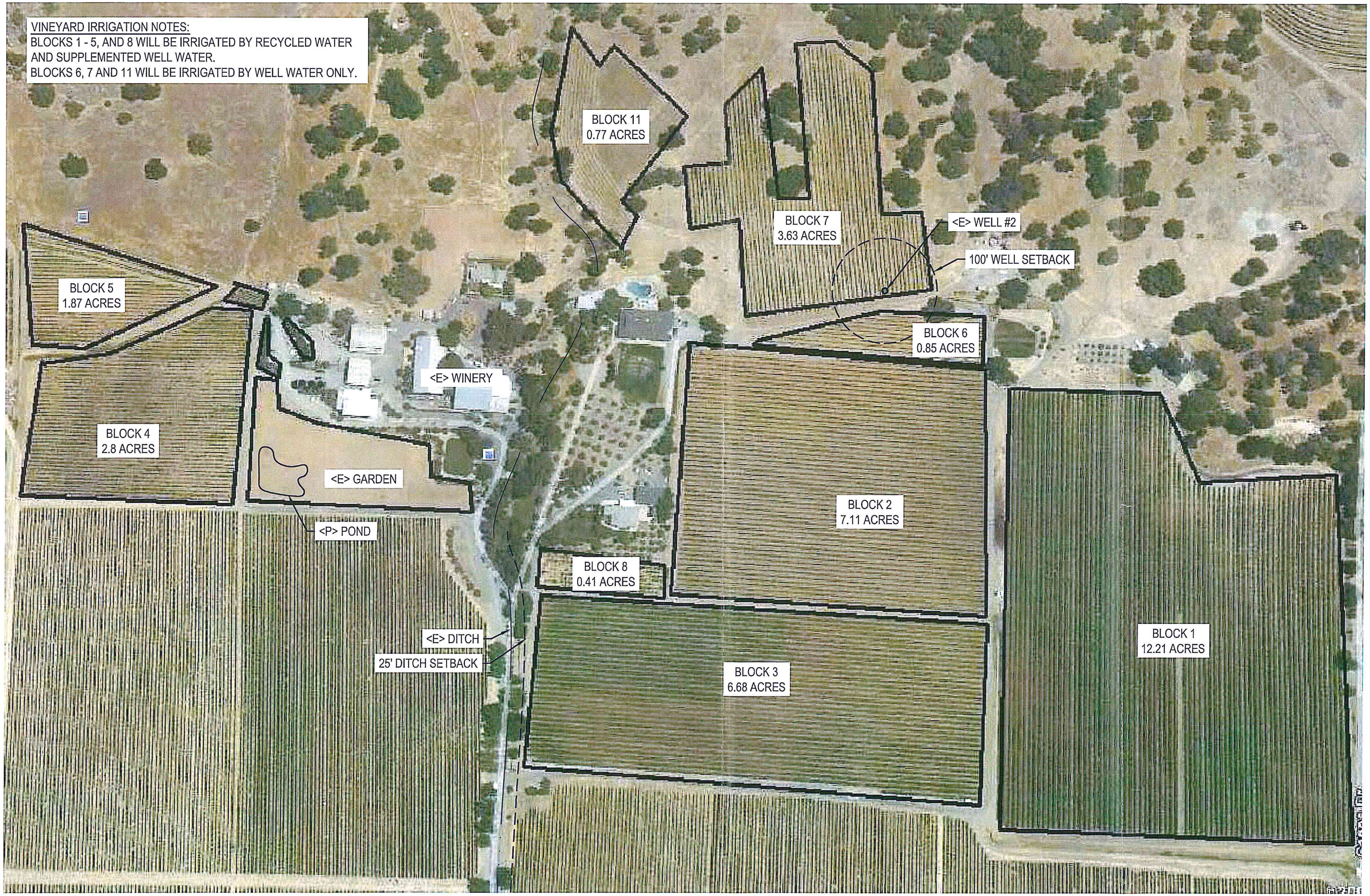
SITE PLAN

REGUSCI WINERY
WASTEWATER SYSTEM SITE PLAN
NAPA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 - ST. HELENA, CALIFORNIA 94574
707-963-8456 + 707-963-8528 FAX

DATE: 06/01/2016
SCALE: AS NOTED
JOB #: O160
APN: 039-030-023

1 OF 1



VINEYARD BLOCK PLAN

NOT TO SCALE

REGUSCI WINERY
VINEYARD BLOCK PLAN

NAPA CA

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203- ST. HELENA, CALIFORNIA 94574
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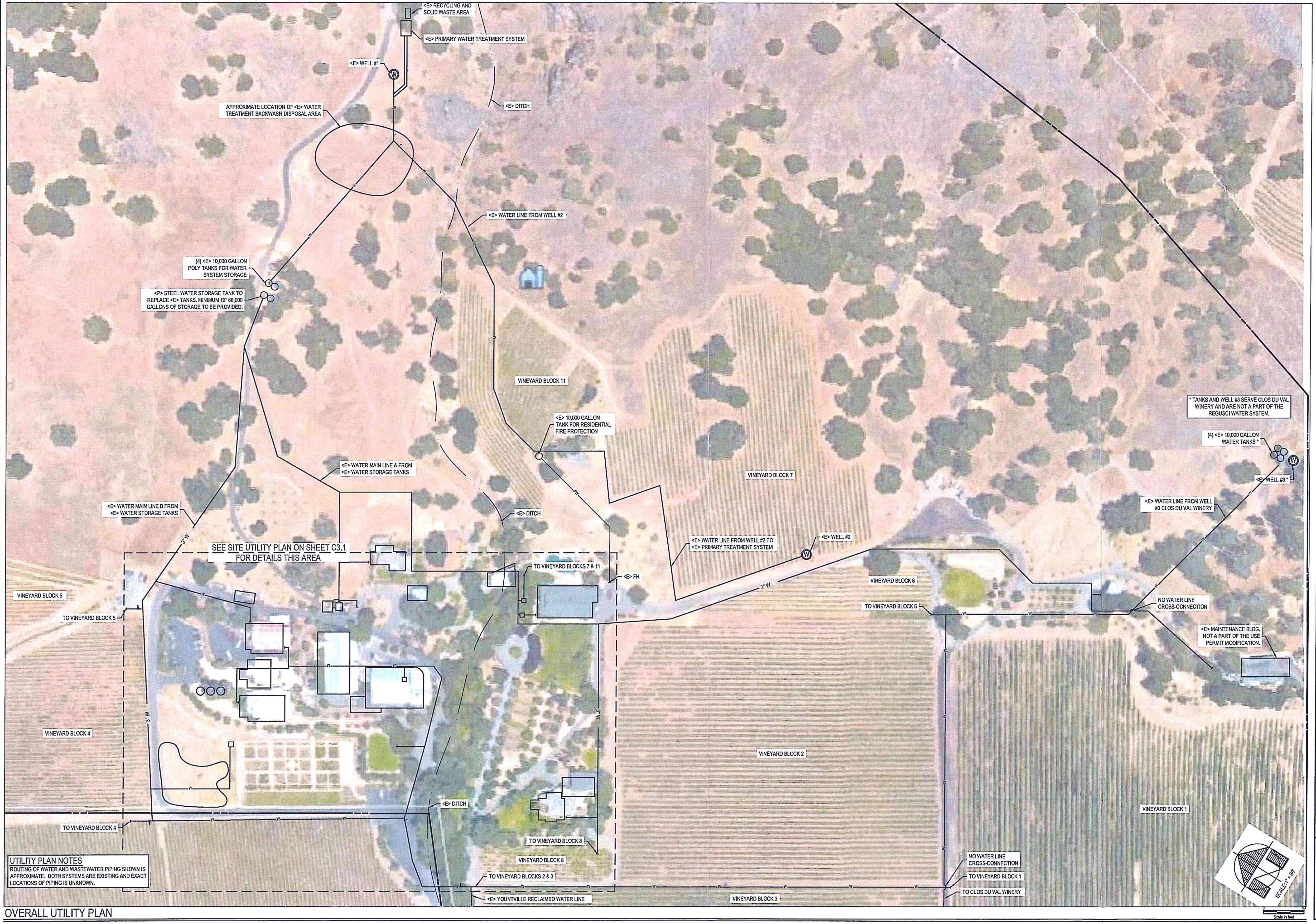
1 OF 1



UTILITY PLAN NOTES
ROUTING OF WATER AND WASTEWATER PIPING SHOWN IS APPROXIMATE. BOTH SYSTEMS ARE EXISTING AND EXACT LOCATIONS OF PIPING IS UNKNOWN.

OVERALL UTILITY PLAN

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 • ST. HELENA, CALIFORNIA 94574
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USE PERMIT MODIFICATION
OVERALL UTILITY PLAN

REGUSCI WINERY
5584 SILVERADO TRAIL
NAPA, CA 94558
APN: 039-030-023
PROJECT: 0160

DATE: 06/01/2016 ISSUE: USE PERMIT

SHEET:
C3.0

** POND NOTES

1. POND LAYOUT SHOWN FOR USE PERMIT PURPOSES ONLY.
2. FINAL POND DESIGN SHALL BE AESTHICALLY PLEASING AND BLEND INTO THE EXISTING NATURAL FEATURES.
3. FINAL POND DESIGN TO BE BY OTHERS AND SUBMITTED AS A SEPARATE CONSTRUCTION PERMIT.
4. POND SHALL STORE A MINIMUM OF 1 AC-FT AND SHALL COVER APPROXIMATELY 0.25 ACRES.

BUILDING LEGEND

BUILDING	BUILDING
A	SHOP / STORAGE *
B	VINEYARD MANAGEMENT OFFICES *
C	OFFICES / CARETAKER'S DWELLING
D	WINERY / BARREL STORAGE
E	WINERY / TASTING ROOM / PRODUCTION

* BUILDINGS ARE NOT A PART OF THE USE PERMIT MODIFICATION

UTILITY PLAN NOTES

1. ROUTING OF WATER AND WASTEWATER PIPING SHOWN IS APPROXIMATE. BOTH SYSTEMS ARE EXISTING AND EXACT LOCATIONS OF PIPING IS UNKNOWN.
2. LOCATIONS OF EXISTING UNDERGROUND WASTEWATER TANKS TANKS SHOWN ARE APPROXIMATE. EXACT GALLONAGE OF EACH TANK IS UNKNOWN.
3. PROPOSED UNDERGROUND WASTEWATER TANKS REQUIRED FOR PROPOSED WASTEWATER TREATMENT SYSTEM ARE NOT SHOWN ON THIS PLAN. EXACT GALLONAGES AND LOCATIONS OF UNDERGROUND WASTEWATER TANKS SHALL BE DETERMINED DURING CONSTRUCTION PERMITTING PHASE OF PROPOSED WASTEWATER TREATMENT SYSTEM.
4. SEE "WATER SYSTEM TECHNICAL REPORT" PREPARED BY THIS OFFICE AND SUBMITTED WITH THE USE PERMIT MODIFICATION FOR ADDITIONAL INFORMATION ON THE EXISTING WATER SYSTEM.
5. SEE "WASTEWATER FEASIBILITY REPORT" PREPARED BY THIS OFFICE AND SUBMITTED WITH THE USE PERMIT MODIFICATION FOR ADDITIONAL INFORMATION ON THE PROPOSED WASTEWATER TREATMENT SYSTEM.

SITE UTILITY PLAN

DELTA CONSULTING & ENGINEERING
OF ST. HELENA
1104 ADAMS STREET, SUITE 203 • ST. HELENA, CALIFORNIA 94574
707-963-8456 • 707-963-8528 FAX

USE PERMIT MODIFICATION
SITE UTILITY PLAN

REGUSCI WINERY
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NAPA, CA 94558
APN: 039-030-023
PROJECT: 0160

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FOR MORE INFORMATION SEE WWW.USANORTH.ORG

DATE:	ISSUE:
06/07/2016	USE PERMIT

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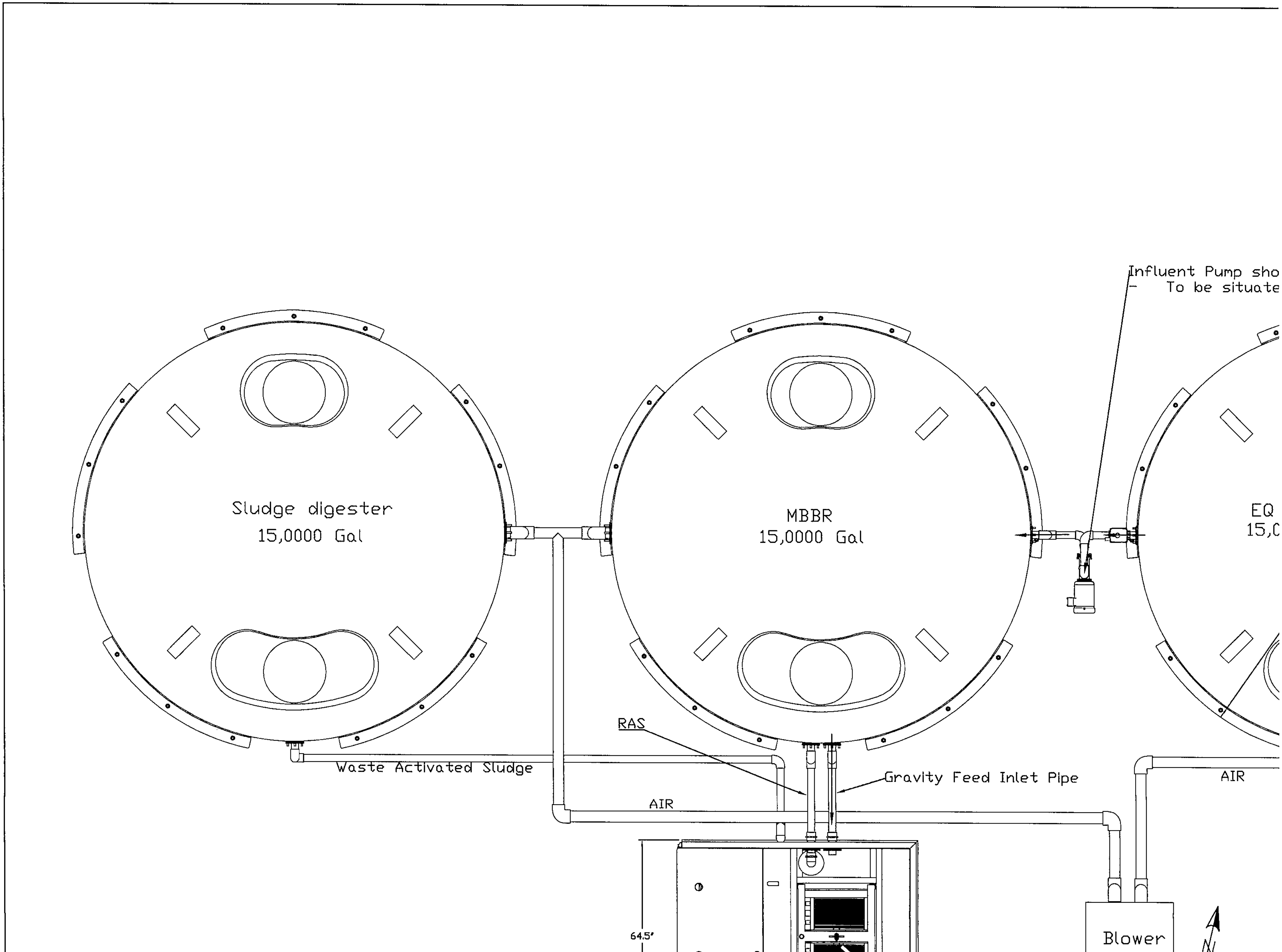
C3.1

APPENDIX 3

Lyve System Information



Influent Pump sho
- To be situate
Sludge digester
15,0000 Gal
MBBR
15,0000 Gal
EQ
15,C
RAS
Waste Activated Sludge
Gravity Feed Inlet Pipe
AIR
AIR
64.5'
Blower
N

WINERY & BREWERY
WASTEWATER TREATMENT SYSTEMS

Lyve WASTEWATER TREATMENT

LYVE SYSTEM™ LS20 Module

FEATURES:

- Produces High-Quality Effluent for Water Reuse
- Small Footprint
- Low Life Cycle Costs
- Award Winning Technology
- Full Performance Guarantee
- Low O&M Costs
- Simple Installation
- Easy Clean Membrane Design.
- Remote Monitoring and Operation Capabilities
- Energy Efficient
- Full Operations and Engineering Support Available

DESIGN CRITERIA			
Design Flow	≤	Up to 8,000	gpd
Influent BOD_5	=	<8,000	mg/L
Influent COD	=	<15,000	mg/L
Effluent BOD	≤	10	mg/L
Effluent TSS	≤	10	mg/L
SPECIFICATIONS – LS20 Module			
Operating Weight	=	10,500	lbs.
Power Requirements	=	460 V/3 Phase/60 Amps	
Dimensions	=	6'7" L x 8'10" H x 5'5" W	

Custom models available for higher strength influent wastewater.

Underground reactor model available (Model LS20-UG).

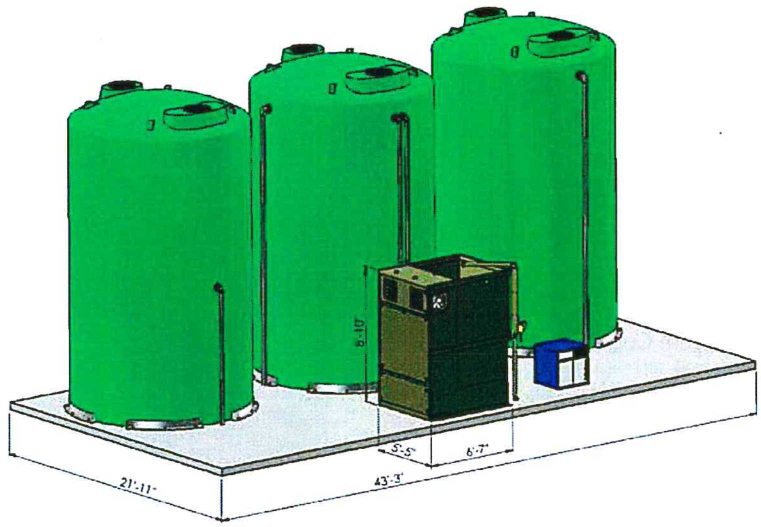
LYVE SYSTEMS offers several pre-engineered packaged treatment systems for various size wineries and breweries. Each system is able to rapidly treat high-strength wastewater and provide superior quality effluent in a small package. With remote monitoring capabilities built into the system, minimal operator time is required.

www.lyvesystems.com info@lyvesystems.com 707-931-5228

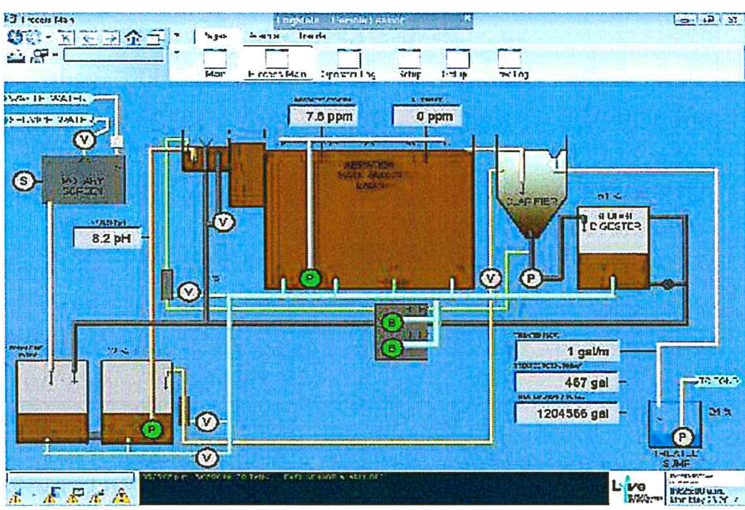
LS20 MODEL INCLUDES

- pH Adjustment System
- Moving Bed Bio-film Roughing Reactor (MBBR)
- Aeration Basin and Title 22 Ultrafiltration Membrane Bio-Reactor (MBR)
- Membrane CIP System
- Touch Screen Control Panel
- Insurance, Delivery, Set-Up and Commissioning at Job Site

2014 Wine Industry Award for Wastewater Treatment



MONITORING & CONTROL SYSTEM



Each **LYVE SYSTEM** includes a web-based monitoring and controls system equipped with a camera for real time viewing. Each system can be operated through a computer, smart phone, or facility command center. Control system records and displays:

- Tank Liquid Levels
- DO Readings
- Flowmeter Readings
- Influent pH Level
- TMP Readings
- Membrane Flux Readings

ADDITIONAL TREATMENT OFFERINGS:

Influent Screens, Equalization Tanks, Dewatering Press, Moving Bed-Biofilm Reactors (MBBR), Dissolved Air Flotation (DAF) Systems, and Sludge Digesters.

Contact wayne@lyvesystems.com for inquiries.

Lyve WASTEWATER TREATMENT

State of California—Health and Human Services Agency
California Department of Public Health

Ron Chapman, MD, MPH
Director & State Health Officer

EDMUND G. BROWN JR.
Governor

October 24, 2012

Moon Seog Jang
President
Econity Co., Ltd.
2374-41, Jungbu-Daero, Yangji-Myeon, Cheoin-Gu,
Yongin-si, Gyeonggi-do, 449-825,
S. Korea

Subject: Conditional Acceptance of the ECONITY CF-Series membrane to comply with California Water Recycling Criteria

Dear Mr. Moon Seog Jang:

The California Department of Public Health's (CDPH) Recycled Water Committee has reviewed a request, dated October 23, 2012, from MWH to consider the ECONITY CF-series as an alternative filtration technology for compliance with the California Water Recycling Criteria (Title 22), Section 60320.5. Accompanying the request was a report entitled, "Assessing the Ability of the ECONITY CF-series Membrane Bioreactor to Meet California's Title 22 Water Reuse Criteria", dated October 2012. The report outlines findings from a study conducted at the Inland Empire Utilities Agency Water Reclamation Facility.

The ECONITY CF-series is manufactured by ECONITY Co. Ltd. and utilizes a high density polyethylene (HDPE) microfiltration submerged hollow-fiber membrane. The ECONITY CF-series membrane operates under vacuum pressure with an outside-in flow direction and has a nominal pore size of 0.4 microns. The pores are shaped more like a slit verse a circle due to the unique stretching method used in manufacturing.

Demonstration studies conducted using the ECONITY CF-series have satisfactorily shown an equal degree of treatment and reliability as those technologies listed in Title 22. Based on a review of the materials submitted, CDPH grants conditional acceptance of the ECONITY CF-series as an alternative treatment technology for recycled water filtration applications, subject to the following conditions:

1. The turbidity of the filtered wastewater does not exceed 0.2 NTU more than 5 percent of the time within a 24-hour period; and does not exceed 0.5 NTU at any time.

2. Acceptance of this technology is contingent on it being complimented with a disinfection process which is compliant with Title 22, Section 60301.230.

Conditional acceptance is specific to the ECONITY CF-series detailed in the report dated October 2012 described above.

Review and approval of all proposed water recycling projects using the ECONITY CF-series are provided through the Regional Water Quality Control Board's Water Reclamation permitting process. CDPH local district offices will also review all proposed water recycling projects using the ECONITY CF-series on a case-by-case basis to confirm full compliance with all applicable treatment and reliability features required by Title 22 for the specific treatment facilities.

If you have any questions regarding this letter, please contact Randy Barnard at (619) 525-4022 or via email at Randy.Barnard@cdph.ca.gov.

Sincerely,

Randy Barnard, P.E.
Recycled Water Treatment Specialist
Technical Operations Section

cc: Recycled Water Committee

Zakir Hirani, P.E.,
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MWH
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