NORTH BAY | CIVIL CONSULTING

Technical Memorandum

For

Herrera Farm

Cultivation Operations

Project Name: Herrera Farm

Project Location: 22066 Jerusalem Grade, Lower Lake CA, 95457

Risk Level: Tier 2, Low

Client: Tony Herrera

Prepared By: Matthew Klein, CA P.E. 79674, Senior Project Manager

Date: April 22, 2022

Contents

INTRODUCTION AND PURPOSE

The intent of this hydrology technical memorandum is to analyze the ground water supply for the above-named project in accordance with the Lake County Board of Supervisors Urgency Ordinance 3106 (Ordinance 3106). Requiring land use applicants to provide enhanced water analysis during a declared drought emergency. Ordinance 3106 requires that all projects that require a CEQA analysis of water use include the following items in a Hydrology Report prepared by a licensed professional experienced in water resources:

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

The purpose of this Technical Memorandum (TM) is to provide the information required by Ordinance 3106 for Herrera Farm. In addition to the Hydrology Report, Ordinance 3106 requires a Drought Management Plan (DMP) depicting how the applicant proposes to reduce water use during a declared drought emergency.

PROJECT LOCATION

The project is located at 22066 Jerusalem Grade, Lower Lake, CA 95457 (APN: 013-013-39). The project site is located approximately 3.3-miles East of Hidden Valley Lake.

PROJECT OVERVIEW

Existing Conditions

The existing conditions of the project site includes one main residence, a barn and septic system. The site is mainly undeveloped and is covered with native grass, brush, and trees. Per the Envirostor website, there are no known historic sources of contamination at the site or within 1,000 feet of the project site. The aforementioned project's proposed cannabis cultivation water source will be a well located on the property just North-East of the cultivation area. The well has an estimated yield of 17 GPM per the Well Installation Report by JAK Drilling & Pump on April 2020. The project site's sheet flow currently flows in a South-Easterly direction towards Soda Creek. Stormwater is conveyed through surface runoff and flows across natural vegetation creating a vegetative buffer between discharge area and watercourses. Stormwater discharge at all location on the site are not considered direct discharges into the creek, as defined by the State Water Board. The property varies in slope, ranging from 0% - 15%. The project parcel ranges in elevation from 940 to 950 feet above mean sea level (Information derived from Google Earth). The location where cannabis cultivation will occur slopes roughly at 0% - 4%. Existing site vegetation, topography, drainage patterns, stormwater conveyance systems, and watercourses are shown on the Overall Site Plan submitted to the County of Lake.

The area that will be utilized for the proposed cannabis operation consists of a combination of Maxwell clay loam and Yorkville variant clay loam. The site is underlain by clay loam and clay. The Soil Analysis reference for the proposed cultivation area can be found in Appendix B.

Proposed Conditions

The project is proposing 51,060 square feet of outdoor cannabis cultivation (approximately 1.5 acres). This project proposes a number of site improvements to ensure that the cultivation site meets all local and state regulations and guidelines. The proposed improvements consist of a security fence, security system, employee parking, trash bins, storage sheds, portable toilets, etc. Plants are to be planted in above ground planter bags or raised planter beds. The limits of the canopy and cultivation area are shown on the Overall Site Plan that was submitted to the County of Lake.

PROJECT WATER DEMAND

The CalCannabis Environmental Impact Report (CDFA, 2017) uses a conservative estimate of 6.0 gpd and assumes that there are approximately 500 plants per acre of canopy and the demand is 3,000 gpd (2.1 gallons per minute [gpm]) per acre of canopy; this use rate is more conservative with the Water Use Management Plan section (Section 12) of the project's Property Management Plan. The total water demand for 1.5 acre of canopy is approximately as follows:

Water Demand Calculations:

- Daily – 4,500 gpd (3.15 gpm)
- Annually (Cultivation Season)
  1. 120-day cultivation season – 1.66 acre-feet (AF)
     - Typical for Indoor, Mixed-light, and Auto-flowering plants.
  2. 180-day cultivation season – 2.48 acre-feet (AF)
     - Typical for Outdoor plants.

WATER SOURCE AND SUPPLY

There is one (1) existing permitted groundwater well that will be used for cultivation approximately (Lat/Long, 38.81885°, -122.4967°). The well is approximately 171 feet deep. The Well Completion Report was performed in April 2022 by JAK Drilling & Pump in which the static water level was at ground level prior to pumping, Appendix A. Using USGS topography, the surface elevation at the well is approximately 939-feet, the initial and static water level elevation is approximately 818-feet and 939-feet respectively.

The well was estimated to have a yield of 17 gpm (27.42 acre-feet per year). The potential daily demand of 3.15 gpm represents 18.5% of the well yield and between 6.0% - 9.0% of the annual well production in acre-feet.

IRRIGATION AND WATER STORAGE

Irrigation for the cultivation operation will use water supplied by the existing well. The irrigation water would be pumped from the well via PVC piping to (4) 2,500-gallon water storage tanks, totaling 10,000 gallons of water storage and then delivered to a drip irrigation system. The drip lines will be sized to irrigate the cultivation areas at a rate slow enough to maximize absorption and prevent runoff.

GROUNDWATER BASIN INFORMATION AND HYDROGEOLOGY

The well site is located nearest to the Coyote Valley groundwater basin (Basin #5-018). The well is approximately 2.8 miles East of the basin boundary (Appendix D). Thus, it is likely the well does not draw from the Coyote Valley groundwater basin, but for this report it will be assumed that the well will depend on the Coyote Valley groundwater basin. According to the California Department of Water Resources (DWR), the major source of recharge is from Putah Creek. A lesser amount of recharge occurs from precipitation and side-stream runoff. (DWR Bulletin 118).

Coyote Valley is a northwest-southeast trending valley located within the southeastern portion of Lake County along Putah Creek about 4 miles Northeast of Middletown. The valley is approximately 5 miles long and a maximum of 2.5 miles in width. The alluvial plain of the valley is bounded by sediments of the Jurassic-Cretaceous Franciscan-Knoxville groups and undifferentiated Cretaceous rocks on the west and northwest. The south and southeastern part of the valley is nearly isolated by low hills of basalt of Upper Jurassic age. The Plio-Pleistocene Cache Formation out crops along the northern edge of the valley and Plio-Pleistocene basalt out crops are observed at the northeastern valley edge valley (Koenig 1963). Annual precipitation in the valley ranges from 37 to 41 inches, increasing to the north (DWR Bulletin 118).

The Coyote Valley Basin consists of two water-bearing formations: Quaternary Holocene alluvial deposits and the Pilo-Pleistocene Cache Formation deposits. The Quaternary Holocene alluvial is the primary water-bearing unit. It is made up of floodplain and channel deposits of Putah Creek and gently sloping alluvial fan deposits. The Pilo-Pleistocene Cache Formation outcrops on the northeast edge of Coyote Valley and underlies much of the Holocene alluvium. Groundwater flow through a few coarse sedimentary strata may be appreciable (DWR 1957).

Evaluation of the groundwater levels in the Coyote Valley Basin are shallow in the spring, decrease over the summer, and recover during the winter. Water levels in the basin are between 10 to 15 feet below ground surface on average in the spring. Spring groundwater levels have been generally stable throughout the valley. Spring to summer drawdown of the water table varies by position in the Coyote Valley Basin, with areas in the west experiencing larger drawdown than the rest of the basin. Spring to summer drawdown in the western areas ranges from 20 to 25 feet, and drawdown on the eastern side of the valley ranges from 5 to 10 feet. The general direction of groundwater flow in the Coyote Valley is to the southeast, in the direction of Putah Creek flow. The Department of Water Resources estimated 29,000 acre feet of storage capacity and 7,000 acre feet of useable storage capacity in 1960. Average-year agricultural groundwater demand in the Coyote Valley basin is roughly 670 AF per year.

The Coyote Valley Basin has not been identified by the California Department of Water Resources (SGMA 2019) as a critically overdrafted basin. DWR defines critically overdrafted 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." The California Statewide Groundwater Elevation Monitoring (CASGEM) program was developed by DWR to establish a permanent, locally managed system to monitor groundwater elevation in California’s alluvial groundwater basins and subbasins. A statewide ranking system, CASGEM Groundwater Basin Prioritization, was created to prioritize California ground water basins to help assess the need for additional groundwater level monitoring. The rankings for the Groundwater Basin Prioritization are classified into four categories high-priority, medium-priority, low-priority, or very low-priority. The Coyote Valley Basin is ranked as very low-priority basins by the California Department of Water Resources (SGMA 2019).

Recharge Rate

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

The CN Method runoff equation is:

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

Where:

- Q = runoff (inches)
- P = rainfall (inches)
- S = potential maximum retention after runoff begins (inches) and
- I_a = initial abstraction (inches)

The initial abstraction (I_a) represents all losses before runoff begins, including initial infiltration, surface depression storage, evapotranspiration, and other factors. The initial abstraction is estimated as

$I_a = 0.2 * S$, S is related to soil and cover conditions of the watershed through the CN, determined as $S = \frac{1000}{CN} - 10$. Using these relations, the runoff equation becomes:

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

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 Coyote Valley Basin contributing to the well. The elevation of the initial water level was at ground level. The elevations in the Coyote Valley Basin range between a maximum of 1,400-feet and a minimum of 1,100-feet at the outlet. Since the well is screened to an elevation of 768 to 828-feet, it is likely the recharge area will not depend on the Coyote Valley Basin. However, to be conservative, it will be assumed that the well will rely on the Coyote Valley Basin. It will be assumed that a localized area of approximately 1139.2 acres of recharge was assumed (Appendix D).

The recharge area soils are classified using the NRCS Web Soil Survey. The different classifications of the recharge soils are classified into four Hydrologic Soil Groups (HSGs) A, B, C, and D. The HSGs are used to determine the soil's ability to infiltrate water. HSG A has the highest infiltration potential and HSG D has the lowest infiltration potential. The project's site recharge area is considered to have HSG D. The site is undeveloped with a cover type of brush and is in fair condition (50% to 75% ground cover) and has a CN of 84.

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 33.8 inches and the minimum precipitation over this period is 6.47 inches (Appendix C).

Using the above information, and assuming that 50% of the initial abstraction infiltrates and the remainder is evapotranspiration (0.19 inches or 18.08 AF), the estimated annual recharge over the recharge area of 1139.2 acres is 189.16 AF during an average year and 155.82 AF during a dry year (Table 1).

Table 1. 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)
Min	1139.2	6.47	84	1.90	0.38	4.64	1.64	155.82
Avg	1139.2	33.8	84	1.90	0.38	31.62	1.99	189.16

CUMULATIVE IMPACT TO SURROUNDING AREAS

The Coyote Valley Basin is accumulated from rain that falls within the 10 square miles area and from Putah Creek (DWR). Coyote Valley Basin estimated storage capacity is 29,000 AF and has a usable storage capacity of 7,000 AF. Coyote Valley Basin is not considered a critically overdrafted basin according to the California Department of Water Resources (SGMA 2019). The proposed Herrera Farm project's annual water demand could change depending on the length of the cultivation season. The demand is estimated to be 1.66 to 2.48 AF per year, or approximately 1.3% and 1.1% of the annual recharge during an average and dry year, respectively. Herrera Farm would need approximately 0.31 inches of rainfall to infiltrate into the recharge area shown in Appendix D, to satisfy its demand. Thus, there is sufficient recharge, on an annual basis, to meet the project's demand.

The Lake County Groundwater Management Plan (Table 3-1), states that there are 86 domestic wells, 17 irrigation wells, 5 municipal wells, 6 monitoring wells, and 13 others wells in in the Coyote Valley Basin. The groundwater demand from agriculture in an average year is 4,073 AF (Table 2-5). The demand from additional proposed cannabis cultivation projects in the Coyote Valley Basin is not included in the Lake County Groundwater Management Plan, so the total additional proposed cannabis cultivation is unknown. It will be assumed that new cannabis cultivation could add an additional 15 to 25 acres to the Coyote Valley Basin. This additional agricultural demand of the groundwater could increase by 45 AF. With the addition of these new cultivations and the proposed Herrera Farm project, the annual groundwater demand could increase up to 48 AF of the leftover usable storage capacity of the Coyote Valley Basin.

Therefore, with the assumptions made for relying on the Coyote Valley Basin, the proposed project water use would have little to no cumulative impact on the agricultural groundwater demand.

QUALIFICATIONS OF AUTHOR

I am a registered Professional Engineer with the State of California with 5-years of experience practicing Water Resources Engineering.

LIMITATIONS

North Bay Civil Consulting is not responsible for the independent conclusions, recommendations, or opinions made by other individuals or agencies based on the well test, research data, topographic mapping, site visit, and interpretations presented in this report.

Hydrogeologic interpretations are based on the drillers' reports which are made available to us through the California department of water resources (DWR), existing geological maps, hydrogeologic findings and professional assessment. This analysis is based on limited hydrogeologic data and therefore relies extensively on individual interpretation of data.

In addition, the passage of time may result in environmental changes, impacting the characteristics at this site and surrounding properties. This report does not guard against future operations or conditions, nor does this allow for operations or conditions present of a type or at a location not investigated.

This report is for the exclusive use of Herrera Farm, their affiliates, designates and assignees. No other party shall have any right to rely on any service provided by North Bay Civil Consulting without prior written consent.

REFERENCES

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APPENDIX A: Well Report & Test

JAK Drilling & Pump

Well Drilling · Pumps · Water Treatment

(707) 809-5525 JAKDRILL.COM

Hole to Home

WELL INSTALLATION SUMMARY REPORT

Client Name: Anthony Herrera
Property Location: 22066 Jerusalem Grade, Lower Lake, CA
Parcel Number: 013-013-39

Location Description: 38.820477, -122.496418
Total Depth: 171-feet below ground surface (bgs) at completion
Depth to Static Water Level: 0-feet bgs
Diameter of well: 5-inches
Casing type: PVC
Test Type: Pump
Pumping Rate: 17-Gallons Per Minute (GPM) at completion

Observations: A new water well was installed at the above referenced property between April 20th and May 7th, 2020. Water was first encountered at approximately 152-feet below ground surface. Following the installation of the filter pack within the annulus to approximately 26-feet below ground surface, JAK installed a temporary submersible pump within the 5-inch well casing for the purpose of pump testing the well. The static water level within the well casing was observed at ground level prior to the installation of the test pump. During the four-hour pump test the pumping level stabilized at approximately 121-feet below ground surface at a flow rate of 17-gallons per minute. After four hours the temporary test pump was removed from the well casing and within 30-minutes the static water level returned to ground level.

JAK Drilling is currently preparing the scope of work for the installation of the submersible well pumping system for the property. Included in the scope of work will be the installation of the continuous monitoring meter(s) necessary to satisfy Lake County Ordinance No. 3073, Section 5.xii. The submersible well pumping system and continuous monitoring meters will be installed before the well is put into production.

Disclaimer:
Observations made of the well(s) are strictly limited to the date and time that the test(s) was conducted and are in no way a guarantee of future conditions, including but not limited to the quantity and/or quality of the water produced by this well.

Please feel free to contact our office if there are any questions regarding the well test and/or well test report.

Sincerely,

Jessica Moreno
JAK Drilling & Pump

Attachments: Well Location Map and Well Completion Report

WELL LOCATION MAP

22066 Jerusalem Grade Road

Lower Lake, CA

State of California

Well Completion Report

Form DWR 188 Submitted 5/12/2020

WCR2020-006196

Owner's Well Number: | Date Work Began: 04/20/2020 | Date Work Ended: 05/08/2020

Local Permit Agency: Lake County Health Services Department - Environmental Health Division

Secondary Permit Agency: | Permit Number: WP0003472 | Permit Date: 04/02/2020

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: Anthony Herrera

Mailing Address: 22066 Jerusalem Grade Rd

City: Lower Lake | State: CA | Zip: 95485

Planned Use and Activity

Activity: New Well

Planned Use: Water Supply Irrigation - Agriculture

Well Location

Address: 22066 Jerusalem Grade RD

City: Lower Lake | Zip: 95485 | County: Lake

Latitude: 38 Deg. 49 Min. 13.7171 Sec. N | Longitude: -122 Deg. 29 Min. 47.1048 Sec. W

Dec. Lat.: 38.820477 | Dec. Long.: -122.496418

Vertical Datum: | Horizontal Datum: WGS84

Location Accuracy: Unknown | Location Determination Method: GPS

APN: 013-013-39

Township: 11 N

Range: 06 W

Section: 11

Baseline Meridian: Mount Diablo

Ground Surface Elevation: 939

Elevation Accuracy: Unknown

Elevation Determination Method: GPS

Borehole Information

Orientation: Vertical | Specify:

Drilling Method: Direct Rotary | Drilling Fluid: Air

Total Depth of Boring: 176 Feet

Total Depth of Completed Well: 171 Feet

Water Level and Yield of Completed Well

Depth to first water: 152 (Feet below surface)

Depth to Static Water Level: 0 (Feet) | Date Measured: 05/08/2020

Estimated Yield*: 17 (GPM) | Test Type: Pump

Test Length: 4 (Hours) | Total Drawdown: 121 (feet)

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

Geologic Log - Free Form

Depth from Surface Feet to Feet		**Description**
0	10	Top Soil, cobble, loose formation
10	37	Serpentine, firm
37	90	Shale, serpentine, medium hard
90	137	Shale with clay
137	152	Shale with clay, firm
152	176	Fractured shale with clay, first water encountered at 152

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	111	Blank	PVC	N/A	0.265	5.563			Solid
1	111	171	Screen	PVC	N/A	0.265	5.563	Milled Slots	0.032	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
26	176	Filter Pack	Other Gravel Pack	0.375 +/-	double washed pea gravel
0	26	Bentonite	Other Bentonite		hydrated bentonite sanitary seal

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	26	10.875
26	176	7.875

Certification Statement

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

Name JAK DRILLING AND PUMP, Kharom Hellwege
Person, Firm or Corporation

PO Box 250 (Address) — Middletown (City) — CA (State) — 95461 (Zip)

Signed *electronic signature received* (C-57 Licensed Water Well Contractor) — 05/12/2020 (Date Signed) — 1013957 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N
Latitude Deg/Min/Sec

W
Longitude Deg/Min/Sec

TRS:

APN:

NORTH BAY CIVIL CONSULTING

APPENDIX B: NRCS Soil Survey Results

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Lake County, California

April 8, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

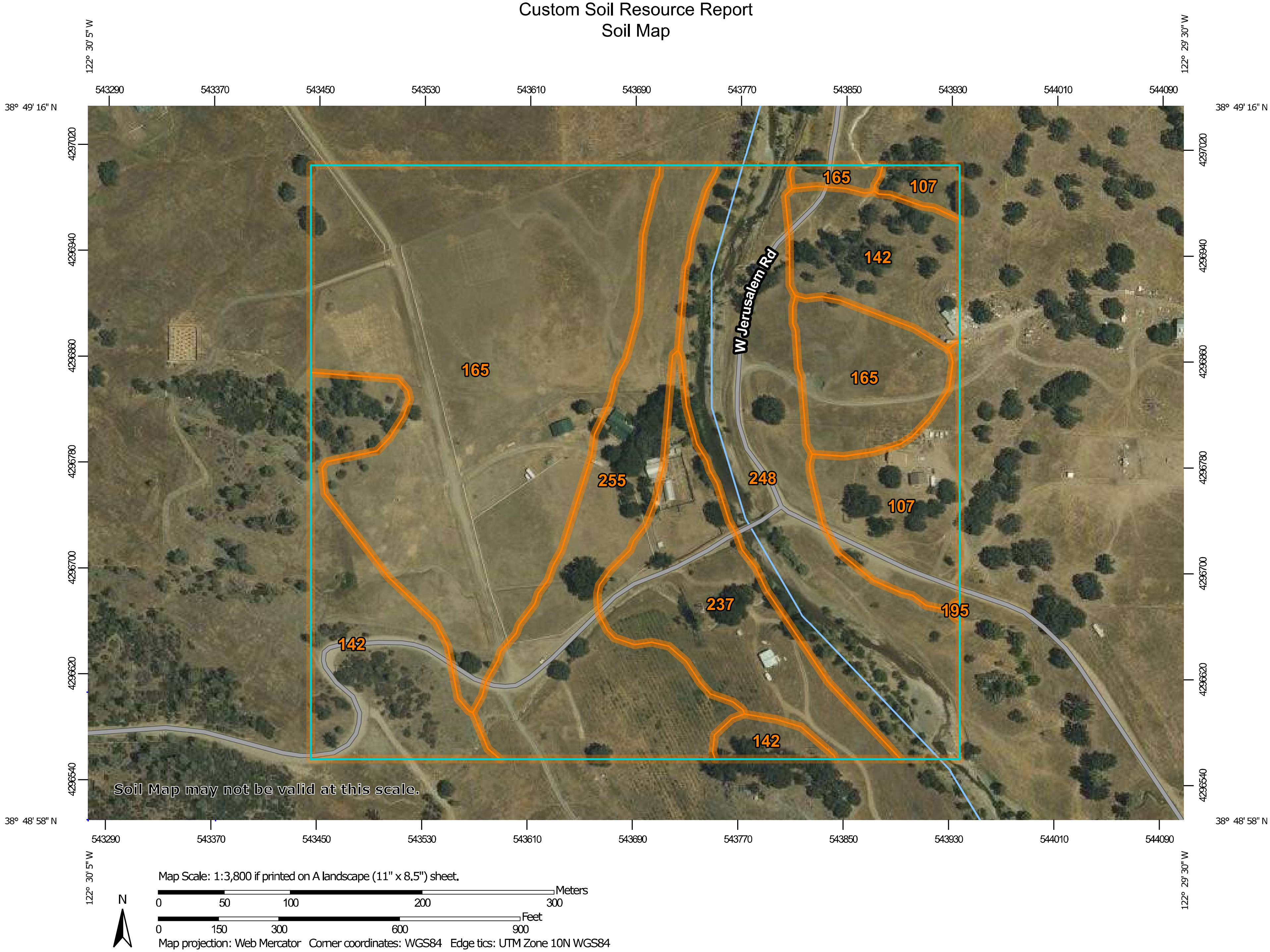
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map


122° 30' 5" W
122° 29' 30" W
38° 49' 16" N
38° 48' 58" N
543290
543370
543450
543530
543610
543690
543770
543850
543930
544010
544090
4297020
4296940
4296860
4296780
4296700
4296620
4296540
165
107
142
165
165
255
248
107
195
237
142
142
W Jerusalem Rd
Soil Map may not be valid at this scale.
Map Scale: 1:3,800 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 50 100 200 300
Feet
0 150 300 600 900
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- SodicSpot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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.

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

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

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

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

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

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

Soil Survey Area: Lake County, California
Survey Area Data: Version 18, Sep 6, 2021

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres inAOI	Percent of AOI
107	Bally-Phipps complex, 15 to 30 percent slopes	3.4	6.3%
142	Henneke-Montara-Rock outcrop complex, 10 to 50 percent slopes, MLRA 15	8.7	15.8%
165	Maxwell clay loam, 2 to 8 percent slopes	20.4	37.3%
195	Phipps complex, 5 to 15 percent slopes	0.0	0.0%
237	Talmage very gravelly sandy loam	5.2	9.4%
248	Xerofluvents, very gravelly	9.3	16.9%
255	Yorkville variant clay loam, 2 to 8 percent slopes	7.8	14.2%
Totals for Area of Interest		**54.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County, California

107-Bally-Phipps complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hf4x
Elevation: 1,100 to 2,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Bally and similar soils: 40 percent
Phipps and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bally

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium

Typical profile

H1 - 0 to 10 inches: gravelly sandy clay loam
H2 - 10 to 18 inches: very gravelly sandy clay loam
H3 - 18 to 37 inches: very gravelly sandy clay
H4 - 37 to 65 inches: very gravelly sandy clay loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Description of Phipps

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 21 inches: gravelly clay
H3 - 21 to 41 inches: gravelly clay loam
H4 - 41 to 73 inches: very gravelly clay loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (i"igated): None specified
Land capability classification (noni"igated): 4e
Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Minor Components

Forbesville

Percent of map unit: 12 percent
Hydric soil rating: No

Gentler slopes

Percent of map unit: 7 percent
Hydric soil rating: No

Steeper slopes

Percent of map unit: 6 percent
Hydric soil rating: No

142-Henneke-Montara-Rock outcrop complex, 10 to 50 percent slopes, MLRA15

Map Unit Setting

National map unit symbol: 2xcb0
Elevation: 1,000 to 3,250 feet
Mean annual precipitation: 26 to 52 inches
Mean annual air temperature: 57 to 60 degrees F
Frost-free period: 212 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Henneke and similar soils: 40 percent
Montara and similar soils: 30 percent
Rock outcrop: 16 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Henneke

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from serpentinite

Typical profile

A - 0 to 3 inches: gravelly loam
Bt1 - 3 to 11 inches: gravelly clay loam
Bt2 - 11 to 16 inches: very gravelly clay
Bt3 - 16 to 19 inches: very gravelly clay
R - 19 to 29 inches: bedrock

Properties and qualities

Slope: 10 to 50 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.2 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (i"igated): None specified
Land capability classification (noni"igated): 7e
Hydrologic Soil *Group:* D
Ecological site: F015XY01 0CA - Hills >40"ppt
Hydric soil rating: No

Description of Montara

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from serpentinite

Typical profile

A - 0 to 6 inches: clay loam
Bt - 6 to 12 inches: clay loam
R - 12 to 16 inches: bedrock

Properties and qualities

Slope: 10 to 50 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.2 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (i"igated): None specified
Land capability classification (noni"igated): 7e
Hydrologic Soil *Group:* D
Ecological site: F015XY01 0CA - Hills >40"ppt
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Free face
Down-slope shape: Convex
Across-slope shape: Convex

Interpretive groups

Land capability classification (i"igated): None specified
Ecological site: F015XY015CA - Loamy Mountains >40"ppt
Hydric soil rating: No

Minor Components

Dubakella

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Okiota

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Maxwell

Percent of map unit: 3 percent
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Millsholm

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

165-Maxwell clay loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hf6s
Elevation: 200 to 1,500 feet
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Maxwell and similar soils: 60 percent
Minor components: 40 percent
Estimates are based on obseNations, descriptions, and transects of the mapunit.

Description of Maxwell

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from serpentinite

Typical profile

H1 - 0 to 6 inches: clay loam
H2 - 6 to 84 inches: clay

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 42 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R014XD084CA- Clayey Serpentine (Annual Grass) - 1990
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 8 percent
Hydric soil rating: No

Montara

Percent of map unit: 8 percent
Hydric soil rating: No

Henneke

Percent of map unit: 8 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 8 percent
Hydric soil rating: No

Yorkville, variant

Percent of map unit: 8 percent
Hydric soil rating: No

195---Phipps complex, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: hf?r
Elevation: 1,100 to 2,500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: **57** degrees **F**
Frost-free period: 160 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Phipps and similar soils: 41 percent
Phipps and similar soils: 39 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Phipps

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 42 inches: clay
H3 - 42 to 60 inches: clay loam

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (i"igated): None specified
Land capability classification (noni"igated): **3e**

Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Description of Phipps

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 21 inches: gravelly clay
H3 - 21 to 41 inches: gravelly clay loam
H4 - 41 to 73 inches: very gravelly clay loam

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Hydric soil rating: No

Forbesville

Percent of map unit: 10 percent
Hydric soil rating: No

237-Talmage very gravelly sandy loam

Map Unit Setting

National map unit symbol: hf93
Elevation: 300 to 1,800 feet
Mean annual precipitation: 25 to 55 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Talmage and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Talmage

Setting

Landform: Flood plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 33 inches: very gravelly sandy loam
H2 - 33 to 70 inches: stratified very gravelly coarse sandy loam to very gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (iffigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: R014XG907CA- Loamy Bottom
Hydric soil rating: No

Minor Components

Kesley

Percent of map unit: 10 percent
Hydric soil rating: No

Xerofluvents

Percent of map unit: 5 percent
Landform: Fans
Hydric soil rating: Yes

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

248-:Xerofluvents, very gravelly

Map Unit Setting

National map unit symbol: hf9g
Elevation: 750 to 1,500 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 145 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerofluvents and similar soils: 65 percent
Minor components: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerofluvents

Setting

Landform: Flood plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Depth to water table: More than 80 inches
Frequency of flooding: Occasional None
Frequency of ponding: None

Interpretive groups

Land capability classification (iffigated): None specified
Land capability classification (noniffigated): 7w

Hydric soil rating: No

Minor Components

Kelsey

Percent of map unit: 9 percent
Hydric soil rating: No

Talmage

Percent of map unit: 8 percent
Hydric soil rating: No

Still

Percent of map unit: 8 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Landform: Fans
Hydric soil rating: Yes

Xerofluvents

Percent of map unit: 5 percent
Hydric soil rating: No

255-Yorkville variant clay loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hf9p
Elevation: 800 to 2,250 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Yorkville, variant, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yorkville, Variant

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from serpentinite

Typical profile

H1 - 0 to 8 inches: clay loam

H2 - 8 to 31 inches: gravelly sandy clay
H3 - 31 to 62 inches: clay
H4 - 62 to 71 inches: sandy clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Lupoyoma

Percent of map unit: 8 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 7 percent
Hydric soil rating: No

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APPENDIX C: Prism Climate Precipitation

PRISM Time Series Data
Location: Lat: 38.8188 Lon: -122.4967 Elev: 1293ft
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: Off
Time series generated: 2022-Apr-08
Details: http://www.prism.oregonstate.edu/documents/PRISM_datasets.pdf

Date	ppt (inches)
1895	41.62
1896	46.58
1897	29.68
1898	18.06
1899	42.96
1900	29.08
1901	31.31
1902	42.43
1903	32.21
1904	53.3
1905	26.79
1906	50.76
1907	43.03
1908	21.86
1909	56.28
1910	21.06
1911	39.01
1912	25.78
1913	32.17
1914	38.37
1915	45.17
1916	37.43
1917	18.65
1918	26.33
1919	28.83
1920	35.21
1921	29.41
1922	35.22
1923	17.17
1924	24.8
1925	30.99
1926	40.46
1927	36.08
1928	25.99
1929	20.13
1930	20.47

	ppt (inches)
Min:	6.47
Average:	33.80444
Max:	73.55

1931	30.69
1932	15.91
1933	26.76
1934	22.71
1935	29.89
1936	31.64
1937	41.45
1938	37.62
1939	16.46
1940	58.47
1941	54.75
1942	41.05
1943	26.46
1944	33.53
1945	37.24
1946	17.84
1947	21.06
1948	29.03
1949	21.05
1950	41.99
1951	35.79
1952	42.66
1953	27.35
1954	36.92
1955	35.2
1956	29.41
1957	38.46
1958	43.17
1959	25.76
1960	36.18
1961	25.61
1962	35.78
1963	37.64
1964	35.06
1965	31.62
1966	31.05
1967	37.7
1968	37.68
1969	46.77
1970	50.14
1971	23.58
1972	25.74
1973	51.48
1974	31.44
1975	32.31
1976	11.27
1977	25.07

1978	37.48
1979	42.7
1980	32.69
1981	41.33
1982	48.7
1983	73.55
1984	24.38
1985	22.03
1986	44.41
1987	31.77
1988	21.67
1989	22.38
1990	18.52
1991	28.5
1992	35.33
1993	40.89
1994	24.56
1995	62.47
1996	49.6
1997	33.12
1998	54.32
1999	28.17
2000	32.29
2001	40.55
2002	34.36
2003	36.14
2004	35.9
2005	45.84
2006	39.73
2007	18.31
2008	24.95
2009	23.93
2010	44.62
2011	29.33
2012	41.69
2013	6.47
2014	34.55
2015	16.7
2016	41.6
2017	51.51
2018	27.94
2019	51.16
2020	12.1

APPENDIX D: Maps

0 1 2 mi

N
W T E
S

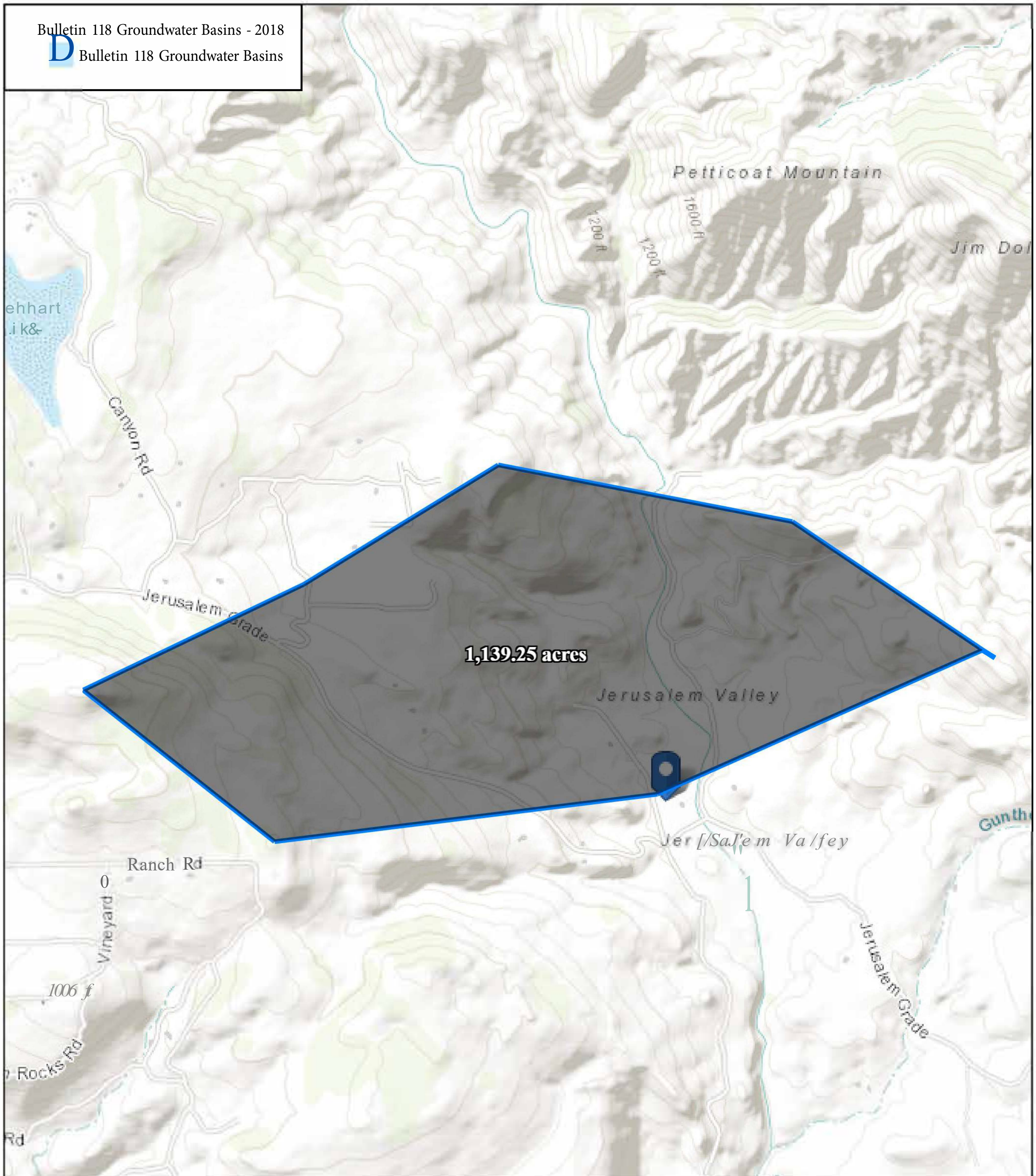
Datum: WGS 1984
Projection: Mercator Auxiliary
Zone:
Units:Mile
Source:

Groundwater Basin Man

Project Location:
22066 Jerusalem Grade Rd.
Lower Lake, CA 95457

NORTH BAY | CIVIL CONSULTING

Prepared	MK	Figure: 001	
Job No.:	20-044	Date: 4/08/2022	
File:			



0 0.2 0.4mi

N
W T E
S

Datum: WGS 1984
Projection: Mercator Auxiliary
Zone:
Units:Mile
Source:

<u>Watershed Area Man</u>

Project Location:
22066 Jerusalem Grade Rd.
Lower Lake, CA 95457

NORTH BAY | CIVIL CONSULTING

Prepared MK	Figure: 002
Job No.: 20-044	Date: 04/08/2022
File:	

NORTH BAY CIVIL CONSULTING

Drought Management Plan

For

Herrera Farm

Cultivation Operations

Project Name: Herrera Farm

Project Location: 22066 Jerusalem Grade, Lower Lake CA, 95457

Risk Level: Tier 2, Low

Client: Tony Herrera

Prepared By: Matthew Klein, CA P.E. 79674, Senior Project Manager

Date: April 22, 2022

CONTENTS

INTRODUCTION AND PURPOSE

The purpose of this Drought Management Plan is to provide the information required by Ordinance 3106 for Herrera Farms. Ordinance 3106 requires a Drought Management Plan (DMP) delineating how the applicant proposes to reduce water use during a declared drought emergency.

PROJECT LOCATION

The project is located at 22066 Jerusalem Grade, Lower Lake, CA 95457 (APN: 013-013-39). The project site is located approximately 3.3-miles East of Hidden Valley Lake.

WATER REDUCTION MEASURES

This project proposes reduction measures that will assist in reducing water loss and minimize the total amount of water use for the proposed project. During drought conditions water availability for the county will be at a critical low. Droughts can reduce the water availability and quality necessary for productive farms, ranches, and grazing lands. It can also contribute to insect outbreaks, increases in wildfire, and altered rates of carbon, and nutrients impacting agricultural production and critical ecosystem services. The proposed water reduction measures are as follows:

Daily Monitoring and Leak Inspection:

Routine inspections of water lines will be made to ensure there are no leaks present. Daily monitoring of the water system shall be conducted and documented to identify any rise or deviation in daily water usage.

Drip Irrigation:

Drip irrigation will be the sole method of watering the cultivation site. Drip irrigation can save up to 80% more water than conventional irrigation methods and can contribute to increased crop yields.

Irrigation Scheduling:

Irrigation scheduling utilizes watering during cooler parts of the day, reducing the amount of water loss due to evaporation. Sensors can be implemented to detect soil moisture levels and soil temperature to further accurately determine when watering is necessary.

Compost and Mulch:

Compost and mulch will be implemented to all cannabis plant soil. Compost or decomposed organic matter used as fertilizer improves soil structure, increasing the soil's water-holding capacity. Mulch will consist of organic materials such as straw or wood chips that will be spread on top of the soil to conserve moisture. Mulch breaks down into compost, further increasing the soil's ability to retain water.

Cover Crops:

Cover crops will be implemented to all cannabis plants. Cover crops use perennial grass to protect the bare soil that surrounds a cannabis plant. Cover crops reduce weeds and increase soil fertility and organic matter, improving compaction and prevention of erosion. In addition, cover crops benefit the ability of water to penetrate the soil and retain water, improving the soil's water-holding capacity.

Organic Practices:

The proposed cultivation site will be certified organic. Use of organic materials and amendments prevents toxic pesticides from affecting waterways and the overall environment. Healthy soil that is rich in organic matter and microbial life serves as a sponge that delivers moisture to plants and improves the recharge. Organic cultivation can recharge groundwater supplies up to 20 percent.

Conservation Tillage: (For In-ground Cultivation)

Conservation tillage uses specialized plows or other implements that partially till the soil but leave at least 30 percent of vegetative crop residue on the surface. Similar to cover crops, conservation tillage helps increase water absorption and reduce evaporation, erosion, and compaction.