

**Clearpath Canyon LLC  
Ordinance 3106 Hydrology Report and Drought Management Plan**

Lead Agency:

*Lake County Community Development Department*  
255 North Forbes Street  
Lakeport, CA 95453



Prepared By:



***Annje Dodd, PhD, PE #77756***  
1117 Samoa Blvd.  
Arcata, CA 95521  
(707) 798-6438

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# Table of Contents

|  |                  |
|--|------------------|
| <b><u>1. INTRODUCTION.....</u></b>   | <b><u>1</u></b>  |
| 1.1. PURPOSE .....   | 1                |
| 1.2. PROJECT LOCATION AND SITE DESCRIPTION.....  | 1                |
| 1.3. PROPOSED PROJECT.....   | 1                |
| <b><u>2. WATER SOURCE AND SUPPLY.....</u></b>  | <b><u>2</u></b>  |
| <b><u>3. WATER DEMAND AND STORAGE .....</u></b>  | <b><u>3</u></b>  |
| 3.1. HISTORICAL WATER DEMAND.....  | 3                |
| 3.2. PROJECT WATER DEMAND .....  | 3                |
| 3.3. IRRIGATION METHOD AND WATER STORAGE .....   | 4                |
| <b><u>4. GEOLOGY AND HYDROGEOLOGY.....</u></b>   | <b><u>5</u></b>  |
| 4.1. GROUNDWATER BASIN INFORMATION.....  | 6                |
| <b><u>5. GROUNDWATER RECHARGE AND STORAGE CAPACITY.....</u></b>                                    | <b><u>8</u></b>  |
| 5.1. GROUNDWATER RECHARGE .....  | 8                |
| 5.2. GROUNDWATER STORAGE .....   | 11               |
| 5.2.1. Storage Beneath Project Parcels .....   | 11               |
| 5.2.2. Groundwater Basin Storage and Recharge .....  | 11               |
| <b><u>6. IMPACTS TO SURROUNDING AREAS.....</u></b>   | <b><u>12</u></b> |
| 6.1. HISTORICAL WATER USE – PROJECT AREA.....  | 12               |
| 6.2. GROUNDWATER USE AND TRENDS IN THE BVGB .....  | 12               |
| 6.3. FUTURE GROUNDWATER USE.....   | 14               |
| 6.4. SURROUNDING WELLS.....  | 16               |
| 6.5. PROJECT WELLS.....  | 17               |
| 6.1. SURFACE WATER.....  | 20               |
| <b><u>7. OPERATIONAL WATER MONITORING, CONSERVATION MEASURES, AND DROUGHT MANAGEMENT .....</u></b> | <b><u>20</u></b> |
| 7.1. STANDARD OPERATIONAL MEASURES .....   | 20               |
| 7.2. DROUGHT MANAGEMENT/EMERGENCY WATER CONSERVATION MEASURES .....                                | 22               |
| <b><u>8. SUMMARY AND CONCLUSIONS .....</u></b>   | <b><u>22</u></b> |
| <b><u>9. LIMITATIONS .....</u></b>   | <b><u>24</u></b> |
| <b><u>10. REFERENCES.....</u></b>  | <b><u>24</u></b> |

## List of Figures

|   |   |
|---|---|
| Figure 1. Geologic map of the Burns Valley and Clear Lake Cache Formation Groundwater Basins including the Burns Valley Creek Watershed, the recharge area, location of the project's wells, and nearby cannabis projects. .... | 6 |
| Figure 2. Local geology of project area. ‘QTc’ = Cache Formation, ‘tb’ = nonmarine terrace deposits, and ‘al’ = alluvium (Source: Hearn et al. 1995). ....  | 7 |

Figure 3. PRISM Climate Group precipitation from 2000 through 2022. 2023 precipitation recorded January 1, 2023 through December 11, 2023 at CoCoRaHS precipitation gauge CA-LK-20 <https://maps.cocorahs.org/>, 31.77 inches. ....10

Figure 4. Annual recharge generated over the recharge area (953 acres) and the project parcels (302.5 acres) based on 10% of the annual precipitation (2023 Precipitation recorded January 1, 2023 through December 11, 2023 at CoCoRaHS precipitation gauge CA-LK-20 <https://maps.cocorahs.org/>, 31.77 inches). ....10

Figure 5. Spring/Fall groundwater levels in the BVGB from 2009 through 2019 (dashed lines represent the trend over the period) .....12

Figure 6. Clear Lake stage height 2000 through early 2023 (USGS Gage 11450000) .....13

Figure 7. City of Clearlake Cannabis District and Lake County parcel base zoning designations. ....16

Figure 8. Groundwater wells in PLSS Sections surrounding the project’s wells (Appendix D).....17

Figure 9. Map of # (n) of WCRs within each PLSS section and average well depth. The BVGB is outlined in red. (\*used updated WCRs) .....18

Figure 10. Wells in the vicinity of the project’s wells with 700-foot radius of influence shown. ....19

Figure 11. Estimated radius of influence (distance) associated with the project’s wells (Threshold = 6-inches). ....19

Figure 12. Screened well interval (SC) elevations (Table 7) compared to ground (GE) and surface water (EL) elevations. ....20

## List of Appendices

APPENDIX A: SITE PLANS

APPENDIX B: PROJECT WELL COMPLETION REPORTS

APPENDIX C: WELL PUMP TEST RESULTS

APPENDIX D: NEIGHBORING WELL COMPLETION REPORTS

APPENDIX E: WEB SOIL SURVEY-HYDROLOGIC SOIL GROUP

APPENDIX F: PRISM CLIMATE GROUP PRECIPITATION 1895 TO 2022

APPENDIX G: THEIS EQUATION DRAWDOWN CALCULATIONS FOR THE PROJECT WELLS

## **1. INTRODUCTION**

### **1.1. PURPOSE**

The purpose of this report is to present the assessment and requirements of Ordinance 3106. On July 27, 2021, the Lake County Board of Supervisors passed an Ordinance 3106, an Urgency Ordinance requiring land use applicants to provide enhanced water analysis during a declared drought emergency. Ordinance 3106 requires all projects that require a California Environmental Quality Act (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,
- Cumulative impact of water use to surrounding areas due to the project, and
- A Drought Management Plan (DMP) depicting how the applicant proposes to reduce water use during a declared drought emergency.

### **1.2. PROJECT LOCATION AND SITE DESCRIPTION**

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.

The site is accessed off of Ogulin Canyon Road. The subject property is designated as 'Rural Lands' zoning, with a General Plan land use designated the same. The topography of the of the area is mountainous with several small plateaus, ridges, ravines, and valleys, including Blackeye Canyon, which is located along the northern edge of the parcels. The elevation ranges from approximately 1,425 feet to 1,775 feet above mean sea level (Graening and Associates, 2023). The site drains in various directions, but flows eventually into Burns Valley Creek, flowing southwest, and eventually into Clear Lake.

### **1.3. PROPOSED PROJECT**

The project proposes 15-acres of outdoor cannabis cultivation either full-sun or using light deprivation within temporary hoopouses. The proposed cultivation will be distributed across five (5) sites (Appendix A), labeled A through E, summarized in Table 1. The proposal includes the development of facilities appurtenant to cultivation, including facilities for drying and curing of harvested cannabis, ancillary nursery, storage sheds, the appropriate irrigation infrastructure, and ancillary processing. Ancillary drying is proposed to occur in an existing 2,800 sq. ft. drying structure. The project may include ancillary nursery space in the drying building when drying is not occurring. Ancillary nursery space may also occur in temporary agriculturally exempt hoop structures.

ORDINANCE 3106 HYDROLOGY REPORT AND DROUGHT MANAGEMENT PLAN  
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Table 1. Summary of cannabis cultivation areas.

| Site         | Name                    | Cultivation Area |                | Canopy Area  |                | Temporary Ag-Exempt Hoop Structures |                |
|--------------|-------------------------|------------------|----------------|--------------|----------------|-------------------------------------|----------------|
|              |                         | acres            | sq. ft.        | acres        | sq. ft.        | Number                              | sq. ft.        |
| A            | Northwestern Hops Field | 4.42             | 192,663        | 4.07         | 177,436        | 99                                  | 178,200        |
| B            | Southwest Clearing      | 6.42             | 279,444        | 5.25         | 228,692        | 128                                 | 230,400        |
| C            | Northeast Hops Field    | 1.95             | 85,137         | 1.16         | 50,501         | 29                                  | 52,200         |
| D            | Central Hops Field      | 4.23             | 184,454        | 2.98         | 129,798        | 73                                  | 131,400        |
| E            | Chaparral Clearing      | 2.61             | 113,485        | 1.54         | 66,973         | 38                                  | 68,400         |
| <b>Total</b> |                         | <b>19.63</b>     | <b>855,183</b> | <b>15.00</b> | <b>653,400</b> | <b>367</b>                          | <b>660,600</b> |

## 2. WATER SOURCE AND SUPPLY

There are five (5) existing, permitted groundwater wells that would be used for cultivation. The estimated yield reported on the Well Completion Report (WCR) for each well is summarized in the Table 2. Wells are shown on the Site Plans in Appendix A and are strategically placed adjacent to each proposed cultivation area. The WCR's for each well are provided in Appendix B. The wells range in depth from 114 ft to 460 ft and have a combined yield of 720 gpm (1,161 acre-feet/year or AFY).

Three, 4-hour well production tests were conducted by Pollack & Sons Pump January 31<sup>st</sup> through February 2<sup>nd</sup>, 2022 (Appendix C). The results are summarized in

Table 3. The well production test results confirm the high productivity of the wells as reported on the WCRs. The tests were conducted at a rate of 38 gpm due to limitations of the pump used during the test, however, the pump operator noted that the wells would yield more with a larger pump.

Table 2. Summary of project well information (WCRs in Appendix B).

| Site  | Name<br>(Well Latitude/Longitude)                   | Well # | Year Drilled | Depth (ft) | Yield (gpm) | Yield (AFY) |
|-------|---|--------|--------------|------------|-------------|-------------|
| A     | Northwestern Hops Field<br>(38.982011, -122.599900) | 1      | 2011         | 240        | 60          | 96.8        |
| B     | Southwest Clearing<br>(38.978344, -122.599803)      | 5      | 2020         | 340        | 300         | 483.9       |
| C     | Northeast Hops Field<br>(38.982033, -122.594181)    | 2      | 2004         | 114        | 60          | 96.8        |
| D     | Central Hops Field<br>(38.979569, -122.595764)      | 4      | 2013         | 358        | 200         | 322.6       |
| E     | Chaparral Clearing<br>(38.980981, -122.586219)      | 3      | 2006         | 460        | 100         | 161.3       |
| Total |   |        |              |            | 720         | 1,161       |

Table 3. Summary well production test results (Results in Appendix C).

| Site | Location                | Static Water Level (ft bgs) |                | 2022 Pump Test Rate <sup>1</sup> (gpm) | Water Level at end of 2hr Test (ft bgs) | Water Level at end of 4hr Test (ft bgs) | Water Level after 24hrs Recovery (ft bgs) |
|------|-------------------------|-----------------------------|----------------|--|---|---|---|
|      |                         | Well Log                    | 2022 Pump Test |  |   |   |   |
| A    | Northwestern Hops Field | 150+                        | 150            | 38                                     | 180                                     | 200                                     | 150                                       |
| B    | Southwest Clearing      | 173                         | 175            | 38                                     | 210                                     | 260                                     | 175                                       |
| C    | Northeast Hops Field    | 68                          | 70             | 38                                     | 80                                      | 85                                      | 70  |

<sup>1</sup>The pump operator noted the yield was limited by the size of pump used to conduct the test and that the wells could yield more with a larger pump.

### 3. WATER DEMAND AND STORAGE

#### 3.1. HISTORICAL WATER DEMAND

The property has a history of intensive agricultural use. The property was formerly operated as a hops farm (Hops Meister Farms), and the crops were started in approximately 2009 over about 13.6 acres. There are also remnants of almond orchards, which existed earlier than 1993. Hops plants have a 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 79,100 gallons per day (gpd) (note: one gallon equates to 231 cubic inches) or 36.4 acre-feet (AF) per year (AFY) assuming a 150-day cultivation season.

In addition to the historical irrigation demand, there is an existing residence on site. According to the Environmental Protection Agency (EPA, <https://www.epa.gov/watersense/how-we-use-water>), the average American family uses 300 gallons of water per day, which equates to an annual demand of 109,500 gallons or 0.33 AF. Thus, the total annual historical demand was approximately 36.7 AF.

#### 3.2. 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 gallon (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 (CDFA, 2017), the demand is 3,000 gpd (2.1 gallons per minute [gpm]) per acre of canopy.

The estimate of 6.0 gpd is a largely conservative estimate for a large outdoor plant, measured in the driest period of the season. Another estimate that is used for outdoor cultivation is 1.2 to 14.7 gallons per canopy square foot per year (Ascent, 2017) which equates to 290-3,560 gpd per acre. Using the upper end of this range, and assuming 65% of the time the cultivation is in the vegetative state and 35% it is in the flowering state and the water use during the flowering period is about 1.7 times the water used during the vegetative state, the total estimated irrigation water demand, for 15 acres of cannabis canopy is as follows:

- Average Daily – 53,470 gpd
- Maximum Daily (Flowering Period) – 73,425 gpd
- Yearly (assuming up to 180-day outdoor season):
  - 29.5 acre-feet per year (AFY)

The monthly irrigation demand and the irrigation demand by cultivation site are summarized in Table 4 and Table 5.

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In addition to the irrigation demand, there is an existing annual demand of the onsite residence is approximately 109,500 gallons or 0.33 AF. Employees will utilize portable toilets and thus should require little to no water demand. Thus, the total annual demand is approximately 29.8 AF.

Table 4. Estimated projected monthly irrigation water use based on vegetative (65% or 117 days) and flowering (35% or 63 days) periods.

|                           | Jan | Feb | Mar | Apr | May   | Jun   | Jul   | Aug   | Sep   | Oct | Nov | Dec | Total |
|---------------------------|-----|-----|-----|-----|-------|-------|-------|-------|-------|-----|-----|-----|-------|
| Irrigation<br>(1,000 gal) | 0   | 0   | 0   | 641 | 1,324 | 1,282 | 1,324 | 1,969 | 2,203 | 881 | 0   | 0   | 9,624 |

The estimated irrigation water demand reported above is an average daily rate over the course of the growing season; however, seasonal water demand likely varies in response to temporal and environmental variables (e.g., temperature, relative humidity, wind, plant age and size, etc.).

Table 5. Summary of cannabis cultivation areas and water demand by cultivation site.

| Site         | Name                    | Canopy Area  |                | Annual Demand |             |
|--------------|-------------------------|--------------|----------------|---------------|-------------|
|              |                         | acres        | sq. ft.        | 1,000 Gallons | AF          |
| A            | Northwestern Hops Field | 4.07         | 177,436        | 2,611         | 8.0         |
| B            | Southwest Clearing      | 5.25         | 228,692        | 3,368         | 10.3        |
| C            | Northeast Hops Field    | 1.16         | 50,501         | 744           | 2.3         |
| D            | Central Hops Field      | 2.98         | 129,798        | 1,912         | 5.9         |
| E            | Chaparral Clearing      | 1.54         | 66,973         | 988           | 3.0         |
| <b>Total</b> |                         | <b>15.00</b> | <b>653,400</b> | <b>9,624</b>  | <b>29.5</b> |

### 3.3. IRRIGATION METHOD AND WATER STORAGE

The project proposes to use the existing groundwater wells to fill forty-six (46) 5,000-gallon water tanks adjacent to the proposed cultivation areas (Table 6, Appendix A), amounting to a total of 230,000-gallons of storage, representing 3 to 5 days of water storage for the cannabis operation. Water from the storage tanks will be piped to drip irrigation systems in individual greenhouses. Drip lines will be sized to irrigate the cultivation areas at a slow rate to maximize absorption and prevent runoff. Drip irrigation systems, when implemented properly, conserve water compared to other irrigation techniques.

Table 6. Summary of water storage at each cultivation site.

| Site         | Name                    | # of 5,000 Gallon Tanks | Water Storage (gallons) |
|--------------|-------------------------|-------------------------|-------------------------|
| A            | Northwestern Hops Field | 12                      | 60,000                  |
| B            | Southwest Clearing      | 16                      | 80,000                  |
| C            | Northeast Hops Field    | 4                       | 20,000                  |
| D            | Central Hops Field      | 9                       | 45,000                  |
| E            | Chaparral Clearing      | 5                       | 25,000                  |
| <b>Total</b> |                         | 46                      | 230,000                 |

#### 4. GEOLOGY AND HYDROGEOLOGY

The geology of the property is mapped predominantly as ‘*QTC*’ – Cache Formation (Pleistocene and Pliocene) – siltstone, sandstone, conglomeratic sandstone and tuff with elements of ‘*tb*’ – terrace deposits of Burns Valley (Pleistocene) – sand and gravel predominantly composed of chert and greenstone clasts reworked from the Cache Formation and rare cobbles of early basaltic rocks, underlain by the Cache Formation. There are a few mapped faults dissecting the property in the region of the Cross Spring fault zone. (Figure 1 and Figure 2)

According to the geologic logs from the project’s WCRs, the water bearing unit of the wells is comprised primarily of green stone (Table 7), which is consistent with the Cache Formation water bearing unit. Based on this, groundwater in the project wells is likely within a confined aquifer consistent with the locally mapped sedimentary sandstone and shale units. The wells are located near/adjacent to mapped historic geologic structural faults, although they are not mapped as active faults as per the California Geological Survey Fault Activity Map of California (<https://maps.conservation.ca.gov/cgs/fam/>).

Table 7. Summary of water bearing units of the project’s wells.

| Well # | Site | Surface Elevation (ft) | Depth (ft) | Screened Interval (ft bgs) | Elevation (ft) | Screened Material                                   |
|--------|------|------------------------|------------|----------------------------|----------------|---|
| 1      | A    | 1,458                  | 240        | 240 – 200                  | 1,218 – 1,258  | Green Clay w/ Green Stone                           |
| 5      | B    | 1,564                  | 340        | 340 – 240                  | 1,224 – 1,324  | Franciscan Cemented Gravels/Green Stone/Green Shale |
| 2      | C    | 1,482                  | 114        | 114 – 74                   | 1,368 – 1,408  | Green Stone/Black Rock                              |
| 4      | D    | 1,588                  | 358        | 342 – 272                  | 1,236 – 1,316  | Green Clay/Green Stone                              |
| 3      | E    | 1,773                  | 460        | 460 – 340                  | 1,313 – 1,433  | Green Stone   |

### 4.1. GROUNDWATER BASIN INFORMATION

The project’s water sources are located at the boundary of two groundwater basins, the Burns Valley (Basin #5-17) Groundwater Basin (BVGB) and the Clear Lake Cache Formation (Basin #5-66) Groundwater Basin (CLCFGB) (Figure 1). The Burns Valley Creek Watershed spans the BVGB and the western portion of the CLCFGB.

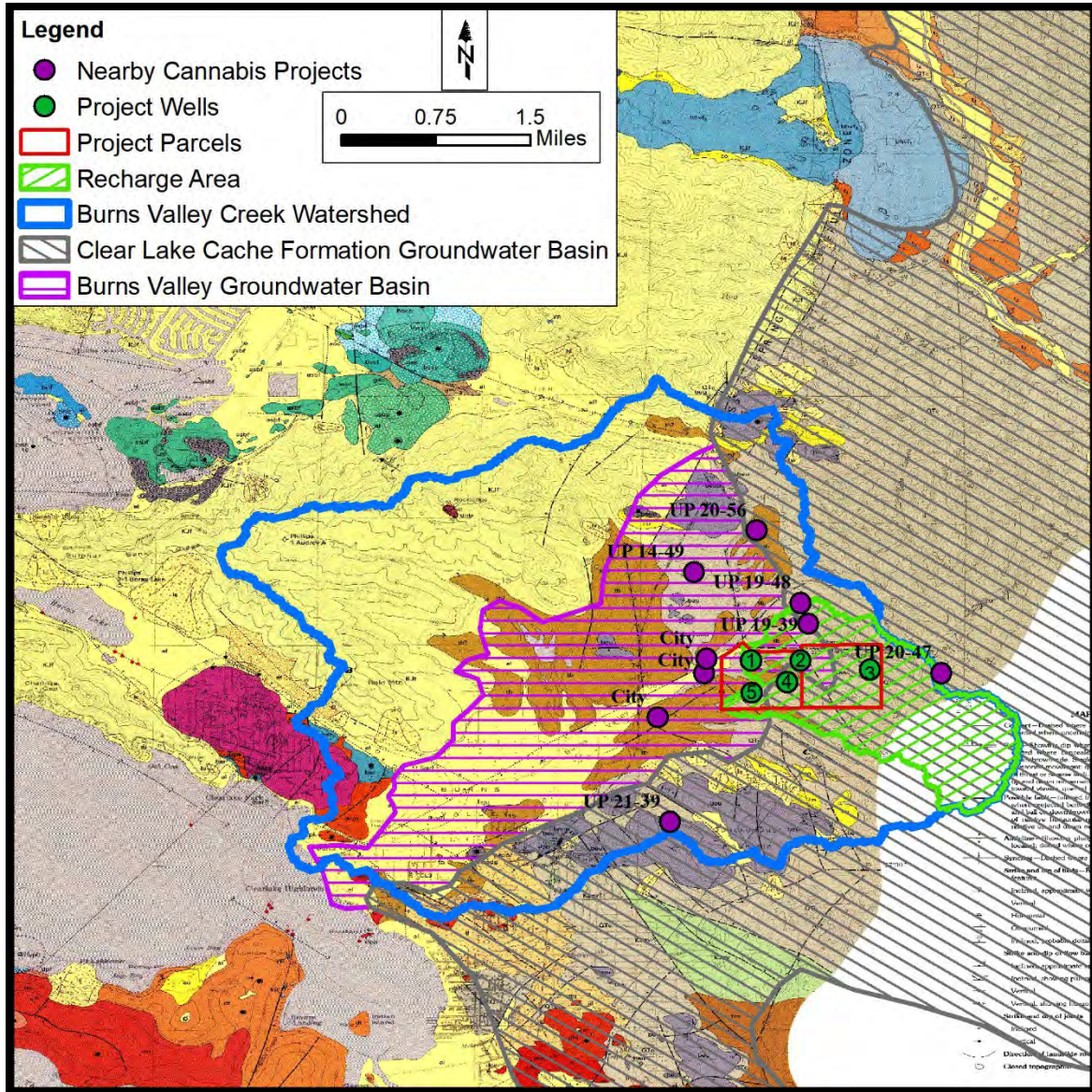


Figure 1. Geologic map of the Burns Valley and Clear Lake Cache Formation Groundwater Basins including the Burns Valley Creek Watershed, the recharge area, location of the project's wells, and nearby cannabis projects.

The BVGB is within the Burns Valley Watershed. The Franciscan Formation borders the BVGB on the north, Clear Lake borders the BVGB on the west, and the Cache Formation borders the BVGB 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 BVGB, The Quaternary Alluvium ('al'), Quaternary Terrace Deposits ('tb'), and the Cache Formation ('QTc') (Figure 2). The Quaternary Alluvium is 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 BVGB. 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. The Cache Formation underlies the alluvial and terrace deposits in the basin and consists of siltstone, sandstone, and tuff, and has a maximum thickness of 200 feet. The Cache formation has low permeability and provides water to wells with yields ranging from 30 to 335 gpm.

The CLCFGB is the largest groundwater basin in Lake County and has a surface area of 47 square miles. Lower Cretaceous marine and Mesozoic ultrabasic intrusive rocks bound the south of the CLCFGB. Lower Cretaceous marine deposits border the east portion of the basin, and the Franciscan Formation borders the north and west portions of the basin, where it shares a boundary with the BVGB. The CLCFGB is drained by the North Fork

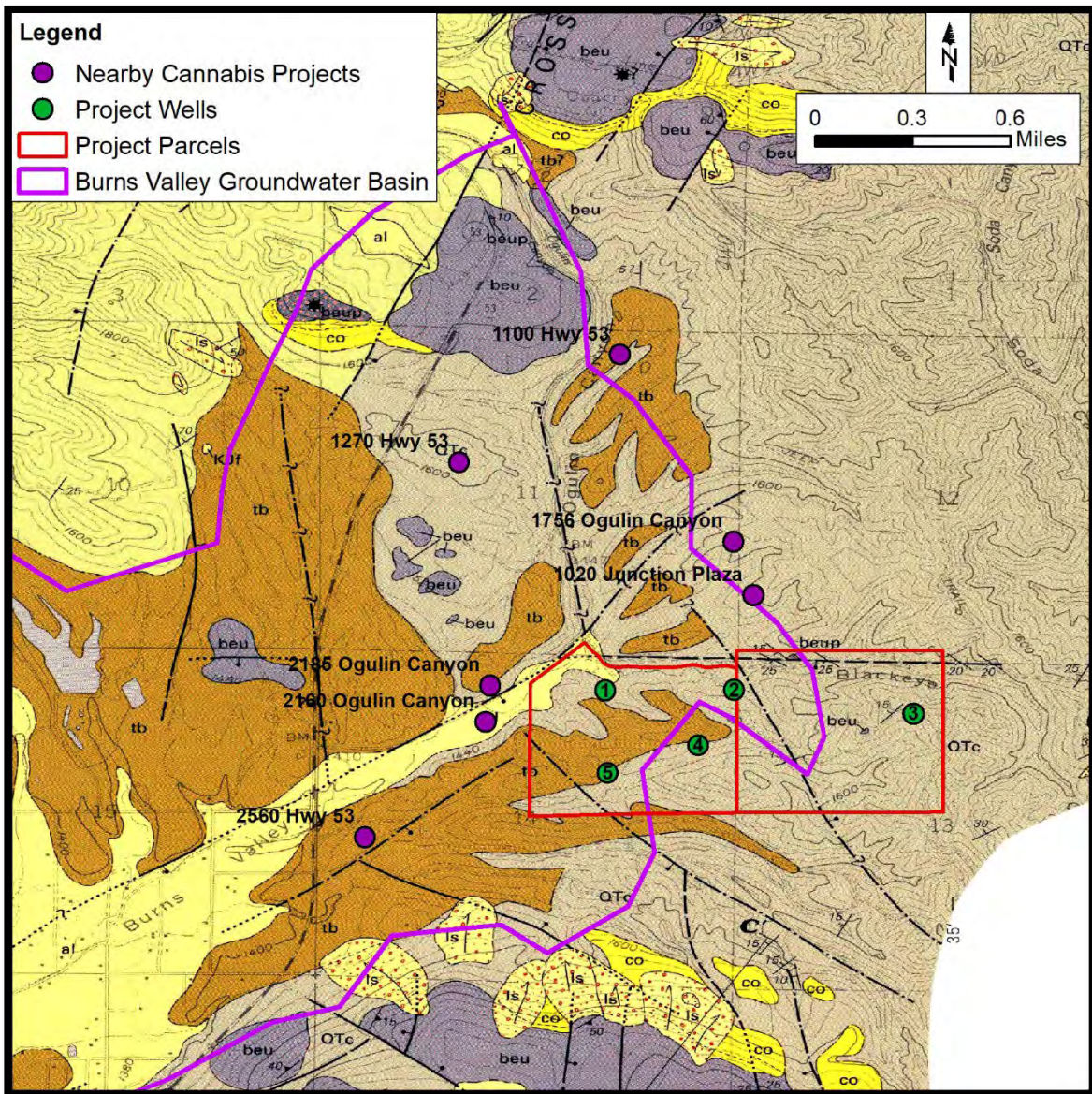


Figure 2. Local geology of project area. 'QTc' = Cache Formation, 'tb' = nonmarine terrace deposits, and 'al' = alluvium (Source: Hearn et al. 1995).

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 and 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 formation has generally low permeability with well yields ranging from 11 to 450 gpm.

According to the geologic logs from the project's WCRs, the water bearing unit of the wells is comprised primarily of shale/green stone (Table 7), which is consistent with the Cache Formation, a confined water bearing unit.

Neither the BVGB nor the CLCFGB 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)

## 5. GROUNDWATER RECHARGE AND STORAGE CAPACITY

### 5.1. GROUNDWATER RECHARGE

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. The recharge area was estimated as the contributing drainage area to the wells associated with the unnamed Class II tributaries to Burns Valley Creek, which is approximately 953 acres (Figure 1), and was delineated using USGS StreamStats (<https://streamstats.usgs.gov/ss/>).

Soils are classified into four HSGs (A, B, C, and D) according to the soil’s 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: 940 acres (99%) HSG C and 13 acres (1%) HSG D (Appendix E). 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 70.1.

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 2000 to 2022, as predicted by PRISM, the annual average precipitation over this period is 27.1 inches and the minimum precipitation over this period is 6.5 inches (Attachment 3).

Using the above information, the estimated annual recharge over the recharge area of 953 acres and the project parcel area of 302.5 acres is summarized in Table 8 for a dry year and an average year.

Table 8. Estimated annual recharge over the recharge area of the project’s well and the project’s parcel area.

| <b>Recharge Area (acres)</b> | <b>P (inches)</b> | <b>CN</b> | <b>S (inches)</b> | <b>I<sub>a</sub> (inches)</b> | <b>Q (inches)</b> | <b>Recharge = <math>P - Q - 0.5 * I_a</math> (inches)</b> | <b>Recharge (AF)</b> |
|------------------------------|-------------------|-----------|-------------------|-------------------------------|-------------------|---|----------------------|
| 953                          | 6.5               | 70.1      | 4.2655            | 0.85                          | 3.2               | 2.9   | 226                  |
| 953                          | 27.1              | 70.1      | 4.2655            | 0.85                          | 22.6              | 4.1   | 325                  |
| 302.5                        | 6.5               | 70        | 4.2655            | 0.86                          | 3.2               | 2.9   | 72                   |
| 302.5                        | 27.1              | 70        | 4.2655            | 0.86                          | 22.6              | 4.1   | 104                  |

The estimated recharge in Table 8 is based on the assumption that recharge is primarily from precipitation percolating or infiltrating down from the ground surface within the recharge area, however, confined aquifers are generally recharged where the aquifer materials are exposed at the surface (e.g. rock outcrop areas). Another method for estimating recharge is based on estimates determined by the USGS (USGS Fact Sheet 2007-3007). Although determined for humid basins in the east, the USGS estimated long-term average groundwater recharge to be between 10 and 66 percent of precipitation. Over the 953-acre recharge area this would equate to 51.4 – 339.1 AFY during a dry year and 215.4 – 1,421.6 AFY during an average year. The recharge estimates in Table 8 fall within these ranges for a dry year and on the lower end for an average year. To be conservative, the lowest estimates of recharge, based on 10 percent of precipitation, are used here to estimate long-term average groundwater recharge.

The PRISM Climate Group precipitation records from 2000 through 2022 indicate that lower precipitation years are typically preceded or followed by near average or above average precipitation years (Figure 3), that there were three drought periods in the last 23 years (one drought period every 7 to 8 years), and the lowest total precipitation over a three-year period occurred from 2007 to 2009. The groundwater recharge over the period 2000 through 2023, based on 10 percent of precipitation, is summarized in (Figure 4) along with the two-year average recharge and the project’s demand. The two-year average annual recharge, even during the lowest precipitation years from 2000 through 2023, exceeds the project demand. The long-term average recharge, over a 7-year period, assuming three drought years and 4 average years, would be 46.1 AFY and 145.1 AFY over the project site (302.5 acres) and the contributing recharge area (953 acres), respectively. The average recharge over the project parcel and 953-acre recharge area, based on 10% of precipitation, over the last 23 years was 68.4 AFY and 215.4 AFY, respectively.

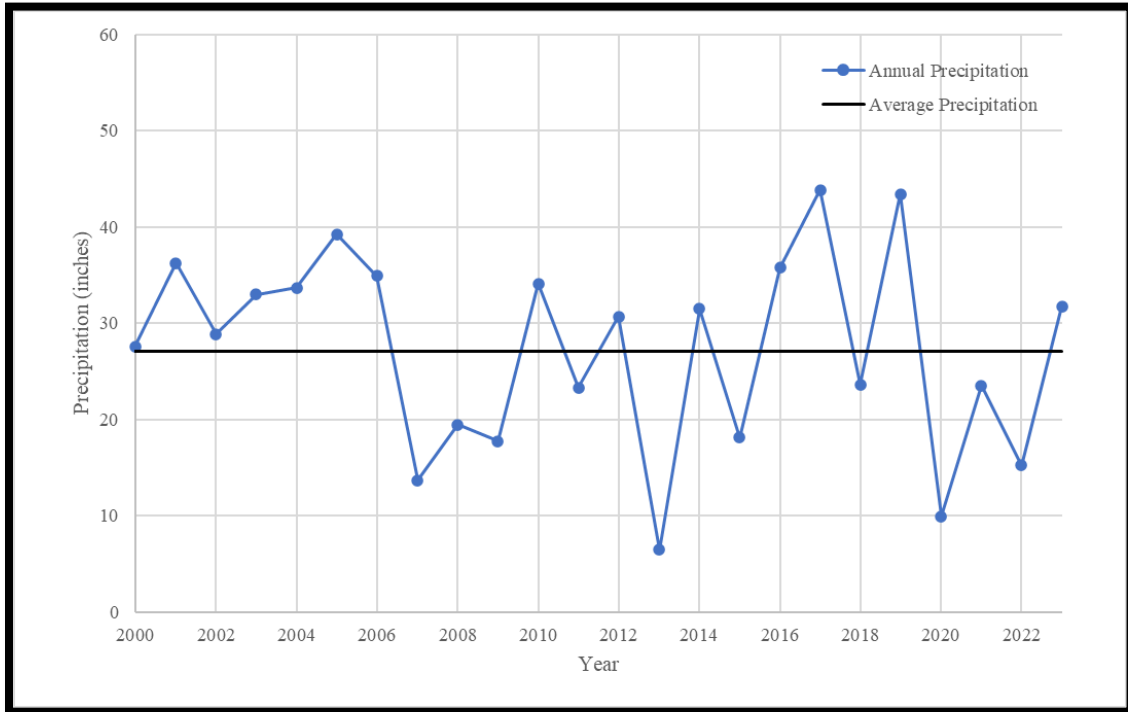


Figure 3. PRISM Climate Group precipitation from 2000 through 2022. 2023 precipitation recorded January 1, 2023 through December 11, 2023 at CoCoRaHS precipitation gauge CA-LK-20 <https://maps.cocorahs.org/>, 31.77 inches.

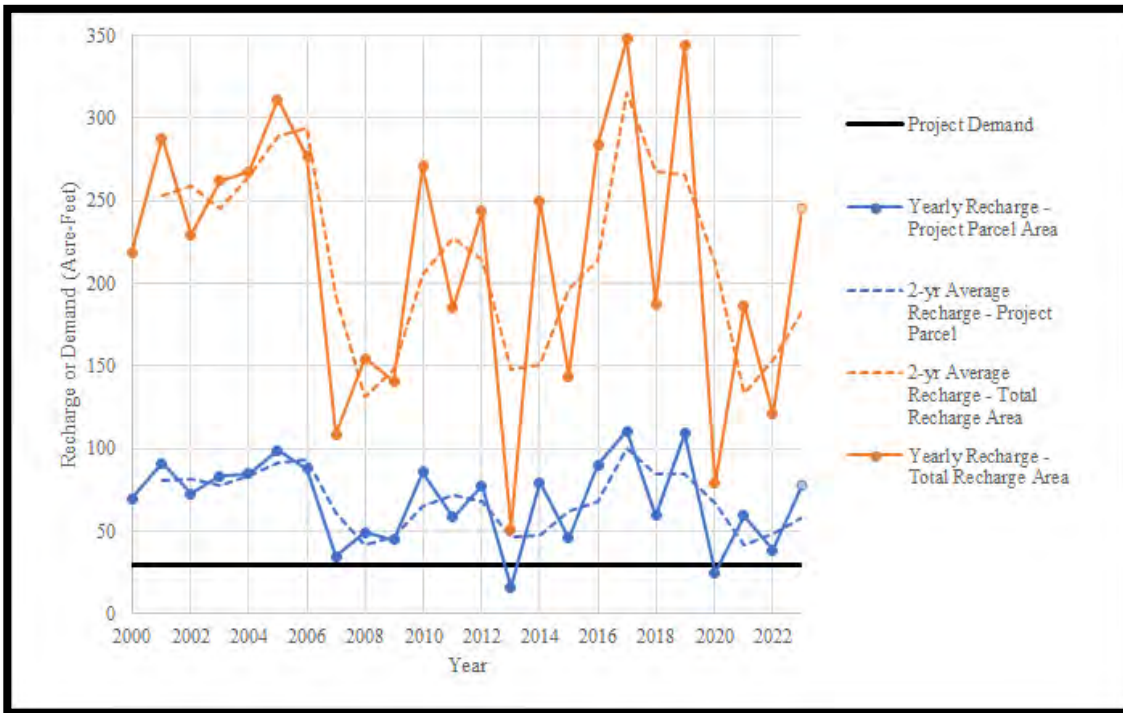


Figure 4. Annual recharge generated over the recharge area (953 acres) and the project parcels (302.5 acres) based on 10% of the annual precipitation (2023 Precipitation recorded January 1, 2023 through December 11, 2023 at CoCoRaHS precipitation gauge CA-LK-20 <https://maps.cocorahs.org/>, 31.77 inches).

## 5.2. GROUNDWATER STORAGE

### 5.2.1. STORAGE BENEATH PROJECT PARCELS

The aquifer acts as a storage reservoir that gains water during the rainy season. The depletion in the reservoir depends on the storage capacity of the reservoir. The theoretical storage capacity of the water source's water-bearing formation can be estimated by multiplying the volume of the aquifer by the specific yield. The area of the water-bearing formation is associated with the BVGB. However, to be conservative, only the project parcel's contributing area is used to estimate the parcel's contributing storage area. The thickness is estimated as the difference in the static groundwater level and the maximum aquifer depth. A range in values for the specific yield (effective porosity) was obtained from literature values for shale/stone, ranging between 0.09% to 0.9% (Heath, 1983 and Morris and Johnson 1967). Although the water bearing formation is a confined aquifer, well yields in the formation are indicative of higher end range of specific yields, however, to be conservative, the lower value is used here. The results are summarized below.

- Aquifer Area: 302.5 acres (project's contributing area)
- Static Groundwater Level: 177.2 ft bgs (source: project's well logs)
- Aquifer Depth: 302.4 ft bgs (source: project's well logs)
- Aquifer Thickness: 125.2 ft
- Specific Yield: 0.0009
- Approximate Storage Capacity: 34.1 AF

### 5.2.2. GROUNDWATER BASIN STORAGE AND RECHARGE

The estimated storage capacity of the alluvial formation of BVGB is 4,000 AF, with a usable storage capacity of 1,400 AF. However, the deeper Cache Formation, from which the project draws water, has between 50,000 and 75,000 acre-feet of storage (Upson and Kunkel, 1955). Excluding the Cache Formation storage, to be conservative, the total potential demand is 55% of the usable storage capacity of the BVGB alluvial formation. According to DWR, groundwater in the BVGB is derived from rain that falls within the 12.5 square mile Burns Valley Watershed drainage area. The recharge over this area, based on 10% of the precipitation, is 431.3 AFY and 1,808.3 AFY during a drought year and average year, respectively. Based on rainfall data, a drought occurs once every 7 to 8 years and can last up to three years, the average recharge over a 7-year period, assuming three drought years and 4 average years, the long-term average recharge would be 1,218.2 AFY.

## 6. IMPACTS TO SURROUNDING AREAS

### 6.1. HISTORICAL WATER USE – PROJECT AREA

As discussed above, historical water demand within the project area, starting in approximately 2009, to irrigate approximately 13.6 acres of hops was approximately 36.4 AFY. Groundwater monitoring has occurred in the BVGB since the 1950’s to monitor long-term groundwater trends. Monitoring data is reported by the Lake County Department of Water Resources and the California Statewide Groundwater Monitoring (CASGEM) Program (refer to CASGEM well ID: 39925, located at Lat/Long 38.96535, -122.63186). The monitoring well has a depth of 177 feet bgs (bottom elevation at approximately 1,183 ft per the WCR). Groundwater levels are measured twice annually, approximately every April and November, to visualize the fall drawdown (November) and the spring recharge (April). The spring/fall monitoring data over the period hop crops were cultivated, from 2009 through 2019, are provided in Figure 5. Note that vineyards in the northern portion of BVGB, which cover an area of approximately 450 acres, were well established prior to 2009. There is a very slight decrease in depth to groundwater over the period when groundwater was used to irrigate the hops, indicating the groundwater aquifer was recharging, not being depleted, during this period.

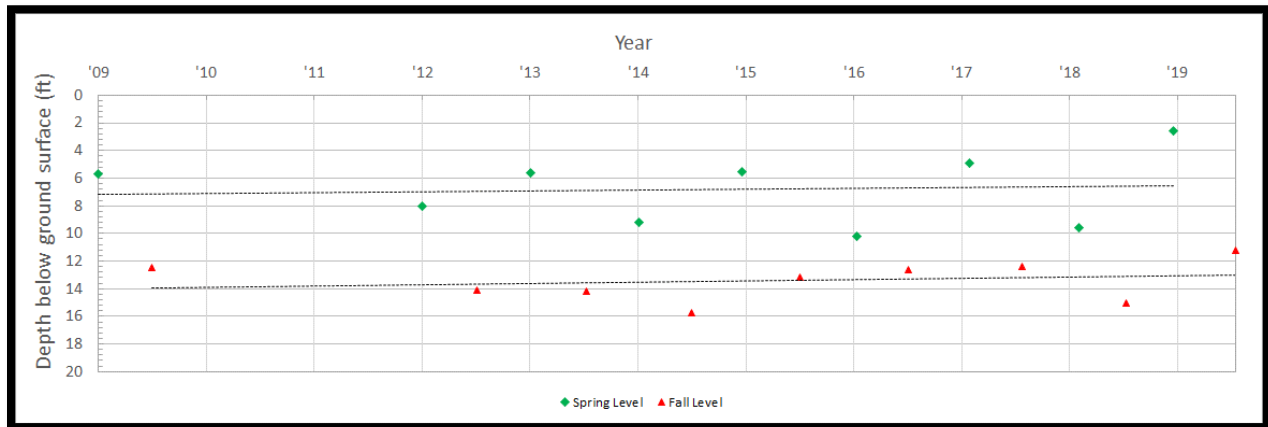


Figure 5. Spring/Fall groundwater levels in the BVGB from 2009 through 2019 (dashed lines represent the trend over the period)

### 6.2. GROUNDWATER USE AND TRENDS IN THE BVGB

Review of Google Earth Imagery shows extensive agricultural development, in the form of walnut/pear orchards and vineyards, in the BVGB since at least 1985. According to the Lake County Water Demand Forecast, the average annual water demand for vineyards and walnut/pear orchards in Lake County is 0.5 acre-feet per acre and 2.2 acre-feet per acre, respectively. Using current Google Earth imagery, there are roughly 450 acres of existing vineyards and 150 acres of orchards in the BVGB. Orchard production in the valley has decreased over time. Accounting for existing vineyards and orchards, the approximate agricultural demand in the valley is about 555 acre-feet per year which is supplied via existing groundwater wells. The estimate of existing agricultural demand of 555 acre-feet per year is likely a high estimate because most of the orchards and some of the vineyards are likely being dry farmed.

The northern residential district of the City of Clearlake relies on groundwater wells as the main source of water. The Highlands Mutual Water Company supplies the majority of residents in the lower part of the BVGB. According to the Lake County Agency Formation Commission 2021 Report on Clearlake Water Providers ([ClearlakeH20 MSR-SOI 2021EDIT-2. cl docx \(lakelafco.org\)](https://www.lakelafco.org/ClearlakeH20%20MSR-SOI%202021EDIT-2.%20cl%20docx)), the Highlands Mutual Water Company serves 6,072 people with water via 2,568 services connections using water drawn from Clear Lake. Approximately 120 residential parcels are not served by HMWC and are assumed to rely on groundwater wells. According to the Environmental Protection Agency (EPA, <https://www.epa.gov/watersense/how-we-use-water>), the average

American family uses 300 gallons of water per day, which equates to an annual demand of 40 acre-feet per year for 120 residences.

The main sources of groundwater in the BVGB are within the Quaternary Alluvium Formation and the Lower Lake Formation. The Quaternary Alluvium dominates the southwestern portion of the BVGB, where both residential development and well development are most dense. The alluvium has a thickness of up to 50 feet; groundwater in this formation is unconfined and typically provides water for domestic use. Wells screened in unconfined aquifers are more directly influenced by lack of rain than those screened in deeper, confined aquifers. The Lower Lake Formation underlies the alluvial deposits in the BVGB. This formation has low permeability and provides water to wells at up to a few hundred gallons per minute and is the dominant source of agricultural water demand in the BVGB. Note that the existing vineyards and the existing and proposed cannabis projects are located outside of the alluvial valley in the northern half of the BVGB.

Well production loss in the Alluvium Formation, within wells screened in the shallower, unconfined aquifer, are more directly influenced by lack of rain and were effected during the drought of 2020 through 2022. It is likely that shallow groundwater in the southern portion of the BVGB is hydrologically coupled to surface water levels in Clear Lake. As a result of the drought, surface water levels in the lake recorded in 2021 and 2022 were the lowest on record since 2000, which would have a direct impact on shallow groundwater well production (Figure 6). Lake levels have recovered with recent rainfall amounts in 2023.

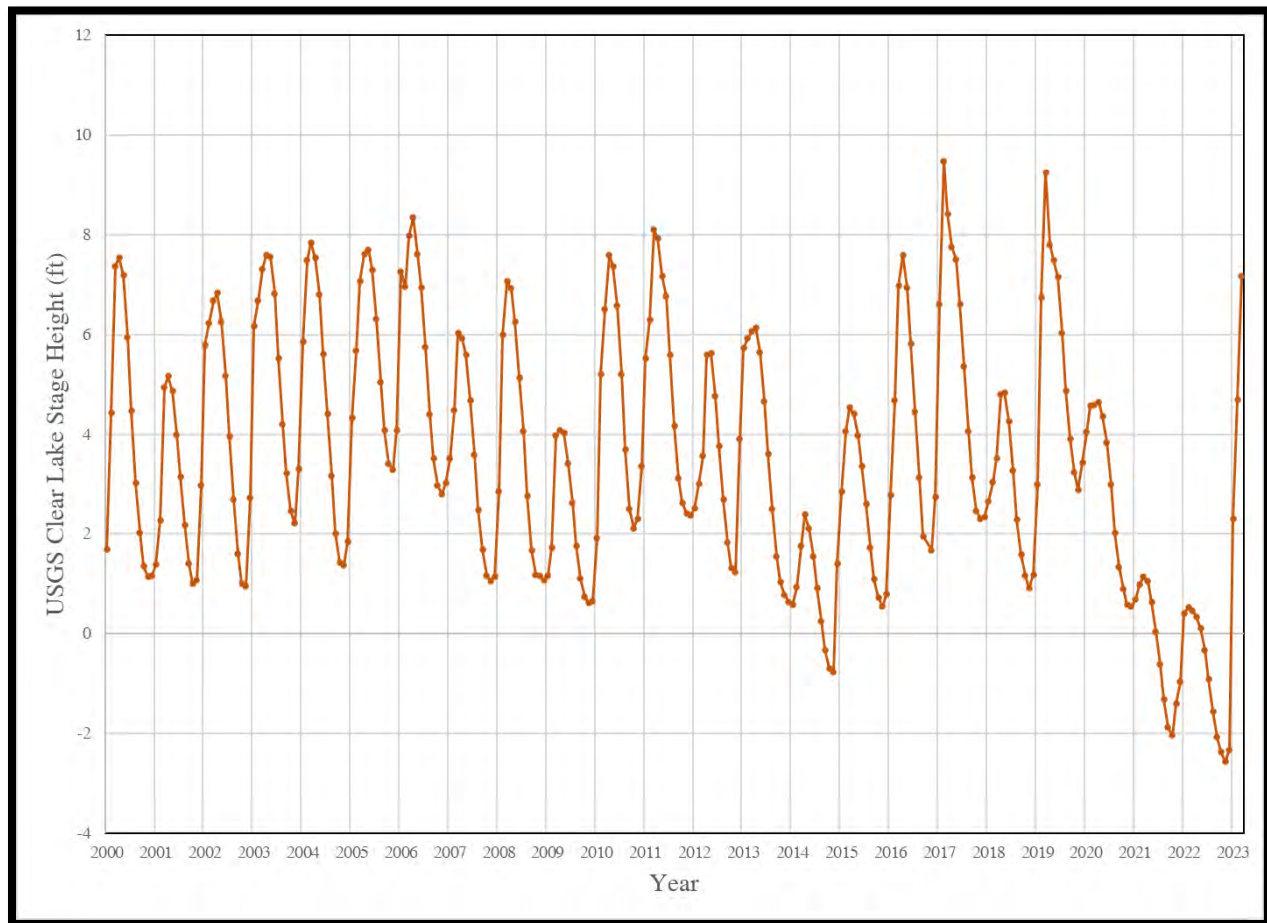


Figure 6. Clear Lake stage height 2000 through early 2023 (USGS Gage 11450000)

### **6.3. FUTURE GROUNDWATER USE**

As discussed above, the current groundwater agricultural demand in the BVGB is roughly 555 acre-feet per year. Approximately 225 acre-feet is from existing vineyards in the upper portion of the BVGB and 330 acre-feet is from orchards located within the lower portion the BVGB. The current residential demand, located in the central portion of the BVGB, is approximately 40 acre-feet per year. A summary of proposed cannabis projects and the approximate annual water demand is provided in Table 9. All the proposed projects are located in the upper portion of the BVGB east of State Highway 53 (Figure 1).

To assess the potential for additional cannabis cultivation within the BVGB, not included in Table 9, a parcel inventory analysis was completed (Figure 7 and Table 10) to identify those parcels that meet requirements for potential cannabis cultivation with an approved permit from Lake County or the City of Clearlake (City).

The Lake County Zoning Ordinance allows 1-acre of outdoor canopy for each 20 acres of parcel size for these zones. There are 40 parcels that are within or intersect the BVGB with a cumulative parcel area of about 1920 acres (total parcel area, not the intersected area, was used for conservativeness). Of these parcels, 10 parcels or 596 acres are existing vineyards and 10 parcels, or 957.1 acres have proposed cultivation shown in Table 9. Excluding these parcels, there are 20 parcels or 367 acres of base zoning that could be eligible for outdoor cultivation with a County permit. Thus, there is the potential for up to 18 acres of potentially new outdoor cultivation (the County allows only 1-acre of cultivation for each 20 acres of parcel area). However, accounting for existing development, steep topography, oak tree areas, waterbody setbacks, flood zones, residential setbacks, and parcel setbacks, there is limited area for development and only approximately 10 acres of new outdoor cultivation would likely be possible. The increased irrigation demand could be up to approximately 20 acre-feet per year assuming 3,560 gallons per day per acre for 180 days.

ORDINANCE 3106 HYDROLOGY REPORT AND DROUGHT MANAGEMENT PLAN  
CLEARPATH CANYON LLC

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Table 9. Approximate water demand of proposed cannabis projects within the BVGB (information obtained from the City of Clearlake and Lake County websites and CEQAnet Database). Refer to Figure 1 for approximate locations.

| Location (jurisdiction)                                    | APN(s)                   | UP #       | Status         | Parcel Area (acres) | Cultivation (Acres) | Approximate Annual Demand (acre-feet) |
|--|--------------------------|------------|----------------|---------------------|---------------------|---------------------------------------|
| 1756 Ogulin Canyon Road (County)                           | 010-055-46               | 19-48      | Expired        | 46.5                | n/a                 | n/a                                   |
| <b>2050 Ogulin Canyon Road (County) (Clearpath Canyon)</b> | <b>010-053-01, 02</b>    | <b>n/a</b> | <b>Pending</b> | <b>302.4</b>        | <b>15.0</b>         | <b>29.8</b>                           |
| 1270 Highway 53 (County)                                   | 010-055-26, 27           | 19-49      | Approved       | 105.6               | 5.0                 | 5.5                                   |
| 1020 Junction Plaza (County)                               | 010-055-45               | 19-39      | Approved       | 49.5                | 1.7                 | 3.3                                   |
| 1850 Ogulin Canyon Road (County)                           | 010-053-03<br>010-011-01 | 20-47      | Approved       | Not in BVGB         |                     |                                       |
| 19073 E State Highway 20 (County)                          | 010-009-21               | 21-12      | Pending        | Not in BVGB         |                     |                                       |
| 1100 Highway 53 (County)                                   | 010-055-39, 40,<br>41    | 20-56      | Pending        | 288.4               | 14                  | 27.5                                  |
| 3000 Highway 53 (County)                                   | 010-053-28               | 21-39      | Pending        | 164.7               | 8                   | 15.7                                  |
| 2185 Ogulin Canyon Road (City)                             | 010-044-17               | n/a        | Approved       | 21.3                | 0.5                 | 1.8                                   |
| 2160 Ogulin Canyon Road (City)                             | 010-044-21               | n/a        | Approved       | 9.6                 | 0                   | n/a                                   |
| 2560 Highway 53 (City)                                     | 010-048-05               | n/a        | Approved       | 15.4                | 1.3                 | 4.3                                   |
| 2250 Ogulin Canyon Road (City)                             | 010-044-19               | n/a        | Approved       | 13.0                | 0.4                 | 1.6                                   |
| <b>Total</b>   |                          |            |                |                     | <b>45.9</b>         | <b>89.5</b>                           |

Table 10. Base zones designations, total areas associated with each base zone designation, parcel count, and base zone eligibility for potential cannabis cultivation within the BVGB.

| Zone  | Description                                   | Total Parcel Area (acres)* | # of Parcels |
|-------|---|----------------------------|--------------|
| RL    | Rural Lands                                   | 1105.9                     | 18           |
| RR    | Rural Residential                             | 677.3                      | 18           |
| Split | Combined Zoning (Dominant Zones are A and RL) | 136.5                      | 4            |
| City  | Cannabis District                             | 242                        | 23           |

\*This is the total area of the parcel, not just the portion within the BVGB

The City of Clearlake Zoning Ordinance allows for mixed-light/indoor cultivation in the BVGB, with a City Cannabis Permit, on 23 parcels with a total area of 242 acres. Accounting for the proposed projects listed in Table 9, existing development, steep topography, waterbody setbacks, and flood zones, only approximately 18

to 20 acres of this area could have the potential for mixed-light/indoor cultivation. The increased irrigation demand could be up to approximately 65.6 acre-feet assuming 3,560 gallons per day per acre for 300 days.

The total potential demand from both the County and City for cannabis cultivation could be up to 175.1 acre-feet per year, which includes the proposed projects listed in Table 9 and a conservative (high) estimate of total potential cultivation. This does not account for the fact that the project at 2050 Ogulin Canyon Road is replacing a 13.6-acre hops farm that utilized approximately 36.4 acre-feet per year of water, creating a **reduction** in water use of 6.9 acre-feet per year over the project area.

Thus, the total potential agricultural demand within the BVGB is the existing demand of approximately 555 acre-feet, plus proposed, 175.1 acre-feet, is approximately 730.1 acre-feet per year, with residential demand, the total groundwater demand is approximately 770.1 acre-feet per year. The dominant demand in the BVGB is associated with residential development and orchards in the lower part of BVGB and vineyards in the upper part of the BVGB.

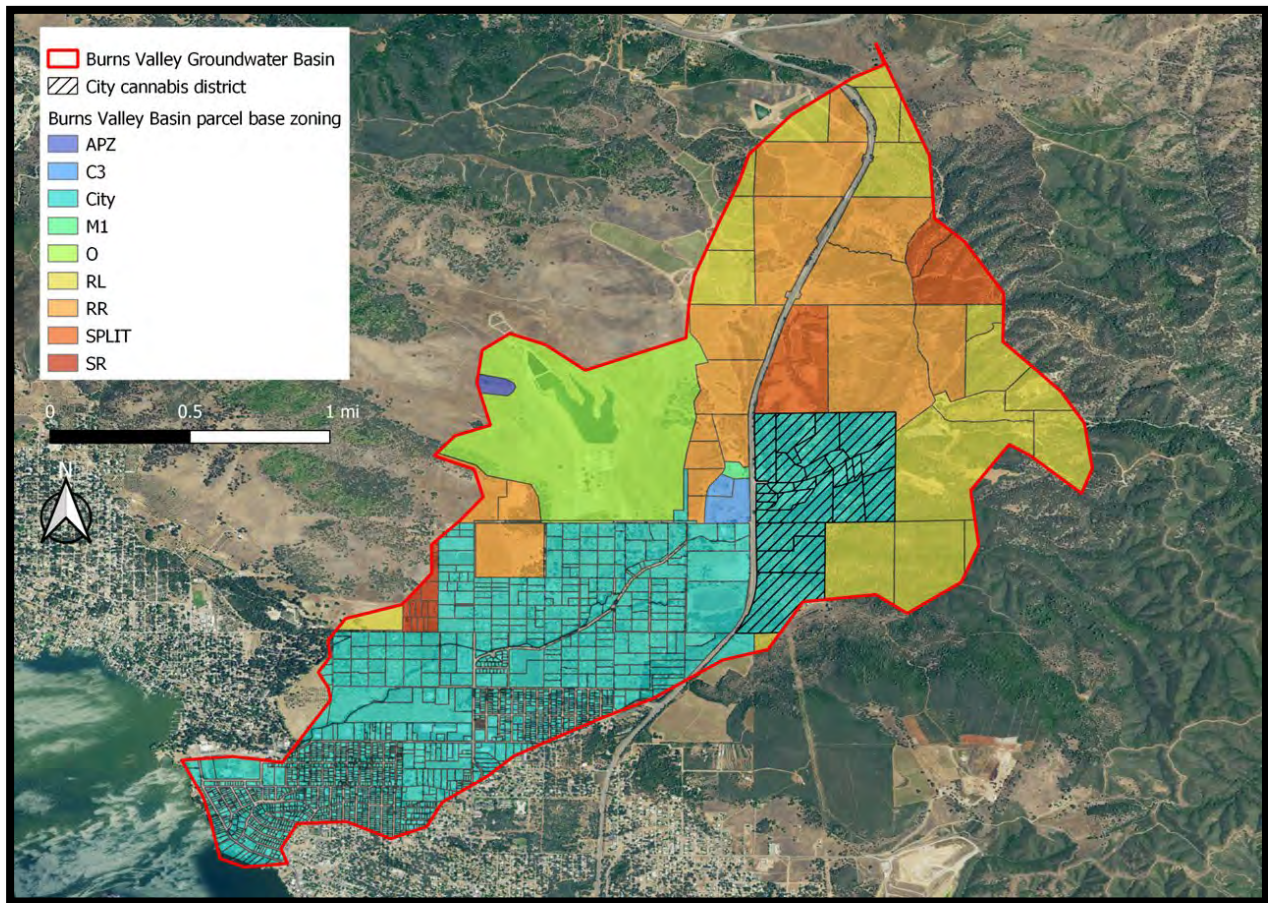


Figure 7. City of Clearlake Cannabis District and Lake County parcel base zoning designations.

#### 6.4. SURROUNDING WELLS

The project is located in a rural area, northeast of Clearlake. WCR's maintained by the California Department of Water Resources (DWR) on the Well Completion Report Map Application were reviewed (Figure 8, Figure 9, Appendix D). Wells are mapped by Public Land Survey System (PLSS) grid section and within a 1-mile radius of the project site. There are a total of twenty-four (24) wells (including the project wells) within the PLSS

sections for which the project wells are located (Figure 9). The overall average depth and yield of these wells is 252 ft and 85 gpm, respectively. The five (5) closest neighboring, offsite wells within the BVGB are shown in Figure 10.

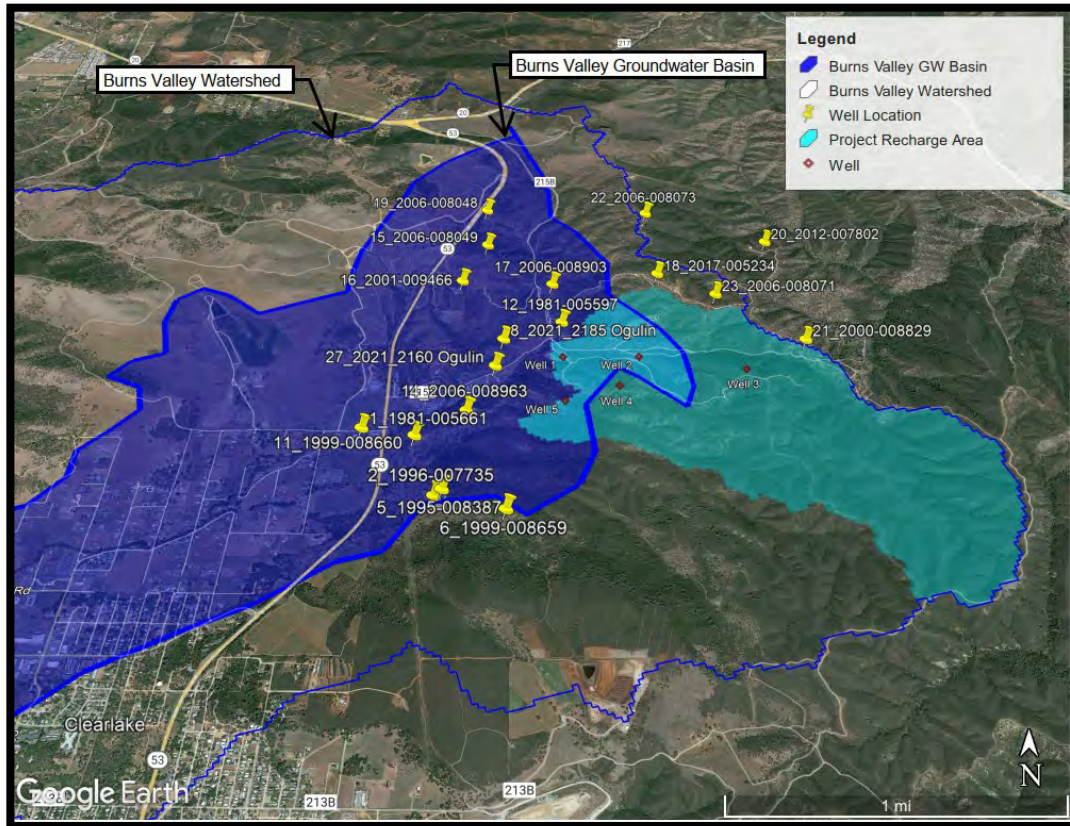


Figure 8. Groundwater wells in PLSS Sections surrounding the project’s wells (Appendix D).

### 6.5. PROJECT WELLS

The maximum daily demand is 73,425 gallons, which occurs during about 35% of the cultivation season (approximately 117 days). The pumping rate to replace the maximum daily demand in 12-hours is 20.4 gpm from each well. The pump tests conducted in February 2022 demonstrated that, after pumping 38 gpm for 4 hours, each of the wells tested recovered before 24 hours. The proposed storage represents 3-days of the maximum daily demand, providing sufficient recovery time for each well.

A radius of influence evaluation was conducted on the project wells using the Theis equation. The Theis equation was developed to model the response of a confined aquifer to pumping (Fetter, 2001). Using the Theis equation, the drawdown at a specific distance from each well can be estimated based on the project’s maximum daily pumping demand, 20.4 gpm, over a duration of 12 hours. The drawdown was used to estimate the specific capacity (SC) and transmissivity (T) for a confined aquifer as follows:

$$SC \text{ (gpm/ft)} = \text{Well Yield (gpm)} \div \text{Drawdown (ft)}$$

$$T \text{ (gpd/ft)} = 2000 \times SC \text{ (gpm/ft)} \quad [\text{Confined Aquifer, Source: Driscoll, 1986}]$$

The drawdown from the project's wells after 12-hours of pumping at 20.4 gpm, for various distances from each well, is provided in Figure 11. Calculations are provided in Appendix G. The radius of influence is estimated to be less than 700 feet based, which is the distance where the modeled cone of depression from groundwater extraction under these conditions is negligible (less than 6-inches). None of the nearby wells are within the modeled cone of depression. In addition, since the project proposes 230,000 gallons of storage, which is approximately 3 to 5 days of water storage, each well would have approximately one (1) to two (2) days to recover, depending on the pumping and irrigation schedule.

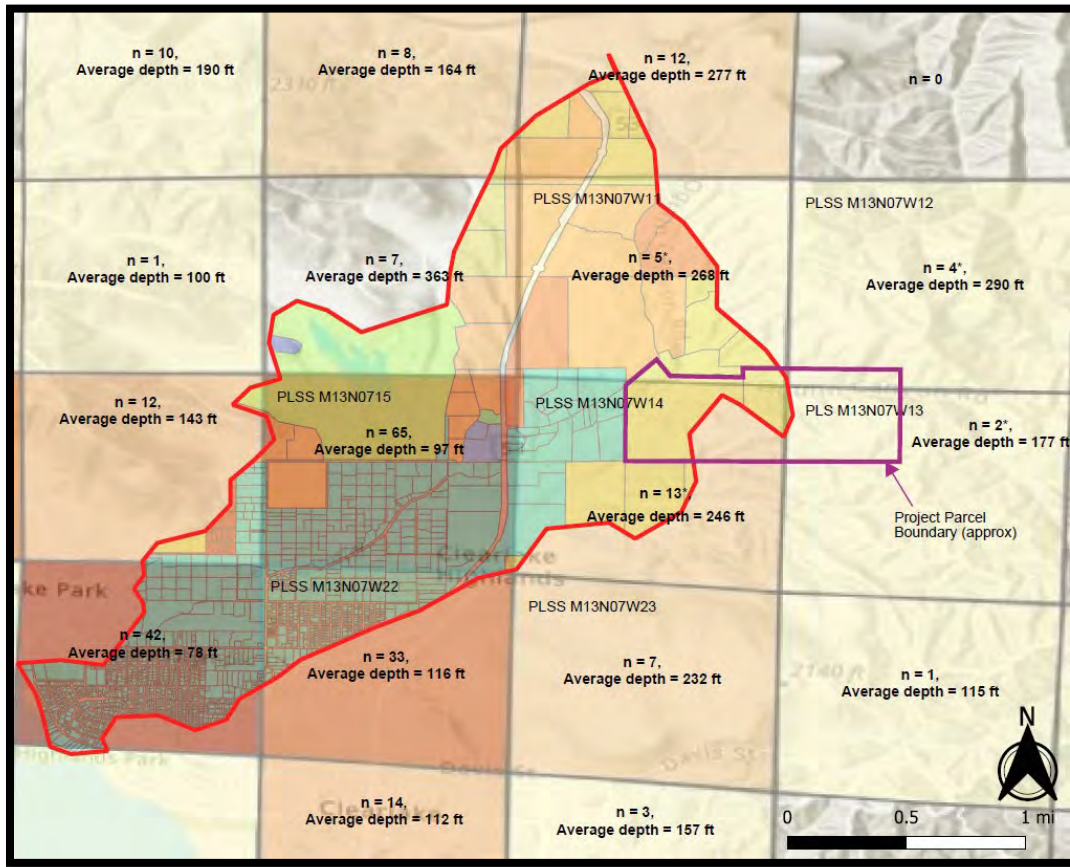


Figure 9. Map of # (n) of WCRs within each PLSS section and average well depth. The BVGB is outlined in red. (\*used updated WCRs)

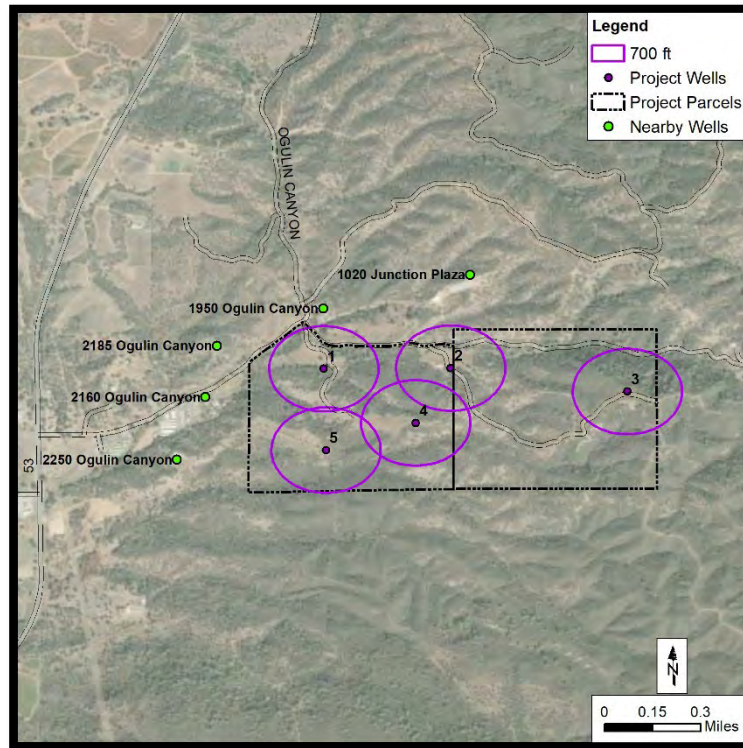


Figure 10. Wells in the vicinity of the project's wells with 700-foot radius of influence shown.

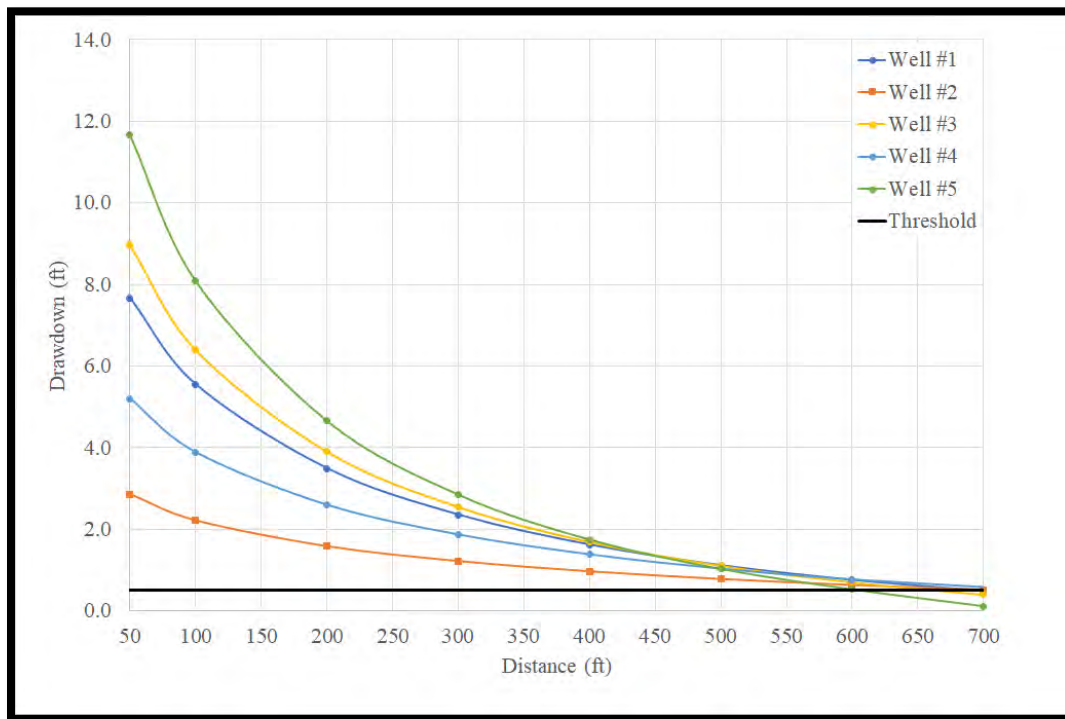


Figure 11. Estimated radius of influence (distance) associated with the project's wells (Threshold = 6-inches).

## 6.1. SURFACE WATER

The closest surface water body, Burns Valley Creek, is an ephemeral/intermittent stream in the vicinity of the project and is located approximately 700 feet west of Well #1 and approximately 320 feet north of Well #2. The elevation of Burns Valley Creek ranges between approximately 1,520 ft at the upper end of the project parcels and 1,420 ft as it leaves the project parcels. The project wells extract water from the confined Cache Formation water bearing unit, at elevations well below Burns Valley Creek and are not likely hydrologically connected to the creek. (Table 7, Figure 12)

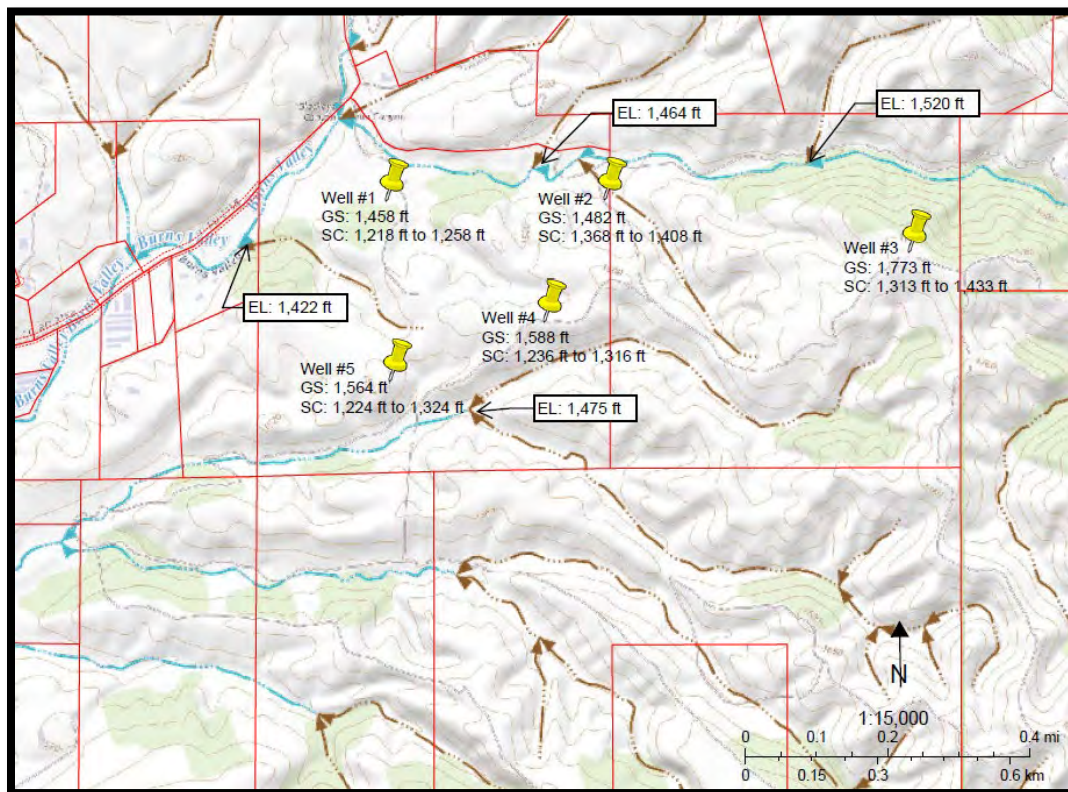


Figure 12. Screened well interval (SC) elevations (Table 7) compared to ground (GE) and surface water (EL) elevations.

## 7. OPERATIONAL WATER MONITORING, CONSERVATION MEASURES, AND DROUGHT MANAGEMENT

### 7.1. STANDARD OPERATIONAL MEASURES

Standard operational procedures are recommended, regardless of whether the project is in an area experiencing drought conditions, including ongoing water monitoring and conservation measures that would reduce the overall use of water. These measures should be incorporated into the Water Use section of the project's Property Management Plan. Water Use includes information on water sources and metering, estimated water use, water conservation, and the irrigation system. Recommended on-going water conservation measures include, but may not be limited to, the following:

- No surface water diversion;
- Selection of plant varieties that are suitable for the climate of the region;
- The use of drip irrigation (instead of spray irrigation);
- Cover drip lines with straw mulch or similar to reduce evaporation;
- Water application rates modified from data from soil moisture meters and weather monitoring;
- Shutoff valves on hoses and water pipes;
- Daily visual inspections of irrigation systems;
- Immediate repair of leaking or malfunctioning equipment; and
- Water use metering and budgeting.

In addition to water use metering, water level monitoring is also required by the Lake County Zoning Ordinance. Ordinance Article 27 Section 27.11(at) 3.v.e. requires the wells to have a meter to measure the amount of water pumped as well as a water level monitor. In addition to the above measures, well water level monitoring and reporting shall be performed as follows:

Seasonal Static Water Level Monitoring: The purpose of seasonal monitoring of the water level in the wells is to provide information regarding long-term groundwater elevation trends. It is recommended that the water level in the wells be measured and recorded once in the Spring (March/April), before cultivation activities begin, and once in the fall (October) after cultivation is complete. (note: The California Statewide Groundwater Monitoring Program (CASGEM) monitors semi-annually around April 15 and October 15). Records shall be kept, and elevations reported to the County as part of the project's annual reporting requirements. Reporting shall include a hydrograph plot of all seasonal water level measurements to-date, beginning with the initial measurement. Seasonal water level trends will aid in the evaluation of the recharge rate of the well. For example, if the water level measured during the Spring remains relatively constant from year to year, then the water source is recharging each year.

Water Level Monitoring During Extraction: The purpose of monitoring the water level in the Project Well during extraction is to evaluate the performance of the wells to determine the effect of the pumping rate on the water source during each cultivation season. This information shall be used to determine the capacity and yield of the well to aid the cultivators in determining pump rates and the need for water storage. The frequency of water level monitoring will depend on the source, the source's capacity, and the pumping rate. It is recommended that initially the water level be monitored twice per week or more, and that the frequency be adjusted as needed depending on the impact the pumping rate has on well water levels. Records shall be kept, and elevations reported to the County as part of the project's annual reporting requirements. Reporting shall include a hydrograph plot of the water level measurements during the cultivation season and compared to prior seasons.

Measuring a water level in a well can be difficult and the level of difficulty will depend on site-specific conditions. As part of the well monitoring program, the well owner/operator shall work with a well expert to determine the appropriate methodology and equipment to measure the water level in their well(s) as well as who will conduct the monitoring and recording of the well level data. The methodology of the well monitoring program shall be described and provided in the project's annual report to the County.

The groundwater level monitoring protocol is recommended to provide a framework for the early detection and response if there is groundwater depletion or inadequate recharge. Thus, in addition to monitoring and reporting, an analysis of the water level monitoring data shall be provided and included in the project's annual report, demonstrating whether use of the well is causing significant drawdown and/or impacts to the surrounding area and what measures were taken to reduce impacts. If there are impacts, a revised Water Management Plan, including a revised water budget, shall be prepared and submitted to the County, for review and approval, demonstrating how the project will operate and mitigate the impacts in the future, including changes in operation, if necessary.

## 7.2. DROUGHT MANAGEMENT/EMERGENCY WATER CONSERVATION MEASURES

Drought can reduce both water availability and water quality necessary for productive farming, ranches, and grazing lands, resulting in significant negative direct and indirect economic impacts to the farm. As discussed above, recommended project monitoring will help detect if seasonal groundwater depletion is occurring, which is especially important during periods of drought. In addition, project reporting requires a revised Water Management Plan that demonstrates how the project will operate to address groundwater depletion.

To plan and prepare for drought conditions, the project will follow recommendations for monitoring, planning, and preparedness provided by the National Integrated Drought Information System - <https://www.drought.gov/sectors/agriculture>.

In addition to the above ongoing conservation measures, water metering, and reporting, during times of drought emergencies or water scarcity, the project will implement the following additional measures, as needed or appropriate to the site, to reduce water use and ensure both success and decreased impacts to surrounding areas:

- Install additional water storage and/or implement a rainwater catchment system;
- Install moisture meters to monitor how much water is in the soil at the root level and reduce watering to only what is needed to avoid excess;
- Cover the soil and drip-lines with removable plastic covers or similar to reduce evaporation;
- Irrigate only in the early morning hours or before sunset;
- Cover plants with shaded meshes during peak summer heat to reduce plant water needs; and/or
- Use a growing medium that retains water in a way to conserve water and aid plant growth. Organic soil ingredients like peat moss, coco coir, compost and other substances like perlite and vermiculite retain water and provide a good environment for cannabis to grow.

In the event the well cannot supply the water needed for the project, the following measures may be taken:

- Reduce the amount of cultivation and/or length of cultivation season;
  - The amount of cultivation would be determined based on available water
  - Early crop harvest, if water becomes limited
- Install additional storage and/or implement a rainwater catchment system, installation of a rainwater catchment pond could provide additional storage and catchment area if the existing groundwater source becomes depleted; and/or
- If possible, develop an alternative, legal, water source that meets the requirements of Lake County Codes and Ordinances.

## 8. SUMMARY AND CONCLUSIONS

The project property has five existing groundwater wells, strategically located adjacent to each proposed cultivation area. Well information is summarized in Table 2,

- Table 3, and Table 7. The total combined well yields, reported on the WCRs, is 720 gpm or 1,161 AFY. Pump tests conducted in 2022 on three of the wells confirmed yields of at least 38 gpm, using a rate of 38 gpm for all five wells, would result in an annual yield of 307 AF.
- The historical demand, including historical hops cultivation, was 36.7 AFY. The proposed project water demand, including the projected residential use, is 29.8 AFY, which is 6.9 AFY less than historical use. The maximum daily demand, 73,425 gpd, would occur during the flowering period, approximately 63 days out of an approximate 180-day cultivation season. The remainder of the season, the daily demand is approximately 53,470 gpd. The overall project demand is 2.5% of the overall project well yield.

- The project proposes a minimum of 3-days of storage at each cultivation site, totaling 230,000 gallons of storage.
- According to the geologic logs from the project's WCRs, the water bearing unit of the wells is comprised primarily of green stone, which is consistent with the Cache Formation water bearing unit. Wells drilled in this formation have yields up to 450 gpm.
- The long-term average recharge, based on the most conservative estimates presented herein (based on 10% of precipitation per USGS Fact Sheet 2007-3007), is approximately 46.1 AFY and 145.1 AFY over the project site (302.5 acres) and the contributing recharge area (953 acres), respectively. Both of which are sufficient to meet the project's demand.
- The average recharge over the project parcel and 953-acre recharge area, based on 10% of the precipitation, over the last 23 years was 68.4 AFY and 215.4 AFY, respectively. Both of which are sufficient to meet the project's demand.
- The estimated groundwater storage beneath the project parcels, over an area of 302.5 acres, is 34.1 AF. The project's groundwater supply, both recharge and storage, is sufficient to meet the project's demand.
- The estimated storage capacity of the alluvial formation of BVGB is 4,000 AF, with a usable storage capacity of 1,400 AF. However, the deeper Cache Formation, from which the project draws water, has between 50,000 and 75,000 acre-feet of storage. The long-term average recharge over the BVGB is 1,218 AFY.
- The total potential agricultural demand within the BVGB is the existing demand of approximately 555 acre-feet, plus proposed, 175.1 acre-feet, is approximately 730.1 acre-feet per year, with residential demand, the total groundwater demand is approximately 770.1 acre-feet per year. The dominant demand in the BVGB is associated with residential development and orchards in the lower part of BVGB and vineyards in the upper part of the BVGB. The long-term average recharge, including drought years, is sufficient to meet this demand. In addition, the projected demand represents only 19% of the BVGB alluvial storage and less than 2% of the deeper Cache Formation storage.
- The project area and surrounding area has had a historical use of vineyard and hops irrigation demand.
- Historical water demand within the project area, starting in approximately 2009, to irrigate approximately 13.6 acres of hops was approximately 36.4 AFY. Groundwater monitoring was conducted during this period by monitoring groundwater levels twice annually, approximately every April and November, to visualize the fall drawdown (November) and the spring recharge (April). The spring/fall monitoring data over the period hop crops were cultivated, from 2009 through 2019, are provided in Figure 5. Note that vineyards in the northern portion of BVGB, which cover an area of approximately 450 acres, were well established prior to 2009. There is a very slight decrease in depth to groundwater over the period when groundwater was used to irrigate the hops, indicating the groundwater aquifer was recharging, not being depleted, during this period. The proposed water use for cannabis cultivation would be 6.9 AFY less than that historically used for hops, this is in addition to 230,000 gallons of water storage for cannabis operations.
- There are 24 wells within a 1-mile radius of the project site. The overall average depth and yield of these wells is 252 ft and 85 gpm, respectively.
- Drawdown was estimated using the Theis equation. The radius of influence is estimated to be less than 700 feet based, which is the distance where the modeled cone of depression from groundwater extraction under these conditions is negligible. None of the nearby wells are within the modeled cone of depression. In addition, since the project proposes 230,000 gallons of storage, which is approximately 3 to 5 days of water storage, each well would have approximately one (1) to two (2) days to recover, depending on the pumping and irrigation schedule.
- The project wells extract water from the confined Cache Formation water bearing unit, at elevations well below Burns Valley Creek and are not likely hydrologically connected to the creek.

Since the recorded and tested yields of the project's wells are much greater than the project's demand; the project proposes at least three (3) of water storage; the long-term average annual recharge exceeds the project's annual demand; the aquifer storage below the project area and within the overall aquifer is sufficient to meet the project's demand and cumulative future basin demand, the project is required to comply with the County's groundwater monitoring and reporting requirements, the potential drawdown due to the project is unlikely to result in appreciable drawdown of off-site wells, and the project wells are not likely hydrologically connected to Burns Valley Creek; the project would have sufficient water and would not have a significant impact on the surrounding area.

## 9. LIMITATIONS

The study of groundwater hydrology is very complex and often relies on limited data, especially in rural areas. Recommendations and conclusions provided herein are based on professional judgment made using information of the groundwater systems and geology in Lake County, which is limited and allows only for a general assessment of groundwater aquifer conditions and recharge. NorthPoint Consulting Group, Inc. is making analyses, recommendations, and conclusions based on readily available data, including studies and reports conducted by other professionals, Lake County, the State of California, and other consultants hired by the project proponent to prepare technical studies for the proposed project. If additional information or data becomes available for the project area, the recommendations and conclusions presented herein may be subject to change.

## 10. REFERENCES

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ORDINANCE 3106 HYDROLOGY REPORT AND DROUGHT MANAGEMENT PLAN  
CLEARPATH CANYON LLC

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## **APPENDIX A: SITE PLANS**

# CLEARPATH CANYON LLC

## MAJOR USE PERMIT

APN: 010-053-01 & 010-053-02



**VICINITY MAP**  
NOT TO SCALE

**DIRECTIONS TO SITE:**

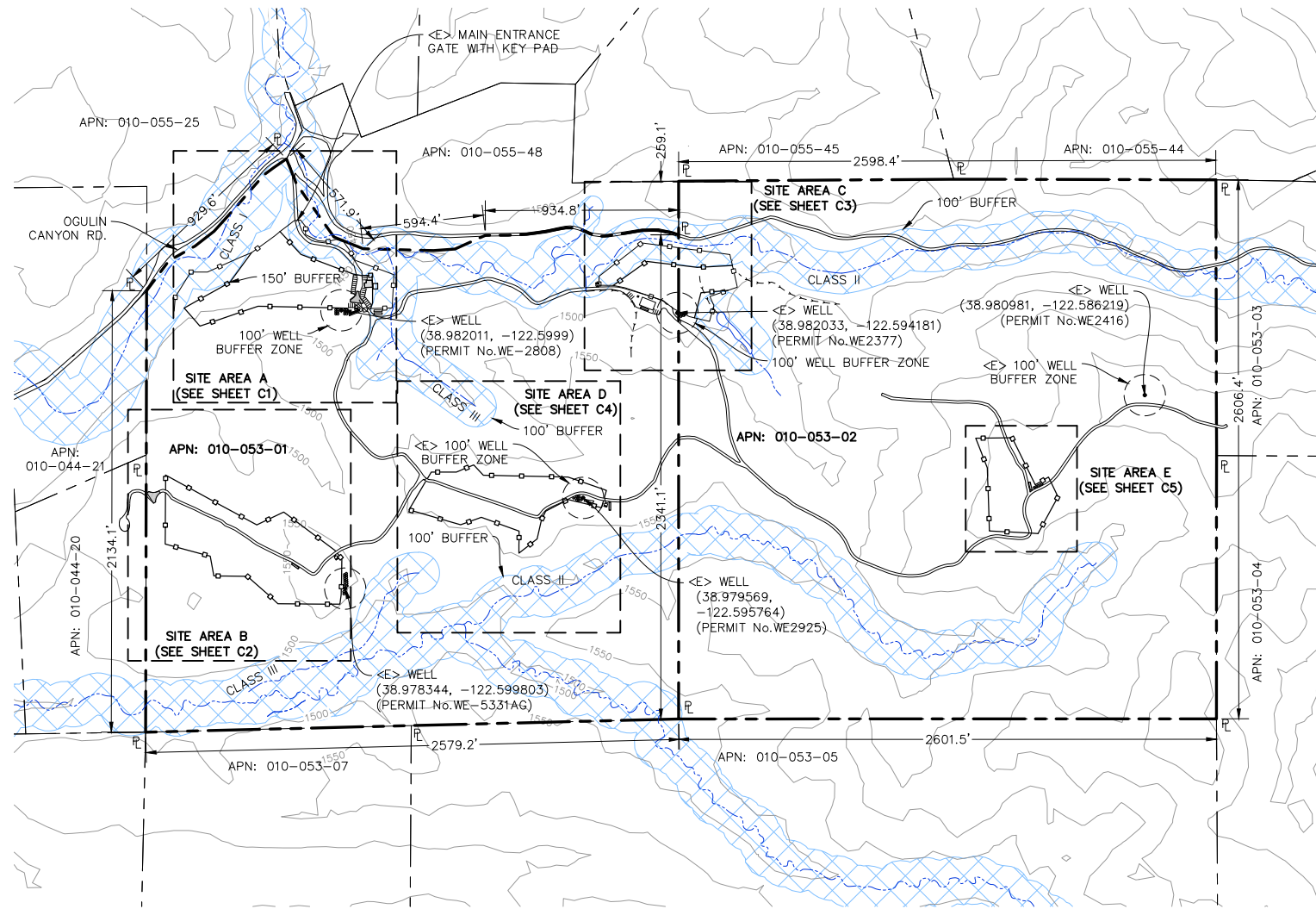
- FROM CLEARLAKE, CA
- TAKE CA-53 N (0.8 MI)
- TURN RIGHT ONTO OGULIN CANYON RD. (0.8 MI)
- TURN RIGHT ONTO UNNAMED ROAD (0.3 MI)

**PROJECT DESCRIPTION:**

THE PROPOSED PROJECT IS TO PERMIT COMMERCIAL CANNABIS CULTIVATION IN ACCORDANCE WITH THE LAKE COUNTY ZONING ORDINANCE (ARTICLE 27). THE PROPOSAL IS FOR A TOTAL OF 653,400 SQ. FT. (15 ACRES) OF OUTDOOR CANOPY AREA AND A TYPE 13 SELF-DISTRIBUTION. THE PROJECT PROPOSES 15-ACRES OF OUTDOOR CANNABIS CULTIVATION. THE PROPOSAL INCLUDES THE DEVELOPMENT OF FACILITIES APPURTENANT TO OUTDOOR CANNABIS CULTIVATION, INCLUDING FACILITIES FOR DRYING AND CURING OF HARVESTED CANNABIS, ANCILLARY NURSERY, STORAGE SHEDS, AND IRRIGATION INFRASTRUCTURE.

**GENERAL NOTES:**

- DRAWING SCALE AS NOTED. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
- THIS IS NOT A BOUNDARY SURVEY. BOUNDARY INFORMATION DEPICTED HAS BEEN OBTAINED FROM LAKE COUNTY 2015 GIS DATA. NORTHPOINT CONSULTING GROUP, INC. HAS NOT VERIFIED THIS PROPERTY BOUNDARY.
- THERE ARE NO NEARBY SCHOOLS, SCHOOL BUS STOPS, PLACES OF WORSHIP, PUBLIC PARKS OR TRIBAL RESOURCES WITHIN 1,000 FEET OF THE PROPOSED CULTIVATION AREA.
- THERE ARE NO RESIDENCES ON ADJOINING PARCELS WITHIN 200 FEET OF THE PROPOSED CULTIVATION AREAS.
- ANY EXISTING DEVELOPMENT CONSTRUCTED WITHOUT THE BENEFIT OF COUNTY REVIEW WILL BE SUBJECT TO THE LAKE COUNTY BUILDING DEPARTMENT UPON APPROVAL OF THE USE PERMIT.
- THE PROJECT SITE IS W/IN 1,000 FEET OF THE CITY OF CLEARLAKE SPHERE OF INFLUENCE. CANNABIS CULTIVATION IS PROHIBITED WITHIN 1,000 FEET OF AN INCORPORATED CITY SPHERE OF INFLUENCE UNLESS THE APPLICANT CAN PROVIDE A LETTER OF SUPPORT FROM THE CITY. A LETTER OF SUPPORT HAS BEEN OBTAINED FROM THE CITY.
- POWER SOURCE: THE PROPOSED PROJECT WOULD USE A COMBINATION OF EXISTING POWER SUPPLIED BY PG&E AND SOLAR POWER. THE OUTDOOR CULTIVATION AREAS WOULD HAVE MINIMAL NEED FOR POWER. THE PROPOSED ANCILLARY NURSERY AND ANCILLARY DRYING WOULD REQUIRE POWER FOR LIGHTING AND CLIMATE CONTROL. OTHER USES THAT WOULD REQUIRE POWER INCLUDE THE SECURITY SYSTEM, SECURITY LIGHTING, AND WELL PUMPS. NO GENERATORS ARE PROPOSED, EXCEPT FOR BACKUP POWER DURING POWER OUTAGES OR AN EMERGENCY. A POWER UPGRADE IS NOT NEEDED FOR OPERATIONS, THE EXISTING PG&E SERVICE IS SUFFICIENT.



**PLOT PLAN**

22x34 SHEET: 1"=400'  
11x17 SHEET: 1"=800'



**PROJECT INFORMATION:**

**APPLICANT:**  
CLEARPATH CANYON LLC  
637 LINDARO STREET, SUITE 201  
SAN RAFAEL, CA 94901-6027

**PROPERTY OWNER:**  
CLEARPATH CANYON LLC  
637 LINDARO STREET, SUITE 201  
SAN RAFAEL, CA 94901-6027

**APPLICANTS AGENT:**  
NORTHPOINT CONSULTING GROUP, INC  
1117 SAMOA BLVD.  
ARCATA, CA 95521  
(707) 798-6438

**SITE ADDRESS:**  
APN: 010-053-01 & 010-053-02  
2050/2122 OGULIN CANYON ROAD,  
CLEARLAKE CA 95422

WATER = PRIVATE  
SEWER = PRIVATE

PROPERTY SIZE  
APN: 010-053-01 = ±145.81 ACRES  
APN: 010-053-02 = ±156.64 ACRES  
TOTAL = ±302.45 ACRES

ZONING = RL-WW  
GENERAL PLAN DESIGNATION = RL

**SHEET INDEX:**

- C0 - PLOT PLAN, VICINITY MAP, & PROJECT NOTES
- C1 - SITE "A" DETAILED AREA
- C2 - SITE "B" DETAILED AREA
- C3 - SITE "C" DETAILED AREA
- C4 - SITE "D" DETAILED AREA
- C5 - SITE "E" DETAILED AREA
- C6 - SECURITY PLAN
- C7 - STRUCTURE ELEVATIONS

|           |  |
|-----------|--|
| DATE      |  |
| REVISIONS |  |

**NORTHPOINT CONSULTING GROUP, INC.**  
1117 Samoa Blvd., Arcata, CA 95521

CLEARPATH CANYON LLC  
APN: 010-053-01 & 010-053-02  
PLOT PLAN, VICINITY MAP & PROJECT NOTES

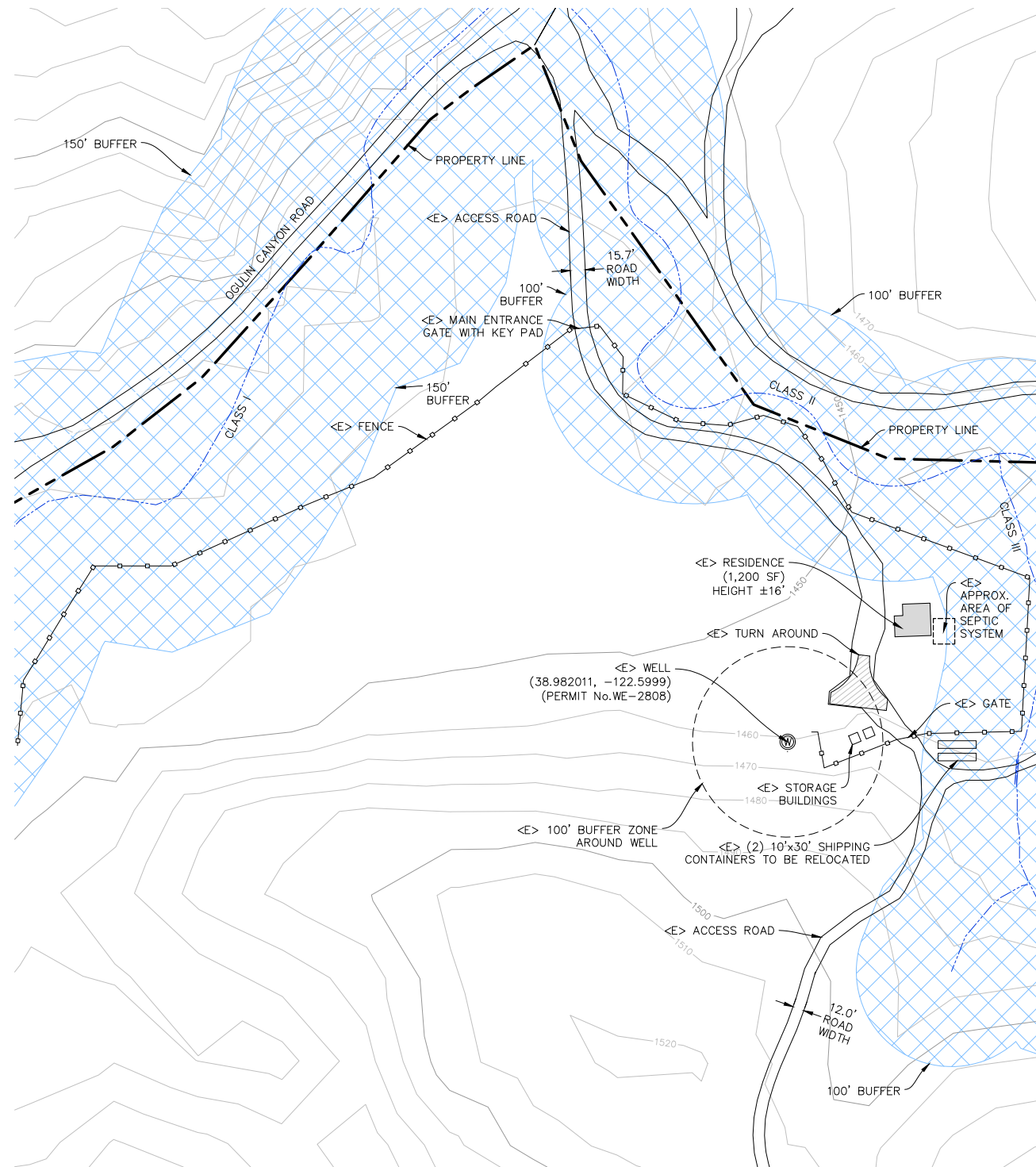
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|------------|----------|
| PROJ. MGR: | AD       |
| DRAWN BY:  | LJM      |
| DATE:      | 11/17/23 |
| SCALE:     | AS SHOWN |
| SHEET      | C0       |
| 20-098     |          |

November 20, 2023 - 11:45 Desi Neme, P.E., Richard Kopal, Consultant - Lake Vista Farms - 20-098/CAD/CLEARPATH CANYON LLC - MAJOR USE PERMIT.dwg Updated By: ToriSwit

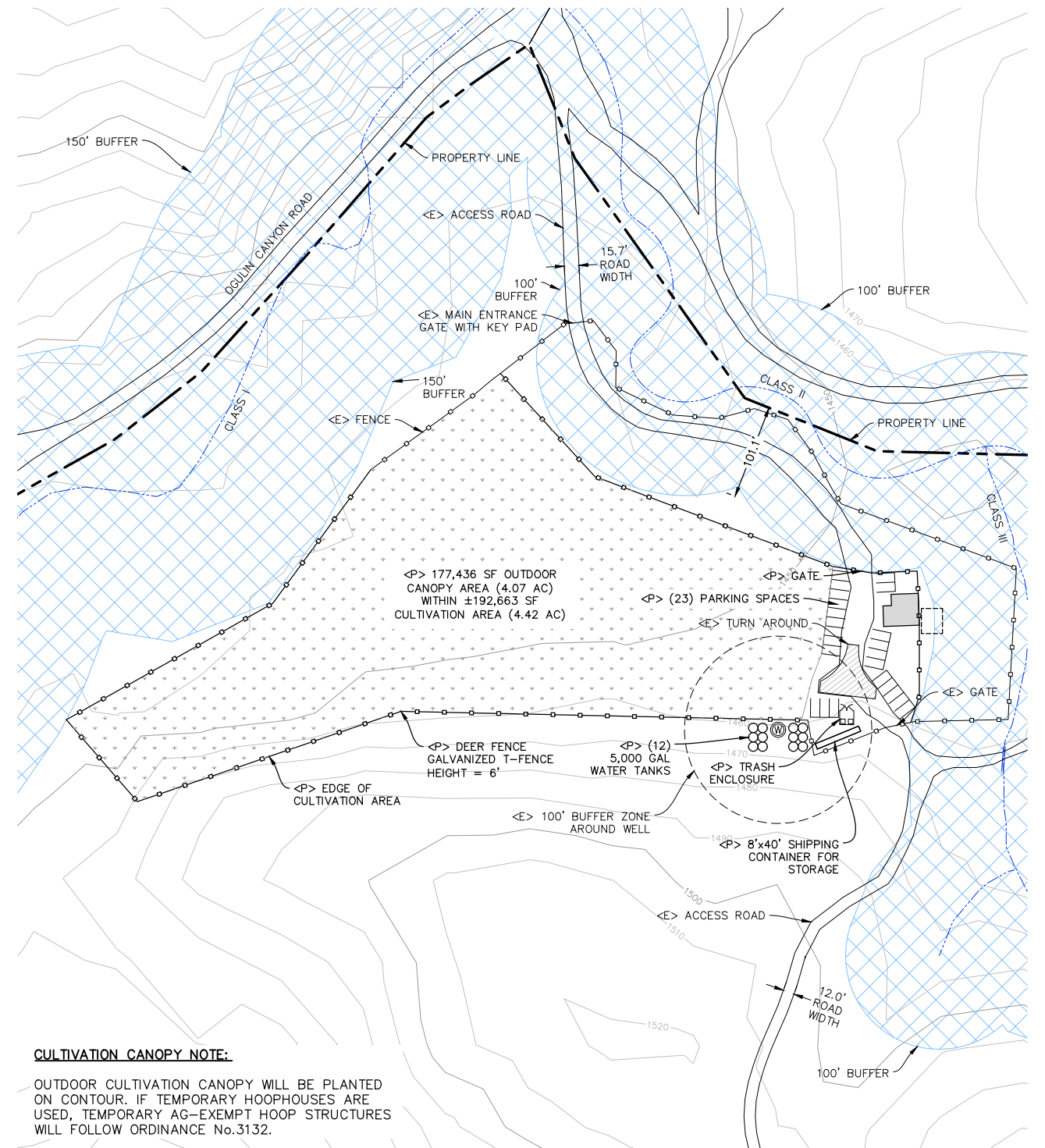
# CLEARPATH CANYON LLC

## SITE 'A' DETAILED AREA

APN: 010-053-01 & 010-053-02



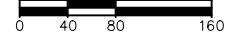
**EXISTING SITE PLAN**



**PROPOSED SITE PLAN**

**CULTIVATION CANOPY NOTE:**  
 OUTDOOR CULTIVATION CANOPY WILL BE PLANTED ON CONTOUR. IF TEMPORARY HOOPHOUSES ARE USED, TEMPORARY AG-EXEMPT HOOP STRUCTURES WILL FOLLOW ORDINANCE No.3132.

22x34 SHEET: 1"=80'  
 11x17 SHEET: 1"=160'



□ - OUTDOOR CANOPY AREA

November 20, 2023 - 11:45 Desi Name: P:\Richard\_Koal\_Consulting - Loka\_Vita\_Farms - 20-098\CAD\CLEARPATH\_CANYON LLC - MAJOR USE PERMIT.dwg Updated By: ToriSwitt

|           |  |
|-----------|--|
| DATE      |  |
| REVISIONS |  |

**NORTHPOINT CONSULTING GROUP, INC.**  
 1117 Samoa Blvd., Arcata, CA 95521

CLEARPATH CANYON LLC  
 APN:010-053-01 & 010-053-02  
 SITE 'A' DETAILED AREA

PROJ. MGR.: AD  
 DRAWN BY: LJM  
 DATE: 11/17/23  
 SCALE: AS SHOWN

SHEET  
**C1**  
 20-098



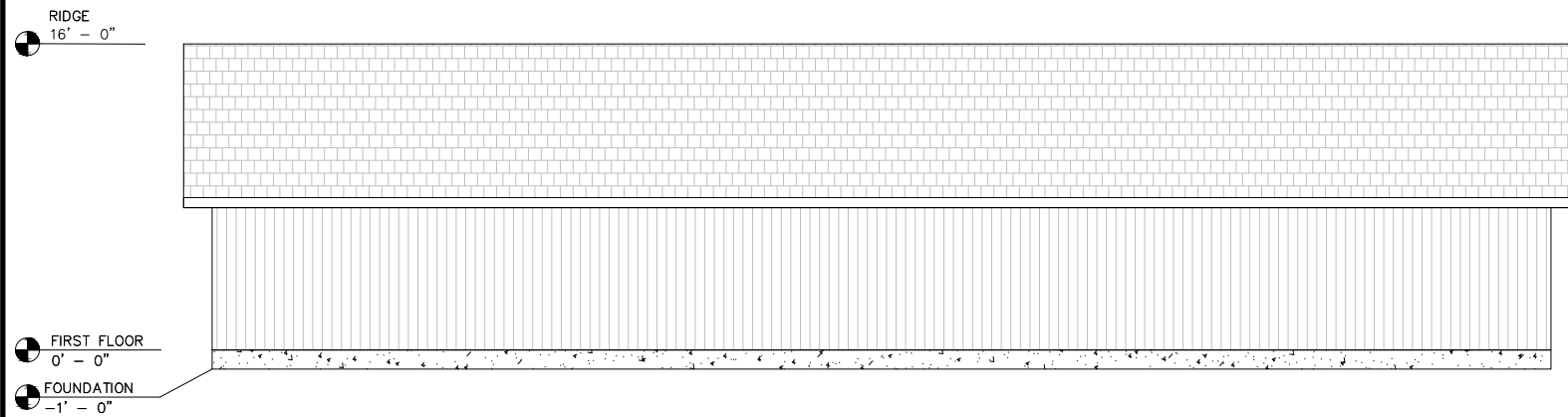






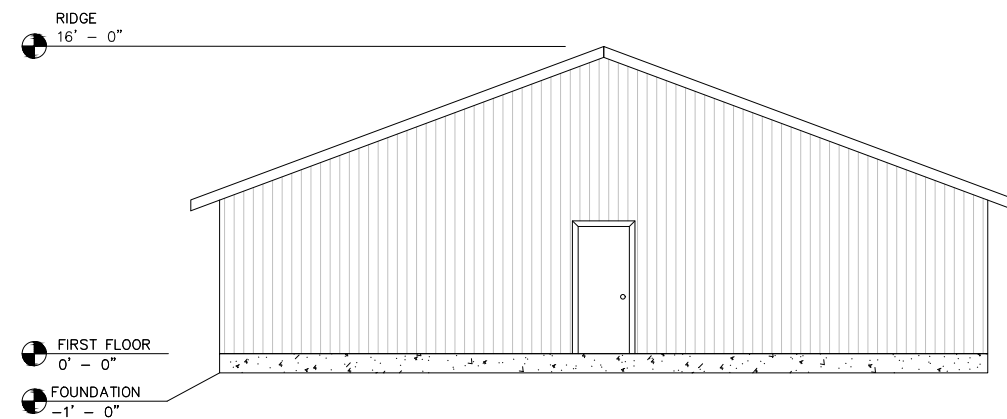


November 20, 2023 - 11:45 - Desi Namer, P., Richard Knoll, Consultant - Laka Vista Farms - 20-098VCA0, CLEARPATH CANYON LLC - MAJOR USE PERMIT.dwg, Updated By: TorSwitt



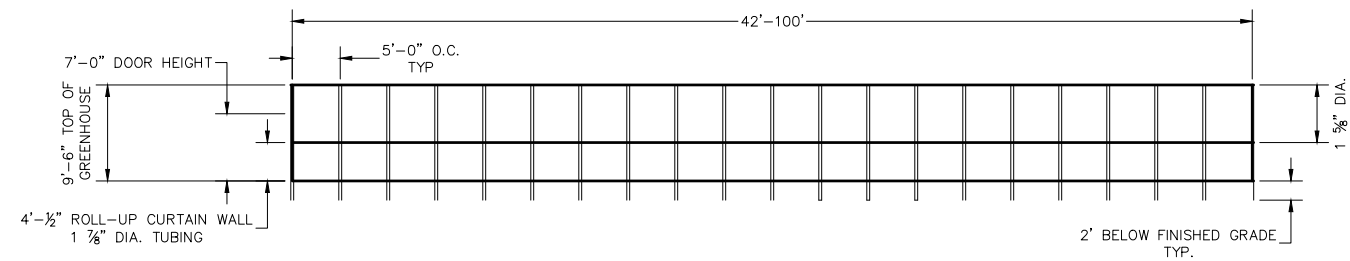
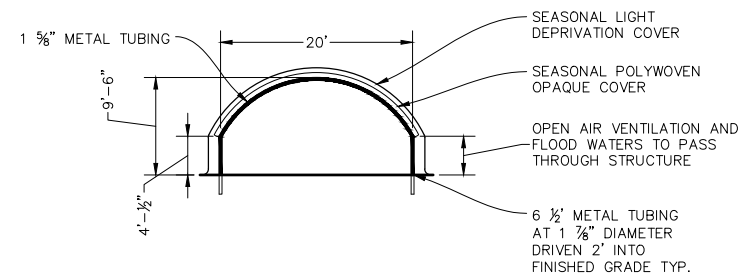
EXISTING 40'x70' BARN ELEVATIONS

SCALE: 1"=5' (11X17 SHEET: 1"=10')



EXISTING 40'x70' BARN ELEVATIONS

SCALE: 1"=5' (11X17 SHEET: 1"=10')



**TYP. HOOP STRUCTURE ELEVATIONS**

NTS

NOTE: TEMPORARY AG EXEMPT HOOP STRUCTURES WILL FOLLOW ORDINANCE No.3132

TYPICAL HOOP STRUCTURE ELEVATION

SCALE: NTS

|           |  |
|-----------|--|
| DATE      |  |
| REVISIONS |  |

**NORTHPOINT**  
CONSULTING GROUP, INC.  
1117 Samoa Blvd., Arcata, CA 95521

CLEARPATH CANYON LLC  
APN:010-053-01 & 010-053-02  
STRUCTURE ELEVATIONS

PROJ MGR: AD  
DRAWN BY: LJM  
DATE: 11/17/23  
SCALE: AS SHOWN

SHEET  
**C7**  
20-098

## **APPENDIX B: PROJECT WELL COMPLETION REPORTS**



DUPLICATE  
Owner's Copy

STATE OF CALIFORNIA  
**WELL COMPLETION REPORT**

Refer to Instruction Pamphlet

DWR USE ONLY - DO NOT FILL IN

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

No. **1075331**

|                            |           |
|----------------------------|-----------|
| STATE WELL NO./STATION NO. |           |
| LATITUDE                   | LONGITUDE |
| APN/TRS/OTHER              |           |

**GEOLOGIC LOG**

**WELL OWNER**

ORIENTATION (≡)  VERTICAL  HORIZONTAL  ANGLE  (SPECIFY)

Name Chaudia Kay - Kucharski

DRILLING METHOD Air Rotary FLUID     

Mailing Address 2015th 536  
Northridge CA 91326  
City      STATE      ZIP     

DEPTH FROM SURFACE  
Fl. to Fl. DESCRIPTION  
Describe material, grain size, color, etc.

0-50 Cemented Gravel  
50-90 Green Stone  
90-120 BLACK ROCK

**WELL LOCATION**

Address 2122 Ogden Canyon Rd.

City Clearlake Ca 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)

Barn FIELD

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           | CONDUIT                    |                         |                           | Fl.                | to Fl. | CE-<br>MENT<br>(≡) | BEN-<br>TONITE<br>(≡) | FILL<br>(≡) | FILTER PACK<br>(TYPE/SIZE) |
| 0                  | 20     | 9                       | X          |                  |                            | PVC                     | 4 1/2                     | 160                | 0      | 20                 | X                     |             |                            |
| 20                 | 74     | 7                       | X          |                  |                            | PVC                     | 4 1/2                     | 160                | 20     | 74                 |                       |             |                            |
| 74                 | 114    | 7                       |            | X                |                            | PVC                     | 4 1/2                     | 2.00               | 74     | 114                |                       |             | 5/16" Screen               |

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

ADDRESS 2015th 536 CITY Northridge STATE CA ZIP 91326

11-4-04 2145:7

ORIGINAL File with DWR

STATE OF CALIFORNIA WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 1093073

DWR USE ONLY - DO NOT FILL IN
13N/07W/13
STATE WELL NO./STATION NO.
LATITUDE
LONGITUDE
APN/TRS/OTHER

Page of

Owner's Well No.

Date Work Began 6-5-06, Ended 6-6-06

Local Permit Agency Health Dept.

Permit No. WE-5417 Permit Date 10-3-05

GEOLOGIC LOG

Well #1, Field A - Identified by Applicant as Ridge Top Well

Table with columns: ORIENTATION, DRILLING METHOD, FLUID, DESCRIPTION, DEPTH FROM SURFACE. Includes handwritten entries for Franciscan, Green Stone, and Green Stone.

WELL LOCATION
Address 2122 Ogulin Canyon Road
City Clearlake Ca 95422
County Lake
APN Book 010 Page 053 Parcel 020
Township 13N Range 7W Section 13
Lat Long

LOCATION SKETCH (Map of Ogulin Canyon with well location)
ACTIVITY (NEW WELL checked)
MODIFICATION/REPAIR
USES (Domestic checked)
MONITORING
TEST WELL
CATHODIC PROTECTION
HEAT EXCHANGE
DIRECT PUSH
INJECTION
VAPOR EXTRACTION
SPARGING
REMEDICATION
OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 180 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 175 (Ft.) & DATE MEASURED 6-6-06
ESTIMATED YIELD 50 (GPM) & TEST TYPE Air Lift
TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN (Ft.)
\* May not be representative of a well's long-term yield.

Table with columns: DEPTH FROM SURFACE, BORE-HOLE DIA., CASING (S), ANNULAR MATERIAL. Includes handwritten entries for PVC casing and gravel annular material.

- 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 Drilling
ADDRESS P.O. Box 1152 Lowerlake Ca 95457
Signed Larry Herman DATE SIGNED 6-9-06 C-57 LICENSE NUMBER 465071

ORIGINAL  
File with DWR

STATE OF CALIFORNIA  
**WELL COMPLETION REPORT**

Refer to Instruction Pamphlet

No. **1093074**

|                            |  |                |  |
|----------------------------|--|----------------|--|
| DWR USE ONLY               |  | DO NOT FILL IN |  |
| <b>13N / 07W / 14</b>      |  |                |  |
| STATE WELL NO./STATION NO. |  |                |  |
| LATITUDE                   |  | LONGITUDE      |  |
| APN/TRS/OTHER              |  |                |  |

Page      of     

Owner's Well No.     

Date Work Began 6-6-06, Ended 6-7-06

Local Permit Agency Health Dept.

Permit No. WE-2416 Permit Date 10-3-05

**GEOLOGIC LOG**

|  |     |   |                                     |                             |
|--|-----|---|-------------------------------------|-----------------------------|
| ORIENTATION (∠)                            |     | <input checked="" type="checkbox"/> VERTICAL        | <input type="checkbox"/> HORIZONTAL | ANGLE <u>    </u> (SPECIFY) |
| DEPTH FROM SURFACE                         |     | DRILLING METHOD <u>Air Rotary</u> FLUID <u>    </u> |                                     |                             |
| Ft.  | to  | Ft.   | DESCRIPTION                         |                             |
| Describe material, grain size, color, etc. |     |   |                                     |                             |
| 0  | 60  |   | Cement Gravel                       |                             |
| 60   | 100 |   | Clay w/ some Gravel                 |                             |
| 100  | 130 |   | Clay with some Gravel               |                             |
| 130  | 220 |   | Cement Gravel                       |                             |
| 220  | 400 |   | Green Stone                         |                             |

**WELL LOCATION**

Address 2050 Ogulin Canyon Rd  
 City Clearlake Ca 95422  
 County Lake  
 APN Book 010 Page 053 Parcel 010  
 Township 13N Range 7W Section 13 14  
 Lat.      N Long      W

**LOCATION SKETCH**

NORTH

WEST EAST

**ACTIVITY (∠)**

NEW WELL

**MODIFICATION/REPAIR**

Deepen  
 Other (Specify)     

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

DESTROY

**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 320 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 300 (Ft.) & DATE MEASURED 6-7-06

ESTIMATED YIELD \* 100+ (GPM) & TEST TYPE Airlift

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

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

TOTAL DEPTH OF BORING 400 (Feet)

TOTAL DEPTH OF COMPLETED WELL 400 (Feet)

| DEPTH FROM SURFACE | BORE-HOLE DIA. (Inches) | CASING (S) |        |            |           | MATERIAL / GRADE | INTERNAL DIAMETER (Inches) | GAUGE OR WALL THICKNESS | SLOT SIZE IF ANY (Inches) | DEPTH FROM SURFACE | ANNULAR MATERIAL |          |                         |  |
|--------------------|-------------------------|------------|--------|------------|-----------|------------------|----------------------------|-------------------------|---------------------------|--------------------|------------------|----------|-------------------------|--|
|                    |                         | TYPE (∠)   |        |            |           |                  |                            |                         |                           |                    | TYPE             |          |                         |  |
| Ft. to Ft.         |                         | BLANK      | SCREEN | CON-DUCTOR | FILL PIPE |                  |                            |                         | Ft. to Ft.                | CE-MENT (∠)        | BEN-TONITE (∠)   | FILL (∠) | FILTER PACK (TYPE/SIZE) |  |
| 0                  | 340                     | 7 1/8      | X      |            |           | PVC              | 4 1/2"                     | 160                     |                           | 0                  | 20               | X        |                         |  |
| 340                | 400                     | 7 1/8      | X      |            |           | PVC              | 4 1/2"                     | 200                     | .030                      | 20                 | 40               | 5/16     | pea Gravel              |  |

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

ADDRESS P.O. Box 1152 Lower Lake Ca 95457  
 CITY STATE ZIP

Signed Larry Herman DATE SIGNED 6-9-06 465071  
 C-57 LICENSED WATER WELL CONTRACTOR DATE SIGNED C-57 LICENSE NUMBER

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

Name Claudia Kay Hudhinski  
 Mailing Address PO Box 586  
Corta Madera CA 94926  
 CITY STATE ZIP

**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

Creep

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

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

USES ( )

WATER SUPPLY

Domestic  Public

Irrigation  Industrial

MONITORING

TEST WELL

CATHODIC PROTECTION

HEAT EXCHANGE

DIFECT PUSH

INJECTION

VAPOR EXTRACTION

SPARGING

REMEDICATION

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

WEST EAST

UPPER FIELD

Old well 175' → well

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 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<br>Fl. to Fl. | BORE-HOLE DIA.<br>(Inches) | CASING (S) |                  |                            |                         |                           |             | DEPTH FROM SURFACE<br>Fl. to Fl. | ANNULAR MATERIAL<br>TYPE |          |                         |  |
|----------------------------------|----------------------------|------------|------------------|----------------------------|-------------------------|---------------------------|-------------|----------------------------------|--------------------------|----------|-------------------------|--|
|                                  |                            | TYPE ( )   | MATERIAL / GRADE | INTERNAL DIAMETER (Inches) | GAUGE OR WALL THICKNESS | SLOT SIZE IF ANY (Inches) | CE-MENT ( ) |                                  | BEN-TONITE ( )           | FILL ( ) | FILTER PACK (TYPE/SIZE) |  |
| 0 to 120                         | 9                          | X          | MVC F400         | 4 1/2                      | SDR26                   |                           | 0 to 1      | X                                |                          |          |                         |  |
| 120 to 272                       | 8                          | X          | " "              | " "                        | " "                     |                           | 1 to 21     |                                  | X                        |          |                         |  |
| 272 to 352                       | 8                          | X          | " "              | " "                        | " "                     | .032                      | 21 to 358   |                                  |                          |          | pea gravel              |  |
| 352 to 358                       | 8                          | X          | " "              | " "                        | " "                     |                           |             |                                  |                          |          |                         |  |

**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 Dan Mc Muller Well Drilling  
 (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINTED)

ADDRESS PO. Box 951 Lower Lake CA 95457  
 CITY STATE ZIP

Signed Dan Mc Muller Date Signed 6/28/2013 570152

C-57 MEMBER WATER WELL CONTRACTOR DWR LICENSE NUMBER



**APPENDIX C: WELL PUMP TEST RESULTS**

---



# POLLACK & SONS PUMP

Well #1, Site A

707.987.0917  
19280 Deer Hill  
Hidden Valley Lake  
CA., 95467

"Your one stop water shop 24 hours"  
Iron and Chlorine Removal  
Softeners • Filters • Pumps • Tanks

LAKE USTA

Name OGULIN CAMP Phone \_\_\_\_\_

Address 7050 OGDEN RD City Clear Lake

State CA Zip \_\_\_\_\_ Date 2-1-22  
2-2-22

### WATER ANALYSIS

Hardness (lime) gpg. \_\_\_\_\_ Iron (rust) ppm \_\_\_\_\_

Manganese ppm \_\_\_\_\_ PH (acid) \_\_\_\_\_

Gal Per Min. 38 GPM

Well Depth. 240 Casing Size 4 1/2 PVC

Static Level. 150

Before Pumping. 150

After Pumping 2 HRS. 180' 4 HRS. 200' 24 HRS. 150'

Water Supply Garden  Private Well  100% Recovery

EXISTING EQUIPMENT \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### COMMENTS/RECOMMENDATIONS

will pump more w/ larger pump



# POLLACK & SONS PUMP

Well #5, Site B

707.987.0917  
19280 Deer Hill  
Hidden Valley Lake  
CA., 95467

"Your one stop water shop 24 hours"  
Iron and Chlorine Removal  
Softeners • Filters • Pumps • Tanks

Name LINCE USTIN Phone \_\_\_\_\_  
Address 2050 OSWING CANYON City CLARK  
State CA Zip \_\_\_\_\_ Date 1-31-21  
2-1-22

### WATER ANALYSIS

Hardness (lime) gpg. \_\_\_\_\_ Iron (rust) ppm \_\_\_\_\_

Manganese ppm. \_\_\_\_\_ PH (acid) \_\_\_\_\_

Gal Per Min. 150 FT

Well Depth 340' Casing Size 6" PVC

Static Level 175'

Before Pumping 175'

After Pumping 2 HRS. 210' 4 HRS. 260' 24 HRS. 175'

Water Supply Garden  Private Well

### EXISTING EQUIPMENT

100% Recovery

### COMMENTS/RECOMMENDATIONS

well pop much more w/ longer pump

(new well)



# POLLACK & SONS PUMP

Well #2, Site C

707.987.0917  
19280 Deer Hill  
Hidden Valley Lake  
CA., 95467

"Your one stop water shop 24 hours"  
Iron and Chlorine Removal  
Softeners • Filters • Pumps • Tanks

*LINCS VISTA*

Name *OGULIN CANYON* Phone \_\_\_\_\_

Address *2122 OGDEN REL.* City *Clearlake*

State *CA* Zip \_\_\_\_\_ Date *2-1-22*  
*2-2-22*

### WATER ANALYSIS

Hardness (lime) gpg. \_\_\_\_\_ Iron (rust) ppm \_\_\_\_\_

Manganese ppm. \_\_\_\_\_ PH (acid) \_\_\_\_\_

Gal Per Min. *38 GPM*

Well Depth. *114'* Casing Size *4 1/2 PVC*

Static Level. *70'*

Before Pumping. *70'*

After Pumping 2 HRS. *80'* 4 HRS. *85'* 24 HRS. *70'*

Water Supply Garden  Private Well  *100% recovery*

### EXISTING EQUIPMENT

### COMMENTS/RECOMMENDATIONS

*will pump more with larger pump*

**APPENDIX D: NEIGHBORING WELL COMPLETION  
REPORTS**

---

| PLSS Section M13N07W14 |                 |          |                 |            |             |            |                |                     |                    |             |  |
|------------------------|-----------------|----------|-----------------|------------|-------------|------------|----------------|---------------------|--------------------|-------------|--|
| # Reported             |                 | 14       |                 |            |             |            |                |                     |                    |             |  |
| # Actual               |                 | 13       |                 |            |             |            |                |                     |                    |             |  |
| Saved Ref #            | WCR Number      | Legacy # | Well Location   | APN        | Use         | Date       | Depth (ft)     | Perforated Interval |                    | Yield (gpm) | Note   |
|                        |                 |          |                 |            |             |            |                | Top (Depth, ft)     | Bottom (Depth, ft) |             |  |
| 1                      | WCR1981-005661  | 228689   | 2510 Old Hwy 53 | 010-048-02 | Industrial  | 11/14/1981 | 361            | 154                 | 354                | 30          | 0.9 miles SW   |
| 2                      | WCR1996-007735  | 445212   | 2511 Hwy 53     | 010-048-09 | Domestic    | 5/17/1996  | 190            | 150                 | 190                | 18          | 0.7 miles SW   |
| 3 (duplicate WCR)      | WCR2006-008902  | 1093074  | 2050 Ogulin     | 010-053-02 | Not Checked | 6/7/06     | 400            | 340                 | 400                | 100         | Project Well #3, Field E - Duplicate of WCR2006-008901, 1093074 Refer to Ref #24 |
| 4                      | WCR1980-006392  | 84076    | Ogulin Rd & Hwy | ??         | Domestic    | 3/27/1980  | 110            | 70                  | 110                | 20          | 0.7 mi SW?, Location uncertain   |
| 5                      | WCR1995-008387  | 555494   | 2511 Hwy 53     | 10-048-09  | Domestic    | 9/5/1995   | 183            | 143                 | 183                | 30          | 0.7 miles SW   |
| 6                      | WCR1999-008659  | 705609   | 2580 Hwy 53     | 010-048-10 | Irrigation  | 6/23/1999  | 240            | ??                  | ??                 | 245         | 0.6 miles S  |
| 7 DNE                  | WCR2007-008038  | 1093138  | 2050 Ogulin     | 010-053-01 | Domestic    | 4/26/2007  | 180            | 140                 | 180                | 60          | Replaced by Well #1. Refer to Ref #12.   |
| 8a DNE                 | WCR2007-008044  | 1080452  | 2185 Ogulin     | 010-044-17 | Domestic    | 8/9/2007   | 200            | 40                  | 200                | 50          | Replaced by new well in 2021? Refer to Reference #8.                             |
| 9 No Info              | WCR1776-003338  | 241      | Unknown         | Unknown    | Unknown     | Unknown    | 80             | ??                  | ??                 | ??          | Unknown  |
| 10                     | WCR2013-008387  | 963040   | 2050 Ogulin     | 010-053-01 | Irrigation  | 6/28/2013  | 358            | 272                 | 352                | 200         | Project Well #4, Field D   |
| 11                     | WCR1999-008660  | 705610   | 2560 Hwy 53     | 010-048-05 | Irrigation  | 6/12/1999  | 230            | 180                 | 230                | 14          | 0.6 miles SW   |
| 12                     | WCR1981-005597  | 13363    | 1950 Ogulin Rd  | 010-055-48 | Domestic    | 7/16/1981  | 69             | 29                  | 69                 | 15          | 0.2 miles N  |
| 13                     | WCR2011-008013  | 950518   | 2050 Ogulin     | 010-053-01 | Domestic    | 7/1/2011   | 240            | 200                 | 240                | 60          | Project Well #1, Field A   |
| 14                     | WCR2006-008963  | 1096367  | 2250 Ogulin     | 010-044-19 | Domestic    | 2/11/2006  | 200            | 120                 | 200                | 30          | 0.4 miles SW   |
| 26                     | Project Well #5 | n/a      | 2050 Ogulin     | 010-053-01 | Irrigation  | 4/10/2020  | 340            | 240                 | 340                | 300         | Project Well #5, Field B   |
| 8                      | 2185 Ogulin     | n/a      | 2185 Ogulin     | 010-044-17 | Irrigation  | 3/25/2021  | 375            | 280                 | 375                | 80          | 0.25 miles W   |
| 27                     | 2160 Ogulin     | n/a      | 2160 Ogulin     | 010-044-21 | Dom&Irr     | 10/1/2021  | 300            | 80                  | 300                | 100         | 0.3 miles W  |
|                        |                 |          |                 |            |             |            | <b>Average</b> | <b>246</b>          | <b>Average</b>     | <b>88</b>   |  |

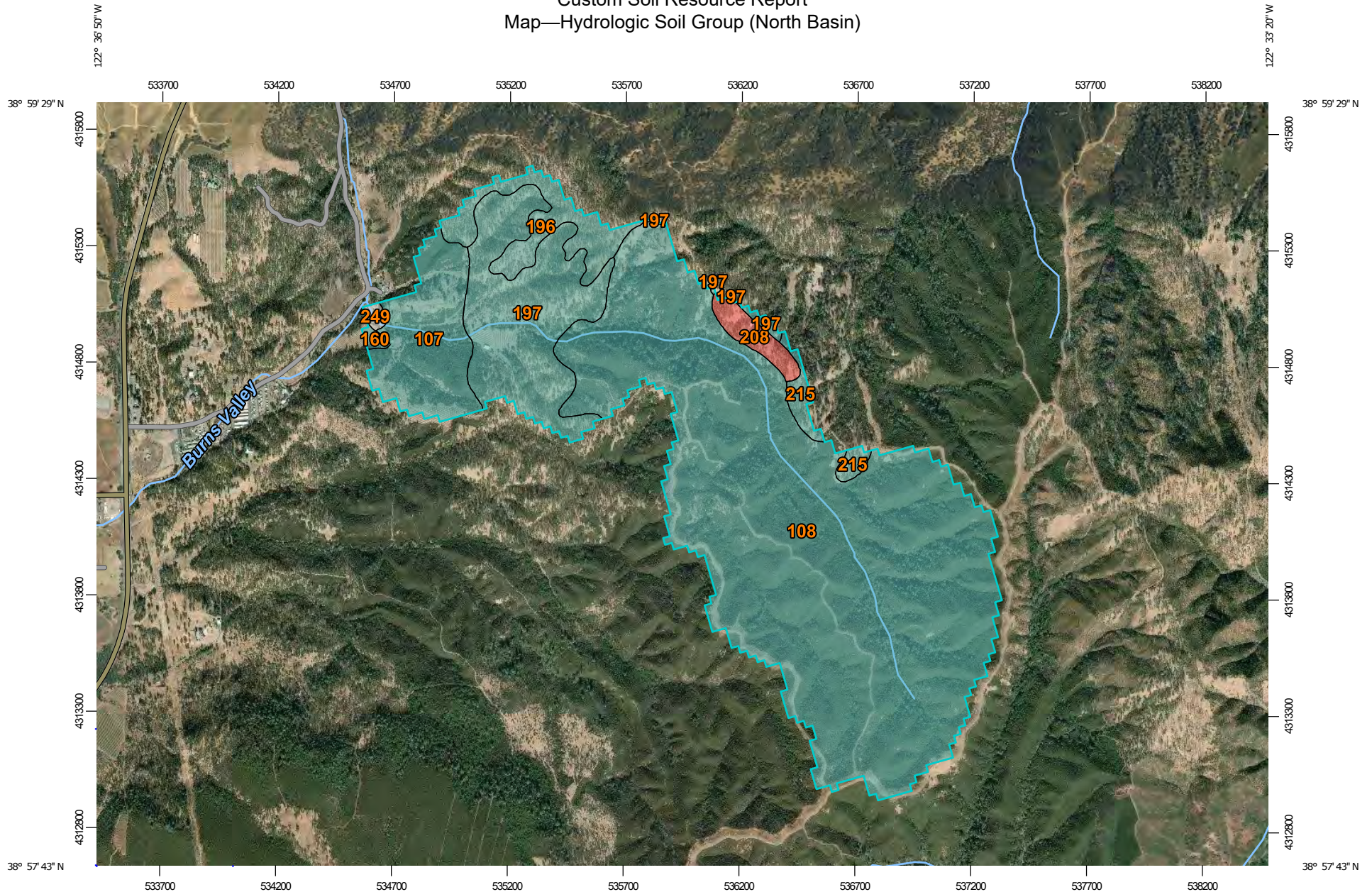
  

| PLSS Section M13N07W11 |                |          |                |            |            |           |                |                     |                    |             |               |
|------------------------|----------------|----------|----------------|------------|------------|-----------|----------------|---------------------|--------------------|-------------|---------------|
| # Reported             |                | 5        |                |            |            |           |                |                     |                    |             |               |
| # Actual               |                | 5        |                |            |            |           |                |                     |                    |             |               |
|                        | WCR Number     | Legacy # | Well Location  | APN        | Use        | Date      | Depth (ft)     | Perforated Interval |                    | Yield (gpm) | Note          |
|                        |                |          |                |            |            |           |                | Top (Depth, ft)     | Bottom (Depth, ft) |             |               |
| 15                     | WCR2006-008049 | 1089142  | 1270 Hwy 53    | 010-055-26 | Domestic   | 10/2/2006 | 380            | 360                 | 380                | 6           | 0.75 miles NW |
| 16                     | WCR2001-009466 | 761881   | 1780 State Hwy | 010-055-24 | Irrigation | 3/22/2001 | 220            | 115                 | 195                | 300         | 0.6 miles NW  |
| 17                     | WCR2006-008903 | 1093075  | 1750 Ogulin    | 010-055-47 | Domestic   | 6/8/2006  | 107            | 67                  | 107                | 50          | 0.4 miles N   |
| 18                     | WCR2017-005234 | e0345527 | 1756 Ogulin    | 010-055-46 | Domestic   | 3/14/2017 | 372            | 292                 | 372                | 50          | 0.5 miles NE  |
| 19                     | WCR2006-008048 | 1089141  | 1000 Hwy 53    | 010-055-27 | Domestic   | 10/2/2006 | 260            | 220                 | 260                | 100         | 1.1 miles NW  |
|                        |                |          |                |            |            |           | <b>Average</b> | <b>268</b>          | <b>Average</b>     | <b>106</b>  |               |

| PLSS Section           |                | M13N07W12      |                   |            |          |            |                     |                        |                    |             |   |  |
|------------------------|----------------|----------------|-------------------|------------|----------|------------|---------------------|------------------------|--------------------|-------------|---|--|
| # Reported             | 6              |                |                   |            |          |            |                     |                        |                    |             |   |  |
| # Actual               | 4              |                |                   |            |          |            |                     |                        |                    |             |   |  |
|                        |                |                |                   |            |          |            | Perforated Interval |                        |                    |             |   |  |
|                        |                |                |                   |            |          |            | Top                 | Bottom                 |                    |             |   |  |
|                        | WCR Number     | Legacy #       | Well Location     | APN        | Use      | Date       | Depth (ft)          | (Depth, ft)            | (Depth, ft)        | Yield (gpm) | Note  |  |
| 20                     | WCR2012-007802 | 0963006        | 9900 Jcnctn Plaza | 010-055-42 | Domestic | 5/11/2012  | 420                 | 320                    | 420                | 25          | 0.8 miles NE  |  |
| 21                     | WCR2000-008829 | 713341         | 2388 Hwy 53       | 010-053-03 | Domestic | 11/8/2000  | 170                 | 150                    | 170                | 200         | Address is off, used WCR map for parcel at end of road. |  |
| 22                     | WCR2006-008073 | 1089186        | 950 Jcnctn Plaza  | 010-055-39 | Domestic | 10/20/2006 | 165                 | 125                    | 165                | 20          | 1 mile N  |  |
| 23                     | WCR2006-008071 | 1089188        | 1030 Jcnctn Plaza | 010-055-44 | Domestic | 10/20/2006 | 403                 | 363                    | 403                | 42          | 0.5 mile N  |  |
| Mapped Wrong           |                | WCR2008-007939 | 1075152           |            |          | 1/29/2008  | n/a                 | 40                     | 25                 |             |   |  |
| Mapped Wrong           |                | WCR2000-009704 | 228021            |            |          | 12/31/1999 | n/a                 | 200                    | 240                |             |   |  |
|                        |                |                |                   |            |          |            | <b>Average</b>      | <b>290</b>             | <b>Average</b>     | <b>94</b>   |   |  |
| PLSS Section           |                | M13N07W13      |                   |            |          |            |                     |                        |                    |             |   |  |
| # Reported             | 1              |                |                   |            |          |            |                     |                        |                    |             |   |  |
| # Actual               | 2              |                |                   |            |          |            |                     |                        |                    |             |   |  |
|                        |                |                |                   |            |          |            | Perforated Interval |                        |                    |             |   |  |
|                        |                |                |                   |            |          |            | Top                 | Bottom                 |                    |             |   |  |
|                        | WCR Number     | Legacy #       | Well Location     | APN        | Use      | Date       | Depth (ft)          | (Depth, ft)            | (Depth, ft)        | Yield (gpm) | Note  |  |
| 24                     | WCR2006-008901 | 1093073        | 2122 Ogulin       | 010-053-02 | Domestic | 6/6/2006   | 240                 | 200                    | 240                | 50          | Duplicate of Legacy 1093074                             |  |
| 25                     | WCR2004-009866 | 1075331        | 2122 Ogulin       | 010-053-02 | Domestic | 11/4/2004  | 114                 | 74                     | 114                | 60          | Project Well #2   |  |
|                        |                |                |                   |            |          |            | <b>Average</b>      | <b>177</b>             | <b>Average</b>     | <b>75</b>   |   |  |
|                        |                |                |                   |            |          |            | <b>Depth (ft)</b>   |                        | <b>Yield (gpm)</b> |             |   |  |
| <b>Overall Average</b> |                |                |                   |            |          |            | <b>252</b>          | <b>Overall Average</b> | <b>85</b>          |             |   |  |

**APPENDIX E: WEB SOIL SURVEY-  
HYDROLOGIC SOIL GROUP**

# 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>  |

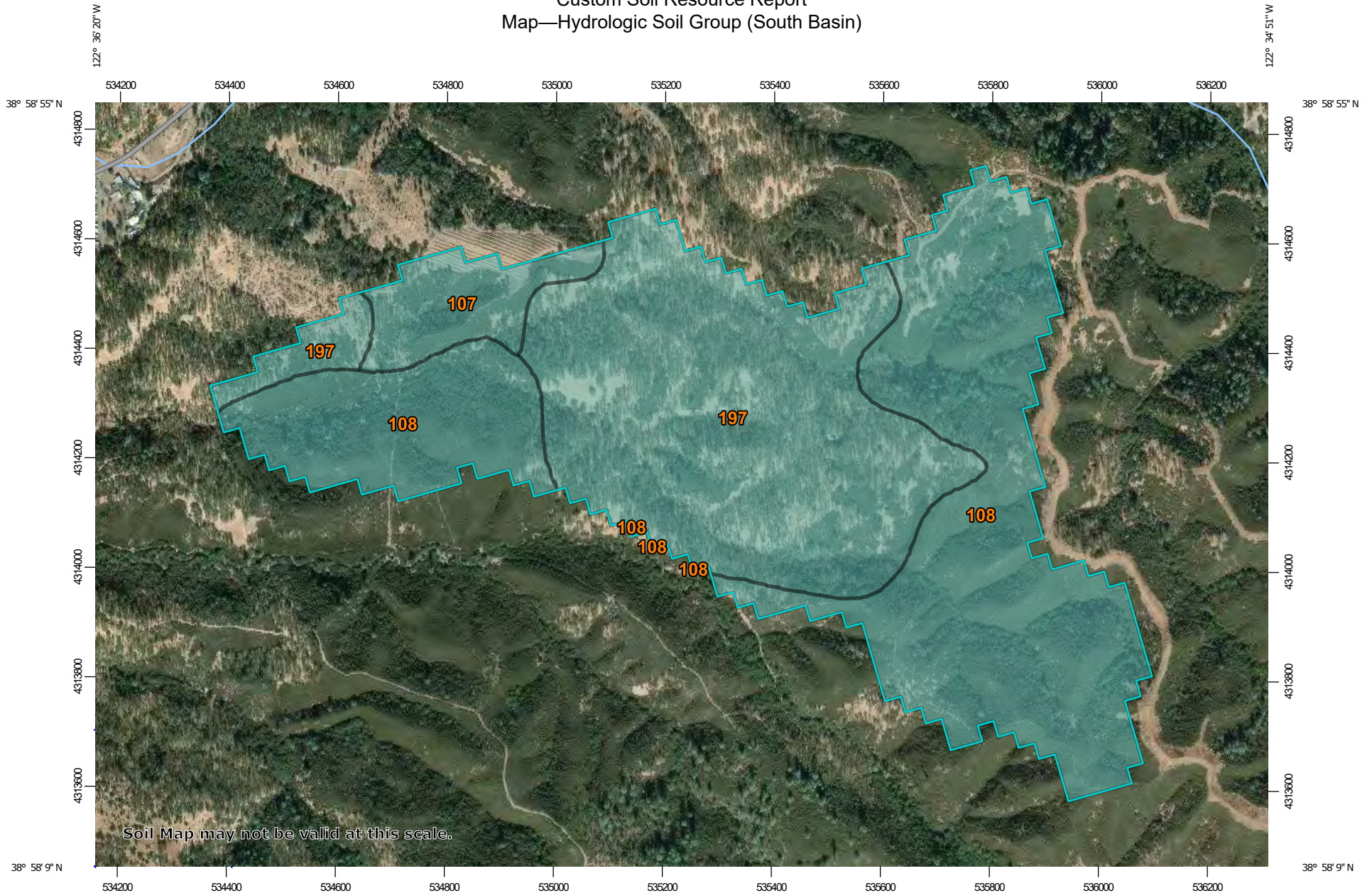
**Rating Options—Hydrologic Soil Group (North Basin)**

*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 (continued)**

-  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

**APPENDIX F: PRISM CLIMATE GROUP  
PRECIPITATION 1895 TO 2022**

PRISM Time Series Data

Location: Lat: 38.9795 Lon: -122.5974 Elev: 1640ft

Climate variable: ppt

Spatial resolution: 4km

Period: 1895 - 2022

Dataset: AN81m

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

Grid Cell Interpolation: On

Time series generated: 2023-Oct-24

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

Date ppt (inches)

2022 15.22  
 2021 23.51  
 2020 9.96  
 2019 43.41  
 2018 23.64  
 2017 43.82  
 2016 35.78  
 2015 18.11  
 2014 31.46  
 2013 6.47  
 2012 30.7  
 2011 23.3  
 2010 34.1  
 2009 17.74  
 2008 19.47  
 2007 13.69  
 2006 34.88  
 2005 39.22  
 2004 33.67  
 2003 33  
 2002 28.88  
 2001 36.25  
 2000 27.57  
 1999 23.61  
 1998 52.63  
 1997 30.28  
 1996 37.16  
 1995 55.61  
 1994 21.35  
 1993 36.44  
 1992 30  
 1991 24.16  
 1990 16.83  
 1989 21.03  
 1988 17.65  
 1987 27.95

|                | ppt (in) | Period    |
|----------------|----------|-----------|
| <b>Average</b> | 27.1     | 2000-2022 |
| <b>Minimum</b> | 6.5      | 2000-2022 |

|                |      |           |
|----------------|------|-----------|
| <b>Average</b> | 27.8 | 1895-2022 |
| <b>Minimum</b> | 6.5  | 1895-2022 |

|      |       |
|------|-------|
| 1986 | 38.75 |
| 1985 | 16.72 |
| 1984 | 21.28 |
| 1983 | 62.55 |
| 1982 | 33.71 |
| 1981 | 31.37 |
| 1980 | 24.72 |
| 1979 | 35.12 |
| 1978 | 30.32 |
| 1977 | 19.26 |
| 1976 | 8.68  |
| 1975 | 24.4  |
| 1974 | 24.1  |
| 1973 | 41.73 |
| 1972 | 19.44 |
| 1971 | 17.76 |
| 1970 | 35.46 |
| 1969 | 34.18 |
| 1968 | 30.57 |
| 1967 | 27.64 |
| 1966 | 22.75 |
| 1965 | 26.01 |
| 1964 | 23.12 |
| 1963 | 28.58 |
| 1962 | 27.15 |
| 1961 | 20.11 |
| 1960 | 27.18 |
| 1959 | 20.71 |
| 1958 | 35.75 |
| 1957 | 30.94 |
| 1956 | 21.24 |
| 1955 | 25.12 |
| 1954 | 29.52 |
| 1953 | 21.3  |
| 1952 | 34.59 |
| 1951 | 29.88 |
| 1950 | 34.47 |
| 1949 | 16.88 |
| 1948 | 23.48 |
| 1947 | 16.86 |
| 1946 | 14.26 |
| 1945 | 29.37 |
| 1944 | 26.58 |
| 1943 | 21.34 |
| 1942 | 32.42 |
| 1941 | 45.3  |
| 1940 | 46.22 |

|      |       |
|------|-------|
| 1939 | 12.71 |
| 1938 | 31.94 |
| 1937 | 34.52 |
| 1936 | 25.6  |
| 1935 | 25.57 |
| 1934 | 18.96 |
| 1933 | 20.95 |
| 1932 | 12.81 |
| 1931 | 25.09 |
| 1930 | 17.44 |
| 1929 | 15.37 |
| 1928 | 20.68 |
| 1927 | 28.57 |
| 1926 | 34.61 |
| 1925 | 26.23 |
| 1924 | 21.11 |
| 1923 | 14.71 |
| 1922 | 27.6  |
| 1921 | 24.22 |
| 1920 | 29.93 |
| 1919 | 23.09 |
| 1918 | 20.69 |
| 1917 | 13.07 |
| 1916 | 30.11 |
| 1915 | 35.75 |
| 1914 | 31.28 |
| 1913 | 26.33 |
| 1912 | 20.54 |
| 1911 | 33.97 |
| 1910 | 17.48 |
| 1909 | 45.5  |
| 1908 | 18.79 |
| 1907 | 35.81 |
| 1906 | 43.25 |
| 1905 | 23.19 |
| 1904 | 43.01 |
| 1903 | 26.85 |
| 1902 | 34.55 |
| 1901 | 26.29 |
| 1900 | 24.88 |
| 1899 | 36.11 |
| 1898 | 15.09 |
| 1897 | 26.48 |
| 1896 | 39.54 |
| 1895 | 33.64 |

**APPENDIX G: THEIS EQUATION DRAWDOWN  
CALCULATIONS FOR THE PROJECT WELLS**

|                               | Well #1 |         |         |         |         |         |         |         | Well #2 |         |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Storativity                   | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  |
| Test Drawdown (ft)            | 50      | 50      | 50      | 50      | 50      | 50      | 50      | 50      | 15      | 15      | 15      | 15      | 15      | 15      | 15      | 15      |
| Yield Q (gpm)                 | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      |
| SC Specific Capacity          | 0.76    | 0.76    | 0.76    | 0.76    | 0.76    | 0.76    | 0.76    | 0.76    | 2.53    | 2.53    | 2.53    | 2.53    | 2.53    | 2.53    | 2.53    | 2.53    |
| T (gpd/ft)                    | 1520.0  | 1520.0  | 1520.0  | 1520.0  | 1520.0  | 1520.0  | 1520.0  | 1520.0  | 5066.7  | 5066.7  | 5066.7  | 5066.7  | 5066.7  | 5066.7  | 5066.7  | 5066.7  |
| T (ft <sup>2</sup> /day)      | 203.2   | 203.2   | 203.2   | 203.2   | 203.2   | 203.2   | 203.2   | 203.2   | 677.3   | 677.3   | 677.3   | 677.3   | 677.3   | 677.3   | 677.3   | 677.3   |
| Project Q (gpm)               | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    |
| Q (ft <sup>3</sup> /d)        | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    |
| Time (days)                   | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     |
| r (ft)                        | 50      | 100     | 200     | 300     | 400     | 500     | 600     | 700     | 50      | 100     | 200     | 300     | 400     | 500     | 600     | 700     |
| u                             | 0.00385 | 0.01540 | 0.06160 | 0.13861 | 0.24642 | 0.38503 | 0.55444 | 0.75466 | 0.00116 | 0.00462 | 0.01848 | 0.04158 | 0.07393 | 0.11551 | 0.16633 | 0.22640 |
| w(u)                          | 4.9863  | 3.6115  | 2.2705  | 1.5327  | 1.0548  | 0.7252  | 0.4902  | 0.3166  | 6.1875  | 4.8047  | 3.4322  | 2.6440  | 2.1001  | 1.6934  | 1.3760  | 1.1218  |
| Drawdown [h-ho] (ft)          | 7.7     | 5.6     | 3.5     | 2.4     | 1.6     | 1.1     | 0.8     | 0.5     | 2.9     | 2.2     | 1.6     | 1.2     | 1.0     | 0.8     | 0.6     | 0.5     |
| Drawdown [h-ho] (in)          | 92.0    | 66.7    | 41.9    | 28.3    | 19.5    | 13.4    | 9.0     | 5.8     | 34.3    | 26.6    | 19.0    | 14.6    | 11.6    | 9.4     | 7.6     | 6.2     |
| Available Drawdown (ft)       | 90      | 90      | 90      | 90      | 90      | 90      | 90      | 90      | 46      | 46      | 46      | 46      | 46      | 46      | 46      | 46      |
| 5% of Available Drawdown (ft) | 4.5     | 4.5     | 4.5     | 4.5     | 4.5     | 4.5     | 4.5     | 4.5     | 2.3     | 2.3     | 2.3     | 2.3     | 2.3     | 2.3     | 2.3     | 2.3     |

**Notes:**  
 Storativity - Average of Multiple Sources (see below)  
 Drawdown during pump test  
 Pump rate during pump test  
 Well Yield / Available Drawdown  
 Driscoll's (1968) Estimate for confined aquifer of  $T = 2000 * Q / SC$   
 gallon = 0.133681 cubic foot  
 Based on 24 hour storage refill rate during maximum daily demand  
 conversion  $ft^3/d = 0.00519481 \text{ gpm}$   
 Fetter (2001) Equation 5.10  
 Fetter (2001) Equation 5.11:  $W(u) \sim -0.5772 - \ln(u) + u - u^2 / (2 * \text{fact}2)$   
 Fetter (2001) Equation 5.11  
 Total water depth measured at time of drilling  
 5% of total water depth

Sources: Applied Hydrogeology, Fourth Edition, C.W. Fetter. 2001  
 Groundwater Wells, Second Edition, F.G. Driscoll 1986. (<https://sehydrogeology.com/using-specific-capacity-monitor-well-performance/#:~:text=The%20Specific%20Capacity%20of%20a,penetrated%20by%20the%20well%20screens.>)

**Storativity - Confined Aquifer (Sources)**

| Minimum  | Maximum | Average          |
|--|---------|------------------|
| 0.00005  | 0.005   | <b>0.0006259</b> |
| Average of all six estimates of Storativity                          |         |                  |
| 0.00001  | 0.0001  |                  |
| Well #1 (using 2nd Source below) 0.00005 Aquifer Thickness*0.000001  |         |                  |
| Well #2 (using 2nd Source below) 0.000015 Aquifer Thickness*0.000001 |         |                  |
| Well #3 (using 2nd Source below) 0.00016                             |         |                  |
| Well #4 (using 2nd Source below) 0.000163                            |         |                  |
| Well #5 (using 2nd Source below) 0.000085                            |         |                  |

Source: [http://www.aqtesolv.com/aquifer-tests/aquifer\\_properties.htm](http://www.aqtesolv.com/aquifer-tests/aquifer_properties.htm)

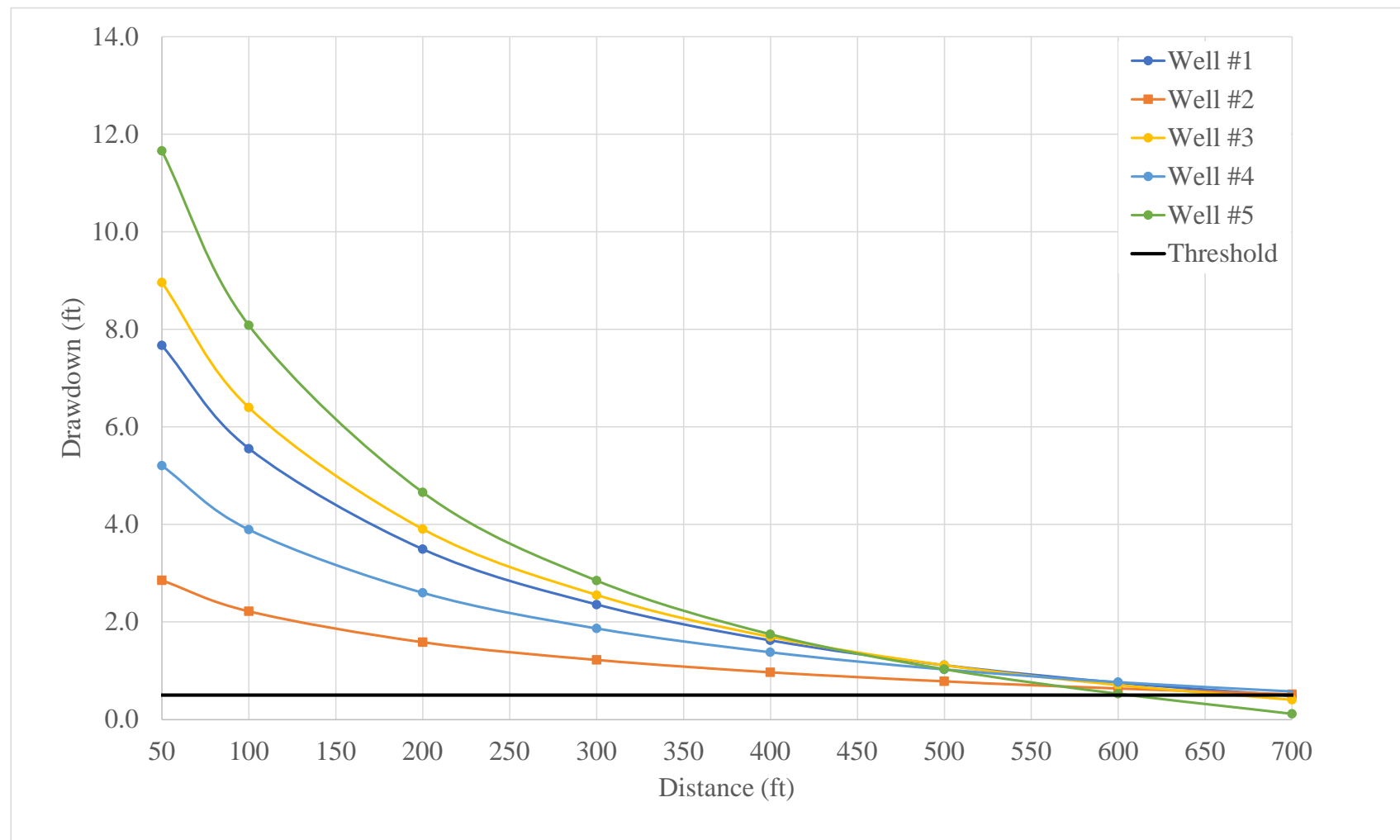
aquifer (or aquitard) thickness [L].

The typical storativity of a confined aquifer, which varies with specific storage and aquifer thickness, ranges from  $5 \times 10^{-5}$  to  $5 \times 10^{-3}$  (Todd 1980).

Specific storage is the volume of water that a unit volume of aquifer (or

Source: <https://www.sciencedirect.com/topics/earth-and-planetary->

from the expansion of water and compaction of the aquifer, both of which are exceedingly small. For confined aquifers the storativity generally ranges between 0.0001 and 0.00001, and for leaky confined aquifers it is in the range of 0.001. One method to estimate storativity for confined aquifers is to multiply the aquifer thickness by 0.000001. The small storativity for confined aquifers means that to obtain a sufficient supply from a well there must be a large pressure change throughout a wide area. This is not the case with unconfined aquifers because the water derived is not related to expansion and compression but comes instead from gravity drainage and dewatering of the aquifer.



|                               | Well #3 |         |         |         |         |         |         |         | Well #4 |         |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Storativity                   | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  |
| Well Drawdown (ft)            | 160     | 160     | 160     | 160     | 160     | 160     | 160     | 160     | 163     | 163     | 163     | 163     | 163     | 163     | 163     | 163     |
| Yield Q (gpm)                 | 100     | 100     | 100     | 100     | 100     | 100     | 100     | 100     | 200     | 200     | 200     | 200     | 200     | 200     | 200     | 200     |
| SC Specific Capacity          | 0.63    | 0.63    | 0.63    | 0.63    | 0.63    | 0.63    | 0.63    | 0.63    | 1.23    | 1.23    | 1.23    | 1.23    | 1.23    | 1.23    | 1.23    | 1.23    |
| T (gpd/ft)                    | 1250.0  | 1250.0  | 1250.0  | 1250.0  | 1250.0  | 1250.0  | 1250.0  | 1250.0  | 2454.0  | 2454.0  | 2454.0  | 2454.0  | 2454.0  | 2454.0  | 2454.0  | 2454.0  |
| T (ft <sup>2</sup> /day)      | 167.1   | 167.1   | 167.1   | 167.1   | 167.1   | 167.1   | 167.1   | 167.1   | 328.1   | 328.1   | 328.1   | 328.1   | 328.1   | 328.1   | 328.1   | 328.1   |
| Project Q (gpm)               | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    |
| Q (ft <sup>3</sup> /d)        | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    |
| Time (days)                   | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     |
| r (ft)                        | 50      | 100     | 200     | 300     | 400     | 500     | 600     | 700     | 50      | 100     | 200     | 300     | 400     | 500     | 600     | 750     |
| u                             | 0.00468 | 0.01873 | 0.07491 | 0.16855 | 0.29965 | 0.46820 | 0.67420 | 0.91766 | 0.00238 | 0.00954 | 0.03816 | 0.08586 | 0.15263 | 0.23849 | 0.34342 | 0.53660 |
| w(u)                          | 4.7915  | 3.4192  | 2.0878  | 1.3648  | 0.9052  | 0.5951  | 0.3776  | 0.2159  | 5.4638  | 4.0846  | 2.7266  | 1.9619  | 1.4493  | 1.0805  | 0.8055  | 0.5099  |
| Drawdown [h-ho] (ft)          | 9.0     | 6.4     | 3.9     | 2.6     | 1.7     | 1.1     | 0.7     | 0.4     | 5.2     | 3.9     | 2.6     | 1.9     | 1.4     | 1.0     | 0.8     | 0.5     |
| Drawdown [h-ho] (in)          | 107.5   | 76.7    | 46.9    | 30.6    | 20.3    | 13.4    | 8.5     | 4.8     | 62.5    | 46.7    | 31.2    | 22.4    | 16.6    | 12.4    | 9.2     | 5.8     |
| Available Drawdown (ft)       | 160     | 160     | 160     | 160     | 160     | 160     | 160     | 160     | 163     | 163     | 163     | 163     | 163     | 163     | 163     | 163     |
| 5% of Available Drawdown (ft) | 8.0     | 8.0     | 8.0     | 8.0     | 8.0     | 8.0     | 8.0     | 8.0     | 8.2     | 8.2     | 8.2     | 8.2     | 8.2     | 8.2     | 8.2     | 8.2     |

For well 3 & 4 used available drawdown = WCR depth - WCR static water level

|                               | Well #5 |         |         |         |         |         |         |         |
|-------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Storativity                   | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  | 0.0006  |
| Test Drawdown (ft)            | 85      | 85      | 85      | 85      | 85      | 85      | 85      | 85      |
| Yield Q (gpm)                 | 38      | 38      | 38      | 38      | 38      | 38      | 38      | 38      |
| SC Specific Capacity          | 0.45    | 0.45    | 0.45    | 0.45    | 0.45    | 0.45    | 0.45    | 0.45    |
| T (gpd/ft)                    | 894.1   | 894.1   | 894.1   | 894.1   | 894.1   | 894.1   | 894.1   | 894.1   |
| T (ft <sup>2</sup> /day)      | 119.5   | 119.5   | 119.5   | 119.5   | 119.5   | 119.5   | 119.5   | 119.5   |
| Project Q (gpm)               | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    | 20.4    |
| Q (ft <sup>3</sup> /d)        | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    | 3927    |
| Time (days)                   | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     | 0.5     |
| r (ft)                        | 50      | 100     | 200     | 300     | 400     | 500     | 600     | 700     |
| u                             | 0.00655 | 0.02618 | 0.10473 | 0.23564 | 0.41891 | 0.65455 | 0.94255 | 1.28292 |
| w(u)                          | 4.4583  | 3.0915  | 1.7812  | 1.0900  | 0.6679  | 0.3940  | 0.2024  | 0.0451  |
| Drawdown [h-ho] (ft)          | 11.7    | 8.1     | 4.7     | 2.8     | 1.7     | 1.0     | 0.5     | 0.1     |
| Drawdown [h-ho] (in)          | 139.9   | 97.0    | 55.9    | 34.2    | 21.0    | 12.4    | 6.4     | 1.4     |
| Available Drawdown (ft)       | 167     | 167     | 167     | 167     | 167     | 167     | 167     | 167     |
| 5% of Available Drawdown (ft) | 8.4     | 8.4     | 8.4     | 8.4     | 8.4     | 8.4     | 8.4     | 8.4     |

Drawdown during pump test  
Pump rate during pump test