Attachment 5

NORTH BAY | CIVIL CONSULTING

Technical Memorandum

For

Sky High Farms

Cultivation Operations

REGISTERED PROFESSIONAL ENGINEER
MATTHEW R. KLEIN
C 79674
01/14/22
CIVIL
STATE OF CALIFORNIA

Project Name: Sky High Farms

Project Location: 10788 Sky High Ridge Rd., Lower Lake, CA 95457

Risk Level: Tier 2 Low

Client: Kathy Crist

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

Date: January 14, 2022

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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 UP 21-27, Sky High Farms. 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 10788 Sky High Ridge Rd., Lower Lake, CA 95457 (APN: 122-340-02). The project site is located approximately 5.3-miles Southeast of the City of Clearlake.

PROJECT OVERVIEW

Existing Conditions

The existing conditions of the project site includes one main residence, a pond, one metal shed, two barns and a wooden shed. The site is mainly undeveloped and is covered with native grass and many 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 an existing well located on the property just North-East of the cultivation area. The well has an estimated yield of 14 GPM per the well test performed by Pollock & Sons Pump. The project site's sheet flow currently flows in a South-Westerly direction towards an unnamed waterway. Stormwater is conveyed through surface runoff and flows across natural vegetation creating a vegetative buffer between discharge area and watercourses. Stormwater discharge at all locations on the site are not considered direct discharges into the waterway, as defined by the State Water Board. The property varies in slope, ranging from 0% - 45%. The project parcel ranges in elevation from 1660 feet to 1820 feet above mean sea level (Information derived from Google Earth). The location where cannabis cultivation will occur slopes roughly at 0% - 9%. 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 site is underlain by a topsoil of loam. The subsoil horizons consist of clay loam. The area that will be utilized for the proposed Cannabis operation consists of a Skyhigh-Millsholm loams. The site is underlain by a topsoil of loam and c lay loam. The Soil Analysis reference for the proposed cultivation area can be found in Appendix B.

Proposed Conditions

The project is proposing 21,600 square feet (half-acre) of outdoor cannabis cultivation for early activation and upon Use Permit approval the project will replace the outdoor cultivation with 21,600 square feet of mixed-light cultivation. This project proposes several 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 a half-acre of canopy is approximately as follows:

Water Demand Calculations:

- Daily – 1,500 gpd (1.05 gpm)
- Annually (Cultivation Season)
    i. 120-day cultivation season – 0.56 acre-feet (AF)
        - Typical for Indoor, Mixed-light, and Auto-flowering plants.
    ii. 180-day cultivation season – 0.83 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, 38.90081°, -122.5243°). The well is approximately 290 feet deep and has existed on the property since the 1970's. A well test was conducted in March 2021 Pollock & Sons Pump in which the static water level was at 80-feet below the ground surface prior to pumping and lowered to 285-feet below the ground surface at the end of well test (Appendix A). Using USGS topography, the surface elevation at the well is approximately 1,900-feet; the initial and static water level elevation is approximately 1,820-feet.

The well was estimated to have a yield of 14 gpm (22.58 acre-feet per year). The potential daily demand of 1.05 gpm represents 7.5% of the well yield and between 2.5%-3.7% 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 located nearest to the Clear Lake Cache Formation Groundwater Basin (#5-066). The well is approximately 1.67 miles West of the basin boundary (Appendix D). Thus, it is likely the well draws from the Clear Lake Cache Formation Groundwater Basin. According to the California Department of Water Resources (DWR), almost all the groundwater in the Clear Lake Cache Formation Groundwater Basin is derived from rain that falls within the 47 square mile Clear Lake Cache Formation Groundwater Basin Watershed drainage area (DWR Bulletin 118).

The Clear Lake Cache Formation Basin is east of Clear Lake and is in both the Shoreline and Cache Creek Inventory. The Clear Lake Cache Formation Groundwater Basin shares a boundary with the Burns Valley Groundwater Basin in the southwest. Lower Cretaceous marine and Mesozoic ultrabasic intrusive rocks bound the south of the basin. Lower Cretaceous marine deposits border the east portion of the basin, and the Franciscan Formation borders the north and west portions of the basin. Clear Lake Cache Formation Basin consists of a single water-bearing formation known as Cache Formation. The Cache Formation is characterized by sandstone, conglomerate, and gray sandstone with light-olive-gray conglomerate lower in the section. It represents fluvial deposition, and was deposited in a fault-controlled, subsiding basin (Rymer 1981). The Cache Formation overlies the Franciscan Formation and Serpentinized Ultramafic Rocks, and is overlain by the Clear Lake Pleistocene Volcanics, and the Lower Lake Formation (Rymer 1981). The Cache Formation dips to the southwest.

The primary water-bearing formation is the Cache Formation. The Cache Formation is largely made up of lake deposits. The formation consists of tuffaceous and diatomaceous sands and silts, limestone, gravel, and intercalated volcanic rocks. In some areas the general lithology includes up to 400 feet of blue clay and shale with alternating strata of shale and limestone below 400-feet (DWR 1957). The permeability of the formation is generally low.

The Clear Lake Cache Formation Groundwater 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 Clear Lake Cache Formation Groundwater 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 Clear Lake Cache Formation Groundwater Basin watershed contributing to the well. The elevation of the initial water level, measured when the well was tested in March 2021, was approximately 1,820-feet. The approximate surface elevations within the Clear Lake Cache Formation Groundwater Basin range between a maximum of 2,425-feet and a minimum of 1,100-feet at the outlet. Since the well is screened from elevations of 1,610 to 1,730-feet, it is likely the recharge area will rely on the Clear Lake Cache Formation Groundwater Basin watershed. However, to be conservative, a localized area of approximately 122.88 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 31.62 inches and the minimum precipitation over this period is 6.45 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 1.95 AF), the estimated annual recharge over the recharge area of 122.8 acres is 20.32 AF during an average year and 16.79 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	122.8	6.45	84	1.90	0.38	4.62	1.64	16.79
Avg	122.8	31.62	84	1.90	0.38	29.44	1.99	20.32

CUMULATIVE IMPACT TO SURROUNDING AREAS

The Clear Lake Cache Formation Groundwater Basin groundwater is accumulated from rain that falls within the 47 square mile drainage area (DWR). Clear Lake Cache Formation Groundwater Basin's storage capacity has not been determined (DWR). According to the Lake County Water Inventory and Analysis the basin has an average-year agricultural groundwater demand of approximately 90 AF per year. Clear Lake Cache Formation Groundwater Basin is not considered a critically overdrafted basin according to the California Department of Water Resources (SGMA 2019). The proposed Sky High Farms project's annual water demand could change depending on the length of the cultivation season. The demand is estimated to be 0.56 to 0.83 AF per year, or approximately 4.1% and 4.9% of the annual recharge during an average and dry year, respectively. Sky High Farms would need approximately 0.35 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 71 domestic wells, 9 irrigation wells, no municipal wells, 10 monitoring wells, and 7 others wells in the Clear Lake Cache Formation Groundwater Basin. The groundwater demand from agriculture in an average year is 100 AF (Table 2-5). The demand from additional proposed cannabis cultivation projects in the Clear Lake Cache Formation Groundwater 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 Clear Lake Cache Formation Groundwater Basin. This additional agricultural demand of the groundwater could increase by 41.5 AF. With the addition of these new cultivations and the proposed Sky High Farms project, the annual groundwater demand could increase up to 42.3 AF of the leftover usable storage capacity of the Clear Lake Cache Formation Groundwater Basin.

Therefore, 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 Sky High Farms, 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.

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APPENDIX A: Well Report & Test

12N/6W-9

ORIGINAL
File with DWR

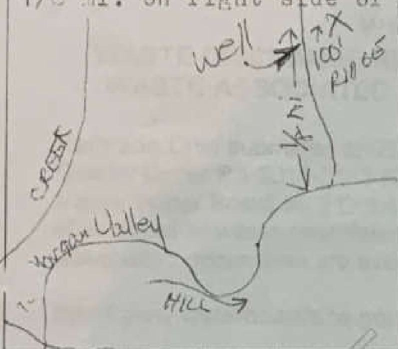
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 133974
State Well No. CONFIDENTIAL LOG
Other Well No. Water Code Sec. 13752

of Intent No. ______
Local Permit No. or Date ______

(
A
C
(:
C

Well address if different from above Morgan Valley Rd.
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. follow gravel rd. to lefft at third gate to Secluded properties across creek and bear to right 1/8 mi. up hill & left at first intersection to well site 1/8 mi. on right side of rd.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic [X]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Stock [ ]
Municipal [ ]
Other [ ]

(5) EQUIPMENT:
Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

(6) GRAVEL PACK:
Yes [X] No [ ] Size 3/8
Diameter of bore 9 7/8
Packed from 20 to 290 ft.

(7) CASING INSTALLED:
Steel [X] Plastic [ ] Concrete [ ]

(8) PERFORATIONS:
Type of perforation or size of screen ______

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	290	6 5/8	x.188	170	290	1/8

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 20 ft.
Were strata sealed against pollution? Yes [ ] No [X] Interval ______ ft.
Method of sealing sacked cement

(10) WATER LEVELS:
Depth of first water, if known 220 ft.
Standing level after well completion 80 ft.

(11) WELL TESTS:
Was well test made? Yes [X] No [ ] If yes, by whom? driller
Type of test Pump [ ] Bailer [ ] Air lift [X]
Depth to water at start of test 80 ft. At end of test 290 ft
Discharge 20 gal/min after 2 hours Water temperature ______
Chemical analysis made? Yes [ ] No [X] If yes, by whom? ______
Was electric log made? Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG: Total depth 290 ft. Depth of completed well 290 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	13	dark brown clay
13	67	red clay & boulders
67	82	blue clay & streaks of shale
82	115	blue shale with streaks of sandstone
115	140	Hard sandstone
140	170	hard black shale
170	290	black & gray shale with streaks of extra hard sandstone/fractured

Work started 2/5 19 79 Completed 2/15 19 79

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED ______ (Well Driller)
NAME Nutting & Jensen Drilling
(Person, firm, or corporation) (Typed or printed)
Address 1924 Gravenstein Hwy. So.
City Sebastopol, Cal. Zip 95472
License No. 340854 Date of this report 3/21/79

 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

CA., 95467

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

Name KATHY CRISP Phone (707) 830-0577

Address 10788 SKY High Ridge City Lewelelle

State CA Zip Date 3-3-21 3-4-21

WATER ANALYSIS

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

Manganese ppm. .... PH (acid)

Gal Per Min. .... 1.4 ....

Well Depth. .... 290 .... Casing Size 5" PVC

Static Level. .... 80 ....

Before Pumping. .... 80 ....

After Pumping 2 HRS. .... 4 HRS. 285 ... 24 HRS. 80 ..

Water Supply Garden ☒ Private Well ☐

EXISTING EQUIPMENT

1 1/2 2 wire Sub

COMMENTS/RECOMMENDATIONS

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

January 7, 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.

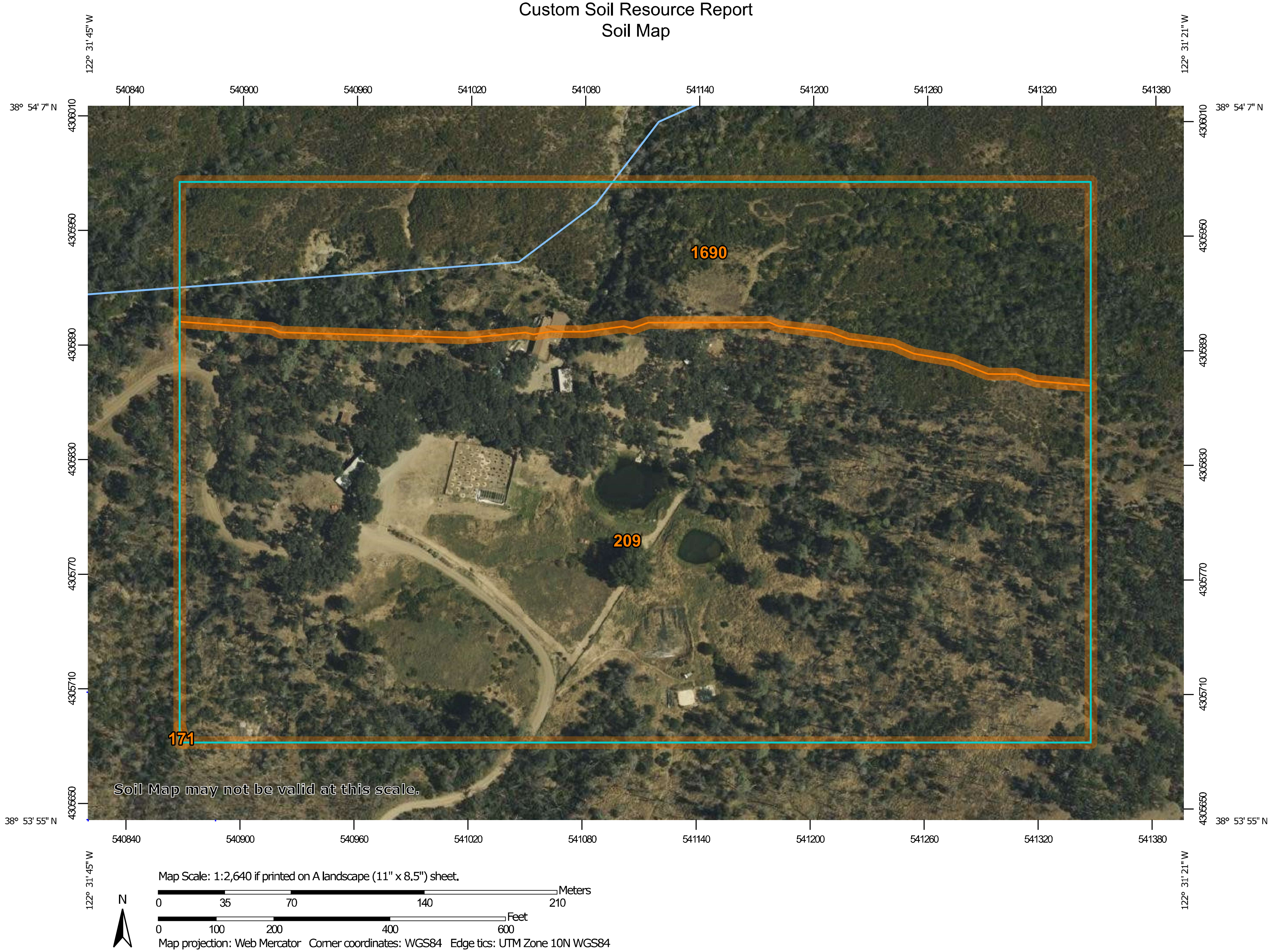
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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° 31' 45" W
122° 31' 21" W
540840
540900
540960
541020
541080
541140
541200
541260
541320
541380
38° 54' 7" N
38° 53' 55" N
4306010
4305950
4305890
4305830
4305770
4305710
4305650
1690
209
171
Soil Map may not be valid at this scale.
Map Scale: 1:2,640 if printed on A landscape (11" x 8.5") sheet.
Meters
0
35
70
140
210
Feet
0
100
200
400
600
N
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
- Sodic Spot
- 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 in AOI	Percent of AOI
171	Maymen-Hopland-Etsel association, 15 to 50 percent slopes	0.0	0.0%
209	Skyhigh-Millsholm loams, 15 to 50 percent slopes	25.1	71.9%
1690	Maymen-Etsel-Snook complex, 30 to 75 percent slopes, low ffd	9.8	28.0%
Totals for Area of Interest		**34.9**	**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

171—Maymen-Hopland-Etsel association, 15 to 50 percent slopes

Map Unit Setting

National map unit symbol: hf6z
Elevation: 400 to 6,000 feet
Mean annual precipitation: 22 to 70 inches
Mean annual air temperature: 45 to 68 degrees F
Frost-free period: 90 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Maymen and similar soils: 31 percent
Hopland and similar soils: 29 percent
Etsel and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Maymen

Setting

Landform: Mountains, ridges
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 12 inches: gravelly loam
H2 - 12 to 22 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 12 to 16 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 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: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F015XY015CA - Loamy Mountains >40"ppt
Hydric soil rating: No

Description of Hopland

Setting

Landform: Mountains, ravines

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 34 inches: clay loam
H3 - 34 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 34 to 38 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 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: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F015XY015CA - Loamy Mountains >40"ppt
Hydric soil rating: No

Description of Etsel

Setting

Landform: Mountains, ridges
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 3 inches: gravelly loam
H2 - 3 to 10 inches: very gravelly loam
H3 - 10 to 20 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 10 to 14 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 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: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F015XY015CA - Loamy Mountains >40"ppt
Hydric soil rating: No

Minor Components

Mayacama

Percent of map unit: 4 percent
Hydric soil rating: No

Henneke

Percent of map unit: 4 percent
Hydric soil rating: No

Sanhedrin

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 2 percent
Hydric soil rating: No

Snook

Percent of map unit: 2 percent
Hydric soil rating: No

Montara

Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

Millsholm

Percent of map unit: 2 percent
Hydric soil rating: No

209—Skyhigh-Millsholm loams, 15 to 50 percent slopes

Map Unit Setting

National map unit symbol: hf86
Elevation: 300 to 3,700 feet
Mean annual precipitation: 12 to 50 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 130 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Skyhigh and similar soils: 45 percent
Millsholm and similar soils: 25 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Skyhigh

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave, convex
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 2 inches: loam
H2 - 2 to 8 inches: clay loam
H3 - 8 to 38 inches: clay
H4 - 38 to 48 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 38 to 42 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
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R015XF006CA - Steep Clayey Hills
Hydric soil rating: No

Description of Millsholm

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, concave
Across-slope shape: Convex
Parent material: Residuum weathered from sedimentary rock

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 16 inches: clay loam
H3 - 16 to 26 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 16 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 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: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Minor Components

Bressa

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

Etsel

Percent of map unit: 4 percent
Hydric soil rating: No

Asbill

Percent of map unit: 4 percent
Hydric soil rating: No

Hopland

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

Sleeper

Percent of map unit: 3 percent
Hydric soil rating: No

Maymen

Percent of map unit: 3 percent
Hydric soil rating: No

1690—Maymen-Etsel-Snook complex, 30 to 75 percent slopes, low ffd

Map Unit Setting

National map unit symbol: 2y4jl
Elevation: 1,670 to 3,310 feet
Mean annual precipitation: 31 to 55 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 196 to 275 days
Farmland classification: Not prime farmland

Map Unit Composition

Maymen and similar soils: 35 percent
Etsel and similar soils: 25 percent
Snook and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Maymen

Setting

Landform: Hillslopes, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Parent material: Colluvium derived from sandstone and shale and/or residuum weathered from sandstone and shale

Typical profile

A - 0 to 4 inches: gravelly loam
Bw - 4 to 12 inches: gravelly loam
R - 12 to 22 inches: bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 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)
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Ecological site: F015XY015CA - Loamy Mountains >40"ppt
Hydric soil rating: No

Description of Etsel

Setting

Landform: Hillslopes, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Parent material: Colluvium derived from sandstone and shale and/or residuum weathered from sandstone and shale

Typical profile

A1 - 0 to 3 inches: gravelly loam
A2 - 3 to 10 inches: very gravelly loam
R - 10 to 20 inches: bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 4 to 12 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 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)
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F015XY015CA - Loamy Mountains >40"ppt
Hydric soil rating: No

Description of Snook

Setting

Landform: Mountains, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Parent material: Colluvium derived from sandstone and shale and/or residuum weathered from sandstone and shale

Typical profile

A - 0 to 5 inches: loam
R - 5 to 15 inches: bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 5 to 9 inches to lithic bedrock
Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 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: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): 8
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: F015XY010CA - Hills >40"ppt
Hydric soil rating: No

Minor Components

Mayacama

Percent of map unit: 7 percent
Landform: Hillslopes, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

Hopland

Percent of map unit: 7 percent
Landform: Hillslopes, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 6 percent
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

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APPENDIX C: Prism Climate Precipitation

PRISM Time Series Data
Location: Lat: 38.9026 Lon: -122.5269 Elev: 2011ft
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-Jan-07
Details: http://www.prism.oregonstate.edu/documents/PRISM_datasets.pdf

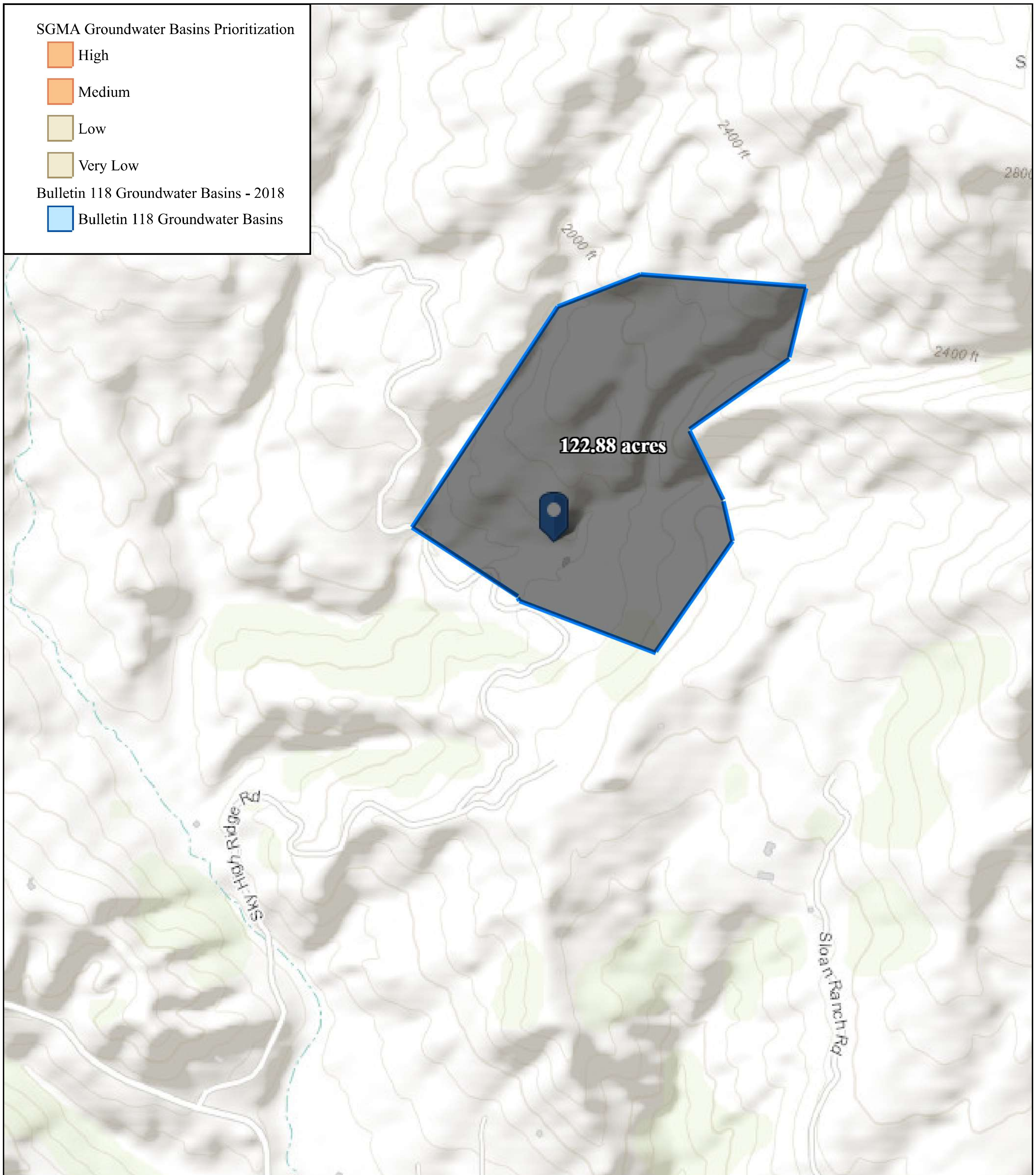
Date	ppt (inches)
1895	38.58
1896	44.27
1897	28.99
1898	17.09
1899	40.6
1900	27.56
1901	29.42
1902	39.46
1903	30.19
1904	50
1905	25.65
1906	48.36
1907	41.11
1908	20.99
1909	51.19
1910	19.78
1911	37.05
1912	24.32
1913	30.26
1914	35.33
1915	41.87
1916	34.71
1917	16.36
1918	24.21
1919	26.96
1920	33.87
1921	27.53
1922	32.33
1923	16.16
1924	23.28
1925	29.58
1926	38.09
1927	33.23
1928	24.01
1929	18.39
1930	19.3

	ppt (inches)
Minimum:	6.45
Average:	31.62
Maximum:	70.20

1931	28.5
1932	14.9
1933	24.79
1934	21.26
1935	28.39
1936	29.08
1937	39.22
1938	35.87
1939	15.66
1940	53.98
1941	51.65
1942	37.97
1943	24.34
1944	30.93
1945	34.86
1946	16.85
1947	19.71
1948	27.21
1949	20
1950	39.37
1951	34.43
1952	39.84
1953	25.19
1954	34.13
1955	30.89
1956	25.98
1957	37.09
1958	40.55
1959	23.64
1960	33.42
1961	24.31
1962	32.66
1963	34.4
1964	30.64
1965	29.38
1966	28.12
1967	33.81
1968	35.54
1969	41.42
1970	44.08
1971	21.9
1972	23.75
1973	48.02
1974	29.01
1975	29.47
1976	10.29
1977	23.06

1978	34.26
1979	39.88
1980	29.16
1981	37.94
1982	44.01
1983	70.2
1984	23.19
1985	20.07
1986	41.78
1987	30.76
1988	19.54
1989	23.08
1990	18.37
1991	27.21
1992	33.11
1993	39.16
1994	23.34
1995	60.32
1996	43.75
1997	32.16
1998	54.97
1999	26.66
2000	30.33
2001	38.98
2002	32.74
2003	35.65
2004	35.47
2005	44.18
2006	37.91
2007	16.07
2008	22.22
2009	21.3
2010	39.96
2011	27.71
2012	38.4
2013	6.45
2014	33.85
2015	18.43
2016	38.45
2017	48.7
2018	25.92
2019	48.62
2020	10.82

APPENDIX D: Maps



0 0.1 0.2mi

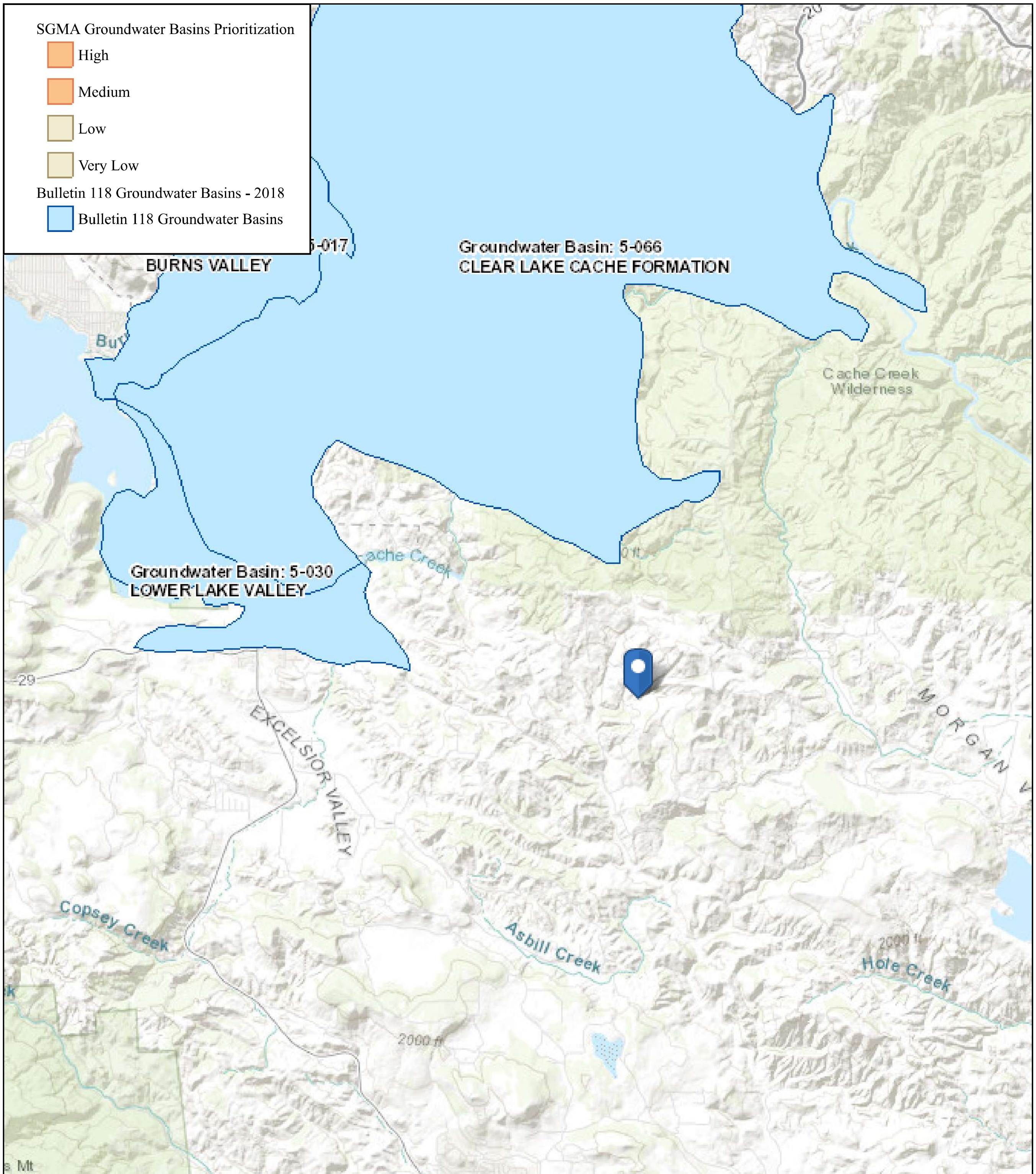
Datum: WGS 1984
Projection: Mercator Auxiliary
Zone:
Units: Mile
Source:

Watershed Area

Project Location:
10788 Sky High Ridge Rd.
Lower Lake, CA 95457

NORTH BAY CIVIL CONSULTING

Prepared MK	Figure: 002
Job No.: 20-089	Date: 01/08/2022
File:	



0 1 2mi

N
W E
S

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

Groundwater Basin Map

Project Location:
10788 Sky High Ridge Rd.
Lower Lake, CA 95457

NORTH BAY CIVIL CONSULTING

Prepared	MK	Figure:	001
Job No.:	20-089	Date:	01/08/2022
File:			

Drought Management Plan

For

Sky High Farms

Cultivation Operations

Project Name: Sky High Farms

Project Location: 10788 Sky High Ridge Rd., Lower Lake, CA 95457

Risk Level: Tier 2 Low

Client: Kathy Crist

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INTRODUCTION AND PURPOSE

The purpose of this Drought Management Plan is to provide the information required by Ordinance 3106 for Sky High 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 10788 Sky High Ridge Rd., Lower Lake, CA 95457 (APN: 122-340-02). The project site is located approximately 5.3-miles Southeast of the City of Clearlake.

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.