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Hydrology Analysis

Rockridge Ranch Horse Facility P15-000393
Planning Commission Hearing July 19, 2017

WATER AVILABILTY ANALYSIS

Use Permit Application for
7630 Butts Canyon Road
Pope Valley, CA

FEBRUARY 19, 2016
rev. 1 May 22, 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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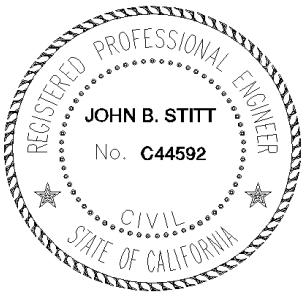

John B. Stitt, PE

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WATER AVAILABILITY ANALYSIS
BUTTS CANYON ROAD PARCEL

1. NARATIVE

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 analysis studies the Butts Canyon Road 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 a per year basis, for the Butts Canyon Road Parcel.

Some future uses are for growing fodder on site, producing fresh barley spouts to the horses to supplement their diets daily. This greatly improves their the horses health, particularly from colic conditions. Fodder in 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.

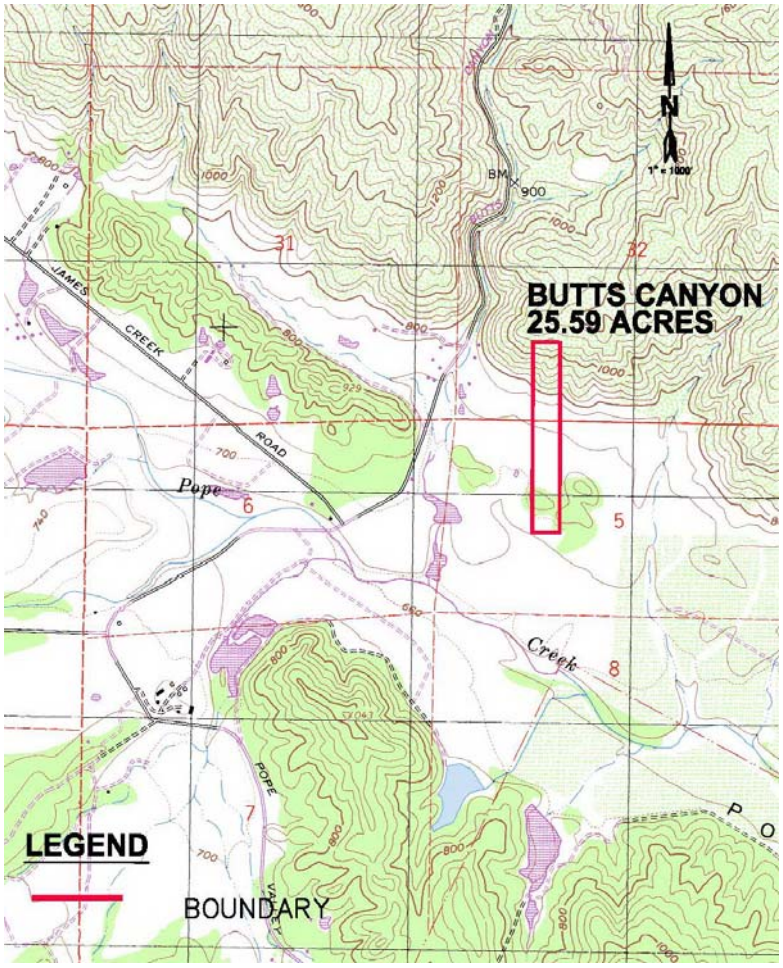
Another future use is an ADA compliant bathroom for 18 persons per day. The current drought conditions have reduces the existing well capacity to 1.5 gallons per minute, but still has the capacity to supply a 2nd residence and ADA compliance bathroom. The new bathroom is a requirement of this project. Previously, the employees and guests would use a "blueroom" temporary service. This new bathroom will be permeate facilities. Albeit the system is connected to two 2500 gallon water tanks, one new code compliance 3000 gallon tank will be installed for these new facilities.

The existing 2nd residence will be demolished, with it existing septic system, and replaced with a new 1200 square foot 2nd residence. The new engineered septic system will replace all on site septic systems.

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

For dry years, water supply is also supplemented by a hillside spring as shown on the "USE PERMIT EXHIBIT" that has had a consistent half a gallon per minute supply year around.

The main house water supply is provided by a cistern and 5000 gallon tank as shown on the "USE PERMIT EXHIBIT." Interconnected water lines are shown on mapping.



Drawing 1: Property Location

2. Water Uses

Water uses for each parcel are as follows:

2.1. INTERNAL HOUSE DOMESTIC WATER

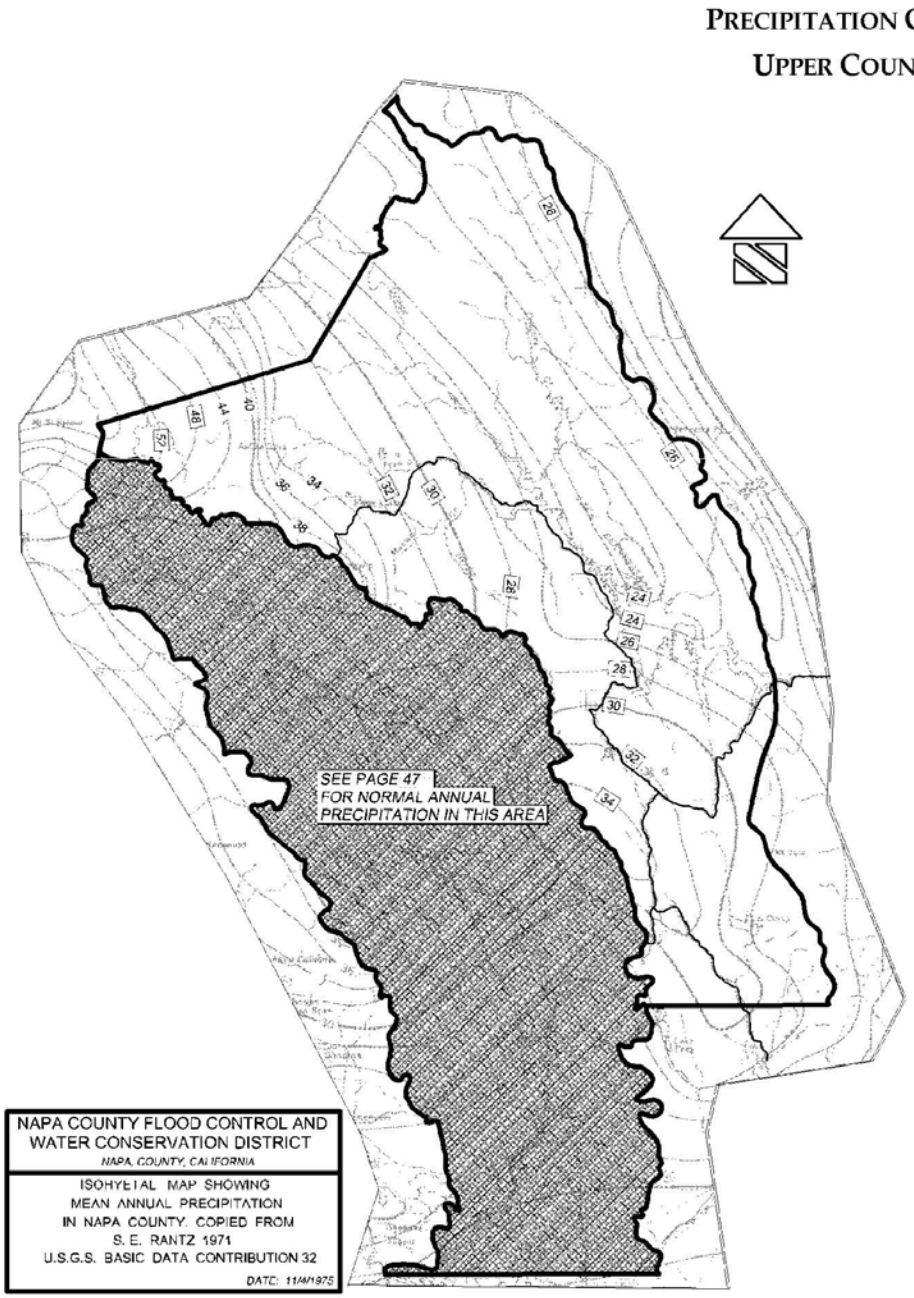
Domestic house water uses are not limited to daily cleaning, food preparation, showering, clothes washing, kitchen food preparation and cleaning needs, emergency fire sprinkler system, and personal consumption. Below is a table that calculates the annual use per house building.

Building	**Bedrooms**	**Butts Parcel**		
		Gallons		Acre-Feet
		Daily	Annual	Annual
Main House (Butts Parcel)	3	450	164,250	0.50
Ranch Manager House	2	300	109,500	0.34
Total		**750**	**273,750**	**0.84**

Therefore, the total annual use for the two households on Butts Canyon Road parcel is 0.84 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 based on 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.



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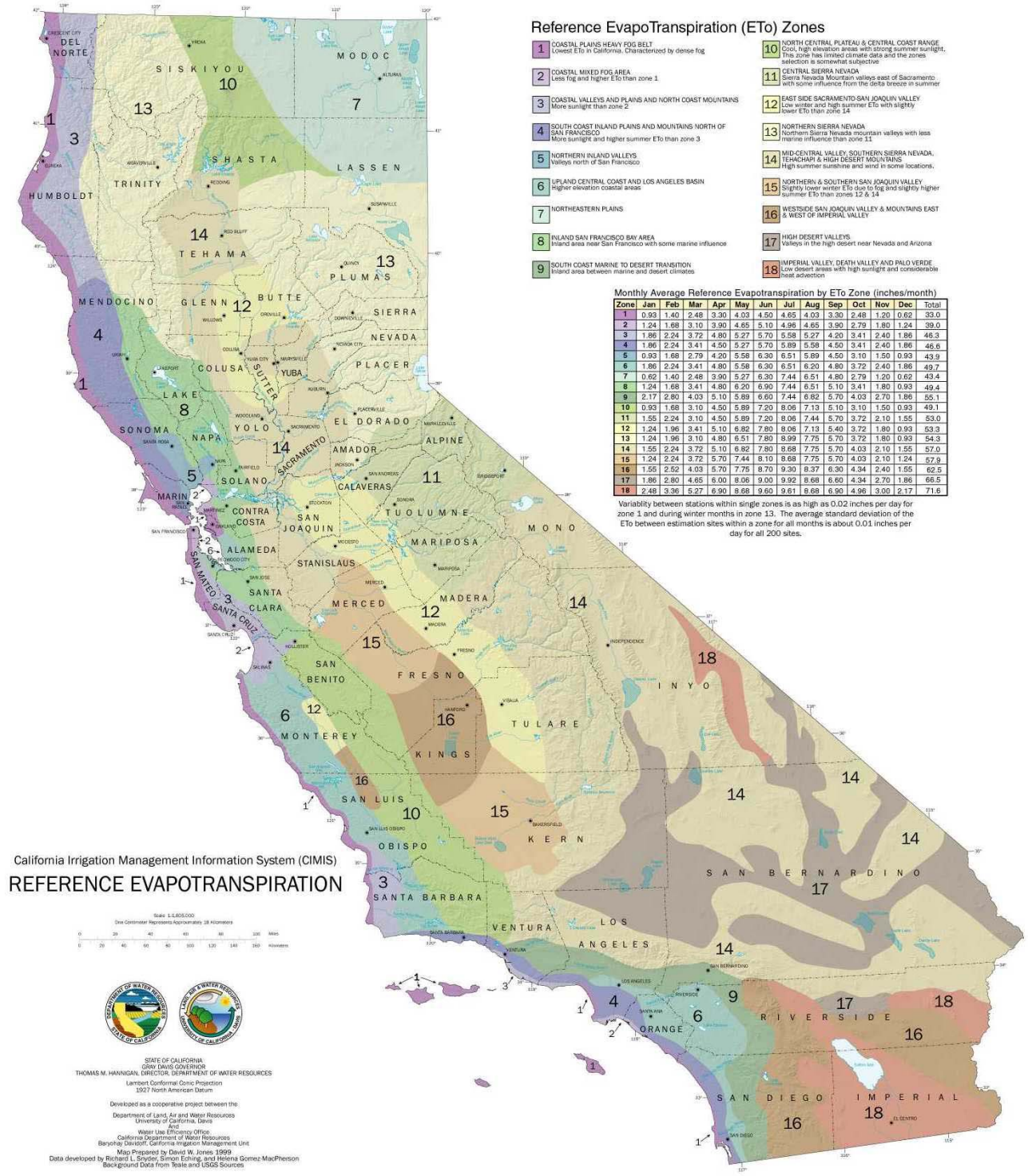
Drawing 2: Napa County Flood Control source



Drawing 3: Evapotranspiration source from EtoZone source, California

Butts Canyon 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 *(Annual ETo)*					From EtoZone Map
26.12 *(Annual Rainfall)*	x	.25	=	6.53 *(Effective Rainfall)*	From Napa Co. PW Std.

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

2150 *(Low water use plant sqft)*	x 0.3	= 645
350 *(Moderate water use plant sqft)*	x 0.6	= 210
(High water use plant sqft)	x 1.0	= 0

Sum of Adjusted Landscape Area = 855

ETWU = 42.87 x 0.62 x 855 / 0.3 = 75751 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
Butts Canyon 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 Butts Canyon parcel is 0.23 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**	**Butts Parcel**		
		Gallons		Acre-Feet
		Daily	Annual	Annual
Horses (Butts Parcel)	20	1,800	657,000	2.02
Total		**1,800**	**657,000**	**2.02**

Water use for horses is based on a total of 20 horses maximum on the Butts Canyon Parcel. Therefore, the total annual water use for the horse care on the Butts Canyon parcel is 2.02 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 a 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 Butts Canyon 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**	**Butts Parcel**		
		Gallons		Acre-Feet
		Daily	Annual	Annual
Horses (Butts Parcel)	20	335	122,275	0.38
Total		**335**	**122,275**	**0.38**

Water use for fodder production is based on a total of 20 horses maximum for this parcel. Therefore, the total annual water use for fodder production of the Butts Canyon 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 each property to supplement the horses' diet on a selective basis. Therefore, the pasture area for Butts Canyon Parcel is two 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**		**Butts Parcel**		
			Gallons		Acre-Feet
		Days	2"/10 days	Annual	Annual
Horses (Butts Parcel)	2	19	14,523	275,935	0.85
Total			**14,523**	**275,935**	**0.85**

Water use for pasture irrigation purposes on the Butts Canyon Parcel is 0.85 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 pond. It requires 5,000 gallon storage, per parcel, or as required by Cal Fire for particular unique circumstances.

Fire Water	**Butts Parcel**		
	Gallons		Acre-Feet
	Daily	Annual	Annual
Butts Canyon Parcel	27	10,000	0.03
Total	**27**	**10,000**	**0.03**

Water use for emergency purposes and maintenance of facilities for Butts Canyon Parcel is 0.03 acre-feet/year.

3. SUMMARY OF ESTIMATED WATER USES

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

Summary	**Butts Parcel**		
	Gallons		Acre-Feet
	Daily	Annual	Annual
Houses	450	164,250	0.50
Horses	1800	657,000	2.02
Public Toilet (18 uses/day	80	29,200	0.09
Landscaping	208	75,751	0.23
Fodder Production	335	122,275	0.38
Pasture Irrigation	1452	275,935	0.85
Fire Water	27	10,000	0.03
Total	**4,352**	**1,334,411**	**4.10**

Total water use for the horse ranch operation, during normal rainfall years, at Butts Canyon Parcel is 4 acre-feet/year. Source of water is an on-site well and spring. The pond is naturally spring feed and seasonal runoff and can be used in an emergency.

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 1 gallon per minute (gpm). Now after the recent rains the well has come back to over 1.5 gpm for a sustained 6 hour test period (see test for well in Appendix A) and improving with more rain. Several factors buffer the effects of the drought for this well, one being the proximity of the parcel's large pond, as shown on the USE PERMIT EXHIBIT, just over 200 feet away, horizontally. During the drought, the pond has dropped approximately two feet, but recent rains has brought levels back to normal. The other positive factor is the rocky outcroppings of the local hills on the property, shown also on the map exhibit, capture rains and directly transport water by gravity into the local aquifer. Therefore this unique aquifer is very responsive to even the slightest amount of rainfall. This is one of the reasons the hillside spring has a consistent half a gallon per minute even during the driest time of the drought.

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 and spring, shown in Appendix A.

Parcel Source Water **Butts Parcel**

	GPM(high)	GPM(low)	Gallons Annual		Acre-Feet Annual	
			high	low	high	low
Well	4	2	2,102,400	1,051,200	6.45	3.23
Spring	2	1	1,051,200	525,600	3.23	1.61
Total			**3,153,600**	**1,576,800**	**9.68**	**4.84**

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 (-4 estimate from the rocky hillside to valley)

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

Ri = 49.4 – 8 – 4 – 32 = **5.4 inches per year**

Using the 5.4 inches per year result over the 23 acres of the ranch property, results in **10.35 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. The aquifer under this parcel recharges itself quickly in response to recent rains. The project's use of its available water is within the lowest estimate, therefore normal rainfall years will sufficiently recharge the aquifer to its former levels.

Conclusion

In conclusion, the two water sources for this property, the well and hillside spring, have shown to provide all the necessary water for this horse operation, as witnessed by this civil engineer over a two year period, without any need to transport water to the property. The summary table in section 3 total water use is 4.10 acre-feet per year and the capacity in the worst conditions of the drought is 4.84 acre-feet per year. With proper water storage management as required by County code and fire code, the two residences and proposed ADA compliant bathroom have adequate water year around during the tested driest year. If the drought continues, water uses would have to be reduced to a level while preserving most critical operational uses accordingly. But currently, all uses have adequate water annually as per specified plan.

Therefore to answer the 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. **Spring Test**
2. **Cistern Test**
3. **Well near main house is currently dry, due to drought.**

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: 1/13/2016	**Report By:** W. Lutz	**Tested By:** **W. Lutz**	**Job#:** 16A 9795

Property Information

Property Location:	7630 Butts Canyon Rd	Pope Valley			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:***
Well S of House	unknown	~107'	5" PVC	yes
Submersible Pump / HP / GPM:	***Motor HP,Voltage,Phase:***	***Pipe Size & Type:***	***Check Valve Type:***	***Annular Seal / Pad:***
producing ~5 GPM, worn	1/2 HP 230 VAC 1pH	1.25" sch 80 drop pipe	none visible	see photo
Submersible Pump Control Panel:	***Low Water Protection:***	***Flow Control Valve:***	***Press Tank(s) & Qty:***	***Press. Relief Valve:***
Pressure Switch	Motor Saver 231	none	1 WX302	1/2"
Submersible Pump Filtration:	**Sub Pump Misc Equipment Notes:**			
None	Sump pump bottom fills tank, no air gap, break in line will drain tank. Sump Pump on upon arrival			

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	N/A	Tank(s), residences/areas supplied by this well are not known.		

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:***
1/13/2016	residential	57' 2"	108'	0.023 GPM/Ft Drawdown	**1.2 GPM**
Start Time:	***Test Duration:***	***Water Level Recovery:***		***Recovery Time:***	***Total Gallons Pumped:***
0:00	6 Hr	recovered to:	81'	165 min	860

*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 Located N 38o 39' 35" W 122o 26' 33" ~730' Elevation
2.) 1-12-16 SWL 53' 6" well offline, control box and motor saver replaced to effect operation of system. Well pumped for ~3 hrs.
3.) Well pump shows signs of age/wear. Pump pulling 6.9 Amps, should be less than 6.0.
4.)

Recommendations:

1.) Pressure switch has debris/corrosion and may need to be replaced soon.
2.) Consider replacement of well pump to increase efficiency/decrease energy consumption.
3.)

Well Test Log

Time:	Water Level	GPM Flow	Water Quantity Flowed (gals)	Basic Water Quality (Visual Color-Sand)	Turbidity (NTU)	Notes:
8:00	57' 2"	6		turbid/brown/red		
8:30	76' 4"	5.6		clear		
9:00	88' 5"	5.3		clear		
9:30	107'	4.7		clear		surging & cascading, adj discharge ~2GP
10:00	*108'	1.9		clear		cascading/adjust to ~1.5 GPM
10:30	*108'	1.3		clear		adjust flow slightly lower
11:00	*108'	1.2		clear		
11:30	*108'	1.2		clear		
12:00	*108'	1.2		clear		
12:30	*108'	1.2		clear		
13:00	*108'	1.2		clear		
13:30	*108'	1.2		clear		
14:00	108'	1.2		clear		shutdown for recovery
14:10	99' 6"	0				recovery
14:20	97' 4"	0				recovery
16:45	81'	0				recovery

Additional Comments and Notes:

1.) * cascading water made exact level dfficult to determine, however water level consistently near the pump.
2.) 222 gallons pumped during last 3 hours of well test (11:00 to 14:00)
3.)
4.)
5.)
6.)
7.)
8.)
9.)
10.)

System Pictures

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

September 4, 2015

Mr William Gardiner
2002 James Creek Rd
Pope Valley, CA 94567

Re: Spring Yield Test for 7630 Butts Canyon

The spring site was visited on Wednesday September 2, 2015. The spring consists of 3 horizontal taps in proximity to each other on the Northern sloping area of the property. The upper/Northernmost horizontal tap had no flow, while the lower two horizontal taps exhibited a consistent combined flow for over 1 hour at a rate of 0.40 GPM, with the western horizontal tap providing 0.06 GPM and the eastern horizontal tap providing 0.34 GPM.

The horizontal taps consist of PVC pipe extending horizontally from a sloped surface. There is no indication of what type of perforations or gravel pack might exist around the horizontal tap or how deep they extend into the sloped surface. The two horizontal taps that are producing are located 8' from each other at a GPS location of N38° 39.803' W 122° 26.520' and a GPS elevation of ~727 ft.

Eastern Tap

Western tap

Northern tap (dry)

Best Regards,

Wesley Lutz
Oakville Pump Service.

HYDROLOGY ANALYSIS

Use Permit Application for
7630 Butts Canyon 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

StittEngineering.com
1822 Blossom Dr.
Antioch, CA 94509

Attention: John Stitt, PE

John B. Stitt, PE

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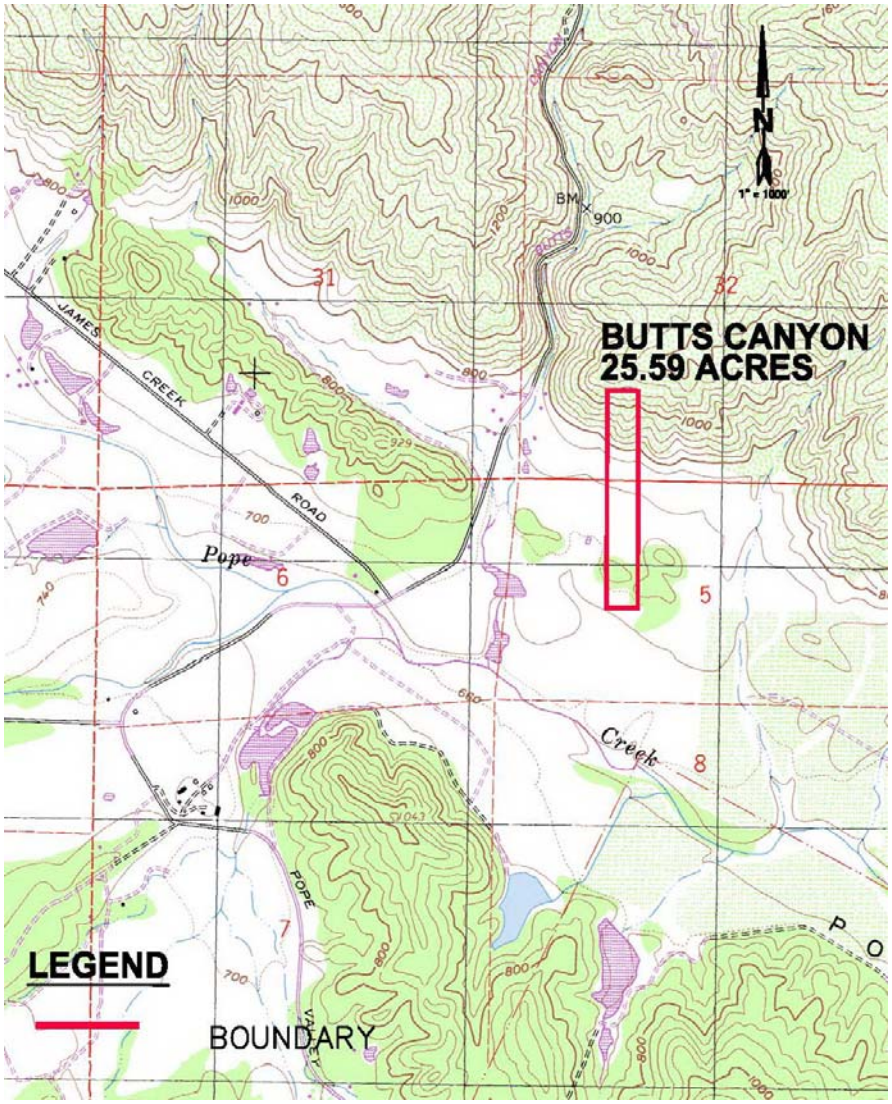
HYDROLOGY ANALYSIS – BUTTS CANYON PARCEL

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, barns and other ancillary buildings, feed storage, a main house and a new farm manager's house, horse training, horse boarding activities, hay irrigation, and fodder production. This parcel is approximately 26 acres located in the Pope Creek drainage basin (see Drawing 1). 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.



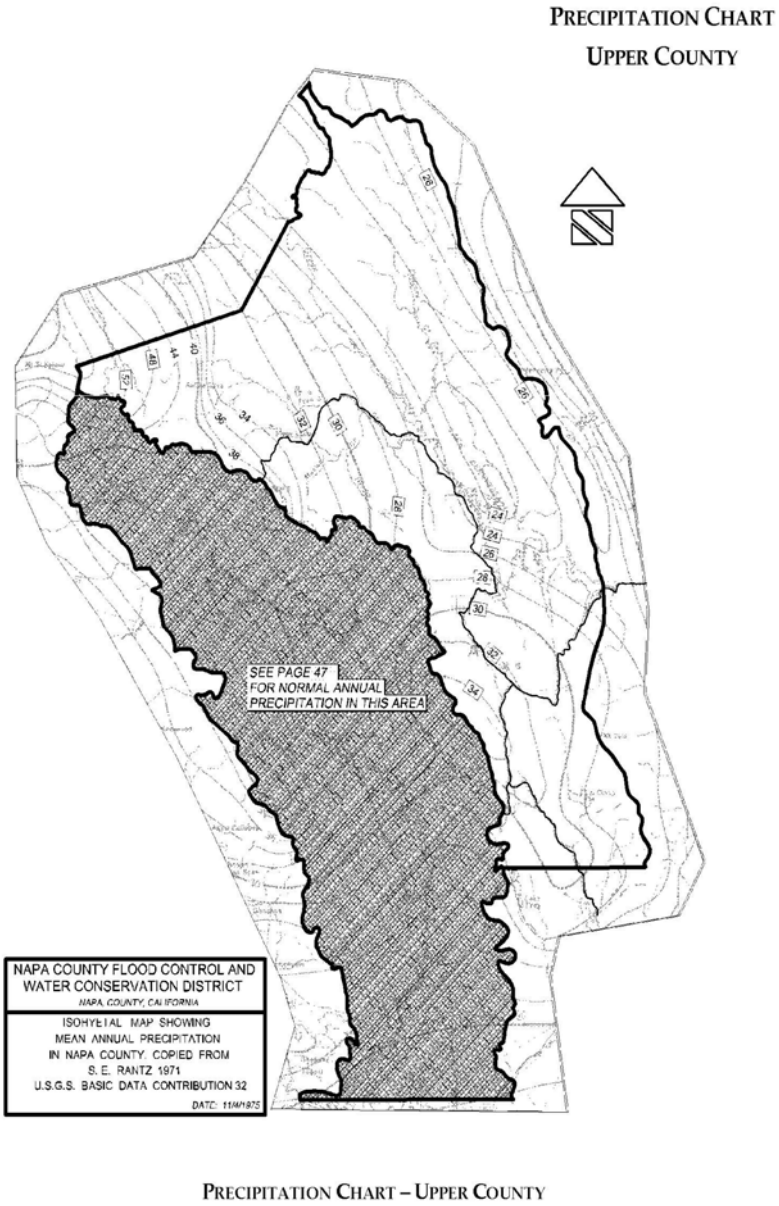
Drawing 1: Pope Creek and local tributary

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 regionally collected in Lake Berryessa, nine miles away.

2. SITE DESCRIPTION

2.1. CLIMATE

The Butts Canyon 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.



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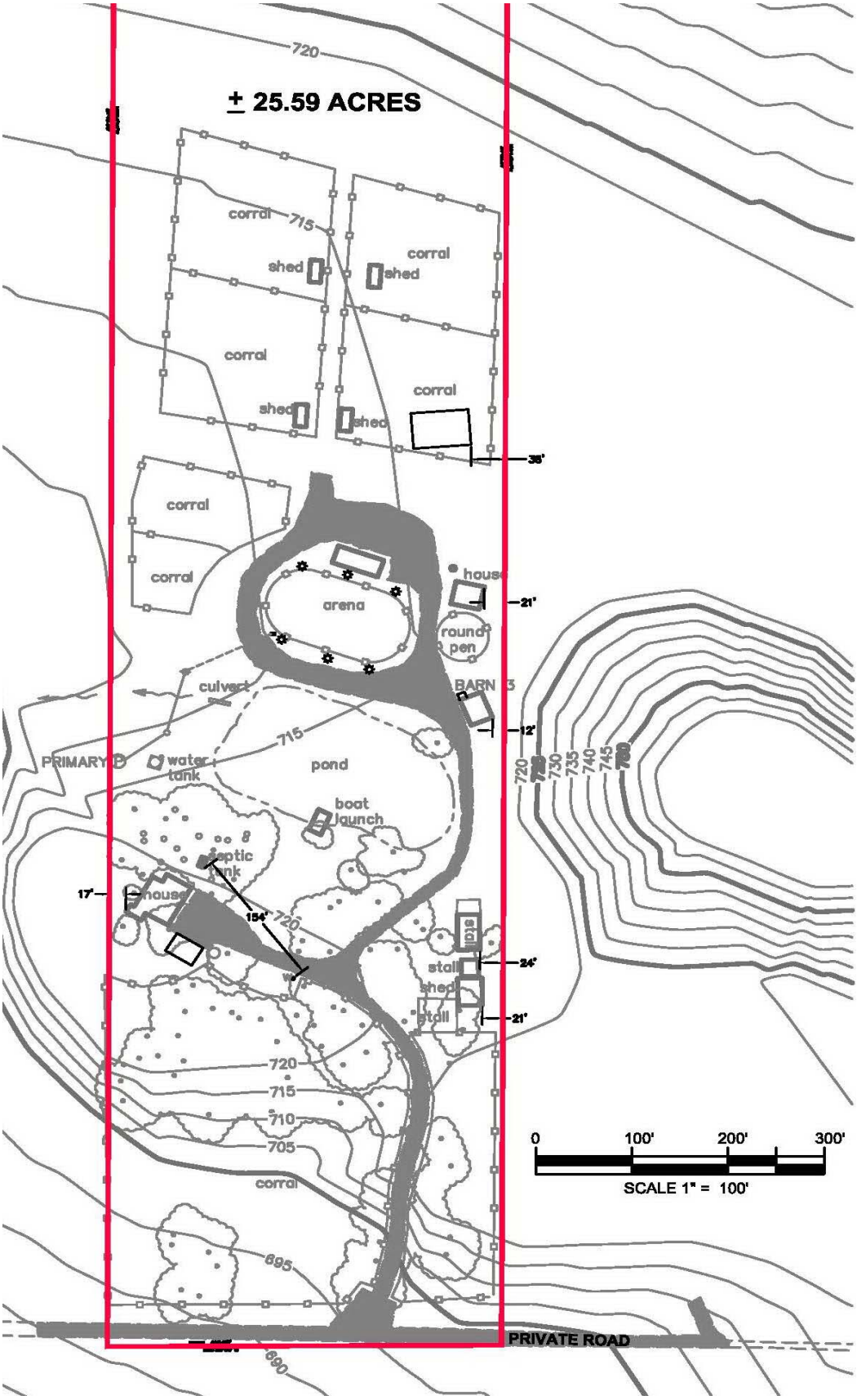
Drawing 2: From Napa County Flood Control Department

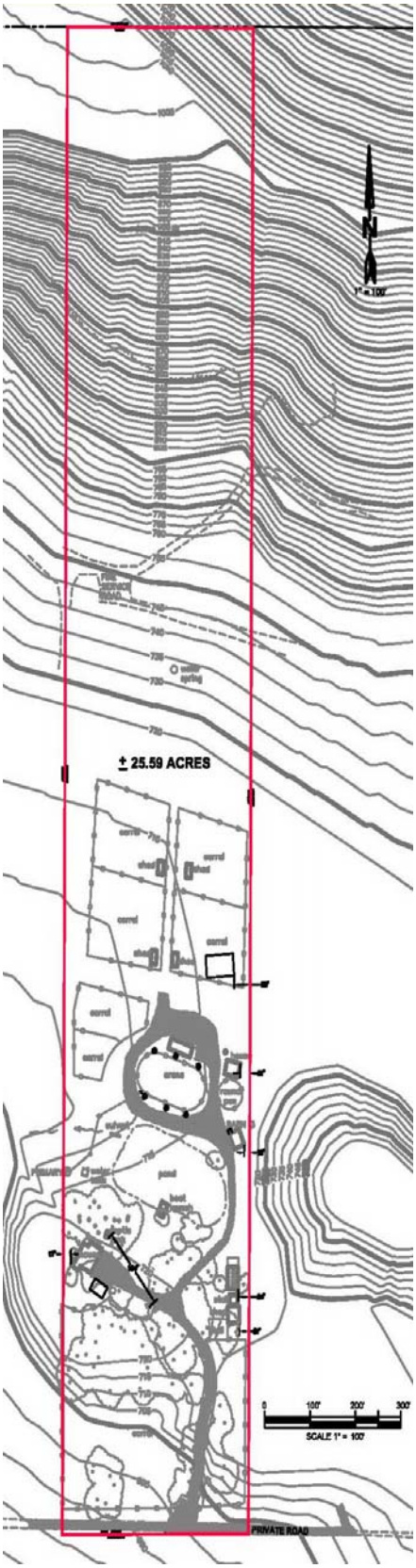
2.2. SITE MAP

The parcel is located 3.5 miles north of the town of Pope Valley, on the northeastern rim of Pope Valley (See Drawings 3 and 4 for scaled site maps). 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 1,400 feet off the property's southern boundary line, moreover 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 private access road off of Butts Canyon Road. The lower, flat southern areas include turn-out pastures and main driveway. In the middle portion of the property, on a knoll, sits the main house. Nearby and in the middle of the parcel is a year around natural pond, with tractor barn, tack barn, a hay barn, pump house and cistern, several loafing sheds and horse corals. Access to the top of the ridge in the northern boundary of the property is only accessible by foot, due to the chaparral, heavy brush and steep terrain. At the foot of the ridge is a spring that runs year around, albeit during the on going drought runs slower, but active, and the primary source of water for the ranch. 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 chaparral and few native pine trees and other native trees. It naturally drains in a southwesterly pattern. The site rises from approximately 710 feet elevation, in the south, to 1,150 feet elevation to the ridge top, in the north.

The original topography of the land surface is much as the settlers found it, over 150 years ago. It has large flat areas, good for pasture, with smoothly contoured minor ridge line in the center of the property, then more flat pasture area before it , with a weathered rocky ridge line. Other pertinent feature is the year around pond that hosts much wildlife in the area and is in line with a minor tributary drainage that enters from the property line to the east and exits to the west property line, of the parcel. A gravel driveway enters the site from the private access road off of Butts Canyon Road.



Drawing 3: Partial Site Map of Butts Canyon parcel



Drawing 4: Site Map of complete Butts Canyon Parcel

2.3. LOCAL SURFACE WATERS AND REGIONAL CONTEXT

The Rockridge Ranch drains into Pope Creek, part of the Lake Berryessa Agricultural Watershed (AW), which is within the Sacramento River Hydrologic Basin. It continues from the Monticello Dam into Putah Creek, then to the Sacramento River, which drains into the San Francisco Bay Area. 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. Solano County Irrigation District provides Lake Berryessa water for irrigation. 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 southeasterly, 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 a net zero increase in impermeable surfaces on this project site. The new residence for the farm manager's family house is to be constructed and the old house, approximately the same square footage, is to be demolished and foundation removed to within 24 inches below the existing grade, and natural grasses replanted. Therefore, the runoff flows will be the same, given the empirical formula of the rational method shown below.

$$Q = CIA$$

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

This parcel is on the upper end of the drainage basin. A large portion of the watershed above this parcel crosses the parcel in-line with the large pond, then onto a marshland, which is on the downstream side of the adjacent parcel. The pond is seasonally feed by this drainage system and also supplemented by surface runoff from the natural spring. This pond is enjoyed by area wildlife and also is used as a fire emergency water supply. See drawing 3 for feature locations.

3. Existing Condition Assessment

3.1. PRECIPITATION

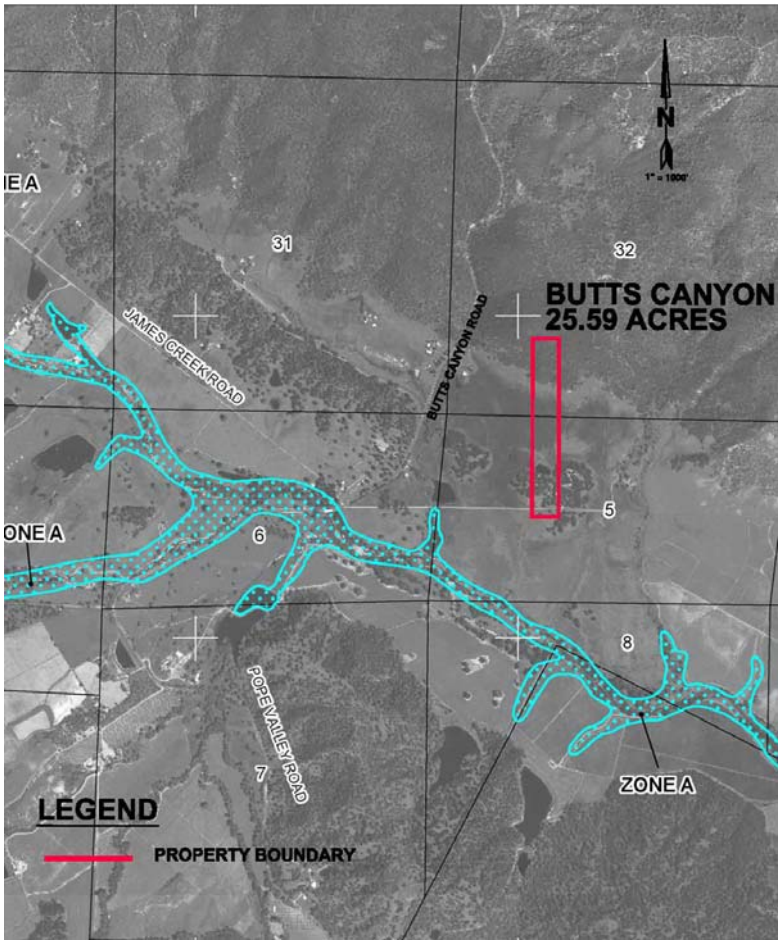
Precipitation data is obtained from the Napa County Precipitation Chart, made part of their public works standard (See Drawing 2 above). The chart indicates an average precipitation of 24 inches per year for the parcel. Pope Valley is characterized as having less rainfall than most other areas of Napa 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 5 below. This report studies the Butts Canyon 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 side of Pope Creek, located north of the private, gravel access road, a continuance of James Creek Road.

Parcel hydrology is mostly sheet flow from the Rattle Snake Ridge line, of approximately 1,150 foot elevation, southwest across the alluvium plain below, where most of the pastures and horse ranch operations occur. The hillside is dense chaparral with predominantly native pine trees, brush and native grasses, then thins out into pasture area to the south, and somewhat large native oak tree grove.



Drawing 5: 100 year Flood Map of Pope Creek

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

4. HYDROLOGY & WATER QUALITY

The Butts Canyon parcel is located well above the 100 year floodplain of Pope Creek, moreover on the high-bank side of the creek system. Therefore, Pope Creek floods to the south, away for the property, into its vast floodplain, not endangering this parcel by flooding. The parcel is bounded by a private access gravel roadway to the south (see drawing 4). This road is lower in elevation from the parcel, and therefore flood waters emanating from the road would be directed away from the parcel and into the Pope Creek drainage system. Moreover, flood water emanating from this road would over top the centerline of the road before entering the parcel. The southern portion of the parcel drains into the roadway open culvert drainage, through cross 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 supports the year around pond, hosting much area wildlife and habitat. This drainage crosses the property's western boundary into marshland drainage, which eventually drains into Pope Creek system. In general, this parcel is a well draining land with no significant flood potential.

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 construction 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 of land disturbance are exempt from coverage, such as disking for agricultural purposes. The proposed project includes 2 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

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.

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. 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. Under the proposed project this will not be required.

Sanitary waste from the two residencies, discharge to a newly permitted engineered 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 Butts Canyon 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.

Mitigation Measure WQ–2: **Construction –** Do not begin construction of new residence before obtaining a building permit for the foundation and utility connections from Napa County Building Department. Constructing a foundation for a manufactured home and porch will disturb substantially less than the threshold of 1 acre of land or more. Because the building and porch footprint area is small, a SWPPP is not required. However, it is good practice to follow Construction BMP's during all phases of construction to reduce sediment loads in local tributaries and creeks. Methods for erosion protection are provided by the private organization called California Stormwater Quality Association (CASQA) and as required by Napa County Building Department.

Mitigation Measure WQ–3: **Impaired Water Bodies –** Follow the building permit requirements for residential construction, provided by Napa County Building Department will satisfy the RWQCB's sediment load concerns for this residential manufactured house construction. No additional requirements are necessary.

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

☐ ☐ ☐ ☒

Explanation:
This project uses a well and natural spring 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 spring, the spring is still viable and returning sufficient water for the animals and domestic use, albeit the well is drought dry. The project activities are contributing to groundwater recharging by minimizing non-permeable surfaces, such as buildings or paved concrete surfaces. Use of gravel driveways, sand for horse arena surface and straw for pens are good examples of typical practices employed on this project to date.

The new residence, once completed, will replace the existing house, which will be removed and reverted back to permeable ground, then planted with native grasses.

	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 substantially 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-1through WQ-3 for mitigations.