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Wastewater Feasibility Study

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October 13, 2014

Kim Withrow, Supervising REHS
Napa County Department of Environmental Management
1195 Third Street, Suite 310
Napa, Ca. 94559

Re: Proposed Use Permit Modification for Bouchaine Vineyards, Inc., 1075 Buchli Station Rd., Napa, Ca. AP # 047-320-031
Septic System Feasibility Report for Domestic Wastewater

Dear Kim:

Bouchaine Vineyards Inc. (Bouchaine) will soon be submitting an application for a Use Permit Modification with Napa County through Firma Design Group of Petaluma. I was asked by Michael Cook of Firma Design Group to address the Septic System Feasibility for this application.

The Bouchaine property sits among 100 plus acres in the Carneros Region of Napa County. In this region of Napa County, we find a vast array of various site and soil conditions for septic systems. In this case, we are very fortunate to have encountered the Huachica Soils Series that is a well-drained soil, acceptable for septic systems. This area of Buchli Station Road is an uplifted soil, out of the valley floor of the Carneros Region.

In 2005, I was the designer of the current septic system that was installed in the summer of 2005. At that time, Bouchaine Winery wanted to voluntarily upgrade the previous standard trench septic system. Mark Phillips of P and R Septic Systems installed the upgraded Septic System that met current standards. The design was for an anticipated Peak Wastewater Flow of 600 gallons per day. The system design included:

- Two new septic tanks connected in series, (2,000 gal tank followed by a 1,500 gal tank),
- A new 1,500 gallon sump to dose treated wastewater to the disposal system,
- Two Orenco AX-20 Advantex Textile Filters to pre-treat the wastewater,
- Dual At-Grade Systems with enlarged gravel beds, and
- An alternating hydrotek valve to properly dose the At-Grade Systems

I was conservative in the design, and used a low infiltration rate for the At-Grade System. In addition, I had the winery retrofit all plumbing fixtures with water saving elements to reduce water consumption. The At-Grade System was installed and became operational. Since that time, there have not been any problems with the wastewater system. The owners have performed routine maintenance of the wastewater system by having the septic tanks and sump pumped and cleaned. And one year ago, the Advantex Textile Filters were cleaned and serviced for the second time in nine years. The owners and P and R Septic Systems have never observed any water in the monitoring wells of either At-Grade gravel bed.

PROCESS WASTEWATER PRODUCTION

As part of the Use Permit Modification, no increase in maximum approved production will be requested. Bouchaine may increase the winery process wastewater production with increases in wine production over current levels (less than permitted). Currently and in the future, process wastewater goes to a permitted and inspected wastewater pond system.

SIZING OF THE DOMESTIC WASTEWATER SYSTEM FOR THIS USE PERMIT MODIFICATION

The Feasibility Report is presented in two sections, to ease the review of the Domestic Wastewater System proposal. Please review the technical sizing details in Attachment #1.

Attachment #1 reviews 11 Marketing Plan elements of the Bouchaine Use Permit Modification proposal. Changes include the number of staff, the number, type and size of events, to the final item - the proposal to add a commercial kitchen to the property and provide food at selected functions.

The commercial kitchen will be completely new. However, the kitchen will not be like a conventional restaurant that serves multiple meals per seat per day. Instead, the kitchen will only provide small food items to pair with selected wines on most days. Occasionally, the kitchen will provide food for the Chef's Dinner Series of up to four events per month of up to 80 persons. There will also be Marketing Events, such as private dinners, lunches, and promotions with, and sometimes without, food.

Again, please review Attachment #1 to see the detailed breakdown of current and Use Permit Modification elements and the projected wastewater flow.

CAPACITY OF THE EXISTING SEPTIC SYSTEM

Nine years ago, when the owners voluntarily upgraded the septic system, there was discussion that someday modifications or other improvements may be proposed. So, using the best technology available, I designed the At-Grade System along with pre-treatment (Note: Subsurface drip systems were not allowed at that time).

For the Use Permit Modification Application, Firma Design Group requested an assessment of the capacity of the septic system. In response, I suggested using the Stress Test Model of hydraulically loading a wastewater system and observing monitoring wells to assess performance and capacity. I directed P and R Septic Systems to install a flow meter, and to "Stress and Load" the disposal field at flows of 600, 900, and 1200 gallons at a time, all within one hour. This is a true "Stress Test" (Note: typical wastewater flows envelope the disposal field over a period of 12 to 18 hours each day – loading an entire day's flow in one hour is a heavy Stress on the system).

You will read in Attachment #1 that all three Stress Tests passed, and I concluded that the Capacity of this septic system is in fact, 1,200 gallons per day peak flow (based on the maximum Stress Flow).

DO PORTIONS OF THE SEPTIC SYSTEM NEED MODIFICATIONS WITH USE PERMIT MODIFICATION?

The technical attachment explains in detail that the disposal field (the At-Grade Gravel Beds) do not need to be modified for this Use Permit Modification. The system can handle up to 1,200 gallons per day peak flow. The proposed Use Permit Modification will generate up to 1,028.25 gallons per day peak flow at large events such as the Chef's Dinner Series (for up to 80 persons per event) plus other events such as Wine Tasting up to 130 persons per day. The gravel beds are not impacted by well, site, or building setbacks. So, no changes are needed.

The septic tank arrangement is properly sized and also will not need changes.

With a kitchen, we will need to design, permit and install a minimum of a 2,000 gallon, UPC APPROVED concrete multi-chamber grease trap to properly capture Fats, Oils, and Grease that may be generated from the preparation and cooking of food items. In this case, I will suggest to the owners that the grease trap size be upgraded to 2,000 gallons. Larger grease traps are more efficient. Dual plumbing will be designed for the kitchen plumbing to properly lay out the exterior grease trap, as well as connecting the exit piping from the grease trap and to combine the raw waste plumbing into the septic tank system.

With a peak flow of 1,028.5 gallons per day, the existing sump may be considered undersized by plan checkers in the Environmental Health Department. With the requirement now for 24 hour retention plus peak flow, we will need to install a second sump unit, and intertie with the current sump, to provide adequate sump retention. I recommend the addition of a 2,000 gallon sump.

With the kitchen wastewater being added to the system, the BOD and Suspended Solids will be slightly higher. In consultation with Orenco Systems (they suggest and I concur), that a third AX-20 should be added and connected to the existing textile filters.

One last item: it is likely that the Chef will request an Ice Maker in his/her kitchen. Since the water serving the Ice Machine meets drinking water standards, it is a waste to have the Ice Machine Defrost and Spill Over line drain into the septic system. With permission from the County and a Kitchen Design Professional, I recommend that the kitchen plumbing system provide a "Green Waste Line" only for the Ice Machine. The ice machine spill water can be plumbed separately out to the garden and lawn areas for reuse.

SEPTIC SYSTEM EXPANSION AREA

This is perhaps the most important issue that a property owner faces with a Use Permit Modification. As I mentioned in the beginning, the project sits on a parcel that is slightly over 100 acres.

So, P and R Septic Systems and I performed a very thorough Site Evaluation on this parcel. The proposed expansion area is located just south of the current septic system, on the south side of the southerly access driveway. The date of the Site Evaluation was July 2, 2014. Kim Withrow, Supervising REHS, was the Environmental Health Staff person that visited the site and logged the test holes with me. The complete Site Evaluation Report was submitted August 4, 2014 to Napa County Environmental Management Department.

I am pleased to report that the test holes indicated acceptable soil conditions for expansion area for the septic system. Test holes A through F indicated acceptable soils for a septic system. In the area of test holes A, B, and C, the septic system will be a Subsurface Drip System. In the location of test holes D, E, and F, an At Grade System would be designed and installed. The slopes and topography are excellent for such a septic system. However, when the At-Grade System is installed, the existing vineyard in this area would have to be removed.

A second upper site was also tested. Test hole #1 was unacceptable, but test holes #2, 3, and 4 all passed.

The infiltration rate for both the test areas is 0.80 gallons per square feet per day.

To size a Drip System area, we use the following:

Assuming 2,000 gallons for 200% expansion area and
Infiltration rate of 0.80 gals/sq. ft. /day, we get:

$$\frac{2,000 \text{ gals}}{0.80 \text{ gals/sq. ft./day}} = 2,500 \text{ square feet of area}$$

Using the drip line spacing of 2 foot center spacing of the drip line laterals,

$$\frac{2,500 \text{ sq. ft.}}{2 \text{ foot center spacing}} = 1,250 \text{ lineal feet of subsurface drip line}$$

Subsurface drip lines would be installed along the natural contour of the ground. In this case of the Bouchaine site, it would much be much easier to install the drip system after removing a portion of the vineyard; however, the vineyard could remain. If the At-Grade System were to be installed, then a portion of the vineyard would have to be removed.

The land mass that was found acceptable (in the lower test site) is roughly 200 ft. x 100 ft., or 20,000 square feet. That area can easily handle the expansion area requirement of this project. Therefore, the Upper Test area is not needed for the Use Permit Modification.

Due to the large size of the expansion area, I do not believe that it is necessary that a design is needed at this time. However, the file should note that this area is the Designated Expansion Area for the Domestic Wastewater needs the Bouchaine property, and that no water wells can be drilled within 100 feet of this area. Please see the August 4, 2014 Site Evaluation Report.

OTHER ITEMS

- 1) A water supply permit is required for the project.
- 2) The existing septic system and the future expansion area septic systems are both Alternative Sewage Disposal Systems. As such, Napa County regulations now require that Alternative Systems follow the new Monitoring and Reporting Program by a certified provider. Monitoring must be performed every six months, with results provided to Napa County Environmental Health. In addition, the owner must apply for and received an Annual Operating Permit to own and properly operate the Alternative Septic System (Note: P and R Septic Systems is a certified installer and service provider).
- 3) The feed and return line to the Drip Expansion area would have to cross under the existing access driveway. So a decision to bore under or cut open the driveway would be made in the future.

SUMMARY

My inspections and findings of the existing septic system deem that it has adequate disposal capacity for the proposed Use Permit Modification. The following should be installed as part of the project: a 2,000 gallon multi chamber grease trap with service manholes, an additional Orenco AX-20 textile filter, and a second sump chamber. I also find that there is more than 200 percent expansion area for this project.

I support the project and the proposed uses in the Use Permit Modification Application.
Should you have questions please contact me at 707-486-1405.

Yours truly,



Theodore J. Walker, REHS #4323

Attachments

Attachment #1: Bouchaine Winery Domestic Wastewater Estimation Sheet

Attachment #1:

Bouchaine Winery Domestic Wastewater Estimation Sheet:

Note: Wastewater flow numbers are from Napa County Wastewater Regulations that do not include credit for water saving devices. However, I have observed greater than 40% less wastewater use on a daily basis at this facility. These are based on observed metered flows. See review later at end of this section.

1. Staffing proposed with UPM (Use Permit Modification): 21 Employees

Weekday Staffing: 16 Full time persons (FTE) x 15 gals/person/day = 240 gals/day

Weekday Staffing: 5 Part time persons (PTE) x 7.5 gals/person/day = 37.5 gals/day

Total = 277.5 gals/day

Weekend Staffing 2 FTE x 15gals/person/day = 30 gals/d

Weekend Staffing 3 PTE x 7.5 gals/person/day = 22.5 gals/d

Total = 52.5 gals/day on weekend

2. Wine Tastings, walk ins with UPM

Average weekday: 35 - 45 persons/day (M-F) x 3 gals/person = 135 gals/day

Weekend day: 120 – 130 persons/day (Sat-Sun) x 3 gals/person = 390 gals/day (maximum loading)

Note: Actual Metered Flow at Bouchaine indicates less than 1.5 gals/person/day for wine tasting which would result in a maximum loading of 150 gals per day

3. Marketing Events

Current: private dinners/promotions up to 8 per year, @ 10 persons x 10 gals/person = 100 gals/event peak flow

UPM: Future: Private dinners/promotions up to 15/year, @ 50 persons max x 10 gal/p = 500 gals/event peak flow

4. Annual Wine Auction (current and post UPM):

2 times per year up to 50 persons x 10 gals/person with meal = 500 gals/event peak flow

5. April in Carneros: will be discontinued (post UPM) = 0 gals/year

6. Wine Related Groups

Current: With food, tasting speeches, currently 4/year with up to 24 persons @ 5 gals/person = 120 gallons/event

With UPM: up to 3/month with up to 50 persons @ 5 gals/person = 250 gals/event peak flow

7. Additional meetings with (lunch or dinner (not both)).

Current: up to 12 events/year @ 24 persons/event = 240gals/event

With UPM: up to 50 events per year @ 50 persons at 10 gals/person = 500 gals/event peak flow

8. Holidays in Carneros: will be discontinued (post UPM) = 0 gals/year

9. Special wine and food events, with UPM up to 60 persons max @ 10 gals/person = 600 gals/event peak flow

10. Wine with food pairings, none currently

Post UPM: Wine with food pairings (small bites of food will be paired with wine being served), up to 30 persons per day x 2 gals = 60 gals/day

These wine with food pairings will offset some of the "Walk-in wine tastings" (section 2 above).

11. Chef's Dinner Series

Currently, there are no events specifically called out in the Use Permit as "Chef's Dinner Series", they are included in items 3 and 7 above.

Post UPM 4 events/month with up to 80 persons X 10 gals/person = 800 gals/event peak flow

Observed Metered Wastewater Flows:

After meeting with Firma Design Group, I suggested that a flow meter (water meter), be installed on the pressurized PVC pipe between the sump and the hydrotek valve, which alternates between the dual At-Grade Gravel Beds. In addition, I directed the Bouchaine managers to log and note the wastewater flow with employee counts and numbers of guests on a regular basis.

The wastewater flow that is pumped into the wastewater system is much lower than estimates. Note the following:

Weekend Use: (since the meter was installed in late June, 2014).

July 4th weekend, (Thursday July 3, 2014 through the end of Sunday July 6, 2014)

Volume of wastewater into the system was 365 gallons

Wine tasters visiting that weekend were 135 persons

Total Staff working the 4 days was 24

From Table 4. Napa County Wastewater Flow Chart:

135 guests at 3 gals/wine taster should have been 395 gallons, and

24 staff at 15 gallons/staff should have been 360 gallons for a net total of

755 gallons of wastewater flow

*The 365 gallons actual flow / 755 gallons estimated Table 4 flow = **48% of estimated flow**

The highest weekend water use that we have measured to date was the weekend of August 23, 2014 (Dinner on the 23rd), through the end of Sunday August 24th.

Volume of wastewater into the system was: 664 gallons (Friday through Sunday)

Visitors that weekend 114 guests at 3 gals/wine taster should have been 342 gallons, and

Persons eating dinner was 55 persons on Saturday, August 23rd should have been 550 gallons,

Total Staff working the two days was 29 at 15 gals/staff should have been 435 gallons for a net total of 1327 gallons.

*The 664 gallons actual flow / 1327gallons of estimated Table 4 flow = **50% of estimated flow**

Single day spot checks: We have performed single day spot checks on wastewater flow. Since the water meter was installed, there are few days that the wastewater flow exceeded 300 gallons (like the dinner event). Some days, the pump only cycled once (the pump is pre-set for a 100 gallon dose). We continue to monitor the actual wastewater flow, but I am observing that the actual wastewater flow is about 40% to 50% lower than the Table 4 design flow chart.

Therefore, I suggest that we utilize a conservation measure allowed by the Uniform Plumbing Code. The code allows for a design flow reduction of 25% or more, when it can be demonstrated that the owner maintains, utilizes, and incorporates any and all feasible water saving devices when possible. This is particularly important during drought years.

I propose a 30% reduction in the design wastewater flows. Note: water saving devices were installed nine years ago, and the owners are using water wisely.

Estimated Peak Wastewater Flows: Use Permit Modification:
(See table below page)

Following items #1 – 11 from the chart shown on page #1 of Attachment #1, we estimate the design Peak Flow as follows:

As per Table #4, Napa County ASTS Regulations	Peak Daily Flow	30% Reduction
1) Staffing (employees FTE and PTE)	277.5 gals	194.25 gals
2) Walk in Wine tasters (weekend)	390	273
Walk in weekday	135	94.5
3) Marketing Events (Private dinners, promotions etc.)	500	350
4) Annual wine auction w/meals	500	350
5) April in Carneros	0	
6) Related Wine Groups Up to 50 persons	250	175
7) Plus meeting w/lunch or dinner (not both)	350	245
8) April and Holidays in Carneros	0	
9) Special wine and food events	500	350
10) Wine with food parings	60	42
11) Chef's Dinner Series (up to 80 persons @ 2 times/month)	800	560

The most consistent wastewater flow is for staffing. Using the 30% estimated water savings credit; the daily flow should be at 194.25 gallons per day, or less.

Conversely, with the UPM, largest wastewater flow event is the Chef's Dinner Series of up to 80 persons. Again, with the water savings credit, the peak flow is 560 gallons. So, if the Chef's Dinner is going to occur, and the winery is fully staffed at 21 persons (for the entire day), the combined flow would be 560 + 194.25 = 754.25 gallons. Then if you add a high weekend day of wine tasters of up to 100 persons, you will add 273 gallons of flow to get 1028.25 gallons peak flow.

What is the Peak Wastewater Flow of the Existing Domestic Wastewater System?

Under my direction, P and R Septic System ran the existing At-Grade Domestic Wastewater System through a high volume Stress Test. The Stress Test covered three days. Water was manually added to the sump, and water was dosed to the At-Grade Beds at a flow of 100 gallons per dose. The pumped

dosed the water through the newly installed flow meter, through the alternating Hydrotek Valve, into each At-Grade Bed equally.

The first test was set for a 600 gallon Stress Test. Each gravel bed was dosed at 100 gallons per dose. Each gravel bed received three doses in sequence. The Stress Test lasted one hour. No water was observed in the downhill monitoring wells.

The Second Stress Test was setup for a total flow of 900 gallons. The same procedure was followed. The test lasted one hour. Again, no water appeared in the downhill monitoring wells.

A Third Stress Test was performed. This time we increased the flow up to 1200 gallons. The same procedure was followed. Just at the end of the one hour stress test, a small amount of water was observed in the monitoring wells of the Uphill At-Grade Gravel Bed. Within 10 minutes, the water was no longer in the monitoring well.

During these three Stress Tests, no signs of breakout occurred downgradient of the systems. The performance of the system during stressing of the hydraulic loading of the gravel beds in 60 minutes or less, demonstrates that (in my opinion), the existing system easily can handle a peak wastewater flow of 1200 gallons per day.