Attachment 5

NORTH BAY | CIVIL CONSULTING

Technical Memorandum

For

Gordo’s Greenery

Cultivation Operations

Project Name: Gordo's Greenery

Project Location: 8300 Old Dirt Road, Kelseyville, CA

Risk Level: Tier 2 Low

Client: Armando Cruz

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

Date: November 9, 2021

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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 20-71, Gordo's Greenery. 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 8300 Old Dirt Road, Kelseyville, California (APN: 007-023-05). The project site is located approximately 2.5-miles Southwest of the City of Kelseyville.

PROJECT OVERVIEW

Existing Conditions

The existing conditions of the project site include 3 sheds and a well. 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 southeast of the outdoor cultivation area, and west of the mixed light cultivation area. The well has an estimated yield of 40 GPM per the Well Completion Report.

The project site's sheet flow currently flows in a Northerly direction towards Hill 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 locations 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% -33%. The project parcel ranges in elevation from 1,510 – 1,595 feet above mean sea level (Information derived from Google Earth). The location where cannabis cultivation will occur slopes roughly at 0% - 15%. Existing site vegetation, topography, drainage patterns, stormwater conveyance systems, and watercourses are shown on the overall site plan that was submitted to the County of Lake.

The site is underlain by a topsoil of gravelly loam. The subsoil horizons consist of Bally-Phipps complex. The area that will be utilized for the proposed Cannabis operation consists of a gravelly loam. The Soil Analysis reference for the proposed cultivation area can be found in Appendix B.

Proposed Conditions

The project is proposing 4 acres of outdoor cannabis cultivation on the subject parcel. 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 nags 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 consistent with the Water Use Management Plan section (Section 12) of the project's Property Management Plan. The total water demand for 4-acres of canopy is approximately as follows:

Water Demand Calculations:

- Daily – 12,000 gpd (8.4 gpm)
- Annually (Cultivation Season)
  i. 120-day cultivation season – 4.4 acre-feet (AF)
     - Typical for Indoor, Mixed-light, and Auto-flowering plants.
  ii. 180-day cultivation season – 6.7 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 (Approx. Lat/Long, 38.947133°, -122.864278°). The well is approximately 125 feet deep with a static water level at 40-feet below the ground surface prior to pumping and did not lower at the end of well test (Appendix A). Using USGS topography, the surface elevation at the well is approximately 1,592-feet; the initial and static water level elevations are approximately 1,467-feet and 1,552- feet, respectively.

The well was estimated to have a yield of 15 gpm (24.2 acre-feet per year). The potential daily demand of 8.4 gpm represents 56% of the well yield and between 18%-28% of the annual well production in acre-feet. There is also a note explaining that there is a possibility that the well can produce double the amount if a larger pump is installed.

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 (6) 2,500-gallon water storage tanks, totaling 15,000 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 towards the middle of the Big Valley Groundwater Basin (Basin #5-015) (Appendix D). According to the California Department of Water Resources (DWR), almost all the groundwater in the Big Valley Basin is derived from rain that falls within the 38 square mile Big Valley Watershed drainage area (DWR Bulletin 118).

Hydrogeology in Big Valley is comprised of two distinct areas: the younger alluvial and basin deposits in the north, and raised uplands comprised of the Kelseyville Formation in the south. The two areas are separated by the Big Valley Fault, which uplifted the Kelseyville Formation and created the uplands in the south Recharge in the northern portion of the Big Valley Basin is primarily infiltration from Kelsey Creek and by underflow from the Adobe Creek Manning Creek Subbasin. Underflow occurs mainly from more permeable zones at depths of 25- to 45-feet and 70- to 90-feet. A limited amount of underflow probably enters the basin from the Central Upland system and from Mt. Konocti. Some recharge by infiltration of rain, applied water, and creek water occurs in areas other than the Kelsey Creek flood plain; however, direct surface recharge is inhibited by clayey soil and the near surface clay layer (SMFE 1967).

The Big Valley Basin has not been identified by the California Department of Water Resources (DWR) 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 Big Valley Groundwater Basin is ranked as a medium-priority basin by the CASGEM ranking system. (DWR, 2021).

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 shown on the Watershed Area Map (Appendix D), contributing to the well. The approximated recharge area is 5,729 acres. The elevation of the initial water level was approximately 1,552-feet. The approximate elevations within the Big Valley Basin range between a maximum of 1,710-feet and a minimum of 1,360-feet at the area of recharge. Since the well is screened from elevations 1,464-feet to 1504-feet it is likely the recharge area is larger than what is shown on the Watershed Area Map (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 be HSG C. 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 79.

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 31.4 inches and the minimum precipitation over this period is 7.47 inches (Appendix C).

Using the above information, and assuming that 50% of the initial abstraction infiltrates and the remainder is evapotranspiration (0.27 inches or 127 AF), the estimated annual recharge over the recharge area of 5,729 acres is 1,295 AF during an average year and 1,044 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	5729	7.47	79	2.66	0.53	5.02	2.19	1044.46
Avg	5729	31.4	79	2.66	0.53	28.42	2.71	1295.37

CUMULATIVE IMPACT TO SURROUNDING AREAS

The Big Valley Basin groundwater is accumulated from rain that falls within the 38 square mile Big Valley Watershed drainage area (DWR). Big Valley Basin's estimated storage capacity is 105,000 AF and has a usable storage capacity of 60,000 AF. The proposed Gordo's Greenery project's annual water demand could change depending on the length of the cultivation season. The demand is estimated to be 4.4 to 6.7 AF per year, or approximately 0.42% and 0.64% of the annual recharge during an average and dry year, respectively. The Gordo's Greenery project would need approximately 0.3-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 463 domestic wells, 297 irrigation wells, 9 municipal wells, 29 monitoring wells and 162 others wells in the Big Valley Basin. The groundwater demand from agriculture in an average year is 11,454 AF (Table 2-5). The demand from additional proposed cannabis cultivation projects in the Big Valley Groundwater Basin is not included in the 2006 Groundwater Management Plan, so the total additional proposed cannabis cultivation is unknown. It will be assumed that new cannabis cultivation could add an additional 30 to 50 acres to the Big Valley Groundwater Basin. This additional agricultural demand of the groundwater could increase by 85 AF. With the addition of these new cultivations and the proposed Gordo's Greenery project, the annual groundwater demand could increase up to 0.8% or 91.7 AF of the leftover usable storage capacity of the Big Valley 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.

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APPENDIX A: Well Report & Test

File Original with DWR NOV 05 2018

Page 1 of 1

Owner's Well Number Well #1

Date Work Began 08/21/2018 Date Work Ended 8/22/2018

Local Permit Agency Lake County Environmental Health Division

Permit Number WE-5055 Permit Date 6/29/18

State of California

Well Completion Report

No. e0371075

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 13N/09W-28

Latitude N | Longitude W

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify____

Drilling Method Air Drilling Drilling Fluid ____

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	43	Rocky brown soil
43	69	Sandy clay
69	114	Gravelly clay
114	126	Gravel
126	140	Clay

Total Depth of Boring 140 Feet

Total Depth of Completed Well 128 Feet

Well Owner

Well Location

Address 8300 Old Dirt Road

City Kelseyville County Lake

Latitude 38 Deg. 56 Min. 47 Sec. N Longitude 122 Deg. 51 Min. 52 Sec. W

Datum ____ Decimal Lat. ____ Decimal Long. ____

APN Book 007 Page 023 Parcel 05

Township 13N Range 9W Section 28

Location Sketch

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

North

West East

South

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

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply
☑ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other____

Water Level and Yield of Completed Well

Depth to first water 117 (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured 08/22/2018

Estimated Yield * 40 (GPM) Test Type Air Lift

Test Length 2.0 (Hours) Total Drawdown 128 (Feet)

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

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	20	11						
20	140	8						
0	88		Blank	PVC Sch. 40	SDR21	5		
88	128		Screen	PVC Sch. 40	SDR21	5	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	25	Bentonite	
25	128	Filter Pack	3/8 Pea Gravel
128	140	Fill	Native

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Site Map

Attach additional information, if it exists.

Certification Statement

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

Name Weeks Drilling & Pump Company
Person, Firm or Corporation

P.O. Box 176 (Address) Sebastopol (City) CA (State) 95473 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

10/16/18 Date Signed

177681 C-57 License Number

8300 Old Dirt Rd, Kelseyville

APN #007-023-05

All parcel boundaries are approximate. Discrepancies in acreage, shape and location are common. This map is not a legal survey document to be used in single site determinations. Consult your deed for a legal parcel description. http://gispublic.co.lake.ca.us/flexviewer

Printed: 09/27/16 14:09:18 PM

Name Vanessa / Armenta Phone
Address 8300 old dirt Rd City Kelseyville CA
State CA Zip Order #

WATER ANALYSIS

Hardness (lime)	/	gpg
Iron (rust)	/	ppm
Ph (acid)	/	gpm
Gal Per Min	(15) with pump that in well	
Well Depth	125'	
Casing Size	6"	
Static Level: Before Pumping	40'	
After Pumping	4 hrs 50'	
Number of Persons in Family	UN	

Water Supply: Municipal ☐ Private Well ☒

RECOMMENDATIONS

Right at Bottom by creek Culvert

static after 24 HRS Back to 40'

COMMENTS ~~Good well will produce Double~~

STATIC Level 24 HRS Later

$ 750—

total
Bill

POLLACK PUMP

Box 5169 HCR, Middletown CA 95461

987-0917/1-800-233-7992

RE: WELL TEST

8300 OLD DIRT ROAD
KELSEYVILLE CA

WELL DEPTH — 125'

STATIC LEVEL BEFORE PUMPING — 40'

STATIC " AFTER 4 HRS OF PUMPING — 50'

STATIC LEVEL AFTER 24 HOURS – 40'

GALLONS PER MINUTES PUMPED 15

WELL WILL PRODUCE DOUBLE THE 15 GPM
WITH A LARGER PUMP

VERY GOOD WELL

THANK YOU

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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

June 1, 2020

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.

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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.

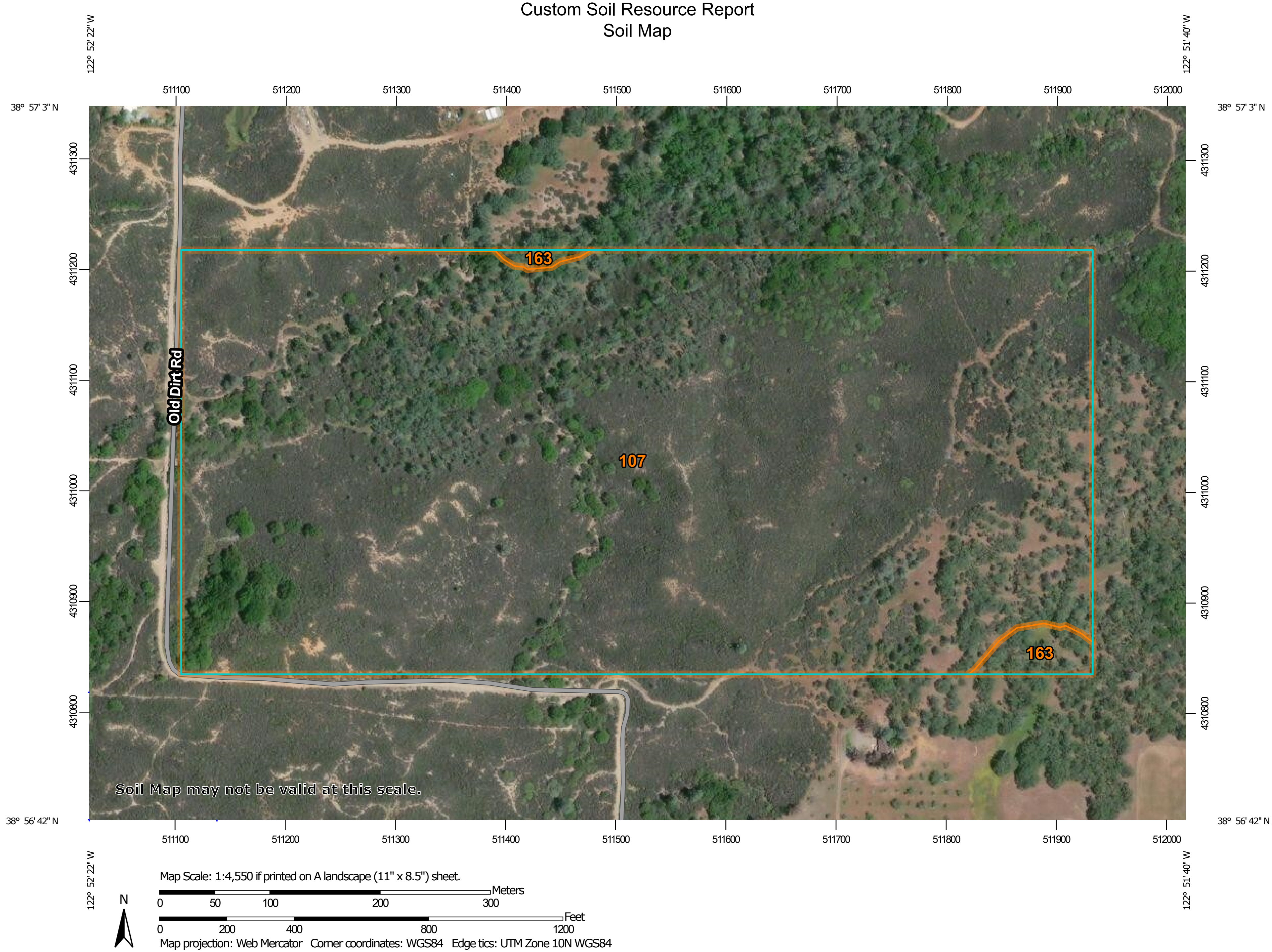
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Custom Soil Resource Report
Soil Map



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 16, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 18, 2016—Nov 4, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
107	Bally-Phipps complex, 15 to 30 percent slopes	77.6	98.5%
163	Manzanita gravelly loam, 8 to 25 percent slopes	1.2	1.5%
Totals for Area of Interest		**78.7**	**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
Natural 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 storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
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
Natural 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 storage in profile: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
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

163—Manzanita gravelly loam, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: hf6q
Elevation: 1,000 to 1,600 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

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

Description of Manzanita

Setting

Landform: Terraces
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 7 inches: gravelly loam
H2 - 7 to 35 inches: gravelly sandy clay loam
H3 - 35 to 60 inches: gravelly clay

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural 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 storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: CLAYEY TERRACE (BLUE OAK/ANNUAL GRASS) (R014XD085CA)
Hydric soil rating: No

Minor Components

Forbesville

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

Steeper slopes

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: 38.9471   Lon: -122.8643   Elev: 1467ft
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: 2021-Nov-12
Details: http://www.prism.oregonstate.edu/documents/PRISM_datasets.pdf

Date	ppt (inches)
1895	37.25
1896	43.38
1897	28.32
1898	17.93
1899	38.79
1900	26.46
1901	28.95
1902	42.73
1903	28.95
1904	46.56
1905	25.12
1906	44.4
1907	37.06
1908	21.69
1909	52.53
1910	19.13
1911	34.94
1912	23.82
1913	29.49
1914	36.43
1915	43.4
1916	32.16
1917	15.96
1918	23.3
1919	26.59
1920	32.31
1921	26.84
1922	31.43
1923	15.29
1924	25.04
1925	31.93
1926	38.62
1927	34.14
1928	24.25
1929	16.53
1930	18.57

min	7.47
avg	31.39238
max	70.03

1931	28.13
1932	13.99
1933	23.7
1934	21.4
1935	26.51
1936	27.06
1937	38.71
1938	33.41
1939	14.4
1940	49.34
1941	47.44
1942	36.89
1943	24.14
1944	30.32
1945	33.95
1946	17.04
1947	19.1
1948	26.22
1949	18.5
1950	38.76
1951	33.51
1952	37.53
1953	25.14
1954	33.79
1955	30.3
1956	28.28
1957	37.4
1958	40.54
1959	24.5
1960	33.15
1961	24.19
1962	33.7
1963	34.38
1964	32.03
1965	29.57
1966	28.6
1967	33.73
1968	35.96
1969	41.82
1970	44.95
1971	22.4
1972	24.15
1973	48.39
1974	28.94
1975	31
1976	12.26
1977	24.9

1978	35.53
1979	42.88
1980	30.66
1981	41.4
1982	43.06
1983	70.03
1984	25.07
1985	19.62
1986	42.25
1987	30.39
1988	20.72
1989	21.51
1990	20.11
1991	25.38
1992	33.94
1993	37.54
1994	25.11
1995	55.08
1996	45.16
1997	33.08
1998	58.56
1999	27.77
2000	31.75
2001	38.03
2002	31.89
2003	35.37
2004	32.7
2005	40.98
2006	37.03
2007	19.29
2008	23.76
2009	23.09
2010	43.17
2011	26.91
2012	35.82
2013	7.47
2014	34.19
2015	19.48
2016	37.05
2017	43.07
2018	24.47
2019	48.26
2020	12.4

APPENDIX D: Maps

Big Valley Basin Map

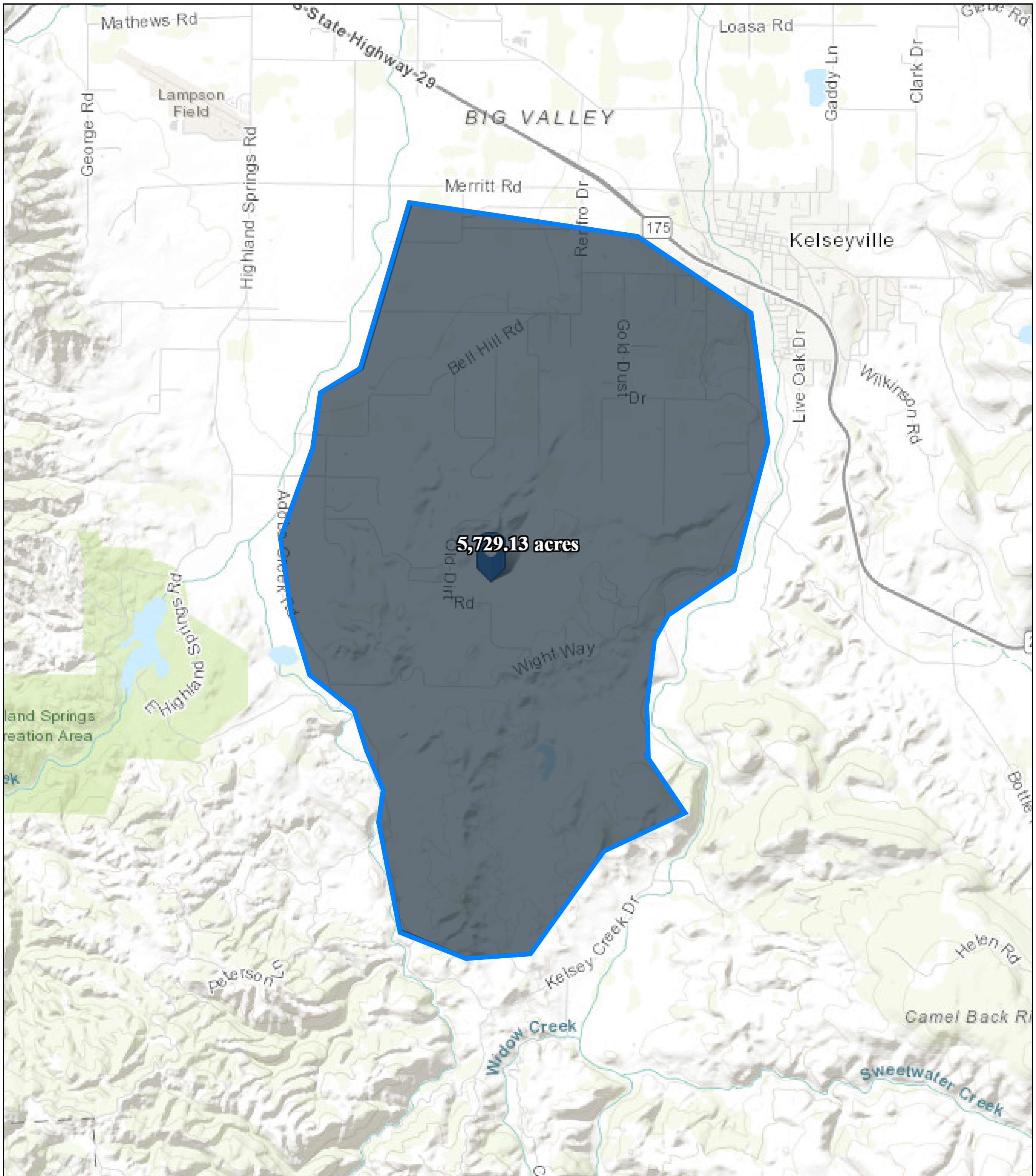
0 1 2mi

N W E S

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

NORTH BAY CIVIL CONSULTING

Prepared MK	Figure: 1
Job No.: 20-006	Date: 11/12/21
File:	



0 0.5 1mi

N W E S

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

Watershed Area Map

NORTH BAY | CIVIL CONSULTING

Prepared	MK	Figure:	2
Job No.:	20-006	Date:	11/12/21
File:			

NORTH BAY | CIVIL CONSULTING

Drought Management Plan

For

Gordo's Greenery

Cultivation Operations

Project Name: Gordo's Greenery

Project Location: 8300 Old Dirt Road, Kelseyville, CA

Risk Level: Tier 2 Low

Client: Armando Cruz

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

Date: November 9, 2021

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WATER REDUCTION MEASURES 3
Daily Monitoring and Leak Inspection: 3
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Irrigation Scheduling: 3
Compost and Mulch: 3
Cover Crops: 4
Organic Practices: 4
Conservation Tillage: (For In-ground Cultivation) 4

INTRODUCTION AND PURPOSE

The purpose of this Drought Management Plan is to provide the information required by Ordinance 3106 for UP 20-71, Gordo's Greenery. 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 8300 Old Dirt Road, Kelseyville, California (APN: 007-023-05). The project site is located approximately 2.5-miles Southeast of the City of Kelseyville.

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.