WATER USE/ WATER AVAILABILITY STUDY

10030 Bottle Rock Road
Kelseyville, CA, 95451
APN 011-057-022/011-057-023

PREPARED FOR:

Bottle Rock Farms FJA Trust
C/O Jennifer Berg
315 College Avenue
Santa Rosa, CA 95401

January 27, 2020
Revised September 24, 2021

PREPARED BY:

HURVITZ ENVIRONMENTAL SERVICES INC.
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Lee S. Hurvitz, PG #7573 CHG #1015
Certified Hydrogeologist

PROJECT NO. 5079.01

HURVITZ ENVIRONMENTAL

GEOLOGIC & ENVIRONMENTAL CONSULTING

January 27, 2020, Revised September 24, 2021

Bottle Rock Farms FJA Trust
C/O Jennifer Berg
315 College Avenue
Santa Rosa, CA 95401

RE: Water Use / Water Availability Study
10030 Bottle Rock Road
Kelseyville, CA
APN 011-057-022/011-057-023
Hurvitz Environmental Project No. 5079.01

Ms. Berg:

Hurvitz Environmental Services, Inc. (HES) is pleased to submit this Water Use / Water Availability Study for the above referenced property. HES prepared this Report in accordance with the Lake County Permit and Resource Management Departments Cannabis Ordinance. The purpose of this Report was to outline the sites proposed water usage rates, water conveyance systems as well as to demonstrate that the project water supply can legally and adequately meet the sites water demands without creating aquifer overdraft.

Based on the information and assessments contained herein, we conclude that the wells discharge capacity appears to be sufficient to provide for the projected annual water use at the site and the well recharge rate appears to indicate that the proposed water usage rates are sustainable. The quantity of groundwater to be used for the project is unlikely to result in significant declines in groundwater availability or depletion of groundwater resources over time. The potential for the project water-use to cause well interference or impacts to Creeks are also considered minimal.

We appreciate the opportunity to provide you with these services. Please do not hesitate to contact us at your convenience, should you have any questions or comments regarding this report or our recommendations.

Sincerely,
HURVITZ ENVIRONMENTAL SERVICES, INC

Lee S. Hurvitz, PG# 7573 CHG #1015
Certified Hydrogeologist

CERTIFIED HYDROGEOLOGIST
LEE S. HURVITZ
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1.0 INTRODUCTION AND SCOPE OF SERVICES

We understand that Ms. Jennifer Berg (the applicant) is applying to Lake County for approval to develop an approximately 4-acre outdoor cannabis cultivation facility (the project) at the property identified as 10030 Bottle Rock Road, Kelseyville, California (the site). The proposed project encompasses two separate, but adjoining parcels with a combined area of 93.24 acres. According to the Lake County Cannabis Ordinance, development of property with the intent to cultivate cannabis requires a Water Use / Water Availability Study. Therefore, on behalf of the applicant Hurvitz Environmental Services (HES) conducted a Water Use Water Availability Study for the site in accordance with the Lake County Permit Requirements.

This Water Use/Water Availability Report includes the following elements:

- Estimates of existing and proposed water uses for the property.
- Characterization of local geologic and hydrogeologic conditions including defining water sheds and sub-basins.
- Review of Well Completion Report (drillers' logs) from the site well.
- Performance of 6-hr well yield test.
- Review of Water Quality Data from Domestic Well.
- Discussion on proposed methods for water level and water usage monitoring.
- Severe drought condition assessment.
- Assess potential for well interference between the project well and neighboring wells and between the project well and nearby streams.

2.0 SITE DESCRIPTION

The site is located in unincorporated Lake County, California, on the east side of Bottle Rock Road. Access to the property is obtained via Nancy Drive, off Bottle Rock Road (**PLATE 1 – SITE LOCATION MAP**). The Lake County Assessor's Office identified the site as Assessor's Parcel No. (APN) 011-057-230 and 011-057-220 (**PLATE 2 – ASSESSORS PARCEL MAP**). The site lies in the California Coastal Mountain Range, approximately 5.2 miles southeast of the town of Kelseyville and 9.6 miles west of the Town of Lower Lake. The southern parcel (011-057-230) consists of 47.68 acres and is developed with one approximately 1,200 sq/ft residential cabin along with an inground septic system and domestic well. In addition, the applicant is currently constructing a 6,000 ft² accessory building on this parcel. The northern parcel (011-057-220) is approximately 45.56 acres and is undeveloped. Both parcels are primarily wooded with canopy forest covering most of the site. Site Photographs are presented in **APPENDIX A**.

2.1 USGS 7.5 MINUTE QUADRANGLE MAP

HES reviewed the United States Geological Survey (USGS) Kelseyville 7.5-minute Quadrangle Map, 2015, (**PLATE 3 – USGS TOPOGRAPHIC MAP**). The approximately 90-acre site generally slopes from southeast to northwest and encompasses a variety of topographic terrains. The southern parcel slopes northwesterly with a peak elevation of approximately 2,800 feet above mean sea level (MSL) on the properties southeast corner and a low elevation of approximately 2,320 along the parcels' northern boundary. The northern parcel also generally slopes to the northwest with the high elevation of approximately 2,500 at the southeast corner of the parcel and a low elevation of approximately 2,300 feet above MSL along the parcels northern boundary. One unnamed Class II intermittent stream flows northerly across the western side of both parcels. The intermittent creek continues flowing north off the northern parcel for approximately 0.4 miles before coalescing with Cole Cree. Cole Creek continues to flow northerly until eventually draining into Clearlake.

2.2 GEOLOGICAL CONDITIONS

HES reviewed the Geologic Map and Structure Sections from the Clear Lake Volcanics, Northern California, 1995, prepared by the California Department of Conservation California Geologic Survey[2]. According to the Map reviewed, the site lies within a geologic region characterized by the Pleistocene aged obsidian (*rto*) and to a lesser extent stony rhyolite (*rts*) **PLATE 5 – GEOLOGIC MAP.**

[2] Geologic Map and Structure Section of the Clear Lake Volcanics, Northern California, California Dept. of Conservation, California Geologic Survey, 1995.

2.3 REGIONAL GROUNDWATER

According to www.ecoatlas.com[3] the project site is located within the Upper Cache Hydrologic Region (sub-basin - HUC-8), the Kelsey Creek-Clear Lake Watershed Region (watershed -HUC-10), and the 180201160302 Region (sub-watershed-HUC-12), all within the jurisdiction of the North Coast Regional Water Quality Control Board.

The Kelsey Creek Watershed totals 28,614 acres, or 44.7 square miles and occupies approximately 10% of the entire Clear Lake watershed. Kelsey Creek is the primary drainage in the watershed and is the third largest tributary to Clear Lake and contributes to approximately 16% of the streamflow into Clear Lake. The site is located in the southern portion of the Kelsey Creek Watershed that is characterized by uplands with elevations in as high as 4,700 above MSL. The region is thought to have two distinct aquifers. The first being a shallow, generally unconfined alluvial aquifer, and the deeper aquifer consisting of volcanic rock and ash. The recharge to the shallow aquifers is thought to be through a combination of direct precipitation and stream flow while recharge to the deeper volcanic aquifer is less known but is generally thought to be by underflow from adjacent uplands. Domestic wells proximate to the site generally tap water from the deeper volcanic aquifer.

[3] EcoAtlas has been developed through funding from the US Environmental Protection Agency and the California State Water Resources Control Board.

3.0 SITE DEVELOPMENT AND WATER USE

It is our understanding that the site will be developed with a total of 4-acres of outdoor cannabis cultivation space. In addition, the project will utilize approximately 1,000 sq/ft for plant propagation to support onsite cultivation activities. The applicant proposes to cultivate two acres of outdoor cannabis on each of the two adjoining parcels. The onsite domestic well (Well # 824915), is located approximately 300 feet from the northern cultivation area and approximately 1,300 feet from the southern cultivation area and will provide water for the entire cultivation project. Discussions on the well construction and yield are presented in Section 3.5 and 3.6 of this Report. The approximate locations of the proposed outdoor cultivation areas, domestic well and onsite cabin are shown on (**PLATE 4 – ENGINEERED SITE PLAN)**.

Water from the domestic well is currently plumbed to the onsite residence only. As part of the site development the applicant plans to re-design the water distribution system so that the well water intended for cannabis will pump directly into a 5,000-gallon poly storage tank located proximate to the well head. From there, the water will be transferred to additional poly tanks located adjacent to each of the proposed cultivation areas using transfer pumps and irrigation lines. Additional small mixing tanks (500-gallons or less) will also be utilized at the cultivation sites.

The project plans do not involve any water diversions, or imported water but does call for rainwater catchment off of the existing cabin. The estimated annual water use for the entire 4-acre cultivation project (outdoor/propagation and employees) is 1.1 million gallons, which is approximately 3.37 acre-feet of groundwater per year. Details on the cultivation projects water usage, including breakdowns of average and peak monthly usage, are presented in **TABLE 1**.

3.1 OUTDOOR CULTIVATION

The applicant plans to develop 2 acres of outdoor cultivation area on each of the 45+ acre parcels. The applicant has not had any specific experience growing cannabis at this location but the applicant is an experienced cannabis cultivator and is designing the system to use minimal amounts of water. First, through the use of "Auto Flowering" plants the applicant will greatly reduce the size, watering frequency, and growing/flowering time, thus creating significantly lower water usage rates than for large plants with a longer cultivation season. The applicant plans to harvest the "Auto Flower" plants twice a season with the entire growing season lasting 6 months and extending from mid-April until mid-October. Second, the applicant plans to utilize point emitter drip irrigation and irrigate early in the day while temperatures are coolest to minimize evaporation rates. Finally the applicant plans to incorporate rainwater catchment tanks proximate to the residence to use for landscape irrigation and dust control.

It is our understanding that a cannabis water usage rate of 2-acre feet/acre/year for outdoor cultivation is not out of the ordinary for typical 6-month cycle large cannabis plants. However, based on the proposed farming methods discussed above, the applicant estimates that they will use approximately 1,100,000 gallons or 3.37-acre feet/year for the entire 4-acre cannabis project. Therefore, we estimate that the applicant will use an average of approximately 6,100 gallons/day over the cultivation season.

3.2 PROPAGATION GREENHOUSE

The applicant also plans to develop 1,000 sq/ft for cannabis propagation space as part of the Project development. The propagation greenhouse will only hold immature plants and clones that are in the process of rooting or growing. Water use is anticipated to be approximately 1,100 gallons per month for the propagation greenhouse or 13,000gallons/year. Breakdowns on the propagation greenhouse water use are presented on **TABLE 1**.

3.3 RESIDENTIAL WATER USE

Domestic water use at the site will initially be used by one 1,200 sq/ft residential dwellings that will occupied by two full time farm managers. The established Napa County Water Availability Analysis methods specify annual domestic water use for a property at 0.75 acre-feet for first dwelling and 0.5 acre-feet for additional dwellings, and 15 gallons per day per worker.[6] So, for this assessment we used the Napa County water use criteria to estimate the annual domestic water use at the site as follows:

1 (primary residence) x 0.75 acre-feet/year (Napa County Water Use Criteria) =
0.75 acre-feet/year = Annual Residential Water Use

3.4 EMPLOYEE WATER USE

We understand that the Project will require two full-time farm mangers, as well as, several part-time seasonal employees. Therefore, for the purpose of this Assessment we estimate that the project will require an average of eight full-time employees throughout the year. Potable water for farm workers will come from the Project Well (#824915). Using the Napa County Water Availability Guidance Document[7] estimate of 15 gallons of water utilized per day per cultivation worker on site, we calculated the following groundwater usage for the Project:

- Annual Onsite Worker Water Use = 8 (average number of daily employees) x 15 gallons/day (daily employee water usage) x 365 days/year) =
  43,800 gallons /year = 0.13 acre-feet/year = Worker Groundwater Use

So, the annual Project water use estimate is 1,100,000 gallons (Outdoor cultivation) + 13,000 gallons (Propagation Greenhouse) + 43,800gallons (Employee Water Usage) + 244,000 gallons (Residential) = 1,400,800 gallons or 4.29 acre-feet/year

3.5 RAIN WATER CATCHMENT

The applicant plans to install rainwater catchment onto the existing 1,200 square-foot residential structure as well as the 6,000 square-foot building currently being constructed. The captured water would be stored in a series of poly tanks and used onsite for onsite landscaping and dust control. We estimate that the average rainfall at the site is 32-inches a year and that the total roof capture space is 7,000 sq/ft. Based on these assumptions the rain water capture potential at the

[6] Water Availability Analysis (WAA) Guidance Document, Napa County, Adopted May 12, 2015.
[7] Water Availability Analysis (WAA) Guidance Document, Napa County, Adopted May 12, 2015.

site is approximately 83,328 gallons/year. This is calculated using the Permit Sonoma Model for rainwater catchment which provides a coefficient for drought conditions and system efficiency. The rainwater capture potential is estimated below.

0.6 (drought and efficiency factor) x 0.62 (unit conversion) x 7,000 sq/ft (catchment area) x 41-inches (average annual precipitation) =
83,328 gallons or 0.26 acre-feet/year = Total Rainwater Catchment Potential

TABLE 1 – TOTAL PROJECT AND SITE WATER USAGE

Source	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
	----------Gallons----------												
Residential	20,000	20,000	20,000	20,000	20,000	20,000	20,000	22,000	22,000	20,000	20,000	20,000	244,000
Outdoor Cultivation	0	0	0	130,000	180,000	180,000	150,000	180,000	180,000	100,000	0	0	1,100,000
Propagation	1,000	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,000	13,000
Employees	2,200	2,200	2,200	4,000	4,000	5,000	5,000	4,000	5,000	5,000	3,000	2,200	43,800
TOTAL USAGE	**23,200**	**23,300**	**23,300**	**155,100**	**205,100**	**206,100**	**176,100**	**207,100**	**208,100**	**126,100**	**24,100**	**23,200**	**1,400,800**

** Rainwater capture total based on Permit Sonoma Model for Rain Water Catchment Potential.

Based on these estimates for onsite water use it appears that the peak water demand at the site will occur annually between May and September with peak daily water demand being approximately 6,800 gallons/day. Total site water usage is anticipated to be ~**4.3 acre-feet/year**.

3.6 DOMESTIC WELL INFORMATION

HES reviewed the well completion report for the proposed project well (**APPENDIX B – Well Completion Report**). The well was installed in August of 2003 under permit number WE-3356. The well has a total depth of 450 feet and static water levels were recorded at approximately 105 feet from the top of casing at the time of installation. The well is equipped with a 1.5 horse power motor and has a water totalizing meter installed at the well head. The well yield at the time of installation was measured at 16.5 gallons/minute. Review of the geologic log on the Well Completion Report indicates that the site is underlain by soft volcanic ash with obsidian from the surface to approximately 105 feet BG. The volcanic ash and obsidian is underlain to approximately 120 feet BG by broken obsidian and the remainder of the borehole to 450 BG was identified as gray volcanics. The well screens though materials identified primarily as gray volcanics and broken obsidian which is consistent with the Obsidian and Stony Rhyolite identified on the Geologic Map.

3.7 WELL YIELD TEST

On January 13, 2020, HES conducted a 6-hour well yield test at the on-site domestic well. we used an existing 1.5hp submersible pump set in the well to perform the test. The yield test began

at 8:50am and ended at 2:55pm the same day. We were not able to measure drawdown of the water level in the well during pumping due to constraints at the well head. However, we were able to measure the well discharge rate in gallons per minute (GPM) which can be approximately correlated to groundwater levels. During the well test, HES pumped the well at an initial rate of 13.2 GPM. Within 1 hour the flow rate was reduced to 11.1 GPM and within approximately 4 hours the pumping rate stabilized and sustained at approximately 9 GPM (**Appendix C – Well Yield Test Data**).

Based on the pump curve for 1.5hp pump and the historically measured static groundwater level we estimate the static water level at the start of the well test was approximately 105 feet BG. After 4 hours of pumping the well discharge stabilized at 9GPM. At this point the well continued to pump at a constant rate for an additional 2.5 hrs. This indicates that the drawdown in the well had stabilized. Based on the standard pump curve for a 1.5 hp submersible pump this flow rate corelates to approximately 335 feet of drawdown. Based on the stabilized flow rate and estimated drawdown we calculated the specific capacity to be 0.027. The total amount of water generated during the 6-hour pump test was 3,678 gallons or an average of 10.1 GPM. The measured flow rate after approximately 17 hours of not pumping from the well was back to 13.2 GPM indicating that the water levels had fully recovered from the drawdown seen the previous day. The well yield test data and pump curve are attached in **APPENDIX C**.

Based on the results of the pump test we estimate that is will take approximately 11-12 hours of pumping from the project well to meet the sites peak daily water demand and only 9-10 hours to meet the average groundwater demand during the growing season. Therefore, based on well yield and recovery measurements it appears that the well can sustainably produce the water required to meet the proposed projects water demand.

3.8 MONITORING AND REPORTING

The applicant currently has a water totalizing meter installed at the well head. The meter measures the total gallons pumped but can also be used to calculate the GPM of the well discharge. Once the project is further developed the applicant plans to re-design the water distribution system so that they can pump water to both cultivation sites as well as the ancillary buildings. The water meter will be reinstalled at this time and utilized to measure water use associated with cannabis irrigation. Monthly water usage totals will be recorded in a log book that will be kept onsite and provided to the oversight agencies upon request.

The project well will also be serviced so that a standard water level probe and measuring tape can be lowered into the well through the well head. Once configured the applicant will utilize a Solinist® Water Level Meter to obtain monthly depth to water readings from the site well. The readings will be taken on the same day of each month and prior to daily pumping activities. Results of the water level measurements will be recorded in a log book and stored onsite and provided to the oversight agencies upon request.

4.0 WATER QUALITY

A water quality assessment of the project well was not performed as part of this Assessment Report. However, the property owner recently performed general water chemistry analysis on groundwater from the well. The results of the well testing are summarized below on **TABLE 2 Water Quality Results**, and a copy of the Laboratory Report is attached in **APPENDIX D**. While the results of the water testing did not identify any contaminants of concern the well water may need to be treated to meet the specific needs of the cannabis irrigation. In addition, we recommend that total coliform and e-Coli bacteria should be analyzed prior to the well being used as a potable water source for employees.

TABLE 2 – Water Quality Results

Location (APN)	Visual Appearance	pH	EC Mmhos/cm	Nitrate as $N03^{-}$ (mg/L)	Total Manganese (mg/L)	Silica (mg/L)
011-057-230	Clear	5.5	0.11	0.2	NA	NA
California Maximum Contaminant Level (MCL)	NA	NA*	NA	45	0.05	70**

TABLE 2 Continued - METALS AND MINERALS

Sample No.	MINERALS					
	Boron (mg/L)	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	Fe (mg/L)	Hardness
011-057-230	<0.02	6.7	7.2	3.2	5.5	31.1
California Maximum Contaminant Level (MCL)	1.0*	NA	NA	NA	NA	NA

***Federal Action Level (AL)**

TABLE 2 Continued – ALKALINITY, ANIONS, TDS AND SAR

Sample No.	ALKALINITY				ANIONS		TDS	SAR
	Total	Bicarbonate	Carbonate	Hydroxide	Chloride (mg/L) (mg/L)	Sulfate as SO4 ((mg/L)	Total Dissolved Solids (mg/L)	Sodium Absorption Ratio
011-057-230	53.5	65	0.0	NA	9	2.3	530	0.52
California Maximum Contaminant Level (MCL)	NA	NA	NA	NAQ	600	500	1000	NA*

5.0 WATER BALANCE INFORMATION

5.1 PRECIPITATION

Precipitation, primarily as rainfall is the major source of inflow to volcanic aquifers like the one at the site. Though there are no climate stations on site or in the immediate vicinity, we estimate that the seasonal precipitation for the site is 32-inches/year [20]**.** Based on this precipitation it can be reasonably expected that approximately 2.66 acre-feet of rain falls on every acre of the site annually, or 248 acre-feet over the entire 93.24-acre site.

5.2 GROUNDWATER RECHARGE

Groundwater recharge is the replenishment of an aquifer with water from the land surface. It is usually expressed as an average rate of inches of water per year, similar to precipitation. Thus, the volume of recharge is the rate times the land area under consideration times the time period, and is usually expressed as acre-feet per year. In addition to precipitation, other sources of recharge to an aquifer are stream and lake or pond seepage, irrigation return flow (both from canals and fields) inter-aquifer flows, and urban recharge (from water mains, septic tanks, sewers, drainage ditches).

For this site, the volcanic aquifer is considered generally unconfined with only thin layers of clay creating minimal aquifer pressure. Drainage features that intersect and border the site have likely eroded through some of the overlying clay layers and are contributing to the recharge of the site's aquifer through the stream bottom. However, it is also likely that a portion of the rain water falling directly on the site infiltrates the ground surface and migrates downward through the soil matrix until it recharges the aquifer.

To estimate the groundwater recharge at the site we first assumed that the recharge to the aquifer is primarily through rainfall and that all rainfall accumulated within the 93.24-acre cultivation parcel drains to the nearby creeks that intersect and border the site. Therefore, the annual precipitation available for recharge onsite can be estimated using the following data and equation.

93.24 acres x 2.66 feet (annual precipitation on the site) =
248 acre-feet Estimated Annual Precipitation Onsite

However, this estimate does not account for surface run-off, stream underflow, and evapo-transpiration that occurs in all watersheds. According to the USGS, the long-term average precipitation that recharges groundwater in these northern California regions is approximately 15 percent but can be as low as 1.67%. Since this site has relatively mixed topography with both upland and low-lying areas, we estimate that the long-term average precipitation that recharges groundwater within the entire site is near the regional average of 15%. With this data and the precipitation data presented above, we can re-calculate the groundwater recharge within the cultivation parcel using the following equation.

[20] http://rainharvestcalculator.com/Rainfall/CA/Middletown/95461 based on 5-year average (2013-2017)

248 acre-feet (annual precipitation onsite) x 0.15 (long term average for recharge) =
Estimated Average Groundwater Recharge = 37.2 acre-feet/year

The total site water usage is estimated to be **4.3 acre-feet/year** and the average groundwater recharge is estimated to be **37.2 acre-feet/year** therefore, it appears that the project will have enough water to meet its demands without creating aquifer overdraft conditions.

5.2.1 Drought Conditions

The above recharge assessment was based on a recent 5-year average for rainfall in the region (2013-2017). However, this average, while lower than the 30-year average, did not account for severe drought conditions as we have seen over the past 2 years (2020-2021). If we were to include periods of severe drought by using a value of 50% of the 5-years average rainfall period used above, and assume that the groundwater recharge rate will subsequently be reduced to 10% due to evaporation at reduced specific yield, we can estimate the potential drought condition or low-end value for annual aquifer recharge as follows.

248 acre-feet (average precipitation onsite) x 0.5 (drought factor) x 0.1 (conservative long-term average for recharge) =

Estimated Severe Drought Value for Groundwater Recharge = 12.4 acre-feet/year

6.0 PUMPING INFLUENCE TO SURROUNDING PROPERTIES

To evaluate potential well pumping impacts to surface water bodies or wells on other properties, the potential lateral extent of pumping from the planned project well was estimated. Using general relationships discussed in Driscoll (1986)[21], we estimated the lateral pumping influence using information from the 2020 well yield test. An approximate relationship between specific capacity calculated from the well yield testing, and aquifer transmissivity was used to obtain aquifer characteristics and estimate a potential radius of pumping influence. Transmissivity was estimated for an unconfined aquifer, using the relationship of Specific Capacity (yield/drawdown) x the coefficient of 1,500 (unconfined). To develop the slope of the drawdown curve from the pumping well, the value of Δs (drawdown over one log graph cycle) was calculated for a distance-drawdown relationship, where $T = 528Q/\Delta s$ (Driscoll,1986, Equation 9.11). The analysis is shown on the attached semi-log plots for the site's irrigation well **APPENDIX E – RADIUS OF PUMPING INFLUENCE**

The estimated specific capacity for the project well was calculated to be 0.027 gpm/foot drawdown (9 gpm/ 335 feet drawdown). Using this data and applying it to the site, we calculated a zone of pumping influence extending approximately 340 feet from the irrigation well, assuming an unconfined aquifer. There are no neighboring wells within 340 of the irrigation well.

There are no surface water bodies within the well estimated radius of pumping influence and therefore stream depletion is not considered a concern to this assessment.

[21] Groundwater and Wells, Second Edition, Fletcher G. Discoll, 1986, published by Johnson Division, St. Paul Minnesota, 1089p.

7.0 DROUGHT MANAGEMENT

Due to the recent drought conditions in California, Lake County has requested that cannabis applicants provide plans on how they will minimize water use if a drought emergency is declared in the Lake County. As previously discussed in Section 3.1 of this Report the project applicant is an experienced cannabis cultivator and is designing the system to use minimal amounts of water. First, through the use of "Auto Flowering" plants the applicant will greatly reduce the size, watering frequency, and growing/flowering time, thus creating significantly lower water usage rates than for large plants with a longer cultivation season. The applicant plans to harvest the "Auto Flower" plants twice a season with the entire growing season lasting 6 months and extending from mid-April until mid-October. Second, the applicant plans to utilize point emitter drip irrigation and irrigate early in the day while temperatures are coolest to minimize evaporation rates. Finally, the applicant plans to incorporate rainwater catchment tanks proximate to the residence and Ag building to use for landscape irrigation and dust control. It is anticipated that 15-20,000 gallons of rainwater will be stored onsite.

In addition to the best water management practices listed above, the applicant will perform these additional water saving measures if the County declares a drought emergency.

- Spreading of mulch or similar material throughout the cultivation area to decrease evaporation losses and decrease watering frequency.
- Install wind barriers at the site to decrease evaporation losses from dry windy conditions.
- Use previously saved rainwater to supplement cannabis irrigation and eliminate landscape watering.

8.0 CONCLUSIONS

The project site is located in the Kelsey Creek- Clear Lake Watershed within an aquifer consisting of broken obsidian, stony rhyolite and volcanic ash of Pleistocene age. The aquifer is considered semi-confined and recharge to the aquifer likely occurs primarily through underflow from the overlying upland areas. The estimated groundwater usage for the entire site including the proposed project is approximately 4.29 acre-feet/year. This value includes the proposed project water usage of 3.37 acre-feet/year but does not include the applicants proposed rainwater catchment which will slightly offset the groundwater usage values in the future. Based on well yield test data collected at the site, it appears that the aquifer storage and recharge area are sufficient to provide for sustainable annual water use at the site and within the area.

In summary:

Estimated Water Usage at Project Site (proposed cultivation/propagation) = 3.37 acre-feet/year
Additional Site Water Use (residential and employees) = 0.92 acre-feet/year
Total Estimated Site Water Use = 4.29 acre-feet/year
Potential Rainwater Offset = 0.26 acre-feet
Estimated Annual Recharge – 37.2 acre-feet/year
Estimated Recharge During Severe Drought – 12.4 acre-feet/year
Sustained Well Yield after 6 hrs. of pumping = 9 gpm
Peak Daily Water Demand = 6,800 gallons

The quantity of groundwater to be used for the project compared to the quantity of available groundwater indicates that pumping for the proposed project is unlikely to result in significant declines in groundwater elevations or depletion of groundwater resources over time. The horizontal and vertical separations between the project wells and the nearest streams and neighboring wells should not result in significant well interference or impacts to creeks. In addition, the permitted domestic well is equipped with the required water totalizing meter and will be re-configured to allow for monthly depth to water recordings directly from the well head.

9.0 LIMITATIONS

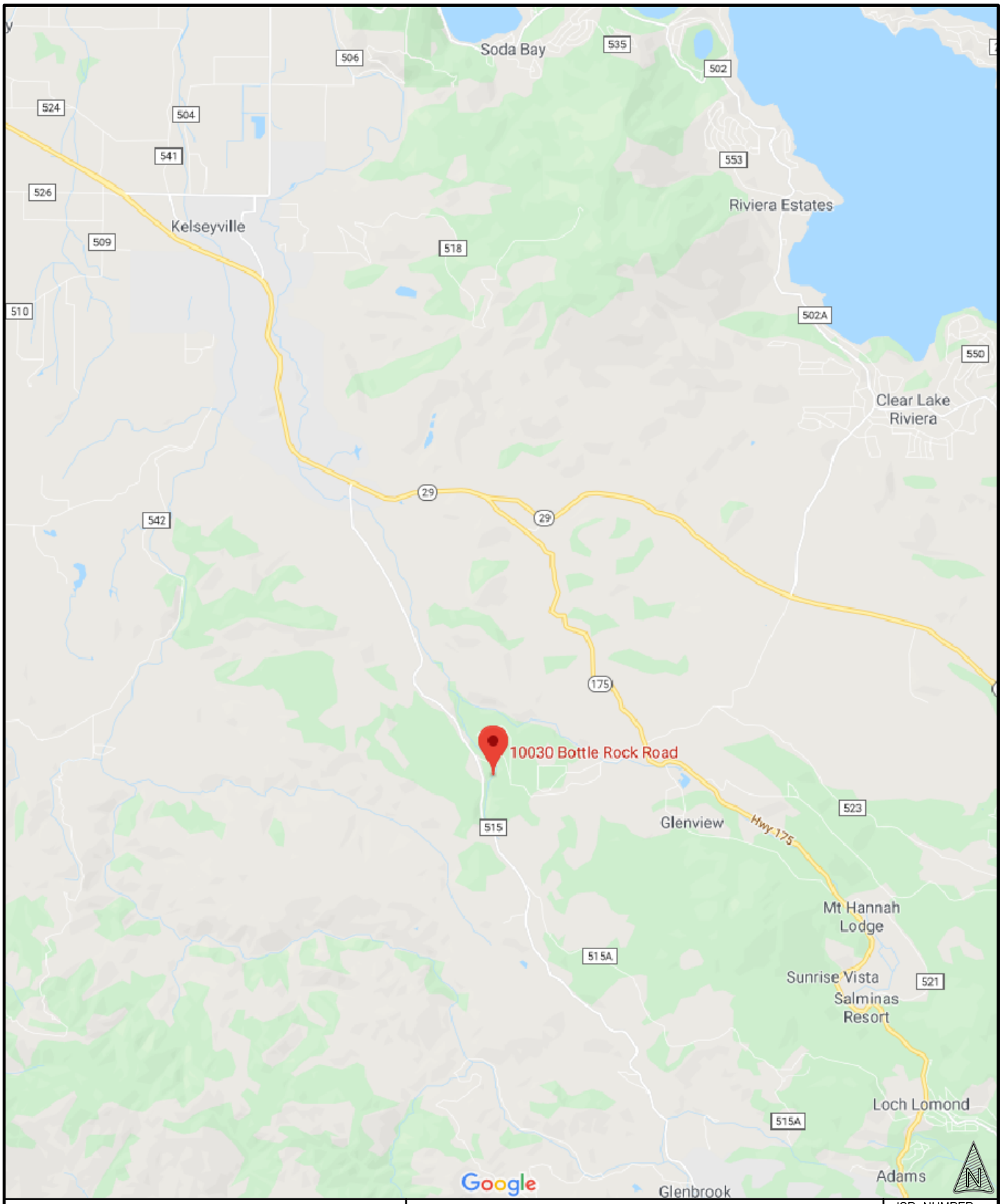
HES is not responsible for the independent conclusions, opinions or recommendations made by others based on the records review, site inspection, field exploration, laboratory test data and interpretations presented in this report.

Groundwater systems of Lake County are typically complex, and available data rarely allows for more than general assessment of groundwater conditions and delineation of aquifers. Hydrogeologic interpretations are based on the drillers' reports made available to us through the California Department of Water Resources, available geologic maps and hydrogeologic studies and professional judgment. This analysis is based on limited available data and relies significantly on interpretation of data from disparate sources of disparate quality.

It should be noted that hydro-geological assessments are inherently limited in the sense that conclusions are drawn and recommendations developed from information obtained from limited research and site evaluation. Additionally, the passage of time may result in a change in the environmental characteristics at this site and surrounding properties. This report does not warrant against future operations or conditions, nor does this warrant operations or conditions present of a type or at a location not investigated.

This study is not intended to assess if any soil contamination, waste emplacement, or groundwater contamination exists by subsurface sampling through the completion of soil borings and the installation of monitoring wells. The scope of work, determined by the client, did not include these activities.

This Report is for the exclusive use of Ms. Jennifer Berg, her affiliates, designates and assignees and no other party shall have any right to rely on any service provided by Hurvitz Environmental Services without prior written consent.



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SITE LOCATION MAP

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KELSEYVILLE, CALIFORNIA 95451

JOB NUMBER: 5079.01
DATE: 1/24/20
PLATE: 1

SEC. 7 T12N R8W
Por. of NW1/4 & a Por. of W1/2 of NE 1/4 of SEC. 8 T12N R8W
SW1/4 & W1/2 of SE1/4 of SEC. 8 T12N R8W

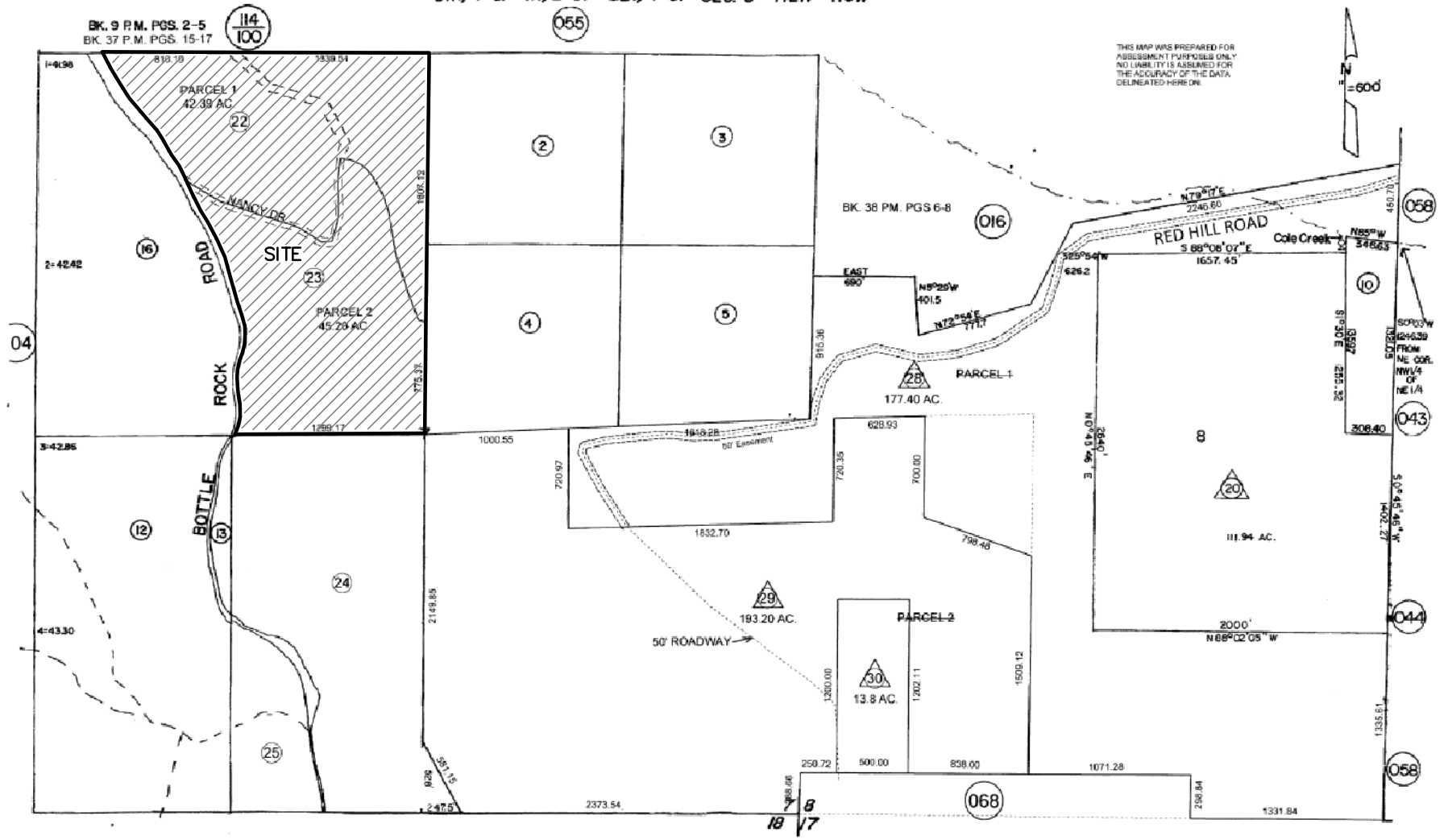
T. R. A.
56-035

11-057

BK. 9 P.M. PGS. 2-5
BK. 37 P.M. PGS. 15-17

114/100

055

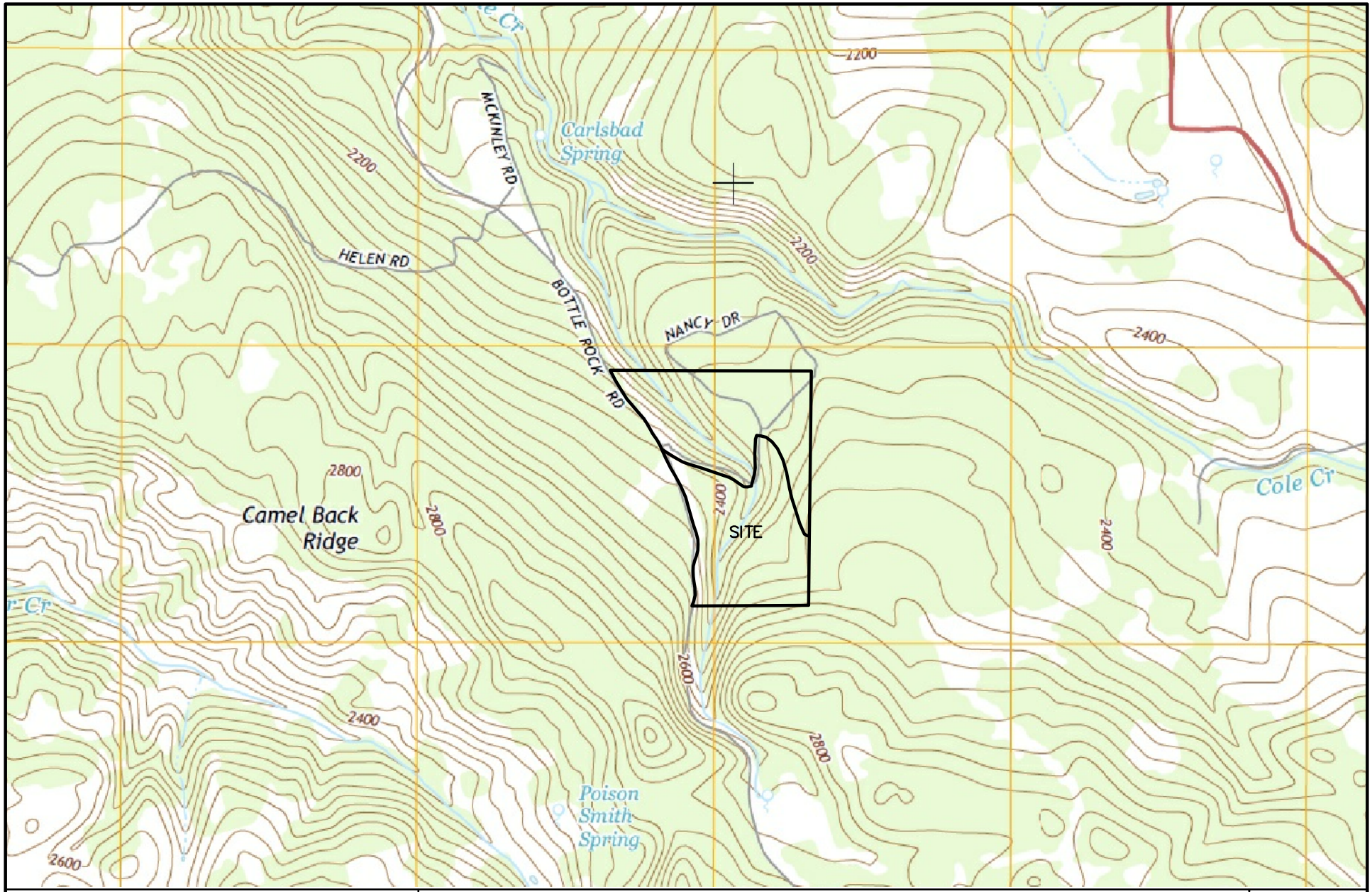


HURVITZ ENVIRONMENTAL
105 MORRIS ST, STE 188
SEBASTOPOL, CA 95472
PH: 707.824.1690
FX: 707.824.2675
HURVITZ.ENVIRONMENTAL@GMAIL.COM
CA PG# 7573

ASSESSORS PARCEL MAP

APN 011-057-220/011-057-230
10030 BOTTLE ROCK RD
KELSEYVILLE, CALIFORNIA 95451

JOB NUMBER: 5079.01
DATE: 1/24/20
PLATE: 2



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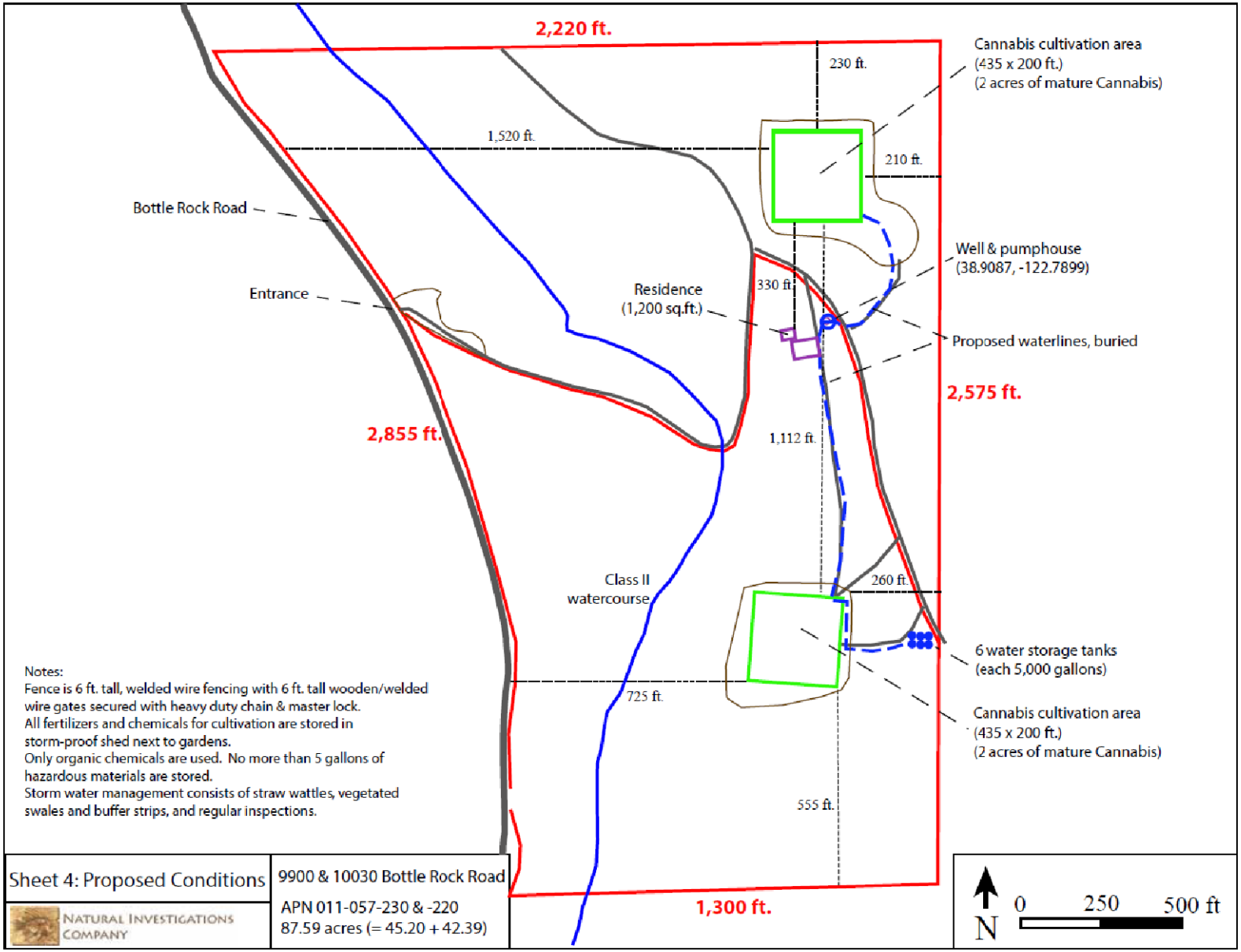
TOPOGRAPHIC MAP

APN 011-057-220/011-057-230
10030 BOTTLE ROCK RD
KELSEYVILLE, CALIFORNIA 95451

JOB NUMBER: 5079.01
DATE: 1/24/20
PLATE: 3



Notes:
Fence is 6 ft. tall, welded wire fencing with 6 ft. tall wooden/welded wire gates secured with heavy duty chain & master lock.
All fertilizers and chemicals for cultivation are stored in storm-proof shed next to gardens.
Only organic chemicals are used. No more than 5 gallons of hazardous materials are stored.
Storm water management consists of straw wattles, vegetated swales and buffer strips, and regular inspections.

Sheet 4: Proposed Conditions	9900 & 10030 Bottle Rock Road
Natural Investigations Company	APN 011-057-230 & -220 87.59 acres (= 45.20 + 42.39)

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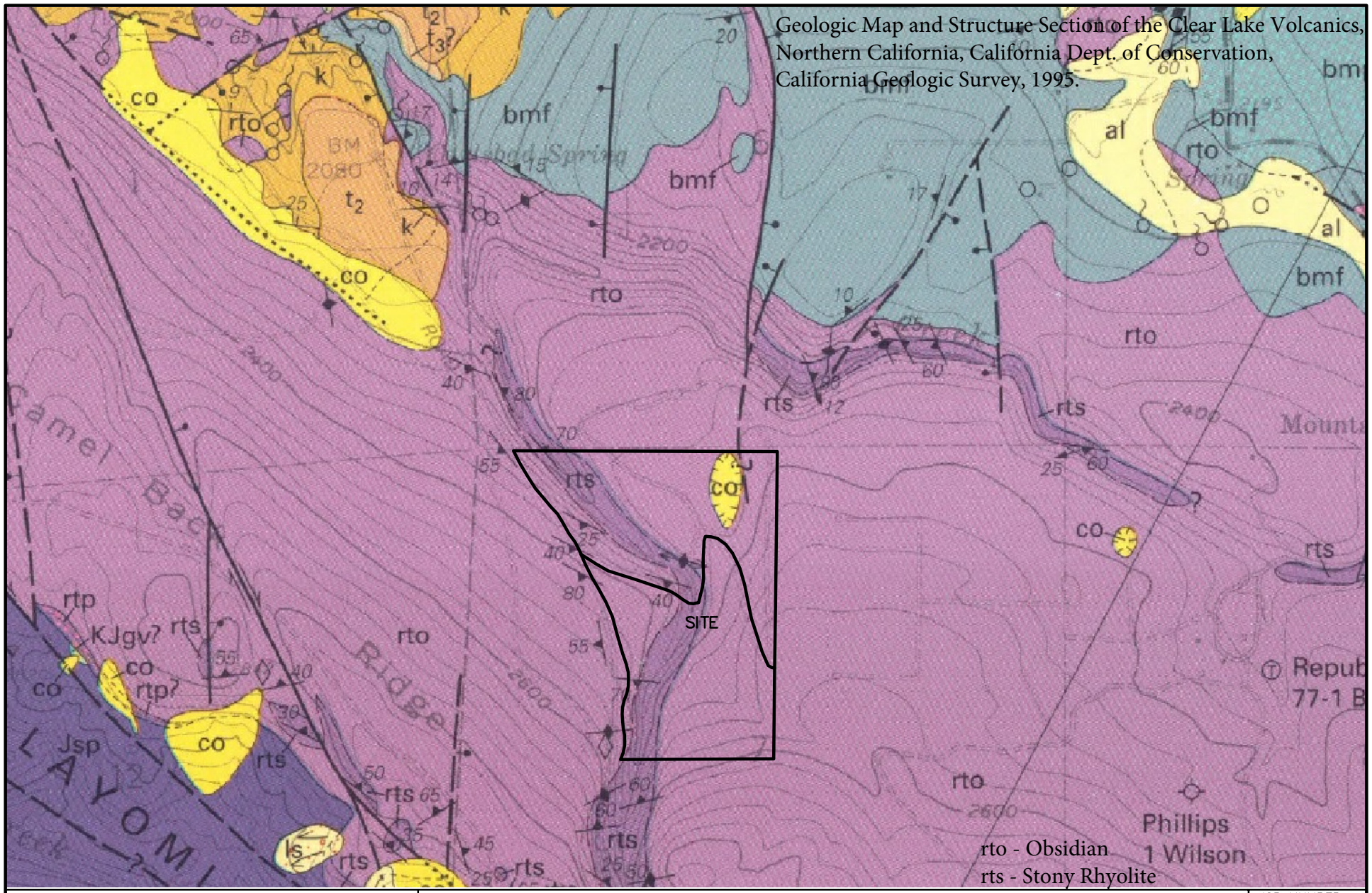
SITE PLAN

APN 011-057-220/011-057-230
10030 BOTTLE ROCK RD
KELSEYVILLE, CALIFORNIA 95451

JOB NUMBER: 5079.01
DATE: 1/24/20
PLATE: 4



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GEOLOGIC MAP

APN 011-057-220/011-057-230
10030 BOTTLE ROCK RD
KELSEYVILLE, CALIFORNIA 95451

JOB NUMBER: 5079.01
DATE: 1/24/20
PLATE: 5

APPENDIX A
SITE PHOTOGRAPHS

SITE PHOTOGRAPHS
January 13, 2020

Photo 1: View of site well # 824915.

Photo 2: Close-up view of site well # 824915 and water flow meter installed at well head.

SITE PHOTOGRAPHS
January 13, 2020

Photo 3: View of site looking north from the site well.

Photo 4: View of well discharge during pump test.

APPENDIX B
WELL COMPLETION REPORT

TRIPLICATE
Owner's Copy

Page ___ of ___

Owner's Well No. ___

Date Work Began 8-19-03 Ended 8-25-03

Local Permit Agency Health Dept.

Permit No. 03-335a Permit Date 8-18-03

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 824915

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD air rotary FLUID ___

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0	105	Soft Volcanic Ash w/obsidian sand
105	120	Broken Obsidian
120	450	Gray Volcanics

TOTAL DEPTH OF BORING 450 (Feet)

TOTAL DEPTH OF COMPLETED WELL 450 (Feet)

WELL OWNER

Name Kristi Wells

Mailing Address 9649 Crestview Dr

City Clearlake Ca. State 95422 ZIP

WELL LOCATION

Address 10030 Big Rock Rd

City Kelseyville

County Lake

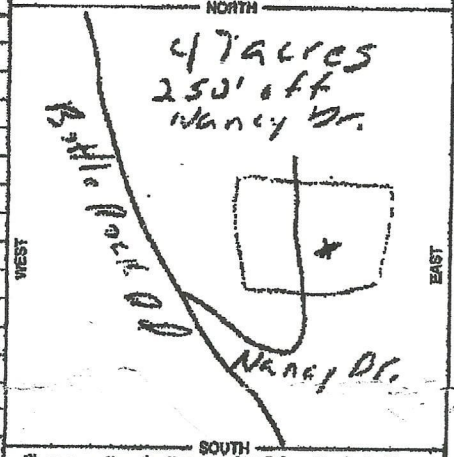
APN Book 011 Page 057 Parcel 17

Township 12N Range 7W Section 7

Latitude ___ DEG. ___ MIN. ___ SEC. NORTH

Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH



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.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

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

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial

___ MONITORING
___ TEST WELL
___ CATHODIC PROTECTION
___ HEAT EXCHANGE
___ DIRECT PUSH
___ INJECTION
___ VAPOR EXTRACTION
___ SPARGING
___ REMEDIATION
___ OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 120 (Ft) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 105 (Ft.) & DATE MEASURED 8-22-03

ESTIMATED YIELD * 10.5 (GPM) & TEST TYPE air lift

TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

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

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	120	9	X				PVC	4½	160	
20	120	5	X				"	"	"	
120	160	5		X			"	"	"	118
160	200	5		X			"	"	200	.032
200	450	5		X			"	"	160	118

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	20	X			
20	450			5/16 Rock	

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 13011 Hwy 29 CITY Lower Lake STATE Ca ZIP 95457

Signed [signature] (WELL DRILLING CONTRACTOR) 8-26-03 DATE SIGNED 462-5071 (PHONE NUMBER)

DWR 188 REV. 11-98 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DS FF DS JB

APPENDIX C
WELL YIELD TEST

Water Yield #_____ Well Permit # WE-3356

I. Individual performing test: Lee S. Huvuitz

II. Type of license/registration, number and expiration date: CHG #1015 5/31/21 - exp.

III. Location of well:
Address: 10030 Bottle Rock Rd. Kelseyville, CA A.P. #: 011-057-023

IV. Type and model of test pump: Franklin 1.5hp. Submersible

V. Test pump setting depth: NA

VI. Maximum reported yield for this pump type at this setting: NA

VII. Type of discharge measurement method: Water Meter

VIII. Type and model of flow meter (or provide an accurate description of weir or orifice plate):

Badger M-25 flow meter

Geographic coordinates (Plane Coordinate Method or distance from fixed landmarks): _____

IX. Estimated elevation of well head: _____

X. Initial static water level (include measuring points such as top of casing, surface seal, access port): Not Available

XI. Date & time of initial static water level measurement 1/13/20 8:50 a.m./p.m.

A. Discharge Rate: 13.2 - 9 gpm
B. Dynamic Water Level: NA
C. Specific Capacity: NA
D. Pump Test duration: 6 hrs

XII. Immediately after the test take the following measurements:

A. Dynamic water level: NA
B. Final discharge rate: 9 gpm

XIII. Post - Test Measurement:

A. Dynamic water level: NA
B. Static water level: NA
C. Percentage of recovery of final static level: NA

Testing performed by (signature): [signature]

Date: 1-13-20 Company: Huvuitz Environmental Phone Number: 707-874-1690

Well Pump Test Data Recordation

Address: 10030 Bottle Rock Rd. Kelseyville APN-011-057-023

Date	Time	Interval	SWL	GPM	Comments		
1-13-2020	8:50A	1 Min	NA	13.2	45,877 gallons @ Start		
	8:51	1 Min		13.2			
	8:52	1 Min		13.2			
	8:53	1 Min		13.2			
	8:54	1 Min		13.2			
	9:00	5 Mins		12.9			
	9:05	5 Mins		12.9			
	9:10	5 Mins		12.7			
	9:15	5 Mins		12.3			
	9:20	5 Mins		12.0			
	9:25	5 Mins		11.8			
	9:30	5 Mins		11.5			
	9:35	5 Mins		11.2			
	9:40	5 Mins		10.9			
	9:45	5 Mins		10.7			
	9:50	5 Mins		10.5			
	9:55	5 Mins		10.3			
	10:15	20 Mins		9.9			
	10:35	20 Mins		9.6			
	10:55	20 Mins		9.3			
	11:25	30 Mins		9.0			
	11:55	30 Mins		9.0			
	12:25p	30 Mins		9.0			
	12:55	30 Mins		9.0			
	1:25	30 Mins		9.0			
	1:55	30 Mins		9.0			
	2:25	30 Mins		9.0			
	2:55	30 Mins		9.0	49,555 gallons @ End		
		30 Mins					
		30 Mins					
		30 Mins			Total Volume = 3,678 gallons		
		30 Mins			Total Time = 6hrs 5minutes		
		30 Mins			Average gpm =	10.08 gpm	
		30 Mins			Stabilized gpm =	9 gpm	
		30 Mins					
		30 Mins					
		30 Mins					
		30 Mins					
		30 Mins					
		30 Mins					
1-14-2020	8:30A		NA	13.7			
		72 Hrs. or					

APPENDIX D
WELL TESTING RESULTS

LOGAN LABS
SOIL TESTING SERVICES

Water Analysis Report

Job Name	Andrew Allen	**Company**	Andrew Allen
Contact		**Sample ID**	369707
Rep		**Lab Number**	15866
Submitted By		**Run Date**	12/17/2019

Sample Location	BRW 1	**Notes**
Sample Name		

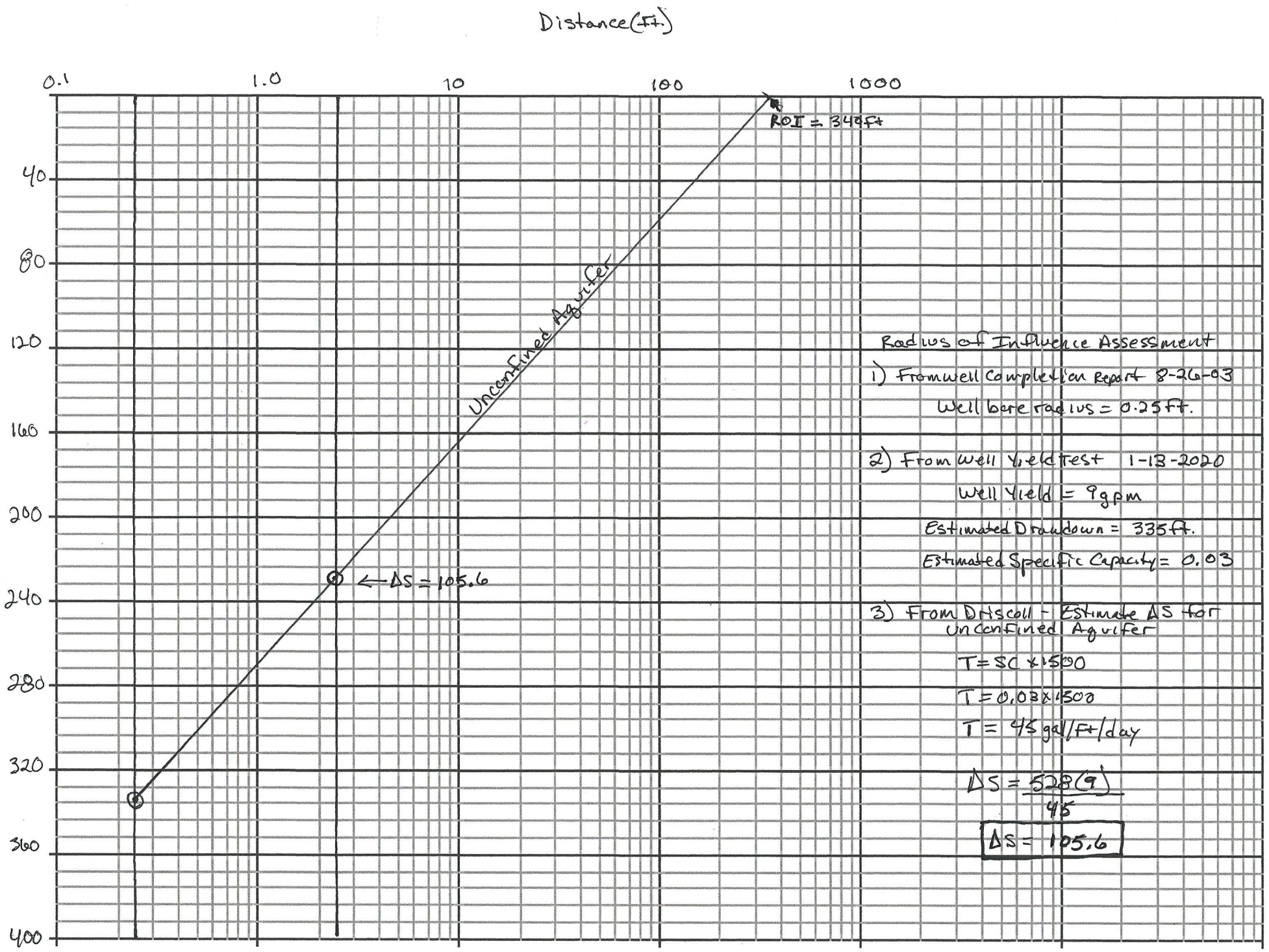
pH		5.5
Hardness	ppm	31.1
Hardness Grains	/gal	1.82
Conductivity	mmhos/cm	0.11
Sodium Adsorption Ratio		0.52

		ppm	meq/L	lbs/A in
Calcium	Ca	7.2	0.36	1.63
Magnesium	Mg	3.2	0.27	0.72
Potassium	K	5.4	0.14	1.23
Sodium	Na	6.7	0.29	1.51
Iron	Fe	5.5		1.25

	meq/L	lbs/A in
Total Alkalinity	53.5	12.16
Carbonate	0.0	0.00	0.00
Bicarbonate	65.0	1.07	14.77
Chloride	9.0	0.26	2.05
Sulfate	2.3	0.05	0.53
Salt Concentration	70.4		16.00
Boron	< 0.02		
Cation/Anion Ratio		0.77	

Nitrate ppm	0.2
P ppm	0.14
pHc	8.82
Adj. SAR	0.3

APPENDIX E
RADIUS OF PUMPING INFLUENCE



Radius of Influence Assessment

1) From well completion Report 8-26-03

Well bore radius = 0.25ft.

2) From Well Yield Test 1-13-2020

Well Yield = 9gpm

Estimated Drawdown = 335ft.

Estimated Specific Capacity = 0.03

3) From Driscoll - Estimate ΔS for unconfined Aquifer

$T = SC \times 1500$

$T = 0.03 \times 1500$

$T = 45$ gal/Ft/day

$$\Delta S = \frac{528(9)}{45}$$

$$\boxed{\Delta S = 105.6}$$

Radius of Pumping Influence
10030 Bottlerock Rd.
Kelseyville, CA


6/2021
Estimated Radius of Pumping Influence
Domestic Well
Nancy Dr
314 ft
Google Earth