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Water Availability Analysis

WATER AVAILABILTY ANALYSIS

Part of the Use Permit Application for
Blossom Creek Farm, LLC
3547 Hwy 128
Calistoga, CA

January 16, 2018

Prepared for

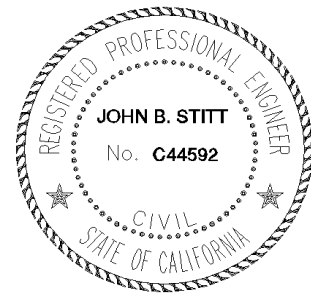
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WATER AVAILABILITY ANALYSIS BLOSSOM CREEK FARM, LLC

1. NARRATIVE

As part of the County of Napa use permit process, a water availability analysis (WAA) is required for each commercially operating parcel, as adopted by the County on May 15, 2015. This WAA answers the question,

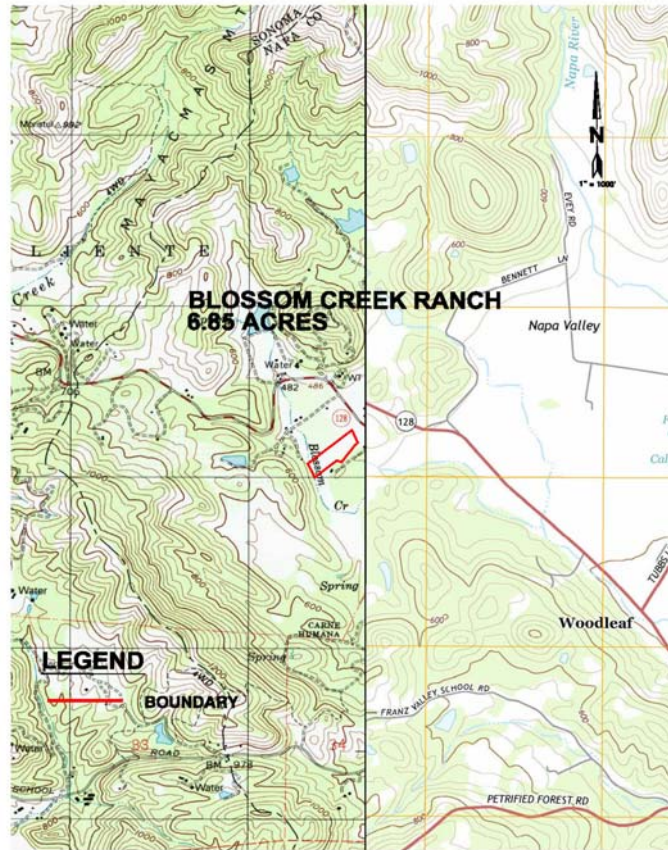
“Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?”

This analysis includes discussions of water demands in support of a horse farm operation on a 6.5 acre parcel. This analysis studies the parcel at 3547 Highway 128, outside of Calistoga, and within Napa County (see Drawing 1 below) owned and operated by Blossom Creek Farm, LLC, a horse farm that is developed for the care of horses and the continued training of equestrians, and offers horse boarding and training services to support farm operations. Ultimately, this study determines the existing water uses for a total water use amount, on a per year basis and compares this with available water source.

Another use is an existing public bathroom, used at a rate of 6.5 persons per day, that as part of the use permit process will be updated to ADA compliance.

The existing and future water lines with their associated 7500 gallon storage tank and other fixtures are shown on the map entitled “USE PERMIT EXHIBIT”.

The main house water supply storage is provided by the 7500 gallon tank, located to the east of the covered arena, by the well house.



Drawing 1: Property Location near Calistoga, CA

2. Water Uses

Water for parcel are as follows:

2.1. HOUSE DOMESTIC WATER

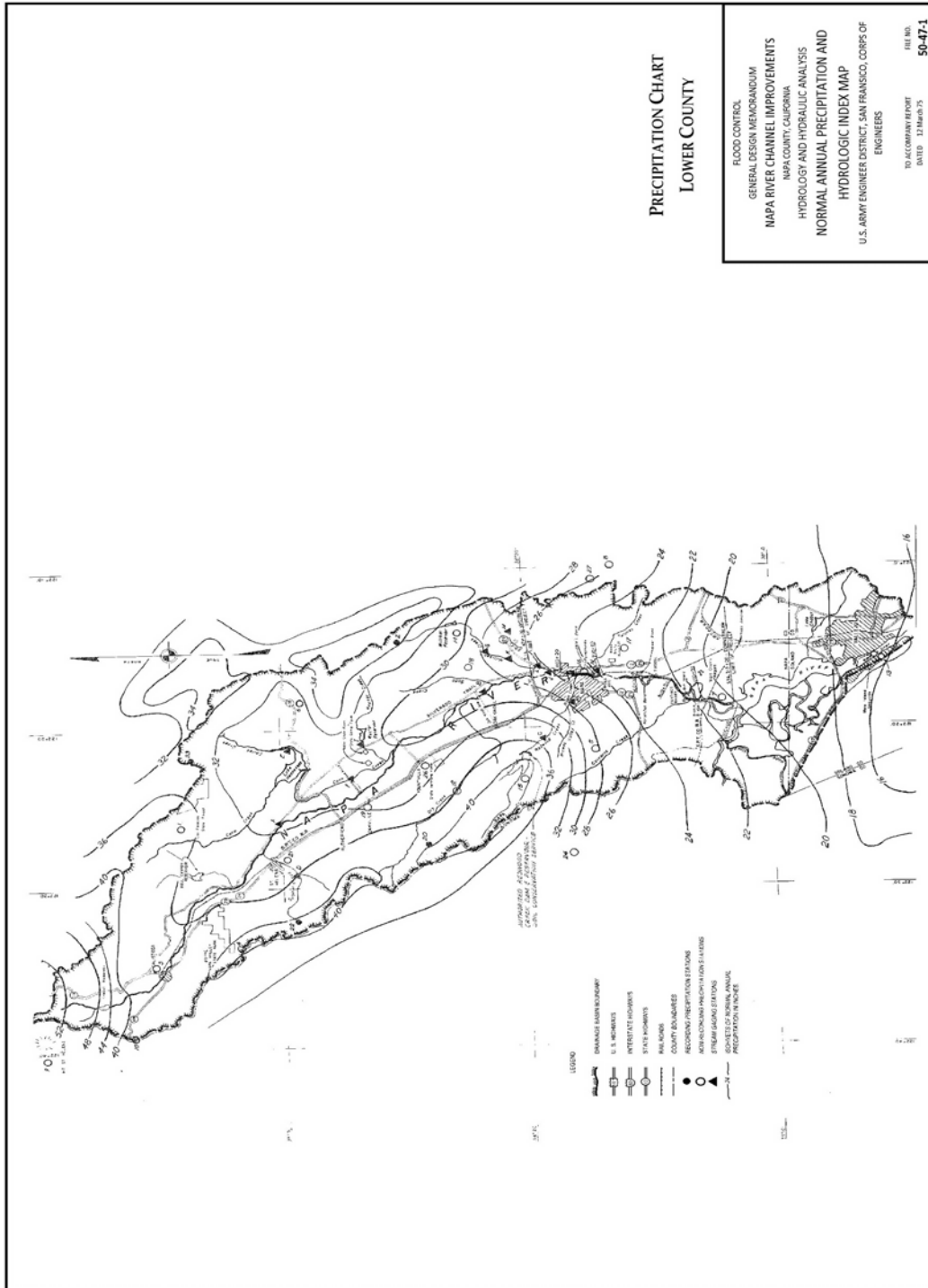
Domestic house water uses for the farm manager house is not limited to daily cleaning, food preparation, showering, clothes washing, kitchen food preparation and cleaning needs, emergency fire sprinkler system, and personal consumption. Below is a table that calculates the annual use per household.

Building	Bedrooms	Blossom Creek Farm		
		Gallons		Acre-Feet
		Daily	Annual	Annual
Farm Manager House	2	300	109,500	0.34
Total		300	109,500	0.34

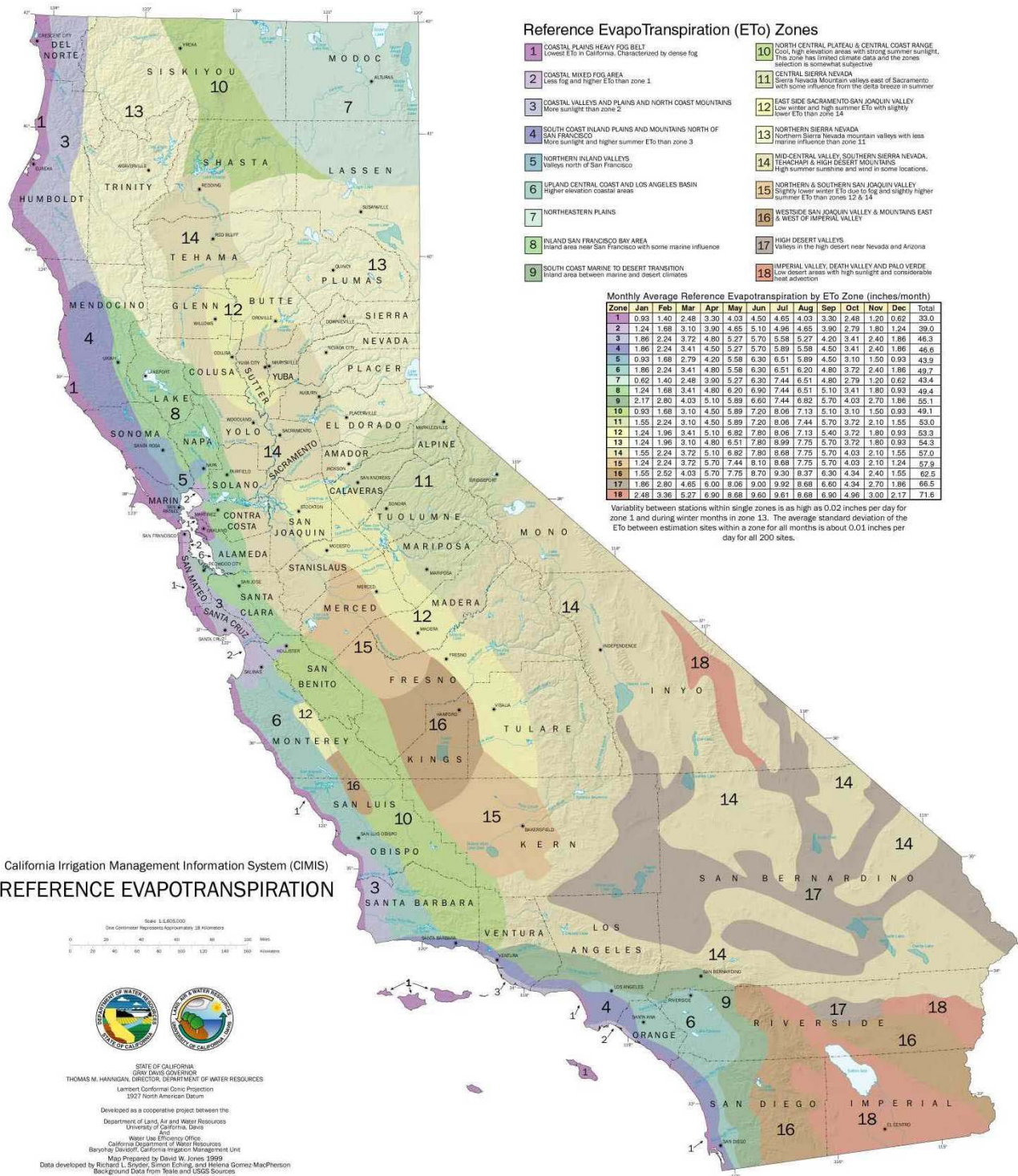
Therefore, the total annual use for the two households on the parcel is 0.34 acre-feet/year, for both current and proposed project.

2.2. NON-COMMERCIAL GARDENING AND LANDSCAPE WATER

Non-commercial use is limited to a small garden and landscape areas surrounding the site facilities. Some plants have an estimated 30% drip irrigation system and the remainder is sprinkler irrigation or hand watering as needed. The following spread sheet calculation is based on the California State standard method of calculating water use based on known average precipitation (Napa County Flood Control source – see Drawing 2 next page), and the known Evapotranspiration specific to Napa Valley region (EtoZoneMap for California - see Drawing 3 following page). This calculation considers the specific climate Zone 8, for Napa Valley.



Drawing 2: Napa County Flood Control source



Drawing 3: Evapotranspiration source from EtoZone, California

Blossom Creek Parcel Water use calculation based on 2,500 square feet of irrigated area:

1 **Evapotranspiration Calculation**

Where:

ETo = Annual Net Reference Evapotranspiration (inches)

0.6 = ET Adjustment Factor

LA = Landscaped Area (square feet)

0.62 = Conversion factor (to gallons per square foot)

SLA = Portion of the landscape area identified as Special Landscape Area (square feet)

0.4 = the additional ET adjustment factor for Special Landscape Area (1.0 - 0.6 = 0.4)

A.) Net Evapotranspiration Calculation

49.40
<i>(Annual ETo)</i>

From EtoZone Map

38.00
<i>(Annual Rainfall)</i>

x .25 =

9.50
<i>(Effective Rainfall)</i>

From Napa Co. PW Std.

Net Evapotranspiration Calculation = Annual ETo - Effective Rainfall = **39.90**

2 **Estimated Total Water Use (ETWU) Annual**

A.) Net Evapotranspiration Calculation

Net Evapotranspiration Calculation = Annual ETo - Effective Rainfall = **39.90**

B.) Adjusted Landscape Area Calculation

2150	x 0.3	=	645
<i>(Low water use plant sqft)</i>			

350	x 0.6	=	210
<i>(Moderate water use plant sqft)</i>			

x 1.0	=	0
<i>(High water use plant sqft)</i>		

Sum of Adjusted Landscape Area = **855**

ETWU = **39.90** x **0.62** x **855** / **0.3** = **70503 gallons**

Irrigation Efficiency Factor		
Percent of total landscape Irrigated with Drip		
0-25%		0.71
26-50%		0.75
51-75%		0.80

Subtotal of Landscaping water use:

Landscaping	Area	Gallons	Acre-Feet
		Annual	Annual
Blossom Cr. Parcel	2500	75,751	0.23
Total		75,751	0.23

Water use for landscaping based on small areas existing, the total annual landscape water use for Blossom Creek parcel is 0.23 acre-feet/year respectively.

2.3. COMMERCIAL EMPLOYEES AND STUDENT WATER USES (NON-RESIDENTIAL)

Employee (trainer and staff) and student or visitor uses is limited to drinking water and toilet use while on shift or during equestrian lessons or visiting boarded horses. There is a before project use and proposed project use as represented by the table below. It is assumed that full operations occur 50 weeks out of the year.

Employee & Student/Visitor			Current		Proposed	
	Current daily	Proposed daily	Gallons Annual	Acre-Feet Annual	Gallons Annual	Acre-Feet Annual
Employees*	1	2	4,500	0.01	9360	0.03
Student/Visitor**	0.86	3.7	771	0.00	3330	0.01
Total			5,271	0.02	12,690	0.04

**Student/Visitor 3 gal/per day

*Employee 15 gal/day shift

With the increase from current employee of 1 to 2 and increased student/visitor use from .86 daily ac-ft to 3.7 daily, water usage doubles from current to propose use.

2.4. EQUINE WATER

Equine water use is not limited to cleaning, drinking, and general support of the animals. It is based on 90 gallons per day of water per animal, as per historic operational quantity required. This calculation estimates the average horse is approximately 1,200 lbs.

Horses	Number		Use			
	Current	Proposed	Current		Proposed	
			Gallons Annual	Acre-ft Annual	Gallons Annual	Acre-ft Annual
Horses	4	12	131,400	0.40	394,200	1.21
Total			131,400	0.40	394,200	1.21

Water use for horses is based on a current 4 horses to a total of 12 horse proposed for the Blossom Creek Parcel. Therefore, the total annual water use for the horse care on the Blossom Creek parcel increased from current 0.4 ac-ft to proposed 1.21 acre-feet/year use.

2.5. PASTURE IRRIGATION WATER

Pasture Irrigation water use is a balance between cost for pumping irrigation water and a nutritional consideration, for the welfare of the horses, and the cost for importing feed. Much of the feed for the horses is imported to the property, but some is grown in irrigated pastures on-site and, during the dry season. In general, one acre of irrigated pasture can support one horse for a year. This horse farm operates by using small portions of each property to supplement the horse's diet on a selective basis. Therefore, the pasture area for Blossom Creek Farm is four acres.

Irrigation is performed approximately every ten days during the dry season, which in Climate Zone 8, is for 6 months. To sustain a pasture, two inches of irrigation is required every ten days¹. The method of irrigation is sprinkler and flood system, over an evenly graded, gently slopping pasture. For fertilizer, the farm manager collects farm wide, and allows the local vineyards to spread throughout their vineyards. The table below calculates the total annual water necessary for pasture irrigation.

Pasture Irrigation	Acres	Days	Gallons		Acre-Feet
			2"/10 days	Annual	Annual
			Pasture Grounds	4	19
Total			29,046	551,870	1.69

Water use for pasture irrigation purposes on the Blossom Creek Farm is 1.69 acre-feet/year.

¹ UC Davis Cooperative Extension, dated 10/2/08

2.6. FIRE WATER

Available emergency fire water, required by Cal Fire policies and code for commercial operations, is stored in a centrally located tank. It requires 5,000 gallon storage, per parcel, or as required by Cal Fire for particular and unique circumstances.

Fire Water	Gallons		Acre-Feet
	Daily	Annual	Annual
Blossom Creek Parcel	27	10,000	0.03
Total	27	10,000	0.03

Water use for emergency purposes and maintenance of facilities for Blossom Creek Farm is 0.03 acre-feet/year.

3. SUMMARY OF ESTIMATED WATER USES

The following table summarizes the various water uses, calculated above, for Blossom Creek Parcel. The daily and annual uses quantified are for use permit purposes of the County.

Summary	Blossom Creek Farm, LLC			
	Gallons		Acre-Feet	
	Current Annual	Proposed Annual	Current Annual	Proposed Annual
House	109,500	109,500	0.34	0.34
Landscaping	75,751	75,751	0.23	0.23
Employee & Student/Visitor	4,500	9,360	0.01	0.03
Equine Water	131,400	394,200	0.40	1.21
Pasture Irrigation	551,870	551,870	1.69	1.69
Fire Water	10,000	10,000	0.03	0.03
Total	883,021	1,150,681	2.70	3.53

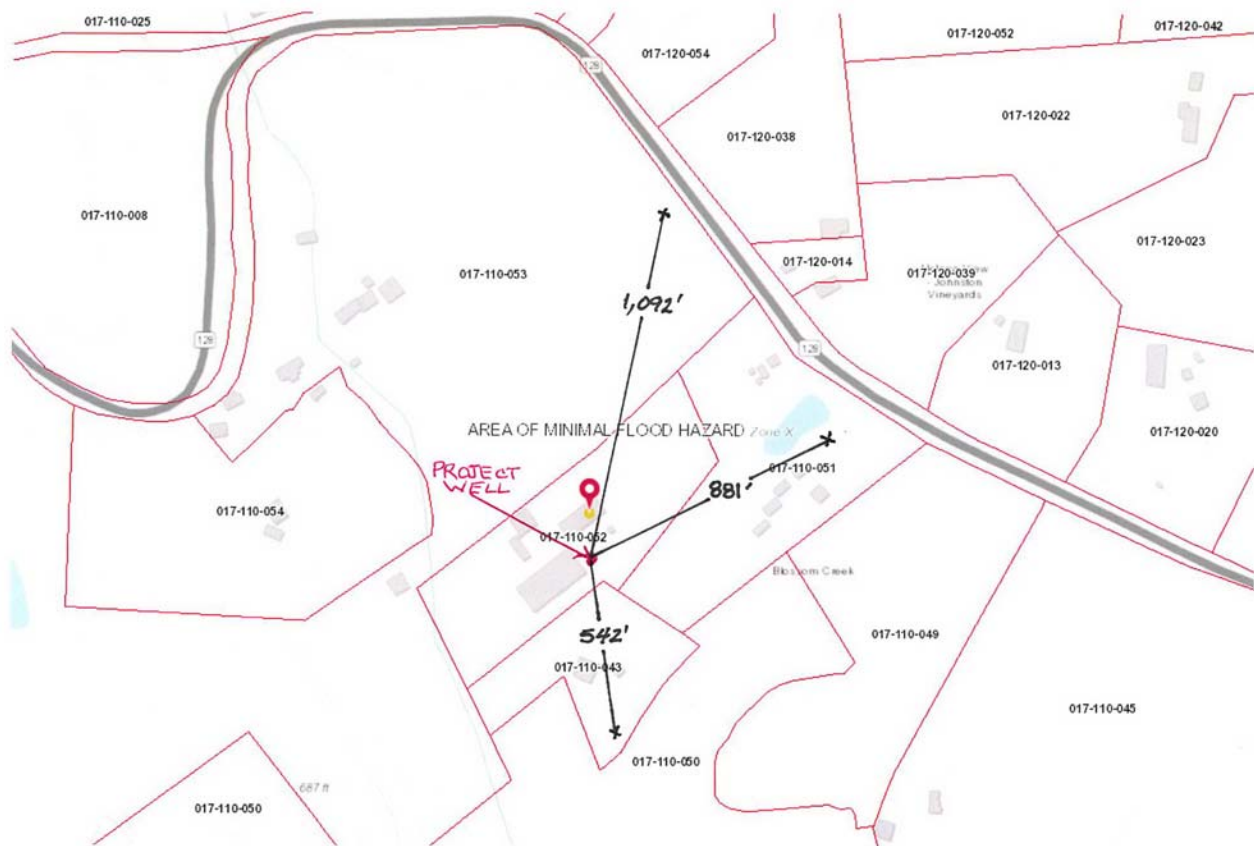
R = Run-off (from County run-off charts) 38 inches annual run-off

$$R_i = 49.4 - 8 + 12 - 38 = \mathbf{15.4 \text{ inches per year}}$$

Using the 15.4 inches per year result over the 6.85 acres of the ranch property, results in **8.8 ac-ft of recharge annual on a normal rainfall year basis.**

500' RADIUS WELLS

During the site investigation, it was noted that no adjacent property wells were within a 500' radius of the project boundary or well. Below, Drawing 4 shows the distance and location of these wells in regards to the project well location. There are three wells that were over the 500 distance from the Blossom Creek Farm well, the parcel to the North, East and South. Also, noticing the good recovering time of only 20 minutes during a four hour, high production rate test demonstrates a good and ample aquifer.



Drawing 4: Existing Well Locations

Conclusion

In conclusion, the water source for this property is a single well, and has been shown by testing to provide all the necessary water for this horse operation, as witnessed by this civil engineer, with a quick recovery period, showing the resilience and performance of the underlining aquifer. The summary table, in section 3 total water use, is 3.74 acre-feet per year and the capacity of 33 acre-feet per year, indicating more than adequate water available for the specified horse farm use. With proper water storage management, as required by County code and fire code, the farm house residence and one public bathroom have adequate water year around. Currently, all uses on site have adequate water annually as per the use plan.

Therefore to answer the County's question of:

“Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?”

The answer would have to be no, the project does not deplete the aquifer, and this study shows ample water resources are available for adjacent, neighboring wells.

Appendix A

1. Well test east of main arena



OAKVILLE PUMP SERVICE, INC.

#1 Walnut Drive / P.O. Box 435
 Oakville, CA 94562
 Phone (707) 944-2471 Fax (707) 944-5636
 License # 744958 / oakvillepump.com

Report Date: 11/18/1016	Report By: W. Lutz	Tested By: W. Lutz	Job#: 16K2116
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Property Information

Property Location:	3547 Hwy 128, Calisoga California	AP#:
Buyers Name:		
Buyers Agent or Rep:		
Property Owner Name:	Bob Fish (Blossom Creek LLC)	
Listing Agent or Owner Rep:		

Well & Pump System Information:

Well ID & Location on Property	Well Depth:	Pump Setting:	Casing Type & Size:	Sanitary Well Seal:
Main Well On west side of property	~300' (info from owner)	No Data	5" PVC	Yes
Submersible Pump / HP / GPM:	Motor HP, Voltage, Phase:	Pipe Size & Type:	Check Valve Type:	Annular Seal / Pad:
Grundfos 25S20-11 2 HP 25GPM	2HP 1Ph 230 VAC Grundfos	1.5" Galv	1.5" Flotmatic DI	None
Submersible Pump Control Panel:	Low Water Protection:	Flow Control Valve:	Press Tank(s) & Qty:	Press. Relief Valve:
2 HP Control Box with Float switch/contacter	None	None	(2) WX350	None
Submersible Pump Filtration:	Sub Pump Misc Equipment Notes:			
none	Pressure tank is on booster pump system, there are two pressure tanks, only 1 is used			
Booster Pump Information:	Pump Controls:	Flow Control Valve:	Check Valve Type:	Press. Relief Valve:
3HP 3ph CRI1-04	Contractor with low level float			
Filtration Equipment:	Storage Tank Size/Type:	Booster Pump/Filtration/Tank Equipment Notes:		
Softner & polymer Injection w/filter	~7500 Gallon Galv	Grundfos Booster pump has a Goulds 3AB2 Controller		

Water Analysis Testing:

Sample Type:	Date Sampled:	Completion Date:	Lab Vender:	Notes:
None				

Well Yield Test (Log on second page)

Date of Test:	Well Type:	Static Water Lvl:	Pumping Water Lvl:	Specific Capacity:	Well/Pump Yield:
11/18/16	residential/ag	28' 8"	36' 3"	4.34 GPM/Ft Drawdown	33 GPM
Start Time:	Test Duration:	Water Level Recovery:		Recovery Time:	Total Gallons Pumped:
10:20	4 Hr	recovered to: 29' 1"		20 minutes	7940

*The well yield test is based upon duration and conditions existing at time of testing. The well production may and will change based upon time of year. The well output may be limited to the size of the pump and the well yield test may not properly represent the true capacity of the well.

Observations:

- 1.) 2nd Booster pump is offline and disconnected from electrical but plumbing is still connected
- 2.) New Grundfos Booster Pump is not anchored to the floor and can shift, potentially breaking discharge piping
- 3.) Large Flow control Valve is unnecessary due to the VFD controls on pump
- 4.) Piping does not have adequate pipe supports

Recommendations:

- 1.) Remove abandoned/unused equipment and properly support pipes and anchor Booster Pump
- 2.)
- 3.)

Well Test Log

Time:	Water Level	GPM Flow	Water Quantity Flowed (gals)	Basic Water Quality (Visual Color-Sand)	Turbidity (NTU)	Notes:
10:20	28' 8"	34		reddish		
10:35	34' 5"	34		clear		
11:00	35' 4"	33		clear		
11:30	35' 9"	33		clear		
12:00	35' 11"	33		clear		
12:45	36' 1"	33		clear		
13:30	36' 2"	33		clear		
14:20	36' 3"	33		clear		shutdown for recovery
14:22	31' 7"	0		n/a		
14:25	30' 8"	0		n/a		
14:30	29' 10"	0		n/a		
14:40	29' 1"	0		n/a		

