

June 25, 2021

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**VIA E-MAIL**

Tina Mitchell  
Planner  
Planning & Development  
Development Review Division  
624 West Foster Road, Suite C  
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tmitchell@countyofsb.org

RE: Groundwater Offset Sources for Suarez Outdoor Cannabis Cultivation Project (2225 Foothill, Cuyama), 19LUP-00000-00327

Dear Ms. Mitchell:

Attached please find two memoranda describing two groundwater offset sources, which will be used for the Suarez Outdoor Cannabis Cultivation Project (2225 Foothill, Cuyama), 19LUP-00000-00327.

Best regards,



Amy Steinfeld

Attachments: (a) March 2021 Memo; and (b) June 2021 Memo.

22821112.1

## **Memorandum**

**DATE:** Updated March 23, 2021

**TO:** County of Santa Barbara

**FROM:** Amy M. Steinfeld

**RE:** Cannabis Water Use Offset Program for Suarez Outdoor Cannabis Cultivation (2225 Foothill, Cuyama), 19LUP-00000-00327 (Ventucopa Offset Partner)

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### **I. Introduction**

Cuyama Farms, LLC (DBA Orange Coast Farms) has committed to adopting a voluntary 1:1 water offset program (Offset Program) for its 34.7 acre cannabis cultivation site, one acre of landscaping, and construction dust control measures (Suarez Project or Project) in Cuyama Valley to address concerns raised by the appellant and the community regarding groundwater use. This offset program mirrors San Luis Obispo County's Cannabis Cultivation Offset Program.<sup>1</sup> The Offset Program will result in no net new groundwater use within the Cuyama Valley as a result of this Project and therefore the Project will not have a significant impact on local groundwater resources. In fact, by decentralizing pumping away from historically irrigated areas, the Suarez Project's Offset Program will likely result in a net benefit to the Cuyama Groundwater Basin (Basin).<sup>2</sup> The Offset Program will begin on May 1, 2021 and will continue so long as Cuyama Farms cultivates cannabis at 2225 Foothill Road, New Cuyama.

### **II. Background on Cuyama Valley Groundwater Resources**

The Suarez Project is located within the Cuyama Groundwater Basin (Cuyama Basin or Basin), which has been designated a critically overdrafted groundwater basin required to have adopted a Groundwater Sustainability Plan by 2020. The Project is subject to the Cuyama Basin Groundwater Sustainability Agency's (Cuyama GSA or GSA) recently adopted Groundwater Sustainability Plan (Cuyama GSP or GSP). The Cuyama GSP describes the GSA's approach to achieve sustainable groundwater management for the Cuyama Basin by 2040. The GSP describes existing basin conditions, identifies undesirable results, develops water budgets, and describes projects and management actions to ensure the Cuyama Basin achieves sustainable management. The entire Cuyama GSP is available here: <https://cuyamabasin.org/resources#final-gsp>.

In order to achieve sustainable groundwater management, the GSP proposes to reduce groundwater pumping by up to 40,000 acre feet per year (AFY). The focus of this reduction in groundwater pumping will be around the central portion of the Cuyama Basin in the Central Basin Management Area (Management Area), where declining groundwater levels are the most severe due to decades of groundwater pumping for

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<sup>1</sup> San Luis Obispo County Code, §§ 22.40.050 (D)(5), 22.40.060(D)(1) [nurseries].

<sup>2</sup> See February 2021 Hydrogeologic Overview Report by Jordan Kear and March 2021 Analysis of Projected New Well Pumping Regimes, filed concurrently herewith.

irrigation of carrots, potatoes, grapes, onions, garlic, lettuce, olives, peaches, pistachios, and alfalfa. The GSA has initiated the process to develop a final allocation framework for the Management Area, but has yet to finalize the framework. They are currently working with the Cuyama Basin Water District (CBWD) on the following management actions: (1) implementation of Pumping Allocations in the Management Area, and (2) development of water budgets for individual landowners within the Management Area.

Implementation of these two management actions must be consistent with the GSP. (Wat. Code, § 10725.2.) According to the Chapter 7 of the GSP, the allocation will set the amount of groundwater individual pumpers can extract in the Management Area. The GSP proposes to develop allocations based on estimated historical use, existing land uses, and total irrigated acreage. The GSA plans to establish the pumping allocation plan for the Management Area by 2022 with pumping reductions beginning in 2023. The GSP also proposes a ramp-down approach (aka, a “glide path”), whereby pumping reductions will be 5 percent of total pumping in 2023, another 5 percent in 2024, followed by a 6.5 percent reduction annually between 2025-2038.<sup>3</sup>

### **III. Suarez Project: Water Use and Offset Program**

The Suarez Project is not located in the Management Area and therefore not subject to the GSA’s proposed pumping reductions. The Management Area was determined by a model that calculates areas that experience a groundwater level decline of more than 2 feet per year over a 50-year period. (GSP, p. ES-2 – 3.) The Suarez Project is outside of the Management Area as groundwater levels in this region have not been declining at the modeled rate. Further, nothing in the GSP precludes the expansion of groundwater use by Cuyama Farms.<sup>4</sup>

To address the community’s concerns, however, Cuyama Farms has committed to voluntarily offset all of its water use on a 1:1 basis. In addition, like all water users located within the Basin, Cuyama Farms will comply with all applicable rules and regulations adopted by the GSA, such as reporting all water usage by January 31 and paying all assessments and fees adopted by the GSA, currently set at \$44/acre foot (AF) of groundwater extracted from the Basin.

#### **A. Suarez Project Water Use**

Water for the Project’s onsite agricultural, domestic, and fire protection uses will be provided by an existing well and a proposed new well.<sup>5</sup> The new well has been permitted (County Well Permit No. 0004497), but has not yet been drilled. Drilling is anticipated to be completed prior to obtaining the single parcel water system permit. Water lines from the existing well extend to the sheep grazing area and existing jujube orchard. No existing water lines extend to the Project Site. A proposed new water line will extend from the existing well to cultivation areas on the Project Site, generally along the existing agricultural road at the center of the site and along the northern perimeter of the cultivation area. Water lines will also extend from the new well to two 5,000 gallon water tanks to serve the cultivation area, the restrooms and the sprinkler system in the security office.

Cuyama Farms proposes to cultivate 34.7 acres of outdoor, sun-grown cannabis in hoop structures. It will cultivate two crops per year: an auto-flower crop planted in March and a full term crop planted in July. A conservative estimate of the annual water demand of outdoor cannabis grown using drip irrigation is 3 AFY

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<sup>3</sup> See New Landowner Sheet, available at: <https://cuyamabasin.org/>.

<sup>4</sup> See generally GSP Chapters. GSAs do not have the authority to regulate land use or supersede the land use authority of local agencies. (Wat. Code, § 10726.8(f); see also Wat. Code, §§ 10726.2, 10726.4 [describing authority of a GSA].)

<sup>5</sup> For more information on the wells and impact of projected pumping on the Basin, see the February and March 2021 Reports by Hydrogeologist, Jordan Kear.

per acre.<sup>6</sup> Therefore, we estimate that the Project's total water demand for cultivating cannabis at this site will be approximately 104.1 AFY. However, this number will be adjusted annually based on well metering to determine actual water demand. For example, if Cuyama Farms pumps more than 104.1 AFY of groundwater in Year 1, it will make up the difference in the following year by offsetting additional groundwater resources. In addition, Cuyama Farms will also offset its annual landscaping irrigation use, which is estimated to be 1.14 AFY, and its one-time dust control construction water use, which is estimated to be between 1 and 2 AF.

#### 1. **Water Efficiency Measures**

The Project will utilize a drip irrigation system that will eliminate the potential for irrigation runoff and maximize the efficient use of water.<sup>7</sup> Tensiometers will be used to monitor soil moisture and prevent over watering.

#### 2. **Cannabis Water Duty**

Cannabis has a low water use relative to other crops. Although the science on cannabis water demand is limited to date, with efficient irrigation techniques, studies estimate that seasonal, outdoor cannabis farms utilize between two to three AF of groundwater per acre for irrigation.<sup>8</sup> Cuyama Farms has committed to installing state-of-the-art water conservation features. Once cannabis is planted, Cuyama Farms will carefully meter and track its water use to develop actual cannabis water demand information for this region and share this information with the GSA, the County, and the Berkeley Cannabis Research Center.<sup>9</sup>

#### B. **Offset Program**

Cuyama Farms is committing to offset its water demand for the duration of the Project by providing compensation to farmers within the same groundwater basin that switch from irrigated to non-irrigated agricultural uses, and/or by funding irrigation improvements in the same groundwater basin.<sup>10</sup> Cuyama Farms proposes the following five year, initial Offset Program to offset its water demand on a 1:1 basis pursuant to an agreement with a Ventucopa farmer.

Cuyama Farms is partnering with a local Cuyama Valley farmer who lives and farms on approximately 200 acres of land he owns near Ventucopa. He has also historically leased another 300 acres of land in the region for farming. The most recent copies of his Cuyama GSA Water Use Estimates for 2019 are attached as Appendix B. The Ventocopa farmer has historically grown alfalfa, forage hay, teff grass, carrots, and onions on a 82.35 parcel of land overlying the Basin (APN 149-220-065). He rotates his crop production and had planned to plant alfalfa this year, which is a five year crop (as opposed to an annual crop). APN

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<sup>6</sup> One acre-foot equals about 326,000 gallons, or enough water to cover an acre of land, about the size of a football field, one foot deep. See Appendix A for support of the use of 3 AF in Year 1.

<sup>7</sup> Drip irrigation can reduce agricultural water demand by up to 17 to 22 percent when compared with spray or flood irrigation. (CALFED Bay-Delta Program, *Water Use Efficiency Comprehensive Evaluation* (2006); H. Cooley, J. Christian-Smith, and P.H. Gleick, *Sustaining California Agriculture in an Uncertain Future* (2009) Pacific Institute.)

<sup>8</sup> See Appendix A.

<sup>9</sup> University of California, Berkeley, Cannabis Research Center, <https://crc.berkeley.edu/> (accessed on March 5, 2021).

<sup>10</sup> During the first five years, irrigation improvements will not be part of the current water offset contract. However, a 1:1 offset could be achieved through irrigation improvements in the future. This will require an engineer to determine the water savings that result from, for example, switching from sprinklers to drip tape.

149-220-065 is divided into Field 0 (28.5 acres) and Field 1 (65 acres) (Field 1 is partially on another parcel owned by the Ventocopa Farmer). The crop history of APN 149-220-065 is as follows:

YEAR	CROP
1980-1985	Alfalfa
1986-1987	Forage
1987-1990	Alfalfa
1991	Forage
1992-1997	Alfalfa
1998	Forage
1999-2002	Alfalfa
2003-2006	Forage
2007	Forage and Teff grass
2008	Forage
2009-2010	Carrots
2011	Half Forage and Onions
2012-2014	Carrots
2017-2021	Forage
2021-2026 (Planned)	Alfalfa

In 2018, the Ventocopa farmer started planting olive trees on another parcel of land, and currently cultivates 119 acres of olives. He is currently planning to remove 14 acres of apple trees that have been irrigated using micro-sprinklers to convert them to olives and replace the micro-sprinklers with a drip system. Once the Ventocopa Farmer receives a bid for the new irrigation system, he will discuss the water savings and develop a partnership whereby Cuyama Farms could help fund the installation of the new, more efficient system.

Cuyama Farms has entered into a five year (with an option to renew) contract with the Ventocopa farmer to pay the farmer the fair market value of producing alfalfa on 28.5 acres of farmland (Field 0) which have been historically planted with various crops, but were planned to be planted in alfalfa started in 2021 and continuing for 5 years.<sup>11</sup> As a result of this agreement, the farmer will not plant or irrigate 28.5 acres of alfalfa in 2021 as planned in May 2021. Instead, he will keep his existing grain crop in and cease irrigation of 28.5 acres on May 1, 2021. Should the local farmer decide to plant another crop type on this acreage after five years (with a lower water demand), Cuyama Farms will engage in other water offset measures, such as contracting for additional agricultural land.<sup>12</sup>

As part of the contract, the local farmer also has agreed to not cut down the existing grain crop to ensure that his land will continue to support grasses and allow native grasses to reseed, which will prevent dust erosion to eliminate air quality impacts associated with not-irrigated this field. The non-irrigated acreage will not result in negative economic impacts for the community because the local farmer will be compensated for the non-irrigated land and will continue to farm the majority of his farm. Further, the offset contract does

<sup>11</sup> In addition, Cuyama Farms' agreement with the Ventocopa farmer provides the option to expand the agreement to include a portion or all of Field 1 (65 acres), if Field 0 is insufficient to offset 100 percent of Cuyama Farms' water use.

<sup>12</sup> For example, Cuyama Farms and the Ventocopa farmer could contract to plant grain hay (water demand of 1.97 AFY) rather than his historical use of the property for alfalfa (water demand of 4.02). Assuming the Ventocopa farmer receives an allocation in the future based on the alfalfa water demand, the contract for grain hay planting would result in a reduction in water use by 2.05 AFY. To achieve a 1:1 water demand offset, Cuyama Farms would then enter into additional offset contracts or pay for additional water efficiency improvements on other ranches overlying the basin.

not restrict what the farmer can do with the non-irrigated field, only that he not apply any groundwater. Accordingly, the local farmer is considering continuing agricultural uses on this field, such as dry farming or grazing livestock.

Currently, the Ventocopa farmer’s land is not subject to GSA mandated pumping reductions (the “glide path”) because it is not located in a Management Area. However, if this changes in the future, the acreage subject to this Offset Program will not be used to satisfy the Ventucopa farmer’s pumping reductions. Instead, the Ventocopa farmer must reduce his water use on his irrigated acreage to satisfy any future GSA requirements. In sum, no double counting will be permitted.

In the event that this farmer, in the future, is no longer the offset partner, Cuyama Farms will be required to continue to offset its groundwater use on a 1:1 basis by: (a) entering into an agreement with another farmer located in the Basin to switch from irrigated to non-irrigated agricultural uses; or (b) paying another farmer to upgrade existing irrigation equipment, fix leaks, etc. Any future arrangement will require Cuyama Farms to submit a technical report to the County providing detailed information supporting its Offset Program.

As noted above, Cuyama Farms must comply with all rules and regulations outlined by the GSA that apply to this property. In the event that the GSA develops a market-based groundwater trading program, Cuyama Farms may participate in that program so long as its participation results in an offset of 100 percent of its groundwater use. While the Project is not currently located within the GSA Management Area, it will update its water use and offset program accordingly in the event the Project is included in a management area or subjected to pumping reductions.

**1. How it Works**

The water duty of alfalfa in the Cuyama Valley is 4.02 AF per year. Ceasing irrigation of 28.5 acres of alfalfa will therefore result in a water savings of 114.57 AF per year. Because Cuyama Farms only plans to utilize 104 AFY to irrigate cannabis, the offset contract will provide a healthy (10 percent) buffer in Year 1. This buffer will also cover the additional 1.14 AF of landscaping irrigation demand, and the one time dust control demand for construction purposes of 1 to 2 AF.

Cuyama Farms will meter its groundwater use to confirm that its estimated groundwater use is accurate. For example, if its actual groundwater use in Year 1 exceeds 114.57 AF, it will work with the Ventacopa Farmer to add additional land under contract the following year to make up the deficit or fund onsite irrigation improvements on the Ventacopa farm to offset groundwater demand. Cuyama Farms must “true up” each year to ensure it achieves the 1:1 offset. Conservation credits, however, may be carried over to the following year.

In sum, the proposed Offset Program will likely result in an estimated net water savings of over 10 AF in Year 1, which means there will be no increase in water use within the Cuyama Valley as a result of the cannabis operation and ensures there is a sufficient buffer in the event cannabis demand exceeds estimates. Below is an illustration of how the Offset Program will work in two scenarios: (a) the Year 1 water demand was underestimated; and (b) the Year 1 water demand was overestimated.

<b>EXAMPLE SCENARIO 1: WATER DEMAND OVERESTIMATED</b>				
<b>Year</b>	<b>Activity</b>	<b>Acreage</b>	<b>Water Duty (AF)</b>	<b>Gross Water Demand (AF)</b>
<b>1</b>	Alfalfa Water Savings	28.5	4.02	114.57
	<i>Estimated Cannabis Water Use</i>	34.7	3	104.1
	Buffer (Net Water Savings)			10.47 (Carry Over to Year 2)

2	Alfalfa Water Savings	23	4.02	92.46
	<i>Actual</i> Cannabis Water Use	34.7	2.5	86.75
	Net Water Savings Year 2 (with Carry Over)			5.71 (16.18 with Carry Over)
3	Alfalfa Water Savings	23	4.02	92.46
	<i>Actual</i> Cannabis Water Use	34.7	2.5	86.75
	Net Water Savings Year 3 (with Carry Over)			5.71 (21.89 with Carry Over)
4	Alfalfa Water Savings	23	4.02	92.46
	<i>Actual</i> Cannabis Water Use	34.7	2.5	86.75
	Net Water Savings Year 4 (with Carry Over)			5.71 (27.6 with Carry Over)
5	Alfalfa Water Savings	23	4.02	92.46
	<i>Actual</i> Cannabis Water Use	34.7	2.5	86.75
	Net Water Savings Year 5			5.71
<b>Total Net Saving With Carry Over</b>				<b>33.31</b>

Note: In this hypothetical, the Offset Program would result in more than a 1:1 water offset annually. Cuyama Farms reserves the right to adjust the net water savings amounts to achieve only a 1:1 water offset.

EXAMPLE SCENARIO 2: WATER DEMAND UNDERESTIMATED				
Year	Activity	Acreage	Water Duty (AF)	Gross Water Demand (AFY)
1	Alfalfa Water Savings	28.5	4.02	114.57
	<i>Estimated</i> Cannabis Water Use	34.7	3	104.1
	Buffer (Net Water Savings)			10.47 (Carry Over to Year 2)
2	Alfalfa Water Savings	28.5	4.02	114.57
	<i>Actual</i> Cannabis Water Use	34.7	3.5	121.45
	Net Water Savings Year 2 (with Carry Over)			-6.88 (3.59 with Carry Over)
3	Alfalfa Water Savings	32	4.02	128.64
	<i>Actual</i> Cannabis Water Use	34.7	3.5	121.45
	Net Water Savings Year 3			7.19
4	Alfalfa Water Savings	32	4.02	128.64
	<i>Actual</i> Cannabis Water Use	34.7	3.5	121.45
	Net Water Savings Year 4 (with Carry Over)			7.19 (14.38 with Carry Over)
5	Alfalfa Water Savings	32	4.02	128.64
	<i>Actual</i> Cannabis Water Use	34.7	3.5	121.45
	Net Water Savings Year 5			7.19
<b>Total Net Savings with Carry Over</b>				<b>21.57</b>

Note: In this hypothetical, the Offset Program would result in use of the Carry Over in Year 2, but otherwise would result in more than a 1:1 water offset annually. Cuyama Farms reserves the right to adjust the net water savings amounts to achieve only a 1:1 water offset.

Water use at the cannabis cultivation site will be closely monitored via a meter on the well and the above numbers will updated accordingly. For example, if the Project's water use is less than 3 AFY, the net water savings will increase and can be applied to the following year as a carry over. If the Project's water use is more than 3 AFY, the net water savings will decrease. In the unlikely event that the net water savings is

negative, Cuyama Farms will increase the amount of land under contract to ensure a net water savings of at least 0 AFY (i.e., an 1:1 offset or greater).

Water use data will continue to be collected beyond the first year and an Annual Water Use Report will be submitted to the County. The report will outline:

- Amount of irrigated cannabis acreage and amount of groundwater applied;
- Amount of water use that is offset through not planting and irrigating alfalfa; and
- The net water savings for that particular year and net water savings inclusive of prior year(s) (i.e., with carry over water).

In addition to offsetting water use, water conservation methods will be employed at the cannabis cultivation site. Daily records will be kept for all water used for cannabis irrigation. Regular inspections of the water system will be done to ensure leaks are caught and fixed in a timely manner. The irrigation system will also include redundancies to lessen the impact in the event a leak occurs.

### **III. Ongoing Collaboration with the Cuyama GSA**

Cuyama Farms also is committed to providing detailed water information to the Cuyama GSA. Specifically, Cuyama Farms will provide the following information at regular intervals: (i) well construction information and capacity; (ii) water demand for cannabis based on meter data and crop uptake; and (iii) water level and quality information. As previously discussed with Cuyama GSA staff, Cuyama Farms is committed to providing the Cuyama GSA with as much data and information as possible.

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# APPENDIX A

## 1. Literature Review

Based on a review of scientific articles that cover the water use of outdoor cannabis cultivation, water demand ranges from less than one acre-foot to five acre-feet (AF) per acre per growing season, depending upon the length of the growing season and other environmental factors (e.g., local rainfall amount). Many articles report that cannabis uses six gallons/plant/day, however, that figure has been widely criticized as exaggerating the water demand of cannabis since it is based on the water needs of a large (full-grown) cannabis plant when in reality the water demand of cannabis varies throughout the growing season (i.e., younger (smaller) cannabis plants require less water).<sup>13</sup> Accordingly, such a statistic represents, at best, the upper-end of cannabis water demand for a large mature plant. Further, the reported information generally does not include the use of state-of-the-art irrigation methods, which will be utilized here.

It is realistic to for Year 1 to estimate that outdoor cannabis cultivation in Cuyama will require three AF per acre per growing season (or year) based on the following:

Article	Water Use	Converted Water Use (AF/acre/growing season)	Background Info & Article Assumptions
<a href="#">First Known Survey of Cannabis Production Practices in California</a> <sup>14</sup> ,	August: 5.5 gal/day/plant (0.22 gal/sq. ft./day)  September, 5.1 gal/day/plant (0.17 gal/sq. ft./day)	190 day growing season: 5 AF/acre  140 day growing season: 3-4 AF/acre  Growing season would have to be 269 days for demand to be 7 AF/acre	Primarily a survey of farms in Northern California but also included responses from all over Calif.  Avg. growing season: 190 days
<a href="#">Water storage and irrigation practices for cannabis drive seasonal patterns of water extraction and use in Northern California</a> <sup>15</sup> ,	358,854 L per year	1 AF/acre/year	Mean outdoor cultivation size (n=179): 1,185 square meters (canopy area and space between plants)

<sup>13</sup> [Commercial Cannabis Cultivation and Manufacturing Regulations and Licensing Program Draft Environmental Impact Report](#), County of Santa Barbra, 2017, 3-16

<sup>14</sup> [First Known Survey of Cannabis Production Practices in California](#), Wilson H, Bodwitch H, Carah J, Daane K, Getz C, Grantham T, Butsic V. 2019. Calif Agr 73(3):119-127. <https://doi.org/10.3733/ca.2019a0015>.

<sup>15</sup> [Water storage and irrigation practices for cannabis drive seasonal patterns of water extraction and use in Northern California](#), Dillis C, McIntee C, Butsic V, Le L, Grady K, Grantham T. 2020. Journal of Environmental Management Vol. 272. <https://doi.org/10.1016/j.jenvman.2020.110955>.

<a href="#">Current Impacts of Outdoor Growth of Cannabis in Colorado</a> <sup>16</sup> .	25-35 inches per year	2-3 AF/acre	
<a href="#">Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds</a> <sup>17</sup>	22.7 L/plant/day (6 gal/plant/day)	190 day growing season: 2.10 AF/acre  140 day growing season: 1.55 AF/acre  (assuming 600 plants/acre)	
<a href="#">County of Santa Cruz Commercial Cannabis Cultivation and Manufacturing Regulations and Licensing Program EIR</a> <sup>18</sup>	0.03 gal/sq. ft./day	180 day growing season: 0.72 AF/acre	

According to an experienced large agricultural consultant who ran nursery operations at Driscoll's and has five years of experience growing large-scale hemp and licensed cannabis, in Cuyama Valley cannabis cultivation would require approximately 2.2 AF/acre/growing season.

<sup>16</sup> [Current Impacts of Outdoor Growth of Cannabis in Colorado](#), Hammon B, Rizza J, Dean D. Colorado State University Extension Crop Series.

<sup>17</sup> [Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds](#). Bauer, S., Olson, J., Cockrill, A., van Hattem, M., Miller, L., Tauzer, M., & Leppig, G. (2015). PLoS ONE, 10(3), e0120016.

<sup>18</sup> [Commercial Cannabis Cultivation and Manufacturing Regulations and Licensing Program Draft Environmental Impact Report](#), County of Santa Cruz, 3-16

# APPENDIX B



# Form I IRRIGATOR

## WATER USE ESTIMATE WORKSHEET - 2019 Cuyama Basin Groundwater Sustainability Agency

Please use one form per well

**LATE FEE**  
Extraction Statement and Fees are due by September 30, 2020. A 10% late penalty will be assessed for payments received after this date with a 1% escalation rate for each additional month late.

Name Triangle E Farms  
 Address 2830 Hwy 33 Maricopa CA 93252  
 Phone Number 661 342 3278  
 Well ID # 2 + # 6  
 Well Location (APN or address) 149-220-65 Lot 7

### Instructions:

- For 2019, input crop name(s) in column A, the associated acres in column B, and the corresponding crop factors from the attached Exhibit C-1 in column C.
- Multiply acres (column B) by the crop factor (column C) and input result in column D.
- Total the acre-feet from column D in row 2 and multiply by the groundwater extraction fee in row 3 and enter in row 4 to determine the amount owed to the Cuyama Basin Groundwater Sustainability Agency (CBGSA).
- Make payment to the following address:

Attn: Cuyama Basin Groundwater Sustainability Agency  
 500 Capitol Mall, Suite 2350  
 Sacramento, CA 95814

	A	B	C	D
	Crop Name	Acres	Crop Factor	Water Use (acre-feet)
1	Alfalfa	102.76	X 4.02	= 413.10
	Grain Hay	103.69	X 1.97	= 204.27
	Metered water		X	=
	Immature Pistachios	19.6	X	=
	Apples	13.6	X	=
	Immature Olives	105.4	X	=
			X	= 153.86
			X	=
2	Total Acre-feet (sum column D)			771.23
3	Groundwater Extraction Fee (\$/af)			\$44
4	Total Cost			\$33934.12

## **Memorandum**

**DATE:** June 25, 2021

**TO:** County of Santa Barbara

**FROM:** Amy M. Steinfeld

**RE:** Updated Cannabis Water Use Offset Program for Suarez Outdoor Cannabis Cultivation (2225 Foothill, Cuyama), 19LUP-00000-00327 (Dairy Farm located in Central Basin Management Area)

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### **I. Introduction**

Cuyama Farms, LLC (DBA Orange Coast Farms) has committed to adopting a voluntary 1:1 water offset program (Offset Program) for its 34.7 acre cannabis cultivation site, one acre of landscaping, and construction dust control measures (Suarez Project or Project) in Cuyama Valley to address concerns raised by the appellant and the community regarding groundwater use. This offset program mirrors San Luis Obispo County's Cannabis Cultivation Offset Program.<sup>1</sup> The Offset Program will result in no net new groundwater use within the Cuyama Valley as a result of this Project and therefore the Project will not have a significant impact on local groundwater resources. In fact, by decentralizing pumping away from historically irrigated areas, the Suarez Project's Offset Program will likely result in a net benefit to the Cuyama Groundwater Basin (Basin).<sup>2</sup> The Offset Program will begin on January 1, 2022 and will continue so long as Cuyama Farms cultivates cannabis at 2225 Foothill Road, New Cuyama.

### **II. Background on Cuyama Valley Groundwater Resources**

The Suarez Project is located within the Cuyama Groundwater Basin (Cuyama Basin or Basin), which has been designated a critically overdrafted groundwater basin required to have adopted a Groundwater Sustainability Plan by 2020. The Project is subject to the Cuyama Basin Groundwater Sustainability Agency's (Cuyama GSA or GSA) recently adopted Groundwater Sustainability Plan (Cuyama GSP or GSP). The Cuyama GSP describes the GSA's approach to achieve sustainable groundwater management for the Cuyama Basin by 2040. The GSP describes existing basin conditions, identifies undesirable results, develops water budgets, and describes projects and management actions to ensure the Cuyama Basin achieves sustainable management. The entire Cuyama GSP is available here: <https://cuyamabasin.org/resources#final-gsp>.

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<sup>1</sup> San Luis Obispo County Code, §§ 22.40.050 (D)(5), 22.40.060(D)(1) [nurseries].

<sup>2</sup> See February 2021 Hydrogeologic Overview Report by Jordan Kear, March 2021 Analysis of Projected New Well Pumping Regimes, and June 2021 Hydrogeologic Overview and Potential Riparian Impact Assessment 2225 Foothill Road, New Cuyama, Santa Barbara County, California filed concurrently herewith.

In order to achieve sustainable groundwater management, the GSP proposes to reduce groundwater pumping by up to 40,000 acre feet per year (AFY). The focus of this reduction in groundwater pumping will be around the central portion of the Cuyama Basin in the Central Basin Management Area (Management Area), where declining groundwater levels are the most severe due to decades of groundwater pumping for irrigation of carrots, potatoes, grapes, onions, garlic, lettuce, olives, peaches, pistachios, and alfalfa. The GSA has initiated the process to develop a final allocation framework for the Management Area, but has yet to finalize the framework. They are currently working with the Cuyama Basin Water District (CBWD) on the following management actions: (1) implementation of Pumping Allocations in the Management Area, and (2) development of water budgets for individual landowners within the Management Area.

Implementation of these two management actions must be consistent with the GSP. (Wat. Code, § 10725.2.) According to the Chapter 7 of the GSP, the allocation will set the amount of groundwater individual pumpers can extract in the Management Area. The GSP proposes to develop allocations based on estimated historical use, existing land uses, and total irrigated acreage. The GSA plans to establish the pumping allocation plan for the Management Area by 2022 with pumping reductions beginning in 2023. The GSP also proposes a ramp-down approach (aka a “glide path”), whereby pumping reductions will be 5 percent of total pumping in 2023, another 5 percent in 2024, followed by a 6.5 percent reduction annually between 2025-2038.<sup>3</sup>

### **III. Suarez Project: Water Use and Offset Program**

The Suarez Project is not located in the Management Area and therefore not subject to the GSA’s proposed pumping reductions. The Management Area was determined by a model that calculates areas that experience a groundwater level decline of more than 2 feet per year over a 50-year period. (GSP, pp. ES-2–3.) The Suarez Project is outside of the Management Area as groundwater levels in this region have not been declining at the modeled rate. Further, nothing in the GSP precludes the expansion of groundwater use by Cuyama Farms.<sup>4</sup>

To address the community’s concerns, however, Cuyama Farms has committed to voluntarily offset all of its water use on a 1:1 basis. In addition, like all water users located within the Basin, Cuyama Farms will comply with all applicable rules and regulations adopted by the GSA, such as reporting all water usage by January 31 and paying all assessments and fees adopted by the GSA, currently set at \$44/acre foot (AF) of groundwater extracted from the Basin for fiscal year 2020-2021.<sup>5</sup>

#### **A. Suarez Project Water Use**

Water for the Project’s onsite agricultural, domestic, and fire protection uses will be provided by an existing well and a proposed new well.<sup>6</sup> The new well has been permitted (County Well Permit No. 0004497), but has not yet been drilled. Drilling is anticipated to be completed prior to obtaining the single parcel water system permit. Water lines from the existing well extend to the sheep grazing area and existing jujube orchard. No existing water lines extend to the Project Site. A proposed new water line will extend from the existing well to cultivation areas on the Project Site, generally along the existing agricultural road at the center of the site and along the northern perimeter of the cultivation area. Water lines will also extend from

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<sup>3</sup> See New Landowner Sheet, available at: <https://cuyamabasin.org/>.

<sup>4</sup> See generally GSP Chapters. GSAs do not have the authority to regulate land use or supersede the land use authority of local agencies. (Wat. Code, § 10726.8(f); see also Wat. Code, §§ 10726.2, 10726.4 [describing authority of a GSA].)

<sup>5</sup> The fee is \$46/AF for fiscal year 2021-2022.

<sup>6</sup> For more information on the wells and impact of projected pumping on the Basin, see the February and March 2021 Reports by Hydrogeologist, Jordan Kear.

the new well to two 5,000 gallon water tanks to serve the cultivation area, the restrooms and the sprinkler system in the security office.

Cuyama Farms proposes to cultivate 34.7 acres of outdoor, sun-grown cannabis in hoop structures. It will cultivate two crops per year: an auto-flower crop planted in March and a full term crop planted in July. A conservative estimate of the annual water demand of outdoor cannabis grown using drip irrigation is 3 AFY per acre.<sup>7</sup> Therefore, we estimate that the Project's total water demand for cultivating cannabis at this site will be approximately 104.1 AFY. However, this number will be adjusted annually based on well metering to determine actual water demand. For example, if Cuyama Farms pumps more than 104.1 AFY of groundwater in Year 1, it will make up the difference in the following year by offsetting additional groundwater resources. In addition, Cuyama Farms will also offset its annual landscaping irrigation use, which is estimated to be 1.1 AFY,<sup>8</sup> and its one-time dust control construction water use, which is estimated to be approximately 0.2 AF.

### 1. **Water Efficiency Measures**

The Project will utilize a drip irrigation system that will eliminate the potential for irrigation runoff and maximize the efficient use of water.<sup>9</sup> Tensiometers will be used to monitor soil moisture and prevent over watering.

### 2. **Cannabis Water Duty**

Cannabis has a low water use relative to other crops. Although the science on cannabis water demand is limited to date, with efficient irrigation techniques, studies estimate that seasonal, outdoor cannabis farms utilize between two to three AF of groundwater per acre for irrigation.<sup>10</sup> Cuyama Farms has committed to installing state-of-the-art water conservation features. Once cannabis is planted, Cuyama Farms will carefully meter and track its water use to develop actual cannabis water demand information for this region and share this information with the GSA, the County, and the Berkeley Cannabis Research Center.<sup>11</sup>

### B. **Offset Program**

Cuyama Farms is committing to offset its water demand for the duration of the Project by providing compensation to farmers within the same groundwater basin that switch from irrigated to non-irrigated agricultural uses, and/or by funding irrigation improvements in the same groundwater basin.<sup>12</sup> Cuyama

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<sup>7</sup> One acre-foot equals about 326,000 gallons, or enough water to cover an acre of land, about the size of a football field, one foot deep. See Appendix A for support of the use of 3 AF in Year 1.

<sup>8</sup> This value reflects a conservative demand estimate for native plants landscape irrigation during the first 5-7 years of planting. The water demand for low-water plants should decline over time as the native plants grow.

<sup>9</sup> Drip irrigation can reduce agricultural water demand by up to 17 to 22 percent when compared with spray or flood irrigation. (CALFED Bay-Delta Program, *Water Use Efficiency Comprehensive Evaluation* (2006); H. Cooley, J. Christian-Smith, and P.H. Gleick, *Sustaining California Agriculture in an Uncertain Future* (2009) Pacific Institute.)

<sup>10</sup> See Appendix A.

<sup>11</sup> University of California, Berkeley, Cannabis Research Center, <https://crc.berkeley.edu/> (accessed on March 5, 2021).

<sup>12</sup> During the first five years, irrigation improvements will not be part of the current water offset contract. However, a 1:1 offset could be achieved through irrigation improvements in the future. This will require an engineer to determine the water savings that result from an irrigation improvement; for example, switching from sprinklers to drip tape.

Farms proposes the following five year, initial Offset Program to offset its water demand on a 1:1 basis pursuant to an agreement with a farmer located in the same Management Area.

Cuyama Farms is partnering with a local Cuyama Valley farmer who farms and runs a dairy on approximately 460 acres of land he owns within the Management Area.<sup>13</sup> The dairy farm is less than one mile from the Project. Over the past 40 years, the farmer has historically grown alfalfa, forage hay, carrots, potatoes and corn on a 120 acre parcel of land overlying the Basin (APN 149-150-017). Most recently, the farmer grew corn, wheat and carrots, and prior to that alfalfa. The farmer was planning to plant alfalfa in 2022.

Cuyama Farms has entered into a five year (with an option to renew) contract with the farmer to pay the farmer the fair market value of producing alfalfa on his 120 acres of farmland.<sup>14</sup> As a result of this agreement, the farmer will not plant or irrigate 120 acres of alfalfa in 2022. Instead, he will keep an existing hay crop in (dry farming) and allow his cattle to graze. Should the local farmer decide to plant another crop type on this acreage after five years (with a lower water demand), Cuyama Farms will engage in other water offset measures, such as contracting for additional agricultural land.

As part of the contract, the local farmer also has agreed to not cut down the existing grain crop to ensure that his land will continue to support grasses and allow native grasses to reseed, which will prevent dust erosion to eliminate air quality impacts associated with not-irrigated this field. The non-irrigated acreage will not result in negative economic impacts for the community because the local farmer will be compensated for the non-irrigated land and will continue to farm the majority of his farm. Further, the offset contract does not restrict what the farmer can do with the non-irrigated field, only that he not apply any groundwater. Accordingly, the local farmer has committed to grazing his cattle from his dairy on this acreage.

Currently, the farmer's land is located within the Management Area and thus will be subject to GSA mandated pumping reductions (the "glide path"). Although the Cuyama GSA has not finalized its allocation program or "glide path" mandated pumping reductions, the offset contract contemplates the "glide path" program proposed in the Cuyama Basin GSP and accounts for annual reductions in the amount of water allocated per acre. (See Example Scenarios 1 and 2 below.) In sum, no double counting will be permitted. Moreover, the contract will decentralize pumping within the Basin by reducing pumping from the most impacted Management Area toward the foothills.

In the event that this farmer, in the future, is no longer the offset partner, Cuyama Farms will be required to continue to offset its groundwater use on a 1:1 basis by: (a) entering into an agreement with another farmer located in the Basin to switch from irrigated to non-irrigated agricultural uses; or (b) paying another farmer to upgrade existing irrigation equipment, fix leaks, etc. Any future arrangement will require Cuyama Farms to submit a technical report to the County providing detailed information supporting its Offset Program.

As noted above, Cuyama Farms must comply with all rules and regulations outlined by the GSA that apply to this property. In the event that the GSA develops a market-based groundwater trading program, Cuyama Farms may participate in that program so long as its participation results in an offset of 100 percent of its groundwater use. While the Project is not currently located within the Management Area, it will update its

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<sup>13</sup> In addition, Cuyama Farms continues to hold an agreement with a Ventucopa farmer that would allow Cuyama Farms to provide water off-sets in other vulnerable areas of the Cuyama Basin. (See Cuyama Farms LLC, Cannabis Water Use Offset Program for Route 66 Outdoor Cannabis Cultivation Memorandum (March 23, 2021).)

<sup>14</sup> The contract is intended to provide the proposed water offset for all three of Cuyama Farms' proposed cannabis farms located at 2011 Foothill Road (20LUP-00000-00199), 2225 Foothill Road (19LUP-0000-327), and 262 Castro Canyon (20LUP-00000-00268). The calculations provided in this memorandum assume that the County approves all three LUP applications, as proposed, to ensure that the contract is capable of offsetting the demand for all three projects.



water use and offset program accordingly in the event the Project is included in a management area or subjected to pumping reductions.

### 1. How it Works

The water duty of alfalfa in the Cuyama Valley is 4.02 AF per year. Ceasing irrigation of 120 acres of alfalfa will therefore result in a total water savings of 482.4 AF in the first year. Cuyama Farms proposes to split this offset among its three proposed farms in proportion to the cultivated acreage of each farm.<sup>15</sup> For the purpose of calculating the offset, this water duty also is adjusted down each year based on the “glide path” in the GSP. Because Cuyama Farms only plans to utilize an estimated 104.1 AFY to irrigate cannabis and an additional 1.1 for landscape irrigation (combined 105.2 AFY), the offset contract will provide a healthy (10 percent) buffer in Year 1. This buffer will also cover the additional 1.1 AF of landscaping irrigation demand, and the one time dust control demand for construction purposes of approximately 0.2 AF.

Cuyama Farms will meter its groundwater use to confirm that its estimated groundwater use is accurate. For example, if its actual groundwater use in Year 1 exceeds 105.2 AF, it will work with the farmer to add additional land under contract the following year to make up the deficit or fund onsite irrigation improvements on the farm to offset groundwater demand. Cuyama Farms must “true up” each year to ensure it achieves the 1:1 offset. Conservation credits, however, may be carried over to the following year.

In sum, the proposed Offset Program will likely result in an estimated net water savings in Year 1, which means there will be no increase in water use within the Cuyama Valley as a result of the cannabis operation and ensures there is a sufficient buffer in the event cannabis demand exceeds estimates. Below is an illustration of how the Offset Program will work in two scenarios: (a) the Year 1 water demand was underestimated; and (b) the Year 1 water demand was overestimated.

EXAMPLE SCENARIO 1: WATER DEMAND OVERESTIMATED				
Year	Activity	Acreage <sup>16</sup>	Water Duty (AF) <sup>17</sup>	Gross Water Demand (AF)
1	Alfalfa Water Savings	32.1	4.02	128.8
	<i>Estimated</i> Cannabis and Landscaping Water Use	34.7	3	105.2
	Buffer (Net Water Savings)	23.6 (Carry Over to Year 2)		
2	Alfalfa Water Savings with Glide Path’s 5 percent reduction	32.1	3.82	122.4
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	2.5	87.9
	Net Water Savings Year 2	34.5		

<sup>15</sup> As noted above, Cuyama Farms intends for the contract to offset all or part of its water demand at all three farms. Should the offset contract not provide sufficient water to support its operations, Cuyama Farms will obtain other offset contracts with local farmers, implement irrigation improvements, or reduce its overall water use to meet the 1:1 offset requirement.

<sup>16</sup> 2225 Foothill would provide 27 percent of Cuyama Farms total cultivated acres; thus, this calculation assigns 27 percent of the farmer’s acreage under the contract (32.1 acres of the 120 acre dairy farm) to 2225 Foothill to calculate the water offset for this property. A larger portion of the water allocation subject to the offset contract could be assigned to 2225 Foothill to cover additional water use, if necessary.

<sup>17</sup> The calculation in the example scenarios assumes that the water duty assigned to a particular crop declines along the “glide path” (e.g., Year 1 allocation equals 95 percent of baseline water duty, and Year 2 allocation equals 93.5 percent of the Year 1 allocation, etc.).

	(with Carry Over)			(58.1 with Carry Over)
3	Alfalfa Water Savings with Glide Path's 5 percent reduction	32.1	3.63	116.3
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	2.5	87.9
	Net Water Savings Year 3 (with Carry Over)			28.4 (86.5 with Carry Over)
4	Alfalfa Water Savings with Glide Path's 6.5 percent reduction	32.1	3.39	108.7
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	2.5	87.9
	Net Water Savings Year 4 (with Carry Over)			20.8 (107.3 with Carry Over)
5	Alfalfa Water Savings with Glide Path's 6.5 percent reduction	32.1	3.17	101.7
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	2.5	87.9
	Net Water Savings Year 5			13.8
<b>Total Net Saving With Carry Over</b>				<b>121.1</b>

Note: In this hypothetical, the Offset Program would result in significantly more than a 1:1 water offset annually. Cuyama Farms reserves the right to adjust the net water savings amounts to achieve only a 1:1 water offset.

EXAMPLE SCENARIO 2: WATER DEMAND UNDERESTIMATED				
Year	Activity	Acreage	Water Duty (AF)	Gross Water Demand (AFY)
1	Alfalfa Water Savings	32.1	4.02	128.8
	<i>Estimated</i> Cannabis and Landscaping Water Use	34.7	3	105.2
	Buffer (Net Water Savings)			23.6 (Carry Over to Year 2)
2	Alfalfa Water Savings with Glide Path's 5 percent reduction	32.1	3.82	122.4
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	3.5	122.6
	Net Water Savings Year 2 (with Carry Over)			-0.2 (26.4 with Carry Over)
3	Alfalfa Water Savings with Glide Path's 6.5 percent reduction	32.1	3.63	116.3
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	3.5	122.6
	Net Water Savings Year 3			-6.3 (20.1 with Carry Over)
4	Alfalfa Water Savings with Glide Path's 6.5 percent reduction	32.1	3.39	108.7
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	3.5	122.6

	Net Water Savings Year 4 (with Carry Over)			-13.9 (6.2 with Carry Over)
5	Alfalfa Water Savings with Glide Path's 6.5 percent reduction	32.1	3.17	101.7
	<i>Actual</i> Cannabis and Landscaping Water Use	34.7	3.5	122.6
	Net Water Savings Year 5			-20.9
<b>Total Net Savings with Carry Over</b>				<b>-14.7</b>

Note: In this hypothetical, the Offset Program would rely on carry over generated in Year 1 due to lower anticipated demand during the first cropping cycle due to the smaller size of auto-flower cannabis. This carry-over would then be used in subsequent years. Under this scenario, Cuyama Farms would obtain an additional water offset contract, fund irrigation efficiency improvements or reduce its overall water use in Year 5 to ensure a 1:1 offset.

Water use at the cannabis cultivation site will be closely monitored via a meter on the well and the above numbers will updated accordingly. For example, if the Project's water use is less than 3 AFY, the net water savings will increase and can be applied to the following year as a carry over. If the Project's water use is more than 3 AFY, the net water savings will decrease. In the unlikely event that the net water savings is negative, Cuyama Farms will increase the amount of land under contract to ensure a net water savings of at least 0 AFY (i.e., an 1:1 offset or greater).

Water use data will continue to be collected beyond the first year and an Annual Water Use Report will be submitted to the County. The report will outline:

- Amount of irrigated cannabis acreage and amount of groundwater applied;
- Amount of water use that is offset through not planting and irrigating alfalfa; and
- The net water savings for that particular year and net water savings inclusive of prior year(s) (i.e., with carry over water).

In addition to offsetting water use, water conservation methods will be employed at the cannabis cultivation site. Daily records will be kept for all water used for cannabis irrigation. Regular inspections of the water system will be done to ensure leaks are caught and fixed in a timely manner. The irrigation system will also include redundancies to lessen the impact in the event a leak occurs.

### III. Ongoing Collaboration with the Cuyama GSA

Cuyama Farms also is committed to providing detailed water information to the Cuyama GSA. Specifically, Cuyama Farms will provide the following information at regular intervals: (i) well construction information and capacity; (ii) water demand for cannabis based on meter data and crop uptake; and (iii) water level and quality information. As previously discussed with Cuyama GSA staff, Cuyama Farms is committed to providing the Cuyama GSA with as much data and information as possible.

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# APPENDIX A

## 1. Literature Review

Based on a review of scientific articles that cover the water use of outdoor cannabis cultivation, water demand ranges from less than one acre-foot to five acre-feet (AF) per acre per growing season, depending upon the length of the growing season and other environmental factors (e.g., local rainfall amount). Many articles report that cannabis uses six gallons/plant/day, however, that figure has been widely criticized as exaggerating the water demand of cannabis since it is based on the water needs of a large (full-grown) cannabis plant when in reality the water demand of cannabis varies throughout the growing season (i.e., younger (smaller) cannabis plants require less water).<sup>18</sup> Accordingly, such a statistic represents, at best, the upper-end of cannabis water demand for a large mature plant. Further, the reported information generally does not include the use of state-of-the-art irrigation methods, which will be utilized here.

It is realistic to for Year 1 to estimate that outdoor cannabis cultivation in Cuyama will require three AF per acre per growing season (or year) based on the following:

Article	Water Use	Converted Water Use (AF/acre/growing season)	Background Info & Article Assumptions
<a href="#">First Known Survey of Cannabis Production Practices in California</a> <sup>19</sup> ,	August: 5.5 gal/day/plant (0.22 gal/sq. ft./day)  September, 5.1 gal/day/plant (0.17 gal/sq. ft./day)	190 day growing season: 5 AF/acre  140 day growing season: 3-4 AF/acre  Growing season would have to be 269 days for demand to be 7 AF/acre	Primarily a survey of farms in Northern California but also included responses from all over Calif.  Avg. growing season: 190 days
<a href="#">Water storage and irrigation practices for cannabis drive seasonal patterns of water extraction and use in Northern California</a> <sup>20</sup> ,	358,854 L per year	1 AF/acre/year	Mean outdoor cultivation size (n=179): 1,185 square meters (canopy area and space between plants)

<sup>18</sup> [Commercial Cannabis Cultivation and Manufacturing Regulations and Licensing Program Draft Environmental Impact Report](#), County of Santa Barbra, 2017, 3-16

<sup>19</sup> [First Known Survey of Cannabis Production Practices in California](#), Wilson H, Bodwitch H, Carah J, Daane K, Getz C, Grantham T, Butsic V. 2019. Calif Agr 73(3):119-127. <https://doi.org/10.3733/ca.2019a0015>.

<sup>20</sup> [Water storage and irrigation practices for cannabis drive seasonal patterns of water extraction and use in Northern California](#), Dillis C, McIntee C, Butsic V, Le L, Grady K, Grantham T. 2020. Journal of Environmental Management Vol. 272. <https://doi.org/10.1016/j.jenvman.2020.110955>.

<a href="#">Current Impacts of Outdoor Growth of Cannabis in Colorado</a> <sup>21</sup> .	25-35 inches per year	2-3 AF/acre	
<a href="#">Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds</a> <sup>22</sup>	22.7 L/plant/day (6 gal/plant/day)	190 day growing season: 2.10 AF/acre  140 day growing season: 1.55 AF/acre  (assuming 600 plants/acre)	
<a href="#">County of Santa Cruz Commercial Cannabis Cultivation and Manufacturing Regulations and Licensing Program EIR</a> <sup>23</sup>	0.03 gal/sq. ft./day	180 day growing season: 0.72 AF/acre	

According to an experienced large agricultural consultant who ran nursery operations at Driscoll's and has five years of experience growing large-scale hemp and licensed cannabis, in Cuyama Valley cannabis cultivation would require approximately 2.2 AF/acre/growing season.

<sup>21</sup> [Current Impacts of Outdoor Growth of Cannabis in Colorado](#), Hammon B, Rizza J, Dean D. Colorado State University Extension Crop Series.

<sup>22</sup> [Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds](#). Bauer, S., Olson, J., Cockrill, A., van Hattem, M., Miller, L., Tauzer, M., & Leppig, G. (2015). PLoS ONE, 10(3), e0120016.

<sup>23</sup> [Commercial Cannabis Cultivation and Manufacturing Regulations and Licensing Program Draft Environmental Impact Report](#), County of Santa Cruz, 3-16