



TECHNICAL MEMORANDUM

To: Lake County Community Development Department
From: Annjanette Dodd, PhD, CA PE #77756 Exp. 6/30/2023
Date: Revised December 29, 2022
Subject: Ordinance 3106 Hydrology Report – UP 20-92 Bar X Farms, LLC
18655, 19395, 20103, and 20333 S Hwy 29, Middletown, (Cultivation APNs: 014-250-07 and 14; Non-cultivation APNs: 014-250-05 and 10)

INTRODUCTION AND PURPOSE

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

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

The purpose of this Technical Memorandum (TM) is to provide the information required by Ordinance 3106 for UP 20-92, Bar X Farms, LLC. In addition to this TM, a Groundwater Availability Analysis and a Cumulative Groundwater Impact analysis were conducted by Chico Environmental dated April 12, 2021 and July 2, 2021, respectively. These analyses were submitted to the Lake County Community Development Department. The Groundwater Availability Analyses, which were prepared by a licensed Professional Geologist, concluded that there is sufficient water for the proposed project and that the project would not affect downgradient groundwater users or other well users in the vicinity of the project.

Ordinance 3106 also requires a Drought Management Plan (DMP) depicting how the applicant proposes to reduce water use during a declared drought emergency. The DMP for this project has been submitted as a separate document.

PROJECT LOCATION

The project is located 18655, 19395, 20103, and 20333 S Hwy 29, Middletown, Lake County, California (Cultivation APNs: 014-250-07 and 14; Non-cultivation APNs: 014-250-05 and 10). The project site is located approximately 1.8 miles northeast of Middletown and approximately 2.3 miles southwest of the Hidden Valley Lake community. The project site is Bar X Ranch, an existing cattle ranch that has been actively farmed for over 100-years for cattle grazing and hay production.



PROPOSED PROJECT

The project proposes outdoor cannabis cultivation of 59 acres of outdoor canopy within seven (7) garden areas. Details are summarized in Table 1 and Figure 1.

Table 1. Summary of Cannabis Canopy

APN	Garden Name	Cultivation Type	Canopy Area (sq. ft.)	Canopy Area (acres)
014-250-07	Center Garden	Outdoor	60,000	1.4
014-250-07	West Center Garden	Outdoor	110,000	2.5
014-250-07	Riverside Garden	Outdoor	785,000	18.0
014-250-07	East Center Garden	Outdoor	455,000	10.4
014-250-14	Pasture Garden	Outdoor	845,000	19.4
014-250-14	Southwest Garden #1	Outdoor	150,000	3.4
014-250-14	Southwest Garden #2	Outdoor	165,000	3.8
		Total	2,570,000	59.0

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 al. (2015), who reported up to 5.0 (gpd) per plant (18.9 Liters/day/plant). Using the largest demand estimate of 6.0 gpd reported by the CDFA (CDFA, 2017), the estimated demand is 3,000 gpd (2.1 gallons per minute [gpm]) per acre of canopy; however, this is an average daily demand over the cultivation period which is lower during seedling/vegetative states and higher during the flowering period. To account for these different states, and use a more conservative estimate, the estimated demand been revised to utilize a higher estimate of 6,970 gpd (0.16 gallons per sq ft) per acre of canopy during the flowering period and 4,180 gpd (0.096 gallons per sq ft) per acre of canopy during the vegetative period is used herein. Assuming 35% of the time the cultivation is in the flowering state and 65% it is in the vegetative state, the average daily demand per acre of canopy is 5,160 gpd per acre of canopy.

The total estimated irrigation water demand is as follows:

- Average Daily – 304,234 gallons (211.3 gpm)
- Maximum Daily (during the flowering period) – 411,230 (285.6 gpm)
- Yearly (based on a typical 150-day outdoor cultivation season) – 140.0 AF

The estimated monthly demand is summarized in Table 2.

Table 2. Estimated projected monthly water use based on vegetative (65% or 97.5 days) and flowering (35% or 52.5 days) periods.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Irrigation (10,000 gal)	0	0	0	0	518	740	765	1,020	1,234	288	0	0	4,563.5



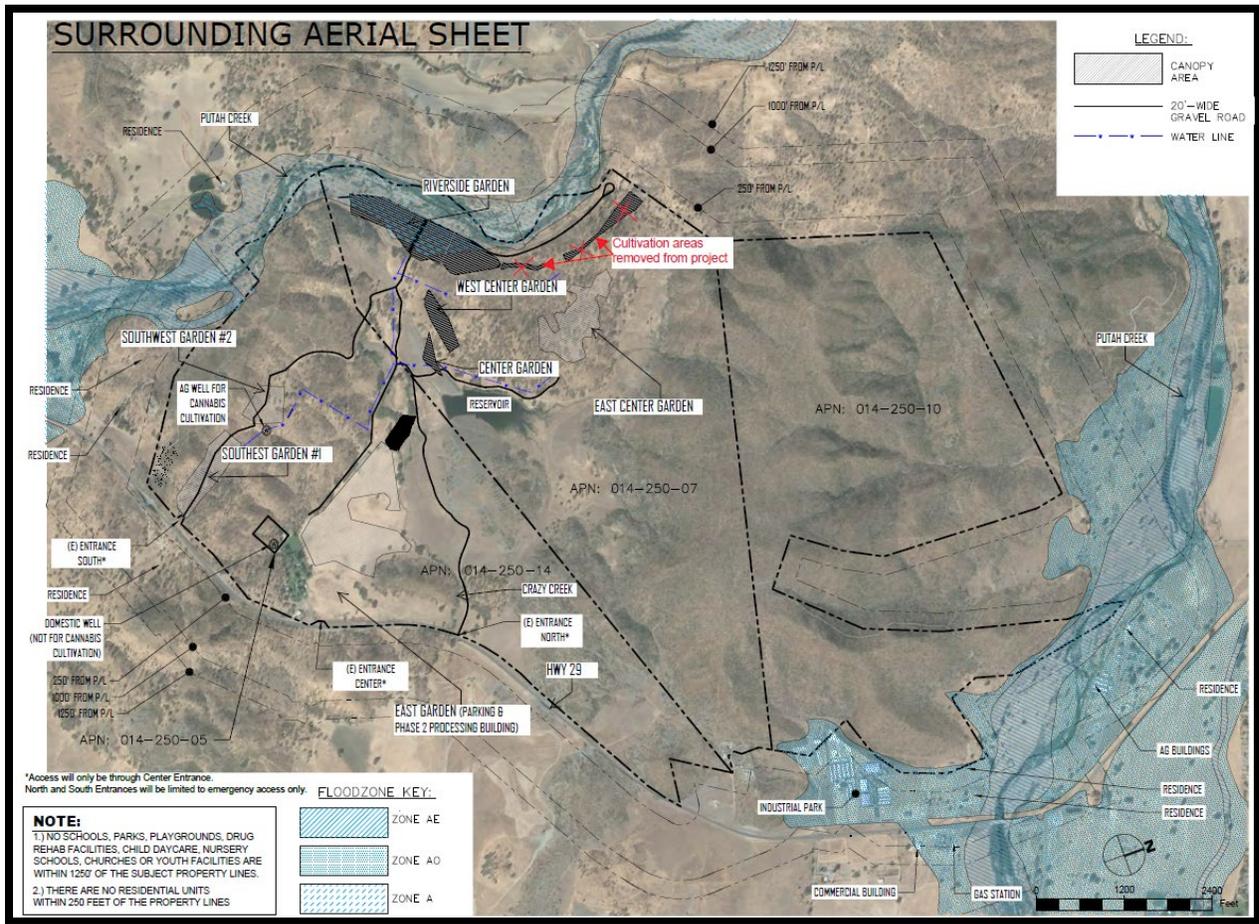


Figure 1. Proposed Site Map

WATER SOURCE AND SUPPLY

There is one (1) existing, permitted groundwater well that will be used for cultivation (Lat/Long 38.76947, -122.59708). The well is approximately 215 feet deep and was drilled in January 2021. The well is screened at two water bearing intervals, 40 and 60 feet and 180 and 220 feet below the ground surface (bgs). During the drilling of the well, the depth of first water was at 60 feet bgs and the static water level was estimated to be 30 feet bgs (Attachment 1 – Well Completion Report). Using USGS topography (<https://apps.nationalmap.gov/viewer/>), the surface elevation at the well is approximately 1,110 feet; the elevations of the screened areas range from approximately 1,050 to 1,070 feet and 890 to 930 feet. The initial and static water level elevations are approximately 1,060 feet and 1,080 feet, respectively.

When the well was drilled, it was determined to have a yield of 800 gpm (1290.4 acre-feet per year). The average daily demand of 211.3 gpm represents 26.4% of the well yield and 11% of the annual potential well production in acre-feet.

A 4-hour well pump test was conducted on October 19 and 20, 2021 by Pollack and Sons Pump (Attachment 1). The pump test was conducted with the existing 75 HP pump with a maximum pump rate of 625 gpm. The static water level at the beginning of the test was 34 feet bgs. During the test, the water



level dropped to 140 feet bgs where it remained for the duration of the pump test. The well sustained a production capacity of 625 gpm throughout the entire 4-hours. After 24-hours, the water level returned to 34 feet bgs. Pollack and Sons Pump reported that the well could produce more water with a larger pump installed. It should be noted that this test was conducted during an extreme drought, at the end of a dry season.

A follow-up, 24-hour well test was conducted by Pollack and Sons Pump in November 2022 (Attachment 1). The static water level at the beginning of the test was 34 feet bgs. The well was pumped at 1,000 gpm for the first 2.5 hours, over which the water level dropped to 70 feet bgs. The well was pumped at 800 gpm during the remainder of the test, over which the water level remained at 70 feet bgs. Upon cessation of pumping, the well achieved a 100% recovery, to 34 feet bgs, after 24 hours. The nearest water district, Callayomi County Water District (District), monitored their water District wells during the pump test to determine if pumping from the Bar X well has an impact on the District's wells. The District monitored their wells hourly during the Bar X pump test. The District provided a letter (Attachment 1) stating that they observed no effects to their wells during the pump test.

These test results validate the yield reported on the Well Completion Report for the well.

IRRIGATION AND WATER STORAGE

Irrigation for the cultivation operation will use water supplied by the existing well. The irrigation water would be pumped (using an existing 75 HP pump) from the well, via PVC piping, to approximately 27, 5,000-gallon water storage tanks (135,000 gallons of storage) located on a ridge adjacent to Southwest Garden #2, and then delivered to the individual gardens via an above ground, gravity water distribution system. Drip irrigation systems will be used at each garden. The drip lines will be sized to irrigate the cultivation areas at a rate slow enough to maximize absorption and prevent runoff. Drip irrigation systems, when done properly, conserve water compared to other irrigation techniques.

GROUNDWATER BASIN INFORMATION AND HYDROGEOLOGY

The Groundwater Availability Analysis by Chico Environmental, dated April 12, 2021, mistakenly attributed the well location to the Coyote Valley Groundwater Basin. However, after review of the well log, the groundwater basin water-bearing formations, and the groundwater basins mapped by the California Department of Water Resources (DWR), it was later corrected in the July 2, 2021, letter by Chico Environmental and confirmed herein – the well is located in a groundwater basin situated between the Collayomi Valley Groundwater Basin (Basin #5-19), to the west, and the Coyote Valley Groundwater Basin (Basin #5-018) to the east. (Figure 2)

The Collayomi Valley Groundwater Basin includes both Collayomi Valley and Long Valley in the headwater area of the Putah Creek watershed. A mixture of Serpentinized ultramafic rocks and Franciscan Formation borders the basin to the north, east, and south. Nearly all groundwater throughout the Collayomi Basin occurs in Quaternary alluvium deposited as alluvial fans of shallow grade and in the gravel channels of Putah Creek, St. Helena Creek, and their tributaries. The maximum depth of the alluvial fill is approximately 350 feet. The fill consists of deposits of clay and silt, with localized areas of channelized gravel. Near Putah Creek, shallow deposits of fine sand and cobbles are present. There is no evidence of any well-defined aquifer of any great areal extent within the basin. The major source of recharge to the basin is from percolation of streamflow from the segments of Putah Creek, Dry Creek, and St. Helena Creek



that are within the basin. Some recharge is derived from infiltration of rainfall and irrigation return flows. The direction of groundwater flow is to the north where it discharges into Putah Creek. Spring groundwater levels in the basin range between 3 and 15 feet bgs. These levels have remained generally constant over the last 40 years. Spring to summer drawdown ranges between 5 and 20 feet. Groundwater levels appear to completely recover each wet season and there does not appear to be any increasing or increasing trend in groundwater levels. The estimated storage capacity is 29,000 AF, with a usable storage capacity of 7,000 AF. According to the Lake County Groundwater Management Plan (CDM, 2006), surface water and groundwater agricultural demand, in the Collayomi Basin, during an average year is 412 AF per year; 266 AF of which is supplied from groundwater. The majority of the wells in the valley range in depths between 25 feet and 325 feet, with a few wells at depths down to 525 feet. Irrigation well yields range between 2 and 1,000 gpm. (CDM 2006 and California DWR 2003, 2021)

The Coyote Valley Groundwater Basin includes the Coyote Valley, a northwest-southeast trending valley along Putah Creek. The valley is approximately 5 miles long and up to 2.5 miles in width. Serpentinized ultramafic rocks border the basin to the south and west. The aquifer system is comprised mostly of Holocene alluvium made up of floodplain and channel deposits of Putah creek and alluvial fan deposits in the southwest portion of the valley. The alluvial fill is primarily comprised of poorly stratified sand and gravel with limited fine-grained material, and ranges in thickness from between 100 and 300 feet (CDM, 2006). Groundwater within the upper 100-feet of the formation is largely unconfined and wells drilled in this layer produce an average of 1,000 gpm. Groundwater recharge is mainly from Putah Creek with lesser amounts from precipitation on the alluvial plain and side-stream runoff. The general direction of groundwater flow is towards the southeast. Groundwater levels are shallow in the spring, decrease over the summer, and recover during the winter. Water levels range between 10 and 15 feet bgs, on average, in the spring and these levels have been generally stable throughout the valley. Spring to summer drawdown in the western areas of the basin range between 20 and 25 feet. The estimated storage capacity is 29,000 AF, with a usable storage capacity of 7,000 AF. According to the Lake County Groundwater Management Plan, dated 2006, surface water and groundwater agricultural demand, in this basin, during an average year is 4,073 AF per year; of this, 671 AF is supplied from groundwater. The majority of the wells in the valley range in depth between 15 feet and 485 feet. (CDM 2006 and California DWR 2003, 2021)

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

As discussed above, the groundwater well is a groundwater basin situated between the Collayomi and Coyote Valley Groundwater Basins. Groundwater throughout the Collayomi and Coyote Valley Groundwater Basins primarily occurs in alluvium formations comprised of clay, silt, sand, and gravel deposits. The water-bearing formation in the Collayomi Groundwater Basin is comprised of clay and silt,



with localized areas of channelized gravel. The water-bearing formations in the Coyote Valley Groundwater Basin are the Holocene Alluvium, the primary water bearing unit consisting of coarse sand and gravel, and the Plio-Pleistocene Volcanics and Cache Formation consisting of gravel, silt, sand and water-laid tuffs. The major source of recharge to these two basins is from percolation of streamflow from Putah Creek and its tributaries. Some recharge is derived from infiltration of rainfall and irrigation return flows.

The project well is drilled through (in order of increasing depth), clay, shale, sandstone, and hard grey rock - indicating that it is in its own water-bearing unit. Although the project's well yield and depth are consistent with wells in both the Collayomi and Coyote Valley Groundwater Basins, the well is clearly located outside of the alluvial areas and in distinct geologic formations units of Jurassic shale and sandstone (Figure 3). From the well pump test conducted in October 2021 to validate the well productivity (Attachment 1), it appears the dominant water-bearing formation of the well is within the deeper sandstone.

Water well driller's reports maintained by the California DWR and published on the DWR Well Completion Report Map Application were reviewed to identify additional wells located in the same water-bearing formation as the project's well. The scope of the California DWR research encompassed the available records for wells located within Sections 29 and 30 of Township 11 North (T11N), Range 6 West (R06W) and Sections 2, 25, 26, 27, 34, 35 of T11N, Range 7 West (R07W), Mount Diablo Basin and Meridian within 1 to 2 miles of the property boundary. This resulted in 102 reports, of which, only four (4) corresponded to locations potentially within the same geologic formation as the project's well (Figure 4), the remainder reports were for wells within the described water-bearing formations of the Collayomi and Coyote Valley Groundwater Basins. Two of the four reports were for abandoned wells located on the Bar X Ranch. Of the remaining two reports, one well was drilled into varying layers of shale/sandstone, screened at an elevation similar to the project's well, and was reported to have a yield of 200 gpm (Attachment 1 - WCR2003-010038).

There is a domestic groundwater well located on APN 014-250-05 (Figure 1). The well has been used to supply domestic water to the housing area on the ranch for several years. Details regarding the well yield and dimensions are unknown. On October 2, 2020, Chico Environmental submitted a Well Completion Report Form to California DWR, but no records were found by DWR regarding this well. This domestic well will not be used for irrigation of cannabis.



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 assumed to be the area associated with the geologic units of the formation in which it is situated. 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 documented literature values, assuming the water-bearing formation is comprised of sandstone. The results are summarized below.

- Aquifer Area: 980 acres
- Static Groundwater Level: 34 feet bgs (October 2021 pump test)
- Aquifer Depth: 215 feet bgs (source well log)
- Aquifer Thickness: 181 feet
- Specific Yield (Sandstone): 5% - 30% (Heath, 1983, Freeze and Cherry, 1979 and Morris and Johnson, 1967)
- Estimated Theoretical Storage Capacity of the project's water source: **8,869 AF – 53,214 AF**

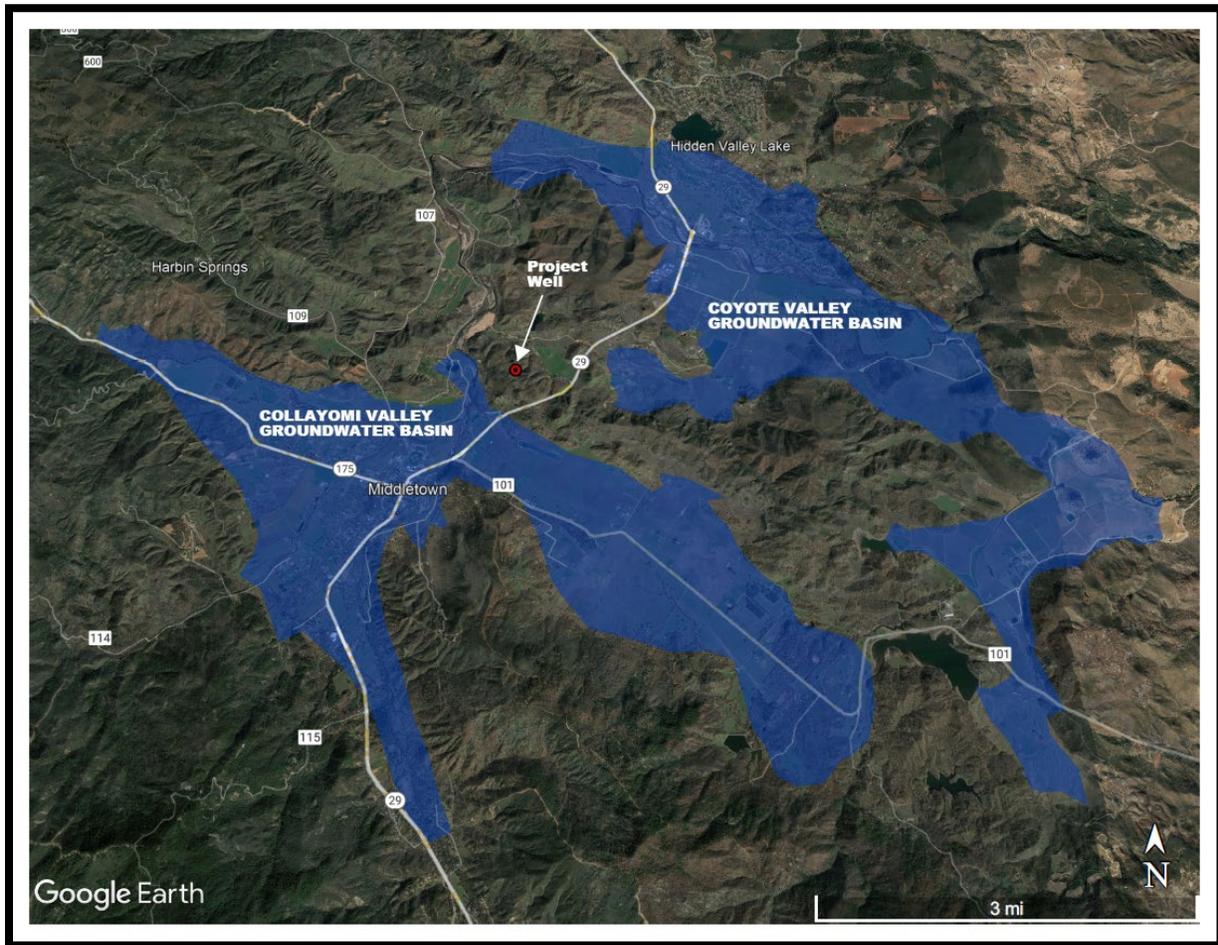


Figure 2. Project Well Location and Mapped Groundwater Basins



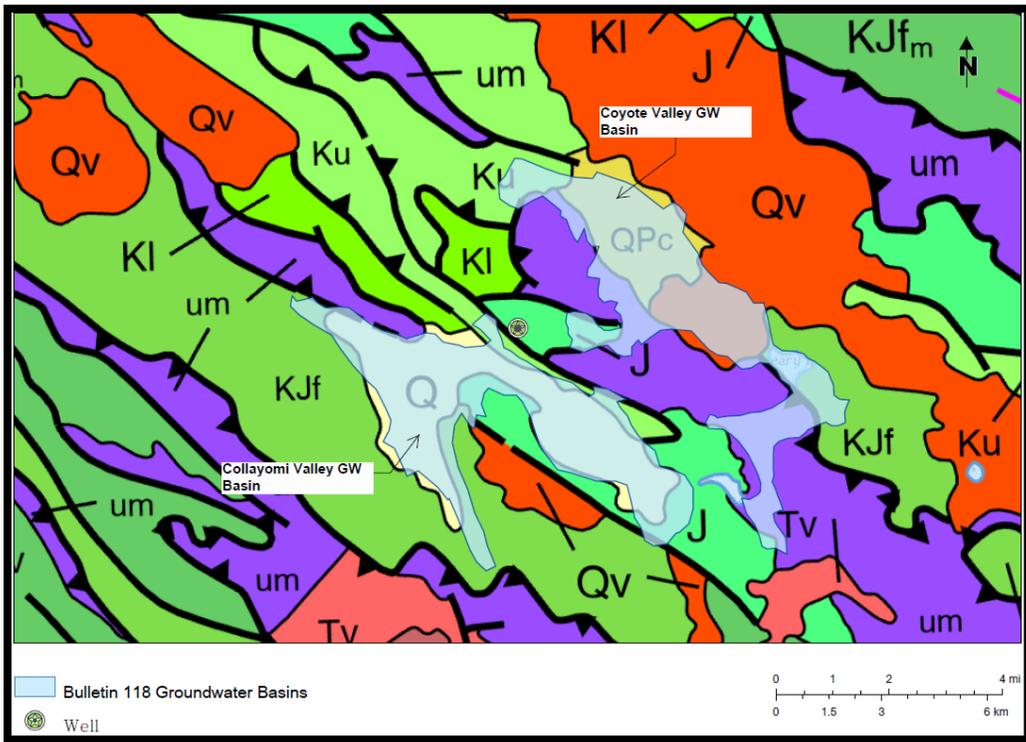


Figure 3. Geologic Map of California (J=Jurassic Shale and sandstone)

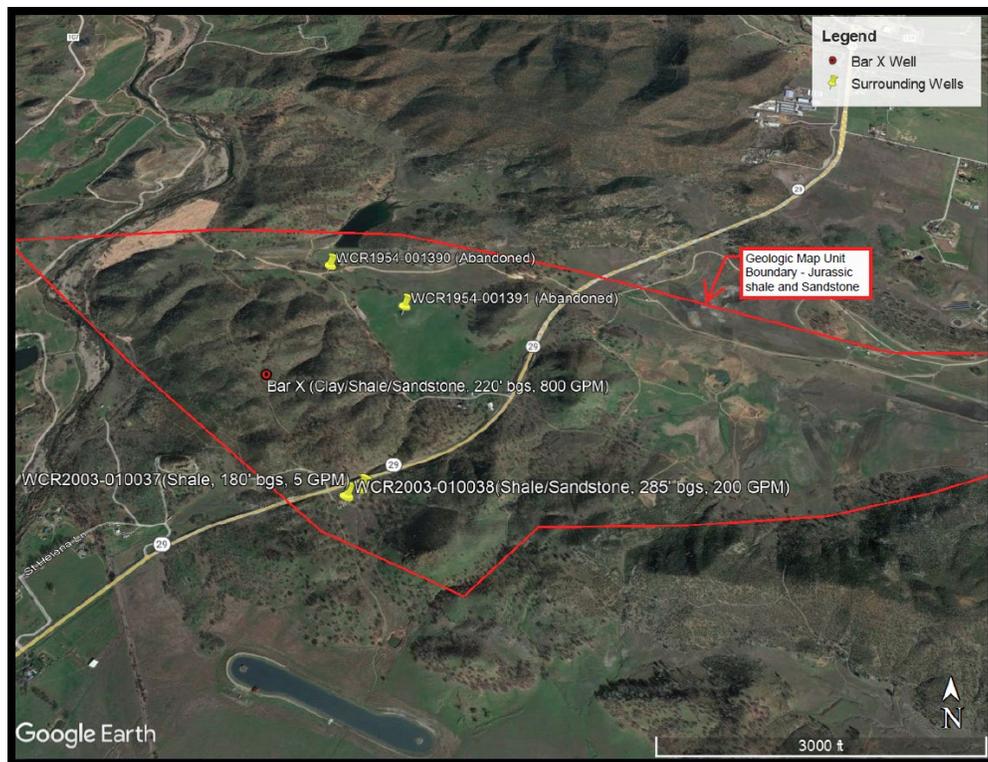


Figure 4. Surrounding Wells in the Same Geologic Unit



GROUNDWATER SOURCE RECHARGE RATE

Annual groundwater 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). The CN is an empirical parameter used to predict runoff or infiltration from excess rainfall. 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 well. The recharge in the surrounding groundwater basins is derived mainly from Putah Creek and its tributaries. The well and project are both located within the Crazy Creek Watershed, a tributary to Putah Creek. Thus, the recharge area is assumed to be the area of the Crazy Creek watershed within the Bar X Ranch. This is likely a conservative estimate because Putah Creek and additional areas of the Crazy Creek Watershed could both contribute to the recharge area. The approximate area of recharge, 758 acres, was delineated using USGS StreamStats (<https://streamstats.usgs.gov/ss/>) and is shown in Figure 5.

Soils are classified into four HSGs (A, B, C, and D) according to the soils ability to infiltrate water; where HSG A has the highest infiltration potential and HSG D has the lowest infiltration potential. HSGs are based on soil type and are determined from the NRCS Web Soil Survey (<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>).



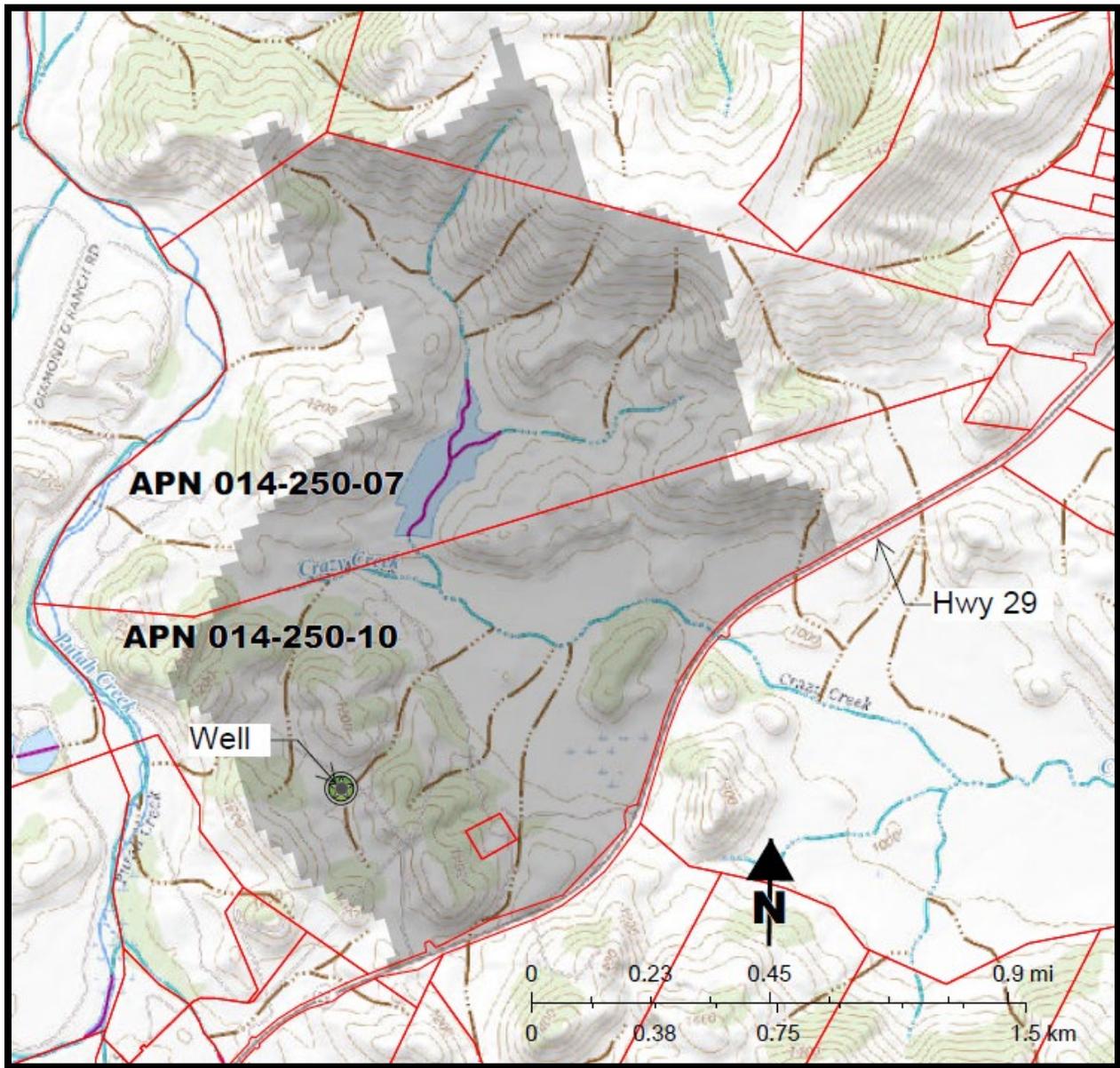


Figure 5. Recharge Area (Shaded Area = upper Crazy Creek Watershed)



The recharge area is comprised of two HSGs: 109 acres (14%) HSG C and 649 acres (86%) HSG D (Attachment 3). The area is dominated by HSG D. The land use is a combination of pasture/rangeland in fair condition (50% to 75% ground cover and not heavily grazed) and undeveloped with a cover type of brush in fair condition (50% to 75% ground cover). The CNs and areas are summarized in Table 3. The weighted CN for the recharge area is 78.

Table 3. Land Use and Curve Numbers

Land Use	HSG	CN	Area (acres)	Weighted CN
Pasture/Range (good)	C	79	73	78
	D	84	120	
Brush (good)	C	70	36	
	D	77	529	

The PRISM Climate Group gathers climate observations from a wide range of monitoring networks and provides time series values of precipitation for individual locations (<https://prism.oregonstate.edu/explorer/>). Using the annual precipitation from 1895 to 2020, as predicted by PRISM, the annual average precipitation over this period is 39.9 inches and the minimum precipitation over this period is 8.2 inches (Attachment 4).

Using the above information, and assuming that 50% of the initial abstraction infiltrates and the remainder is evapotranspiration (0.56 inches or 35.6 AF), the estimated annual recharge over the recharge area of 758 acres is 184 AF during an average year and 148 AF during a dry year (Table 4).

Table 4. Estimated annual recharge over the recharge area of the project's well.

Recharge Area (acres)	P (inches)	CN	S (inches)	I _a (inches)	Q (inches)	Recharge = $P - Q - 0.5 * I_a$ (inches)	Recharge (AF)
758	8.2	78	2.82	0.56	5.6	2.3	148
758	39.9	78	2.82	0.56	36.7	2.9	184

CUMULATIVE IMPACT TO SURROUNDING AREAS

The annual water demand of the proposed project is approximately 140.0 AF per year, assuming a typical 150-day outdoor cultivation season. The project demand is approximately 76.1% of the annual recharge during an average year and 94.6% of the annual recharge during and dry year. The recharge area used to estimate annual recharge is less than the Bar X Ranch total area, which is approximately 1,594.6 acres, and does not include potential recharge from Putah Creek, which has a contributing area of 62 square miles upstream of the Bar X Ranch. Thus, the recharge estimate provided herein is likely low. Even so, there is sufficient recharge on an annual basis to meet the project's demand, even during dry years.

Although determined for humid basins in the east, the USGS (USGS Fact Sheet 2007-3007) estimated long-term average recharge to be between 10 and 66 percent of precipitation. Over the 758-acre recharge area this would equate to 51.8 – 341.9 AFY during a dry year and 252 – 1663 AFY during an average year. The recharge estimates in Table 3 fall within these ranges for a dry year and on the lower end for an average



year. To be conservative, using a recharge value of 51.8 AFY to represent a dry year and 216 AFY to represent an average year, assuming a dry year occurs once on average every 5-years, the 5-year average annual recharge would be 158 AFY over the 758-acre recharge area – which is greater than project's irrigation demand and includes a surplus recharge of 216 AF over the five year period.

The project's water source is located within a water-bearing formation that is not included in California's Groundwater Bulletin 118. Additionally, the groundwater source is in an area with numerous mapped local faults and contacts between geologic units which can serve as conduits for water and may explain the well's high productivity. A conservative estimate of the storage capacity of the water-bearing formation is approximately 8,869 AF. The annual project demand is less than 2% of the estimated storage capacity.

Although there are several wells located in the adjacent Collayomi and Coyote Groundwater Basins, there is only one well that may be within the same water-bearing formation as the project's well, located approximately 0.4 miles southeast (Figure 4). This well was drilled in October 2003 and was shown to have a yield of 200 gpm, however, the well diameter of 4.5-inches is much smaller than the project's well diameter of 14-inches. Thus, the nearby well's productivity would be limited by the smaller well diameter. In addition, during a recent high-capacity well test (conducted November 2022), the nearest water district, Callayomi County Water District (District), monitored their water District wells during the pump test to determine if pumping from the Bar X well has an impact on the District's wells. The District monitored their wells hourly during the Bar X pump test. The District provided a letter (Attachment 1) stating that they observed no effects to their wells during the pump test.

The source well has an estimated yield of 800 gpm, which was confirmed by two separate well pump tests conducted in October 2021 and November 2022 during a prolonged period drought. Using the existing well pump to pump at 625 gpm, the well can supply the average daily irrigation needs in under 9-hours.

In addition to the proposed project, there are two projects proposed that may have the potential to result in a cumulative impact to the surrounding area. These two proposed projects are the Diamond J Ranch cannabis cultivation project and the Guenoc Valley development project (Figure 5 and Figure 6). Diamond J Ranch is located approximately 2.5 miles northeast of Bar X Ranch and is within the Coyote Valley Groundwater Basin (Figure 5). Therefore, the two properties are not hydrogeologically connected, and the proposed project will not have a hydrogeologic effect on the Diamond J Ranch (Chico Environmental, 2021b).

The Guenoc Valley project is located over 3 miles to the southeast of Bar X Ranch (Figure 6). According to the Environmental Impact Report for the Guenoc Valley project (AES, 2020), 1,340 acres (approximately 8% of the project site) are located within the Coyote Valley Basin and 100 acres (approximately 1%) is located within the Collayomi Valley Groundwater Basin. The majority of the project (over 90%) is located outside of these basins, east of the Coyote Valley Groundwater Basin, which separates Bar X Ranch from Guenoc Valley. Therefore, the Bar X Ranch is not hydrogeologically connected to the Guenoc Valley project and the proposed project will not have a hydrogeologic effect on the Guenoc Valley project.

Therefore, proposed cannabis cultivation project, in combination with the Diamond J project and Guenoc Valley project, would not have a cumulative impact on groundwater.



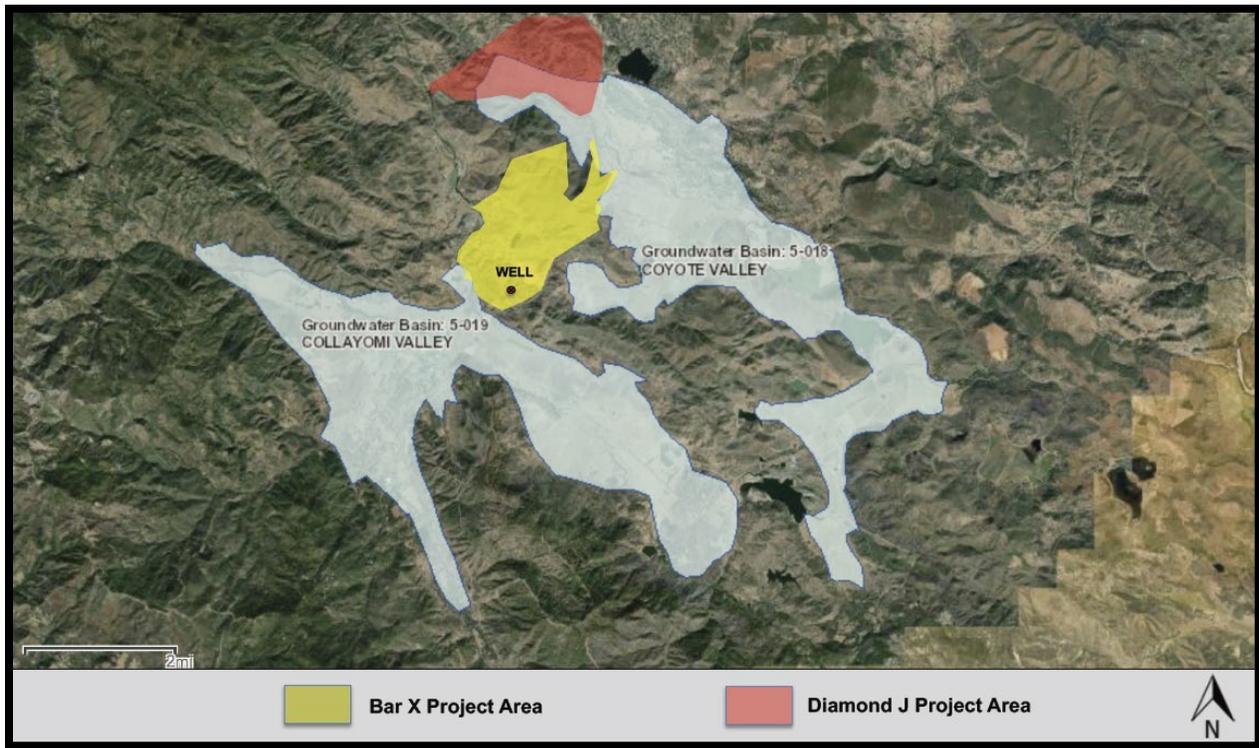


Figure 6. Bar X Project Area and Diamond J Project Area (Source: Chico Environmental (2021b), Attachment 2)

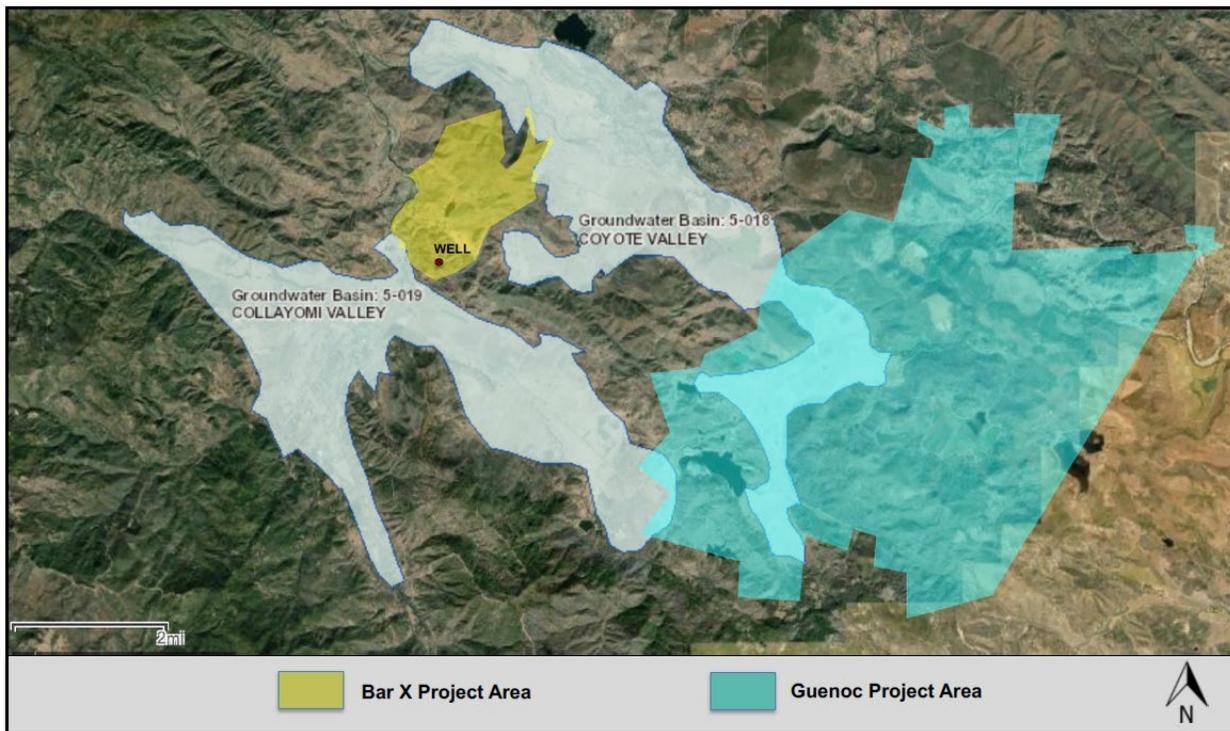


Figure 7. Bar X Project Area and Guenoc Project Area (Source: Chico Environmental (2021b), Attachment 2)



Since the recharge rate is an estimate determined using an approximation of the recharge area and the *in-situ* characteristics of the water source; it is recommended that the project applicant monitor water levels in the well. The purpose of the monitoring is to evaluate the functionality of the well to meet the long-term water demand of the proposed project and validate the annual recharge of the water-bearing formation. Water level monitoring is required by the Lake County Zoning Ordinance. Ordinance Article 27 Section 27.11(at) 3.v.e. requires the well to have a water level monitor. Recommendations for well water level monitoring are provided below.

Seasonal Static Water Level Monitoring: The purpose of seasonal monitoring of the water level in the well is to provide information regarding long-term groundwater elevation trends. It is recommended that the water level in the well 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 well during extraction is to evaluate the performance of the well 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 the well water level. 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.

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 shall be prepared and submitted to the County, for review and approval, demonstrating how the project will mitigate the impacts in the future, including, for example, additional water sources and possibly a reduction in cultivation, if a reduction in water availability has occurred.



CONCLUSION

Since the project water source is not hydrogeologically connected to the Diamond J project or the Gueonoc Valley project, well productivity tests have confirmed well yield and demonstrated that the project water source have demonstrated no impact to neighboring wells, the project's demand is only 11% of the annual well production, the annual project demand is less than 2% of the aquifer storage capacity, and there is sufficient recharge to meet the project's demand during average and dry years, and with required monitoring and reporting and the requirement of a revised Water Management Plan for review and approval, the proposed project water use would not have a cumulative impact on the surrounding area.

QUALIFICATIONS OF AUTHOR

Dr. Dodd has a PhD in Water Resources Engineering. In addition, Dr. Dodd is registered Professional Engineer with the State of California with 30-years of experience practicing and teaching Water Resources Engineering, including over 15 years of teaching, practicing, and modeling surface and groundwater hydrology.

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. This report has been prepared solely for the client and any reliance on this report by third parties shall be at such party's sole risk.

ATTACHMENTS

1. Project's Well Completion Report (WCR), Project's Well Pump Tests, Letter from Callayomi County Water District
2. Chico Environmental Memorandum
3. NRCS Soil Survey Results
4. PRISM Climate Precipitation 1895 to 2020

REFERENCES

- Analytical Environmental Services (AES). (2020). Draft Environmental Impact Report Guenoc Valley Mixed Use Planned Development Project. February 2020.
- Bauer S, Olson J, Cockrill A, van Hattem M, Miller L, Tauzer M, et al. (2015). Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds. PLoS ONE 10(9): e0137935. <https://doi.org/10.1371/journal.pone.0137935>
- CDFA (2017) CalCannabis Cultivation Licensing Program Draft Program Environmental Impact Report.



- State Clearinghouse #2016082077. Prepared by Horizon Water and Environment, LLC, Oakland, California. 484 pp.
- California DWR (2003). California's Groundwater Bulletin 118 Update 2003. October 2003.
https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/Statewide-Reports/Bulletin_118_Update_2003.pdf
- California DWR (2003). California's Groundwater Bulletin 18, Update 2003. October 2003.
- California DWR (2021). California's Groundwater. <https://water.ca.gov/programs/groundwater-management/bulletin-118>
- CDM (2006). Lake County Water Inventory Analysis. Prepared for the Lake county Watershed Protection District. March 2006.
<http://www.lakecountyca.gov/Assets/Departments/WaterResources/Groundwater+Management/Lake+County+Water+Inventory+and+Analysis+w+Appendices.pdf>
- CDM (2006). Lake County Groundwater Management Plan. Prepared for the Lake county Watershed Protection District. March 2006.
<http://www.lakecountyca.gov/Assets/Departments/WaterResources/IRWMP/Lake+County+Groundwater+Managment+Plan.pdf>
- Chico Environmental. (2021a). Groundwater Availability Analysis for Bar X Farms. April 12, 2021.
- Chico Environmental. (2021b). Bar X Farms Cumulative Groundwater Impacts. July 2, 2021.
- Freeze, R.A. and Cherry, J.A. (1979) Groundwater. Prentice-Hall, Inc., Englewood Cliffs.
- Gupta, R.S. (2008). Hydrology and Hydraulic Systems, 3rd Edition. Waveland Press, Long Grove IL.
- Heath, R.C. (1983). Basic ground-water hydrology, U.S. Geological Survey Water-Supply Paper 2220, 86p.
- Morris, D.A. and A.I. Johnson. (1967). Summary of hydrologic and physical properties of rock and soil materials as analyzed by the Hydrologic Laboratory of the U.S. Geological Survey, U.S. Geological Survey Water-Supply Paper 1839-D, 42p.
- Natural Resources Conservation Service, NRCS. (1986) Urban Hydrology for Small Watersheds. US DFA NRCS Technical Release 55. June 1986.
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044171.pdf
- USGS. 2007. USGS Fact Sheet 2007-3007. <https://pubs.usgs.gov/fs/2007/3007/>



ATTACHMENT 1
PROJECT'S WELL COMPLETION REPORT
PROJECT'S WELL PUMP TESTS
BAR X FARMS, LLC



COUNTY OF LAKE
HEALTH SERVICES DEPARTMENT
 Division of Environmental Health
 922 Bevins Court, Lakeport, CA 95453-9739
 Telephone 707/ 263-1164 FAX: 263-1681

Denise Pomeroy
 Health Services Director

Erin Gustafson
 Public Health Officer

Jasjit Kang
 Environmental Health Director

SEAL WITHOUT WITNESS

Permit Number: WE 5501AB
 Site Address: 20333 S. State Hy 29 Middletown CA 95461
 Assessor's Parcel No: 014 - 250 - 141
 Owner Name: Jed Morris
 Date: 1-15-21

REASON FOR SEAL WITHOUT WITNESS:

- Emergency Seal – Explain: _____
- Inspector unable to witness
- Other: _____

IMPERMEABLE LAYER in which annular space terminates:

2'' at a depth of 22' feet.

SEALANT USED: Bentonite Clay with Concrete cap.
 METHOD OF PLACEMENT: Pour down Hole Mix Concrete cap.

I hereby certify that I have installed the annular seal in accordance with the provisions of the Lake County Well Ordinance and unless otherwise specified in the Lake County Well Ordinance, with the California Department of Water Resources Bulletin 74-81 or as modified by subsequent revisions or supplements.

DRILLING CONTRACTOR SIGNATURE: [Signature]

COMPANY: Will Peterson Well Drilling LICENSE NO: 1009053

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Form No. 1

No. XXXXXXX

Page 1 of 1

Owner's Well Number 2

Date Work Began 1-4-21

Date Work Ended 1-15-21

Local Permit Agency LAKE County Environmental Health

Permit Number WE-5501

Permit Date 1-19-20

DWR Use Only - Do Not Fill In

State Well Number/State Number	
N	W
Latitude	Longitude
APN/TRS/Other	

Geologic Log

Orientation Vertical Horizontal Angle Specify _____
 Drilling Method Mud Rotary Drilling Fluid Bentonite

Depth from Surface		Description
Feet	to Feet	
0	18	Brown clay
18	50	Black shale
50	80	Sandstone
80	220	Hard Grey Rock
Total Depth of Boring		220 Feet
Total Depth of Completed Well		215 Feet

Well Owner

Name Jed Morris
 Mailing Address P.O. Box 82
 City Middletown State CA Zip 95461

Well Location

Address 20333 S. State Hwy 29
 City Middletown County LAKE
 Latitude _____ N Longitude _____ W
 Datum _____ Dec. Lat. _____ Dec. Long. _____
 APN Book 014 Page 250 Parcel 141
 Township _____ Range _____ Section _____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

New Well
 Modification/Repair
 Deepen
 Other
 Destroy
Describe procedures and materials under "CPCA DG-C-02"

Planned Uses

Water Supply
 Domestic Public
 Irrigation Industrial
 Cathodic Protection
 Dewatering
 Heat Exchange
 Injection
 Monitoring
 Remediation
 Sparging
 Test Well
 Vapor Extraction
 Other

Water Level and Yield of Completed Well

Depth to first water 60 (Feet below surface)
 Depth to Static 30
 Water Level _____ (Feet) Date Measured 1-14-21
 Estimated Yield 800 (GPM) Test Type Art. Lift
 Test Length 2 HRS (Hours) Total Drawdown _____ (Feet)
 *May not be representative of a well's long term yield.

Casings

Depth from Surface	Borehole Diameter	Type	Material	Wall Thickness	Outside Diameter	Screen Type	Slot Size
Feet to Feet	(Inches)			(Inches)	(Inches)		if Any (Inches)
0	40		PVC	1/2"	14"	Blank	
40	60		PVC	1/2"	14"	Perf.	1035
60	180		PVC	1/2"	14"	Blank	
180	220		PVC	1/2"	14"	Perf.	035

Annular Material

Depth from Surface	Fill	Description
Feet to Feet		
0	1	Concrete SEAL
1	22	Bentonite SEAL
22	220	5/16" gravel pack

Attachments

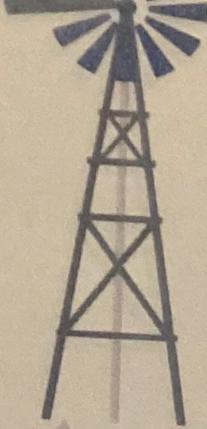
Geologic Log
 Well Construction Diagram
 Geophysical Log(s)
 Soil/Water Chemical Analyses
 Other _____

Attach additional information if it exists.

Certification Statement

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

Name Will Peterson Well Drilling
 Person, Firm, or Corporation
P.O. Box 695
 City Kelseyville State CA Zip 95451
 Signed [Signature] Date Signed 1-17-21 License Number 1009053
 C-57 Licensed Water Well Contractor



BOLLACK & SONS PUMP

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

(BIR X)
Name TIGHEEN VALLEY BOYERS Phone (707) 315-1764
Address 20333 Hwy 29 City MIDDLETON
State CA Zip 95461 Date 10-20-21

WATER ANALYSIS

Hardness (lime) gpg. / Iron (rust) ppm /
Manganese ppm. / PH (acid) /
Gal Per Min. 625 GPM (WITH EXISTING PUMP)
Well Depth. 220 Casing Size 19" PVC
Static Level. 34'
Before Pumping. 34'
After Pumping 2 HRS. / 4 HRS. 140' 24 HRS. 34'

Water Supply Garden Private Well

EXISTING EQUIPMENT 75 HP TURBINE

COMMENTS/RECOMMENDATIONS
WILL PRODUCE MORE GPM WITH LARGER PUMP

ORIGINAL File with DWR APR 27 2004 WELL COMPLETION REPORT

STATE OF CALIFORNIA

Refer to Instruction Pamphlet

Page ___ of ___
 Owner's Well No. No. 824920

Date Work Began 10-3-03 Ended 10-7-03

Local Permit Agency Health Dept.
 Permit No. 2257 Permit Date 9-29-03

DWR USE ONLY - DO NOT FILL IN

11N/07W-35M

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

WCR2003-010038

<https://cadwr.app.box.com/v/WellCompletionReports/file/461871465580>

ORIENTATION () VERTICAL HORIZONTAL ANGLE (SPECIFY)

DRILLING METHOD air rotary FLUID

DEPTH FROM SURFACE DESCRIPTION

0 285 Francisah
 Varying layers of shale, sandstone
 shale w/ lots of quartz

WELL LOCATION
 Address 20104 Hwy 29
 City Middletown
 County Lake
 APN Book 014 Page 280 Parcel 10
 Township 11N Range 7W Section 35
 Latitude _____ NORTH Longitude _____ WEST

LOCATION SKETCH NORTH

ACTIVITY ()
 NEW WELL
 MODIFICATION/REPAIR
 Deepen
 Other (Specify)
 DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")
 PLANNED USES ()
 WATER SUPPLY
 Domestic Public
 Irrigation Industrial
 MONITORING
 TEST WELL
 CATHODIC PROTECTION
 HEAT EXCHANGE
 DIRECT PUSH
 INJECTION
 VAPOR EXTRACTION
 SPARGING
 REMEDIATION
 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.

TOTAL DEPTH OF BORING 285 (Feet)
 TOTAL DEPTH OF COMPLETED WELL 285 (Feet)

WATER LEVEL & YIELD OF COMPLETED WELL
 DEPTH TO FIRST WATER 60 (Ft.) BELOW SURFACE
 DEPTH OF STATIC _____ (Ft.) & DATE MEASURED 10-7-03
 WATER LEVEL _____ (Ft.)
 ESTIMATED YIELD 200 (GPM) & TEST TYPE air lift
 TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN _____ (Ft.)
 * May not be representative of a well's long-term yield.

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	CASING (S)					DEPTH FROM SURFACE Ft. to Ft.	ANNULAR MATERIAL 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 20	9"	X	PVC	4 1/2	160	0 20	X				
20 165	7"	X	"	"	"						
165 185	7"	X	"	"	200	20 285			5/16 Pea		
185 245	7"	X	"	"	160						
245 285	7"	X	"	"	200						

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

CERTIFICATION STATEMENT

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

NAME Larry Herman Drilling
 (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 13011 Hwy 29 Lower Lake Ca 95457
 CITY STATE ZIP

Signed Larry Herman
 WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED 10-7-03 465071
 C-57 LICENSE NUMBER

WELL TEST APN Book 014 PAGE 250 PARCEL 41
 20333 S STATE HWY 29 MIDTOWN CALIF 9516

CORSONE M^a PUC
 WELL DEPTH 230'

	STATIC LEVEL	TIME	GPM
1	34'	12 noon	1000
2			
3			
4	36	1230	
5			
6	45	1	
7			
8	30	130	
9			
10	55	2	
11			
12	70	230	600
13	"	5	
14	"	230	
15	"	4	
16	"	430	
17	"	5	
18	"	530	
19	"	6	800
20	"	630	
21	"	7	
22	"	730	
23	"	8	
24	"	830	
25	"	9	
26	"	930	
27	"	10 pm	
28	34'	12 noon	

TESTING
 11-22
 11-23

POLLACK & SONS 24 HR
 UMP 19280 Deer Hill
 Hidden Valley Lake, CA
 987-0917

100% RECOVERY
 AFTER 24 HR
 WITH NO EFFECT
 ON CURRENT
 WATER DISCHARGE
 WELL

* STATIC LEVELS WERE COORDINATED WITH CALCOMI WATER IN THEIR MIDDLE TOWN WELL AT WHICH TIME THEY UNCOVERED THE BAR X WELL SERVICE TIME. THEIR FINAL CONCLUSION WAS THE BAR X WELL WHEN PUMPED 600-1000 GPM FOR 10 HRS HAD NO EFFECT ON THE MIDDLE TOWN WELL AT ALL.

ORIGINAL TEST WAS PUMPED AT 625 GPM FOR 4 HOURS THAT DROVE DOWN WELL 40' AND 1000' RECOVERY AFTER 24 HRS

Callayomi County Water District

21282 Stewart St • P.O. Box 623 • Middletown, CA 95461
Phone: (707) 987-2180 • Fax: (707) 987-0779 • www.callayomiwater.com

Date: December 5th, 2022

RE: Bar X Ranch 10 Hour Pump Test- November 23rd, 2022

To whom it may concern;

Callayomi County Water District (CCWD) was asked to monitor the Districts wells during a 10-hour pump test from the Bar X Well to determine if there are any affects from the Bar X Well. CCWD has 5 wells and monitored 3 of them by checking the static water level hourly for the duration of the Bar X Pump test. The Districts wells were not used during the pump test.

	<u>Diamond D Well</u>	<u>Well #3</u>	<u>Santana Well</u>
10:00 am	Static 13ft	Static 18ft	Static 18ft
12:00 pm	Static 13ft	Static 18ft	Static 18ft
1:00 pm	Static 13ft	Static 18ft	Static 18ft
2:00 pm	Static 13ft	Static 18ft	Static 18ft
3:00 pm	Static 13ft	Static 18ft	Static 18ft
4:00 pm	Static 13ft	Static 18ft	Static 18ft
5:00 pm	Static 13ft	Static 18ft	Static 18ft
6:00 pm	Static 13ft	Static 18ft	Static 18ft
7:00 pm	Static 13ft	Static 18ft	Static 18ft
8:00 pm	Static 13ft	Static 18ft	Static 18ft
9:00 pm	Static 13ft	Static 18ft	Static 18ft
10:00 pm	Static 13ft	Static 18ft	Static 18ft

CCWD observed no affects to our wells during the pump test.

If you have any questions, please feel free to contact me at 707-987-2180, cell 707-350-4614, or e-mail ccwdfiora@att.net.

Respectfully Submitted,



Todd Fiora, General Manager
Callayomi County Water District

ATTACHMENT 2
CHICO ENVIRONMENTAL MEMORANDUM

July 2, 2021

Lake County Community Development Department
Attn: Eric Porter, Associate Planner
255 N Forbes Street
Lakeport, 95453

RE: Bar X Farms Cumulative Groundwater Impacts

Dear Mr. Porter:

Chico Environmental has prepared a Report of Findings – Groundwater Availability Analysis for the Bar X Farms, Middletown, Lake County, CA. The report dated April 12, 2021, states:

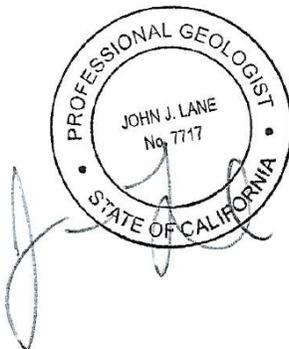
Groundwater pumped for irrigation on the Bar X Farms will not be used for export out of the County.

The expected annual water use for the full buildout would be 3,000 gallons per day per acre (64 acres) within the 120-day growing season for a total 23,040,000 gallons or 70.7 acre-feet. The well yield is 800 gallons per minute and will be monitored by a flow through meter.

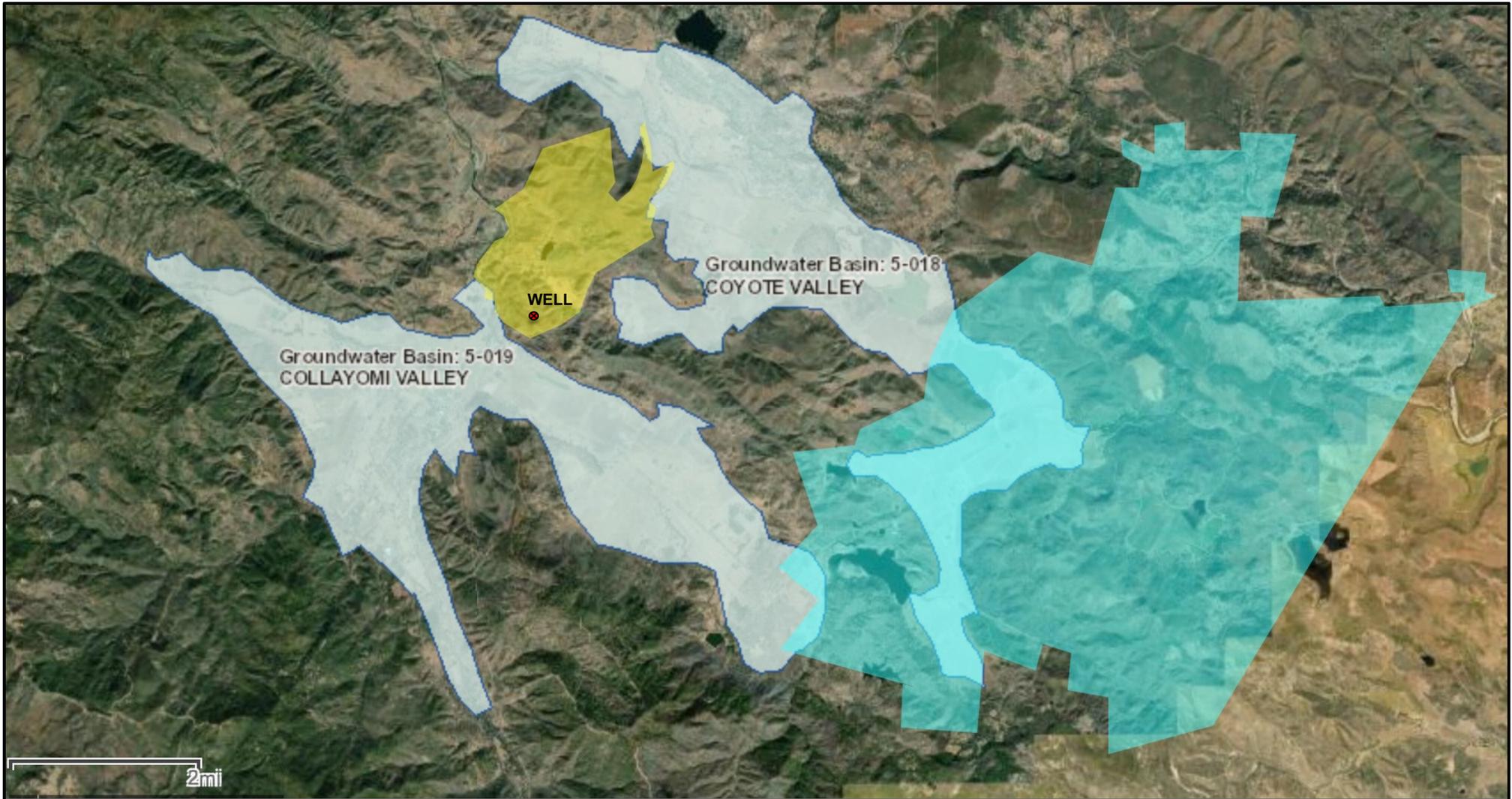
It is Chico Environmental's opinion that the newly completed well is of sufficient yield to irrigate the 64 acres of cannabis at Bar X Farms. The newly installed well at the Bar X farm is not in the Coyote Valley Groundwater Basin (see attached Figure 1). Additionally, groundwater pumping at Bar X Farms will not have a hydrogeologic effect on the Diamond J Ranch as the two properties are not hydrologically connected (Figure 2). Therefore, there are no cumulative effects from groundwater pumping at the Bar X Farm.

If you have any questions, please do not hesitate to contact us regarding this document.

Sincerely,



CHICO ENVIRONMENTAL
John Lane
Principal Geologist



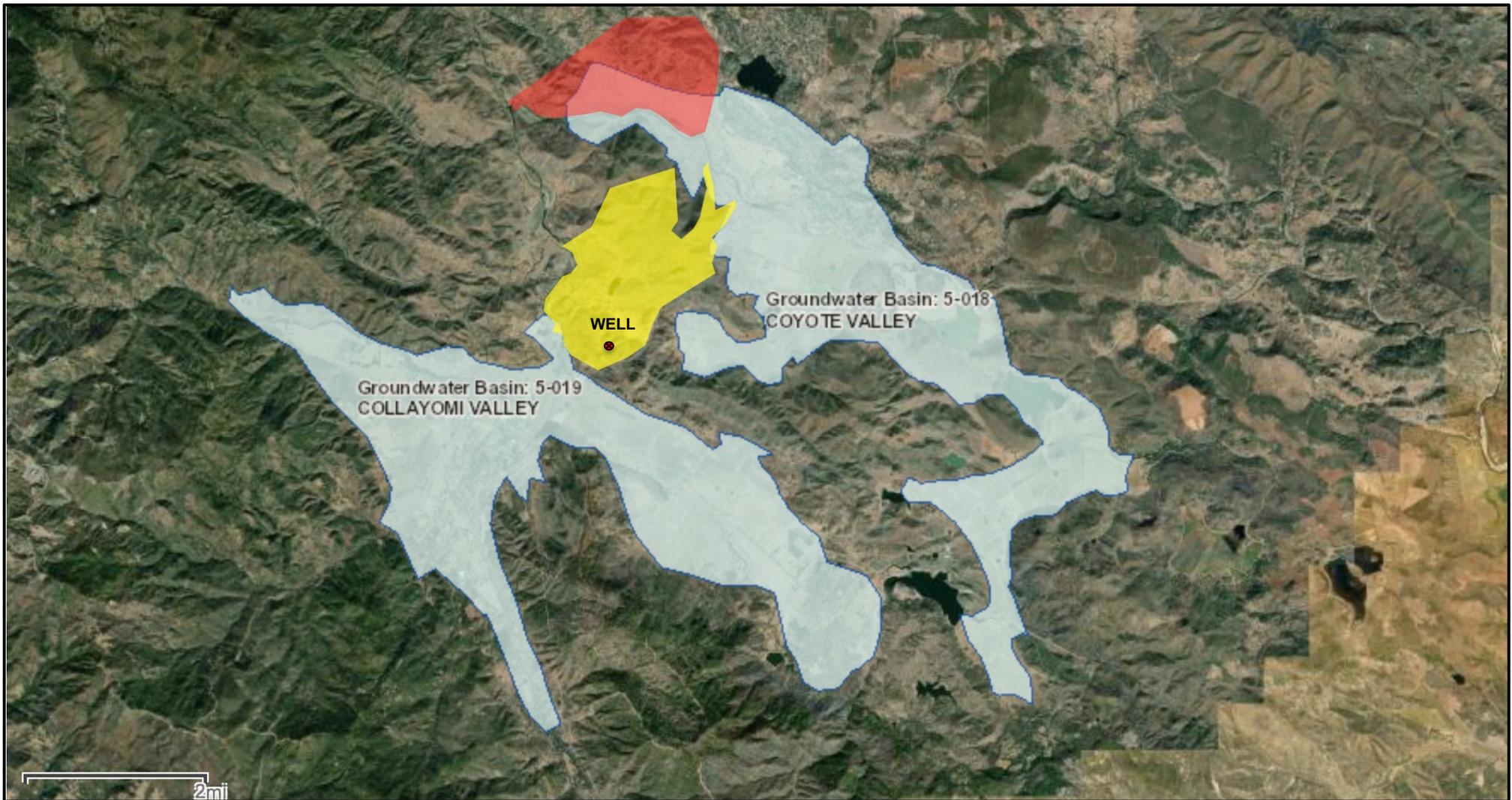
Bar X Project Area



Guenoc Project Area



**FIGURE 1: GROUNDWATER BASIN MAP- BAR X and GUENOC
LAKE COUNTY, CA**



Bar X Project Area



Diamond J Project Area

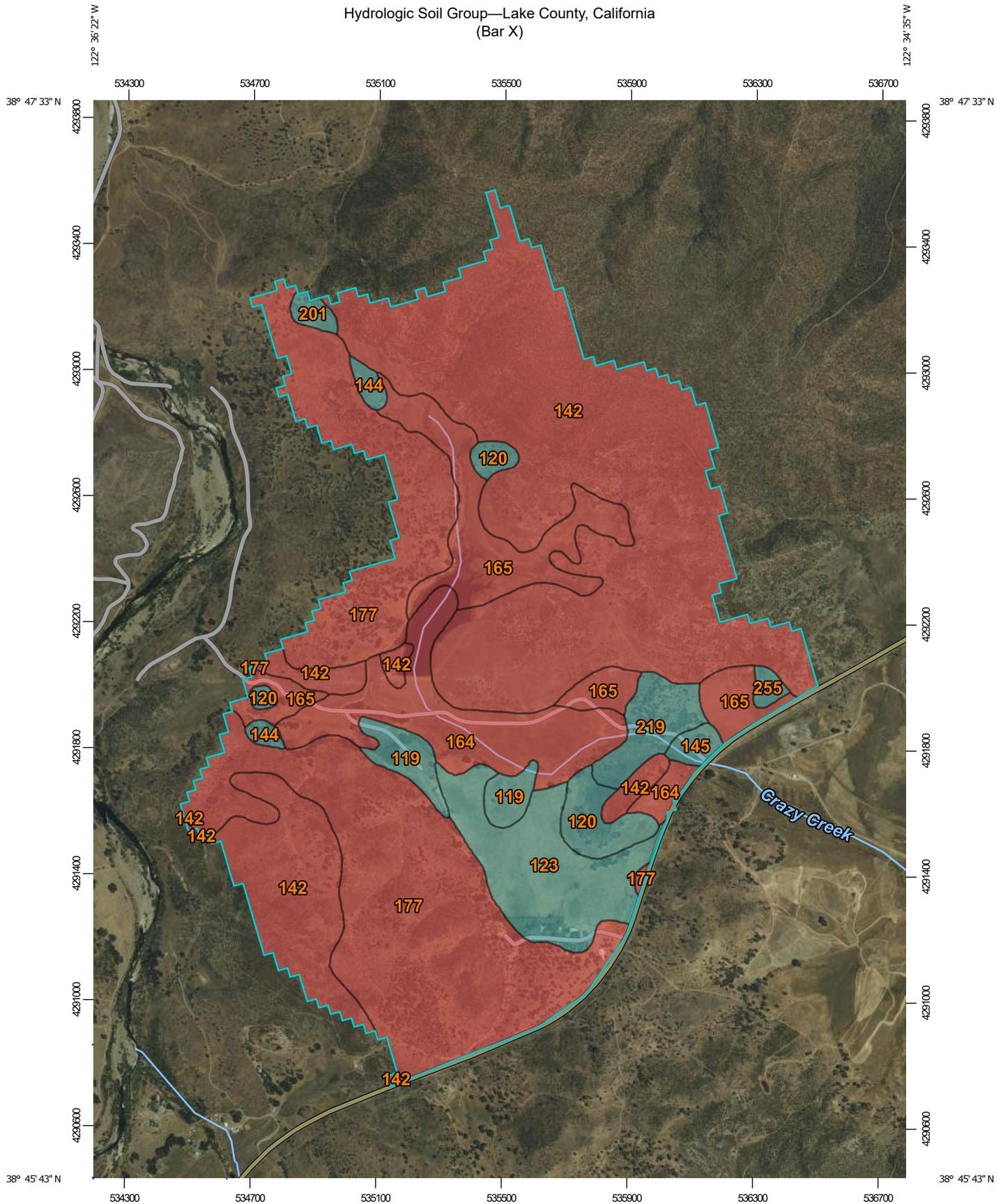


**FIGURE 2: GROUNDWATER BASIN MAP- BAR X AND DIAMOND J
LAKE COUNTY, CA**



ATTACHMENT 3
NRCS SOIL SURVEY RESULTS
HYDROLOGIC SOIL GROUPS
BAR X FARMS, LLC

Hydrologic Soil Group—Lake County, California
(Bar X)



Map Scale: 1:16,700 if printed on A portrait (8.5" x 11") sheet.



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



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

8/27/2021
Page 1 of 4

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: Jul 2, 2019—Jul 5, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
119	Bressa-Millsholm loams, 8 to 15 percent slopes	C	14.8	2.0%
120	Bressa-Millsholm loams, 15 to 30 percent slopes	C	16.7	2.2%
123	Cole clay loam, drained	C	47.9	6.3%
142	Henneke-Montara-Rock outcrop complex, 10 to 50 percent slopes, MLRA 15	D	314.4	41.5%
144	Jafa loam, 2 to 5 percent slopes	C	4.7	0.6%
145	Jafa loam, 5 to 15 percent slopes	C	4.0	0.5%
164	Maxwell clay loam, 0 to 2 percent slopes	D	59.0	7.8%
165	Maxwell clay loam, 2 to 8 percent slopes	D	61.2	8.1%
177	Millsholm-Bressa loams, 30 to 50 percent slopes	D	214.4	28.3%
201	Sanhedrin-Kekawaka- Speaker complex, 15 to 30 percent slopes	C	3.1	0.4%
219	Sobrante-Guenoc- Hambricht complex, 15 to 30 percent slopes	C	15.6	2.1%
255	Yorkville variant clay loam, 2 to 8 percent slopes	C	2.5	0.3%
Totals for Area of Interest			758.3	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ATTACHMENT 4
PRISM PRECIPITATION 1895-2020
BAR X FARMS, LLC

PRISM Time Series Data

Location: Lat: 38.7755 Lon: -122.5911 Elev: 1191ft

Climate variable: ppt

Spatial resolution: 4km

Period: 1895 - 2020

Dataset: AN81m

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

Grid Cell Interpolation: On

Time series generated: 2021-Aug-27

Details: http://www.prism.oregonstate.edu/documents/PRISM_datasets.pdf

Date	ppt (inches)		ppt (inches)
1895	49.43		
1896	54.81		
1897	32.15		
1898	21.98		
1899	50.43		
1900	33.37	Average	39.9
1901	35.84	Minimum	8.2
1902	54.04		
1903	36.84		
1904	65.25		
1905	31.88		
1906	55.3		
1907	50.3		
1908	25.84		
1909	65.4		
1910	24.13		
1911	42.17		
1912	30.36		
1913	39.16		
1914	45.87		
1915	56.19		
1916	42.12		
1917	21.95		
1918	29.69		
1919	33.82		
1920	41.97		
1921	34.27		
1922	38.58		
1923	19.3		
1924	28.73		
1925	36.52		
1926	47.74		
1927	42.45		
1928	30.12		
1929	23.68		
1930	22.6		

1931	35.53
1932	18.27
1933	32.28
1934	26.53
1935	34.36
1936	34.81
1937	47.36
1938	42.39
1939	19.52
1940	72.37
1941	65.77
1942	49.8
1943	31.83
1944	41.04
1945	44.93
1946	21.6
1947	25.18
1948	35.85
1949	26.39
1950	51.22
1951	43.72
1952	51.64
1953	33.97
1954	45.33
1955	42.93
1956	38.71
1957	46.42
1958	50.67
1959	30.7
1960	45.66
1961	29.78
1962	44.64
1963	46.4
1964	43.42
1965	38.78
1966	37.33
1967	46.11
1968	44.72
1969	58.69
1970	61.64
1971	28.07
1972	29.93
1973	61.35
1974	37.06
1975	38.09
1976	13.28
1977	30.34

1978	43.96
1979	50.55
1980	40.06
1981	50.44
1982	58.87
1983	85.64
1984	29.59
1985	26.82
1986	50.58
1987	37.27
1988	26.25
1989	26.2
1990	22.34
1991	32.67
1992	41.47
1993	46.74
1994	27.9
1995	72.83
1996	61.18
1997	37.15
1998	58.41
1999	33.21
2000	37.43
2001	44.81
2002	38.79
2003	40.49
2004	38.68
2005	52.08
2006	43.63
2007	22.39
2008	30.36
2009	29.19
2010	53.95
2011	32.99
2012	48.88
2013	8.18
2014	39.36
2015	19.51
2016	48.4
2017	57.43
2018	31.52
2019	58.91
2020	15.05