



DRAFT TECHNICAL MEMORANDUM

To: Robert Arabian

Date: November 25, 2020

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Subject: Analysis of Odor at the Proposed Outdoor Cannabis Cultivation Located in Somerset (El Dorado County), California

INTRODUCTION AND SUMMARY

Environmental Permitting Specialists (EPS) has completed its review of potential odors at your proposed outdoor cannabis cultivation site in Somerset. It is our understanding the site would occupy 20.18 acres for outdoor cultivation. The site is located at 5445 Hawkeye Road in Somerset. It has been assigned an APN# 041-910-08-100.

The maximum area for outdoor cultivation is approximately 10,000 square feet divided into two areas. Cultivation area # 1 is 7,154 square feet. Cultivation area #2 is 2,845 square feet. The distance between the cultivation areas and the property lines varies between 89 feet to 1,375 feet. Figures 1 and 2 show the property lines of the proposed project site.

EPS used an air dispersion model, 1 year (2019) of hourly wind and temperature data at Somerset and on-site measurements of odor intensity at other locations to conduct this analysis. Data from 4 other outdoor cannabis and hemp cultivation facilities and one Tedlar bag sample were

reviewed as part of the current analysis. Odor measurements taken at 0.75 acre outdoor cultivation site in Yolo County were used as baseline odors to predict odors at the property lines.

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The results of our analysis indicate that maximum odor intensity along the property lines would range from 1.13 to 16.21 DT. Since there is a potential for odor intensity exceeding El Dorado County's limit of 7 DT, EPS recommends the installation of an odor control system along a portion of the Southwestern property line to mitigate the odors. See Figure 9.

This Technical Memorandum presents the methodology, data and assumptions used in this analysis. These are described in detail below.

SCOPE AND METHODOLOGY OF ODOR ANALYSIS

The overall methodology used in this analysis is to use an atmospheric dispersion model to predict the dilution of odors as they migrate away from the outdoor cultivation area. By calculating the relative concentration of odors adjacent to the cultivation area and at the property line(s), we can determine the dilution ratio defined as odor concentration at the cultivation area divided by concentration at the property line(s).

For example, if the maximum concentration at the cultivation area is 5,000 micrograms per cubic meter (ug/m³) and the relative concentration at the property line 2,000 ug/m³, the dilution ratio would equal:

$$\text{Dilution Ratio} = \frac{5,000 \text{ ug/m}^3}{2,000 \text{ ug/m}^3} = 2.5$$

In other words, the odors would be diluted by a factor of 2.5 as they migrate from the cultivation area towards the property line.

The dilution factor is used along with measurements at other outdoor cannabis cultivation sites to predict odor intensity at property lines. This methodology was reviewed by the staff at El Dorado County Air Quality Management District (AQMD) to confirm that this approach would be acceptable. The District agreed with this approach as noted in their August 28, 2020 letter to Aaron Mount at El Dorado County Planning.

Modeling Methodology

We used the EPA and AQMD recommended AERMOD dispersion model (Version 19191) along with one year (2019) of hourly wind data for Somerset. The data (known as MM5) is derived from

weather satellites to calculation winds and other parameters for all locations in the continental US. The data used was prepared by Lakes Environmental (Waterloo, Canada)¹.

The cultivation site was modeled as a single ground based area source. Concentration were calculated using a 20 meter grid using an emission rate of 1.00×10^{-4} grams/sec-square meter. See Figure 8.

The model results are concentrations in terms of micrograms per cubic meter at each grid location averaged over 1-hour. These concentrations are meaningful only in a relative sense to help establish the dilution pattern. It is recognized that the time-scale for detecting odors is a few minutes, not 1 hour. Typically, peak concentrations over a few minutes are many times greater than those over 1 hour. However, the *ratio* of concentrations and the dilution factor will remain the same whether averaged over a few minutes or 1 hour averaging time.

Finally, we note that the maximum predicted concentration varies with both the distance and the direction from the cultivation site. Generally, the concentration decreases with distance from the cultivation site, however, since the canopy is modeled with a release height of 2 meters, the peak concentration occur some distance from the canopy. Figures 4 and 5 illustrate the spatial distribution of 1-hour relative concentration. These figures show an East-West alignment of maximum odors.

Baseline Odor Used in the Analysis

We used odor measurements taken at a Yolo County outdoor cannabis site. This outdoor site covers 0.75 acres and is located at 22945 County Road 23, Esparto. At the time the measurements were taken, the plants were 2 weeks away from harvesting. Odor measurements were taken September 22, 2020 that indicated odor intensity of 15 DT. However, we noted that there were brief periods when odor intensity was above 15 but were not fully captured by the Nasal Ranger. We estimated the odor intensity to be closer to 20 DT and this is the value used in the current analysis. A complete documentation of the September 22nd odor survey is attached.

CALCULATION OF ODOR INTENSITY AND RESULTS

The calculation of odor intensity at the property lines is as follows:

$$\text{Odor Intensity at Property Line} = \frac{\text{Baseline Odor Intensity (DT)}}{\text{Dilution Factor}}$$

For example, the odor intensity at the Eastern property line (Figure 6) would equal:

¹ Lakes Environmental. Waterloo, Canada. Information on the development of local wind data based on the MM5 for Somerset can be found at: https://www.weblakes.com/services/met_data.html#aermetmm5

$$\frac{20 \text{ DT}}{2.4} = 8.35$$

The results for the closest property lines is summarized on the next page.

Location	Distance to Property Line		Maximum Conc.	Conc. At Property Line	Lowest Dilution Ratio	Fenceline DT
Eastern Property Line (North)	(ft)	(m)				
	89	27.1	23,544	19,081	1.23	16.21
North	325	99.1	4,639	592	7.84	2.55
Western Property Line #1	350	106.7	25,741	6,945	3.71	5.40
Western Property Line #2	350	106.7	21,294	6,236	3.41	5.86
Southern Property Line	1375	419.2	28,885	1,628	17.74	1.13
Baseline DT	20					

The odor intensity at the Eastern property line would exceed the County's threshold of 7. As a result, odor mitigation along this property line is recommended. Samples of mitigation systems currently used are shown in Figure 9.

Once a permit has been issued and cannabis cultivation proceeds, EPS staff will be available to conduct odor monitoring at your property to confirm that odors do not exceed the County limit of 7 DT.

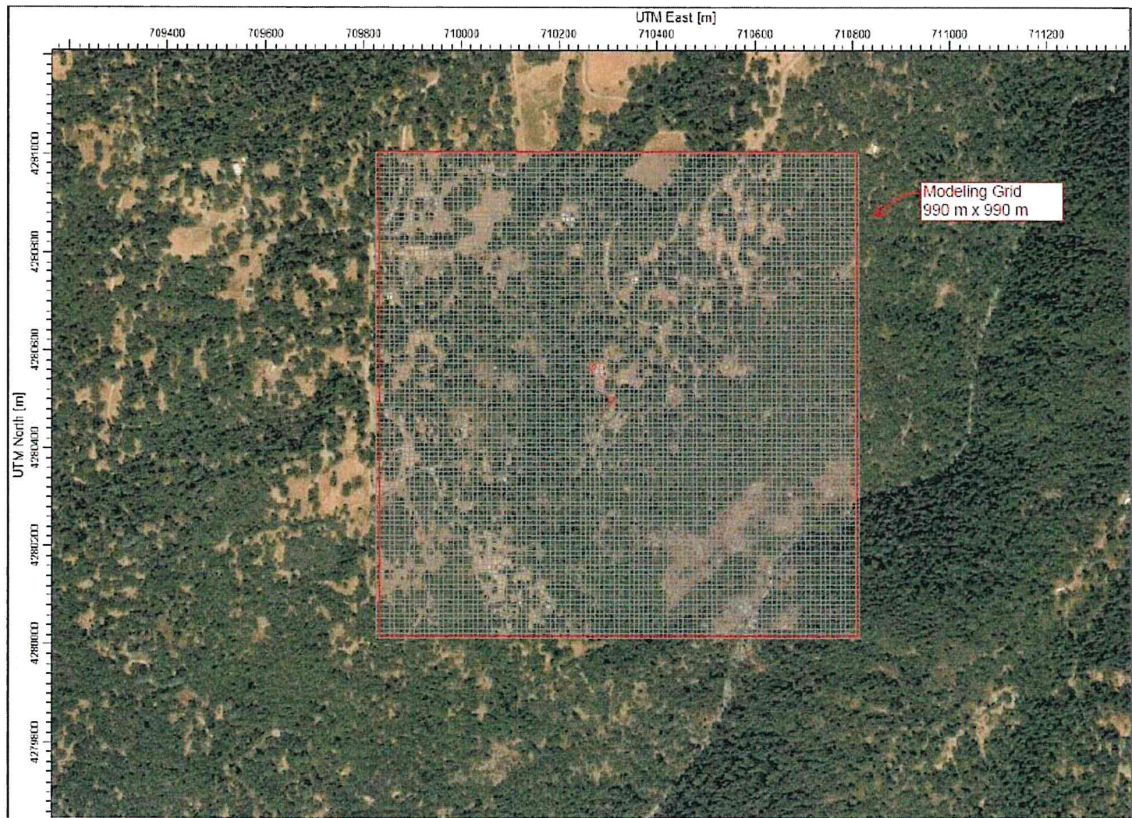
FIGURES

Figure 1: Site Map Figure 2: Arial Map Figure 3: Modeling Grid Figure 4: Contours of Relative Concentrations Figure 5: Contours of Relative Concentration (close-up) Figure 6: Display of Numerical Concentration Figure 7: Calculation of Dilution Factor Figure 8: Summary of Results and Recommended Mitigation Figure 9: Typical Odor Mitigation Systems for Outdoor Odor Sources

Figure 2 Aerial Map



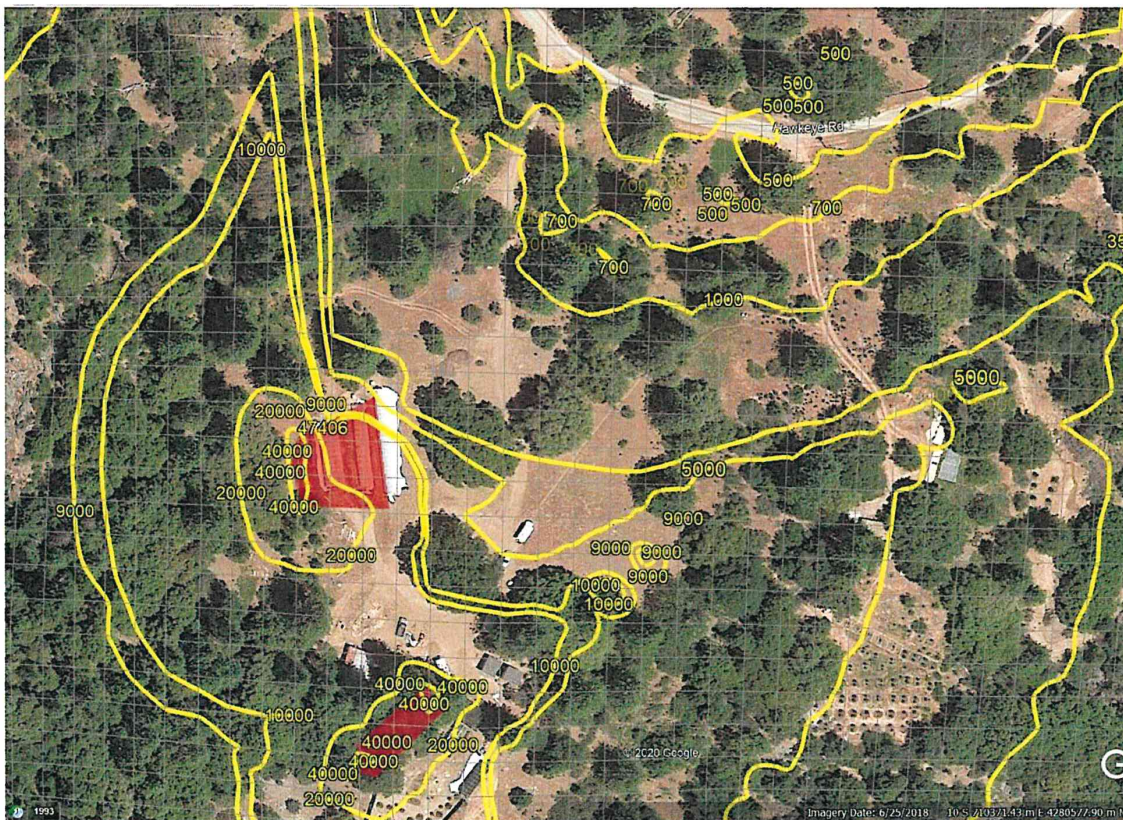
Figure
Modeling Grid



Contours of Relative 1-Hour Concentrations



Figure 5



Numerical Values of Relative Concentration

Figure 6



Figure 7

Sample Calculation of Dilution Factor at Eastern Property Line

Distance to Property Line 89 feet (27.1meters)

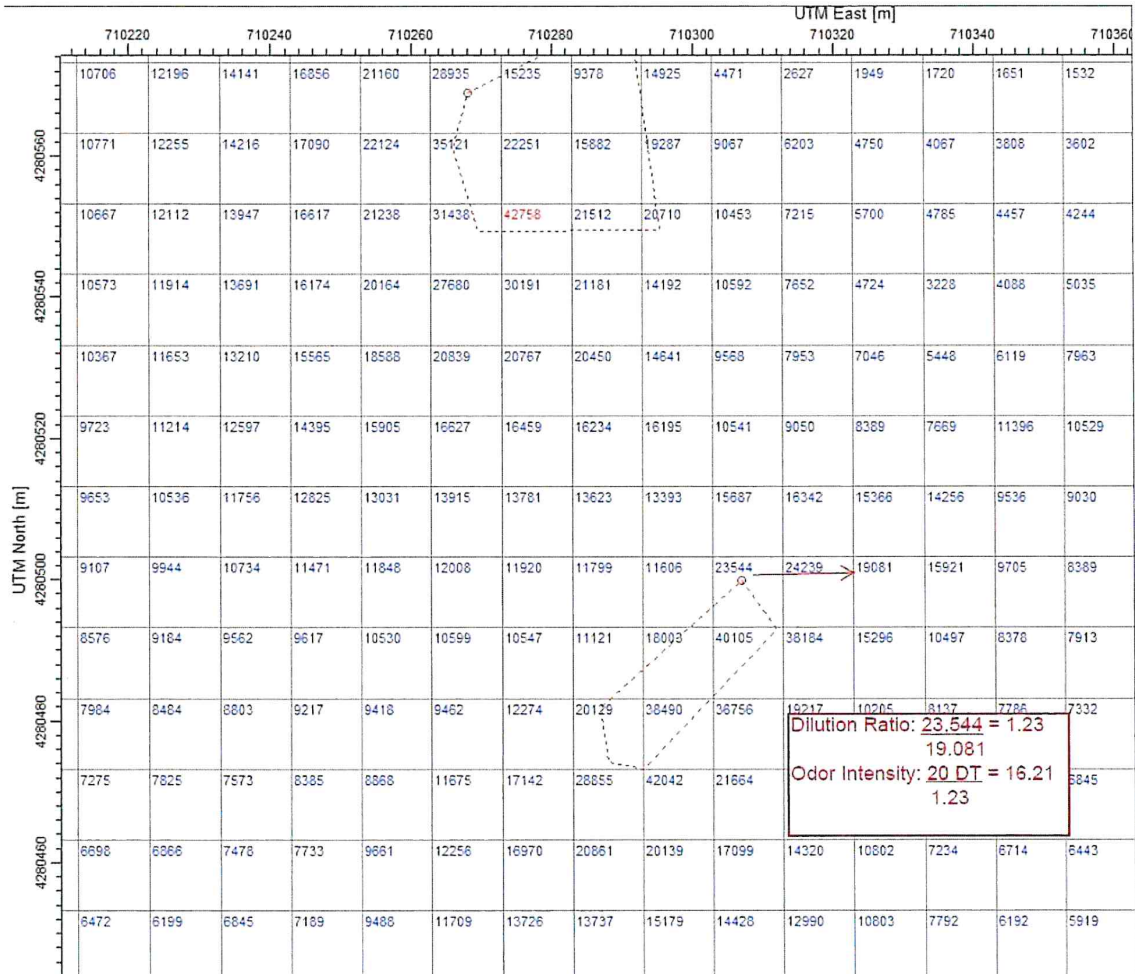


Figure 8

Summary of Results and Recommended Mitigation



Typical Odor Systems in Current Use for Outdoor Odor Sources