Pura Vineyards Project
Drought Management Plan

Pura Vineyards
Drought Management Plan

Project Location

6700, 6800, 6900 Wilkinson Road, and

7590 and 7530 State Hwy 29

Kelseyville, CA

Project Parcels

Lake County APNs

007-108-04 and 007-018-05

Project Property

Lake County APNs

007-108-02, 007-018-04, 007-018-11,

007-108-04, and 007-018-05

This page intentionally left blank.

TABLE OF CONTENTS

Figures

This page intentionally left blank.

1. PURPOSE AND INTENT OF THE DROUGHT MANAGEMENT PLAN

The purpose of this Drought Management Plan (DMP) is to meet the requirements of Lake County Ordinance 3106, passed by the Board of Supervisors on July 27, 2021. The Ordinance requires that all projects requiring a CEQA analysis provide an evaluation of water use and prepare a DMP specifying how the project would implement measures to reduce water use during a declared drought emergency. In part, the DMP is intended to help ensure both the success of the project and decrease environmental impacts including those to the aquifer through groundwater withdrawals and the potential for the withdrawals to affect the water used by surrounding properties. In addition to the DMP, Ordinance 3106 also requires preparation of a hydrology report to address water usage, water supply, and cumulative impacts to surrounding areas. A groundwater hydrology report, dated January 2021, has been submitted as a separate document for this proposed project and is incorporated by reference.

In consideration of the above, this DMP has been prepared to provide information related to actions taken by the project applicant to reduce water use during drought years. The DMP includes specific measures, modification to cultivation methodologies and production could be made to both ensure success while decreasing impacts to surrounding areas. The DMP would include steps that could be taken by the applicant to reduce water use during these times.

Approach

The overall intent of the DMP is to provide a strategy for the project to reduce the demand for groundwater withdrawal, maximize the potential for water infiltration and groundwater recharge, and to minimize effects on ground water during drought conditions. The DMP outlines strategies already included in the project and additional recommendations to be implemented. Key goals that focus on drought management include, preventing aquifer drawdown, promoting infiltration, encouraging efficient water use, preventing runoff, and enhancing drought resistance. These preventative and strategic measures aim to increase resistance to drought and mitigate potential drought risk and impacts on the economy, society, and environment.

The DMP uses both a proactive and reactive approach to water use and conservation. The DMP is focused on proactive water conservation measure that have been included to the project and that have been designed to reduce water use regardless of environmental conditions. These measures have been included as part of the project. The DMP also includes reactive measures which are actions that can be taken to further address water uses if additional conservation or reductions are needed. The measures include both short and long-term strategies that can be implemented as needed to reduce overall water consumption but more importantly, minimize the effects of drought conditions.

2. PROJECT DESCRIPTION

The Pura Vineyards project is located approximately 2.5 miles southeast of the community of Kelseyville, CA, at 6700 Wilkinson Road in unincorporated Lake County. The proposed project includes a total of five (5) individual, contiguous assessors parcels (APN), with a total area of 314.48 acres (project property): 007-018-02 (60.7 acres), 007-018-04 (59.09 acres), 007-018-11 (115.46 acres), 007-029-04 (19.84 acres), 007-029-05 (59.39 acres). See *Figure 1: Regional Location Map*, *Figure 2: Project Vicinity Map.*

Within the project property, cultivation is proposed on only two of the parcels APNs 007-029-04 and 007-029-05. Within these parcels, cultivation and related activities including cultivation, areas with prefabricated structures, irrigation, water tanks, etc., would occupy a total of 32.82 acres (project site). The cultivation area within the project site would occur within three outdoor areas comprising approximately 646,820 sf or 14.84 acres (cultivation area). The remaining parcels would not be used for cultivation or cultivation support. *Figure 3: Project Site Plan*, shows the locations of the cultivation areas and support systems. A brief description of the location and area covered by the cultivation canopy is as follows:

Cultivation Area 1 –would be located in the northerly portion of APN 007-029-04 and would total approximately 4.79 acres or 208,740 sf of canopy.

Cultivation Area 2 –would be located within the southerly portion of APN 007-029-04 and the northerly portion of APN 007-029-005 and would total approximately 5.47 acres or 238,560 sf of canopy.

Cultivation Area 3 –would be located within the northerly portion of APN 007-029-005 and adjacent to the southern boundary of CA 2 and would total approximately 5.96 acres or 260,000 sf of canopy

The proposed cultivation activities would require the removal of approximately 15.25 acres of an existing 120-acre vineyard that is currently irrigated using an existing drip systems. The project site is located on gently sloping and flat terrain and would not be located on land containing any ephemeral streams, ponds, potential wetlands, or any mapped waters. The project also includes support structures would include prefabricated sheds, barns, and refrigerated storage. A total of 30 HDPE water tanks would be installed for a total of 150,000 gallons of storage.

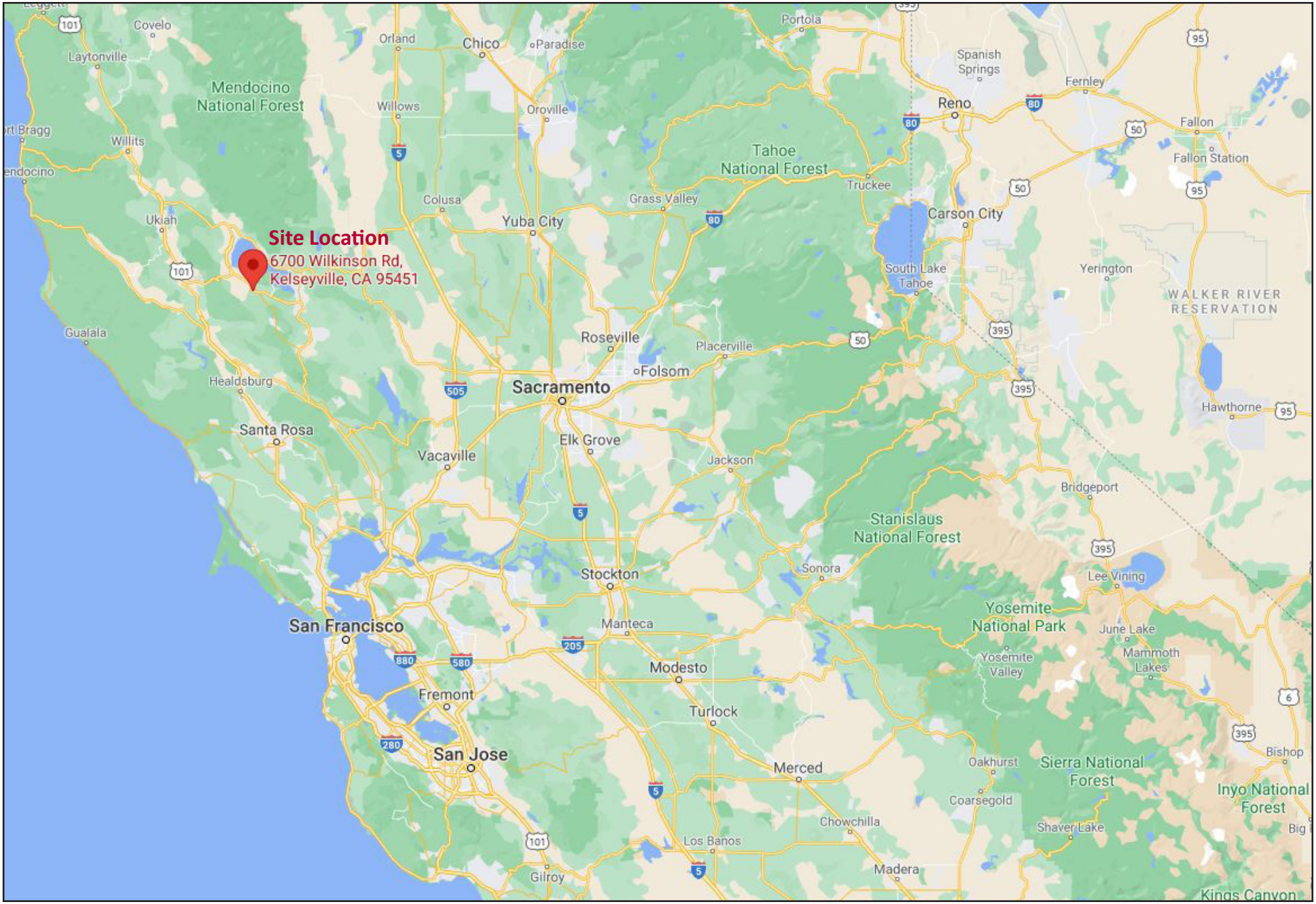
Water Resources

Red Hills Watershed

The project site is located in the Red Hills Watershed. The volcanic soils of the Red Hills area have excellent drainage and poor water retention capacity. These soils are characteristically gravelly or rocky and very well-drained. In these volcanic soil types, water is absorbed quickly and efficiently. These soils limit water run-off in rain-fall and increase the efficiency of drip irrigation.

Groundwater

There are two existing water wells within the project property, but irrigation water would be provided by only one of the permitted wells on APN 007-029-05 that would be used for cultivation. This well was completed in April of 1999 under County well permit number WP2570. The well has a depth of 598 feet with a static water level of 500 feet. The well has a total depth of 635 feet and at the time it was drilled depth to first water was at 530 feet and static water level was 500 feet. The water pump is located at approximately 588 feet and has a pumping rate of 225 gallons per minute with full recharge within 10 to 20 minutes. Water would be piped to the HDPE tanks in the cultivation areas via an above ground water line.

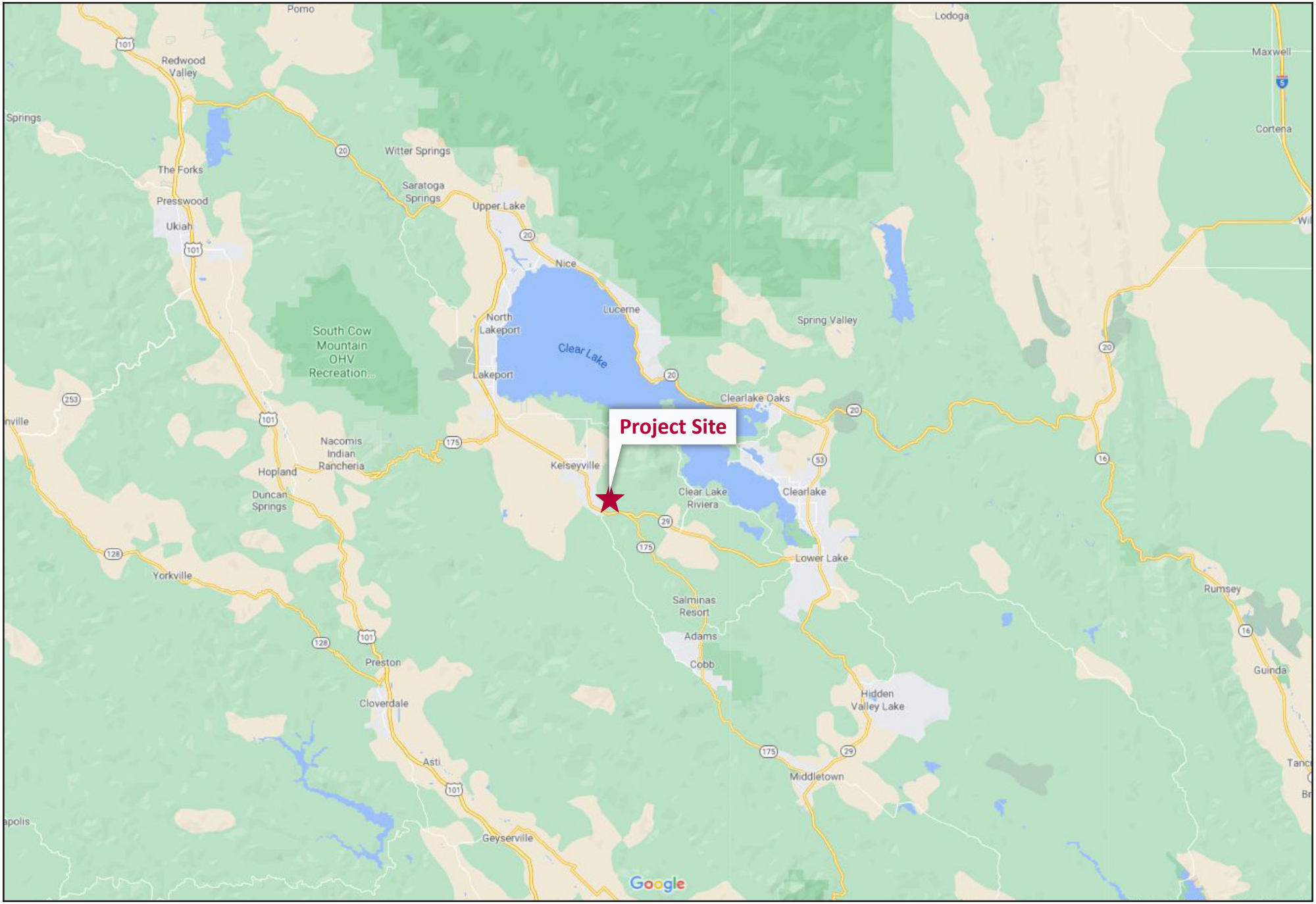


Source: Google Maps 2020

January 2022

FIGURE 1: Regional Location Map

Not to scale



Source: Google Maps 2020

January 2022

FIGURE 2: Local Vicinity Map

Not to scale

FIGURE 3: Project Site Plan

Not to scale

Surface Water Resources

The USFWS National Wetland Inventory website and biological resources report prepared for the project, showed that there are no water features within the project site or the surrounding project property. No cultivation operations or other project activities are located within 100 feet of any spring, top of bank of any creek or seasonal stream, edge of lake, delineated wetland or vernal pool. *Figure 4: Wetland and Water Map*, shows these resources in relation the project site and cultivation area.

Irrigation and Water Use

Irrigation water would be provided by one of the permitted wells on APN 007-029-05. Currently the well is the sole water source for all activities on the project site, and would be the only well used for cannabis cultivation. Watering for cannabis would occur between June and November. Water demand would be minimal at the beginning of the season and increase as plants mature. Initial watering would require approximately one gallon per plant every three days and as plants mature and temperatures increase water demand could increase up to 10 gallons per plant every other day. *Table 1: Estimated Water Demand* provides an estimate of monthly water used for irrigation. Actual usage will be reported to the SWRCB annually.

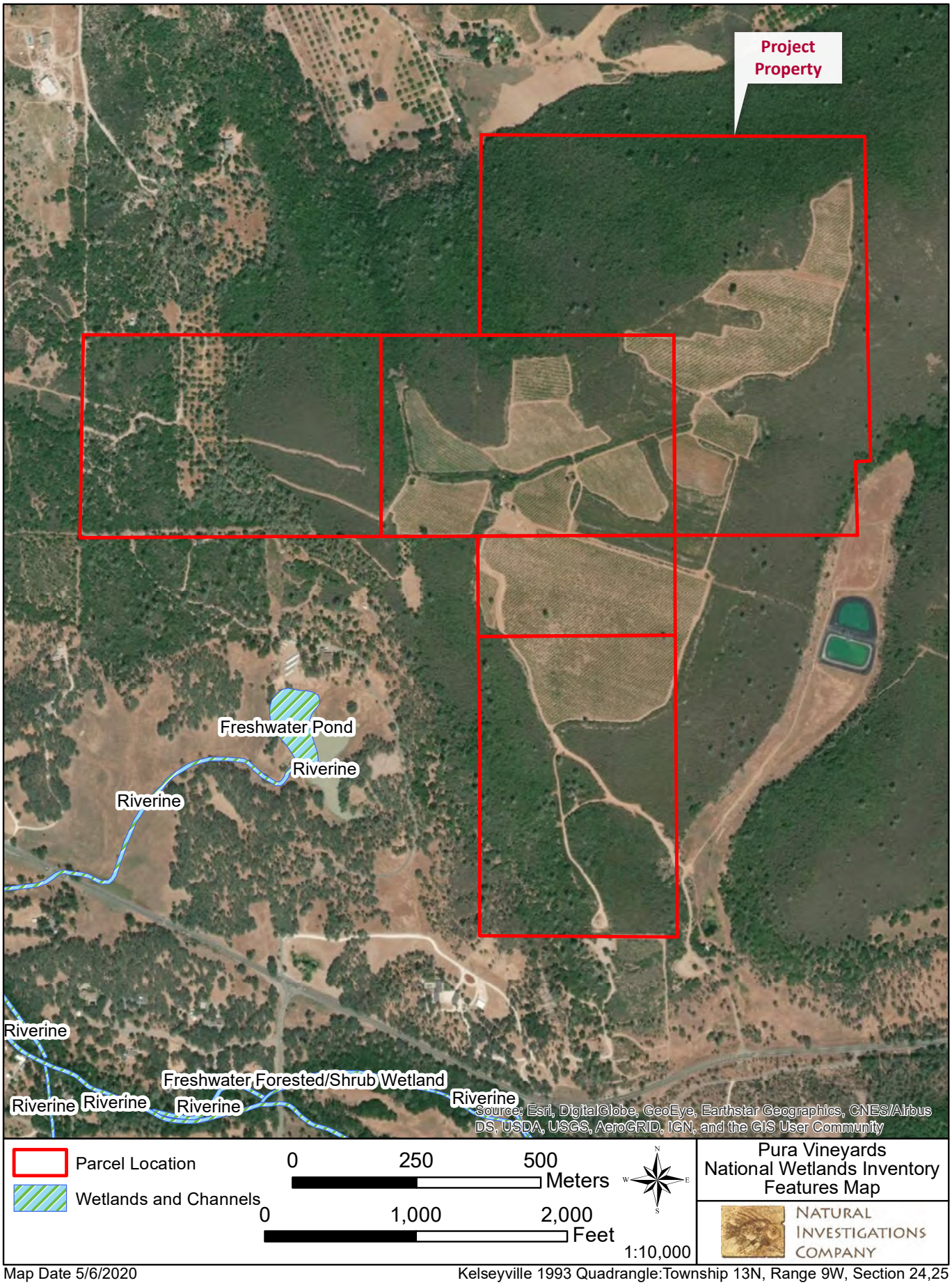
Table 1: Estimated Water Demand (gallons)

Month	Jun	Jul	Aug	Sept	Oct	Nov	Annual
Per acre	50,000	100,000	750,000	750,000	50,000	10,000	**335,000**
Total	750,000	1,500,000	11,250,000	11,250,000	750,000	150,000	**25,650,000**

The cultivation operations will include a drip irrigation system to ensure targeted and efficient use of water. Efficient irrigation provides a template for how and when to water. A weather or sensor- based, self-adjusting irrigation controller that has been certified by the Irrigation Association and has multi-cycle timers, a moisture sensor shutoff, and a controller that can detect problems will be installed.

3. EXISTING OPERATIONS WATER MONITORING AND CONSERVATION

As part of standard operating procedures, the applicant would implement ongoing water monitoring and conservation measures as part of the project to reduce the overall water use. These measures are discussed in the Property Management Plan for the project but are discussed in additional detail within this document. This includes information above, as well as below and include discussion of water sources, metering, estimated water use, water conservation, and irrigation system details. Conservation measures will be followed regardless of presence and absence of a County/regional drought emergency. The proposed project's water conservation and monitoring measures are listed below.


Project Property
Freshwater Pond
Riverine
Riverine
Riverine
Riverine
Riverine
Riverine
Freshwater Forested/Shrub Wetland
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Parcel Location
Wetlands and Channels
0 250 500 Meters
0 1,000 2,000 Feet
1:10,000
Pura Vineyards
National Wetlands Inventory
Features Map
Natural Investigations Company
Map Date 5/6/2020
Kelseyville 1993 Quadrangle:Township 13N, Range 9W, Section 24,25

Water Conservation Measures

Irrigation

The irrigation system will use a water efficient drip irrigation system that applies water concentrated water directly to ground surface instead of a spray irrigation system that requires more water to wet the ground surface and reach the plant roots. The proposed irrigation system will incorporate a range of features including a pre-programmable and web-based irrigation system that will enable adjustments in water application and will provide more control for on/off/duration. The irrigation system also will have a weather function and/or moisture sensors, that can self-adjust irrigation in the case of wet weather. Controllers are available and would be used that have been certified by the Irrigation Association and they have multi-cycle timers that enables watering of various gardens individually or as needed. The benefits and implementation methodology of the proposed irrigation system are as follows:

- Drip irrigation delivers a low-pressure supply of water directly to the plant's roots through tubes or tape running along the ground surface at the base of a row of plants.
- A drip irrigation enables a more exact way of watering, enables easier adjustments to application rates, prevents overwatering, reduces runoff, and promotes water infiltration.
- Drip lines would be covered with straw mulch or similar to reduce evaporation of water.
- Water application rates would be adjusted based on soil moisture meters and weather.
- Some of the existing system for the vineyard would be re-used.
- Hoses and water pipes would have adequate shutoff valves to turn off water and enable prompt repairs. The irrigation system would be inspected daily, and leaking or malfunctioning equipment would be immediately repaired or replaced.
- Focus irrigation to the early morning hours or before sunset when temperatures are cooler. This methodology will facilitates infiltration and result in more efficient water delivery and minimize water lost to evaporation.

Stormwater and Water Monitoring

Through the stormwater management measures that would be implemented as part of the project, infiltration of rainwater would be encouraged. The project will meet the requirements of the Lake County Storm Water Management Ordinance and includes winterization measures to monitor stormwater retention on site using Best Management Practices (BMPs). The BMPs would be used to protect water quality but also to retain stormwater on-site and facilitate water infiltration and eventual return to the groundwater. In addition, the proposed project was classified as a 'Tier 2 Low Risk' activity under the State Water Resources Control Board (SWRCB) General Order for Cannabis Cultivation Activities. The applicant will comply with all requirements of the Cannabis General Order to protect water resources including implementation of applicable BMPs. The benefits and implementation methodology of the BMPs (not already listed above) are as follows:

- Install float valves on all water storage tanks to keep them from overflowing onto the ground.
- Document and maintain daily records of all water used by the proposed cannabis cultivation operation.

The project also would include water level monitoring in the water well as required by the Lake County Zoning Ordinance. Ordinance A Section 27.11 (at) 3.v.e. This ordinance requires a meter for measuring water use. *Table 2: Water Measurement*, shows the methodology of this task.

Table 2: Water Measurement	
Parameters to Measure	**Method**
Static level of	Static level monitoring device will be installed in well casing that provides continuous
Groundwater usage and	Irrigation controller will be installed in the water supply line to the project area.
Stormwater	Rain gauge and visual inspection/written documentation of Project site after significant

Seasonal Static Water Level Monitoring

Seasonal monitoring of well water levels provides information regarding long-term groundwater elevation trends. The water level in the irrigation supply well will be measured and recorded once in the Spring (March/April) before cultivation activities begin, and once in the fall (October) after cultivation is complete. Data reported to the County as part of the projects annual reporting requirements shall include a hydrograph plot of all seasonal water level measurements for the irrigation well. Seasonal water level trends will aid in the evaluation of the recharge rate of the well. For example, if the water level in water well during spring remains relatively constant from year to year, then the water source is likely recharging each year.

Water Monitoring During Extraction

The project would monitor the water level in a well during extraction to evaluate the wells performance to determine if the pumping is effecting the water source during the heaviest use during the cultivation season. Information from the monitoring will be used to determine the capacity and yield of the irrigation well for determining future pump rates and if additional water storage is needed. It is recommended that initially the water level be monitored twice per week or more, and that the frequency be adjusted as needed depending on the impact the pumping rate has on the well water level. Similar to the seasonal reporting, the yearly performance including water elevations shall be reported to the County as part of the project's annual reporting requirements. This report also will include a hydrograph plot of the water level measurements during the cultivation season and compared to prior seasons.

To monitor the water levels, the applicant will develop a methodology (with consultation with a well expert or other knowledgeable party) and as acceptable to the county to measure the water level in the well. The methodology will include but not be limited to timing of measurements (e.g. time of day and how many days per week, gallons pumped during the time period), as well as who will conduct the monitoring and recording of the well level data. The methodology of the well monitoring program shall be described and provided in the project's annual report.

In addition to monitoring and reporting, an analysis of the water level monitoring data shall be provided and included in the project's annual report, demonstrating whether or not use of the project wells is causing significant drawdown and/or impacts to the surrounding area and what measures were taken to reduce impacts. If there are impacts, the applicant will work with the County to prepare a plan to reduce water use and that would include measures and an explanation of how the project will mitigate the impacts in the future.

Soil Use

The proposed project would use existing native soils with amendments added to create a growing medium for the plants. The project would include composting of vegetative waste material that would be used to amend the soils for future growing seasons. This practice will help reduce additional water that would be necessary if importation of new organic growing medium is required. The benefits and implementation methodology of the proposed soil management strategies are as follows:

- Use best soil practices including conditioning of soils when not in use to maximize water infiltration from irrigation and from rain events.
- As applicable, the soils could be supplemented with natural water holding materials (e.g. peat moss, coco coir, polymers, compost and other substances like perlite and vermiculite) to help retain water.
- Soils could be amended using organic supplements that can minimize heat stress through the provision of appropriate nutrients. This could include use of Humic acid supplements to protect the roots from water stress; kelp extract to reduce heat stress and boost yield and growth, and silica supplements that help strengthen cell walls and stems.

4. OTHER WATER CONSERVATION STRATEGIES

During times of drought emergencies or water scarcity, the project may implement the following additional measures, as needed or appropriate to the site, to reduce water use and ensure both success of the cultivation operations and decreased impacts to surrounding areas. To further reduce water use, the following measures could be implemented to further reduce water use and mitigate against drought conditions. The benefits and implementation methodology of the potential additional conservation strategies are as follows:

- The project could install basin(s) or swale(s) at downslope areas to capture rainfall and facilitate infiltration. For effective capture and hold of runoff the basin would be located downslope.
- The project could install a rainwater catchment system that would be installed on the rooftops of the proposed buildings on the project site that would flow to storage tanks to be used for irrigation instead of groundwater.
- The project could install additional water storage that could be filled during the rainy season to be used for irrigation and reduce groundwater withdrawal.
- The applicant could install taller cover plants and/or shaded meshes during peak summer heat to reduce plant water needs.
- The applicant can closely monitor water quality and water pH to ensure the balance is optimal to facilitate nutrient uptake (Lead Cannabis Grower, 2019).
- The applicant will consider use of more heat tolerate cannabis strains. Some strains can bear higher heat, are vigorous and drought resistant, and use less water while still producing high yields. These types of strains can come from be sativa-dominant genetics, those with shorter flowering periods, and strains from auto flowering seeds.
- The applicant will consider planting seeds over using clones as the seeds tend to develop a deeper and more complex root system that can draw water from deeper layers of soil.

- During non-cultivation months, the applicant could plant vegetative ground cover (e.g. nitrogen fixing legumes) to naturally add soils nutrients and facilitate water infiltration from storm events.

In the event that the well cannot supply the water needed for the project, the following measures may be taken:

- Reduce the amount of cultivation and/or length of cultivation season;
- If any well experiences significant drawdown or loses capacity, water will be diverted from one of the other on-site wells for irrigation purposes;
- If possible, develop an alternative, legal water source that meets the requirements of Lake County Codes and Ordinances.

Conclusion

The DMP is intended to help ensure both the success of the project and decrease environmental impacts. This includes potential direct impacts to the aquifer through groundwater withdrawals as well as the withdrawals to affect the water available to surrounding properties. In summation, this Drought Management Plan supports the proposed projects water monitoring and conservation strategies and recommends additional measures to reduce water use should they be needed. Taken in sum, these specific measures include modifications to cultivation methodologies and production that would ensure the success of the projects objectives while decreasing impacts to surrounding areas.

References

Lead Cannabis Grower. 2019. *Minimize Water Waste in Your Cannabis Grow.* Cannabis Training University. https://cannabistraininguniversity.com/blog/growing-marijuana/minimize-water-waste-in-your-cannabis-grow/ Accessed November 29, 2021.

Schaneman, Bart. 2021. *Cannabis Growers Eye Drought-Resistant Strains to Cope With Water Shortage*. MJBiz Daily. https://mjbizdaily.com/cannabis-growers-eye-drought-resistant-strains-to-cope-with-water-shortage/ Accessed November 29, 2021.

Royal Queen Seeds. 2020. *How to Grow Cannabis in Drought Conditions.* https://www.royalqueenseeds.com/blog-growing-cannabis-in-drought-conditions-n758 Accessed November 29, 2021.

Lake County. 2021. *Pura Vineyards Property Management Plan.*