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# Wastewater Feasibility Study

Darms Lane Winery P16-00017-UP & P18-00152-VIEW
Planning Commission Hearing Date March 6, 2019

December 2018 - Revised
Job No. 98-55

BARTELT ENGINEERING

# ONSITE WASTEWATER FEASIBILITY STUDY FOR THE DARMS LANE WINERY 1150 DARMS LANE, NAPA COUNTY APN 034-190-034 & -035

As required by Napa County Planning, Building & Environmental Services (PBES), this study outlines the feasibility of providing onsite wastewater disposal for a proposed winery production facility and tasting room at 1150 Darms Lane in Napa County, California.

## PROJECT DESCRIPTION

It is our understanding that the project proposes to construct a full crush winery on the above referenced parcel with the intent of the facility having the capability of producing 30,000 gallons of wine per year. Along with the proposed wine production at the site, the project proposes a moderate staffing and marketing plan. The project proposes four (4) full-time employees, two (2) part-time employees, and two (2) seasonal (harvest) employees. The project also proposes to offer private tour and tasting appointments for a maximum number of twenty-four (24) guests per day and 150 guests per week. Furthermore, the Applicant plans to offer two (2) food and wine pairing events per month for parties up to 12 persons and two (2) food and wine pairing events per month for parties up to 24 persons. Additionally, the Applicant intends to host four (4) wine club/release events per year for groups of up to 75 persons and two (2) 125 person auction related event at the winery.

Table 1 summarizes the proposed marketing plan:

**TABLE 1: MARKETING PLAN SUMMARY**

| Guest Experience Proposed | Frequency Proposed | Number of Persons Proposed |
|---|---|---|
| Private Tours & Tasting | Daily | 24 per day |
| Food & Wine Pairings | 2 per month<br>2 per month | 12 per event<br>24 per event |
| Wine Club / Release Events | 4 per year | 75 per event |
| Auction Related Events | 2 per year | 125 per event |

As part of our services, representatives from Bartelt Engineering have reviewed the planned operational methods for the winery with our Client, reviewed the parcel files at Napa County Environmental Health, held conversations with Napa County Environmental Health staff, performed a reconnaissance of the site to view existing conditions and conducted a site evaluation on November 17, 1998 to evaluate the feasibility of installing a septic system to serve the proposed winery and tasting room.

This study and the associated Use Permit Drawings will demonstrate that the proposed winery and tasting room improvements and marketing plan can feasibly be developed and all wastewater can adequately be dispersed onsite.

**WASTEWATER ANALYSIS**

## Winery Production Facility Process Wastewater Flow

The winery facility's production process wastewater flow rates for harvest and non-harvest seasons can be calculated as follows:

Harvest Peak Winery Process Wastewater Flow =

$$\left(\frac{30{,}000\ \text{gallons of wine}}{\text{year}}\right)\times\left(\frac{1.5\ \text{gallons of water}}{1\,\text{gallon of wine}}\right)\times\left(\frac{1\text{year}}{40\,\text{days of crush}}\right)=$$

Harvest Peak Winery Process Wastewater Flow = 1,125 gallons per day (gpd)

Non-Harvest Peak Winery Process Wastewater Flow =

$$\left(\frac{30{,}000\ \text{gallons of wine}}{\text{year}}\right)\times\left(\frac{4.5\,\text{gallons water}}{1\,\text{gallon of wine}}\right)\times\left(\frac{1\ \text{year}}{325\ \text{days}}\right)=$$

Non-Harvest Peak Winery Process Wastewater Flow = 415.4, use 416 gpd

## Winery Production Facility and Tasting Room Sanitary Wastewater Flow

All plumbing fixtures in the winery production facility and tasting room will be water saving fixtures per the California Plumbing Code as adopted by the Napa County Building Division. The sanitary wastewater generated by full-time employees, part-time employees, and seasonal (harvest) employees at the winery production facility and tasting room can be itemized as follows:

Employees:

- 4 Full-Time Employees x 15.0 gpd per employee = 60 gpd
- 2 Part-Time x 15.0 gpd per employee = 30 gpd
- 2 Harvest Season x 15.0 gpd per employee = 30 gpd

The sanitary wastewater generated by guests at the tasting room can be itemized as follows:

Guests[1,2]:

- Private Tours and Tasting with Food:
  - (24 guests per day) x (6 gpd per guest) = 144 gpd
- Food and Wine Pairings - Lunch:
  - (12 guests per event) x (11 gpd per guest) = 132 gpd per event
- Food and Wine Pairings - Dinner:
  - (24 guests per event) x (11 gpd per guest) = 264 gpd per event
- Wine Club / Release Events:
  - (75 guests per event) x (11gpd per guest) = 825 gpd per event
- Auction Related Events:
  - (125 guests per event) x (11 gpd per guest) = 1,375 gpd per event

Total Harvest Season and Non-Harvest Season Peak Sanitary Wastewater Flow

The total proposed harvest season peak sanitary wastewater flow is the combination of the winery production facility and tasting room sanitary wastewater flows during the months of August through November (harvest). The total proposed non-harvest season peak sanitary wastewater flow is the combination of the winery production facility and tasting room sanitary wastewater flows during the months of December through July (non-harvest).

It is assumed that Auction Related Events will not occur during the harvest season. Table 2 below outlines the proposed marketing event schedule. Each "X" in the same column represents which events can occur on the same day. For example, Private Tours and Tastings with Food can occur on the same day as Food and Wine Pairings – Lunch and Food and Wine Pairings – Dinner during both harvest and non-harvest seasons; however, no other event can occur on the same day when a Wine Club / Release Event is scheduled during the Harvest season.

**TABLE 2: HARVEST AND NON-HARVEST PROPOSED DAILY EVENT SCHEDULE**

| Event | Daily Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Harvest | | | Non-Harvest | | |
| Private Tours and Tasting with Food | X | | | X | X | |
| Food and Wine Pairings - Lunch | X | | | X | | |
| Food and Wine Pairings - Dinner | X | | | X | | |
| Wine Club / Release Events | | X | | | X | |
| Auction Related Events | | | | | | X |

[1] Volume rate accounts for 3 to 8 gpd per guest from the commercial kitchen and 3 gpd from restroom use
[2] Flow (gpd) represents a maximum value as events (except Auction) that may occur during any season

Using the marketing schedule outlined in Table 2, the greatest sanitary wastewater generating combination of events for a single day during the harvest and non-harvest seasons can be calculated. Table 3A below outlines the sanitary wastewater flows generated by employees and guests during a particular event in harvest and non-harvest seasons.

**TABLE 3A: HARVEST AND NON-HARVEST SEASON DAILY SANITARY WASTEWATER FLOWS**

| | Employees | Private Tours and Tasting with Food | Food and Wine Pairings | | Wine Club / Release Events | Auction Related Events | Total |
|---|---|---|---|---|---|---|---|
| | | | Lunch | Dinner | | | |
| | *Daily Occurrence (gpd)* | | | | | | |
| Harvest | 120 | 0 | 0 | 0 | 0 | 0 | 120 |
| | 120 | 144 | 132 | 0 | 0 | 0 | 396 |
| | 120 | 144 | 0 | 264 | 0 | 0 | 528 |
| | 120 | 144 | 132 | 264 | 0 | 0 | 660 |
| | 120 | 0 | 0 | 0 | 825 | 0 | 945 |
| Non-Harvest | 90 | 0 | 0 | 0 | 0 | 0 | 90 |
| | 90 | 144 | 0 | 0 | 0 | 0 | 234 |
| | 90 | 144 | 132 | 264 | 0 | 0 | 630 |
| | 90 | 144 | 0 | 0 | 825 | 0 | 1,059 |
| | 90 | 0 | 0 | 0 | 0 | 1,375 | 1,465 |

Table 3A shows that the greatest daily sanitary wastewater flow is generated during a day that has a Wine Club / Release Event during the harvest season and a day that has an Auction Related Event during the non-harvest season. The greatest practical harvest and non-harvest season peak daily process and sanitary wastewater flows are summarized in the following table:

**TABLE 3B: HARVEST AND NON-HARVEST SEASON DAILY PEAK WASTEWATER SUMMARY**

| Wastewater Source | Harvest (gpd) | Non-Harvest (gpd) |
|---|---|---|
| Process Wastewater | 1,125 | 416 |
| Sanitary Wastewater | 945 (Wine Club / Release Event) | 1,465 (Auction Related Event) |
| Combined Wastewater | 2,070 | 1,881 |

The greatest total proposed daily wastewater flow is the combination of the greatest winery facility's production daily flow and the winery production facility and tasting room daily sanitary wastewater flow that occurs in the same season and on the same day.

Therefore, the project's wastewater treatment system will be designed for a treatment capacity of 2,070 gpd which is based on the flows outlined in the above table.

### WASTEWATER EFFLUENT DISPERSAL METHODS

Prior to construction and installation of the proposed septic system, the existing residential sewage dispersal system will be removed and disposed of properly offsite.

Under proposed conditions, wastewater is generated onsite from the tasting room and offices building, winery, and cave. Sanitary wastewater is produced in the tasting room restroom, the commercial kitchen, the winery employee restroom, and the cave restroom. Process wastewater is generated and collected at the winery and in the caves.

### Option #1: Combined Winery, Cave and Tasting Room Wastewater Dispersal System

Bartelt Engineering is proposing to use a Subsurface Drip Wastewater Treatment System for all wastewater produced onsite. Under the subsurface drip design all wastewater from the winery facility, cave, and tasting room and offices building will gravity flow to a series of septic tanks fitted with filters for solids removal. A grease interceptor tank will be required for the proposed commercial kitchen in the tasting room and offices building.

From the septic tanks, wastewater effluent will gravity flow to a recirculation / blend tank from which it will be time dosed to an AdvanTex AX Treatment System. Filtrate from the AdvanTex Treatment system will flow via gravity to a recirculating / splitter valve located at the riser over the inlet compartment of the recirculation / blend tank. The recirculating / splitter valve will direct the filtrate either back into the recirculation / blend tank to mix with incoming septic tank effluent or to the discharge sump tank for delivery to the dispersal field depending on the effluent level in the recirculation / blend tank. Treated effluent stored in the sump tank will then be disposed of via a subsurface drip dispersal field.

Wastewater Effluent Subsurface Drip Dispersal Field and Replacement Area for Option #1

Based on the site evaluation performed by Bartelt Engineering on November 17, 1998, test pits #1 through #3 showed similar results and are acceptable for a subsurface drip dispersal type septic system and 200% replacement area. The site evaluation determined that the soil type in the area of these test pits is Clay Loam (CL)[3]. According to Table 10 of the Napa County Standards, a hydraulic loading rate of 0.60 gal/sf per day is allowed for this soil type using an alternative sewage treatment system with pre-treatment[4].

The maximum acceptable soil depth found during the site evaluation was approximately 60 inches. Napa County Standards require a minimum of 24 inches of useable soil below the drip lines and a minimum of six (6) inches and a maximum of eight (8) inches of cover above the drip lines. The maximum acceptable soil depth found at the site allows for 24 inches of useable soil beneath drip emitters buried six (6) inches below the ground surface. The required subsurface drip dispersal field area can be calculated as follows:

[3] Based on the most restrictive soil type encountered within two (2) feet below the bottom of the dripline.
[4] An approved pretreatment system is required by County of Napa for a subsurface drip dispersal system as proposed under this proposal.

$$\text{Dispersal Field Area} = \left(\frac{\text{design flow rate}}{\text{soil loading rate}}\right) = \left(\frac{2{,}070\ \frac{\text{gal}}{\text{day}}}{0.60\ \frac{\text{gal}}{\text{day}\cdot\text{ft}^2}}\right) = 3{,}450, \text{ use } 3{,}500 \text{ square feet}$$

200% Replacement Area = 7,000 square feet

Slopes within the dispersal field area are less than 20% so the design is based on two (2) foot lateral spacing between drip lines and two (2) foot emitter spacing.

The required number of emitters is calculated as follows:

$$\text{Required Number of Emitters} = 3{,}500 \text{ square feet} \times \frac{1 \text{ emitter}}{4 \text{ square feet}} = 875 \text{ emitters}$$

To make the best use of the available dispersal field area we recommend the system consist of four (4) zones, each zone having an area of 875 square feet with a total of 292 lineal feet of drip line per zone. This layout provides 146 emitters per zone or 584 total emitters.

**Option #2: Proposed Seasonal Surface Drip Irrigation Process Wastewater Dispersal System and Sanitary Wastewater Subsurface Drip System**

Under this option Bartelt Engineering proposes to dispose of all process wastewater effluent via seasonal surface irrigation and all sanitary wastewater effluent via a subsurface drip dispersal system.

The winery facility's process wastewater treatment system will consist of several steps. The floors of the proposed winery, covered work area, and caves will be sloped so that all process wastewater is collected in trench drains and floor drains. The drains will be fitted with baskets to collect a majority of the larger debris. The winery process wastewater collected in the trench drains and floor drains will then gravity flow into a trash tank fitted with filters to remove finer solids. All of the former procedures will be a part of the wastewater collection process regardless of the septic system type. From the trash tank, the process wastewater effluent will gravity flow into a sump tank before being pumped into the equalization tanks of the wastewater treatment system.

The process wastewater effluent in the equalization tanks will be treated by a pretreatment system for beneficial reuse. After the winery facility's and cave's process wastewater has been treated, the treated effluent will be held in storage tanks from which it will be distributed via seasonal surface irrigation on a designated portion of the existing vineyards, landscaping, or oak woodlands on the parcel.

The winery and cave combined sanitary wastewater as well as the tasting room sanitary wastewater will gravity flow to 1,500 gallon septic tanks adjacent to their respective buildings fitted with filters for solids removal. A grease interceptor tank will be required for the proposed commercial kitchen in the tasting room. From their respective septic tanks, the sanitary wastewater effluent will gravity flow to a common dose tank which will hold the combined winery, cave, and tasting room sanitary septic wastewater before pumping the wastewater into the subsurface drip dispersal system as described in Option #1 above.

Surface Drip Irrigation Wastewater Flow Balance for Option #2

A wastewater flow balance was determined by estimating the monthly process wastewater produced (see Table I Process Wastewater Flow), the average irrigation flow based on estimated vineyard irrigation practice (see Table II - Vineyard Process Wastewater Irrigation), and determining the required volume necessary to store excess treated process wastewater effluent until it can be properly disposed of in the vineyard (see Table III - Treated Process Wastewater Irrigation Storage Tank Balance).

The analysis concluded that the treated process wastewater effluent storage tank(s) should have a minimum volume of 50,000 gallons (see attached Table III - Treated Process Wastewater Irrigation Storage Tank Balance) to provide for some storage of the treated effluent through the winter months when surface drip land application is minimal and to equalize differences between the process wastewater generation rate and the vineyard irrigation application rate. It was assumed that available groundwater in the root zone is depleted by April and that irrigation is primarily applied to the vines for the months of April through October. In the months where the irrigation demand exceeds the amount of treated effluent that is available for irrigation, it is assumed that the entire irrigation requirement for the vines is not met or that another water source (an existing onsite or offsite well) is used to supply additional irrigation water.

The winery effluent surface irrigation drip dispersal area design is based on 8.94± acres (16,211± grape vines) of the total 12.62± acres of proposed vineyard located on the subject parcels[5]. The dispersal area will need to be verified once all dispersal field setbacks are determined. Furthermore, all dispersal field areas will need to be labeled with signage indicating the use of treated effluent for irrigation in accordance with Napa County Environmental Health standards.

Wastewater Effluent Subsurface Drip Dispersal Field and Replacement Area for Option #2

Based on the site evaluation performed by Bartelt Engineering on November 17, 1998, test pits #1 through #3 showed similar results and are acceptable for a subsurface drip dispersal type septic system and 200% replacement area. The site evaluation determined that the soil type in the area of these test pits is Clay Loam (CL)[6]. According to Table 10 of the Napa County Standards, a hydraulic loading rate of 0.60 gal/sf per day is allowed for this soil type using an alternative sewage treatment system with pre-treatment[7].

The maximum acceptable soil depth found during the site evaluation was approximately 60 inches. Napa County Standards require a minimum of 24 inches of useable soil below the drip lines and a minimum of six (6) inches and a maximum of eight (8) inches of cover above the drip lines. The maximum acceptable soil depth found at the site allows for 24

[5] Refer to Bartelt Engineering's approved Track II Vineyard Erosion Control Plan prepared for Crichton Hall Vineyards dated September 2001 (Napa County 01107-ECPA). Area and number of vines reported includes a 0.88± acre (1,593± vine) and 3.68± acre (6,219± vine) reduction of the 13.50± acres of approved plantable acreage as a result of this project's proposed development footprint and setback constraints, respectively.

[6] Based on the most restrictive soil type encountered within two (2) feet below the bottom of the dripline.

[7] An approved pretreatment system is required by County of Napa for a subsurface drip dispersal system as proposed under this proposal.

inches of useable soil beneath drip emitters buried six (6) inches below the ground surface. The required subsurface drip dispersal field area can be calculated as follows:

$$\text{Dispersal Field Area} = \left(\frac{\text{design flow rate}}{\text{soil loading rate}}\right) = \left(\frac{1{,}465\ \frac{\text{gal}}{\text{day}}}{0.60\ \frac{\text{gal}}{\text{day}\cdot\text{ft}^2}}\right) = 2{,}442, \text{ use } 2{,}500 \text{ square feet}$$

200% Replacement Area = 5,000 square feet

Slopes within the dispersal field area are less than 20% so the design is based on two (2) foot lateral spacing between drip lines and two (2) foot emitter spacing.

The required number of emitters is calculated as follows:

$$\text{Required Number of Emitters} = 2{,}500 \text{ square feet} \times \frac{1 \text{ emitter}}{4 \text{ square feet}} = 625 \text{ emitters}$$

To make the best use of the available dispersal field area we recommend the system consist of four (4) zones, each zone having an area of 625 square feet with a total of 313 lineal feet of drip line per zone. This layout provides 156 emitters per zone or 624 total emitters.

### TANK SIZING

#### Existing Tanks

There are two (2) existing tanks of unknown size and age currently serving the Home Occupancy Business[8] sanitary sewage dispersal system. These tanks and all wastewater appurtenances will be removed and disposed of properly offsite.

#### Proposed Tanks for Wastewater Effluent Dispersal Method Option #1

The winery, caves, office, and tasting room building will require septic tanks sized for three (3) days retention time during peak wastewater flow. The Napa County Sewage Ordinance requires that fixtures which discharge food waste from the food preparation and dishwashing areas of commercial food facilities be connected to an approved grease interceptor prior to connection to an individual or private sewage dispersal system. A grease interceptor tank will be required for the proposed commercial kitchen in the tasting room and should be sized for a minimum retention time of three (3) days.

The restrooms in the winery building and cave will require a septic tank sized for three (3) days retention time for the sanitary wastewater. The proposed process wastewater tank adjacent to the winery will collect wastewater from the covered work area, winery building floor drains, and cave floor drains, and be sized for two (2) days retention time.

The sanitary and process wastewater effluent from the tanks above will utilize gravity flow to combine into a blend/recirculation and dose tank sized for one and a half (1-½) days retention time during peak wastewater flow. All tanks will be fitted with a Zabel A300

[8] Home Occupancy Business Permit issued by Napa County Planning, Building & Environmental Services on 06/05/2003; refer to application #60-15153 and permit #03187.

filter or approved equal installed at the outlet to aid in the screening of suspended solids and the reduction of biochemical oxygen demand (BOD) in the wastewater effluent stream.

**Proposed Tanks for Wastewater Effluent Dispersal Method Option #2**

The Napa County Sewage Ordinance requires that fixtures which discharge food waste from the food preparation and dishwashing areas of commercial food facilities be connected to an approved grease interceptor prior to connection to an individual or private sewage dispersal system. Therefore, a grease interceptor tank will be required for the proposed commercial kitchen in the tasting room and should be sized for a minimum retention time of three (3) days.

Sanitary wastewater from the offices and tasting room building as well as grease tank effluent will flow by gravity to a septic tank sized for three (3) days retention time during peak wastewater flow. The septic tank(s) will be equipped with a Zabel A300 filter (or approved equal) to aid in the screening of suspended solids and reduction of BOD in the wastewater effluent stream. Effluent from the septic tank(s) will flow by gravity into a blend/dose tank sized for one and a half (1-½) days retention time during peak wastewater flow. The dose tank will include a timed dose pumping system for conveyance of wastewater effluent to the subsurface drip dispersal field.

The winery will utilize a dedicated pretreatment system and seasonal surface irrigation for dispersal of treated process wastewater. All septic tanks used for process wastewater should be sized to provide a minimum of two (2) days retention time during peak wastewater flow. Based on discussions with the manufacturers of pretreatment systems, the equalization tank should be sized for a minimum of three (3) days of peak flow capacity. The irrigation storage tank should be sized based on vineyard irrigation demands and flow balance calculations, see enclosed spreadsheets for preliminary calculations on treated wastewater flows and irrigation demands.

**WINE CAVE SETBACKS TO SEPTIC SYSTEMS**

We have reviewed Napa County Environmental Health files to determine if there are any septic systems located within 400 feet of the proposed cave location. Based on the Napa County Geographic Information System topographic maps and parcel boundary overlay, we have identified one (1) parcel with an existing septic system that falls within 400 feet of the proposed cave. The identified parcel and the associated septic systems are shown on the enclosed "Cave and Septic Location Map".

The following is a summary of our findings per Napa County Environmental Health records regarding the existing septic systems on the identified parcels:

| | |
|---|---|
| APN 034-190-035 (subject parcel) | There is an existing residential septic system of unknown age that is proposed to be removed under this Use Permit application. The septic system is located at an elevation of 158±. This system is located at a higher than the proposed cave floor elevation of 153± and 400± feet south of the cave. The project proposes to install a pretreatment system at the entrance (5+ feet downhill) of the proposed cave. A reclaimed water storage tank will be located uphill greater than 100 feet from the nearest portion of the cave. The proposed subsurface drip system is located downhill approximately 400± feet from the cave entrance. |
| APN 034-190-037 | There is an existing septic system and an existing cave on this parcel. The cave on the neighboring parcel is located south of the septic system on the subject parcel at a distance of over 1,000 feet. It is not expected that the septic system on the subject parcel will drain towards the cave on the neighboring parcel. The septic system on the neighboring parcel is downhill of the proposed cave. |

The following parcel is within the 400 foot cave setback. This parcel is not expected to drain towards the proposed cave location.

APN 034-170-026

The following parcels are adjacent to properties within the 400 foot cave setback, however they are downhill of the subject parcel or their natural drainage is either away from or does not allow drainage towards the proposed cave location.

APN 034-180-008, 034-190-034, 034-200-005, 034-200-006, 034-211-055 and 034-211-056

## CONCLUSIONS

Wastewater generated as a result of the proposed project, which includes the proposed winery, offices, tasting room, and caves, can feasibly be treated and dispersed onsite by using one of the dispersal methods outlined in this analysis. The proposed location of the wastewater dispersal field is shown on the Use Permit Drawings. The Use Permit Drawings represent the proposed conditions under the assumption that Option #2 will be chosen for design, but show the larger subsurface drip dispersal field outlined in Option #1.

Full design calculations and construction plans will be completed after approval of the Use Permit under consideration.

## REFERENCES

California Onsite Wastewater Association (COWA). "Pumping and Pressure Distribution Systems." May 1998.

Geoflow, Inc. *Wastewater Design, Installation and Maintenance Guidelines.* v1, 2007.

Napa County Department of Environmental Management. "Design, Construction and Installation of Alternative Sewage Treatment Systems." November 2013.

U.S. Department of Health, Education and Welfare, Public Health Service Publication. *Manual of Septic-Tank Practice.* 1967.

U.S. Environmental Protection Agency. "Onsite Wastewater Treatment Systems Manual." February 2002.

Napa County Planning, Building and Environmental Services, “Napa County Onsite Wastewater Treatment Systems (OWTS) Technical Standards.” Final Draft.

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# Darms Lane Winery
# Process Wastewater Flow
# Table I

| | |
|---|---|
| **Total annual wine production (gallons):** | **30,000** |
| **Annual water usage per gallon of wine (gallons):** | **6.0** |
| **Annual process wastewater flow (gallons):** | 180,000 |
| **Average daily process wastewater flow (gpd):** | 493 |
| **Annual sanitary sewer wastewater flow (gallons):** | 0 |

*MONTHLY WASTEWATER FLOW (gallons/month):*

| ***Process Wastewater Flow*** | | |
|---|---|---|
| **Month** | **Annual Percent** | **Wastewater Flow** |
| September | **12.5%** | 22,500 |
| October | **12.9%** | 23,220 |
| November | **10.0%** | 18,000 |
| December | **7.0%** | 12,600 |
| January | **4.0%** | 7,200 |
| February | **3.0%** | 5,400 |
| March | **3.5%** | 6,300 |
| April | **7.0%** | 12,600 |
| May | **8.0%** | 14,400 |
| June | **8.5%** | 15,300 |
| July | **11.5%** | 20,700 |
| August | **12.1%** | 21,780 |
| TOTALS | 100% | 180,000 |

*Notes:*

> Wastewater monthly proportioning is based on industry standards

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# Darms Lane Winery
# Vineyard Process Wastewater Irrigation
# Table II

| | |
|---|---|
| **Vineyard area (acres):** | 8.94 |
| **Row width (feet):** | 4 |
| **Vine spacing (feet):** | 6 |
| **Total number of irrigated vines:** | 16,211 |

*Seasonal irrigation (May - October):*

**Seasonal irrigation per vine (gallons/season):** **120**

*Non-Seasonal irrigation (November - April):*

**Depth of Non-Seasonal Irrigation (inches/month)[1]:**

| | |
|---|---|
| November | 0.00 |
| December | 0.00 |
| January | 0.00 |
| February | 0.00 |
| March | 0.00 |
| April | 0.00 |
| Total | **0.00** |

| ESTIMATED VINEYARD PROCESS WASTEWATER IRRIGATION | | | |
|---|---|---|---|
| | | *Estimated* | |
| **Month** | **Seasonal Percent (%)** | **Seasonal Irrigation (gal/vine)** | **Total Irrigation (gallons)** |
| September | 33.6% | 40.0 | 648,440 |
| October | 7.3% | 9.0 | 145,899 |
| November[1] | | 0.0 | 0 |
| December[1] | | 0.0 | 0 |
| January[1] | | 0.0 | 0 |
| February[1] | | 0.0 | 0 |
| March | 0.5% | 0.6 | 9,727 |
| April | 0.4% | 0.4 | 6,484 |
| May | 4.4% | 5.0 | 81,055 |
| June | 11.8% | 14.0 | 226,954 |
| July | 15.5% | 19.0 | 308,009 |
| August | 26.6% | 32.0 | 518,752 |
| **TOTAL** | 100.0% | 120.0 | **1,945,320** |
| | | | **5.97 acre-feet** |

[1] *Total non-seasonal irrigation (treated wastewater supplied by Pre-Treatment Unit = (vineyard area) * (43,560 sq.-ft./acre) * (depth of irrigation/12 in./ft.) * (7.48 gal./cu.-ft.)*

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# Darms Lane Winery
## Treated Process Wastewater Irrigation Storage Tank Balance
## Table III

| Month | Beginning Balance (gallons) | Wastewater Flow (gallons) | Vineyard Irrigation (gallons) | Tank Volume (gallons) |
|---|---|---|---|---|
| September | 0 | 22,500 | 648,440 | 0 |
| October | 0 | 23,220 | 145,899 | 0 |
| November | 0 | 18,000 | 0 | 18,000 |
| December | 18,000 | 12,600 | 0 | 30,600 |
| January | 30,600 | 7,200 | 0 | 37,800 |
| February | 37,800 | 5,400 | 0 | 43,200 |
| March | 43,200 | 6,300 | 9,727 | 39,773 |
| April | 39,773 | 12,600 | 6,484 | 45,889 |
| May | 45,889 | 14,400 | 81,055 | 0 |
| June | 0 | 15,300 | 226,954 | 0 |
| July | 0 | 20,700 | 308,009 | 0 |
| August | 0 | 21,780 | 518,752 | 0 |
| | **TOTALS** | **180,000** | **1,945,320** | |
| | **Average** | **15,000** | **162,110** | **17,939** |

*Recommended Tank Storage (gallons):* 50,000
*Recommended Tank Storage (acre-feet):* 0.15

*Notes:*

> Water balance calculations assume storage tank is empty at the beginning of November due to post-harvest irrigation.

> In months when the irrigation demand exceeds the beginning balance plus the process wastewater flow it is assumed that the full irrigation demand is not met or that the additional irrigation water is supplied from an alternate source (ie. well).

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GEOFLOW SUBSURFACE DRIP

# Field Flow

| | |
|---|---|
| Job Description: | *Darms Lane Winery - Sanitary* |
| Contact: | *Bartelt Engineering* |
| Prepared by: | *Michael Grimes, PE* |
| Date: | *December 2018* |

Please fill in the shaded areas and drop down menus:
This spreadsheet serves as a guide, and is not a complete hydraulic design.

## Worksheet 1- Field Flow

### Total field

| | | |
|---|---|---|
| Total Quantity of effluent to be disposed per day | 1,465 | gallons / day |
| Hydraulic loading rate | 0.60 | gallons / sq.ft. / day |
| Minimum Dispersal Field Area | 2,442 | square ft. |
| Total Dispersal Field Area | 2,500 | square ft. |

### Flow per zone

| | | |
|---|---|---|
| Number of Zones | **4** | zone(s) |
| Dispersal area per zone | 625 | square ft. |
| Choose line spacing between WASTEFLOW lines | 2 | ft. |
| Choose emitter spacing between WASTEFLOW emitters | 2.0 | ft. |
| Total linear ft.per zone (minimum required) | 313 | ft. per zone |
| Total number of emitters per zone | 156 | emitters per zone |
| Select Wasteflow dripline (16mm) | Wasteflow PC - 1 gph | dripline |
| Pressure at the beginning of the dripfield | 30 | psi |
| Feet of Head at the beginning of the dripfield | 69.3 | ft. |
| What is the flow rate per emitter in gph? | 1.02 | gph |
| **Dose flow** per zone | **2.65** | **gpm** |

**Note: A few States or Counties require additional flow for flushing. Please check your local regulations.**
**Flush velocity calculation below is for PC dripline. Classic dripline requires less flow to flush than PC.**
**Please refer to Geoflow's spreadsheet "Design Flow and Flush Curves" at www.geoflow.com or call 800-828**

| | | |
|---|---|---|
| If required, choose flush velocity | 2 | ft/sec |
| How many lines of WASTEFLOW per zone? | 4 | lines |
| Fill in the *actual* length of longest dripline lateral | 78 | ft. |
| Flush flow required at the end of each dripline | 1.48 | gpm |
| Total Flow required to achieve flushing velocity | 5.92 | gpm |
| **Total Flow** per zone- worst case scenario | **8.57** | **gpm** |

### Select Filters and zone valves

| | | |
|---|---|---|
| Select Filter Type | Vortex Screen Filter | |
| Recommended Filter (item no.) | AP4E-1F | 1" Screen Filter 0-20gpm |
| Select Zone Valve Type | Electric Solenoid | - |
| Recommended Zone Valve (item no.) | SVLVB-100 | 1-in. Solenoid valve |

-

### Dosing

| | | |
|---|---|---|
| Number of doses per day / zone: | 6 | doses |
| Timer ON. Pump run time per dose/zone: | 23.01 | mins:secs |
| Timer OFF. Pump off time between doses | 3:36 | hrs:mins |
| Per Zone - Pump run time per day/zone: | 2:18 | hrs:mins |
| All Zones - Number of doses per day / all zones | 24 | doses / day |
| Allow time for field to pressurize | 0:00:30 | hrs:mins:secs |
| Filter flush timer | 0:00:20 | hrs:mins:secs |
| Drain timer | 0:05:00 | hrs:mins:secs |
| Field flush timer | 0:01:00 | hrs:mins:secs |
| Field flush counter | 3 | cycles |
| **Time required to complete all functions per day** | **11:56** | hrs:mins |
| Dose volume per zone | 61 | gallons per dose |

BARTELT ENGINEERING

GEOFLOW SUBSURFACE DRIP

# Field Flow

| | |
|---|---|
| Job Description: | *Darms Lane Winery - Sanitary + Process* |
| Contact: | *Bartelt Engineering* |
| Prepared by: | *Michael Grimes, PE* |
| Date: | *December 2018* |

Please fill in the shaded areas and drop down menus:
This spreadsheet serves as a guide, and is not a complete hydraulic design.

## Worksheet 1- Field Flow

### Total field

| | | |
|---|---|---|
| Total Quantity of effluent to be disposed per day | 2,070 | gallons / day |
| Hydraulic loading rate | 0.60 | gallons / sq.ft. / day |
| Minimum Dispersal Field Area | 3,450 | square ft. |
| Total Dispersal Field Area | 3,500 | square ft. |

### Flow per zone

| | | |
|---|---|---|
| Number of Zones | **4** | zone(s) |
| Dispersal area per zone | 875 | square ft. |
| Choose line spacing between WASTEFLOW lines | 3 | ft. |
| Choose emitter spacing between WASTEFLOW emitters | 2.0 | ft. |
| Total linear ft.per zone (minimum required) | 292 | ft. per zone |
| Total number of emitters per zone | 146 | emitters per zone |
| Select Wasteflow dripline (16mm) | Wasteflow PC - 1 gph | dripline |
| Pressure at the beginning of the dripfield | 30 | psi |
| Feet of Head at the beginning of the dripfield | 69.3 | ft. |
| What is the flow rate per emitter in gph? | 1.02 | gph |
| **Dose flow** per zone | **2.48** | **gpm** |

**Note: A few States or Counties require additional flow for flushing. Please check your local regulations.**
**Flush velocity calculation below is for PC dripline. Classic dripline requires less flow to flush than PC.**
**Please refer to Geoflow's spreadsheet "Design Flow and Flush Curves" at www.geoflow.com or call 800-828**

| | | |
|---|---|---|
| If required, choose flush velocity | 2 | ft/sec |
| How many lines of WASTEFLOW per zone? | 4 | lines |
| Fill in the *actual* length of longest dripline lateral | 73 | ft. |
| Flush flow required at the end of each dripline | 1.48 | gpm |
| Total Flow required to achieve flushing velocity | 5.92 | gpm |
| **Total Flow** per zone- worst case scenario | **8.40** | **gpm** |

### Select Filters and zone valves

| | | |
|---|---|---|
| Select Filter Type | Vortex Screen Filter | |
| Recommended Filter (item no.) | AP4E-1F | 1" Screen Filter 0-20gpm |
| Select Zone Valve Type | Electric Solenoid | - |
| Recommended Zone Valve (item no.) | SVLVB-100 | 1-in. Solenoid valve |

-

### Dosing

| | | |
|---|---|---|
| Number of doses per day / zone: | 6 | doses |
| Timer ON. Pump run time per dose/zone: | 34.45 | mins:secs |
| Timer OFF. Pump off time between doses | 3:25 | hrs:mins |
| Per Zone - Pump run time per day/zone: | 3:28 | hrs:mins |
| All Zones - Number of doses per day / all zones | 24 | doses / day |
| Allow time for field to pressurize | 0:00:30 | hrs:mins:secs |
| Filter flush timer | 0:00:20 | hrs:mins:secs |
| Drain timer | 0:05:00 | hrs:mins:secs |
| Field flush timer | 0:01:00 | hrs:mins:secs |
| Field flush counter | 3 | cycles |
| **Time required to complete all functions per day** | **16:38** | hrs:mins |
| Dose volume per zone | 86 | gallons per dose |

BARTELT ENGINEERING

# GREASE INTERCEPTOR SIZING

Project Name: Darms Lane Winery
Project #: 98-55
Project Address: 1150 Darms Lane
Napa County, CA, 94558
APN: 034-190-035

| Required Capacity [gal] | = | (Peak No. of meals per Hour) | X | (Waste Flow Rate) | X | (Retention Time) | X | (Storage Factor) |
|---|---|---|---|---|---|---|---|---|
| 1,500 | = | 125 | x | 8 | x | 1.5 | x | 1 |
| 2,000 | Recommended | | | | | | | |

Waste Flow Rates:

| | |
|---|---|
| 1 gpd/meal | Food Waste Disposer |
| 2 gpd/meal | Single Service Kitchen |
| 3 gpd/meal | if Single Service Utensils |
| 5 gpd/meal | if Multi-Service Utensils |
| 5 gpd/meal | Without Dishwashing Machine |
| 6 gpd/meal | With Dishwashing Machine |

plus type of facility present:

| | |
|---|---|
| 3 gpd/person | bar/cocktail |
| 8 gpd/person | short order |

Retention Time:

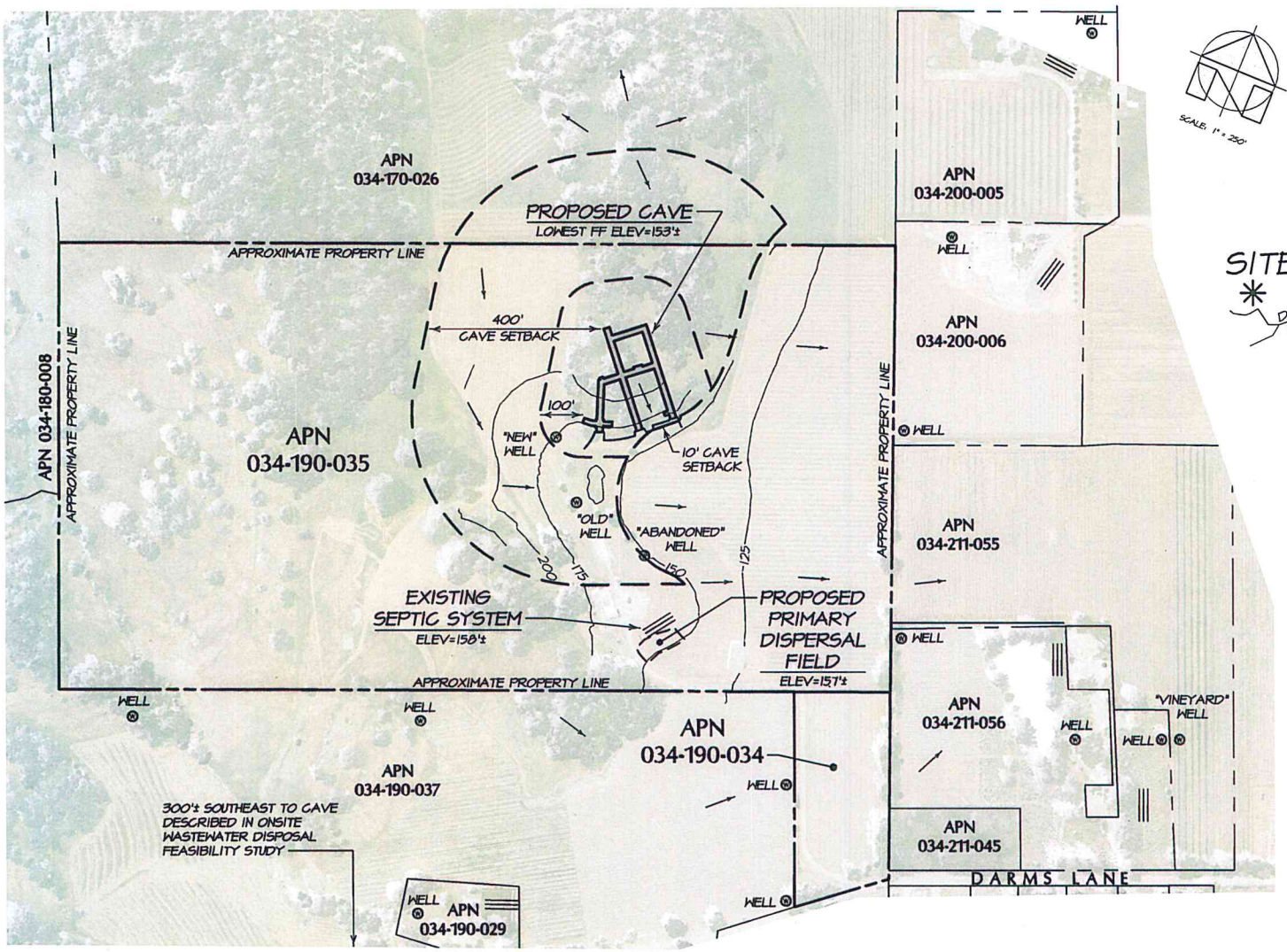
| | |
|---|---|
| 1.5 | if Single Service Utensils (Single Service Kitchen -- Single Serving) |
| 2.5 | if Multi-Service Utensils (Commercial Kitchen Waste -- Dishwasher) |

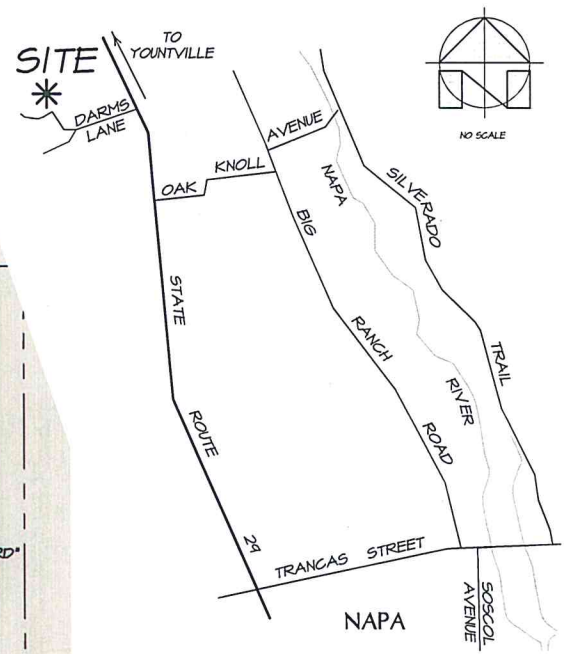
Storage Factor:

Fully Equipped Comercial Kitchen

| | | |
|---|---|---|
| 1 | if hours of operation are | up to and including 8 |
| 2 | if hours of operation are | from 9 up to and including 16 |
| 3 | if hours of operation are | from 17 up to and including 24 |

Single Service Kitchen
1.5




LOCATION MAP
NO SCALE

BARTELT
ENGINEERING
CIVIL ENGINEERING · LAND PLANNING
1303 Jefferson Street, 200 B, Napa, CA 94559
www.barteltengineering.com
· Telephone: 707-258-1301 ·

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# CAVE & SEPTIC LOCATION EXHIBIT

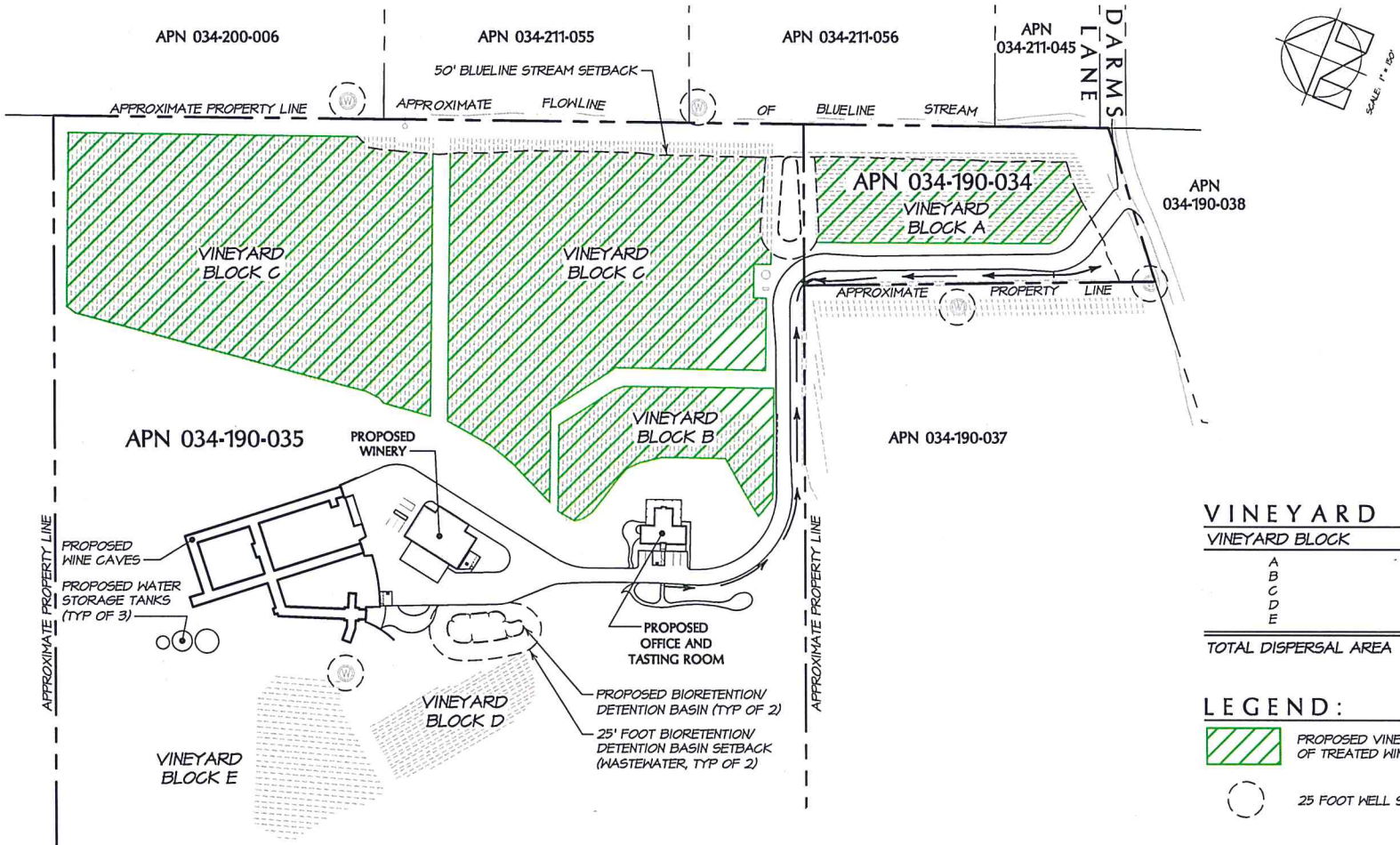
SCALE: 1" = 250'

LEGEND

- APPROXIMATE LOCATION OF EXISTING SEPTIC SYSTEM
- LIMITS OF CAVE SETBACK
- SURFACE FLOW DIRECTION
- WELL

Darms Lane Winery
1150 Darms Lane
Napa, CA 94558
APN 034-190-034 & -035
Job No. 98-55
December 2018
Sheet 1 of 1

12/13/2018 - 2:02 PM, Kristenk, S:\LAND PROJECTS\1492-1999\1955\2018 LP\ACAD\EXHIBITS\1955-CAVE-SEPTIC.DWG




## VINEYARD SUMMARY:

| VINEYARD BLOCK | DISPERSAL AREA |
|---|---|
| A | 0.95± ACRES |
| B | 0.86± ACRES |
| C | 7.13± ACRES |
| D | 0± ACRES |
| E | 0± ACRES |
| TOTAL DISPERSAL AREA | 8.94± ACRES |

## LEGEND:

PROPOSED VINEYARD AREA FOR IRRIGATION OF TREATED WINERY WASTEWATER

25 FOOT WELL SETBACK

## NOTE:

NEIGHBORING WELLS ARE ASSUMED TO BE CONSTRUCTED UNDER A PERMIT AND HAVE A DOCUMENTED WELL LOG.

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· Telephone: 707-258-1301 ·

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# TREATED WINERY WASTEWATER VINEYARD IRRIGATION EXHIBIT

SCALE: 1" = 150'

Darms Lane Winery
1150 Darms Lane
Napa, CA 94558
APN 034-190-034 & -035
Job No. 98-55
Revised - December 2018
Sheet 1 of 1

12/17/2018 - 11:06 AM, Kristenk, S:\LAND PROJECTS\1998-PARK\98551\2018 EP\ACAD\EXHIBITS\98555-EX1 IRRDYMS

Chris

NAPA COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
REQUEST FOR SITE EVALUATION INSPECTION

ENVIRONMENTAL HEALTH DEPT. USE ONLY

FEE: $289-
DATE: 11/10/98
RECEIPT: 6847
BY: JKP CR.#6847

PARCEL NUMBER: 34-190-35
JOB ADDRESS: 1150 Darms Lane (end)
OWNER: Richard Crichton
TEST CONDUCTED BY: Bartelt / Montelli

TYPE OF TEST: FIELD ANALYSIS X
To be run on 11/17 at ____ (am/pm)

PERCOLATION TEST ____
To be run on ____ from ____ am/pm to ____ pm

PURPOSE OF TEST: HOUSE: ____ WINERY: X OTHER: ____

PROJECTED WASTEWATER FLOWS: 50,000gpy (≅1400-1600gpd winery + domestic) gpd
(need 6 holes minimum)

**********

PERCOLATION TEST INSPECTION RESULTS

Pre-soak checked? yes ___ no ___ Length of pre-soak: ____

Checked by: ____ Date: ____

Rate at time of inspection: ____ Stabilized perc rate: ____

Gravel and Pipe Used? yes ___ no ___ If so, take the perc rate ____ x .6 = ____ in/hr

**********

TYPE OF SYSTEM APPROVED

STANDARD SYSTEM

Acceptable soil to: ____ / Assigned perc range: (1-3) / 3-6 / 6-12

Depth of trenches: ____ / Rock under pipe: ____ / Cover over rock: ____

Lineal feet of leachline required: ____ / Plot plan received: ____

Slope: ____ / Surface drainage problems: ____

Additional information: Stay in area of hole 1, 2 + 3. Hole 4 was lower on hill and was not well drained (wet/sticky)

SPECIAL DESIGN SYSTEM DUE TO THE FOLLOWING - Size constraints: ____

Perc rate too slow: ____ /Perc rate too fast: ____ /Steep slope: ____

Insufficient soil depth: X /High seasonal groundwater: ____

Acceptable soil for special design: 60" @ 1/2"/hr for PD system Other problems: Size constraints in area tested. This may limit size of project.

E.H. Specialist Chris Date 11/17/98

## FIELD ANALYSIS

**TEXTURE** ( In the proposed trench zone )

CLAY CONTENT

| Core Hole | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Low (<12) | | | | | | |
| Mod (12-27) | | | | | | |
| High (27-40) | X | X | X | X | | |
| High (>40) | | | | | | |

SAND CONTENT

| Core Hole | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| High (>50) | | | | | | |
| Mod (20-50) | X | X | X | X | | |
| Low (<20) | | | | | | |

GRAVEL, COBBLE, STONE CONTENT

| Core Hole | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Very High (>60) | | | | | | |
| High(35-60) | | X | | | | |
| Mod (15-35) | X | | | | | |
| Low (<15) | | | X | X | | |

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

**STRUCTURE**

SOIL DENSITY WHEN PICKED **(Circle whether wet or dry)** — moist→wet

| Core Hole | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| pick sluffs or caves soil in | | | | | | |
| pick bites and soil sluffs | X | X | X | X | | |
| pick bites/ little or no soil sluffs | | | | | | |

CONSISTENCE **(Circle w or d)** — moist to wet

| Core Hole | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Easy | | | | | | |
| Moderate | X | X | X | | | |
| Hard | | | | X | | |

(wet however softer)

STRUCTURE

| Core Hole | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Granular | | | | | | |
| Blocky | X | X | X | X | | |
| Prism | | | | | | |
| Platy | | | | | | |
| Massive | | | | | | |
| Cemented | | | | | | |

MODIFIER CHARACTERISTICS

1) Soil Survey Name: _____

2) Horizon Boundaries: Diffuse ____ Gradual ____ Abrupt ____

3) Topography: Concave _____ Convex _____ / Aspect: _____

4) Vegetation: Type _____ Condition: _____

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

### CORE HOLE RECORD

**HOLE #1**

| | | | EST. PERC |
|---|---|---|---|
| 0 | to 18" | dark brown clay loam | 1-3 |
| 18" | to 30" | lighter brown clay loam w/ cobbles & fractured rock/clay loam (clay) | 1-3 |
| 30" | to 60" | | ≥1/2"/hr |

Roots: most to 30", some to bottom
Color: **bright** / **dull**
Water Table: not seen
Dug: **easy** / **hard** / **dusty** / **smear**
Acceptable Soil To: 30" (≥1/2"/hr to 60") ← greater for p/d system

**HOLE #2**

| | | | EST. PERC |
|---|---|---|---|
| 0 | to 36" | lighter brown clay loam w/ vertically platy rock | 1-3 |
| ___ | to 66" | soft ash type silty loam to bottom | 1-3 |
| ___ | to ___ | | |

Roots:
Color: **bright** / **dull**
Water Table: not seen
Dug: **easy** / **hard** / **dusty** / **smear**
Acceptable Soil To: 66"

**HOLE #3**

| | | | EST. PERC |
|---|---|---|---|
| 0 | to 15" | dark brown clay loam | 1-3 |
| 15 | to 24" | orangy clay loam | 1-3 |
| 24 | to 60" | rocky heavier clay loam | ≥1/2"/hr |

Roots: most to 24"
Color: **bright** / **dull**
Water Table: not seen
Dug: **easy** /**hard** /**dusty** /**smear**
Acceptable Soil To: 24" (≥1/2"/hr to 60")

### CORE HOLE RECORD

**HOLE #4**

| | | | EST. PERC |
|---|---|---|---|
| 0 | to 18" | heavy dark sticky clay loam | 1? |
| 18" | to 24" | light orange dense clay loam | 1-3 |
| ___ | to ___ | | |

Roots: most to 24"
Color: **bright** / **dull**
Water Table:
Dug: **easy** / **hard** / **dusty** /**smear**
Acceptable Soil To:

**HOLE #5** uphill

| | | | EST. PERC |
|---|---|---|---|
| 0 | to 6" | soil | |
| 6" | to | rock | |
| ___ | to ___ | | |

Roots:
Color: **bright** / **dull**
Water Table:
Dug: **easy** / **hard** / **dusty** / **smear**
Acceptable Soil To:

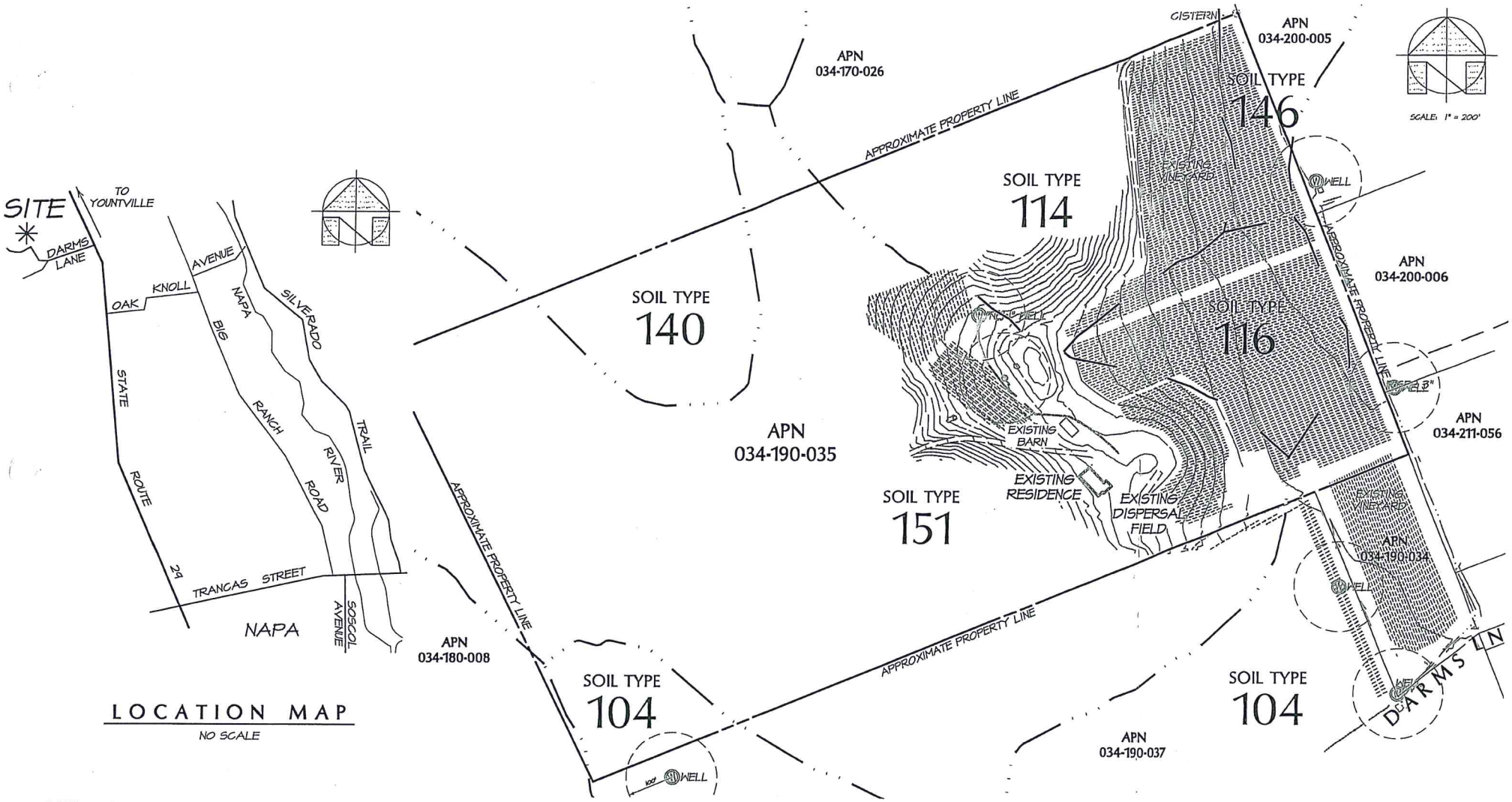
**HOLE #6** uphill

| | | | EST. PERC |
|---|---|---|---|
| 0 | to 36" | brown soil | 1-3 |
| 36" | to | cemented | |
| ___ | to ___ | | |

Roots:
Color: **bright** / **dull**
Water Table:
Dug: **easy** /**hard** /**dusty** /**smear**
Acceptable Soil To:

poor structure — this hole not good→wet, heavy - abrupt horizon change

Hole 7 (uphill) 0-18" clay loam - 18" rock




## LOCATION MAP

NO SCALE

## OVERALL SITE PLAN
## TEST PIT EXHIBIT
## W/ WELL SETBACKS

SCALE: 1" = 200'

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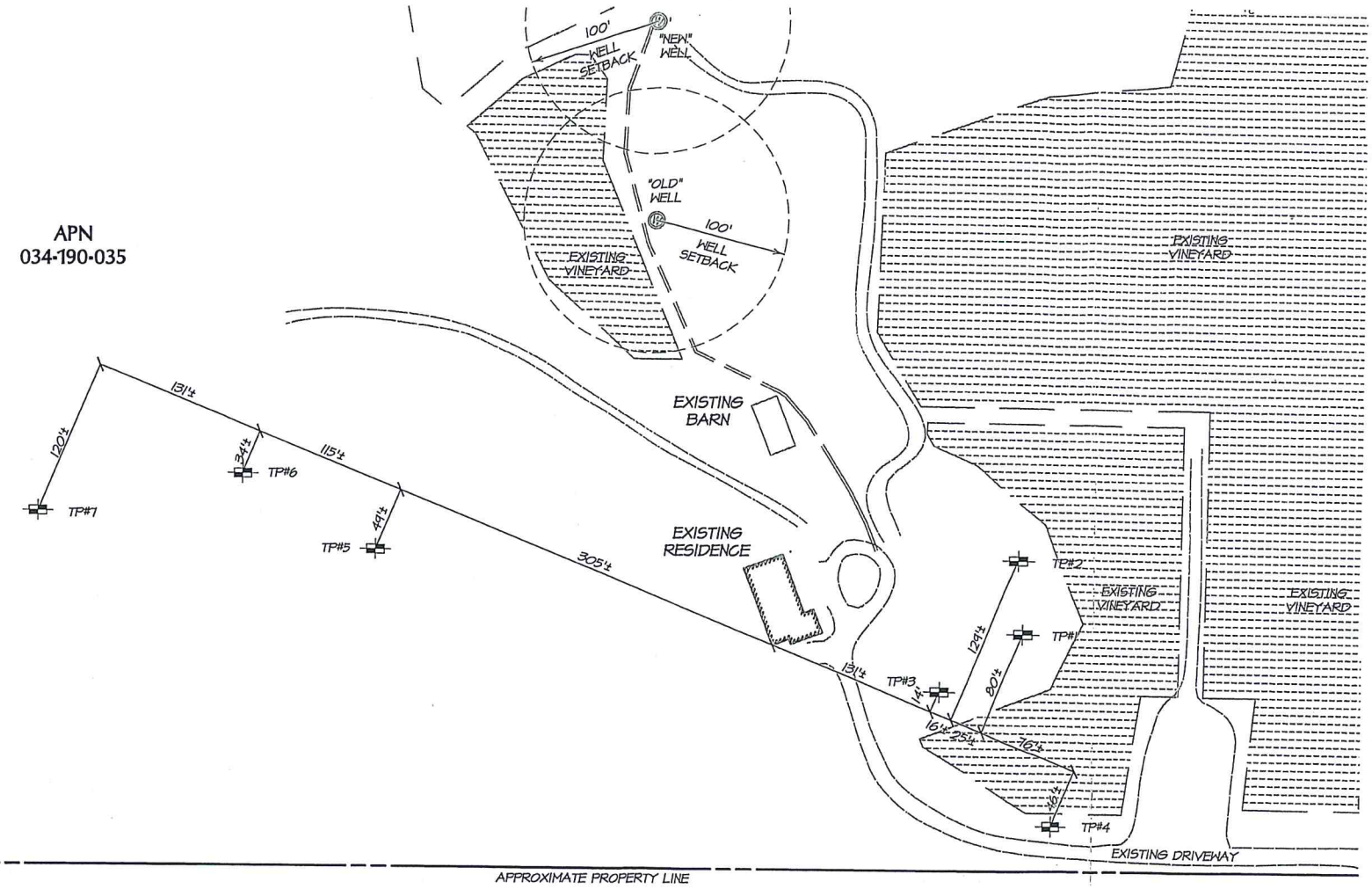
APN 034-190-035
Job No. 98-55
November 1998
Sheet 1 of 2




## TEST PIT LOCATION MAP

SCALE: 1" = 80'

## TEST PIT EXPLORATION NOTES:

1. REPRESENTS TEST PIT LOCATION.
2. TEST PITS WERE EXCAVATED ON NOVEMBER 17, 1998 AND WITNESSED BY A REPRESENTATIVE FROM BARTELT ENGINEERING AND NAPA COUNTY ENVIRONMENTAL HEALTH.

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