



## TECHNICAL MEMORANDUM

To: Lake County Community Development Department  
From: Annjanette Dodd, PhD, CA PE #77756 Exp. 6/30/2023  
Date: August 19, 2021  
Subject: Ordinance 3106 Hydrology Report – UP 19-36 Lake Vista Farms, LLC  
2050 and 2122 Ogulin Canyon Road, Clearlake, (APNs 010-053-01 and 010-053-02)

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### INTRODUCTION AND PURPOSE

On July 27, 2021, the Lake County Board of Supervisors passed an Urgency Ordinance (Ordinance 3106) requiring land use applicants to provide enhanced water analysis during a declared drought emergency. Ordinance 3106 requires that all projects that require a CEQA analysis of water use include the following items in a Hydrology Report prepared by a licensed professional experienced in water resources:

- Approximate amount of water available for the project's identified water source,
- Approximate recharge rate for the project's identified water source, and
- Cumulative impact of water use to surrounding areas due to the project.

The purpose of this Technical Memorandum (TM) is to provide the information required by Ordinance 3106 for UP 19-36, Lake Vista Farms, LLC. In addition to the Hydrology Report, Ordinance 3106 requires a Drought Management Plan (DMP) depicting how the applicant proposes to reduce water use during a declared drought emergency. The DMP for this project has been submitted as a separate document.

### PROJECT LOCATION

The project is located 2050 and 2122 Ogulin Canyon Road, Clearlake, Lake County, California (APNs 010-053-01 and 010-053-02). The project site is located northeast of the City of Clearlake, about 1- mile east of State Highway 53. The project site is part of a former hops farm, operated as Hops-Meister Farms, cultivating approximately 13.6-acres of hops beginning in about 2009.

### PROPOSED PROJECT

The project proposes 15-acres of outdoor cannabis cultivation without the use of light deprivation and/or artificial lighting. The proposed cultivation will be distributed across five (5) sites (Figure 1), labeled A through E.



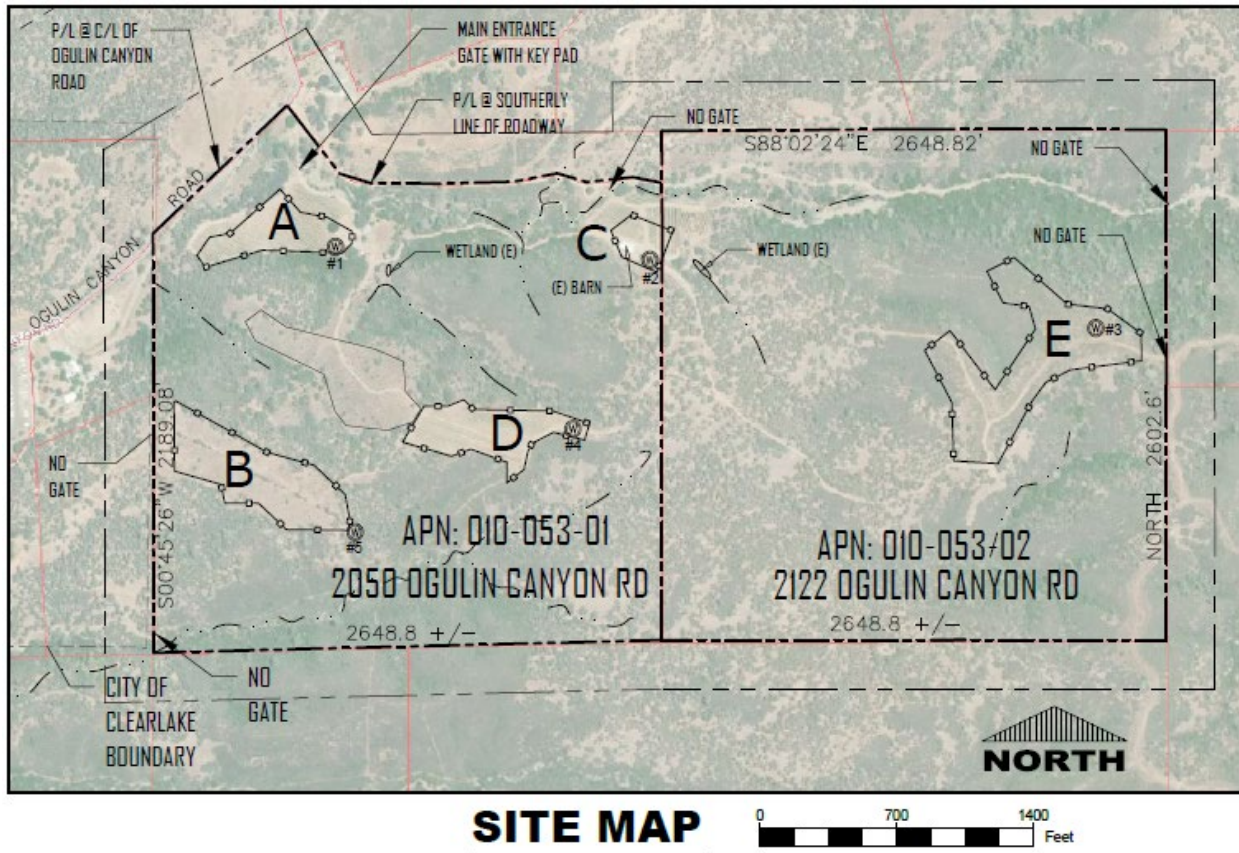


Figure 1. Proposed Site Map

**PROJECT WATER DEMAND**

The CalCannabis Environmental Impact Report (CDFA, 2017) uses 6.0 gallons per day per plant as an estimated water demand for cannabis cultivation. This is 1.0 gallons (gpd) per plant more than reported by Bauer et. el. (2015), who reported up to 5.0 (gpd) per plant (18.9 Liters/day/plant). Using the more conservative estimate of 6.0 gpd, and assuming there are approximately 500 plants per acre of canopy (CDFA, 2017), the demand is 3,000 gpd (2.1 gallons per minute [gpm]) per acre of canopy; this use rate is consistent with the Water Use Management Plan section (Section 15.2) of the project’s Property Management Plan. The total water demand for 15-acres of canopy is approximately as follows:

- Daily – 45,000 gpd (31.5 gpm)
- Yearly
  - 120 day cultivation season – 16.6 acre-feet (AF)
  - 180 day cultivation season – 24.9 AF

**WATER SOURCE AND SUPPLY**

There are five (5) existing, permitted groundwater wells that would be used for cultivation. The yield for each well is summarized in the Table 1 and shown on Figures 1 and 3. The well logs are attached to this TM (Attachment 1). The wells range in depth from 114 ft to 460 ft and have a combined yield of 720 gpm



(1,161 acre-feet per year). The potential daily demand of 31.5 gpm represents 4.4% of the combined well yield and between 1.4-2.1% of the combined annual production in acre-feet.

*Table 1. Summary of cannabis cultivation canopy areas for each cultivation site.*

Site	Name (Well Latitude/Longitude)	Groundwater Basin <sup>1</sup>	Well #	Depth (ft)	Yield (gpm)
A	Northwestern Hops Field (38.982011, -122.599900)	Burns Valley	1	240	60
B	Southwest Clearing (38.978344, -122.599803)		5	340	300
C	Northeast Hops Field (38.982033, -122.594181)		2	114	60
D	Central Hops Field (38.979569, -122.595764)	Clearlake Cache Formation	4	358	200
E	Chaparral Clearing (38.980981, -122.586219)		3	460	100

<sup>1</sup>California Department of Water Resources, California Groundwater (Bulletin 18)

## IRRIGATION AND WATER STORAGE

Irrigation for the cultivation operation will use water supplied by the existing wells. The irrigation water would be pumped from each well, via PVC piping, to a 2,500-gallon water storage tank, adjacent to each well, and then delivered to a drip irrigation system. The drip lines will be sized to irrigate the cultivation areas at a rate slow enough to maximize absorption and prevent runoff. Drip irrigation systems, when done properly, conserve water compared to other irrigation techniques.

## GROUNDWATER BASIN INFORMATION AND HYDROGEOLOGY

The project's water sources are located within the eastern portion of the Burns Valley (Basin #5-17) Groundwater Basin and the western portion of the Clear Lake Cache Formation (Basin #5-66) Groundwater Basin (Table 1, Figure 2 and Figure 3).

The Burns Valley Basin is within the Burns Valley Watershed. The Franciscan Formation borders the Burns Valley Basin on the north, Clear Lake borders the basin on the west, and the Cache Formation borders the basin on the south and east. The valley is drained by Burns Valley Creek, flowing southwest, and eventually into Clearlake. There are three water bearing formations in the Burns Valley Basin, The Quaternary Alluvium, Quaternary Terrace Deposits, and Lower Lake Formation. *Quaternary Alluvium* located in the valley lowlands in the southern end of the valley are composed of silt, sand, and gravel with a thickness up to 50 feet. Groundwater in this formation is unconfined and typically provides water for domestic use. *Quaternary Terrace Deposits* have been deposited on the sides of the alluvial plain in the Burns Valley Basin. The terrace deposits are approximately 15 feet above the valley floor and slope up the valley to a similar elevation as the foothill exposures of the Cache Formation. Groundwater in this formation is not well understood. The *Lower Lake Formation*, consisting of lake deposits, underlies the alluvial and terrace deposits in the basin. The formation consists of fine sands, silts, and thick interbeds of marl and limestone, and has a maximum thickness of 200 feet. The formation has low permeability and provides water to wells at up to a few hundred gallons per minute. The California Department of Water Resources (DWR) estimated a storage capacity of the Burns Valley Basin as 4,000 AF with a usable storage



capacity of 1,400 AF. According to DWR, almost all the groundwater in the Burns Valley Basin is derived from rain that falls within the 12.5 square mile Burns Valley Watershed drainage area. According to the Lake County Groundwater Management Plan, dated 2006, agricultural demand during an average year is 105 AF per year; of this, 14 AF is supplied from groundwater. Wells in the valley range in depth between 25-feet and 525-feet. (CDM 2006 and California DWR 2003, 2021)

The Clear Lake Cache Formation Basin shares a boundary with the Burns Valley Groundwater Basin in the southwest. Lower Cretaceous marine and Mesozoic ultrabasic intrusive rocks bound the south of the basin. Lower Cretaceous marine deposits border the east portion of the basin, and the Franciscan Formation borders the north and west portions of the basin. The basin is drained by the North Fork Cache Creek and Cache Creek to the south and east. The primary water-bearing formation is the Cache Formation. The Cache Formation is largely made up of lake deposits. The formation consists of tuffaceous and diatomaceous sands and silts, limestone, gravel, and intercalated volcanic rocks. In some areas the general lithology includes up to 400 feet of blue clay and shale with alternating strata of shale and limestone below 400-feet. The permeability of the formation is generally low. According to the Lake County Groundwater Management Plan, dated 2006, agricultural demand during an average year is 100 AF; of this, 85 AF is supplied from groundwater. Wells in the valley range in depth between 5-feet and 500-feet. (CDM 2006 and California DWR 2003, 2021)

Neither of these basins have been identified by the California Department of Water Resources (DWR) as critically overdrafted basins. Critically overdrafted is defined by DWR as, "A basin subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." In addition, as part of the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, DWR created the CASGEM Groundwater Basin Prioritization statewide ranking system to prioritize California groundwater basins in order to help identify, evaluate, and determine the need for additional groundwater level monitoring. California's groundwater basins were classified into one of four categories high-, medium-, low-, or very low-priority. Both the Burns Valley and Clear Lake Cache Formation Basins were ranked as very low-priority basins by the CASGEM ranking system. (DWR, 2021)





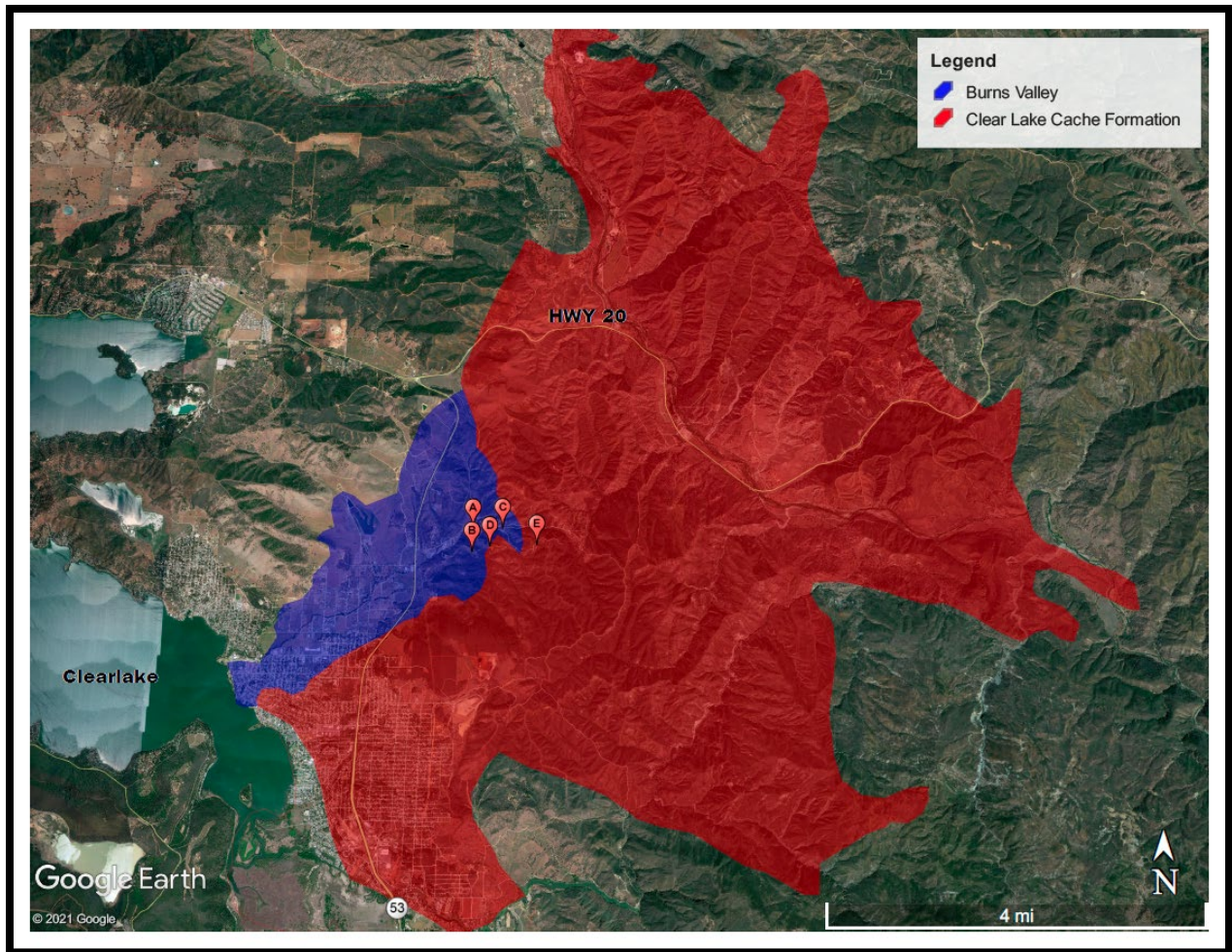


Figure 2. Field Locations (labeled A through E) and Mapped Groundwater Basins



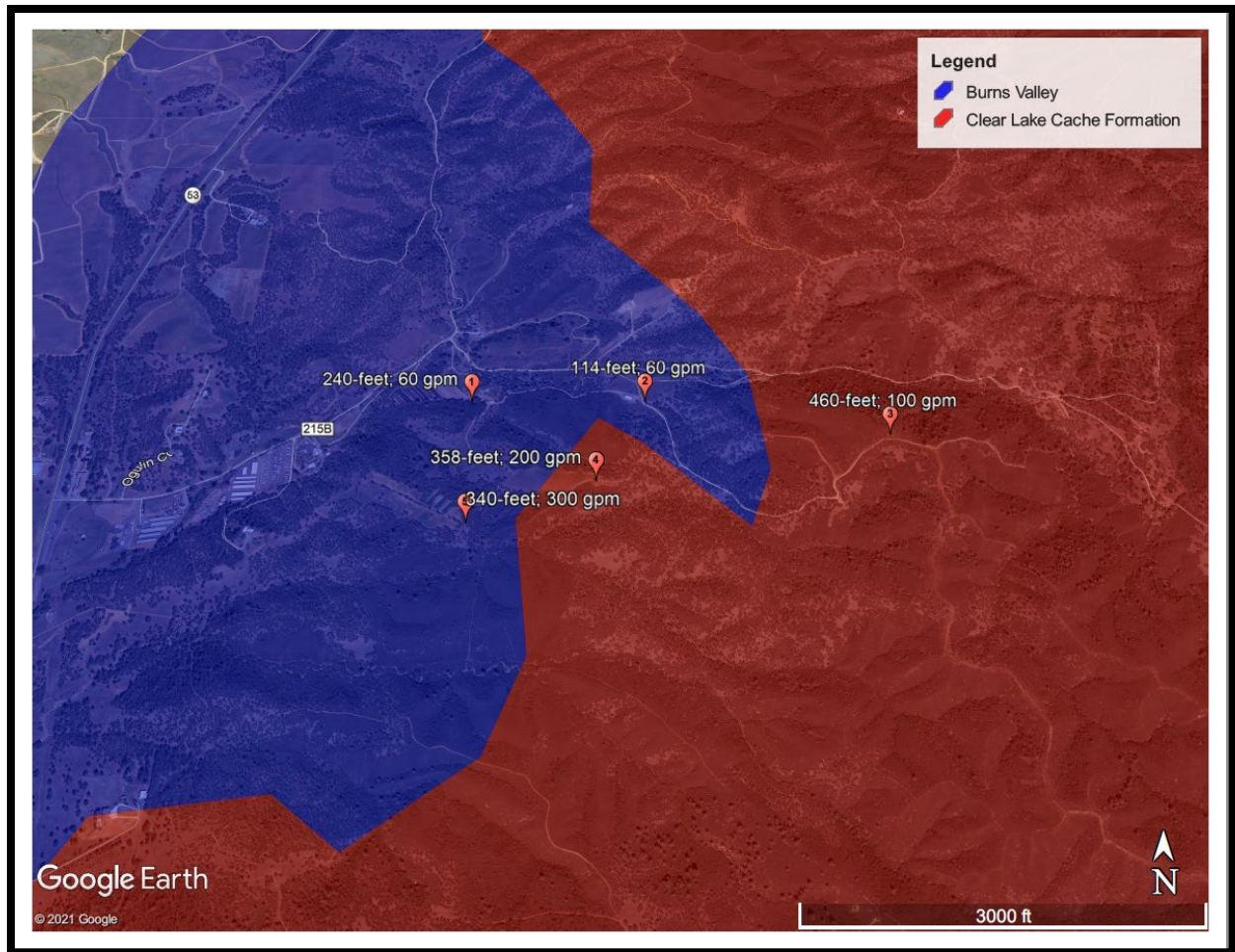


Figure 3. Well Locations (numbered 1 through 5) and Mapped Groundwater Basins

## RECHARGE RATE

The annual recharge can be estimated using a water balance equation, where recharge is equal to precipitation ( $P$ ) less runoff ( $Q$ ) and abstractions that do not contribute to infiltration (e.g., evapotranspiration). A simple tool that can be used to estimate runoff and abstractions, that uses readily available data, is the Natural Resources Conservation Service (NRCS) Curve Number (CN) Method (NRCS, 1986). Determination of the CN depends on the watershed's soil and cover conditions, cover type, treatment, and hydrologic condition. The CN Method runoff equation is

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

where

$Q$  = runoff (inches)

$P$  = rainfall (inches)

$S$  = potential maximum retention after runoff begins (inches) and

$I_a$  = initial abstraction (inches)





The initial abstraction ( $I_a$ ) represents all losses before runoff begins, including initial infiltration, surface depression storage, evapotranspiration, and other factors. The initial abstraction is estimated as  $I_a = 0.2S$ .  $S$  is related to soil and cover conditions of the watershed through the CN, determined as  $S = 1000/CN - 10$ . Using these relations, the runoff equation becomes:

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

The CN is estimated based on hydrologic soil group (HSG), cover type, condition, and land use over the area of recharge, which is estimated as the area of the watershed contributing to the wells. Although well numbers 3 and 4 are located in the Clear Lake Cache Formation, they are on the western boundary and within the Burns Valley Watershed. The approximate area of recharge, 954 acres, was delineated using USGS StreamStats (<https://streamstats.usgs.gov/ss/>) and is shown in Figure 4.

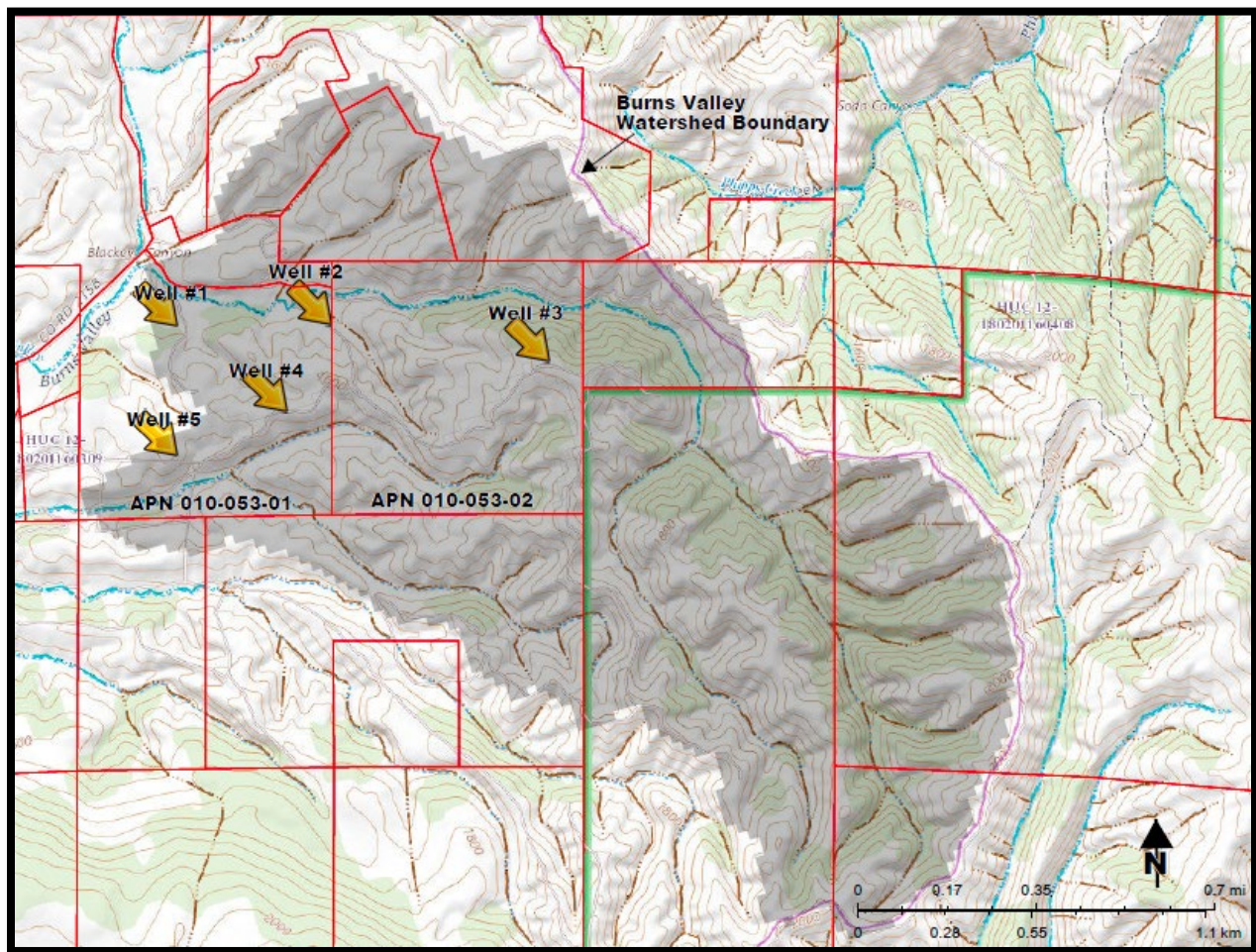


Figure 4. Recharge Area (Shaded Area)

Soils are classified into four HSGs (A, B, C, and D) according to the soils ability to infiltrate water; where HSG A has the highest infiltration potential and HSG D has the lowest infiltration potential. HSGs are based on soil type and are determined from the NRCS Web Soil Survey



<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>).

The recharge area is comprised of two HSGs: 942 acres (99%) HSG C and 12 acres (1%) HSG D (Attachment 2). The area is dominated by HSG C. The land use is undeveloped with a cover type of brush in fair (50% to 75% ground cover) condition and has CNs of 70 and 77 for HSGs C and D, respectively. The weighted CN for the recharge area is 70.

The PRISM Climate Group gathers climate observations from a wide range of monitoring networks and provides time series values of precipitation for individual locations (<https://prism.oregonstate.edu/explorer/>). Using the annual precipitation from 1895 to 2020, as predicted by PRISM, the annual average precipitation over this period is 27.5 inches and the minimum precipitation over this period is 6.5 inches (Attachment 3).

Using the above information, and assuming that 50% of the initial abstraction infiltrates and the remainder is evapotranspiration (0.43 inches or 34.2 AF), the estimated annual recharge over the recharge area of 954 acres is 328 AF during an average year and 228 AF during a dry year (Table 1).

*Table 2. Estimated annual recharge over the recharge area of the project's well.*

Recharge Area (acres)	P (inches)	CN	S (inches)	I <sub>a</sub> (inches)	Q (inches)	Recharge = $P - Q - 0.5 \cdot I_a$ (inches)	Recharge (AF)
954	6.5	70	4.29	0.86	3.2	2.9	228
954	27.5	70	4.29	0.86	23.0	4.1	328

## CUMULATIVE IMPACT TO SURROUNDING AREAS

The Burns Valley Groundwater Basin has a storage capacity of 4,000 AF with a usable storage capacity of 1,400 AF (CDM 2006 and California DWR 2003, 2021). The proposed project's demand, 24.9 AF, is 1.8% of the usable storage capacity. In addition, the proposed 15-acres cannabis cultivation is replacing approximately 13.6 acres of hops cultivation. Hops have large leaf area and require a significant amount of water, approximately 1.5-inches of water equivalent per week (Bamka and Dager, 2002). This equates to 40,700 gallons per acre per week or 5,800 gallons per day (gpd) per acre (note: 1 US gallon equates to 231 cubic inches); which is almost double the amount of water used to cultivate cannabis (43.6 AF per year for hops). The proposed cannabis cultivation would use less water compared to farming hops and would have less of an impact on the surrounding area.

Since all five project wells are within the Burns Valley Watershed, it is likely that they would have the most impact on the Burns Valley Groundwater Basin. Annual water demand of the proposed project could be up to 24.9 AF per year, depending on the length of the cultivation season, which is approximately 8% and 11% of the annual recharge during an average and dry year, respectively. The project recharge area of 954 acres would need just under 1-inch of rain per year to meet the project's demand. Thus, there is sufficient rainfall recharge, on an annual basis, to meet the project's demand, even during low precipitation years.

According to the Lake County Groundwater Management Plan, there are 86 domestic wells and 9 irrigation wells in the Burns Valley Basin and agricultural demand during an average year is 105 AF per year; of this, 14 AF is supplied from groundwater. The Groundwater Management Plan is dated 2006, and does not include the demand from the hops farm. With the 13.6-acre hops farm included, the average





annual groundwater demand for irrigation is 57.6 AF. Replacing the 13.6-acres of hops with 15.0-acres of cannabis reduces the average annual demand from 57.6 AF to 38.9 AF or only 2.8% of the usable storage capacity in the Burns Valley Basin.

The Burns Valley Groundwater Basin appears to have sufficient storage and recharge to meet the proposed projects' water demand, during both a dry and average rainfall year. In addition, the proposed cannabis cultivation uses less water than the previous hops farm. Therefore, the proposed project water use would not likely have a cumulative impact on the surrounding area.

## QUALIFICATIONS OF AUTHOR

I am a registered Professional Engineer with the State of California with 30-years of experience practicing and teaching Water Resources Engineering.

## REFERENCES

- Bamka, W and Dager, E (2002). Growing Hops in the Backyard. Rutgers Cooperative Research & Extension. Published January 2002. Accessed August 2021.  
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**Attachments:**

1. Well Logs
2. NRCS Soil Survey Results
3. PRISM Climate Precipitation 1895 to 2020



ATTACHMENT 1  
WELL LOGS  
LAKE VISTA FARMS, LLC



TRIPPLICATE  
Owner's Copy

STATE OF CALIFORNIA  
**WELL COMPLETION REPORT**

Refer to Instruction Pamphlet

No. **0950518**

DWR USE ONLY - DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Page \_\_\_ of \_\_\_

Owner's Well No. \_\_\_\_\_

Date Work Began 6-30-11 Ended 7-1-11

Local Permit Agency Health Dept

Permit No. WE-2808 Permit Date 6-30-11

**GEOLOGIC LOG**

**WELL OWNER**

ORIENTATION ( )  VERTICAL  HORIZONTAL  ANGLE \_\_\_\_\_ (SPECIFY)

DRILLING METHOD Air Rotary FLUID \_\_\_\_\_

DEPTH FROM SURFACE

Fl.	to	Fl.	DESCRIPTION
0	20		Brown Clay
20	130		Brown Clay w/ Red Chert
130	240		Green Clay w/ Greenstone

Describe material, grain size, color, etc.

Name Claudia Kay Kudinski

Mailing Address 20 Box 13366

CITY Clear Lake Ca STATE Ca ZIP 95427

**WELL LOCATION**

Address 2050 OGDUN Canyon Rd

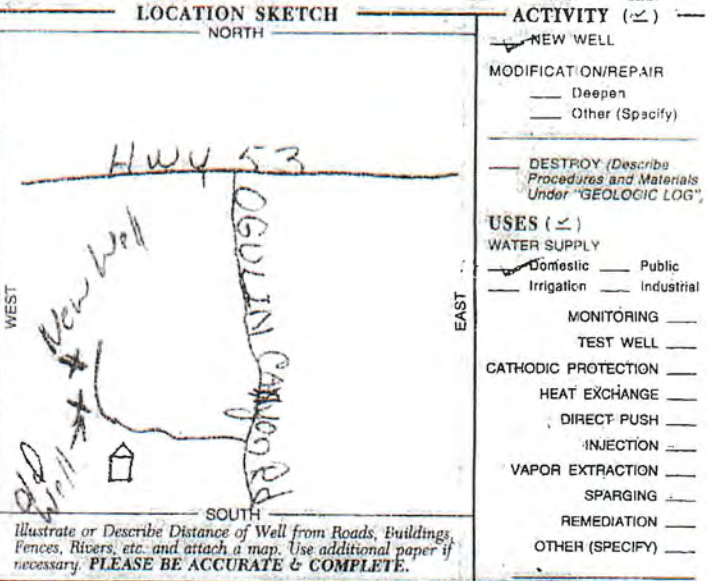
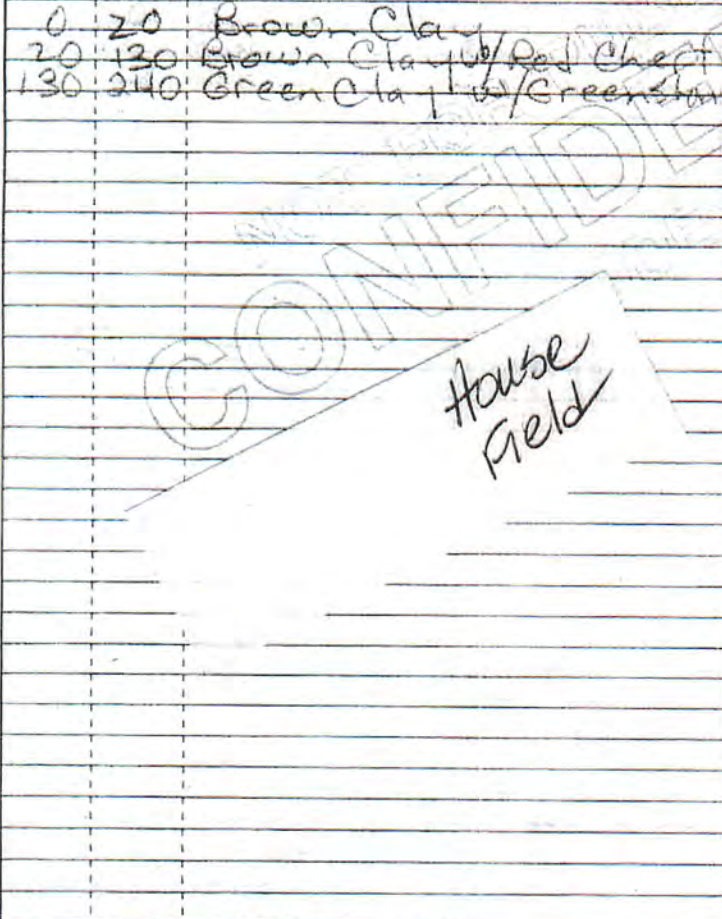
City Clear Lake Ca 95427

County Lake

APN Book 010 Page 053 Parcel 01

Township 13N Range 7W Section 13

Lat \_\_\_\_\_ Deg. MIN. SEC. Long \_\_\_\_\_ Deg. MIN. SEC.



TOTAL DEPTH OF BORING 240 (Feet)

TOTAL DEPTH OF COMPLETED WELL 240 (Feet)

**WATER LEVEL & YIELD OF COMPLETED WELL**

DEPTH TO FIRST WATER 60 (FL) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 150 + (FL) & DATE MEASURED 7-1-11

ESTIMATED YIELD \* 60 (GPM) & TEST TYPE Air Lift

TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN \_\_\_\_\_ (FL)

\* May not be representative of a well's long-term yield.

DEPTH FROM SURFACE	BORE-HOLE DIA. (Inches)	CASING (S)						DEPTH FROM SURFACE	ANNULAR MATERIAL			
		TYPE ( )	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)	FL. to FL.		CE-MENT ( )	BEN-TONITE ( )	FILL ( )	FILTER PACK (TYPE/SIZE)
0	160	7"	PVC	4 1/2"	160		0	20				
160	200	7"	PVC	4 1/2"			20	240	5/16	pea Gravel		
200	240	7"	X	PVC	4 1/2"	200						

- ATTACHMENTS ( )**
- Geologic Log
  - Well Construction Diagram
  - Geophysical Log(s)
  - Soil/Water Chemical Analyses
  - Other \_\_\_\_\_
- ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

**CERTIFICATION STATEMENT**

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Larry Herman Drilling

ADDRESS PO Box 1152 Lower Lake Ca 95457

Signed [Signature] DATE SIGNED 7-2-2011 C-57 LICENSE NUMBER 465071



DUPLICATE  
Owner's Copy

STATE OF CALIFORNIA  
**WELL COMPLETION REPORT**

Refer to Instruction Pamphlet

No. **1075331**

DWR USE ONLY - DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Page      of     

Owner's Well No.     

Date Work Began 11-4-04 Ended 11-4-04

Local Permit Agency Health Dept.

Permit No. WE-2337 Permit Date 10-7-04

**GEOLOGIC LOG**

**WELL OWNER**

ORIENTATION (≠)  VERTICAL  HORIZONTAL  ANGLE  (SPECIFY)

Name Chaudia Kay - Anderson

DRILLING METHOD Air Rotary FLUID

Mailing Address 2015th St

City Northridge Ca STATE CA ZIP 91328

DEPTH FROM SURFACE

**DESCRIPTION**

Describe material, grain size, color, etc.

**WELL LOCATION**

Address 2122 Ogden Canyon Rd

City Clearlake Ca ZIP 95422

County Lake

APN Book 010 Page 053 Parcel 02

Township 13N Range 7W Section 13

Lat      DEG. MIN. SEC. N Long      DEG. MIN. SEC. W

**LOCATION SKETCH**



**ACTIVITY (≠)**

NEW WELL

MODIFICATION/REPAIR  
 Deepen  
 Other (Specify)

DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

**USES (≠)**

**WATER SUPPLY**

Domestic  Public  
 Irrigation  Industrial

MONITORING

TEST WELL

CATHODIC PROTECTION

HEAT EXCHANGE

DIRECT PUSH

INJECTION

VAPOR EXTRACTION

SPARGING

REMEDICATION

OTHER (SPECIFY)

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

**WATER LEVEL & YIELD OF COMPLETED WELL**

DEPTH TO FIRST WATER 90 (FL) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 68 (FL) & DATE MEASURED 11-3-04

ESTIMATED YIELD 60 (GPM) & TEST TYPE Air Lift

TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN      (FL)

\* May not be representative of a well's long-term yield.

TOTAL DEPTH OF BORING 120 (Feet)

TOTAL DEPTH OF COMPLETED WELL 114 (Feet)

DEPTH FROM SURFACE		BORE-HOLE DIA. (Inches)	CASING (S)				ANNULAR MATERIAL						
Fl.	to Fl.		TYPE (≠)	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)	DEPTH FROM SURFACE	TYPE				
Fl.	to Fl.		BLANK	SCREEN	CONDUCTOR	FILL PIPE		Fl.	to Fl.	CE- MENT (≠)	BEN- TONITE (≠)	FILL (≠)	FILTER PACK (TYPE/SIZE)
0	20	9	X				PVC	4 1/2	160				
20	74	7	X				PVC	4 1/2	160				
74	114	7		X			PVC	4 1/2	2.00	.030			5/16" Pack

**ATTACHMENTS (≠)**

- Geologic Log
- Well Construction Diagram
- Geophysical Log(s)
- Soil/Water Chemical Analyses
- Other

**CERTIFICATION STATEMENT**

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Larry Herman Williams

(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 2015th St

CITY Northridge STATE CA ZIP 91328

Date 11-4-04 Initials LHW



DATE  
& Copy

STATE OF CALIFORNIA  
**WELL COMPLETION REPORT**  
Refer to Instruction Pamphlet

No. **1093074**

DWR USE ONLY - DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Owner's Well No. \_\_\_\_\_ of \_\_\_\_\_  
Date Work Began 6-6-06, Ended 6-7-06  
Local Permit Agency Health Dept  
Permit No. WE 2416 Permit Date 10-2-05

WELL OWNER

GEOLOGIC LOG

ORIENTATION ( )		DRILLING METHOD	FLUID	DESCRIPTION
<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> HORIZONTAL <input type="checkbox"/> ANGLE _____ (SPECIFY)		<u>Air Rotary</u>		
DEPTH FROM SURFACE	Describe material, grain size, color, etc.			
Ft. to Ft.				
0-60	Cement Gravel			
60-100	Clay w/ green gravel			
100-130	Clay w/ some gravel			
130-220	Green Gravel			
220-400	Green Stone			
<b>RIDGE TOP</b>				
TOTAL DEPTH OF BORING <u>400</u> (Feet)				
TOTAL DEPTH OF COMPLETED WELL <u>400</u> (Feet)				

Name Mindy ...  
Mailing Address 2150 ...  
CITY ... STATE ... ZIP ...

WELL LOCATION

Address 2150 ...  
City ...  
County ...  
APN Book ... Page ... Parcel ...  
Township 12N Range 7W Section ...  
Lat \_\_\_\_\_ N Long \_\_\_\_\_

LOCATION SKETCH

ACTIVITY ( )

NEW WELL

MODIFICATION/REPAIR

Deepen

Other (Specify) \_\_\_\_\_

DESTROY (Describe Procedures and Mater Under "GEOLOGIC LOG")

USES ( )

WATER SUPPLY

Domestic     Public

Irrigation     Indus

MONITORING \_\_\_\_\_

TEST WELL \_\_\_\_\_

CATHODIC PROTECTION \_\_\_\_\_

HEAT EXCHANGE \_\_\_\_\_

DIRECT PUSH \_\_\_\_\_

INJECTION \_\_\_\_\_

VAPOR EXTRACTION \_\_\_\_\_

SPARGING \_\_\_\_\_

REMEDICATION \_\_\_\_\_

OTHER (SPECIFY) \_\_\_\_\_

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 320 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 300 (Ft.) & DATE MEASURED \_\_\_\_\_

ESTIMATED YIELD 160 (GPM) & TEST TYPE \_\_\_\_\_

TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN \_\_\_\_\_ (Ft.)

\* May not be representative of a well's long-term yield.

DEPTH FROM SURFACE	BORE-HOLE DIA. (Inches)	CASING (S)						DEPTH FROM SURFACE	ANNULAR MATERIAL				
		TYPE ( )				MATERIAL / GRADE	INTERNAL DIAMETER (Inches)		GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)	TYPE		
FL to Ft.		BLANK	SCREEN	CON- DUCTOR	FILL PIPE								
0-340	7 1/2	X					4 1/2	160					
340-400	7 1/2	X					4 1/2	200					

ATTACHMENTS ( )

- Geologic Log
  - Well Construction Diagram
  - Geophysical Log(s)
  - Soil/Water Chemical Analyses
  - Other \_\_\_\_\_
- ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME LARRY ...  
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 20 ... CITY ... STATE ... ZIP ...

Signed \_\_\_\_\_ DATE SIGNED \_\_\_\_\_  
C-57 LICENSE NUMBER \_\_\_\_\_



TRIPLICATE  
Owner's Copy

STATE OF CALIFORNIA  
**WELL COMPLETION REPORT**  
Refer to Instruction Pamphlet

DWR USE ONLY -- DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Page \_\_\_ of \_\_\_

Owner's Well No. \_\_\_\_\_

No. **0963040**

Date Work Began 6/26/2013 Ended 6/28/2013

Local Permit Agency Lake County Environmental Health

Permit No. WF 2925 Permit Date 6/25/2013

**GEOLOGIC LOG**

**WELL OWNER**

ORIENTATION (°)		DRILLING METHOD	FLUID
<input checked="" type="checkbox"/> VERTICAL	<input type="checkbox"/> HORIZONTAL	<u>Rotary</u>	<u>Air</u>
ANGLE (SPECIFY)		DESCRIBE material, grain size, color, etc.	
DEPTH FROM SURFACE			
Ft. to Ft.			
0 - 5	<u>Brown Soil</u>		
5 - 130	<u>Soft Tan Clay like Rock</u>		
130 - 195	<u>Brown Clay and Green Clay</u>		
195 - 272	<u>Greenish Brown Clay</u>		
272 - 352	<u>Green Stone</u>		
352 - 370	<u>Soft Tan Clay like Rock</u>		

Name Claudia Kay Hudinski  
Mailing Address PO Box 586  
Costa Mesa CA 92626

WELL LOCATION  
Address 2050 Ogden Canyon Rd.  
City Clearlake  
County Lake  
APN Book 010 Page 053 Parcel 01  
Township \_\_\_\_\_ Range \_\_\_\_\_ Section \_\_\_\_\_  
Lat \_\_\_\_\_ DEG. MIN. SEC. N Long \_\_\_\_\_ DEG. MIN. SEC. W

**LOCATION SKETCH**

ACTIVITY ( )

NEW WELL

MODIFICATION/REPAIR

Deepen

Other (Specify) \_\_\_\_\_

— DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

USES ( )

WATER SUPPLY

Domestic  Public

Irrigation  Industrial

MONITORING \_\_\_\_\_

TEST WELL \_\_\_\_\_

CATHODIC PROTECTION \_\_\_\_\_

HEAT EXCHANGE \_\_\_\_\_

DIRECT PUSH \_\_\_\_\_

INJECTION \_\_\_\_\_

VAPOR EXTRACTION \_\_\_\_\_

SPARGING \_\_\_\_\_

REMIEDIATION \_\_\_\_\_

OTHER (SPECIFY) \_\_\_\_\_

WEST EAST

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

UPPER FIELD

Old well  
175' → well

**WATER LEVEL & YIELD OF COMPLETED WELL**

DEPTH TO FIRST WATER 280 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 195 (Ft.) & DATE MEASURED 6/28/2013

ESTIMATED YIELD 200+ (GPM) & TEST TYPE Air Lift

TEST LENGTH 1 (Hrs.) TOTAL DRAWDOWN \_\_\_\_\_ (Ft.)

\* May not be representative of a well's long-term yield.

TOTAL DEPTH OF BORING 370 (Feet)

TOTAL DEPTH OF COMPLETED WELL 358 (Feet)

DEPTH FROM SURFACE	BORE-HOLE DIA. (Inches)	CASING (S)					DEPTH FROM SURFACE	ANNULAR MATERIAL			
		TYPE ( )	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)		CEMENT ( )	BENTONITE ( )	FILL ( )	FILTER PACK (TYPE/SIZE)
0 - 120	9	X	MVC F400	4 1/2	SDR26	0 - 1	X				
120 - 272	8	R	" "	" "	" "	1 - 21		X			
272 - 352	8	X	" "	" "	" "	21 - 358				pea gravel	
352 - 358	8	X	" "	" "	" "						

**ATTACHMENTS ( )**

**CERTIFICATION STATEMENT**

- Geologic Log
  - Well Construction Diagram
  - Geophysical Log(s)
  - Soil/Water Chemical Analyses
  - Other \_\_\_\_\_
- ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Don Mc Miller Well Drilling  
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS PO Box 951 Lower Lake CA 95457  
CITY STATE ZIP

Signed Don Mc Miller DATE SIGNED 6/28/2013 527152  
C-57 LICENSED WATER WELL CONTRACTOR DWR LICENSE NUMBER



\*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

### Well Completion Report

Page 1 of 1

Refer to Instruction Pamphlet

Owner's Well Number 2

No. XXXXXXX

Date Work Began 4-8-20

Date Work Ended 4-10-20

Local Permit Agency LAKE County Environmental Health

Permit Number WE-5331AG Permit Date 3-17-20

DWR Use Only - Do Not Fill In

State Well Number/Site Number

Latitude Longitude

APN/TRS/Other

Depth from Surface		Description
Feet	to Feet	Describe material, grain size, color, etc
0	30	Brown Clay
30	60	Brown Gravelly clay
60	100	Brown shale
100	240	Brown Gravelly clay & shale
24	280	Green stone (soft)
280	300	Franciscan Gravels cemented
300	340	Green stone / Green shale

Orientation  Vertical  Horizontal  Angle Specify \_\_\_\_\_

Drilling Method Air Rotary Drilling Fluid \_\_\_\_\_

Total Depth of Boring 345 Feet

Total Depth of Completed Well 340 Feet

**Well Owner**

Name LAKE vista Farms

Mailing Address 405 Clearview Place

City Petaluma State CA Zip 94952

**Well Location**

Address 2050 Ogulin Canyon Rd.

City Clearlake County LAKE

Datum \_\_\_\_\_ Dec. Lat. \_\_\_\_\_ Dec. Long. \_\_\_\_\_

APN Book 010 Page 053 Parcel 01

Township \_\_\_\_\_ Range \_\_\_\_\_ Section \_\_\_\_\_



**Activity**

New Well

Modification/Repair

Deepen

Other \_\_\_\_\_

Destroy

Describe procedures and materials under "GEOLOGIC LOG"

**Planned Uses**

Water Supply

Domestic  Public

Irrigation  Industrial

Cathodic Protection

Dewatering

Heat Exchange

Injection

Monitoring

Remediation

Sparging

Test Well

Vapor Extraction

Other \_\_\_\_\_

**Water Level and Yield of Completed Well**

Depth to first water 200' (Feet below surface)

Depth to Static \_\_\_\_\_

Water Level 173 (Feet) Date Measured 4-9-20

Estimated Yield 300+ (GPM) Test Type A-1.1 ft

Test Length 2 HRS (Hours) Total Drawdown \_\_\_\_\_ (Feet)

\*May not be representative of a well's long term yield.

Depth from Surface	Borehole Diameter	Type	Material	Wall Thickness	Outside Diameter	Screen Type	Slot Size if Any
0	240	F-480	PVC	.340	6"	Blank	—
240	340	F-480	PVC	.340	6"	Perfs.	.032

Depth from Surface	Fill	Description
0	1	Concrete SEAL
1	21	Bentonite
21	340	5/16" Gravel Pack

**Attachments**

Geologic Log

Well Construction Diagram

Geophysical Log(s)

Soil/Water Chemical Analyses

Other \_\_\_\_\_

Attach additional information, if it exists.

**Certification Statement**

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

Name Will Peterson Well Drilling

P.O. Box 695 Person, Firm or Corporation

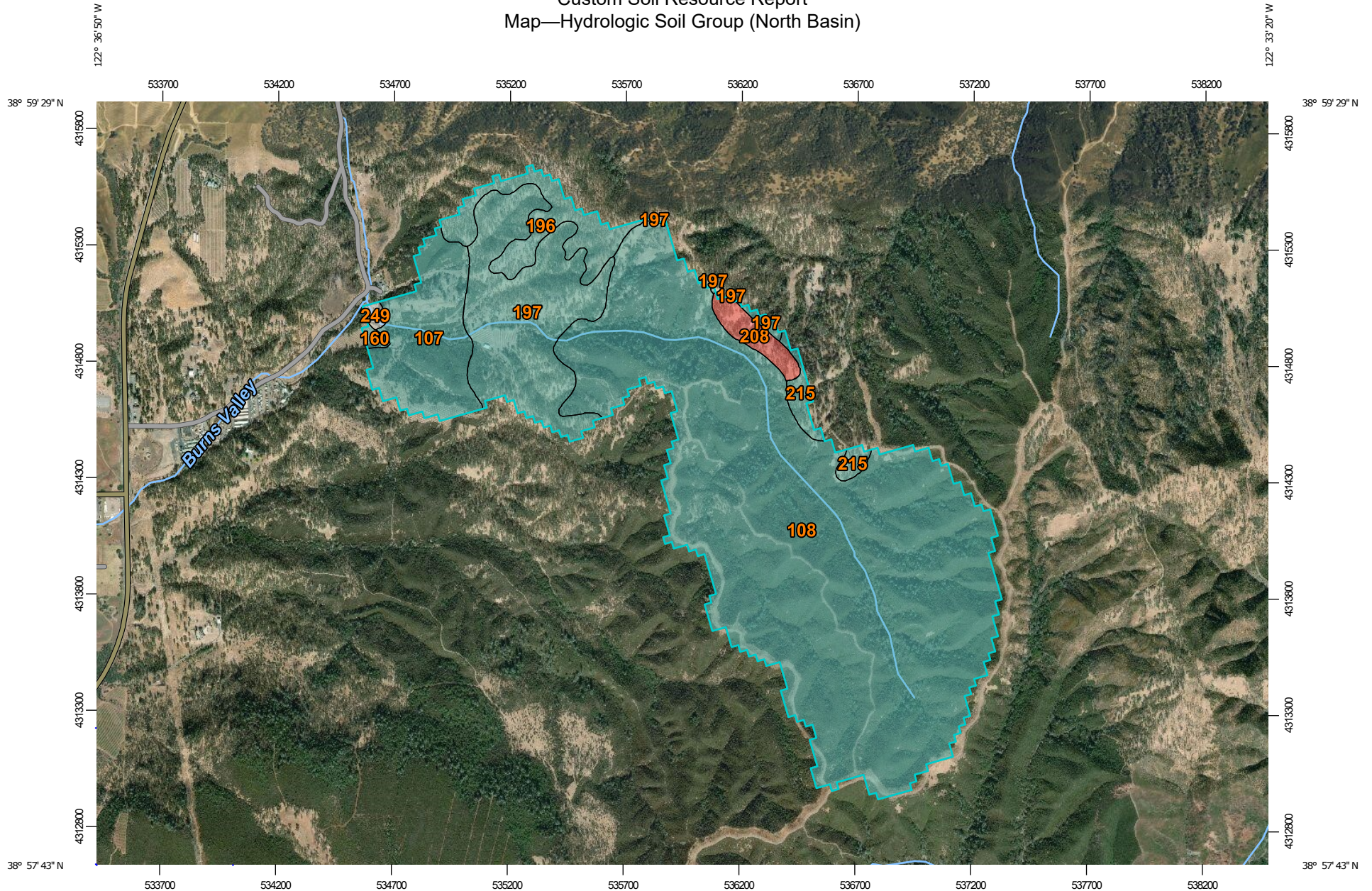
Kelseyville CA 95451 City State

Signed Will Peterson Date Signed 4-10-20 C-57 License Number 1009053

ATTACHMENT 2  
NRCS SOIL SURVEY RESULTS  
HYDROLOGIC SOIL GROUPS  
LAKE VISTA FARMS, LLC



# Custom Soil Resource Report Map—Hydrologic Soil Group (North Basin)



Map Scale: 1:23,100 if printed on A landscape (11" x 8.5") sheet.

0 300 600 1200 1800 Meters


0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84



### MAP LEGEND

**Area of Interest (AOI)**









 Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

**Soil Rating Lines**


-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

**Soil Rating Points**






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


**Water Features**

 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, California  
 Survey Area Data: Version 17, Jun 1, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 18, 2016—May 10, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

**Table—Hydrologic Soil Group (North Basin)**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
107	Bally-Phipps complex, 15 to 30 percent slopes	C	61.8	8.5%
108	Bally-Phipps-Haploxerafls association, 30 to 75 percent slopes	C	507.5	69.4%
160	Manzanita loam, 5 to 15 percent slopes	C	1.9	0.3%
196	Phipps complex, 15 to 30 percent slopes	C	34.0	4.6%
197	Phipps complex, 30 to 50 percent slopes	C	102.3	14.0%
208	Skyhigh-Asbill complex, 15 to 50 percent slopes	D	11.5	1.6%
215	Sleeper variant-Sleeper loams, 30 to 50 percent slopes	C	10.0	1.4%
249	Xerofluvents-Riverwash complex		2.0	0.3%
<b>Totals for Area of Interest</b>			<b>731.0</b>	<b>100.0%</b>

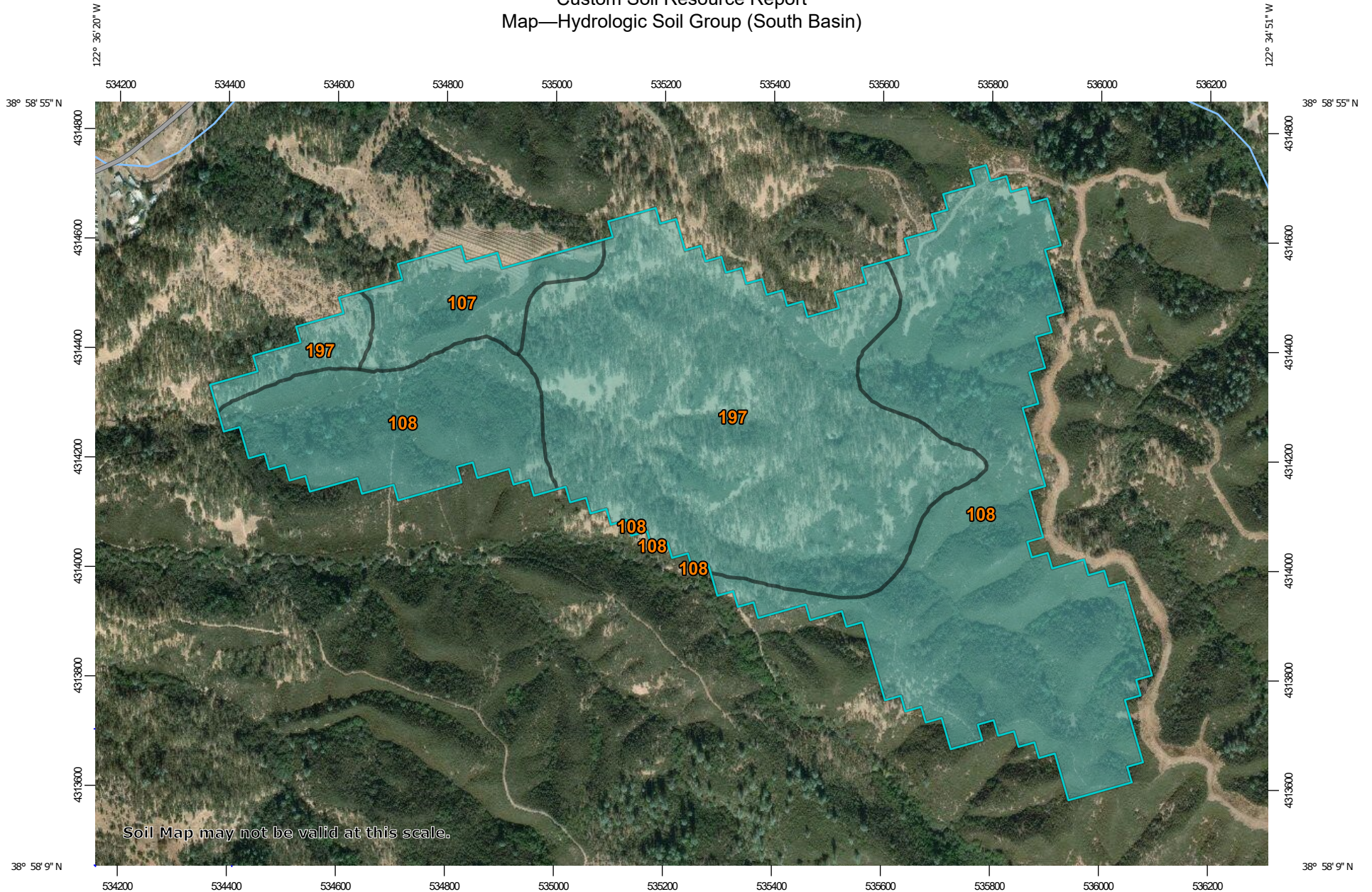
**Rating Options—Hydrologic Soil Group (North Basin)**

*Aggregation Method: Dominant Condition*

*Component Percent Cutoff: None Specified*

*Tie-break Rule: Higher*

# Custom Soil Resource Report Map—Hydrologic Soil Group (South Basin)



Map Scale: 1:9,840 if printed on A landscape (11" x 8.5") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84













### MAP LEGEND









**Area of Interest (AOI)**  
 Area of Interest (AOI)

**Soils**





**Soil Rating Polygons**

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available


**Soil Rating Lines**

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available






**Soil Rating Points**

-  A
-  A/D
-  B
-  B/D


**Water Features**

-  Streams and Canals





**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

-  Aerial Photography

**Soils**

-  C
-  C/D
-  D
-  Not rated or not available

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, California  
 Survey Area Data: Version 17, Jun 1, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 18, 2016—Nov 4, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

**Table—Hydrologic Soil Group (South Basin)**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
107	Bally-Phipps complex, 15 to 30 percent slopes	C	13.8	6.2%
108	Bally-Phipps-Haploxerafls association, 30 to 75 percent slopes	C	112.3	50.6%
197	Phipps complex, 30 to 50 percent slopes	C	95.8	43.2%
<b>Totals for Area of Interest</b>			<b>222.0</b>	<b>100.0%</b>

**Rating Options—Hydrologic Soil Group (South Basin)**

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

ATTACHMENT 3  
PRISM PRECIPITATION 1895-2020  
LAKE VISTA FARMS, LLC



**PRISM Time Series Data**

Location: Lat: 38.9813 Lon: -122.5945 Elev: 1634ft

Climate variable: ppt

Spatial resolution: 4km

Period: 1895 - 2020

Dataset: AN81m

PRISM day definition: 24 hours ending at 1200 UTC on the day shown

Grid Cell Interpolation: On

**Time series generated: 2021-Aug-16**

**Details: [http://www.prism.oregonstate.edu/documents/PRISM\\_datasets.pdf](http://www.prism.oregonstate.edu/documents/PRISM_datasets.pdf)**

Date	ppt (inches)		ppt (inches)
1895	33.45		
1896	39.39		
1897	26.36		
1898	14.99		
1899	35.97		
1900	24.78	Average	27.5
1901	26.17	Minimum	6.5
1902	34.35		
1903	26.73		
1904	42.74		
1905	23.09		
1906	43.07		
1907	35.61		
1908	18.71		
1909	45.28		
1910	17.39		
1911	33.86		
1912	20.46		
1913	26.18		
1914	31.14		
1915	35.54		
1916	29.98		
1917	13		
1918	20.62		
1919	22.96		
1920	29.78		
1921	24.1		
1922	27.53		
1923	14.67		
1924	21.03		
1925	26.1		
1926	34.49		
1927	28.45		
1928	20.62		
1929	15.29		
1930	17.41		

1931	25.01
1932	12.77
1933	20.87
1934	18.91
1935	25.48
1936	25.52
1937	34.4
1938	31.82
1939	12.63
1940	46.02
1941	45.09
1942	32.28
1943	21.27
1944	26.49
1945	29.24
1946	14.2
1947	16.79
1948	23.39
1949	16.78
1950	34.38
1951	29.78
1952	34.45
1953	21.19
1954	29.38
1955	24.98
1956	21.1
1957	30.79
1958	35.6
1959	20.63
1960	27.07
1961	20.06
1962	27.04
1963	28.52
1964	23
1965	25.92
1966	22.66
1967	27.6
1968	30.44
1969	34.03
1970	35.32
1971	17.7
1972	19.37
1973	41.58
1974	23.99
1975	24.29
1976	8.63
1977	19.17



8/17/2021

PRISM Precipitation

UP 19-36  
Lake Vista Farms, LLC

1978	30.24
1979	34.99
1980	24.62
1981	31.16
1982	33.5
1983	62.26
1984	21.22
1985	16.61
1986	38.61
1987	27.83
1988	17.57
1989	20.95
1990	16.75
1991	24.08
1992	29.87
1993	36.33
1994	21.27
1995	55.42
1996	36.89
1997	30.2
1998	52.5
1999	23.46
2000	27.45
2001	36.14
2002	28.7
2003	32.85
2004	33.62
2005	39.04
2006	34.76
2007	13.57
2008	19.35
2009	17.68
2010	33.89
2011	23.12
2012	30.45
2013	6.46
2014	31.29
2015	18.08
2016	35.65
2017	43.57
2018	23.61
2019	43.17
2020	9.92