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Hydrology Analysis

Gardiner Horse Facility P15-00394
Planning Commission Hearing July 19, 2017

WATER USE ANALYSIS

Use Permit Application for
2002 James Creek Road
Pope Valley, CA

September 16, 2015
rev 1 May 11, 2017

Prepared for

Planning, Building and Environmental Services
County of Napa
1195 Third Street, 2nd Floor
Napa, CA 94558

Prepared by

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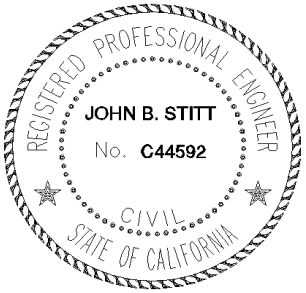
John Stitt, PE



John B. Stitt, PE

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WATER AVAILABILITY ANALYSIS
JAMES CREEK ROAD PARCEL

1. BACKGROUND & INTRODUCTION

As part of the County of Napa use permit process, a water availability analysis (WAA) is required for each non-contiguous 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 ranch operation. Each parcel will be analyzed separately, because they are non-contiguous parcels, albeit owned by the same owner, and as required by the County's policies.

This study analyzes the James Creek parcel (see Drawing 1 below) owned and operated by Rockridge Ranch, a horse ranch that is developed for the care and humane treatment of retired horses, and offers horse boarding and training services to support horse retirement goals. Ultimately, this study determines the existing uses and some planned uses for a total water use amount, on an annual basis, for the James Creek Road Parcel.

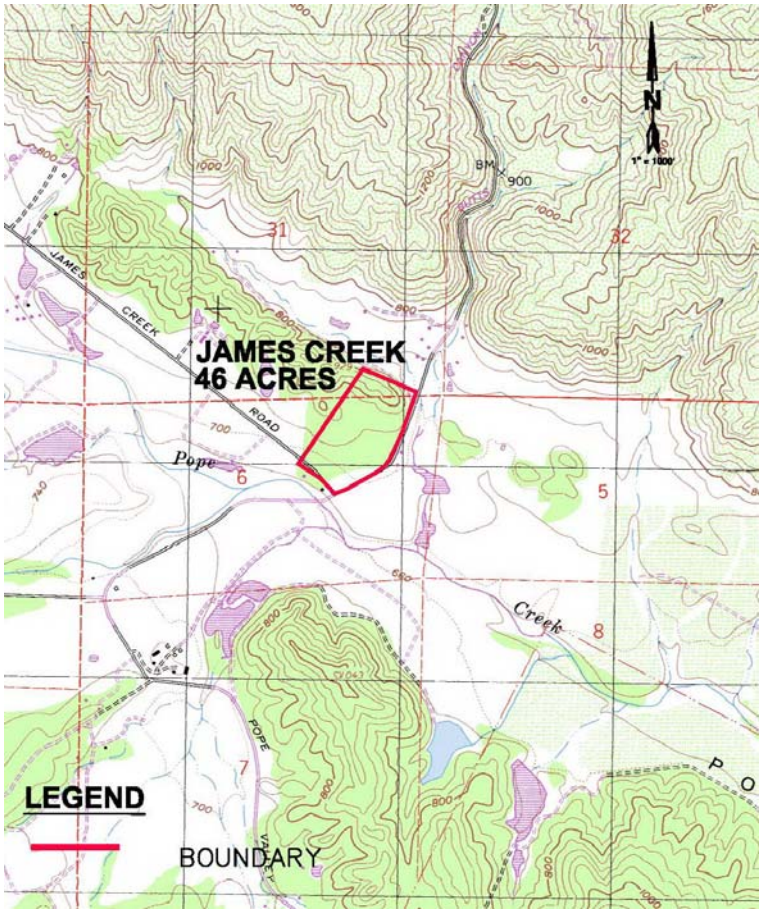
Some future uses are for growing fodder on site, producing fresh barley spouts to supplement the horse's diet on a daily basis. This greatly improves their health, particularly from colic conditions. Fodder is spouted inside a small self-contained grow unit the size of a small shipping container. This method recycles water thereby being more that 90% water efficient.

Another future use is an ADA compliant bathroom for 18 persons per day. A recent well test shows the well is viable at 21.5 gallons per minute, which will take care of all uses proposed on this property, including the new ADA compliant bathroom. The new ADA bathroom is a requirement of this project. Previously, the employees and guests would use a "blueroom" temporary service. This new bathroom will be permanent facilities.

The existing residence has recently been updated to 2013 California Building Code for Seismic and Wind, aswell as California Title 24 Energy requirements. The septic system system has been replaced with a new engineered septic system that replaces all other septic systems on site.

The existing water lines with their associated tanks and other fixtures are shown on the map entitled "USE PERMIT EXHIBIT", attached.

A backup well is also located on the "USE PERMIT EXHIBIT" and tests are shown in the appendix.



Drawing 1: Property Location

2. Water Uses

Water uses for each parcel are as follows:

2.1. INTERNAL HOUSE DOMESTIC WATER

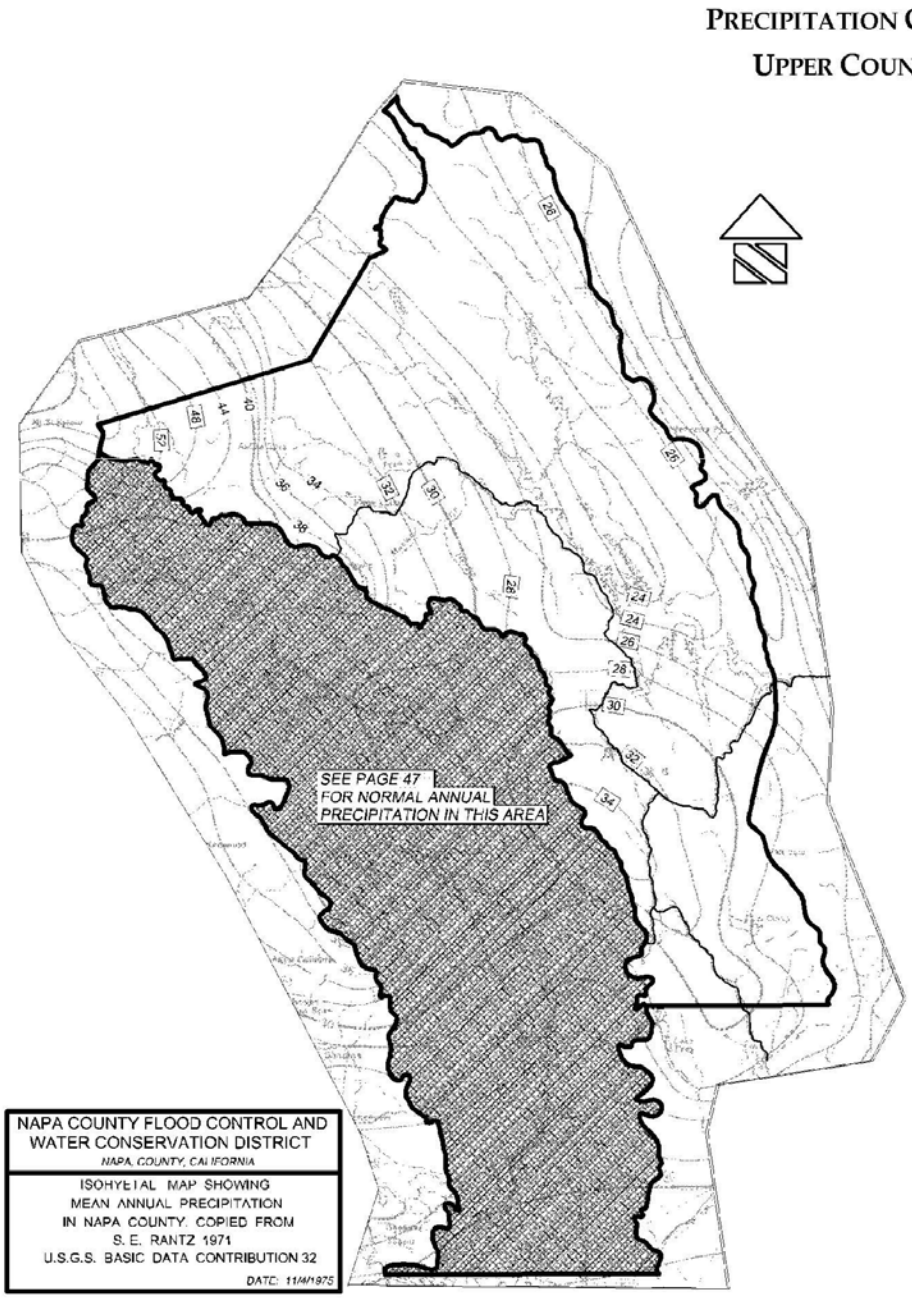
Domestic house water uses are not limited to daily cleaning, food preparation, showering, clothes washing, kitchen food preparation and cleaning needs, emergency fire sprinkler system, and personal consumption. Below is a table that calculates the annual use per house building.

Building	**Bedrooms**	**James Cr. Parcel**		
		Gallons		Acre-Feet
		Daily	Annual	Annual
Main House (James Parcel)	3	450	164,250	0.46
Total		**450**	**164,250**	**0.46**

Therefore, the total annual use for the household on James Creek parcel is 0.46 acre-feet/year.

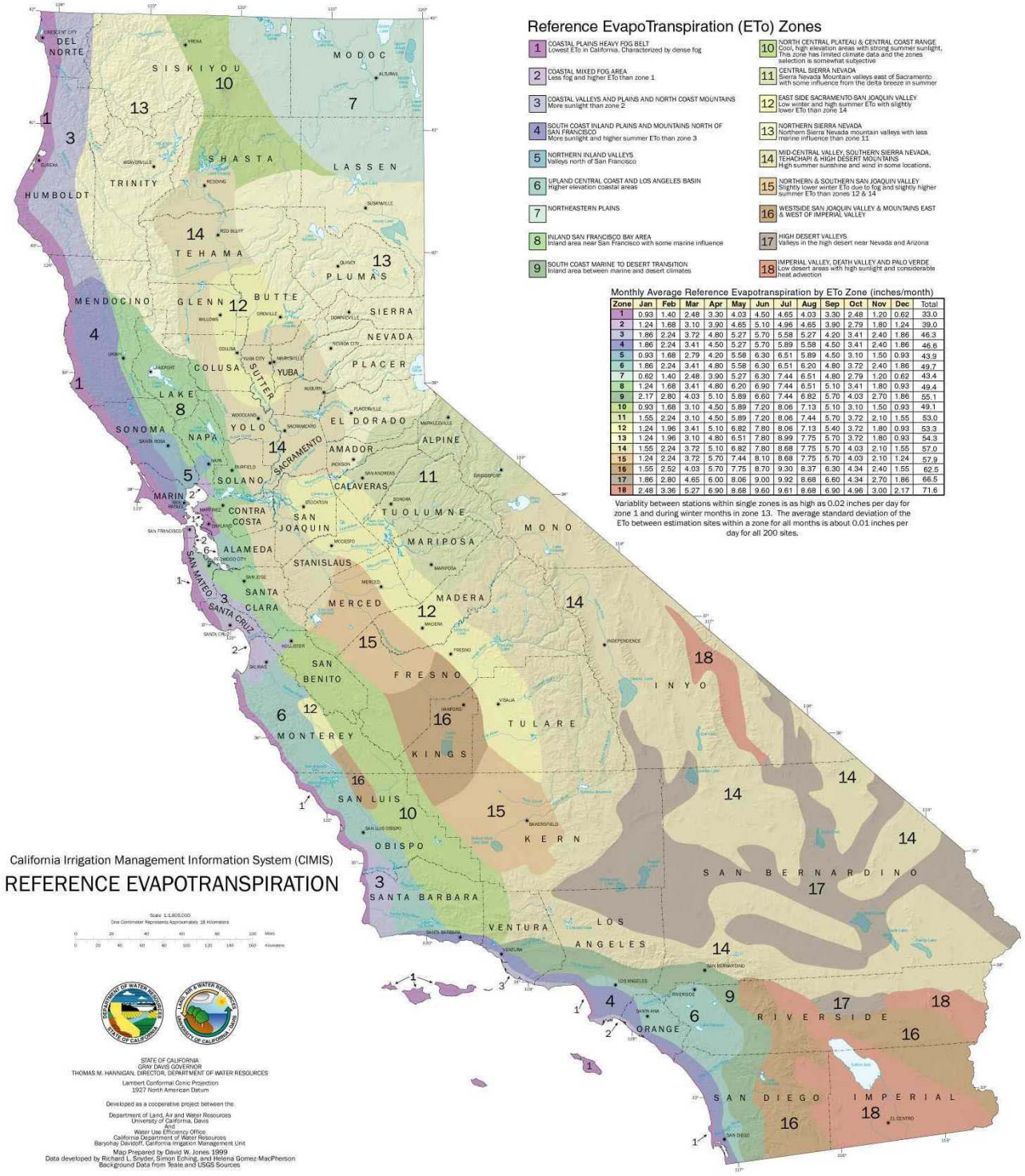
2.2. NON-COMMERCIAL GARDENING AND LANDSCAPE WATER

Non-commercial use is limited to a small garden and landscape areas surrounding the house. 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 from known average precipitation (Napa County Flood Control source – see Drawing 2 next page), and the known Evapotranspiration specific to Pope Valley region (EtoZoneMap for California - see Drawing 3 following page). This calculation considers the specific climate Zone 8, for Pope Valley.



PRECIPITATION CHART – UPPER COUNTY

Drawing 2: Napa County Flood Control source



Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	0.93	1.40	2.48	3.30	4.03	4.50	4.65	4.03	3.30	2.48	1.20	0.62	33.0
2	1.24	1.68	3.10	3.90	4.65	5.10	4.96	4.65	3.90	2.79	1.80	1.24	39.0
3	1.86	2.24	3.72	4.80	5.27	5.70	5.58	5.27	4.20	3.41	2.40	1.86	46.3
4	1.86	2.24	3.41	4.50	5.27	5.70	5.89	5.58	4.50	3.41	2.40	1.86	46.6
5	0.93	1.68	2.79	4.20	5.58	6.30	6.51	5.89	4.50	3.10	1.50	0.93	43.9
6	1.86	2.24	3.41	4.80	5.58	6.30	6.51	6.20	4.80	3.72	2.40	1.86	49.7
7	0.62	1.40	2.48	3.90	5.27	6.30	7.44	6.51	4.80	2.79	1.20	0.62	43.4
8	1.24	1.68	3.41	4.80	6.20	6.90	7.44	6.51	5.10	3.41	1.80	0.93	49.4
9	2.17	2.80	4.03	5.10	5.89	6.60	7.44	6.82	5.70	4.03	2.70	1.86	55.1
10	0.93	1.68	3.10	4.50	5.89	7.20	8.06	7.13	5.10	3.10	1.50	0.93	49.1
11	1.55	2.24	3.10	4.50	5.89	7.20	8.06	7.44	5.70	3.72	2.10	1.55	53.0
12	1.24	1.96	3.41	5.10	6.82	7.80	8.06	7.13	5.40	3.72	1.80	0.93	53.3
13	1.24	1.96	3.10	4.80	6.51	7.80	8.99	7.75	5.70	3.72	1.80	0.93	54.3
14	1.55	2.24	3.72	5.10	6.82	7.80	8.68	7.75	5.70	4.03	2.10	1.55	57.0
15	1.24	2.24	3.72	5.70	7.44	8.10	8.68	7.75	5.70	4.03	2.10	1.24	57.9
16	1.55	2.52	4.03	5.70	7.75	8.70	9.30	8.37	6.30	4.34	2.40	1.55	62.5
17	1.86	2.80	4.65	6.00	8.06	9.00	9.92	8.68	6.60	4.34	2.70	1.86	66.5
18	2.48	3.36	5.27	6.90	8.68	9.60	9.61	8.68	6.90	4.96	3.00	2.17	71.6

Drawing 3: Evapotranspiration source from EtoZone source, California

James Creek Parcel Water use calculation based on 2,000 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					From EtoZone Map
(Annual ETo)					
26.12	x	.25	=	6.53	From Napa Co. PW Std.
(Annual Rainfall)				*(Effective Rainfall)*	

Net Evapotranspiration Calculation = Annual ETo - Effective Rainfall = 42.87

2 Estimated Total Water Use (ETWU) Annual

A.) Net Evapotranspiration Calculation

Net Evapotranspiration Calculation = Annual ETo - Effective Rainfall = 42.87

B.) Adjusted Landscape Area Calculation

1650	x 0.3	= 495
(Low water use plant sqft)		
350	x 0.6	= 210
(Moderate water use plant sqft)		
	x 1.0	= 0
(High water use plant sqft)		

Sum of Adjusted Landscape Area = 705

ETWU = 42.87 x 0.62 x 705 / 0.3 = 62462 gallons

Irrigation Efficiency Factor		
Percent of total landscape Irrigated with Drip		
0-25%		0.71
26-50%		0.75
51-75%		0.80
76-100%		0.85

Subtotal of Landscaping water use:

Landscaping	**Area**				
		Gallons Annual	Acre-Feet Annual	Gallons Annual	Acre-Feet Annual
James Creek Parcel	2000			62,462	0.17
Total		**0**	**0.00**	**62,462**	**0.17**

Water use for landscaping based on small existing areas, the total annual landscape water use for James Creek parcel is 0.17 acre-feet/year respectively.

2.3. 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. The typical horse is approximately 1,000 lbs whereas, these retired horses are generally 1,500 lbs, therefore requiring proportionally more water on average.

Horses	**Number**	**James Cr. Parcel**		
		Gallons		Acre-Feet
		Daily	Annual	Annual
Horses (James Parcel)	30	2,700	985,500	2.73
Total		**2,700**	**985,500**	**2.73**

Water use for horses is based on a total of 30 horses maximum on the James Creek Parcel. Therefore, the total annual water use for the horse care on the James Creek parcel is 2.73 acre-feet/year.

2.4. FODDER PRODUCTION WATER

Fodder production water use is more than 90% water efficient compared to traditional field crop irrigation and can be produced year round. Since the fodder crop is grown inside a closed container, evapotranspiration is significantly reduced to almost nothing. Furthermore, irrigation water that would have bypassed the crop's root system, by either going deep into the ground or as runoff, is not lost with an hydroponic system, but recaptured and recycled. Grown in 20 foot shipping containers, fodder is used to supplement the horses' diet. This hydroponic grow operation can produce as much as 140 tons of fodder per container, per year. This will offset other feed that would have been imported from outside the County. One grow-unit will be used on the James Creek parcel.

For the water use analysis in hydroponic fodder production, we use the manufacturer's specification for a model F-1100 fodder sprouting system, Fodder Works Inc. Water use table is below.

Fodder Production	**No. Horses**	**James Cr. Parcel**		
		Gallons		Acre-Feet
		Daily	Annual	Annual
Horses (James Parcel)	30	335	122,275	0.38
Total		**335**	**122,275**	**0.38**

Water use for fodder production is based on a total of 30 horses maximum. Therefore, the total annual water use for fodder production for James Creek parcel is 0.38 acre-feet/year. All fodder produced remains on this parcel for 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 ranch operates by using small portions of the property to supplement the horse's diet on a selective basis. Therefore, the pasture area for James Creek Parcel is three acres.

Irrigation is performed approximately every ten days during the dry season, which in Climate Zone 8, is 6 months. To sustain a pasture, two inches of irrigation is required every ten days[1]. The method of irrigation is flooding, over an evenly graded, gentle slopping pasture. For fertilizer, the ranch manager collects ranch wide, and composts the manure then later spreads at a 16 to 20 cubic yards per acre. This operation is designed to be self-sustaining. To get the pasture operational, 200 pounds per acre of organic 16-20-0 fertilizer (nitrogen and phosphorous may be necessary on an as-needed basis. The table below calculates the total annual water necessary for pasture irrigation.

Pasture Irrigation	**Acres**		**James Cr. Parcel**		
			Gallons		Acre-Feet
		Days	2"/10days	Annual	Annual
Horses (James Parcel)	3	19	21,784	413,903	1.27
Total			**21,784**	**413,903**	**1.27**

Water use for pasture irrigation for the James Creek Parcel is 1.27 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 properly sized tanks with a hydrant system, at pressure. It requires 10,000 gallon storage, per parcel, or as required by Cal Fire for particular unique circumstances.

Fire Water	**James Cr. Parcel**		
	Gallons		Acre-Feet
	Daily	Annual	Annual
James Creek Parcel	41	15,000	0.04
Total	**41**	**15,000**	**0.04**

Water use for emergency purposes and maintenance of facilities for James Creek Parcel is 0.04 acre-feet/year.

3. SUMMARY OF WATER USES

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

Summary	**James Cr. Parcel**		
	Gallons		Acre-Feet
	Daily	Annual	Annual
Houses	450	164,250	0.46
Horses	2,700	985,500	2.73
Landscaping	171	62,462	0.17
Fodder Production	335	122,275	0.34
Pasture Irrigation	21,784	413,903	1.27
Fire Water	41	15,000	0.04
Total	**25,482**	**1,763,390**	**5.01**

Total water use for the horse ranch operation at James Creek Parcel is 5.01 acre-feet/year. Source of water is one on-site well. The ponds on James Creek Parcels seasonal and feed by natural runoff, and not part of this this water availability calculation.

4. PROJECT IMPACT TO AQUIFER

The ground water aquifer of this specific parcel has unique factors that keep water available through even the driest of years. The latest example was last year being the worst drought-year in resent history. After a prolonged drought of over four years, the well was showing signs of dropping production to just around 21.5 gallon per minute (gpm), based on historical data. See Appendix A for the 6 hour test data. The aquifer is recharged by the rocky hillside of Rattle Snake Ridge. This unique aquifer is very responsive to even the slightest amount of rainfall.

Below is a table to estimates the high and the low parcel sourced water. The low is an estimate based on recent testing of the well, shown in Appendix A.

Parcel Source Water			**James Creek Parcel**			
	GPM(high)	GPM(low)	Gallons Annual		Acre-Feet Annual	
			high	low	high	low
Well	30	20	15,768,000	10,512,000	48.39	32.26
Total			**15,768,000**	**10,512,000**	**48.39**	**32.26**

Groundwater Recharge Calculation

For a groundwater recharge calculation, it is selected to use the “Soil Water Balance” Method. It uses the following equation for the calculation, albeit the calculation is only an approximation, because many factors can influence accurate results:

Ri = P – ET – Ws -Ro (equation 1)

Ri = Recharge

P = Precipitation (49.4 inches per year) from Zone 8

ET = Evaporation Transpiration (from table Eto Zone Map 8) (ET=KcETo)

(8 inches per year)

Kc = .25 and Eto 0.65 pan evaporation at Lake Berryessa

Ws = Change in soil water storage (-2 estimate from the rocky hillside to valley)

R = Run-off (from County run-off charts)

Ri = 49.4 – 8 – 2 – 32 = **7.4 inches per year**

Using the 7.4 inches per year result over the 46 acres of the ranch property, results in **28 ac-ft of recharge annual on a normal rainfall year basis.**

500' RADIUS WELLS

Since there are no wells within a 500 foot radius of property lines it in not likely any neighbor's aquifer would be adversely affected by this project.

Conclusion

In conclusion, the water source for this property has shown to be more than ample for the needs of the horse ranch and two residences, as witnessed by this civil engineer over a two year period. The summary table in section 3, total water use is 5.01 acre-feet per year and the capacity in the worst conditions of the drought is 32.26 acre-feet per year. And in a normal rainfall year, recharging of the aquifer is estimated to be 28 ac-ft per year. Presently, all water usage on site is more than adequately provided by the one well.

Therefore to answer the County 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 to this question would be no, with ampule water resources in reserve.

Appendix A

1. Well Test at Pump House

2. Well Test on Ridge top (backup well)

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: 9/8/2015	**Report By:** W. Lutz	**Tested By:** **W. Lutz**	**Job#:** 15H 9305

Property Information

Property Location:	2002 James Creek Rd				AP#:
Buyers Name:					
Buyers Agent or Rep:					
Property Owner Name:	William Gardiner				
Listing Agent or Owner Rep:	Chuck Barron	chuckbarron@ymail.com	(707)815-7537, (707) 965-2834		

Well & Pump System Information:

Well ID & Location on Property	***Well Depth:***	***Pump Setting:***	***Casing Type & Size:***	***Sanitary Well Seal:***
Backup Well Near Main Entrance		~60'	5" PVC	Yes
Submersible Pump / HP / GPM:	***Motor HP,Voltage,Phase:***	***Pipe Size & Type:***	***Check Valve Type:***	***Annular Seal / Pad:***
~ 10 GPM	1/2 HP 230 VAC 1Ph	1.25"/1" PVC	None above well head	Yes
Submersible Pump Control Panel:	***Low Water Protection:***	***Flow Control Valve:***	***Press Tank(s) & Qty:***	***Press. Relief Valve:***
15A Fused Dct, Tank Fill Float, C-Box	None	Gate Valve	N/A	N/A
Submersible Pump Filtration:	**Sub Pump Misc Equipment Notes:**			
10" Cartridge Filter				

Booster Pump Information:	***Pump Controls:***	***Flow Control Valve:***	***Check Valve Type:***	***Press. Relief Valve:***
Meyers 1 HP	Fused Disconnect/M4	none	1.25" Simmons & PVC	3/4" Brass
Filtration Equipment:	***Storage Tank Size/Type:***	***Booster Pump/Filtration/Tank Equipment Notes:***		
None	700 Gallon White Poly	Brass Check Valve Slamming, water in tank greyish		

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:***
9/8/2015	Residential	19' 8"	`60'	0.015GPM/ft drawdown	**0.6 GPM**
Start Time:	***Test Duration:***	***Water Level Recovery:***		***Recovery Time:***	***Total Gallons Pumped:***
12:35		recovered to: 55'		20min	225

*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.) No low water protection for submersible well pump
2.) Bad Control Box, Replaced in order to bring well pump online and conduct well test.
3.)
4.)

Recommendations:

1.) Install Submersible Pump protection to keep from running dry/wasting power using throttling valve
2.)
3.)

Well Test Log

Time:	Water Level	GPM Flow	Water Quantity Flowed (gals)	Basic Water Quality (Visual Color-Sand)	Turbidity (NTU)	Notes:
12:35	19' 8"	14		Turbid/Red		
12:45	58' 8"	1		Clear		
13:00	53'	2.5		Clear		
13:15	53	1.6		Clear		
13:30	54'	1.6		Clear		
14:00	below 60'	1.6		Clear		
14:35	below 60'	0.6		Clear		
14:55	55'	0				

Additional Comments and Notes:

1.) Well Located N 38° 39' 33.2" W 122° 27' 11.6"
2.)
3.)
4.)
5.)
6.)
7.)
8.)
9.)
10.)

System Pictures

OAKVILLE PUMP SERVICE, INC.

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Oakville, CA 94562
Phone (707) 944-2471 Fax (707) 944-5636
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Report Date: 9/2/2015	**Report By:** W Lutz	**Tested By:**	**W. Lutz**	**Job#:** 15H 9305

Property Information

Property Location:	2002 James Creek Rd	Pope Valley, CA			AP#:
Buyers Name:					
Buyers Agent or Rep:					
Property Owner Name:	William & Deborah Gardiner				
Listing Agent or Owner Rep:	Chuck Barron	chuckbarron@ymail.com	(707)815-7537, (707) 965-2834		

Well & Pump System Information:

Well ID & Location on Property	***Well Depth:***	***Pump Setting:***	***Casing Type & Size:***	***Sanitary Well Seal:***
Main Well On Hill N of facility	340'	320'	5" PVC	Yes
Submersible Pump / HP / GPM:	***Motor HP,Voltage,Phase:***	***Pipe Size & Type:***	***Check Valve Type:***	***Annular Seal / Pad:***
`20 GPM	3HP 230 VAC 1Ph 14.2 AMPS	1.5" Galv/pvc	1.5" DI	see photo
Submersible Pump Control Panel:	***Low Water Protection:***	***Flow Control Valve:***	***Press Tank(s) & Qty:***	***Press. Relief Valve:***
control box and fused disconnect	none	none	none	none
Submersible Pump Filtration:	**Sub Pump Misc Equipment Notes:**			
none at site				

Booster Pump Information:	***Pump Controls:***	***Flow Control Valve:***	***Check Valve Type:***	***Press. Relief Valve:***
n/a	n/a	n/a	n/a	n/a
Filtration Equipment:	***Storage Tank Size/Type:***	***Booster Pump/Filtration/Tank Equipment Notes:***		
n/a	(1) 5000 gal poly above well			

Water Analysis Testing:

Sample Type:	***Date Sampled:***	***Completion Date:***	***Lab Vender:***	***Notes:***
none taken				

Well Yield Test (Log on second page)

Date of Test:	***Well Type:***	***Static Water Lvl:***	***Pumping Water Lvl:***	***Specific Capacity:***	***Well/Pump Yield:***
9/2/2014	Residential	73' 5"	196'	0.18 GPM/Ft drawdown	**21.5**
Start Time:	***Test Duration:***	***Water Level Recovery:***		***Recovery Time:***	***Total Gallons Pumped:***
14:20	4 Hr	recovered to	102.5'	20 Min	4610

*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.) Well Runs off of Genset
2.) Well located N 38° 39' 44.6" W 122° 27' 3.5" +/-9ft
3.) Well yeild and static water level have decreased since 2011 when the well was last tested.
4.)

Recommendations:

1.) cracked electrical conduits should be repaired at well head
2.) vented turned down/screened well vent should be installed
3.)

Well Test Log

Time:	Water Level	GPM Flow	Water Quantity Flowed (gals)	Basic Water Quality (Visual Color-Sand)	Turbidity (NTU)	Notes:
14:20	73.5'	17.3		Clear		
14:30	93'	16.9		"		
14:35	108'	25.5		"		Adjust Genset Throttle
14:40	122'	25		"		Throttled to 20 GPM
14:50	127'	20		"		
15:00	136'	20		"		Throttled to 15 GPM
15:10	125'	15		"		
15:20	126'	15		"		
15:30	130	15		"		
15:45	132'	15		"		Throttled to 14 GPM
16:00	131'	14		"		
16:15	132'	14		"		Opened full (25 GPM)
16:30	182'	23		"		
16:45	191'	21.5		"		
17:00	191'	21.5		"		
17:15	192'	21.5		"		
17:30	193'	21.5		"		
17:45	194'	21.5		"		
18:20	196'	21.5		"		Shutdown for recovery
18:25	133'	0		"		
18:30	111'	0				
18:35	106'	0				
18:40	102.5'	0				

Additional Comments and Notes:

1.)
2.)
3.)
4.)
5.)
6.)
7.)
8.)
9.)
10.)

System Pictures

HYDROLOGY ANALYSIS

Use Permit Application for
2002 James Creek Road
Pope Valley, CA

September 16, 2015

Prepared for

Planning, Building and Environmental Services
County of Napa
1195 Third Street, 2nd Floor
Napa, CA 94558

Prepared by

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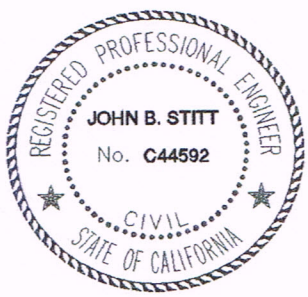
1822 Blossom Dr.
Antioch, CA 94509

Attention: John Stitt, PE



John B. Stitt, PE

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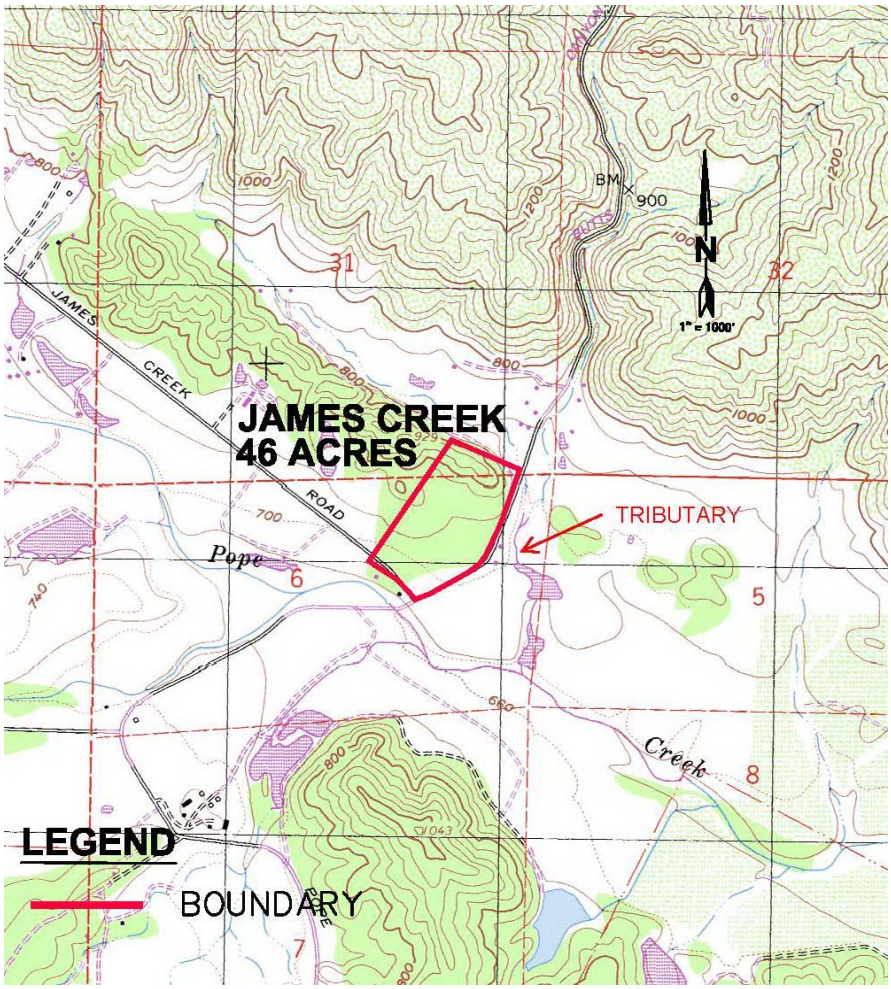
HYDROLOGY ANALYSIS - JAMES CREEK PARCEL

1. PROJECT INTRODUCTION & BACKGROUND

As part of the County of Napa use permit process for a horse ranch operation, called Rockridge Ranch, a hydrology study is required for each non-contiguous parcel. This permit would allow irrigated horse pasture, barn and other ancillary buildings, feed storage, horse training, horse boarding activities and fodder production. This parcel is approximately 46 acres located in the Pope Creek drainage basin. The purpose of this study is to evaluate the existing surface water hydrologic conditions of the parcel and assure proposed use has no adverse effect on drainage for the parcel or nearby properties.

The parcel has been operated as a ranch for over 100 years. It was subdivided from a larger ranch parcel and its use has been consist throughout the century. It is zoned in Napa County as Agricultural Watershed (AW) and proposed use is consist with current zoning. All existing runoff from the property runs generally southwest into County roadside ditches, then into a minor tributary to Pope Creek, then into Lake Berryessa, nine miles away.

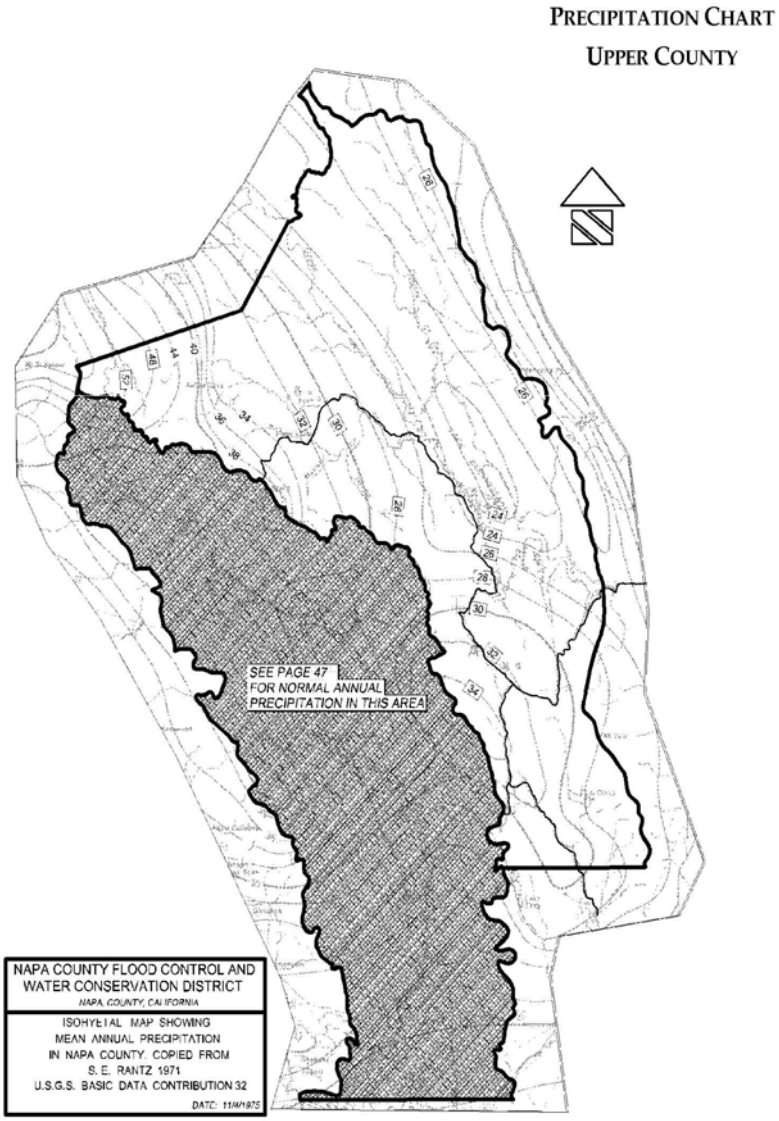


Drawing 1: Pope Creek and local tributary

2. SITE DESCRIPTION

2.1. CLIMATE

The James Creek parcel lies within Pope Valley, Napa County and is along the northern rim of said valley, which is part of the California Coast Range. This parcel drains directly to Pope Creek, and then into Lake Berryessa. Pope Valley, albeit drier than the larger and adjacent Napa Valley, is considered to have a Mediterranean climate, which is typified by warm dry summers and mild winters. During the summer months, Pope Valley is protected from the hot weather of the adjoining Central Valley by the coastal mountain range and influence of the San Francisco Bay. Maximum temperature recorded was 110 degrees. The Pacific Ocean provides a source of cool air, which moderates the temperature regularly. Approximately 90 percent of annual precipitation occurs as rain that falls during the winter and early spring from November to April. Annual precipitation varies significantly from year to year, and deviations can be as high as 200 percent from the 85-year average. In general, precipitation varies significantly throughout Pope Valley, but on average receives 24 inches per year (in/yr), increasing from south to north and increasing with higher elevations (see Drawing 2). The greatest rainfall intensity is along the ridge lines and surrounding mountains along the northern and western edges of Pope Valley.



PRECIPITATION CHART – UPPER COUNTY

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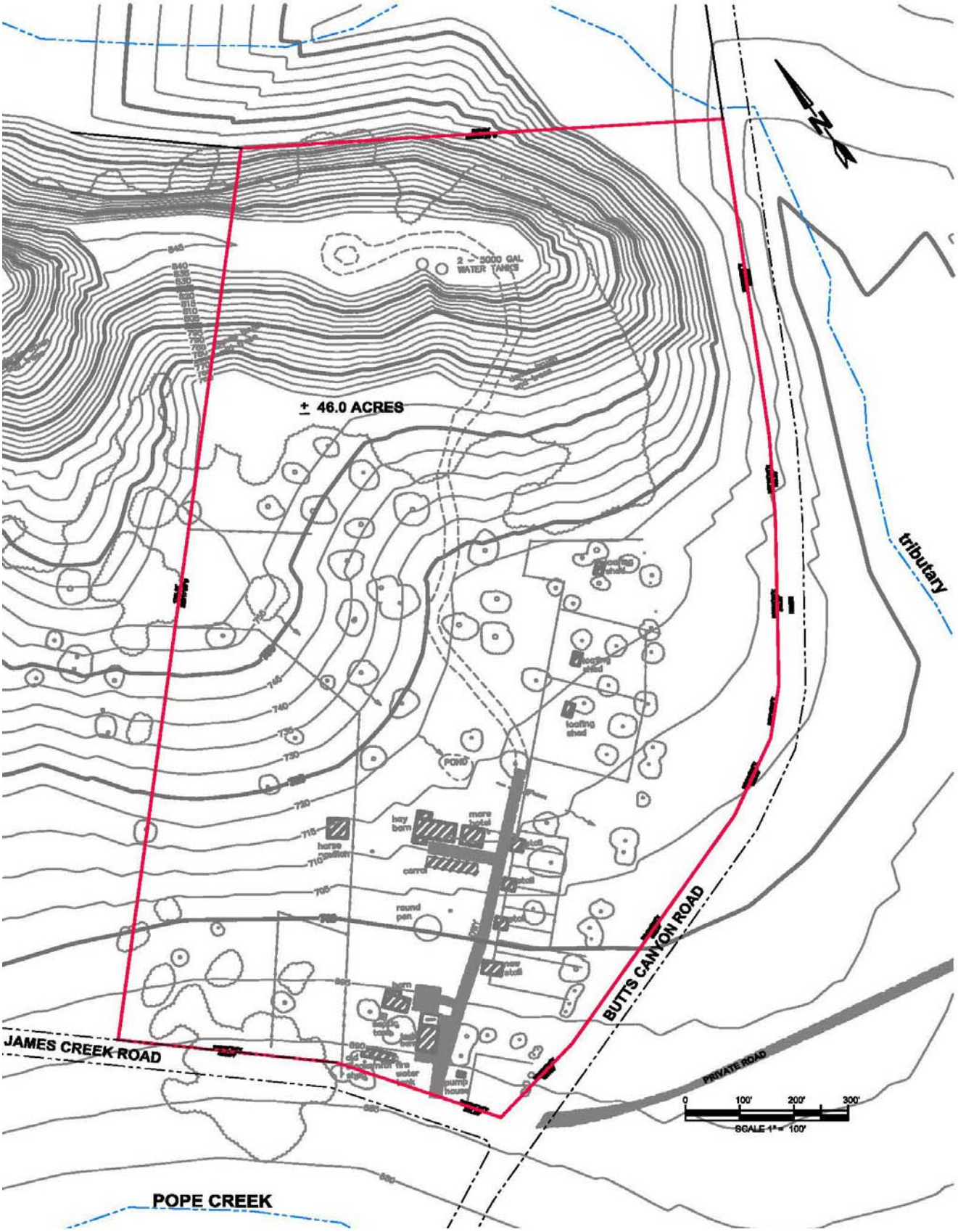
Drawing 2: From Napa County Flood Control Department

2.2. SITE MAP

The parcel is located 3.5 miles north of the town of Pope Valley, on the northeastern rim of Pope Valley. See Drawing 3 for a scaled site map. In general, the site topography includes a rocky ridge line, called Rattle Snake Ridge, to the north and alluvial plain that forms the Pope Valley floor below. Pope Creek is over 350 feet off the property's southern boundary line, therefore this site is on the high bank side of the valley floor, with the Creek's floodplain well south of the property. Topography at the site is relatively flat on the southern end near the intersection of Butts Canyon Road and James Creek Road. The lower, flat southern areas are where the house, the tack barn, a hay barn, pump house, several loafing sheds and horse corals are located. There is a narrow access road to the top of the ridge where fire water emergency storage tanks are located. The horse ranch owner wishes to naturally preserve the slope of the hillside up to the ridge line, while using the flatter, more gentle sloped areas for horse ranch operations. The steep slopes are protected from erosion by natural grasses and brush with dense native oak trees. It naturally drains in a southeasterly pattern. The site rises from approximately 700 feet elevation, in the south, to 850 feet elevation on the ridge top, in the north.

The condition of the land surface is much the same as the original topography the settlers found it over 150 years ago, from large flat areas, good for pasture, with smoothly flat valley floor to a natural, smoothly contoured, gently weathered ridge line. Other pertinent feature is the seasonal dry pond of a minor tributary drainage at the center of the parcel. A gravel access road enters the site from James Creek Road, near the intersection of Butts Canyon road.



Drawing 3: Site Map of James Creek Parcel

2.3. LOCAL SURFACE WATERS AND REGIONAL CONTEXT

The Rockridge Ranch drains to Pope Creek, part of the Lake Berryessa Agricultural Watershed, which is within the Sacramento River Hydrologic Basin. From the Monticello Dam, it continues into Putah Creek and the Sacramento River, and emptying into the San Francisco Bay. Pope Valley watershed is controlled by the Board of Supervisors of Napa County.

Pope Creek contributes to the larger regional watershed of Putah Creek, which mingles with waters of Lake Berryessa, a BLM's Solano Project, created by the construction of the Monticello Dam completed in 1983. The Solano Irrigation District provides water for irrigation, although it also supplies municipal and industrial water to major cities in Solano County. Putah Creek originates from springs on the eastern side of Cobb Mountain in Lake County. It descends eastward to the town of Whispering Pines, where it turns southeast, paralleling State Route 175. Upper watershed tributaries include Bear Canyon, Dry, Helena, Crazy, Harbin, and Big Canyon Creeks. Putah Creek enters Napa County at the confluence with Hunting Creek about 11 miles east of Middletown. In Napa County, the creek merges with Butts Creek just before it empties into Lake Berryessa. This lake is formed by the Monticello Dam, the only major storage dam on the creek. Lake Berryessa has a capacity of 1,602,000 acre-feet of water, making it one of the largest reservoirs in California.

2.4. PROJECT HYDROLOGY ANALYSIS

There is no statistically significant increase in impermeable surfaces on this project site, therefore the pre-project flows are the same as post-project flows. The fodder production modular unit being the only addition to grounds does not require a permanent foundation. The existing structures shed water from the roofs, but the runoff is slightly delayed from peak runoff flows by only a few minutes as determined in the Rational Hydrology Method. The empirical formula for flows is shown below for information only.

$$Q = CIA$$

Q = FLOW CUBIC FEET/SECOND
C = RUNOFF COEFICIENT
I = RAIN INTENCITY
A = ACRES

This parcel is near the top of the drainage basin that outfalls into Pope Creek. All flows exit the parcel on the southeastern boundaries of the property into roadside ditches, then through county roadway culverts and discharging into the creek. The small seasonal ponds on the parcel are in-line with the drainage course on the parcel, which outfalls directly into County roadside ditches. A large portion of the watershed remains oak woodlands, made up of natural grasses, brush and oak trees, with the remaining area dedicated to the horse ranch pastures, paddocks and one residence. A small gravel road provides access to the emergency water supply tanks at the top of the ridge. See drawing 3 for feature locations.

3. Existing Condition Assessment

3.1. PRECIPITATION

Precipitation data is obtained from the Napa County Precipitation Chart, made part of their public works standard (See Drawing 2 above). The chart indicates an average precipitation of 24 inches per

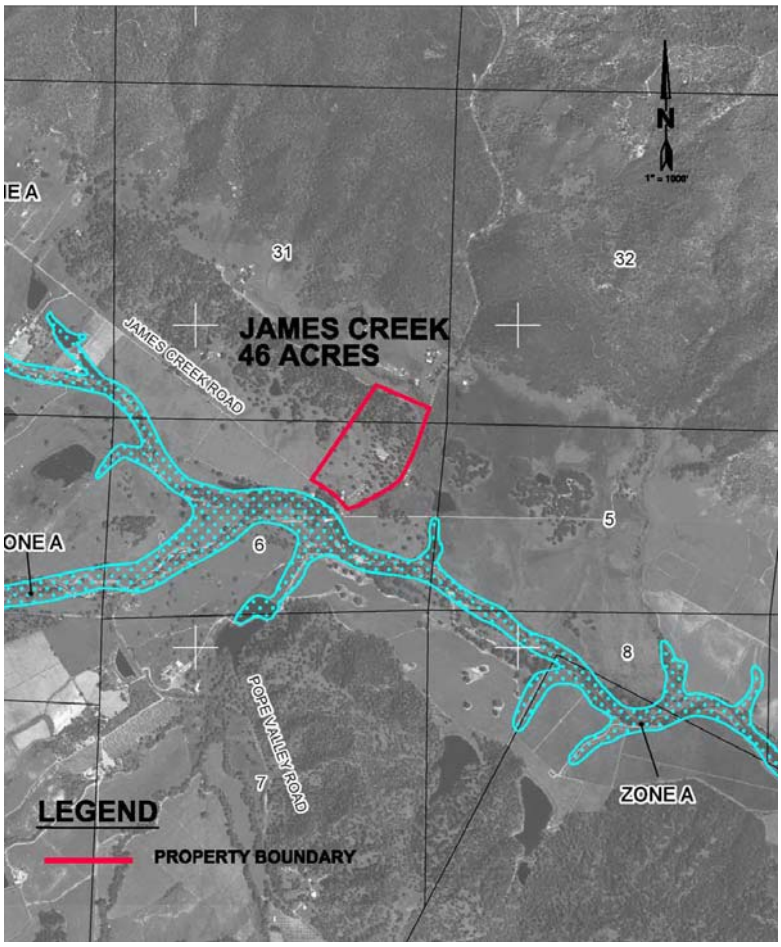
year. Pope Valley is characterized as having less rainfall than most other areas of Napa County.

3.2. ADJACENT FEMA MAP

This study investigation includes discussions of the nearby FEMA 100 year floodplain or the Zone A shown in Drawing 4 below. This report studies the James Creek Parcel shown in red.

This study uses available information from FEAM flood maps[1], which are superimposed on the parcel map boundary below. It shows that the entire property is outside of the 100 year floodplain or the X Zone, which is not in the FEMA required insurance area, on the high bank of Pope Creek, located north of James Creek Road.

Parcel Hydrology is mostly sheet flow from the Rattle Snake Ridge line, of approximately 850 foot elevation, southwest across the alluvium plain below, where most of the pastures and ranch horse operations occur. The hillside is heavily wooded with oak trees and brush and native grasses, then thins out into pasture area to the south, with large oak trees that typify the valley floor.



Drawing 4: 100 year Flood Map of Pope Creek

1 Most current FEMA Flood Maps available on www.FEMA.gov

4. HYDROLOGY & WATER QUALITY

The James Creek parcel is located well above the 100 year floodplain of Pope Creek, on the high-bank side of the creek system. Moreover, Pope Creek floods to the south, away for the property, into its vast floodplain, not endangering this parcel. The parcel is bounded by James Creek Road and Butts Canyon Road, County maintained roadways to the south. These roads are lower in elevation from the parcel, and therefore flood waters emanating from the roads would be directed away from the parcel and into the Pope Creek drainage system, and not a threat to the parcel. In fact, flood water emanating from these roadways would over top the centerline of the road before entering the parcel. The southern portion of the parcel drains into the roadway culverts then directly into Pope Creek. Runoff on-site is mostly sheet flow overland, with a minor tributary in the center of the parcel, which drains to Butts Canyon Road open culverts. Some drainage crosses the properties western boundary, but is relatively minor amount of potential flows. The backside of the ridge, or northern boundary drops off into a tributary the crosses Butts Canyon Road in a closed culvert and then into Pope Creek. In general, this parcel is a well draining land with no significant flood potential. If new construction occurs, following Best Management Practices (BMP's for construction) will address any short term potential for erosion and sediment control for the Pope Creek drainage system.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
	☐	☐	☐	☐

4.1. IMPACT ANALYSIS – *WOULD THE PROJECT?:*

a) Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☐

Explanation:
Manure control - The horse manure in a pasture or pen is a potential problem if the waste is not properly managed and recycled or disposed of safely. It can increase bacteria count in downstream drainages, also can encourage disease in horses and create habitat for infectious vectors, such as the common house fly. Therefore, horse owners should practice good sanitation methods by disposing of urine and manure contaminated bedding (straw) and soil that may contain contagions from an occasionally sick horse, and collect manure from the pastures. Since disease organisms live in the soil, however, it is impossible to get rid the potential for disease completely, therefore the approach this ranch owner takes is to keep the pens and pastures clean daily of manure and then compost to decontaminate. This cycle is considered by the State of California as a green and sustainable ranch management method, that is discussed later in this impacts section.

Construction - Excavation and other soil-disturbing activities associated with the project could

potentially affect water quality as a result of erosion of sediment. In addition, leaks from construction equipment; accidental spills of fuel, oil, or hazardous liquids used for equipment maintenance; and accidental spills of construction materials are all potential sources of pollutants that could degrade water quality during remediation activities.

Impaired Water Bodies - Pope Creek drains into a listed impaired water body, as compiled by the Central Valley Regional Water Quality Control Board (RWQCB) pursuant to Section 303(d) of the federal Clean Water Act (CWA). The creek ultimately discharges into Lake Berryessa, and is listed on the 303(d) list of impaired water bodies for the pollutant of mercury. Mercury was mined in the region to support former gold mine operations in the 1800's and early 1900's, as a means to process gold. The RWQCB prioritizes the water bodies on the 303(d) list according to potential impacts to beneficial uses. Beneficial uses can include a wide range of uses, such as nautical navigation; wildlife habitat; fish spawning and migration; commercial fishing, including shellfish harvesting; recreation, including swimming, surfing, fishing, boating, beach combing, and more; water supply for domestic consumption or industrial processes; and groundwater recharge, among other uses. The State is required to develop action plans and establish Total Maximum Daily Loads (TMDLs) to improve water quality within these impaired water bodies. The TMDL is the quantity of a pollutant that can be safely assimilated by a water body without violating the applicable water quality standards. The uncontrolled discharge of pollutants into impaired water bodies is considered particularly detrimental. According to the U.S. Environmental Protection Agency (USEPA), sediment is one of the most widespread pollutants contaminating U.S. rivers and streams. Sediment runoff from construction sites is 10 to 20 times greater than from agricultural lands and 1,000 to 2,000 times greater than from forest lands[2]. Consequently, the discharge of stormwater from large construction sites is regulated by the RWQCB under the federal CWA and California's Porter- Cologne Water Quality Control Act[3]. Pursuant to the CWA, the RWQCB regulates construction discharges under the National Pollutant Discharge Elimination System (NPDES). The project sponsor of construction or other activities that disturb more than 1 acre of land must obtain coverage under NPDES Construction General Permit (CGP) Order 2009-0009-DWQ, administered by the RWQCB[4]. The proposed project would not disturb over 1 acre of land, and would therefore not require coverage under a CGP. The proposed excavation for a new farm manager's house is less than 2,500 square feet (0.05 acre). Therefore, the proposed project is eligible for a waiver CGP coverage.

Order 2009-0009-DWQ requires project sponsors to implement construction Best Management Practices (BMPs) at the project site and comply with Napa County Building standards. Therefore, no CGP would be required for small residential construction. And furthermore, agricultural use is not regulated.

Source Control BMP's - Measures to control non-stormwater discharges such as spills, leakage, and dumping must be addressed through structural as well as nonstructural BMPs. However, certain types

2 U.S. Environmental Protection Agency, Office of Water, *Stormwater Phase II Final Rule, Construction Site Runoff Control, Minimum Control Measure*, EPA 833-F-00-008 Fact Sheet 2.6, Revised December 2005.

3 The Porter-Cologne Water Quality Act established the regulatory of the State Water Resources Control Board and the Regional Water Quality Control Boards to regulate water quality in California so as to protect beneficial uses of water resources, but does not directly apply to the proposed project, and is not discussed further in this Initial Study.

4CGP Order 2009-0009-DWQ remains in effect, but has been amended by CGP Order 2009-0014-DWQ, effective February 14, 2011, and CGP Order 2009-0016-DWQ, effective July 17, 2012. The first amendment merely provided additional clarification to Order 2009-0009-DWQ, while Order 2009-0016-DWQ eliminated numeric effluent limits on pH and turbidity (except in the case of active treatment systems), in response to a legal challenge to the original order.

of land disturbance are exempt from coverage, such as disking for agricultural purposes. The proposed project includes 3 acres of irrigated hay field, which is therefore exempt. Construction stormwater BMPs are intended to minimize the migration of sediments off–site. They can include covering soil stockpiles, sweeping soil from streets or other paved areas, performing site-disturbing activities in dry periods, and planting vegetation or landscaping quickly after disturbance to stabilize soils. Other typical stormwater BMPs include erosion-reduction controls such as hay bales, water bars, covers, sediment fences, sensitive area access restrictions, vehicle mats in wet areas, and retention/settlement ponds. In the case of the proposed project, the BMP requirements would also include routing stormwater away from stockpiled soil or manure composting piles and open excavations. Any construction requirements will be stated in building permits issued by Napa County Building Department. Most agricultural activities on the Ranch is otherwise exempted. The County may require a Storm Water Pollution Prevention Plan (SWPPP) if ground disturbance is over 1 acre. This project does not consider this type of construction.

Sanitary waste from the one residence on-site and outbuilding toilet, discharge is to a newly permitted septic system on-site, and constructed under County permit. No off-site affluent is discharged as part of this project or under previous conditions, therefore no discharge regulatory requirements are necessary.

Impacted Mitigation Measures:

The following impact analysis is necessary to determine whether adverse effects to the James Creek parcel or to adjacent parcels or the surrounding community and Pope Valley drainage system has occurred as determined from this hydrologic study and the mitigation measures that are used to offset any effects.

Mitigation Measure WQ–1: **Manure Control –** As part of this use permit, the owner is allowed to compost manure at a quantity under 1,000 cubic yards for use on-site, or for sale or to give away. Because the annual quantity is under the State threshold, no inspection is required, however the owner shall continue with existing manure composting methods that incorporate the following key elements: 1) Site - select an appropriate site for the manure pile(s), 50 foot setback minimum from animal pens, marshlands and ponds and 10 foot setback minimum from any water sources and underground storm drain, sewer or water lines. Small piles are better to manage than larger piles. 2) Site should be well draining and not near a tributary or stormwater channel. Up-slope stormwater drainage or sheet flow shall be redirected as necessary, using earth berms or other deflecting methods. An earth berm completely around the pile is a good way to contain runoff from the pile(s) and allow to soak into the ground naturally after a storm event. Alternately, the pile(s) can be covered with a tarp, securing the edges from weather. 3) Aerate the pile through mechanical air venting systems or turning the pile regularly, with a skip-loader tractor to maintain microbial activity. Also, manage temperature and moisture as necessary. 4) Horse manure has the idea carbon:nitrogen ratio for proper composting, therefore no additional ingredients need to be added, however this needs to be monitored to be sure complete composting occurs. Other ingredients may be mixed with the manure pile, such as

straw, sawdust or wood chips used as bedding from the pens that have been mixed with soil and urine. 5) composting is complete within one to two months, in the summer, and three to six months during winter months. Once composting cycle is complete, spread through sections of the pastures and other grassy areas at a minimum 16 cubic yards per acre rate.

Composting of horse manure falls into the category of green material composting. Title 14 Section 17857 of the California Code of Regulations outlines the requirements for permitting based upon the quantity of raw material and all stages of processed material present on site at any given time. Since the threshold of 1,000 cubic yards per year is not met, no State permit is required.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
	☐	☐	☐	☐
b) 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 that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒

Explanation:
This project uses well water for watering animals and domestically. Furthermore, the project does not include any activity that would deplete the groundwater, as test results in the Appendix A of the Water Use study show. These tests by a local commercial well inspector show that even though the recent drought has reduced the the production of the well, the well is still viable and returning sufficient water for the animals and domestic use. The project activities are contributing to groundwater recharging by minimizing impervious surfaces, such as buildings or paved concrete surfaces. The gravel driveway and using sand for horse arena surface and straw for pens are good examples of typical practices employed on this project to date.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
	☐	☐	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site?	☐	☐	☐	☒

Explanation:
No part of the project will there be substantial alteration to the any natural drainage course of the property. Any alternations that may have occurred before this project by previous property owners still have not altered the natural drainage courses found on the property, and the topography follows the historic record information of the USGS quadrangle maps.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☒

Explanation:
No part of the project will substantial alter drainage patterns or cause any flood on-site or off-site.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
	☐	☐	☐	☐
e) Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒

Explanation:
No part of the project will contribute to runoff water which would substantially alter drainage patterns or cause any increase of pollutants on-site or off-site. See WQ-1for mitigations.