



TECHNICAL MEMORANDUM

TO: Coast Oak, Inc.

DATE: August 25, 2021

FROM: Caitlin Gilmore, PE

SUBJECT: **Enhanced Water Supply Analysis per Ordinance No. 3106**

Introduction

The intent of this hydrologic study is to analyze the water supply, recharge rate and cumulative impact of water use for the agricultural site at 7329 Highway 29. This study is pursuant to Lake County Ordinance No. 3106 (2021), requiring enhanced water analysis during a declared drought emergency. The Site is located north of Highway 29 near the intersection with Bottle Rock Road, within the Cole Creek watershed. The site location may be seen in Figure 1.

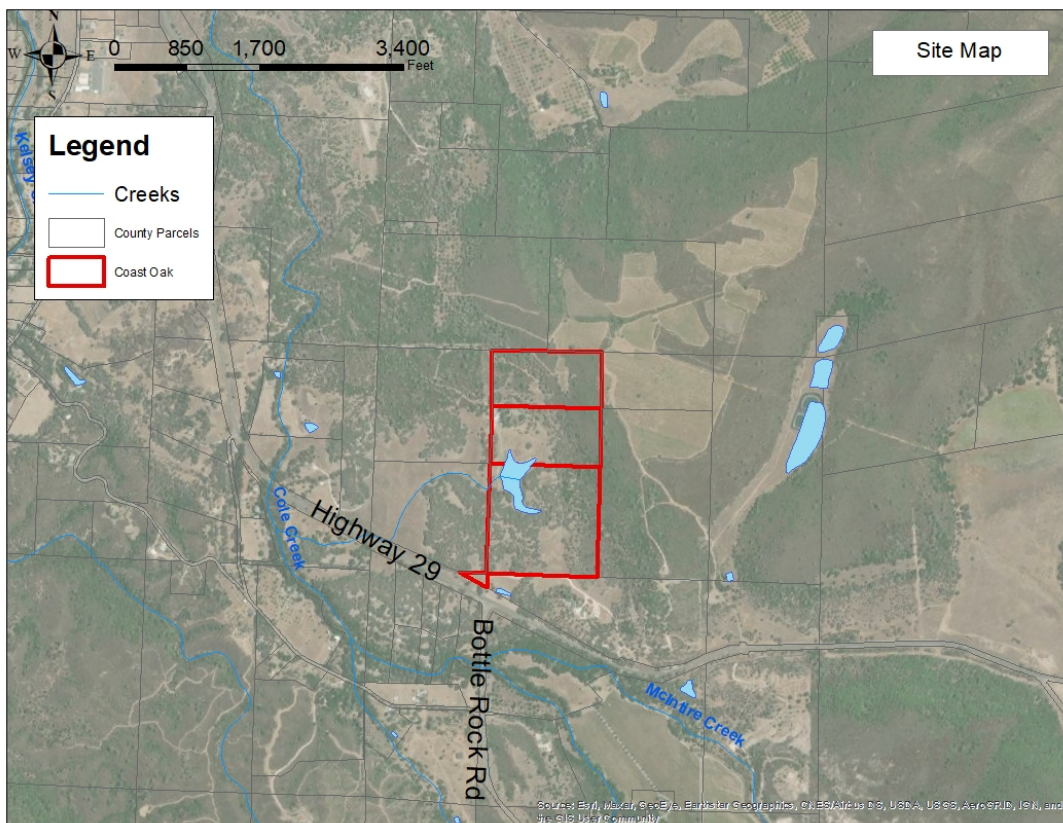


Figure 1. Project Site Location

Surface Water Availability

The agricultural site water source is an onsite 2.5-acre surface water pond. The site pond is contained by an earthen dam on the west side which has a spillway elevation of approximately 514 (assumed datum). The pond averages 8 feet deep and has an approximate non-drought year starting water surface elevation of 512 feet based on observed levels in spring of 2019 and 2020. It is conservatively assumed for this study that the ponds' capacity is based on a maximum water surface elevation of 512, resulting in a storage volume of 7.7 ac-ft based on the table below.

Table 1. Onsite Pond Stage-Storage

Stage	Incremental Storage (cu-ft)
512	110,543
511	79,870
510	56,765
509	38,381
508	24,594
507	14,834
506	7,116
505	1,680
Total Storage	333,693 cu-ft 7.7 ac-ft

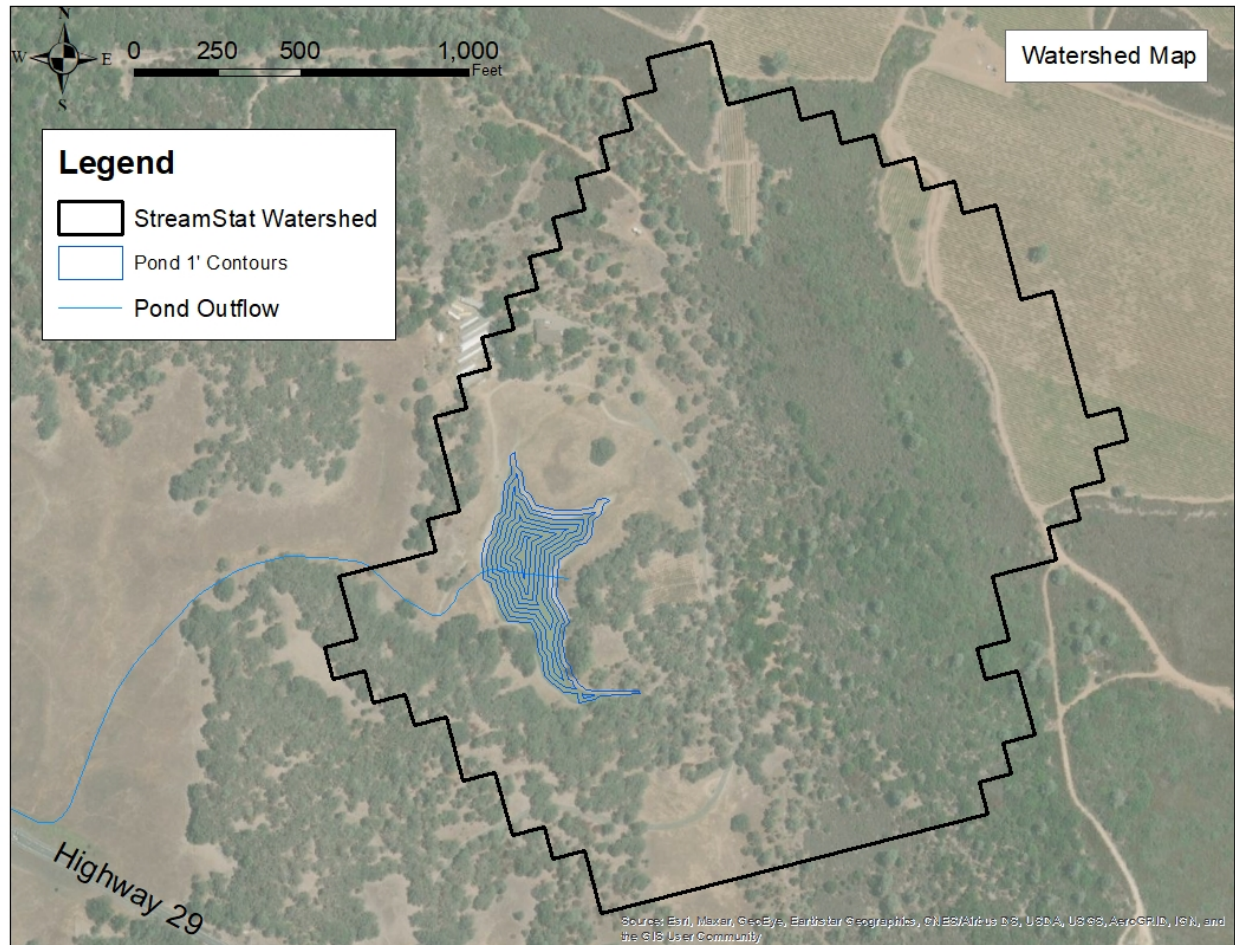


Figure 2. Estimated Pond Bathymetry and Watershed

Surface Water Usage

The project operations rely solely on on-site surface water. Reported site operations water usage for year 2020 was 400,000 gallons or 1.2 acre-feet, representing approximately 16% of the pond storage capacity. Note that permitted annual water usage for the site is 25 acre-feet.

The pond loses water due to evaporation at a rate of 3.1 acre-feet per year on average based on NOAA monthly evaporation rates in Lake County from 1991-2020.

The pond loses water to seepage at a rate of 0.01 inches per day based on the loamy clay substrate. This equates to an estimated 0.8 acre-feet per year.

The total anticipated annual usage and loss at the site is 5.1 acre-feet.

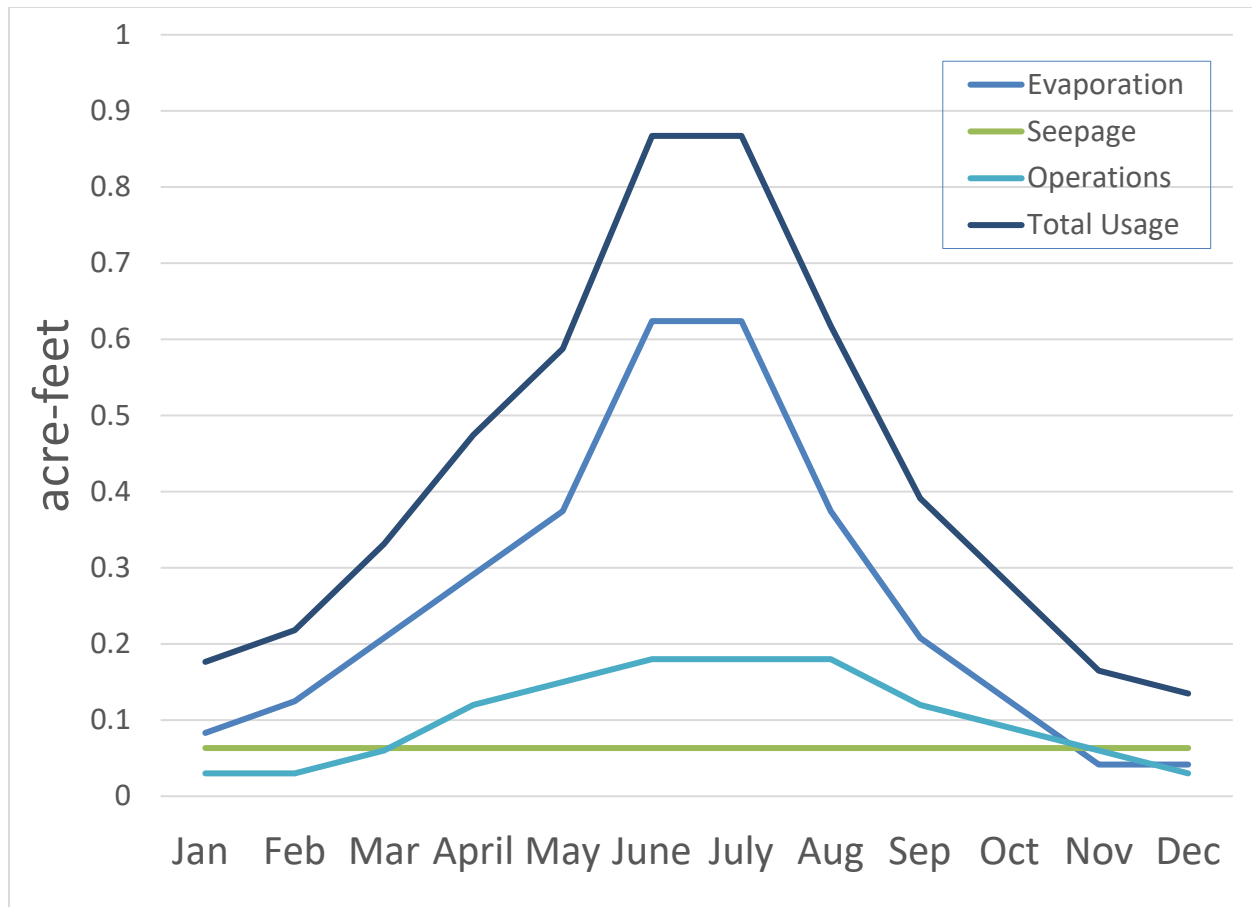


Figure 3. Usage by Month

Surface Water Recharge Rate

The watershed tributary to the pond is approximately 64 acres as determined by USGS stream stat and depicted in Figure 2. The mean annual precipitation of the watershed is 26 inches based on the Lake County Hydrology Standards (1999) Figure 3. Underlying watershed soils are type C and D based on USGS soil survey. For this study type C soils are assumed as they would produce the least runoff to the pond. A modified rational method is utilized to establish the average annual runoff volume based on mean annual precipitation. The equation is based on the Lake County Hydrology Standards. A C-value of 0.32 is calculated for 20% slopes, silty clay loam soil, fair vegetal ground cover and moderate surface storage.

$$Volume (V) = C * MAP * A * K$$

$$V = 0.32 * 26 \text{ inches} * 64 \text{ acres} * 26/35$$

$$V = 33 \text{ acre-feet per year}$$

Water recharge during a drought year is assumed to be 33% of an average year. This is based on historical local drought records of 1976-2014. Drought year recharge rate is estimated to be 11 acre-feet per year.

Water use and water recharge occur at different rates throughout the year as depicted in Figure 4. In a drought year water usage does not exceed water recharge.

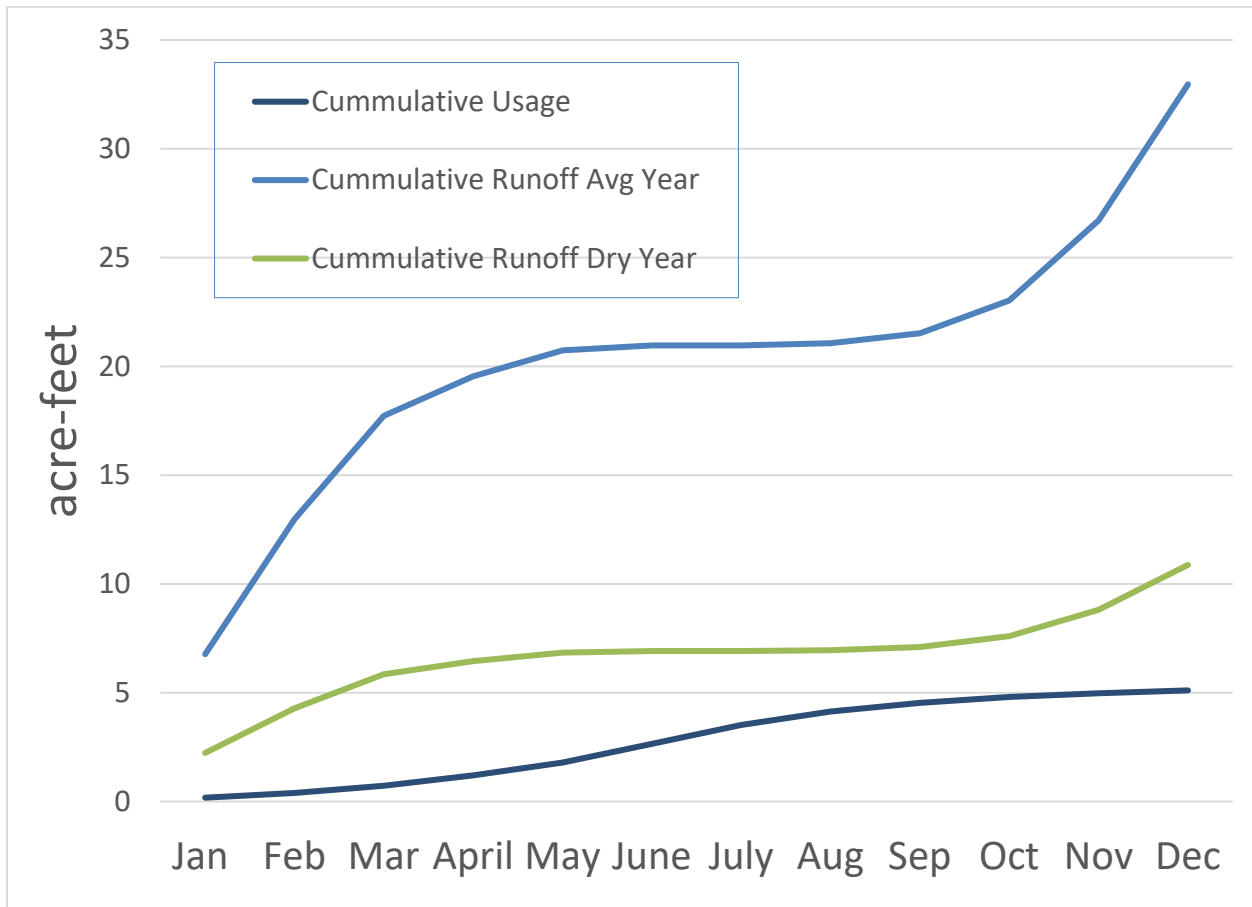


Figure 4. Recharge Versus Use

Groundwater Wells

Note that the project utilizes surface water only. However, local water wells exist on adjacent parcels. Based on the California State Department of Water Resources (DWR) well record, as depicted in Figure 5, there are no water wells within 1,500 feet of the onsite pond. The water wells are located outside of the pond watershed, and generally across from Highway 29. Based on the distance from the pond, the water wells and pond zones of influence are anticipated to have no impact on one another.

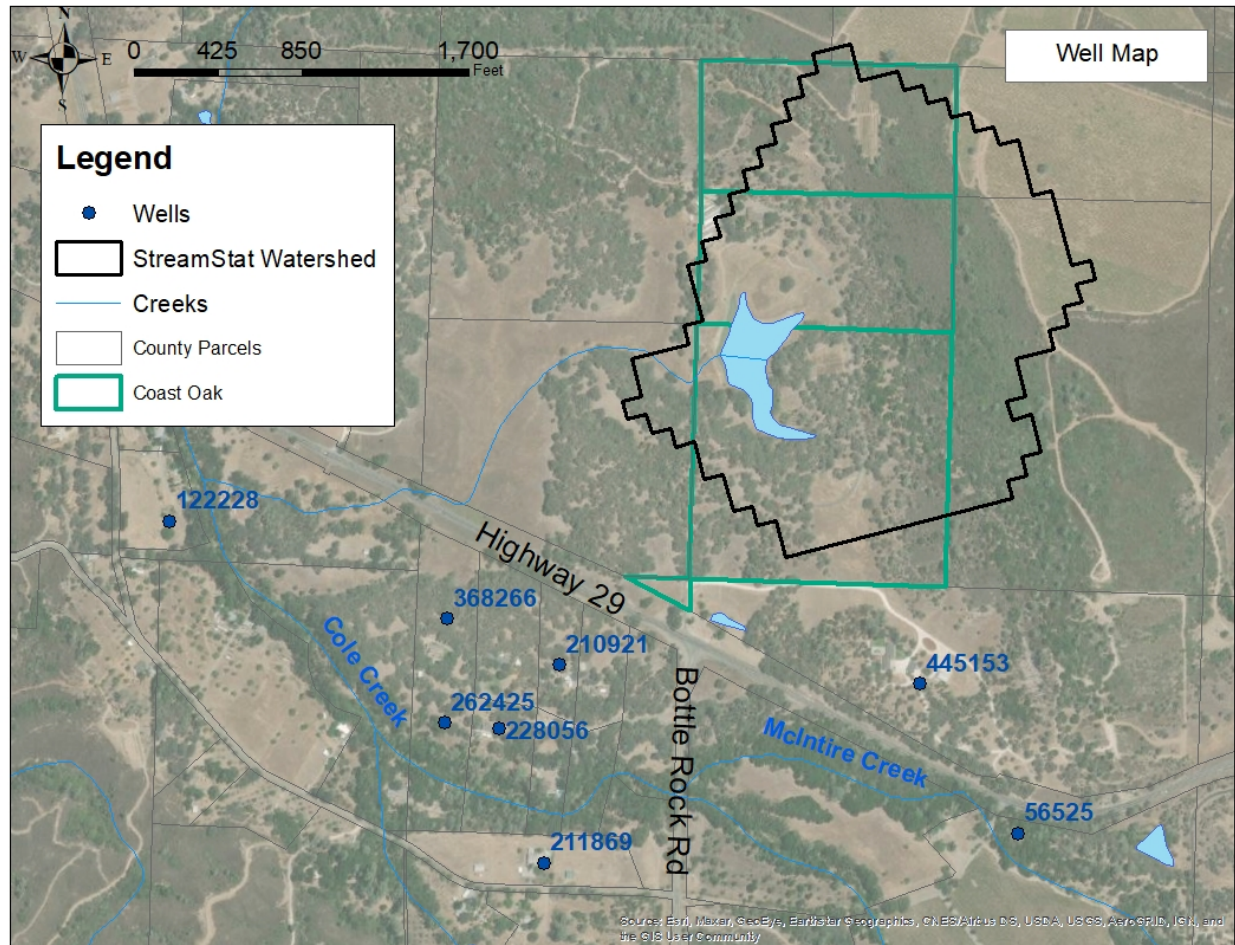


Figure 5. Local Water Well Map

Cumulative Impacts

The site relies on an onsite surface water source that is solely for the use of the property. There are no other known uses of the runoff from the watershed. Therefore, there is no cumulative impact of water use on the pond.

The pond's capacity and recharge rate exceed demand, even in a dry or very dry year.