WATER AVAILABILITY ANALYSIS
MAJOR USE PERMIT, UP 18-35
GREEN BEAR FARMS CALI, LLC
4680 CLARK DRIVE
KELSEYVILLE, CA 95451
LAKE COUNTY APN 008-042-04 (PROJECT PROPERTY/PARCEL)

Water Sources and Storage

There is an existing well on the Project Property, located approximately 300 feet west of the existing and proposed cultivation area(s) and 300 feet north of Cole Creek (Latitude 39.986365°; Longitude -122.818529°), in a 100 ft^2 wooden well house with a diameter of 6 inches and a 9-inch diameter metal well casing. Green Bear Farms Cali, LLC (GBFC) will use water from this groundwater well as the primary source of water for the proposed cultivation operation. On September 14th, 2018 Stevenson Water Treatment & Distribution Services (C-61/D-21 & C55 License # 1025430) performed a thorough inspection and pump test of GBFC's groundwater well (primary water source). The well was pumped for 2 hours at 60 gallons per minute, and water level measurements were taken and recorded every minute for the first 5 minutes, then every five minutes for the next hour, then every thirty minutes for the last 1.5 hours of the pump test. A final water level measurement was taken and recorded 10 minutes after pumping ceased. The water level in the well had recovered 100% in the 10 minutes following pumping (please see the attached Well Water Yield & Inspection Report). GBFC will maintain at least 10,000 gallons of water stored on the Project Property for emergency irrigation and fire suppression purposes/uses.

Water Availability Analysis

From the CalCannabis Cultivation Licensing Program's Final Programmatic Environmental Impact Report (PEIR):

"According to Hammon et al. (2015), water use requirements for outdoor cannabis production (25-35 inches per year) are generally in line with water use for other agricultural crops, such as corn (20-25 inches per year), alfalfa (30-40 inches per year), tomatoes (15-25 inches per year), peaches (30-40 inches per year), and hops (20-30 inches per year). In a study of cannabis cultivation in Humboldt County, approximate water use for an outdoor cultivation site was 27,470 gallons (0.08 acre-feet) per year on average and ranged from approximately 1,220 to 462,000 gallons per year (0.004 to 1.4 acre-feet), with the size of the operation being a major factor in this range. Annual water uses for a greenhouse operation averaged approximately 52,300 gallons (0.16 acre-feet) and ranged from approximately 610 to 586,000 gallons (0.002 to 1.8 acre-feet) annually (Butsic and Brenner 2016). During a field visit conducted by technical staff to an outdoor cultivation site, one cultivator reported using approximately 75,000 gallons (0.23 acre-feet) for 1 year's entire cannabis crop (approximately 66 plants), or approximately 1,140 gallons per plant per year."

GBFC's proposed cultivation practices are most similar to commercial heirloom tomato production with an estimated water use requirement of 25 inches per year. GBFC's total proposed cannabis cultivation area is 46,080 ft^2 with an expected total annual water use requirement of less than 2.2 acre-feet or 716,872 gallons. The cultivation season for GBFC's proposed mixed-light cannabis cultivation operation will begin in March and end in November of each year. The following table presents the expected water use of the proposed cultivation operation by month during the cultivation season in gallons and acre-feet.

Mar	Apr	May	June	July	Aug	Sept	Oct	Nov
0.05	0.11	0.2	0.3	0.3	0.35	0.3	0.3	0.11
16000	36,000	66,000	96,000	96,000	112,000	96,000	96,000	36,000

Irrigation water for the proposed cultivation operation, will be pumped from the well to four proposed 2,500-gallon water storage tanks located adjacent to the proposed cultivation area, via an HDPE water supply line. The water storage tanks will be equipped with float valves to shut off the flow of water from the well and prevent the overflow and runoff of irrigation water when full. An HDPE water supply line will be run from the water storage tanks to the irrigation systems of each greenhouse within the proposed cultivation area. The water supply lines will be equipped with redundant safety valves, capable of shutting off the flow of water so that waste of water and runoff is prevented/minimized when leaks occur and the system needs repair. The irrigation system of the proposed cultivation area(s) will be composed of PVC piping, black poly tubing, drip tapes/lines, and micro-spray emitters. Supplemental irrigation may be applied when needed by hand using garden hoses.

Water Use Monitoring

An Eno Scientific Well Watch 660 continuous water level monitor was installed on GBFC's groundwater well (primary water source), and a Carlon inline flow meter was installed on the main water line between this groundwater well and the proposed cultivation operation. GBFC's personnel will regularly read and record measurements from these water monitoring devices. GBFC will provide those records to Lake County and/or State Water Resources Control Board's staff upon request.

Stevenson Water Treatment &
Distribution Services

21705 Dry Creek Cutoff Middletown, CA 95461
(707)889-6194
rick@stevensonwater.com

WELL WATER YIELD & INSPECTION REPORT

(Worksheet example taken from PRMD No. F:WLS-010 Certification of Water Yield in Water Scarce Areas.wpd)

I. Individual performing test: Richard Stevenson

II. Type of license/registration, number and expiration date: C-61/D-21 & C55 License # 1025430 Exp. 4/30/2019

III. Location of well: Address: 4680 Clark Ave. Kelseyville, CA A.P. # 008-042-04

IV. Type and model of test pump: FE 45FA3S4 230/3

V. Test pump setting depth: 90’

VI. Maximum reported yield for this pump type at this setting: 60 GPM

VII. Type of discharge measurement method: 1 1/2” electronic flow meter, 1” pulse water meter & 5 Gallon Graduated Bucket

VIII. Type and model of flow meter (or provide an accurate description of weir or orifice plate):
Eno Scientific WS2100 1 ½” Flow Meter & Ultrasonic sounder. Carlon 1” Pulse Meter & 5 Gallon graduated bucket.

Geographic coordinates (Plane Coordinate Method or distance from fixed landmarks):
Lat. 359’10.92” N Long. 122°49’6”.88’

IX. Estimated elevation of well head: 1356.4’

X. Initial static water level (include measuring points such as top of casing, surface seal, access port):
50’ 6” From the top of the surface seal.

XI. Date & time of initial static water level measurement: 9/14/2018 14:15 p.m.

A. **Discharge Rate:** 60 GPM

B. **Dynamic Water Level:** 55.70’

C. **Specific Capacity:** 11.787 GPM /ft

D. Pump Test duration: 2 Hrs.

XII. Immediately after the test take the following measurements:

A. Dynamic water level: 55.70'

B. Final discharge rate: 60GPM

XIII. Post - Test Measurement:

A. Dynamic water level: 55.70'

B. Static water level: 50.58'

C. Percentage of recovery of final static level: 100%

Testing performed by (signature): ____________________

Date: 9/25/2018 **Company:** Stevenson water Treatment & Distribution Systems

Phone Number: (707) 889-6194

Approved______ **Denied**______ **Specialist**____________________ **Date**___________

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Well Pump Test Data Recordation

Address: 4680 Clark Drive Kelseyville, CA

Date	Time	Interval	SWL	GPM	Comments		
9/14/18	14:15	1 Min	50.79	60	Well Depth 142"		
	14:16	1 Min	50.91	60	12" Well		
	14:17	1 Min	51.18	60	Concrete Grout Sea		
	14:18	1 Min	51.42	60			
	14:19	1 Min	51.69	60			
	14:25	5 Mins	52.63	60			
	14:30	5 Mins	53.01	60			
	14:35	5 Mins	54.52	60			
	14:40	5 Mins	54.97	60			
	14:45	5 Mins	55.23	60			
	14:50	5 Mins	55.40	60			
	14:55	5 Mins	55.51	60			
	15:00	5 Mins	55.53	60			
	15:05	5 Mins	55.52	60			
	15:10	5 Mins	55.60	60			
	15:15	5 Mins	55.64	60			
	15:20	5 Mins	55.70	60			
	15:40	20 Mins	55.69	60			
	16:00	20 Mins	55.83	60			
	16:20	20 Mins	55.72	60			
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		72 Hrs. or					

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Calculation of Well Recovery

(Worksheet example taken from PRMD No. 9-2-28)

1. Determine the water level draw down by subtracting the initial static water level measurement from the stabilized pumping level. Record this result as the well draw down.

2. Next determine the water level recovery by subtracting the post test (within 72 hours) static water level from the stabilized dynamic pumping level. Record this result as the well recovery.

3. Next determine the percent recovery of the well. Divide the water level recovery by the water level draw down and multiply by 100. Record this result as the percent well recovery.

a.	**Initial static water level:**	50.61'	(measured value)
b.	***Post test static water level:**	50.58'	(measured value)
b.1.	**Time (hours) of measurement:**	23 mins.	(within 72 hours)
c.	****Stabilized pump measured value**	55.70'	(measured value)
d.	**Draw down:**	5.09'	(calculate by subtracting A from C)
e.	**Recovery:**	5.12'	(calculate by subtracting B from C)
f.	**Percent recovery:**	100%	(calculate by dividing E by D and multiplying result by 100)

Well percent recovery (F) must be 90% or greater within a 72 hour period.

* The static water level after 72 hours or less post pump test.

** Kleinfelder refers to this as the dynamic pumping level.

F:\WLS-010 Certification of Water Yield in Water Scarce Areas.wpd

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License #1025430

WATER ANALYSIS

ANALYSIS CONDUCTED BY: Rick Stevenson

CUSTOMER NAME: Rashid Perdue
CUSTOMER ADDRESS: 4680 Clark drive, Kelsyville,ca

WATER SOURCE: Water Well (Agricultural)
DATE SAMPLE WAS DRAWN: 09/14/18
DATE SAMPLE WAS TESTED: 09/14/18

HARDNESS	**6**	**GPG**
IRON	**5.0**	**MG/L**
PH	**6.95**	
ALKALINITY	**120**	**MG/L**
TDS	**140**	**MG/L**
MANGANESE	**0.20**	**MG/L**
CHLORINE	**N/D**	**MG/L**
ODOR	**N/D**	
VISUAL APPEARANCE	**Hazy / Yellow**	

Abbreviations: **GPG = Grains per US Gallon** **MG/L = milligrams per liter**
N/D = non-detectable

Please see attachments for comments, and recommendations:

For questions regarding this report please contact Rick Stevenson,
rick@stevensonwater.com or phone 707-889-6194

IMPORTANT INFORMATION REGARDING THE LIMITATIONS OF THIS REPORT: The purpose of this is to provide information regarding the general mineralogical character of a water supply. Unless specifically noted, this report does not include analysis for Coliform bacteria or any other health related contaminant and this analysis alone is therefore not suitable for determining the safety of a drinking water supply. This report is intended for the sole and exclusive use of our client named above. Our liability for errors or omissions is expressly limited to the amount paid for the analysis.

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Water Analysis information

Stevenson Water use industry standard methods of informational water analysis both in the field and in our lab. We analyze water to assist our customers in securing a useful water supply and to support our water treatment work. The tests performed and the way we report the results are tailored to these two goals. Certified analysis for other purposes such as regulatory compliance or litigation should be performed by a commercial laboratory.

HARDNESS

Hardness in water is an accumulation of a variety of compounds including calcium and magnesium. Water is a solvent and tends to dissolve minerals it comes in contact with. As water moves through the ground it comes in contact with soil and rocks. As contact occurs, the water will dissolve small amounts of minerals and holds them in solution. Calcium and magnesium are the two most common minerals to dissolve in water to make it "hard." Hard water can require more soap and detergent for cleaning and laundry. Hardness also contributes to scaling in water heaters, household appliances, and plumbing fixtures. Hardness is shown here as grains per gallon (GPG) and/or Milligrams per liter (mg/L). The degree of hardness in water can be determined by the following chart:

Water Hardness Scale

Grains Per Gallon	Milligrams Per Liter (mg/L)or Parts Per Million (ppm)	Classification
less than 1.0	less than 17.1	Soft
1.0 - 3.5	17.1 – 60	Slightly Hard
3.5 - 7.0	60 – 120	Moderately Hard
7.0 - 10.5	120 – 180	Hard
over 10.5	over 180	Very Hard

IRON

Iron can occur in water in several forms. We report the total iron content. The recommended limit is 0.3 milligrams per liter, although levels slightly higher than this are not always objectionable. Iron can cause stains on plumbing fixtures, appliances, and laundry. It can plug pipelines and cause unpleasant tastes and odors in water. Iron is an aesthetic nuisance in water but is not a health concern.

pH

The pH scale is a measure of the relative balance between acid and basic properties of water. The pH scale runs from 0 to 14 with 7 in the middle being considered neither acid nor basic, in other words neutral. Values less than 7 are considered increasingly acidic. Values greater than 7 are increasingly basic. There is no specific recommended limit for pH, but because this factor can play a major role in the corrosion of plumbing, water with a pH of less than 6.8 should be considered potentially corrosive.

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ALKALINITY

Total Alkalinity is an indicator of the general character of well water. The values for total alkalinity can be useful when evaluating other water quality parameters. There is no recommendation upper or lower level of alkalinity.

TDS

Total Dissolved solids (TDS) is a measurement of all the dissolved minerals in the water. The recommended limit for TDS is 500mg/l based mainly on taste considerations rather the physiological effects. Depending on what minerals are present in the water to account for high TDS the recommended limit may in many cases be too low. Some water substantially above the recommended limit may be completely acceptable in some areas but not in others. Although there is no recommended lowered limit it is important that TDS not be too low as very low TDS water is often corrosive. We usually consider TDS lower than 50 to 75 mg/l to be a cause for further inquiry into possible corrosion.

MANGANESE

Manganese is a metal similar in occurrence to iron. The recommended limit is 0.05 mg/L. The problems caused by manganese are similar to iron except that the stains caused by manganese are brown or black. Manganese is an aesthetic nuisance in water but is not of health concern.

ODOR

When our analysis reports odor it is usually expressed as a description of what is causing the odor rather than a numerical result. In some cases, we report sulfur odor as parts per million of hydrogen sulfide. On water samples tested at our office we usually do not report odor because it may not persist in a transported sample.

APPEARANCE

As with odor, we report the appearance of water as a visual description rather than a numerical value. Iron and manganese may discolor a water sample before analysis, resulting in a report of discoloration or haziness even though the water was clear at the time of sampling.