DRAFT CONDITIONAL USE PERMIT (CUP)
TYPE 3B "MIXED-LIGHT"
(APN 005-010-03)

For submittal to:

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PROPERTY MANAGEMENT PLAN

1.0 PURPOSE

In compliance with the Lake County Municipal Code, Article 27, this Property Management Plan (PMP) is required for all minor and major use permits for the commercial cultivation of cannabis, and is being prepared for AMPEG, INC. (here after referred to as the "applicant"). The intent of the PMP is to identify and locate all existing and proposed cannabis and non-cannabis related uses on the property, and describe how these related uses will be managed in the future. Suggested mitigation measures MM-1 through MM-21 would help to reduce impacts from the proposed project. The PMP shall demonstrate how the operation of the commercial cannabis cultivation site will not harm the public health, safety, and welfare or the natural environment of Lake County.

The PMP consists of the following sections:

1. Purpose
2. Proposed Project
3. Regulatory Requirements
4. Project Location
5. Air Quality
6. Cultural Resources
7. Energy Usage
8. Fertilizer Usage
9. Fish and Wildlife Protection
10. Operations Manual
11. Pest Management
12. Security
13. Stormwater Management
14. Waste Management
15. Water Resources
16. Water Use

This PMP will include a series of maps (Appendix A). Unless otherwise described, these maps will include, at a minimum, the entire parcel where the cultivation site is located. In addition, the site plans will include the cultivation site, plus a minimum of 100 feet around the site. All maps and site plans shall be to scale and will be prepared by Laura Hall Consulting. The applicant shall provide any other information as may be requested by the Community Development Director and/or by the Planning Commission. The PMP will be provided in PDF format to the County. No hard copies will be accepted.

2.0 PROPOSED PROJECT

Pursuant to Lake County's Article 72, the applicant has been approved for the medical collective cannabis cultivation of 72 plants, as a precursor to applying for an A - Type 3B: "mixed-light" License under the County's newly adopted Article 27. Pursuant to Article 27, the applicant will submit a conditional use permit (CUP) for the A - Type 3B: "mixed-light" License and for

construction of a 210' x 240' foundation with an 8" raised pad consisting of road base gravel and cement, to accommodate an inset 193' x 227' fence which will enclose seven (7) 30 'x 100' greenhouses for the cultivation of 21,000 sq. ft. of mature canopy, plus one (1) 30' x 100' greenhouse for the cultivation of 3,000 sq. ft. of immature canopy, and 19,560 sq. ft. of walkways, paths, and other areas (Table 1). In addition, a 50' x 80' sq. ft. metal building would be constructed for the processing of cannabis onsite to include: seed production, cloning, harvesting, drying, trimming, curing, packaging, weighing and storage of cannabis goods.

Table 1: Proposed Cultivation Area Construction-Installed Features

Proposed Construction	Dimensions	Square Feet	Purpose
fence	227' x 192'	43,560	cultivation area
greenhouse(s)	(7) 30' x 100' (1) 30' x 100'	21,000 3,000	mature canopy immature canopy
proposed water tank	(1) 2,500 gallon	-	water tank
composting site	25' x 25'	625	cannabis waste composting
metal building	50' x 80'	4,000	cannabis processing
greenhouse walkways/paths	various	19,500	access around cultivation area

All lighting in the greenhouses would be below the rate of 25 watts per square foot. The metal building, which would be utilized for cannabis processing, and storage of fertilizers and other amendments, would be equipped with LED lighting. The cannabis composting site would be surrounded by a fence and kept approximately 115 feet away from the greenhouses to prevent mold and mildew.

The parcel is identified as being in Zone AO according to FEMA flood maps. Therefore, the greenhouses and metal building will be designed by an engineer to meet flood elevations. During the construction phase, the greenhouses and metal building would be delivered by truck to a staging area north of the proposed cultivation area. The proposed cultivation area and metal building sites would be cleared of vegetation and prepared for constructing the foundations. A dozer, compactor, skip loader, skid steer, and cement truck will be utilized for construction.

3.0 STATE PERMITS

In compliance with Business and Professions Code Section 19332.2 (b), which was extended pass its original deadline date of June 30, 2017, a Form 19332.2 (b)(4) was filed March 10, 2018, on the artesian well. A response letter from the State Water Board was received on May 18, 2018, stating that the applicant will need to prove exemption by providing substantial evidence. Currently, the applicant is contacting qualified professionals to inquire about the process and fees.

A Notification of Lake and Streambed Alteration (LSA) has been submitted to the California Department of Fish and Wildlife (CDFW) in compliance with the Business and Professions Code 26060.1(b)(3), which states that every license for cultivation issued by the CDFA must comply

with Section 1602 of the Fish and Game Code or receive written verification from the CDFW that a Lake or Streambed Alteration (LSA) Agreement is not required. As of June 12, 2018, response from the CDFW was not yet received.

4.0 PROJECT LOCATION

The project site consists of a 25-acre parcel located at 3682 Scotts Valley Road, Lakeport, California, in Lake County. Cannabis cultivation occurs on APN 005-010-03, and irrigation comes from an artesian well located at 39.0841, -122.9485, which is southeast of the single-family residence (Appendix A). According to California USGS 7.5-Minute Quadrangles-North Index map, the project site is within the Lakeport Quadrant.

5.0 AIR QUALITY

Intent: All cannabis permittees shall not degrade the County's air quality as determined by the Lake County Air Quality Management District (LCAQMD).

As proposed, the project would include constructing eight 30' x 100' greenhouses with a pad, and a 50' x 80' metal building with a pad. After the construction phase, operations would begin. Ambient air pollutants and greenhouse gas emissions were modeled for the proposed project using CalEEMod (Appendix B). The commercial land use option was selected for the metal building and greenhouses under the research and development sub land use option. Currently, CalEEMod does not offer an agriculture land use option for greenhouses. However, the Bureau of Cannabis Control lists research activities as related to cannabis operations, therefore, although not identical, it can be thought of as a similar type of land use. In addition, because research and development is a more intensive land use, it provides for a worst-case scenario, were emissions will not be decreased. Below is a very brief overview and discussion of findings.

Construction

Construction would occur over a 40 day period from August 5, 2018, to September 28, 2018, and start 5 days after site preparation begins on August 1, 2018. Both site preparation and construction would be completed simultaneously between the greenhouse cultivation area and metal building site area. Construction equipment would include a tractor, skid steer loader, dozer, and cement truck. Two construction workers would be hired to assist the applicant and his associates.

The ambient air pollutants before and after mitigation is applied to construction of the proposed greenhouses and metal building, are listed in Appendix B. Mitigation would include items 1 through 3 below. After applying the following mitigation, the percent reduction for each pollutant is listed in Table 2.

MM-1

1. Soil stabilizer on unpaved roads to reduce PM10 by 50%;
2. Replace ground cover of area disturbed to reduce PM10 and PM2.5 by 50%; and
3. Reduce vehicle speed to 10 mph.

With mitigation applied, all ambient air pollutants are will within the California Air Resources Board (ARB) ambient air quality standards (Appendix C). Currently, there are no thresholds available for greenhouse gas emissions resulting from construction activities. However, the Sacramento Metropolitan Air Quality Management District provides mitigation measures to reduce emissions, which are attached to this PMP as Appendix D.

Operations

Operation of the project would begin shortly after construction has ended on September 28, 2019. Activities would include cultivating cannabis in the greenhouses, processing cannabis in the metal building, and traffic from temporary workers, vendors, and deliveries.

The ambient air pollutants before and after mitigation is applied to operations of the proposed greenhouses and metal building, are listed in Appendix B. Mitigation would include items 1 through 9 below. After applying the following mitigation, the percent reduction for each pollutant is listed in Table 3. With mitigation applied, all ambient air pollutants are will within the California Air Resources Board's (ARBs) ambient air quality standards (Appendix C). Currently, the significance of greenhouse gas emissions related to operation of the greenhouses and metal building are measured using the Business and Usual (BAU) methodology. This methodology is based on the reduction that California would need to reduce greenhouse gas emissions to 1990 levels by the year 2020, at a minimum of 29 percent reduction from BAU. Tables 4 includes 2005 emissions before AB 32 was enacted, 2018 emissions with regulations in place, and 2018 emissions with both regulations and the mitigation listed below applied to the project.

MM-2

1. Require 100% of employees to commute together;
2. No hearth;
3. Use low VOC cleaning supplies (project will use only biodegradable products for cleaning hands and equipment) and paint on metal building when needed;
4. Will exceed Title 24 by 55%;
5. Will install high efficiency lighting that reduces energy reduction by 80%;
6. Will apply water conservation strategy to reduce indoor & outdoor use of water by 50%;
7. Will institute recycling and composting services to reduce 50 percent of waste disposed;
8. Increase density by adding 0.08 jobs per acre; and
9. Planting 15 trees on the property.

As a condition of approval for construction, the applicant shall comply with the following condition:

MM-3

10. All cannabis permittees shall obtain Authority to Construct Permit pursuant to LCAQMD Rules and Regulations, if applicable, to operate any article, machine, equipment or other

contrivance which causes or may cause the issuance of an air contaminant, prior to the construction of the facility described in the Property Management Plan. All permittees shall maintain an Authority to Construct or Permit to Operate for the life of the project, until the operation is closed and equipment is removed.

Odors

The primary source of odor from cannabis farms comes from the flowering plants. The proposed project would include eight greenhouses with ventilation fans to expel air from indoor each greenhouse to the outside and/or to pull in outside air. During the heat of the summer, odors can become strong.

Currently, Lake County has a 600-foot buffer from sensitive receptors. However, the nearest residence from the project site is 544 feet to the southwest of the cultivation area. Therefore, paying close attention to any signs of odor will be important.

An odor response program is a required part of this PMP. The following measures will be implemented at the site:

MM-4

1. Jacob Mason-Davis shall be responsible for responding to all odor complaints.
2. Property owners and residents of property within a 1,000 foot radius of the cultivation area shall be provided with Jacob's name and contact information for responding to odor complaints.
3. Within the first 24 hours of receiving a compliant, investigate the source of odor, and then to determine the cause.
4. All temporary employees shall be instructed on how to handle odor complaints.
5. Use carbon filters or odor neutralizer products to control odors in the greenhouse. Change per manufactures directions.
6. Should odor issues persist following the procedures outlined above: the applicant shall consider these other, but more costly options:

    - Designing the ventilation discharge to release the cannabis plume 10 to 20 feet above the outlet nozzle way up into the air.
    - Removing fans to create air tight greenhouses where air is circulated from within.
    - Hiring a landscape specialist to design a tree wall to move air up and over neighboring residences.

Other odors might be generated from onsite composting. However, the composting site would be over 600 feet from the nearest neighbor, so likely would not be an odor problem. Fertilizers and other amendments, which are sometimes an odor source, would be stored inside of the metal building. The door where odors would escape from the building is also over 600 feet from the nearest neighbor. Other odors including those generated from diesel powered yard tools or delivery trucks, would only be temporary.

Table 2: Ambient Air Pollutant Reductions (Construction)

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	48.96	0.00	34.62	49.44	0.00	27.82	0.00	0.00	0.00	0.00	0.00	0.00

Table 3: Ambient Air Pollutant Percent Reductions (Operations)

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	5.31	10.17	9.20	12.18	12.45	13.41	12.48	12.46	13.51	12.57	50.00	16.56	16.64	39.39	46.75	16.81

Table 4: 2020 Operational and BAU Greenhouse Gas Estimates

Source (2018)	BAU (2005) MTCO2e	2020 (2018) (with Regulation) MTCO2e
Area	9.5000e-004	9.1000e-004
Energy	68.4103	39.9068
Mobile	433.8799	343.8389
Waste	1.8155	0.9077
Water	68.7857	1.8123
Total	572.8923	386.4667
	Reduction= 183.4256 Significant Threshold= 32% Are emissions significant after mitigation and regulation? No	

Source: Jacob Mason-Davis, 2018.
Note: source of BAU emissions: CalEEMod output for the year 2005 (Appendix B).
Note: source of 2018 emissions: CalEEMod output for the year 2018 (Appendix C).
Note: 2018 is counted as 2020 with the idea that regulations would remain the same.

6.0 CULTURAL RESOURCES

Intent: All permittees shall protect the cultural, historical, archaeological, and paleontological resources on the lot of record where the permitted activity is located.

A CHRIS non-confidential search for cultural resources was submitted on May 15, 2018, to the Northwest Information Center (NWIC). As of June, 1, 2018, results were not received. The land has been historically distributed by agricultural activities including disking and plowing for row crops.

MM-5

The proposed project would comply with all recommendation included in the non-confidential search from the NWIC, plus all state and local regulations for cultural, historical, archaeological, and paleontological resources.

7.0 ENERGY USAGE

Intent: Permittees shall minimize energy usage. In this section permittees shall:

Table 5 provides best guess annual energy consumption estimations for the mature and immature greenhouses, metal building, and well pump. Some information is unknown at this time, and estimations are only a best guess. During the first year of operations, the applicant will log approximate energy usages and determine the approximate amount of electricity usage for ventilation, evaporative cooling, heating, and dehumidifier.

MM-6

Section 5.0 provides measures and mitigation in compliance with CCR Title 3, Division 8, Chapter 1, Section 8305 the Renewable Energy Requirements. Other mitigation to reduce impacts are listed throughout this PMP.

Table 5: Best Guess Annual Energy Consumption Estimations

Source	Energy Source	Amount	Watts	Aggregate Wattage per Canopy Area	Total
Greenhouse Mature	inside lighting, metal halide fixtures	30 lights per greenhouse	400 watts per light	30 lights x 400 watts= 12,000 watts each canopy area is 3,000 sq. ft. 12,000	12,000 watts x 7 greenhouses= 84,000 watts x 3,000 hrs per yr= 252,000,000 watts (252,000 kW)

				watts/3,000 sq. ft.= 4 watts/ per sq. ft.	
Greenhouse Immature	inside lighting not to exceed 25 watts per square feet	30 lights	3000 sq. ft./25 watts per sq. ft.=120 watts per light	30 lights x 120 watts= 3,600 watts canopy area is 3,000 sq. ft. 3600 watts./3,000 sq. ft.= 1.2 watts/ per sq. ft.	3,600 watts x 3,000 hrs per yr= 10,800,000 watts (10,800 kW)
Metal Building[1]	LED	80 lights	14 watts per light	80 lights x 14 watts= 1,120 watts building area is 4,000 sq. ft. 1,120 watts/ 4,000 sq. ft.= 0.28 watts per sq. ft.	1,120 watts x 2,424 hrs per yr= 2,714,880 watts (2,714 kW)
Well	pump	cannabis irrigation and cleaning greenhouses and metal building= 1 226,400 gallons	1.403 Kw x 0.25 hours per week= 0.35075 Kw= 350.75 watts	-	350.75 watts x 303 operational days per year= 106,277.25 watts (106 kW)
Ventilation, Evaporative Cooling, Heating, and Dehumidifier	TBD	TBD	TBD	-	TBD

Note: TBD (To Be Determined).

[1] Pursuant to the 2016 Building Energy Efficiency Standards, for specialized task work, 0.50 watts are required per sq. ft.

8.0 FERTILIZER USAGE

Intent: To ensure consistency of fertilizer storage and use with the other sections of the Property Management Plan.

The future use of fertilizers will primarily include compost tea which will be prepared and mixed onsite using Dr. Elaine Ingham (Founder and President and Director of Research for Soil Foodweb Inc.) receipt. Fertilizer mixing would occur inside the cultivation area which is approximately 249 feet from the artesian well and 391 feet from the neighboring pond. Compost tea will be mixed using the following recipe.

MM-7

Compost Tea Basic Recipe

A basic tea recipe would be as follows, with the understanding that if larger or smaller quantities of water are used, change the amounts of additives relative to the amount of water:

1. 25 gallons of water, aerated to remove chlorine, add two teaspoons of a humic acid solution (preferably humic acid extracted from your own compost).
2. 1 to 2 tablespoons of humic acid diluted in 2 cups of water BEFORE adding to the compost tea water OR 1 to 2 tablespoons of fish hydrolysate (pre-diluted to neutralize the acid preservative according to the label on the container)
3. 1/2 cup of kelp mixed in 5 cups of water BEFORE addition to the compost tea
4. 5 pounds of good aerobic (good smelling, like deep forest soil) compost with excellent bacteria, fungi, protozoa in the compost. Using a microscope, assess the compost: Using a 1:5 dilution of compost, 400X total magnification, there should be a MINIMUM of thousands of bacteria in each field of view, 1 strand of fungal hyphae in each 5 fields, 1 flagellate or amoebae in each 5 to 10 fields of view and 1 beneficiall nematode per drop.

Additional foods if needed to improve fungi: 1 cup steel cut oats, or bran flour, or shrimp shells (no protein on the shells!) put in the compost bag with the compost
Replace humic acids with the same amount of fish hydrolysate if the plants need a nitrogen boost
NO MOLASSES!!!!!!!!

Compost Extract

1. Place the compost (please test so you know the compost contains the organisms needed as indicated above) in the compost bag (0.5 to 1 pound per 5 gallons of water)
2. Briskly massage the bag for 30 seconds to a minute
3. Check the tea to make sure it has the organisms needed.
4. If not enough organisms, then extract another 0.5 to 1 pound, repeat if necessary until organisms reach minimum or desired levels.
5. Apply.
6. If the compost you are using has good sets of organisms in it, perform the procedure above.
7. But if you do not know if your compost is good or not, then add foods (humic acid or fish

> hydrolysate, or steel ground oats, or bran or.....whatever fungal food desired) to the compost 3 to 7 days before extracting (good air flow around the compost, don't let it get stinky).

Should the applicant decide to purchase addition products, they would be exempt from tolerance requirements, and either exempt from registration requirements, or have labels broad enough to include use on cannabis per California Food and Agriculture Code, Division 6 Pest Control Operations and Division 7 Agriculture Chemical; Chapter 1 – 3.6 and California Code of Regulations, Division 6 Pest Control Operations. All fertilizers will be stored in the proposed metal building in the designated fertilizer/amendments storage area (Appendix A). The applicant, his associates, and temporary workers shall comply with the following fertilizer application and storage protocols:

- Comply with all fertilizer label directions;
- All fertilizers shall be stored in the proposed metal building only with exception of compost tea which may be mixed and drums in the cultivation area. In that case, each drum shall be securely covered;
- Fertilizers shall be kept in their original containers and placed in secondary containment;
- Fertilizer containers shall be handled with care to avoid destroying labels;
- Immediately clean up any spills;
- Preventing offsite drift;
- Do not apply pesticides when pollinators are present;
- Do not allow drift to flowering plants attractive to pollinators;
- Spray only when wind is blowing away from surface water bodies;
- Fertilizer mixing and application shall only occur in the greenhouses; and
- Use only properly labeled fertilizers.

Appendix A includes all the proposed projects features.

9.0 FISH AND WILDLIFE PROTECTION

Intent: To minimize adverse impacts on fish and wildlife.

A Biological Resource Assessment was completed on May 8, 2018, by wildlife biologist Brian Shaw at Klamath Environmental Resources (Attachment E). The Assessment concluded the following:

> No federally listed, proposed, or candidate plant or animal species were observed during the field inspections and are not listed to be near or on the subject property. No other habitat or designated critical habitat for federally listed species or EFH for Pacific salmon are present in the study area. This is mostly due to the lack of natural habitats in the area, as the area has been long ago converted completely to croplands.

10.0 OPERATIONS MANUAL

Intent: To describe the operating procedures of the commercial cannabis cultivation site to

ensure compliance with the use permit, protect the public health, safety and welfare, as well as the natural environment of Lake County.

The applicant will enter into a written agreement, or other form of agreement per Lake County guidelines, that allows the County, its agents, and employees, to seek verification of the information contained within the development permit or use permit applications, the Operations Manual, and the Operating Standards at any time before or after development or use permits are issued.

MM-8

Temporary workers will be hired on an as needed basis. Screening will include asking for proof of age with either a California Driver's License or California Identification Card (both forms of ID must include a picture). Temporary workers will need to provide at least 3 local references. Background checks will be mandatory.

The business will be open 8:00 a.m. to 6:00 p.m. on Monday through Saturday, excluding holidays. Depending on the workload, these hours could be reduced over time. However, the only visitors to the site would consist of distributors coming to pick up cannabis goods, and vendors and delivery personals. All visitors would have to see ID, and sign a log in and log out sheet. Licensees other than distributors may visit the site in the future if the applicant decides to apply for a Type 11 License and/or Type 4 License.

Greenhouse gas emissions related to the operations of the project will be reduced through the mitigation measures listed in Section 5.0 of this PMP.

The future use of chemicals will include compost tea, neem oil, and Dr. T's Natural RX, as well as other products that are exempt from tolerance requirements, and either exempt from registration requirements, or have labels broad enough to include use on cannabis per California Food and Agriculture Code, Division 6 Pest Control Operations and Division 7 Agriculture Chemical; Chapter 1 – 3.6 and California Code of Regulations, Division 6 Pest Control Operations (Table 2). There has been no discharge of effluent as the result of mixing and/or applying products. Section 11 of this PMP provides protocols for the application of chemicals.

Ground Maintenance

The following procedures shall be implemented at the site by the applicant, his associates, and temporary workers:

MM-9

1. On a daily basis, one hour before the close of business, the applicant, his associates, and/or temporary workers shall stop working, and properly clean up by whipping down all surface areas and cleaning tools. Only biodegradable soaps shall be used. Tools and other equipment shall be stored in their proper places. All litter and waste shall be stored in the solid waste container north of the metal building.

2. On an as needed basis, or at least every two weeks during the spring to fall seasons, excluding high fire conditions, the applicant and/or temporary workers shall cut weeds and/or grass to prevent pest infestations and to maintain a tidy site.
3. Inspections of roads, yards, and the parking area will be conducted on a weekly basis. Repairs will be made immediately if needed. Both the loading area in front of the metal building and the parking area will be kept free of debris and trash.
4. The parking area, loading area at the metal building, and entryway into the cultivation area shall be maintained with gravel to reduce foot-borne filth. These area should drain into the onsite vegetation. Rubber mats shall be placed at the entrances to the metal building to prevent tracking in the elements.
5. All drainage occurring at the site leaves the buildings and other impermeable areas and drains into the surrounding vegetation.

All surrounding adjacent properties are maintained and free of clutter and trash. Currently, pest are not a problem at the project site.

11.0 PEST MANAGEMENT

Intent: To ensure consistency of pest management with the other sections of the Property Management Plan.

MM-10

No food or drinks (with the exception of water) shall be allowed in the cultivation area or metal building. If temporary workers bring bagged lunches to the site, they must eat in their vehicles. Signs will be posted at both the cultivation area and metal building "No Food or Non-Water Drinks Allowed".

The future use of repellants, insecticides, and fungicides will include products that are exempt from tolerance requirements, and either exempt from registration requirements, or have labels broad enough to include use on cannabis per California Food and Agriculture Code, Division 6 Pest Control Operations and Division 7 Agriculture Chemical; Chapter 1 – 3.6 and California Code of Regulations, Division 6 Pest Control Operations (Table 6).

Table 6: Proposed Repellants, Insecticides, and Fungicides

Product Ingredients	Pick-up	Use	Storage
Capsicum Oleoresin, Putrescent Whole Egg Solids, Garlic	as needed throughout the year	rodent repellants	metal building
Neem oil	as needed throughout the year	Insecticides and Miticides	metal building
Bacillus amyloliquefaciens strain D747	as needed throughout the year	Fungicides and Antimicrobials	metal building

All chemicals will be stored in the proposed metal building in the designated fertilizer/amendments storage area (Appendix A). The applicant, his associates, and temporary workers shall comply with the following pesticide application and storage protocols:

MM-11

- Comply with all pesticide label directions;
- Store chemicals in their original containers in a secure building or shed to prevent access by wildlife;
- Chemicals in their original containers shall be placed in secondary containment;
- Chemical containers shall be handled with care to avoid destroying labels;
- Contain any chemical leaks and immediately clean up any spills;
- Preventing offsite drift;
- Do not apply pesticides when pollinators are present;
- Do not allow drift to flowering plants attractive to pollinators;
- Do not spray directly to surface water or allow pesticide product to drift to surface water. Spray only when wind is blowing away from surface water bodies;
- Do not apply pesticides when they may reach surface water or groundwater;
- Use only properly labeled pesticides; and
- Do not use pesticides within 100 feet of any spring, top of bank of any creek or seasonal stream, edge of lake, delineated wetland or vernal pool. For purposes of determining the edge of Clear Lake, the setback shall be measured from the full lake level of 7.79 feet on the Rumsey Gauge.

12.0 SECURITY

Intent: To minimize criminal activity, provide for safe and secure working environments, protect private property, and to prevent damage to the environment. The Applicant shall provide adequate security on the premises, as approved by the Sheriff and pursuant to this section, including lighting and alarms, to ensure the safety of persons and to protect the premises from theft.

Security Surveillance Procedures

MM-12

Locked security gates at the north and southwest ends of the property prevent access to the site. The cultivation area would be enclosed with a 6-foot wooden fence with a locking gate. With exception of the fire department, the applicant and his partners would be the only persons to have access to the properties keys. Doors and gates would be kept locked at all times when not occupied. Access to the proposed metal building and fenced cultivation site would be limited to the applicant and his partners.

Security lights shielded and facing downward would be installed at all entrances. Three security cameras would be mounted on the cultivation area fence. Camera #1 would be mounted above the locked gate on the west side, and Camera #2 would be mounted on the northwest corner of

the fence and aimed at the access driveway. Camera #3 would be mounted on the southeast corner of the fence and aimed toward the back of the property. The proposed metal building would be equipped with 4 outside security cameras #1-#4 which would be mounted on all entrances and exits (Appendix A).

The applicant would contract with Gossett Alarm in Lakeport, CA to install and monitor an alarm system for the business. The company may also be hired to install all the security cameras, and if more cost efficient, monitor the security cameras with their own video system. The second alterative would be the applicant setting up and monitoring his own security system. If this option was chosen, the applicant would use a Lorex by FLIR (Formally Lorex Technology, Inc.) model is NR900 Series NVRs system (Appendix F). Videos would be viewed once a week and archived every 30 days.

Plants, scrubs, and grasss around the property will be properly maintained to provide a clear view of all areas surrounding the parcel. Should any security measures become breached, or trespassers enter the property, 911 will be called immediately.

Unlighted signage would be posted on the side of the proposed metal building with the following language: “THESE PREMISES ARE UNDER CONSTANT VIDEO SURVEILLANCE. NO ONE UNDER THE AGE OF 18 IS PERMITTED TO ENTER”.

Cannabis Good Loss and Theft Procedures

MM-13

Both the applicant and his associates will be working directly with temporary workers, at no time will workers be left alone while in the cultivation area and/or metal building. Temporary workers will only be allowed to carry their keys and water bottles into the cultivation and metal building. All other items should be kept in their vehicles.

Loading and unloading areas will be monitored with security cameras, and the roll-up door shall be kept locked at all times. Only the applicant and his associates will have access to the keys. When setting up an appointment for a distributor to pick up cannabis goods, they will be instructed to call upon arrival, and remain in their vehicles until the applicant or his associates arrive at the loading and unloading area.

Emergency Contacts

MM-14

The applicant shall visibly post and maintain a contact list in the cultivation area and metal building which includes at a minimum:

1. Applicant Contact: Jacob Mason-Davis, Phone: (530) 520-2146, Email: dialedinathletics@gmail.com
2. Owner Contact: Jerry Ray Barnett, Phone: (253) 229-8704, Email:

chopdog54@gmail.com
3. Emergency Responder Contact: Phone: EMERGENCY CALL 911
4. Nonemergency Sheriff Contact: Phone: (707) 262-4200 and/or Fire Department: Lakeport Fire Department: Phone: (707) 263-4396
6. Poison Control Contact(s): EMERGENCY CALL 911 and/or Poison Control Center: Phone: (800) 222-1222

The applicant or person receiving the compliant shall enter the issue into a log book along with the date, the person's name and contact information who is making the complaint, and after investing the issue, the resolution to the complaint. A tally of all complaint and summary of each will be included in the annual Performance Review Report.

13.0 STORM WATER MANAGEMENT

Intent: To protect the water quality of the surface water and the stormwater management systems managed by Lake County and to evaluate the impact on downstream property owners. This section shall include at a minimum:

Drainage from all impermeable services is transported to the immediate surrounding vegetation where it percolates down into the ground (Appendix A). The artesian well is approximately 249 feet from the future cultivation site, and the metal building is further than that.

MM-15

All fertilizer mixing will occur in the cultivation area. Fueling for yard tools would occur on the cement foundation to the far east of the barn, approximately 196 feet from the artesian well. As required in the applicant's Site Management Plan for the State Water Board, a spill kit would be kept at the barn, and in the cultivation area.

MM-16

All fertilizers/amendments will be stored in the metal building. Fuels used for yard tools would be stored in the fueling area in a securely covered structure. Excess soils will be cover cropped, amended with compost tea and reused.

Drip irrigation will be installed in each greenhouse. Daily inspections will be conducted to make sure all equipment is functioning properly. Due to the distance of the cultivation area and slope of the property, it is unlikely storm water would makes its way to the artesian well or neighboring pond. During the applicant's consultant's site visit during the rainy season, water was infiltrating directly into the surrounding vegetation.

There is a county maintained drainage ditch with culverts that fronts each property along this stretch of Scotts Valley. A small amount of stormwater discharge from the property may flow over the bank and into the ditch.

The applicant will have to obtain a permit for the installation of greenhouses, which will comply with all applicable requirements under Chapter 29, Storm Water Management Ordinance of the

Lake County Ordinance Code. During the site preparation of the construction phase, vegetation will be removed for the cultivation area and metal building. Section 5.0 describes both the construction and operation of the proposed project. No grading is currently being proposed. In addition, the applicant will have to comply with the Best Practicable Treatment or Control (BPTC) included in the Site Management Plan that is currently being prepared in compliance with ORDER WQ 2017-0023-DWQ.

14.0 WASTE MANAGEMENT

Intent: To minimize the generation of waste and dispose of such waste properly, to prevent the release of hazardous waste into the environment, minimize the generation of cannabis vegetative waste and dispose of cannabis vegetative waste properly, and manage growing medium and dispose of growing medium properly.

This section shall include the following components:

14.1 Solid Waste Management

Table 7 provides estimations of the amount of solid waste that will be generated on an annual basis and daily during peak operational seasons at the project site.

Table 7: Estimated Annual and Peak Operational Solid Waste Amounts

Type	Annual (lbs)	Peak Operational (lbs)	Type	Recycled (Y/N)
Paper	50-100	75	packaging and cardboard	Y
Glass	40	30	bottles	Y
Metal	-	-	-	-
Electronics	0-5	0-5	cameras	N
Plastic	10	5	small screw top containers, packaging bags, irrigation piping	Y
Organics	TBD	TBD	see Section 14.3 & 14.4	Y
Inerts	TBD	TBD	demoed barn materials (wood)	Y (per Lake County regulations)
Household hazardous waste	10-15	10	gasoline cans, alcohol bottles, high-pressure sodium (HPS) and light-emitting diode (LED)	N
Special waste	-	-	-	-
Mixed residue	-	-	-	-

Note: TBD= To Be Determined.

MM-17

Some solid waste will be minimized by buying items in bulk. This may include hauling soil from a local nursery in the City of Lakeport when soil replenishing is needed. Other reductions would include purchasing biodegradable planting pots in bulk. Temporary workers would be encouraged to eat off site. To prevent pest problems, if not eating offsite, workers would have to eat lunch in their vehicles, and haul the waste offsite at the end of the work day. The applicant will work with vendors to reduce packaging when possible, or to recycle packaging through the manufacture. All earthen materials would likely be recycled and used at the project site with possible exception of the barn which will need to be demoed. Refillable drinking and biodegradable soap containers would be utilized at the site.

Solid waste collection, storage, and compost and recycling will be conducted in compliance with Lake County Code, Chapter 9, Article II, Division 1. There are three disposal companies that serve Lake County. Lakeport Disposal would provide curbside pickup services at the project site. The applicant would pay for one Yard Bin for the cannabis business and one 95 gallon can for domestic solid waste which would be emptied once per week. Both the Yard Bin and can will be kept onsite (Appendix A). Yard waste would be reapplied to the land during mowing, and woody debris would be chipped and used for mulch on domestic plants and garden areas. Domestic recyclables would be stored in the single-family residence, and disposed of at the same site as hazardous waste.

14.2 Hazardous Waste Management

Pursuant to the California Health and Safety Code, the use of hazardous materials shall be prohibited except for limited quantities of hazardous materials that are below State threshold levels of 55 gallons of liquid, 500 pounds of solid, or 200 cubic feet of compressed gas. The production of any Hazardous Waste as part of the cultivation process is prohibited.

MM-18

Hazardous waste would include broken or nonfunctional lighting, alcohol containers used for cleaning trimming tools, and nonfunctioning gasoline containers which are used for domestic yard tools. The applicant would call (707) 234-6400 to make an appointment for dropping off business related hazardous waste at the Lake County Waste Solutions Transfer Station & Recycling Yard which is located at 230 Soda Bay Road in Lakeport. Household hazardous waste would be dropped off once a week on Friday or Saturday at the same facility.

Hazard Analysis and Management Plan

MM-19

The applicant would not be manufacturing cannabis at the site. The only hazardous materials would are those listed in Section 14.2. Fertilizers would be organic, and future use of repellants, insecticides, and fungicides will include products that are exempt from tolerance requirements, and either exempt from registration requirements, or have labels broad enough to include use on cannabis per California Food and Agriculture Code, Division 6 Pest Control Operations and Division 7 Agriculture Chemical; Chapter 1 – 3.6 and California Code of Regulations, Division

6 Pest Control Operations (Table 5). When yard tools are needed for maintenance the property, fueling would occur at the fueling area (Appendix A). There would be two onsite spill kits, one in the fueling area in case of accidental gasoline spills, and one in the cultivation area for other types of spills. Temporary workers would be educated on how, when, and where to use fuels and spill kits. In case of emergencies, signage would be posted in the metal building and cultivation areas with emergency contact numbers. Careful inspection of hazardous containers will be conducted and logged on a regular bases.

In compliance with the Lake County Municipal Code, Chapter 13, Article II yards must be kept clear of rubbish and weeds. Therefore, yard maintenance is required even if cannabis was not grown at the site. However, gasoline would be bought on an as needed bases to avoid storage whenever possible. When purchased, it will be poured into a 5-gallon spill proof container and placed in secondary containment to comply with the State Water Board. If any remaining fuel needs to be stored, it will be placed in the fueling area inside a securely covered enclosed container (Appendix A).

14.3 Cannabis Vegetative Material Waste Management

Cannabis vegetative waste will be composed onsite. In compliance with the California Code of Regulations (CCR), Title 3, Division 8, Chapter 1, Section 8108, the applicant has prepared a Cannabis Waste Management Plan (Appendix G).

14.4 Growing Medium Management

Appendix H includes information on the types of alternative containers which will be used for both immature plants in a 3000 sq. ft. greenhouse, and mature plants in the mixed-light greenhouses. Any non-compostable pots would be recyclable and reused until taken to the Lake County Waste Solutions Transfer Station & Recycling Yard. Currently, there is no records available for the amount of growing medium that would be produced. Therefore, during the first year the applicant will keep a log of all recycled growing medium that needed to be taken to the Lake County Waste Solutions Transfer Station & Recycling Yard.

15.0 WATER RESOURCES

Intent: To minimize adverse impacts on surface and groundwater resources. This section shall include:

A developed artesian well which is used for domestic and cannabis irrigation is located at 39.0841, -122.9485 (Section 17.0). There are no other surface water features on the property. The closest surface water is a pond which is located less than 20 feet of the proposed project site's southwest boundary. The pond is approximately 391 feet from the proposed fenced cultivation area. Other nearby surface areas includes Scotts Creek which is approximately 691 feet from the proposed parcel's east boundary line.

Watershed Description

The following description was taken from the Scotts Creek Watershed Assessment which was

prepared by the County of Lake Department of Public Works Water Resources Division on February, 2010. The Scotts Creek Watershed is located in the Northern California Coast Ranges about 80 miles north of San Francisco (Plate 1). The watershed is almost entirely within the boundaries of Lake County, with only 0.1% located in Mendocino County, and it occupies an area of 105.5 square miles (67,525 acres). Elevations in the watershed range from 1,340 feet at the mouth of Scotts Creek where it enters Middle Creek to 3,924 feet at the top of Cow Mountain. The lowest portion of the watershed is comprised of fairly level valleys, Scotts Valley, Bachelor Valley and Tule Lake (Plate 4). Blue Lakes, two lakes in the northwest portion of the watershed, occupy a narrow canyon at approximately 1,400 feet elevation. The western portion of the Scotts Creek Watershed lies in the Mayacmas Mountain Range, a mountain chain dividing the headwaters of the Russian River from Clear Lake. The majority of the upper watershed is comprised of steep, rugged terrain. In addition there are two small, relatively level valleys, Benmore Valley and Eight Mile Valley. Scotts Creek is the largest tributary to Clear Lake, which is the largest natural freshwater lake located entirely in California.

The Scotts Creek Watershed comprises 23% of the Clear Lake Basin and contributes an estimated 24% of streamflow to Clear Lake. Clear Lake has apparently existed as a shallow lake for at least 480,000 years because the lake basin has shifted downward at approximately the same rate that sediment fills it in (Richerson et al. 1994). Clear Lake is not especially clear as its name implies, but has been a eutrophic, or algae and plant rich lake, throughout its history (Sims et al. 1988). This abundant growth in turn feeds large fish and wildlife populations. Clear Lake drains to the east via Cache Creek into the Sacramento River. California Highway 20 runs east-west across the northern portion of the watershed, and Highway 175 crosses the southern tip of the watershed (Plate 2). There are no towns in the Scotts Creek Watershed, although the City of Lakeport (approximate population 5,200) is located just outside the watershed boundary to the east. The most heavily populated areas of the watershed include Scotts and Bachelor Valleys, and the area along the Blue Lakes/Highway 20 corridor (Plate 3). The broad expanse of Scotts Valley, with elevations ranging from 1,460 feet in the south to 1,400 feet in the north has long been an important agricultural center in Lake County. Bachelor Valley, Tule Lake and Benmore Valley are smaller agricultural areas.

According to California's Groundwater Bulletin 118: The Scotts Valley Basin lies adjacent to the west side of Clear Lake and extends northwesterly along Scotts Creek north to Hidden Lake. The valley is bordered to the east by the shoreline of Clear Lake and bounded on the west and the north by the Jurassic-Cretaceous Franciscan complex of metamorphic and sedimentary rocks which constitute the basement rock in the basin (Jennings 1969). The basin shares a boundary with the Big Valley Basin to the south and may be hydrologically contiguous. Annual precipitation in the basin ranges from 31- to 35-inches, increasing the northwest (State Water Board, 2004).

MM-20

To avoid impacts to the neighboring pond, the access gate from Scotts Valley Road to the property will not be utilized for the cannabis business. The gate is kept locked at all times. The applicant will need to meet with the fire department to see if they will require a copy of the gate key.

Impacts to the artesian well would be reduced by monitoring the water use, as well as checking and maintaining the water infrastructure regularly. As discussed in Section 17.0 of the PMP, a licensed driller will be hired to conduct a full assessment of the well to make sure everything is functioning properly and no repairs are needed. A map of the areas surface and groundwater (artesian well) is provided in Appendix A.

16.0 WATER USE

Intent: To conserve the County's water resources by minimizing the use of water.

Water used for all purposes comes from a developed artesian well located at 39.0841, -122.9485. Historically (2010), water was pumped underground to a 1,500 gallon transfer tank in a pump house, and then through an array of underground piping to the east side of the old barn to water storage tanks (no longer there) used five 100' x 30' greenhouses. This same water infrastructure would be used for the proposed project. A new 2,500 gallon storage tank would be installed inside of the greenhouse area, where water would be fed to the greenhouses. The artesian well is also used for domestic purposes. Future water use for 21,000 sq. ft. of cannabis generating 3 cycles per year, cleaning, and washing hands and tools is estimated to be 3.8 acre-feet (1,231,400 gallons) per year.

During the initial permitting under Article 72, the applicant went to the Environmental Health Department to ask for a copy of the well permit. County staff could not find anything in the property's file, and the applicant was told that the well may have been developed per 1989. Next, an email was sent to Darin Clark at the State Water Board to determine if the well was ever permitted with the state, and there was nothing on record.

MM-21

A water meter shall be installed to measure the amount of water pumped for irrigation that goes to cannabis. Monthly data will be logged. An applicant shall maintain a record of all data collected and shall provide a report of the data collected to the County Planning Department annually. The system is currently fitted with a pressure gage to monitor water levels. The pressure gage shall be checked daily. The entire system will be evaluated by a license water well driller to make sure everything is functioning properly.

State Permitting

A Notification of Lake and Streambed Alteration (LSA) has been submitted to the California Department of Fish and Wildlife (CDFW) in compliance with the Business and Professions Code 26060.1(b)(3), which states that every license for cultivation issued by the CDFA must comply with Section 1602 of the Fish and Game Code or receive written verification from the CDFW that a Lake and Streambed Alteration (LSA) Agreement is not required. As of April 29, 2018, response from the CDFW was not yet received.

In compliance with Business and Professions Code, Section 19332.2 (b)(4) (extended pass its original deadline date of June 30, 2017), a Form B4 was filed March 10, 2018, on the artesian

well. Estimated" flow from the well is unknown at this time, but will be determined as one of the conditions to filing the form.

The applicant applied for coverage under the State Water Resources Control Board Order WQ 2017-0023-DWQ on March 20, 2018.

17.0 REFERENCES

California Energy Commission. 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings. June 2015.

California Department of Food and Agriculture. 2017. CalCannabis Cultivation Licensing Final Program Environmental Impact Report.

County of Lake. 1973. Lake County Code 1973.

County of Lake Department of Public Works Water Resources Division. 2010. Scotts Creek Watershed Assessment. 7 June, 2018, accessed at: <http://www.lakecountyca.gov/Assets/Departments/WaterResources/Scotts+Cr+Watershed+Assessment+Documents/03+Scotts+Creek+Watershed+Assessment.pdf>.

Lakeport Disposal Company. 2015. Homepage. 12 June, 2018, accessed at: <http://www.lakeportdisposal.com/>.

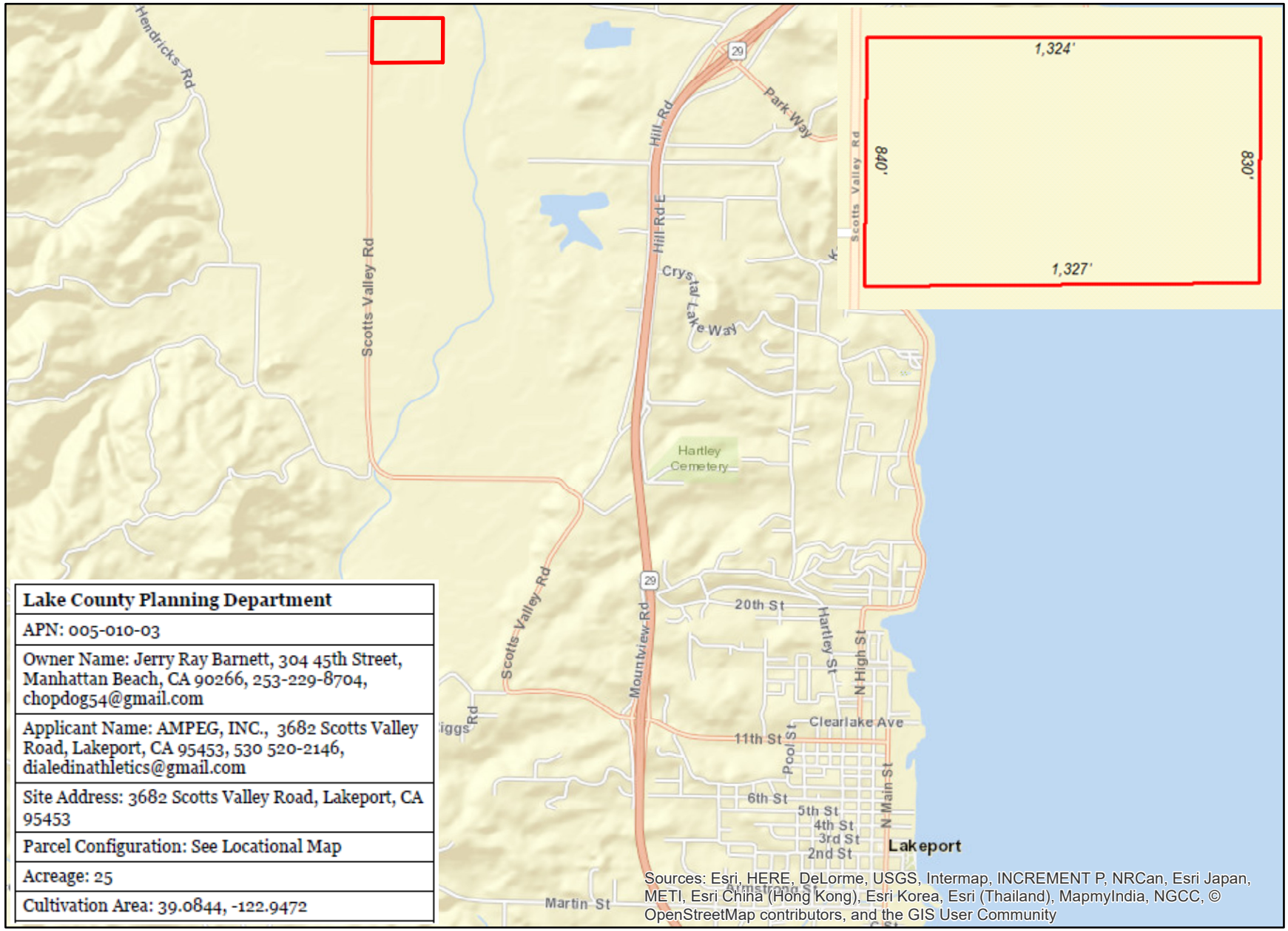
State Water Board. 2004. Scotts Valley Basin (California's Groundwater Bulletin 118). 7 June, 2018, accessed at: <https://www.water.ca.gov/LegacyFiles/groundwater/bulletin118/basindescriptions/5-14.pdf>.

University of Kentucky. 2013. Alternative Containers for a Sustainable Greenhouse and Nursery Crop Production.

Quinn, C. and A. Fulcher. 2015. Beyond Plastic Pots, Part 4: Comparison of Alternative Nursery Containers.

APPENDIX A: Site Plan Map Sheets

Draft Location Map:
AMPEG, INC. (Applicant)



Lake County Planning Department
APN: 005-010-03
Owner Name: Jerry Ray Barnett, 304 45th Street, Manhattan Beach, CA 90266, 253-229-8704, chopdog54@gmail.com
Applicant Name: AMPEG, INC., 3682 Scotts Valley Road, Lakeport, CA 95453, 530 520-2146, dialedinathletics@gmail.com
Site Address: 3682 Scotts Valley Road, Lakeport, CA 95453
Parcel Configuration: See Locational Map
Acreage: 25
Cultivation Area: 39.0844, -122.9472

Source: County of Lake, 2016. Prepared by Laura Hall Consulting on April 22, 2018. Note: Parcel boundary is approximate.

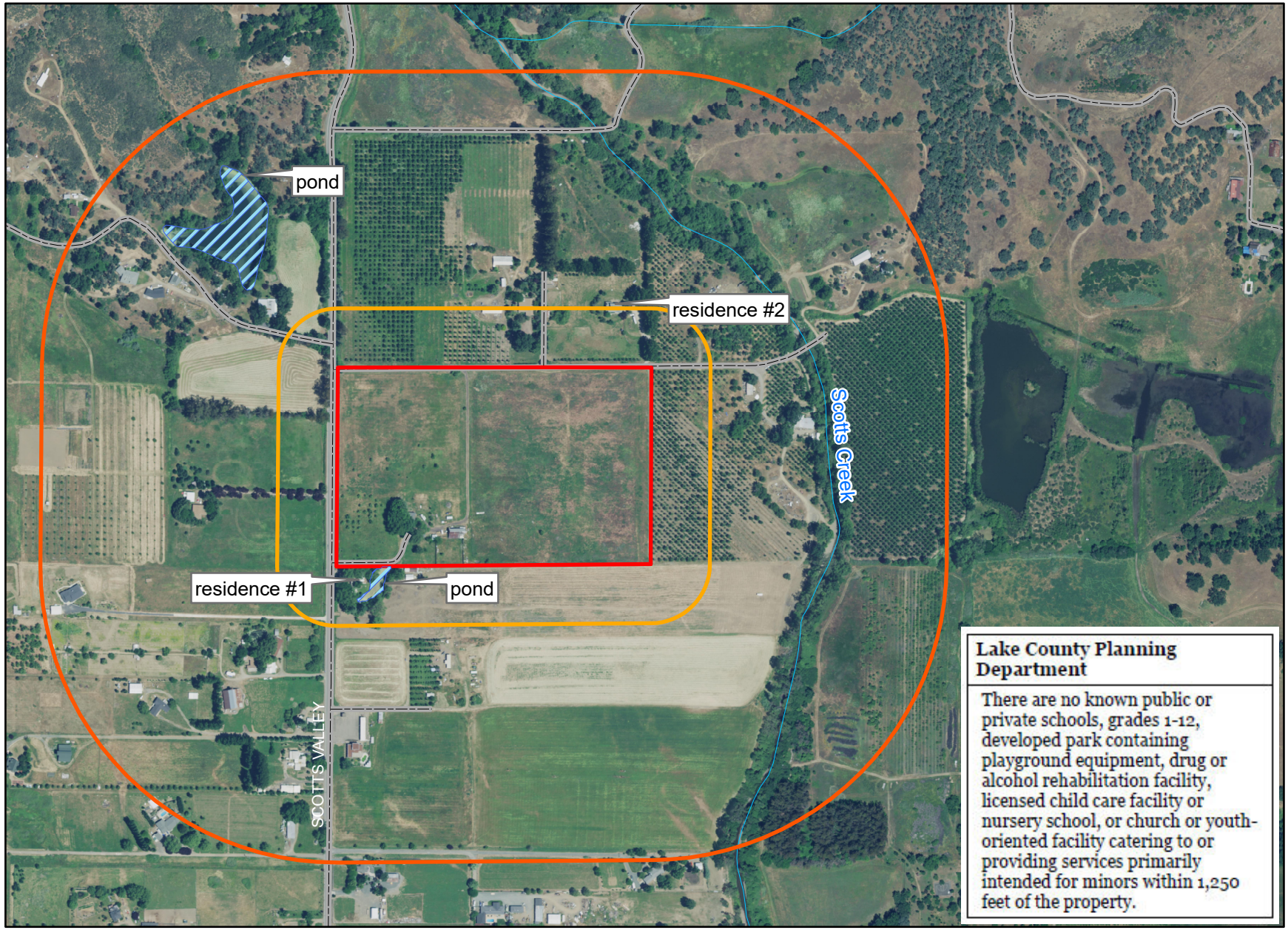
0 0.25 0.5 Miles

1 inch = 1 miles

parcel boundary

N

Draft Surrounding Area Aerial Map:
AMPEG, INC. (Applicant)



Source: California Department of Fish and Wildlife, 2016; County of Lake, 2016. Prepared by Laura Hall Consulting on April 22, 2018. Note: Parcel boundary is approximate.

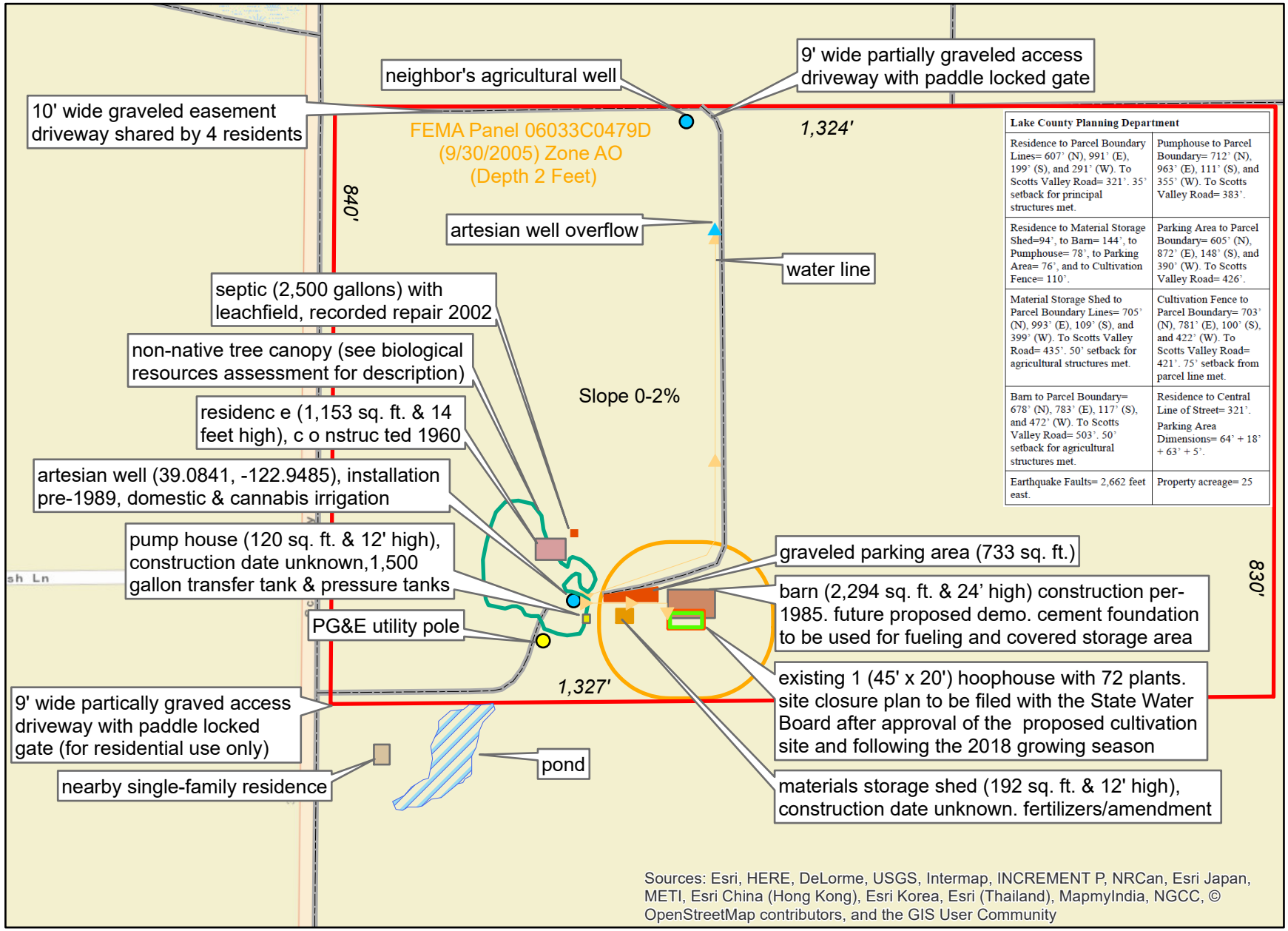
0 250 500 Feet

1 inch = 600 feet

N

parcel boundary 250' buffer 1250' buffer

Draft Site Plan: Existing Conditions
AMPEG, INC. (Applicant)



Source: County of Lake, 2016. Prepared by Laura Hall Consulting on April 22, 2018. Note: Parcel boundary is approximate.

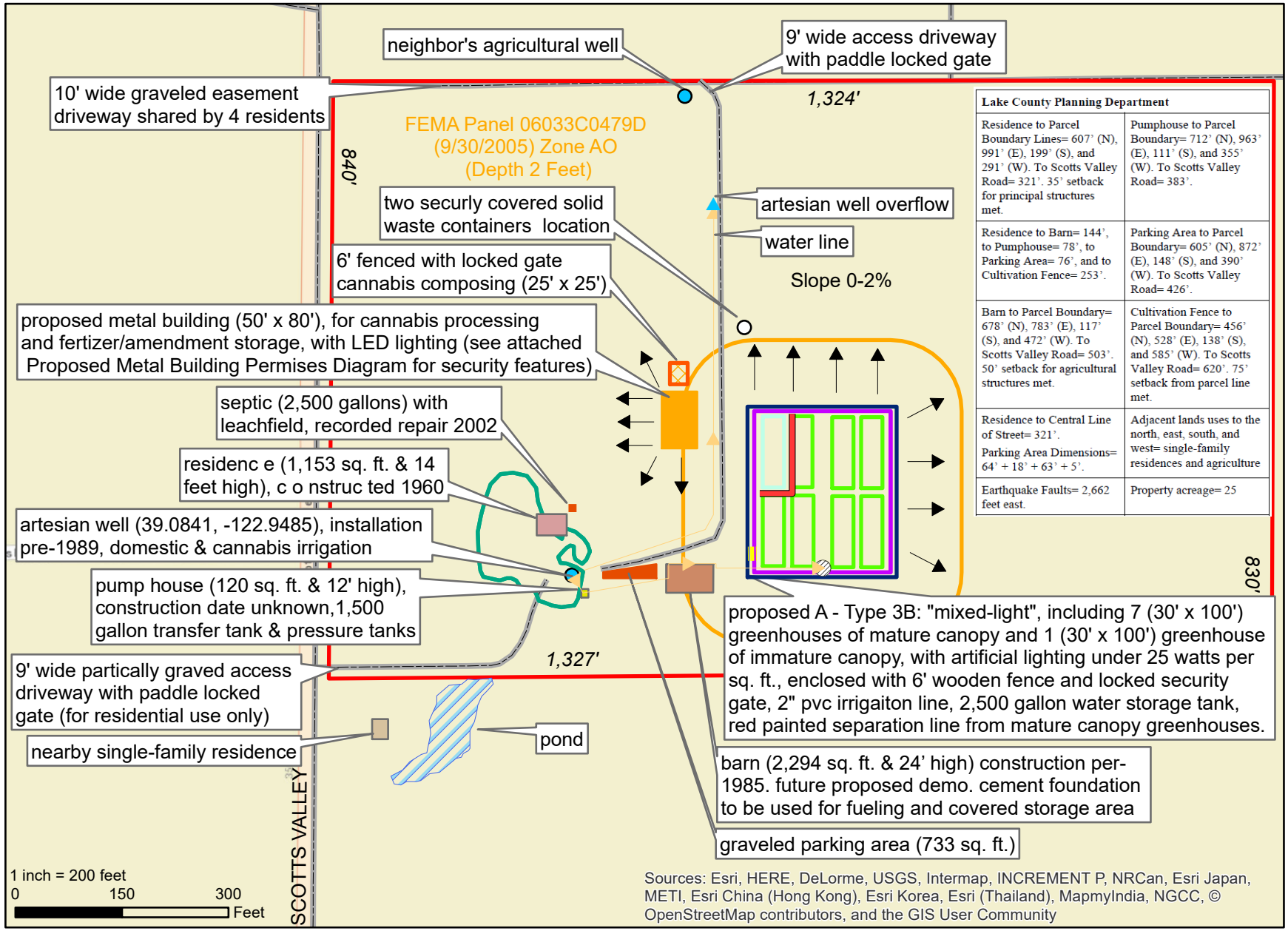
0 150 300 Feet

1 inch = 200 feet

parcel boundary | 100' buffer | mature tree canopy

N

Draft Site Plan: Proposed Conditions
AMPEG, INC. (Applicant)



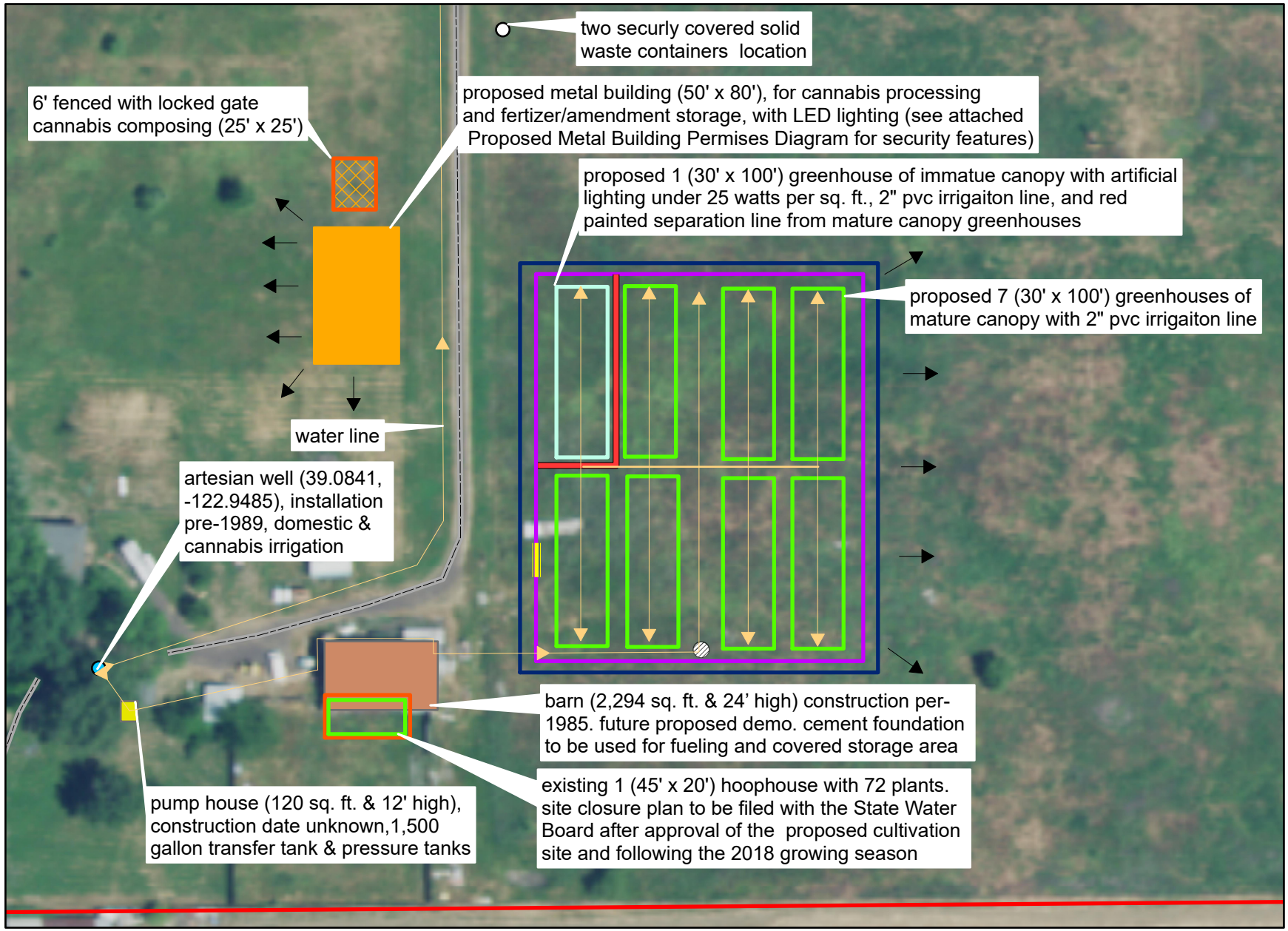
Lake County Planning Department	
Residence to Parcel Boundary Lines= 607' (N), 991' (E), 199' (S), and 291' (W). To Scotts Valley Road= 321'. 35' setback for principal structures met.	Pumphouse to Parcel Boundary= 712' (N), 963' (E), 111' (S), and 355' (W). To Scotts Valley Road= 383'.
Residence to Barn= 144', to Pumphouse= 78', to Parking Area= 76', and to Cultivation Fence= 253'.	Parking Area to Parcel Boundary= 605' (N), 872' (E), 148' (S), and 390' (W). To Scotts Valley Road= 426'.
Barn to Parcel Boundary= 678' (N), 783' (E), 117' (S), and 472' (W). To Scotts Valley Road= 503'. 50' setback for agricultural structures met.	Cultivation Fence to Parcel Boundary= 456' (N), 528' (E), 138' (S), and 585' (W). To Scotts Valley Road= 620'. 75' setback from parcel line met.
Residence to Central Line of Street= 321'. Parking Area Dimensions= 64' + 18' + 63' + 5'.	Adjacent lands uses to the north, east, south, and west= single-family residences and agriculture
Earthquake Faults= 2,662 feet east.	Property acreage= 25

Source: California Department of Fish and Wildlife, 2016; County of Lake, 2016. Prepared by Laura Hall Consulting on April 22, 2018. Note: Parcel boundary is approximate.

parcel boundary
100' buffer
mature tree canopy
stormwater to vegatation
foundation (210' x 240')
fence (193' x 227')

N

Draft Cannabis Cutivation Map
AMPEG, INC. (Applicant)



Source: California Department of Fish and Wildlife, 2016; County of Lake, 2016. Prepared by Laura Hall Consulting on April 22, 2018. Note: Parcel boundary is approximate.

0 50 100 Feet

1 inch = 83 feet

parcel boundary

water storage tank

foundation (210' x 240')

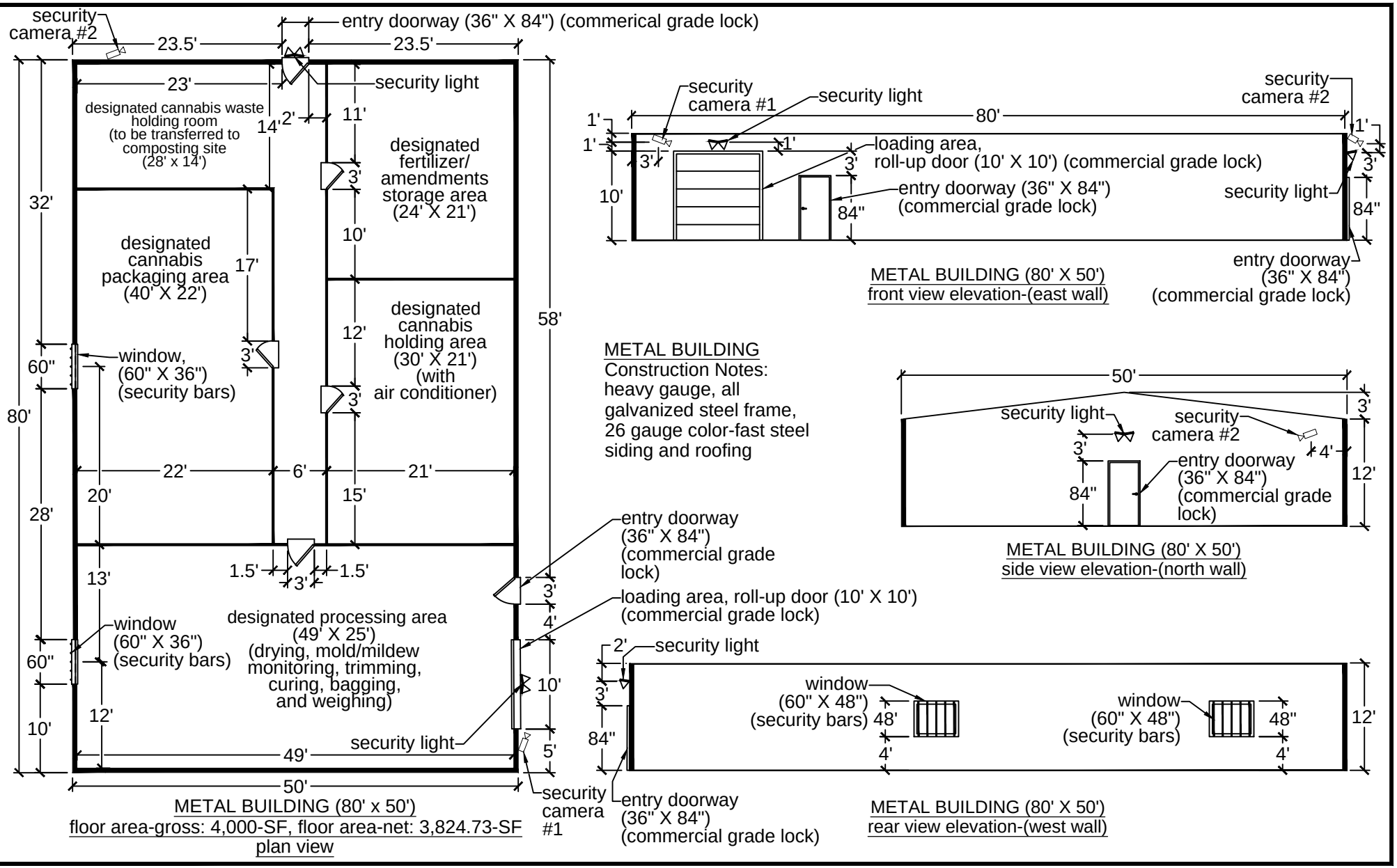
fence (193' x 227')

stormwater to vegatation

locked security gate

N

"Proposed Metal Building Premises Diagram"
Type 3B "Mixed Light" License
Applicant: AMPEG, INC.



Prepared by Mary Beth Harwood, for Laura Hall Consulting on June 04, 2018.

0 7.5 15 Feet

shielded and facing downward

N

APPENDIX B: CalEEMod Results

Lake County CUP for Type 3B "Mixed Light" License (AMP EG, INC.) - Lake County

Lake County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Research & Development	47.56	1000sqft	1.09	47,560.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	67
Climate Zone	1			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Lake County CUP for Type 3B "Mixed Light" License (AMP EG, INC.) - Lake County - Lake County, Annual

Project Characteristics - construction of eight 30' x 100' greenhouses and a 50' x 80' metal building

Land Use -

Construction Phase - construction starts 5 days after site preparation begins

Off-road Equipment -

Off-road Equipment - pre contractor's specifications

Trips and VMT - EMFAC fleet mix
workers come from City of Lakeport

Energy Use -

Water And Wastewater - indoor water includes 3 cycles (4 gallons) and cleaning

Land Use Change -

Sequestration - native only

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Mobile Commute Mitigation -

Area Mitigation - biodegradable products only

Energy Mitigation -

Water Mitigation -

Waste Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	10
tblConstructionPhase	NumDays	200.00	40.00
tblConstructionPhase	NumDays	2.00	30.00
tblConstructionPhase	PhaseEndDate	4/17/2019	9/28/2018
tblConstructionPhase	PhaseEndDate	7/5/2018	9/11/2018
tblConstructionPhase	PhaseStartDate	7/12/2018	8/5/2018
tblConstructionPhase	PhaseStartDate	7/4/2018	8/1/2018

tblOffRoadEquipment	HorsePower	247.00	84.00
tblOffRoadEquipment	HorsePower	8.00	231.00
tblOffRoadEquipment	HorsePower	9.00	89.00
tblOffRoadEquipment	HorsePower	65.00	46.00
tblOffRoadEquipment	LoadFactor	0.40	0.74
tblOffRoadEquipment	LoadFactor	0.43	0.29
tblOffRoadEquipment	LoadFactor	0.56	0.20
tblOffRoadEquipment	LoadFactor	0.37	0.45
tblOffRoadEquipment	OffRoadEquipmentType	Generator Sets	Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType	Cranes	Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType	Forklifts	Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType	Welders	Skid Steer Loaders
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSequestration	CO2perTree	0.04	0.04
tblSequestration	NumberOfNewTrees	0.00	15.00
tblTripsAndVMT	HaulingVehicleClass	HHDT	EMFAC_Mix
tblTripsAndVMT	HaulingVehicleClass	HHDT	EMFAC_Mix
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	EMFAC_Mix
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	EMFAC_Mix
tblTripsAndVMT	WorkerTripNumber	15.00	2.00
tblTripsAndVMT	WorkerTripNumber	8.00	3.00
tblTripsAndVMT	WorkerVehicleClass	LD_Mix	EMFAC_Mix
tblTripsAndVMT	WorkerVehicleClass	LD_Mix	EMFAC_Mix
tblWater	IndoorWaterUseRate	23,384,964.13	1,232,240.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0849	0.6932	0.4428	7.6000e-004	0.0889	0.0368	0.1257	0.0448	0.0348	0.0796	0.0000	66.3558	66.3558	0.0161	0.0000	66.7575
Maximum	**0.0849**	**0.6932**	**0.4428**	**7.6000e-004**	**0.0889**	**0.0368**	**0.1257**	**0.0448**	**0.0348**	**0.0796**	**0.0000**	**66.3558**	**66.3558**	**0.0161**	**0.0000**	**66.7575**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0849	0.6932	0.4428	7.6000e-004	0.0454	0.0368	0.0822	0.0227	0.0348	0.0575	0.0000	66.3557	66.3557	0.0161	0.0000	66.7574
Maximum	**0.0849**	**0.6932**	**0.4428**	**7.6000e-004**	**0.0454**	**0.0368**	**0.0822**	**0.0227**	**0.0348**	**0.0575**	**0.0000**	**66.3557**	**66.3557**	**0.0161**	**0.0000**	**66.7574**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**48.96**	**0.00**	**34.62**	**49.44**	**0.00**	**27.82**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Lake County CUP for Type 3B "Mixed Light" License (AMP EG, INC.) - Lake County - Lake County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-6-2018	9-5-2018	0.5417	0.5417
2	9-6-2018	9-30-2018	0.2283	0.2283
		Highest	0.5417	0.5417

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2409	0.0000	4.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.1000e-004
Energy	9.0000e-004	8.1800e-003	6.8700e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	68.1253	68.1253	2.8500e-003	7.2000e-004	68.4103
Mobile	0.2622	0.8984	2.9689	4.3000e-003	0.3191	9.8200e-003	0.3289	0.0858	9.3000e-003	0.0951	0.0000	389.9699	389.9699	0.0303	0.0000	390.7272
Waste						0.0000	0.0000		0.0000	0.0000	0.7328	0.0000	0.7328	0.0433	0.0000	1.8155
Water						0.0000	0.0000		0.0000	0.0000	0.3909	1.9397	2.3306	0.0402	9.7000e-004	3.6246
Total	**0.5040**	**0.9066**	**2.9762**	**4.3500e-003**	**0.3191**	**0.0104**	**0.3295**	**0.0858**	**9.9200e-003**	**0.0957**	**1.1237**	**460.0358**	**461.1595**	**0.1167**	**1.6900e-003**	**464.5785**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2270	0.0000	4.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.1000e-004
Energy	4.9000e-004	4.4500e-003	3.7400e-003	3.0000e-005		3.4000e-004	3.4000e-004		3.4000e-004	3.4000e-004	0.0000	39.7413	39.7413	1.6700e-003	4.2000e-004	39.9068
Mobile	0.2497	0.8099	2.6981	3.7900e-003	0.2794	8.7000e-003	0.2881	0.0751	8.2400e-003	0.0834	0.0000	343.1567	343.1567	0.0273	0.0000	343.8389
Waste						0.0000	0.0000		0.0000	0.0000	0.3664	0.0000	0.3664	0.0217	0.0000	0.9077
Water						0.0000	0.0000		0.0000	0.0000	0.1955	0.9699	1.1653	0.0201	4.8000e-004	1.8123
Total	**0.4772**	**0.8144**	**2.7023**	**3.8200e-003**	**0.2794**	**9.0400e-003**	**0.2884**	**0.0751**	**8.5800e-003**	**0.0837**	**0.5619**	**383.8687**	**384.4306**	**0.0707**	**9.0000e-004**	**386.4667**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**5.31**	**10.17**	**9.20**	**12.18**	**12.45**	**13.41**	**12.48**	**12.46**	**13.51**	**12.57**	**50.00**	**16.56**	**16.64**	**39.39**	**46.75**	**16.81**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
New Trees	11.0100
Vegetation Land Change	-4.3100
Total	**6.7000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2018	9/11/2018	5	30	
2	Building Construction	Building Construction	8/5/2018	9/28/2018	5	40	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Rubber Tired Dozers	1	8.00	84	0.74
Building Construction	Plate Compactors	1	6.00	231	0.29
Building Construction	Cement and Mortar Mixers	1	6.00	89	0.20
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Building Construction	Welders	3	8.00	46	0.45
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction	Skid Steer Loaders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Building Construction	11	2.00	8.00	0.00	16.80	6.60	20.00	EMFAC_Mix	EMFAC_Mix	EMFAC_Mix
Site Preparation	3	3.00	0.00	0.00	16.80	6.60	20.00	EMFAC_Mix	EMFAC_Mix	EMFAC_Mix

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0870	0.0000	0.0870	0.0443	0.0000	0.0443	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0271	0.3112	0.1212	2.6000e-004		0.0143	0.0143		0.0131	0.0131	0.0000	23.6144	23.6144	7.3500e-003	0.0000	23.7982
Total	**0.0271**	**0.3112**	**0.1212**	**2.6000e-004**	**0.0870**	**0.0143**	**0.1013**	**0.0443**	**0.0131**	**0.0575**	**0.0000**	**23.6144**	**23.6144**	**7.3500e-003**	**0.0000**	**23.7982**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.7000e-004	1.4200e-003	4.5300e-003	1.0000e-005	5.6000e-004	2.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	0.6798	0.6798	5.0000e-005	0.0000	0.6810
Total	**6.7000e-004**	**1.4200e-003**	**4.5300e-003**	**1.0000e-005**	**5.6000e-004**	**2.0000e-005**	**5.8000e-004**	**1.5000e-004**	**2.0000e-005**	**1.7000e-004**	**0.0000**	**0.6798**	**0.6798**	**5.0000e-005**	**0.0000**	**0.6810**

3.2 Site Preparation - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0435	0.0000	0.0435	0.0222	0.0000	0.0222	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0271	0.3112	0.1212	2.6000e-004		0.0143	0.0143		0.0131	0.0131	0.0000	23.6144	23.6144	7.3500e-003	0.0000	23.7982
Total	**0.0271**	**0.3112**	**0.1212**	**2.6000e-004**	**0.0435**	**0.0143**	**0.0578**	**0.0222**	**0.0131**	**0.0353**	**0.0000**	**23.6144**	**23.6144**	**7.3500e-003**	**0.0000**	**23.7982**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.7000e-004	1.4200e-003	4.5300e-003	1.0000e-005	5.6000e-004	2.0000e-005	5.8000e-004	1.5000e-004	2.0000e-005	1.7000e-004	0.0000	0.6798	0.6798	5.0000e-005	0.0000	0.6810
Total	**6.7000e-004**	**1.4200e-003**	**4.5300e-003**	**1.0000e-005**	**5.6000e-004**	**2.0000e-005**	**5.8000e-004**	**1.5000e-004**	**2.0000e-005**	**1.7000e-004**	**0.0000**	**0.6798**	**0.6798**	**5.0000e-005**	**0.0000**	**0.6810**

3.3 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0554	0.3770	0.3052	4.8000e-004		0.0225	0.0225		0.0216	0.0216	0.0000	40.4739	40.4739	8.5500e-003	0.0000	40.6876
Total	**0.0554**	**0.3770**	**0.3052**	**4.8000e-004**		**0.0225**	**0.0225**		**0.0216**	**0.0216**	**0.0000**	**40.4739**	**40.4739**	**8.5500e-003**	**0.0000**	**40.6876**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1900e-003	2.3400e-003	7.8100e-003	1.0000e-005	7.9000e-004	2.0000e-005	8.1000e-004	2.1000e-004	2.0000e-005	2.4000e-004	0.0000	0.9834	0.9834	8.0000e-005	0.0000	0.9854
Worker	5.9000e-004	1.2600e-003	4.0300e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.2000e-004	1.3000e-004	1.0000e-005	1.5000e-004	0.0000	0.6042	0.6042	4.0000e-005	0.0000	0.6053
Total	**1.7800e-003**	**3.6000e-003**	**0.0118**	**2.0000e-005**	**1.2900e-003**	**3.0000e-005**	**1.3300e-003**	**3.4000e-004**	**3.0000e-005**	**3.9000e-004**	**0.0000**	**1.5877**	**1.5877**	**1.2000e-004**	**0.0000**	**1.5907**

3.3 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0554	0.3770	0.3052	4.8000e-004		0.0225	0.0225		0.0216	0.0216	0.0000	40.4739	40.4739	8.5500e-003	0.0000	40.6876
Total	**0.0554**	**0.3770**	**0.3052**	**4.8000e-004**		**0.0225**	**0.0225**		**0.0216**	**0.0216**	**0.0000**	**40.4739**	**40.4739**	**8.5500e-003**	**0.0000**	**40.6876**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1900e-003	2.3400e-003	7.8100e-003	1.0000e-005	7.9000e-004	2.0000e-005	8.1000e-004	2.1000e-004	2.0000e-005	2.4000e-004	0.0000	0.9834	0.9834	8.0000e-005	0.0000	0.9854
Worker	5.9000e-004	1.2600e-003	4.0300e-003	1.0000e-005	5.0000e-004	1.0000e-005	5.2000e-004	1.3000e-004	1.0000e-005	1.5000e-004	0.0000	0.6042	0.6042	4.0000e-005	0.0000	0.6053
Total	**1.7800e-003**	**3.6000e-003**	**0.0118**	**2.0000e-005**	**1.2900e-003**	**3.0000e-005**	**1.3300e-003**	**3.4000e-004**	**3.0000e-005**	**3.9000e-004**	**0.0000**	**1.5877**	**1.5877**	**1.2000e-004**	**0.0000**	**1.5907**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Density

Implement Trip Reduction Program

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2497	0.8099	2.6981	3.7900e-003	0.2794	8.7000e-003	0.2881	0.0751	8.2400e-003	0.0834	0.0000	343.1567	343.1567	0.0273	0.0000	343.8389
Unmitigated	0.2622	0.8984	2.9689	4.3000e-003	0.3191	9.8200e-003	0.3289	0.0858	9.3000e-003	0.0951	0.0000	389.9699	389.9699	0.0303	0.0000	390.7272

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Research & Development	385.71	90.36	52.79	856,942	750,220
Total	385.71	90.36	52.79	856,942	750,220

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Research & Development	14.70	6.60	6.60	33.00	48.00	19.00	82	15	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Research & Development	0.480916	0.057590	0.206316	0.143582	0.053535	0.008702	0.017105	0.019307	0.001395	0.001279	0.006529	0.001261	0.002484

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	34.8938	34.8938	1.5800e-003	3.3000e-004	35.0305
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	59.2170	59.2170	2.6800e-003	5.5000e-004	59.4490
NaturalGas Mitigated	4.9000e-004	4.4500e-003	3.7400e-003	3.0000e-005		3.4000e-004	3.4000e-004		3.4000e-004	3.4000e-004	0.0000	4.8476	4.8476	9.0000e-005	9.0000e-005	4.8764
NaturalGas Unmitigated	9.0000e-004	8.1800e-003	6.8700e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	8.9083	8.9083	1.7000e-004	1.6000e-004	8.9613

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Research & Development	166936	9.0000e-004	8.1800e-003	6.8700e-003	5.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	8.9083	8.9083	1.7000e-004	1.6000e-004	8.9613
Total		**9.0000e-004**	**8.1800e-003**	**6.8700e-003**	**5.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**8.9083**	**8.9083**	**1.7000e-004**	**1.6000e-004**	**8.9613**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Research & Development	90839.6	4.9000e-004	4.4500e-003	3.7400e-003	3.0000e-005		3.4000e-004	3.4000e-004		3.4000e-004	3.4000e-004	0.0000	4.8476	4.8476	9.0000e-005	9.0000e-005	4.8764
Total		**4.9000e-004**	**4.4500e-003**	**3.7400e-003**	**3.0000e-005**		**3.4000e-004**	**3.4000e-004**		**3.4000e-004**	**3.4000e-004**	**0.0000**	**4.8476**	**4.8476**	**9.0000e-005**	**9.0000e-005**	**4.8764**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Research & Development	203557	59.2170	2.6800e-003	5.5000e-004	59.4490
Total		**59.2170**	**2.6800e-003**	**5.5000e-004**	**59.4490**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Research & Development	119946	34.8938	1.5800e-003	3.3000e-004	35.0305
Total		**34.8938**	**1.5800e-003**	**3.3000e-004**	**35.0305**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

No Hearths Installed

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2270	0.0000	4.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.1000e-004
Unmitigated	0.2409	0.0000	4.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.1000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0551					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1858					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	4.0000e-005	0.0000	4.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.1000e-004
Total	**0.2409**	**0.0000**	**4.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**8.5000e-004**	**8.5000e-004**	**0.0000**	**0.0000**	**9.1000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0551					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1719					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	4.0000e-005	0.0000	4.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.1000e-004
Total	**0.2270**	**0.0000**	**4.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**8.5000e-004**	**8.5000e-004**	**0.0000**	**0.0000**	**9.1000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	1.1653	0.0201	4.8000e-004	1.8123
Unmitigated	2.3306	0.0402	9.7000e-004	3.6246

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Research & Development	1.23224 / 0	2.3306	0.0402	9.7000e-004	3.6246
Total		**2.3306**	**0.0402**	**9.7000e-004**	**3.6246**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Research & Development	0.61612 / 0	1.1653	0.0201	4.8000e-004	1.8123
Total		**1.1653**	**0.0201**	**4.8000e-004**	**1.8123**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.3664	0.0217	0.0000	0.9077
Unmitigated	0.7328	0.0433	0.0000	1.8155

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Research & Development	3.61	0.7328	0.0433	0.0000	1.8155
Total		**0.7328**	**0.0433**	**0.0000**	**1.8155**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Research & Development	1.805	0.3664	0.0217	0.0000	0.9077
Total		**0.3664**	**0.0217**	**0.0000**	**0.9077**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	6.7000	0.0000	0.0000	6.7000

11.1 Vegetation Land Change

Vegetation Type

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Grassland	25 / 24	-4.3100	0.0000	0.0000	-4.3100
Total		**-4.3100**	**0.0000**	**0.0000**	**-4.3100**

11.2 Net New Trees

Species Class

	Number of Trees	Total CO2	CH4	N2O	CO2e
		MT			
Miscellaneous	15	11.0100	0.0000	0.0000	11.0100
Total		**11.0100**	**0.0000**	**0.0000**	**11.0100**

Lake County CUP for Type 3B "Mixed Light" License (AMP EG, INC.) - Lake County

Lake County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Research & Development	47.56	1000sqft	1.09	47,560.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	67
Climate Zone	1			**Operational Year**	2005
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - construction starts 5 days after site preparation begins

Off-road Equipment - pre contractor's specifications

Off-road Equipment -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	200.00	40.00
tblConstructionPhase	NumDays	2.00	15.00

tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	8.00	3.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018											0.0000	71.7551	71.7551	0.0163	0.0000	72.1617
Maximum											**0.0000**	**71.7551**	**71.7551**	**0.0163**	**0.0000**	**72.1617**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018											0.0000	71.7551	71.7551	0.0163	0.0000	72.1616
Maximum											**0.0000**	**71.7551**	**71.7551**	**0.0163**	**0.0000**	**72.1616**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.5000e-004
Energy											0.0000	68.1253	68.1253	2.8500e-003	7.2000e-004	68.4103
Mobile											0.0000	431.6310	431.6310	0.0900	0.0000	433.8799
Waste											0.7328	0.0000	0.7328	0.0433	0.0000	1.8155
Water											7.4190	36.8108	44.2298	0.7637	0.0183	68.7857
Total											**8.1518**	**536.5679**	**544.7197**	**0.8998**	**0.0191**	**572.8923**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area											0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.5000e-004

Energy											0.0000	68.1253	68.1253	2.8500e-003	7.2000e-004	68.4103
Mobile											0.0000	431.6310	431.6310	0.0900	0.0000	433.8799
Waste											0.7328	0.0000	0.7328	0.0433	0.0000	1.8155
Water											7.4190	36.8108	44.2298	0.7637	0.0183	68.7857
Total											**8.1518**	**536.5679**	**544.7197**	**0.8998**	**0.0191**	**572.8923**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2018	8/21/2018	5	15	
2	Building Construction	Building Construction	9/5/2018	10/30/2018	5	40	

Acres of Grading (Site Preparation Phase): 7.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction	Cement and Mortar Mixers	1	6.00	9	0.56
Building Construction	Cranes	1	6.00	231	0.29
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction	Forklifts	1	6.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74

Site Preparation	Graders	1	8.00	187	0.41
Building Construction	Plate Compactors	1	6.00	8	0.43
Building Construction	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Skid Steer Loaders	1	6.00	65	0.37
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	3.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	11	15.00	8.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road											0.0000	11.8072	11.8072	3.6800e-003	0.0000	11.8991
Total											**0.0000**	**11.8072**	**11.8072**	**3.6800e-003**	**0.0000**	**11.8991**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker											0.0000	0.2668	0.2668	2.0000e-005	0.0000	0.2674
Total											**0.0000**	**0.2668**	**0.2668**	**2.0000e-005**	**0.0000**	**0.2674**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road											0.0000	11.8072	11.8072	3.6800e-003	0.0000	11.8991
Total											**0.0000**	**11.8072**	**11.8072**	**3.6800e-003**	**0.0000**	**11.8991**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker											0.0000	0.2668	0.2668	2.0000e-005	0.0000	0.2674
Total											**0.0000**	**0.2668**	**0.2668**	**2.0000e-005**	**0.0000**	**0.2674**

3.3 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.0000	52.5374	52.5374	0.0121	0.0000	52.8389
Total											**0.0000**	**52.5374**	**52.5374**	**0.0121**	**0.0000**	**52.8389**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor											0.0000	3.5860	3.5860	2.2000e-004	0.0000	3.5916
Worker											0.0000	3.5577	3.5577	2.8000e-004	0.0000	3.5647

Total											**0.0000**	**7.1437**	**7.1437**	**5.0000e-004**	**0.0000**	**7.1563**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road											0.0000	52.5373	52.5373	0.0121	0.0000	52.8389
Total											**0.0000**	**52.5373**	**52.5373**	**0.0121**	**0.0000**	**52.8389**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor											0.0000	3.5860	3.5860	2.2000e-004	0.0000	3.5916
Worker											0.0000	3.5577	3.5577	2.8000e-004	0.0000	3.5647
Total											**0.0000**	**7.1437**	**7.1437**	**5.0000e-004**	**0.0000**	**7.1563**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											0.0000	431.6310	431.6310	0.0900	0.0000	433.8799
Unmitigated											0.0000	431.6310	431.6310	0.0900	0.0000	433.8799

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Research & Development	385.71	90.36	52.79	856,942	856,942
Total	385.71	90.36	52.79	856,942	856,942

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Research & Development	14.70	6.60	6.60	33.00	48.00	19.00	82	15	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Research & Development	0.415909	0.119360	0.172796	0.153026	0.080153	0.011073	0.015953	0.016403	0.001365	0.001022	0.006400	0.001070	0.005470

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated											0.0000	59.2170	59.2170	2.6800e-003	5.5000e-004	59.4490
Electricity Unmitigated											0.0000	59.2170	59.2170	2.6800e-003	5.5000e-004	59.4490
NaturalGas Mitigated											0.0000	8.9083	8.9083	1.7000e-004	1.6000e-004	8.9613
NaturalGas Unmitigated											0.0000	8.9083	8.9083	1.7000e-004	1.6000e-004	8.9613

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Research & Development	166936											0.0000	8.9083	8.9083	1.7000e-004	1.6000e-004	8.9613
Total												**0.0000**	**8.9083**	**8.9083**	**1.7000e-004**	**1.6000e-004**	**8.9613**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Research & Development	166936											0.0000	8.9083	8.9083	1.7000e-004	1.6000e-004	8.9613
Total												**0.0000**	**8.9083**	**8.9083**	**1.7000e-004**	**1.6000e-004**	**8.9613**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Research & Development	203557	59.2170	2.6800e-003	5.5000e-004	59.4490
Total		**59.2170**	**2.6800e-003**	**5.5000e-004**	**59.4490**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Research & Development	203557	59.2170	2.6800e-003	5.5000e-004	59.4490
Total		**59.2170**	**2.6800e-003**	**5.5000e-004**	**59.4490**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated											0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.5000e-004
Unmitigated											0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.5000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping											0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.5000e-004
Total											**0.0000**	**8.5000e-004**	**8.5000e-004**	**0.0000**	**0.0000**	**9.5000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products											0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping											0.0000	8.5000e-004	8.5000e-004	0.0000	0.0000	9.5000e-004
Total											**0.0000**	**8.5000e-004**	**8.5000e-004**	**0.0000**	**0.0000**	**9.5000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	44.2298	0.7637	0.0183	68.7857
Unmitigated	44.2298	0.7637	0.0183	68.7857

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Research & Development	23.385 / 0	44.2298	0.7637	0.0183	68.7857
Total		**44.2298**	**0.7637**	**0.0183**	**68.7857**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Research & Development	23.385 / 0	44.2298	0.7637	0.0183	68.7857
Total		**44.2298**	**0.7637**	**0.0183**	**68.7857**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.7328	0.0433	0.0000	1.8155
Unmitigated	0.7328	0.0433	0.0000	1.8155

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Research & Development	3.61	0.7328	0.0433	0.0000	1.8155
Total		**0.7328**	**0.0433**	**0.0000**	**1.8155**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Research & Development	3.61	0.7328	0.0433	0.0000	1.8155
Total		**0.7328**	**0.0433**	**0.0000**	**1.8155**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX C: California Air Resources Board (ARB) Ambient Air Quality Standards

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No National Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

APPENDIX D: Sacramento Metropolitan Air Quality Management District Mitigation Measures

GUIDANCE FOR CONSTRUCTION GHG EMISSIONS REDUCTIONS

These measures are considered best management practices providing options for reducing greenhouse gas emissions from construction projects. Emission reductions must be quantified and documented on a case-by-case basis.

- Improve fuel efficiency from construction equipment:
  - Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to no more than 3 minutes (5 minute limit is required by the state airborne toxics control measure [Title 13, sections 2449(d)(3) and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site.
  - Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.
  - Train equipment operators in proper use of equipment.
  - Use the proper size of equipment for the job.
  - Use equipment with new technologies (repowered engines, electric drive trains).
- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Use alternative fuels for generators at construction sites such as propane or solar, or use electrical power.
- Use an ARB approved low carbon fuel for construction equipment. *(NOx emissions from the use of low carbon fuel must be reviewed and increases mitigated.)*
- Encourage and provide carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.
- Reduce electricity use in the construction office by using compact fluorescent bulbs, powering off computers every day, and replacing heating and cooling units with more efficient ones.
- Recycle or salvage non-hazardous construction and demolition debris (goal of at least 75% by weight).

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

- Use locally sourced or recycled materials for construction materials (goal of at least 20% based on costs for building materials, and based on volume for roadway, parking lot, sidewalk and curb materials). Wood products utilized should be certified through a sustainable forestry program.

- Minimize the amount of concrete for paved surfaces or utilize a low carbon concrete option.

- Produce concrete on-site if determined to be less emissive than transporting ready mix.

- Use SmartWay certified trucks for deliveries and equipment transport.

- Develop a plan to efficiently use water for adequate dust control.

References:

1. California Green Building Standards Code. http://www.bsc.ca.gov
2. US EPA. *Potential for Reducing Greenhouse Gas Emissions in the Construction Sector,* February 2009. https://archive.epa.gov/sectors/web/pdf/construction-sector-report.pdf
3. US EPA SmartWay Program. http://www.epa.gov/smartway/index.htm
4. US Green Building Council. LEED Green Building Rating System. http://www.usgbc.org/

APPENDIX E: Biological Resource Assessment

BIOLOGICAL RESOURCES ASSESSMENT

Prepared For:
3682 Scotts Valley Road
Lakeport, CA 95453
Lake County, CA
APN #005-010-03

May 16, 2018

Completed by:
Klamath Wildlife Resources
Biologist: Brian Shaw
1760 Kenyon Drive
Redding, CA 96001
Brian Shaw

TABLE OF CONTENTS

1. INTRODUCTION

The purpose of this biological resources assessment is to provide technical information and to review the proposed project in sufficient detail to determine to what extent the proposed project may affect federally listed, proposed, or candidate species as well as designated critical habitats for listed species and essential fish habitat (EFH) for appropriate fish species. The biological resources assessment is prepared in accordance with legal requirements in accordance with California Environmental Quality Act (CEQA) statutes, as well as the newest "Appendix D" for Regional Water Quality Control and California Department of Fish and Wildlife 2018 statutes for proposed new cannibas cultivation sites, as per *Section 722, Title 14 of the California Code of Regulations to read:* ***§ 722. General Lake or Streambed Alteration Agreement for Activities Related to Cannabis Cultivation.*** . The document presents technical information upon which later decisions regarding project impacts are developed. This document also covers the requirements of the California State Water Resources Control Board's 2011 requirements for a Biological Resources Assessment.

PROJECT LOCATION

The project site consists of a 25 acre parcel located at 3682 Scotts Valley Road, Lakeport, California, in Lake County. Cultivation occurs on APN 005-010-03, and irrigation comes from an artesian well located at 39.0841, -122.9485, which is southeast of the single-family residence (Figure 1: Site Map). According to California USGS 7.5-Minute Quadrangles-North Index map, the project site is within the Lakeport Quadrant.

Figure 1: Vicinity Map

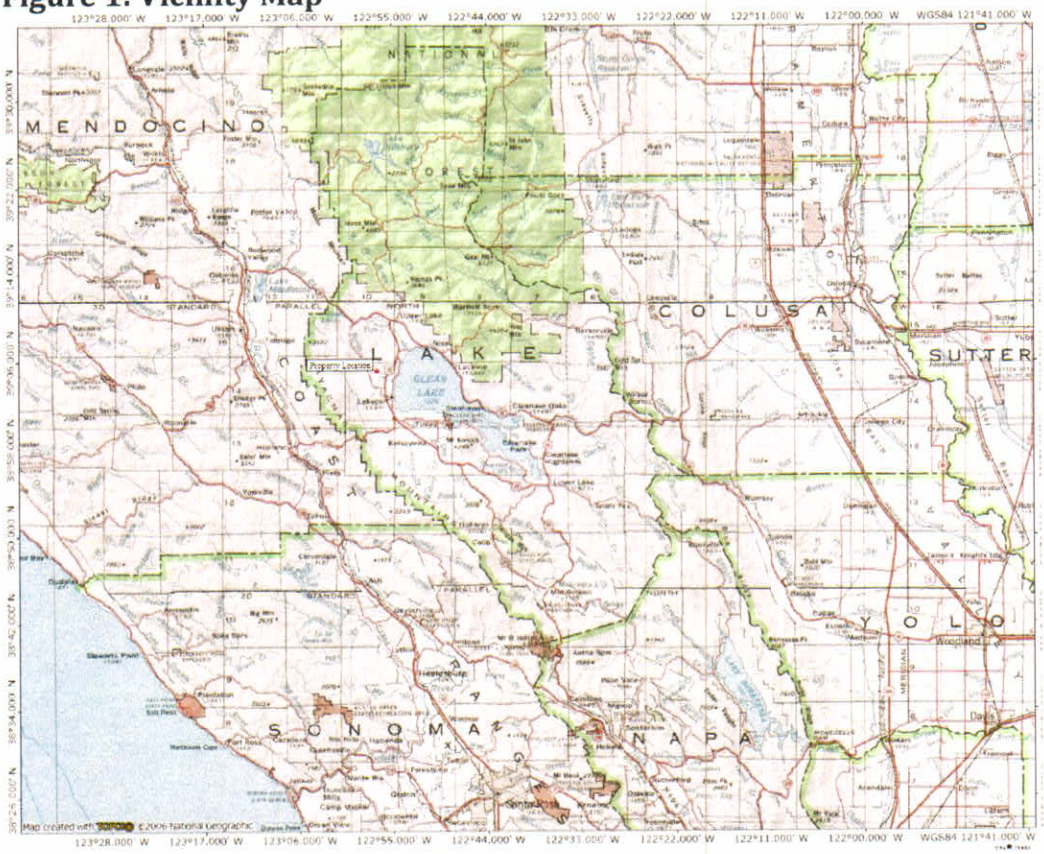


Figure 2: Project Site Location Map

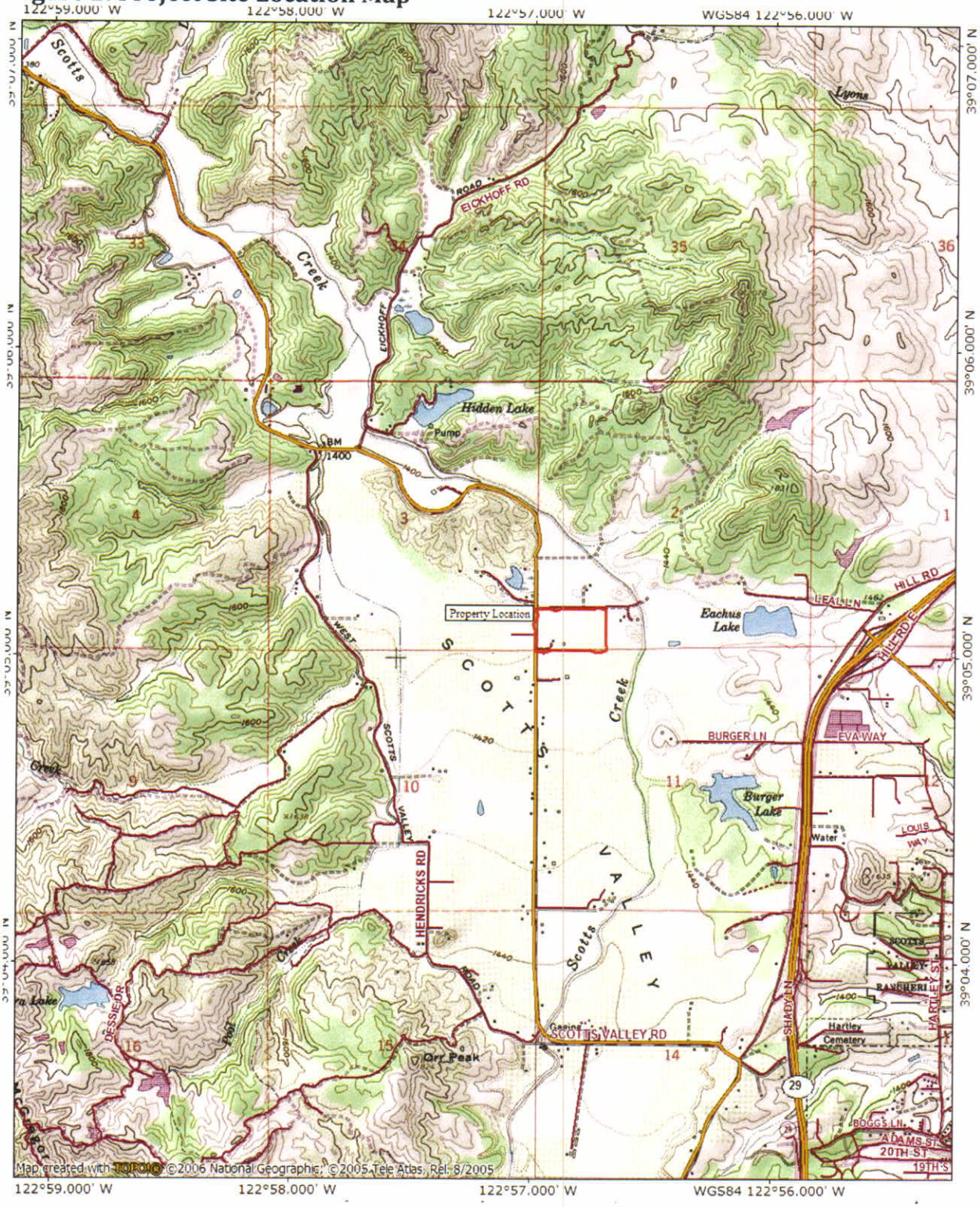


Figure 3: Project Site Map Air Photo (Red Line Square)

EXISTING SITE and HABITAT CONDITIONS

The property is located on a completely flat piece of land that has historically and extensively been used for agriculture for fruit (pear) and nut (walnut) trees for over ¾ of the acreage, and occurs on the north and east side of the property. The remainder of the lot consists of mostly non-native grasses, with a few non-native trees surrounding the home that occurs on the western edge of the property. Manmade site features include this single-family residence, a dilapidated barn which will likely be taken down, and a materials storage building which will need to be restored and enclosed on one side.

The overall condition of the land is in an agricultural state, rather than a natural state. Thus, natural conditions are not the case here, as there has been tens of years of agriculture, which involves planting non-native trees, harvesting them and tilling them under and starting again cyclically. Very little natural habitat exists on the 25 acre subject parcel.

PROJECT DESCRIPTION

Under Lake County's Article 72, the applicant is applying for the medical collective cannabis cultivation of 48 plants, as a precursor to applying for an A - Type 3B: "mixed-light" license under the County's newly adopted Article 27. Under Article 27, the applicant will apply for A - Type 3B: "mixed-light" license from Lake County through a conditional use permit (CUP) to allow for construction of a 210' x 240' building pad, with an inset 192' x 227' fence, that will enclose 30,000 sq. ft. of greenhouses (ten 30 'x 100') with 22,000 sq.

ft. of canopy and walkways, plus an additional 21,560 sq. ft. of walkways, paths, and other areas. In addition, a 50' x 80' sq. ft. metal building will be constructed for the processing of cannabis onsite (including seed production, cloning, drying, trimming, curing, packaging, and storage of cannabis goods). Cannabis waste will be composed onsite in compliance with state and local regulations, as well as follow recommendations in the State Water Board, Division of Water Quality's required Site Management Plan. In compliance with the California Department of Pesticide Regulation, future use of fertilizers, repellants, insecticides, and fungicides will include products that are exempt from tolerance requirements and either exempt from registration requirements or have labels broad enough to include use on cannabis (Table 1).

QUALIFICATIONS

Klamath Wildlife Resources Senior Biologist, Brian Shaw has been approved by CDFW and CWQCB biologists as "qualified" to compete biological studies and reports for projects such as this, where there is ground manipulating activities on natural or non-natural lands. Brian Shaw has a Bachelor's of Science in Biological Science and a Bachelors of Arts in Geography. His understanding of northern California ecosystems is well understood and on par with any biologist in the field in California. He has owned and operated Klamath Wildlife Resources since the year 2000 and has been completing all types of biological surveys and reports and many other types of environmental surveys and reports since that time. His resume is attached as Appendix E for further reference.

2. METHODS

LISTED, PROPOSED, AND CANDIDATE SPECIES POTENTIALLY PRESENT

A list of threatened, endangered and sensitive species list for the surrounding area including Lakeport and adjacent quadrangles; which were reviewed to evaluate the potential was created using the California Natural Diversity Database (CNDDB) out to1, 5, and 10 miles from the property center. The following list was created as a result, showing the species' state and federal listings:

Table 1 – CNDDB and USFWS TES Species List

Species	CDFW	State Listing	Federal	CNPS Plant Ranking
1-mile buffer				
Tricolored blackbird (*Agelaius tricolor*)	SSC	SSC		
5-mile buffer				
Clear Lake hitch (*Lavinia exilicauda chi*)		Threatened		
Sacramento perch (*Archoplites interruptus*)	SSC	-	-	
Townsend's big-eared bat (*Corynorhinus townsendii*)	SSC	-	-	
Pacific Fisher - West Coast DPS (*Pekania pennanti*)	SSC	Candidate Threatened	-	

American badger (*Taxidea taxus*)	SSC	-	-	
Red-bellied newt (*Taricha rivularis*)	SSC	-	-	
Osprey (*Pandion haliaetus*)	WL	-	-	
Double-crested cormorant (*Phalacrocorax auritus*)	WL	-	-	
Western pond turtle (*Emys marmorata)*	SSC	-	-	
10-mile buffer				
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	-	Endangered	-	
Foothill yellow-legged frog (*Rana boylii)*	SSC	Candidate Threatened	-	
Few-flowered navarretia (*Navarretia leucocephala ssp. Pauciflora*)	-	Threatened	Endangered	
Pallid bat (*Antrozous pallidus*)	SSC	-	-	
Humboldt marten (*Martes caurina humboldtensis*)	SSC	Candidate Endangered	-	
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	-	Endangered	Threatened	
Double-crested cormorant (*Phalacrocorax auritus*)	WL	-	-	
Grasshopper sparrow (*Ammodramus savannarum*)	SSC	-	-	
Burke's goldfields (*Lasthenia burkei*)	-	Endangered	Endangered	
Lake County stonecrop (*Sedella leiocarpa*)	-	Endangered	Endangered	
Northern Spotted Owl (*Strix occidentalis caurina*)	SSC	Threatened	Threatened	

The USFWS list of federally listed plants, animals and habitats is listed in the Appendices.

STUDIES REQUIRED

Studies required include a general wildlife and aquatic survey and botanical survey. Descriptions of the methodologies used to conduct the wildlife and botanical evaluations are provided below. These surveys were completed on May 8, 2018.

WILDLIFE and BIOLOGICAL EVALUATION

A wildlife evaluation was conducted to determine if habitat potentially capable of supporting endangered, threatened, proposed, or candidate species is present, or may be

present, in the study area. The wildlife evaluation was conducted in two stages. First, historical occurrence databases were queried to identify federally listed, proposed, and candidate animal species previously reported in the vicinity of the study area, and/or potentially affected by construction within this project. These records include CNDDB records (CDFW, 2018), and critical habitat GIS data maintained by the National Marine Fisheries Service (NMFS, 2018) and US Fish and Wildlife (USFWS, 2018), all listed above. The second stage of the project consisted of a habitat and species study within and just beyond the bounds of the imprint of the study area. Based on the results of the records review and this field evaluation, the potential for federally listed, proposed, and candidate animal species to utilize habitats in the study area was determined to be minimal. A field study was completed by Brian Shaw on May 8, 2018. The results of the survey are discussed below.

BOTANICAL EVALUATION

A botanical evaluation was conducted to determine if habitat potentially capable of supporting federally listed, proposed, or candidate plant species exists in the study areas. The botanical evaluation was completed in two stages. First, historical occurrence databases were queried to identify federally listed, proposed, and candidate species previously reported in the vicinity of the study area, and/or species that could potentially be affected by the construction within this project. These records included the USFWS species list for the Fort Bidwell quadrangle and adjacent quadrangles, California Natural Diversity Data Base (CNDDB) records (CDFW, 2018), and critical habitat geographic information system (GIS) data maintained by the USFWS (USFWS, 2018). The second stage of the study consisted of a field visit and project walkthrough and survey of the natural environment in and near the project footprint. The survey generally followed the CDFW *Protocol for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities, 2009*. A survey was completed on May 8, 2018 during peak flowing period for all plants in the area. The results of the study are below.

Time Spent At Site: A full eight hours was spent evaluating the 25 acre parcel, with focus on areas where buildings will be built. This was plenty of time to evaluate the non-native fallow cropfield that currently exists at the property for botanicals, birds, mammals, habitats and make in depth biological evaluations for the site.

AGENCY COORDINATION

There are no consultations necessary with regulatory agencies for fish, wildlife or botanical species are a result of the proposed project, or as a result of the biological and botanical survey.

3. RESULTS: ENVIRONMENTAL SETTING

DESCRIPTION OF EXISTING BIOLOGICAL AND PHYSICAL CONDITIONS

The study area is located at 1390 feet above sea level, on area that originally was flat oak woodlands foothill pine/chapparal habitat types. However, for tens of years the land was converted to agricultural lands due to the deep, healthy soils and used as such for over fifty

years. Thus, nearly no natural habitat remains on any of the 25 acre parcel. The area is now defined by the California Habitat Wildlife Relationship (CWHR) system (*Laudenslayer et al 1988)* as "Cropland" in the "Deciduous Orchard" category. The so called "habitat" if DOR is in its "fallow" stage, as it has not been used for at least 3 years for cropland orchard nut and fruit production. Thus, no remnants of the natural communities found on the natural lands around Clearlake and Lakeport are found on this property.

The climate of the western portion of Lake County is Mediterranean in nature and is found in the southern portion of the northern coast range mountains that separate the coast from the interior central valley of California. Thus, dry summers are the case here with mild, temperate winters. Annual precipitation in Lakeport the town, which is only 2 miles from the subject property is: 28.64" per year (WRCC, 2017).

A soils search was completed for the property, using the NRCS Soils Search online query; with two soils units found to be present in the study area, which are the Lupoyoma Silt Loam and Maywood Variant Sandy Loam Soils associations (**Table 2**). These are alluvial soils created by older areas of sediment runoff and fanning out as they get to open areas. Both soils are excellent for cropland, which is why much of the Scotts Valley area is used for agricultural purposes. Thus, the soils are alluvial soils, thus were derived from "hydric" environments. However, the soil type post deposition, is not listed as a hydric soil.

Table 2 – NRCS Soils Survey Query

Lake County, California (CA033)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
158	Lupoyoma silt loam, protected	25.0	99.8%
176	Maywood variant sandy loam	0.1	0.2%
Totals for Area of Interest		**25.0**	**100.0%**

4. RESULTS: BIOLOGICAL RESOURCES, IMPACTS, AND MITIGATION

OCCURRENCES OF FEDERALLY LISTED, PROPOSED AND CANDIDATE WILDLIFE SPECIES

The USFWS species list for the Lakeport and adjacent quadrangles list the following federally listed, proposed, or candidate animal species as potentially being affected by work proposed in the quadrangle.

Animals

- **Northern Spotted Owl** *(Strix occidentalis)*
- **California Red-Legged Frog** *(Rana draytonii)*
- **Delta Smelt** *(Hypomesus transpacificus)*

Discussion

For all of the above species, the US Fish and Wildlife service has nearby "critical habitat" and occurrences for these species. However, as Appendix B shows, it further states that "there is no critical habitat for these species" on the property. As again, the property long ago was converted to cropland, and remains as such today.

Wildlife/Avian Survey and Results

KWR biologist Brian Shaw completed a wildlife and avian survey on May 8, 2018. The large elm and ash trees were searched for raptor and other bird nests, with none discovered. A point count bird survey was conducted on this day, as per protocol. Mammals, frogs, reptiles, insects (butterflies, and others) were also searched for. No other protocol surveys for TES species were required due to lack of their specific habitat(s). Thus a generalized observation survey was completed. There were no Endangered, Threatened, Candidate or Sensitive species found, nor were there any nests found that would be protected by the Migratory Bird Treaty Act during the May 2018 field survey. All avian and wildlife species that were detected are listed below:

Reptiles

- Western Fence Lizard: *Sceloporus occidentalis*

Birds

- Lesser Goldfinch
- Red-Tailed Hawk
- Bald Eagle
- Turkey Vulture
- Mallard
- Brown Towhee
- Spotted Towhee
- European Starling
- Red-Winged Blackbird
- Pacific Slope Flycatcher
- Ash-Throated Flycatcher
- California Quail
- Mourning Dove
- Common Raven
- Acorn Woodpecker
- Lesser Goldfinch
- Northern Flicker
- Western Kingbird

USFWS Listed Plants – Lakeport and adjacent quadrangle query out to 10 miles from project site:

- Burke's Goldfield *(Lasthenia burkei)*

Further Review of CNDDB/CDFW records found the following additional California Native Plant Society (CNPS) plant species and information: California Department of Fish and Wildlife considers rare plant species as defined by CNPS to be special status species." List 2 species are considered special status, as are List 3 and 4 species if they can be shown to meet the definition of Rare or Endangered under CEQA Guidelines sections 15125 (c) and/or section 15380. Impacts to these species must be analyzed during the CEQA process. These species thus, are as follows:

Amsinckia lunaris – Bent-flowered fiddleneck: CNPS 1B
Coast and Valley Freshwater Marsh: Wetland habitat type found along shore of Clear Lake
Cryptantha clevelandii var. dissita – Serpentine cryptantha: CNPS 1B
Didymodon norrisii – Norris' beard-moss: CNPS 2
Hesperolinon adenophyllum – Glandular western flax: CNPS 1B
Layia septentrionalis – Colusa layia: CNPS 1B
Plagiobothrys lithocaryus – Mayacamas popcorn flower: CNPS 1A
Strepthansus breweri var. hespiridis – Green jewel flower: CNPS 1B
Tracyina rostrate – Beaked tracyina: CNPS 1B

The CNPS listed species shown above are the California protected species when considering a new project in an area. All of the species listed above do not have habitat that occurs at or near the subject property, as the property is not considered any type of naturally occurring plant community (cismontane woodland, chapparal, etc), and has long been converted to monotypic cropland use. Most of the above species are found in cismontane woodlands, chapparal and foothill grasslands, and several of them are found only in serpentine specific rock outcrops and soil derivations. Thus, there is very little likelihood of these plant species being found in the cropland vegetation present on the subject property. To be certain however, a plant survey was conducted using CDFW *Protocol for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities, 2009*. The resultant plant species discovered during the survey are listed below.

Botanical Survey and Results
Botanical Species Found during the May 2018 field survey are listed below:

Ulmus Americana (elm)
Fraxinus Americana (ash)
Juglans nigra (Black walnut)
Baccharis pilularis (Coyote Brush)
Pyrus spp (Pear)
Cortaderia selloana (pampas grass)
Rumex occidentalis (Dock)

Cirsium vulgare (Spear thistle)
Lupinus onustus(lupine)
Ranunculus spp (Buttercup)
Verbascum sp. (Mullein)
Taraxacum spp (Dandelion)
Eschscholzia californica (California poppy)
Bromus spp (Grasses)
Rubus ursinus (Blackberry)

There were no threatened, endangered, or sensitive plant species found during the botanical survey.

WATERS OF THE UNITED STATES:

A "Surface Waters" assessment study and evaluation was completed on May 8, 2018. This includes a study and full walk through of the property to evaluate if Class I-IV watercourses, lakes, ponds, artesian wells, springs, seeps and man-made canals are present or not. The findings are below.

40 CFR 230.3(s) of the Federal Registry states this to be: The term waters of the United States means: 1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; 2. All interstate waters including interstate wetlands; 3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters.

The Army Corps of Engineers (ACOE) is the lead agency and oversees all matters in this latter category (Category 3). A reconnaissance query of the National Wetlands Inventory (NWI) through USFWS wetland mapping database was completed. There are no wetlands or streams or other bodies of water on or near to the subject property See Appendix B at the back of the document for this query map. Further, a field review was completed on May 8, 2018. This confirmed the USFWS NWI map assessment as that there are no wetlands or waters found on or near the subject property. The property is now a fallow cropfield, and is on a slight flat upland from the nearest water body, which is Scotts Creek and is over .13 miles from the eastern edge of the property. There is one drainage ditch between Scotts Valley Road and the subject property, however this is within the maintenance right of way of the road, and is not subject to even possibly being modified or built upon in any way, and will remain as is post-project completion.

Artesian Well: As the map in Appendix A shows, there is one artesian well found on the property, near to where the shop will be built. This artesian well has its overflow location (controlled by an on-off valve) just north of its location along the north access road to the property. There is also another well on the far northern edge of the property. However this well is not used by the land owner. The well, as shown on the map, is the well for the northern-adjacent property owners use. This is a free flowing well and is fully for use by

the landowner as per any water rights laws. Water use has already been tested strongly on this property with the previous hundreds of orchard trees being brought to full fruit for many years using this well. Water us will remain the same or will be even less when this new land use is in operation.

CRITICAL HABITAT

Critical habitat is a specific geographic area that is essential for the conservation of a threatened or endangered species, and may require special management or protection (USFWS, July 15, 2013). Critical habitat can be designated by the USFWS or the National Marine Fisheries Service (NMFS). No critical habitat for fish is designated in the study area (or project watershed). The USFWS species lists for the Lakeport quadrangle out to ten miles do not identify designated critical habitat for any federally listed animal or plant species as per **Appendix B**, USFWS TES Query at the back of the document.

ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, established the EFH mandate, that only applies to fish species managed under a federal Fishery Management Plan. As such, EFH analysis is required for the Pacific salmon. Essential fish habitat for the Pacific salmon fishery consists of "those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem" (NMFS, 2001). There are no creeks or tributary creeks that flow into any critical habitat streams or rivers for anadramous ocean dwelling fish, as the closest creek - Scotts Creek flows into Clear Lake which does not allow anadramous fish into its waters. This finding was confirmed through review of Figure A-1 in the Pacific Fisheries Management Council's *Appendix A: Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon* (August 1999).

DISCUSSION OF SPECIES POTENTIALLY AFFECTED

As determined through the records search and field evaluation, no currently known locations of federally listed, proposed, or candidate wildlife or plant species would be affected by project implementation. No habitat exists for the species on the property, as the property is now considered cropland and is no longer a native habitat type. Further, a wildlife and botanical survey was completed, with no listed, proposed or candidate species or Migratory Bird Treaty Act nests found on the subject property.

PROJECT EFFECTS

See Appendix A for the map of the proposed buildings that are to be placed on the subject property. They are as follows:

The construction of a 210' x 240' building pad, with an inset 192' x 227' fence, that will enclose 30,000 sq. ft. of greenhouses (ten 30 'x 100') with 22,000 sq. ft. of canopy and walkways, plus an additional 21,560 sq. ft. of walkways, paths, and other areas. In addition, a 50' x 80' sq. ft. metal building will be constructed for the processing of cannabis onsite

AVOIDANCE/MINIMIZATION MEASURES
There are no avoidance/minimization required for the project.

ESTIMATE OF TAKE ON TES SPECIES OR HABITATS
There are no TES species or their habitats found on or near the subject property. Thus, there will be no "harm or harassment" or "take" of any TES or candidate species.

CUMULATIVE EFFECTS
Cumulative effects are effects that when treated separately do not create an adverse effect for a habitat or TES species singularly, but when combined, would create a negative affect for that species or its habitat.

There are no known current projects that are ongoing or are planned to occur adjacent or near to this property. Thus, there are no known cumulative effects that would or could affect add to the effects (none) of this subject properties' effects.

The cumulative habitat types are also that of "cropfields", as nearly all of the properties in the Scotts Valley are agricultural in nature, and mostly lack original pre-settlement native and natural community characteristics. Thus, adjacent properties also do not have appropriate habitat types to support the species listed in the queried CNDDB and USFWS TES tables listed herein.

5. CONCLUSIONS
No federally listed, proposed, or candidate plant or animal species were observed during the field inspections and are not listed to be near or on the subject property. No other habitat or designated critical habitat for federally listed species or EFH for Pacific salmon are present in the study area. This is mostly due to the lack of natural habitats in the area, as the area has been long ago converted completely to croplands.

6. REFERENCES

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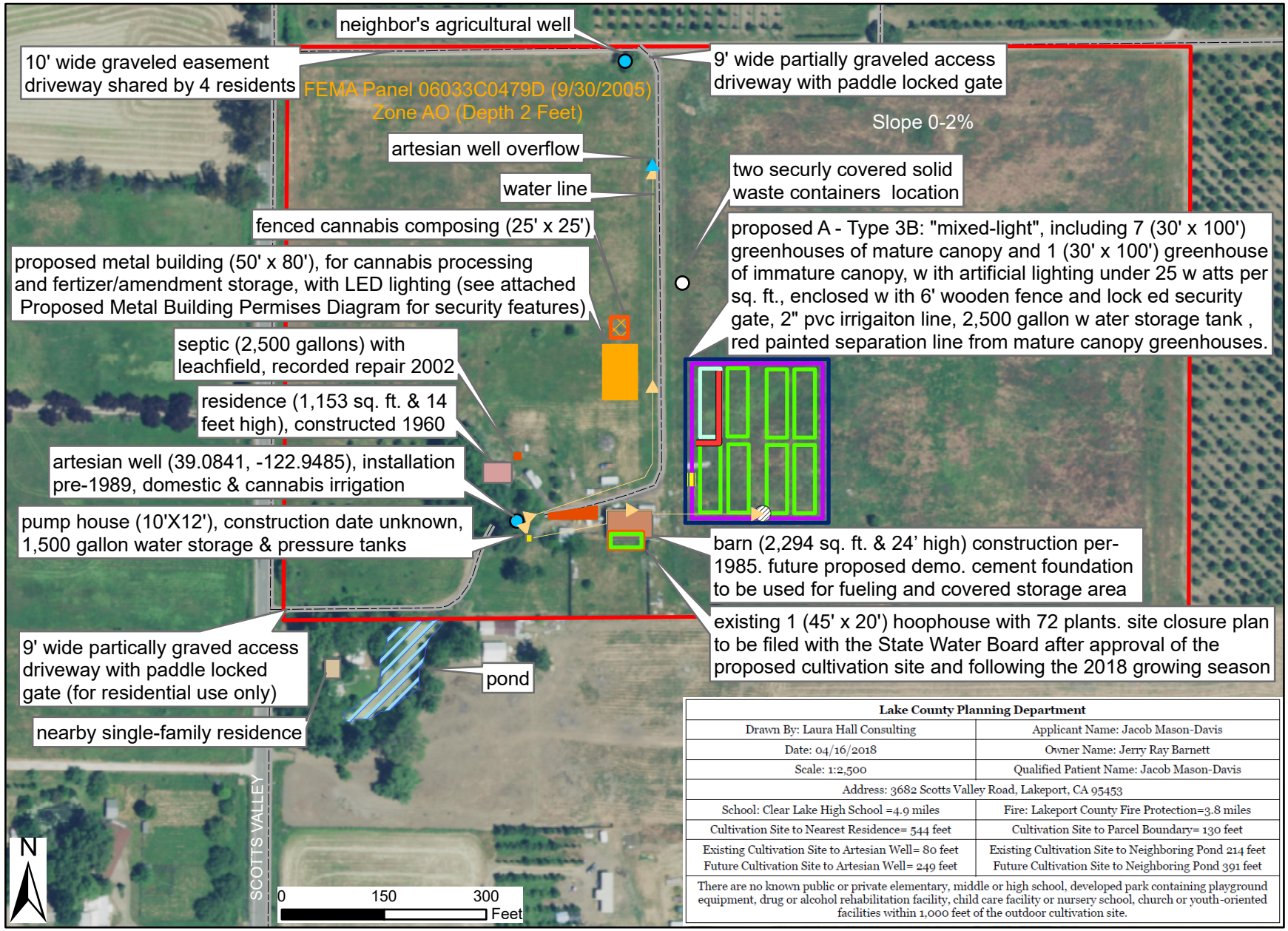
http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3157

Western Regional Climate Center (WRCC). 2018. Lakeport, Lake County, CA.
<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3157>

APPENDIX A: Proposed Site and Construction Location Map

Draft Site Map: AMPEG, INC. (Applicant)
APN 005-010-03/25 Acres/Zoning "A" Agriculture



Lake County Planning Department	
Drawn By: Laura Hall Consulting	Applicant Name: Jacob Mason-Davis
Date: 04/16/2018	Owner Name: Jerry Ray Barnett
Scale: 1:2,500	Qualified Patient Name: Jacob Mason-Davis
Address: 3682 Scotts Valley Road, Lakeport, CA 95453	
School: Clear Lake High School =4.9 miles	Fire: Lakeport County Fire Protection=3.8 miles
Cultivation Site to Nearest Residence= 544 feet	Cultivation Site to Parcel Boundary= 130 feet
Existing Cultivation Site to Artesian Well= 80 feet Future Cultivation Site to Artesian Well= 249 feet	Existing Cultivation Site to Neighboring Pond 214 feet Future Cultivation Site to Neighboring Pond 391 feet
There are no known public or private elementary, middle or high school, developed park containing playground equipment, drug or alcohol rehabilitation facility, child care facility or nursery school, church or youth-oriented facilities within 1,000 feet of the outdoor cultivation site.	

Source: California Department of Fish and Wildlife, 2016; County of Lake, 2016. Prepared by Laura Hall Consulting on April 22, 2018. Note: Parcel boundary is approximate.

parcel boundary
water storage tank
foundation (210' x 240')
fence (193' x 227')
locked security gate
733 sq. ft. graveled parking area

APPENDIX B: US Fish and Wildlife Species Query: May 18, 2018

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Reptiles/Amphibians

NAME STATUS

California Red-legged Frog Rana draytonii
There is _nal critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2891
Threatened

Fishes

NAME STATUS

Delta Smelt Hypomesus transpaci_cus
There is _nal critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/321
Threatened

Flowering Plants

NAME STATUS

Burke's Goldfields Lasthenia burkei
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4338

Birds

NAME STATUS

Northern Spotted Owl Strix occidentalis caurina
There is _nal critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/1123
Threatened

Migratory birds

NAME STATUS

Bald Eagle Haliaeetus leucocephalus
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in o□shore areas from certain types of development or activities.
Breeds Jan 1 to Aug 31
5/18/2018 IPaC: Explore Location
https://ecos.fws.gov/ipac/location/DU657ZE2LVCSDGZCR37FNAPTHU/resources 5/12
Clark's Grebe Aechmophorus clarkii

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
Breeds Jan 1 to Dec 31

Common Yellowthroat Geothlypis trichas sinuosa
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084
Breeds May 20 to Jul 31

Lawrence's Goldfinch Carduelis lawrencei
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464
Breeds Mar 20 to Sep 20

Marbled Godwit Limosa fedoa
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481
Breeds elsewhere

Nuttall's Woodpecker Picoides nuttallii
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410
Breeds Apr 1 to Jul 20

Oak Titmouse Baeolophus inornatus
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656
Breeds Mar 15 to Jul 15

Rufous Hummingbird selasphorus rufus
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002
Breeds elsewhere

Short-billed Dowitcher Limnodromus griseus
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480
Breeds elsewhere

Song Sparrow Melospiza melodia
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
Breeds Feb 20 to Sep 5

Spotted Towhee Pipilo maculatus clementae
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

Breeds Apr 15 to Jul 20

Tricolored Blackbird Agelaius tricolor
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910
Breeds Mar 15 to Aug 10

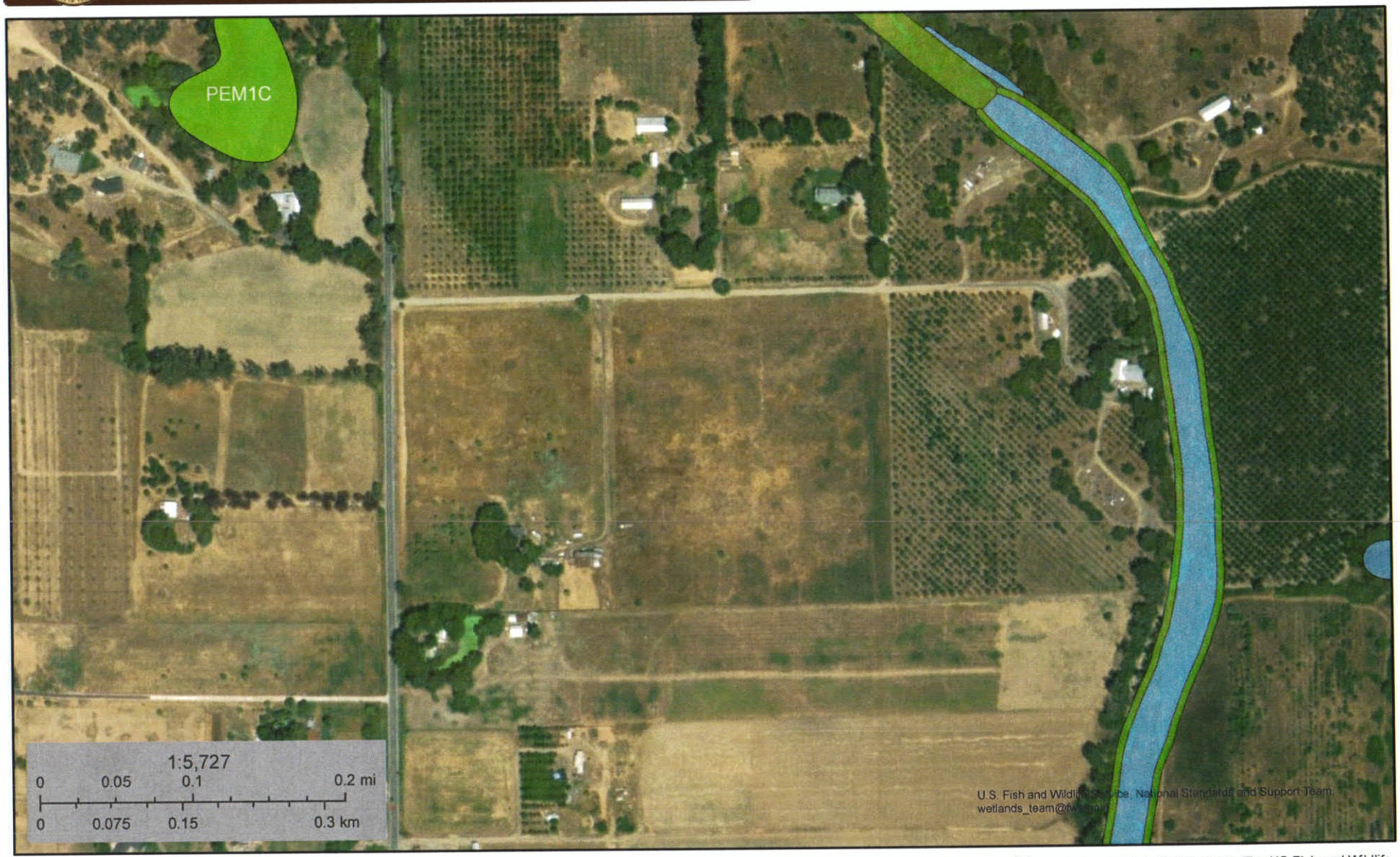
Wrentit Chamaea fasciata
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
Breeds Mar 15 to Aug 10

APPENDIX C: Wetland and Waters of the US Map: National Wetlands Inventory Map

U.S. Fish and Wildlife Service

National Wetlands Inventory

APN #005-010-03 Wetland Inventory Map



May 18, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

APPENDIX D: Photographs of the Project Building Locations "Habitats" (Cropland)

1: Largest Building Location (Large Greenhouse) – See Building Map Above

2: Smaller Building (Processing Building) Location

Appendix E: Resume

Brian Shaw
Company Owner and Supervisory Biologist
1760 Kenyon Drive
Redding, CA 96001
Phone Number: 530-244-5652/530-524-8474(cell)

Education
Graduated: Double Major - California State University, Chico
Bachelors of Science Biological Science: Spring 1997
Bachelors of Arts: Geography (GIS Emphasis) - Spring 1993

Affiliations/Certifications/Permits
USFWS Permit Number **TE-20914-B-0** - California Gnatcatcher
CDFW Scientific Collecting Permit Number: **#SC-3910**
CALFIRE Certified Spotted Owl Expert #29 (Formerly PCB #0050)
Member of The Wildlife Society Western Chapter and Shasta-SAC Chapter
Wetland Certification - Tiburon Wetland Training Certified ESRI Arc GIS Certification and Classes: CSU Chico, Shasta College, DOT, ESRI

Employment Experience

Klamath Wildlife Resources - Company Owner/Senior-Supervisory Biologist
Owner and Senior Biologist, Technical Writer and GIS/GPS Senior of **Klamath Wildlife Resources (KWR)** from 2000-2015 (current). I manage and oversee all aspects of company ownership/management, including: budget items, staff scheduling, staff performance evaluations, proposal writing, contract acquisition and project management. The company specializes in biological, watershed evaluation, GIS, botanical and environmental analysis and assessment. Our focus area has been in natural resource related science and planning, GIS/GPS mapping/data management, environmental permitting/reporting, **Construction monitoring** (Wind Farm/Telecommunication/Power Lines) NEPA, CEQA Documents, EA, BA, BE, FONSI, ND) and sensitive species assessments. Our company and myself also complete protocol surveys and studies for: California Gnatcatcher, Least Bells Vireo, Northern Goshawk, Spotted Owl, Siskiyou Mountains Salamander, Willow Flycatcher, Fellers and Freel Amphibian surveys, Great Gray Owl, Carnivores, point count avian surveys, bat surveys (mines, mist netting, acoustical) as well as vegetation & botanical surveys and timber cruising for the USFS, BLM and private land and timber owners of northern California. Complete environmental assessments, wetland delineation (certified delineator), biological evaluations/assessments, agency permitting (404, 401, 1601) and agency consultation (CDFG, USFWS, ACOE, RWQCB). We/I also assist land developers their future planning and land use documentation, including environmental, traffic, noise studies. Certified CALFIRE Spotted Owl Expert #29 (Formerly PCB #0050, Habitat Evaluation Expert). CDFW permit holder for small mammal, amphibian, bird/owl handling in support of wildlife studies. Involved with wind farm biological clearance surveys, which involves systematic searching through the year below all existing wind turbines on platforms and in surrounding vegetation for avian/chiropteran impacts. These surveys are multi-tiered, involving Searcher Efficiency Trials, Live Avian Bird Counts, Scavenger Trials as well as the Post Construction Fatality Surveys. Our company also completes the recently very often offered Environmental Site Assessment

and Evaluations for environmental remediation typically on government properties. I have personally prepared over 400 technical proposals for a wide range of environmental, biological, botanical, and wildlife projects. This has resulted in being awarded over 250 separate projects based on these proposals/offers. My company and myself as the representative have many solid and long-standing solid business relationships with the US Forest Service, BLM, National Parks Service, Private Timber Companies throughout the west, large and small engineering/land planning firms, California State Parks, CALFIRE, many Native American Tribes through the west, PG&E, WAPA, SoCAL Edison, and have working contracts currently in five separate western states.

Previous Employment

Department of Transportation – Environmental and Transportation Planner Districts 2 & 3: 2001-2004: Redding and Marysville, CA

Environmental: Under the direction of a Senior Environmental Planner, I assessed the impacts of the more difficult transportation projects for biological resources, and made recommendations for the appropriate environmental approvals, mitigation measures and permits. Deep and well-rounded knowledge of the California Environmental Quality Act, National Environmental Policy Act, Federal and State Endangered Species Act and other state and federal laws. Wrote many environmental impact reports (called Natural Environment Study at Caltrans), covering many species and habitats, involving consultation with ACOE, NMFS, USFWS and CDFG.

Transportation: Under the supervision of the Chief, Regional Planning & Local Assistance Regional/Systems Planning Senior served as the point of contact between District 2 and 3 Division of Planning and the Regional Transportation Planning Agency (RTPA) for Siskiyou and Lassen Counties. Provided technical assistance and arranged annual meetings with tribal governments and RTPs. Monitored fund administration documents prepared by RTPA staff-including Federal and State public transportation grant programs. Was point of contact for assignments relating to Regional Planning activities outside of Siskiyou and Lassen Counties (other local counties). Conducted Transportation Concept Reports and traffic flow modeling, ATR data acquisition and analysis to assess traffic in Redding, Marysville, Burney and many other north-state cities and highways. Wrote corridor management plan for Highway 299 from Modoc County (Nevada State Border) to the Humboldt County line.

Senior Wildlife Biologist - Natural Resources Manager, Alpine Land Information Services (01/98 to 1/00): Company wildlife biologist for Roseburg Resources Company through contract to Alpine LIS. Represented RRC on all wildlife management issues, most importantly Northern Spotted Owl, but also Northern Goshawk, Willow Flycatcher, Osprey, Bald Eagle, amphibians, and botanicals. Also wrote cumulative impact reports for Sierra Pacific Industries (SPI). I planned and completed ecological investigations (studies/reports, etc.) and GIS habitat evaluation and management of timberland development proposals to determine their effect on these species. I also studied watercourses on their lands, delineating impacts caused by storms and/or roads. I also planned and carried out herpetological (Tailed Frog, Yosemite Toad, Foothill and Mountain Yellow-legged Frog, Cascades Frog) and macroinvertebrate surveys on their lands. I coordinated, worked within and supervised contracts for Northern Spotted Owl, Goshawk and conducted Willow Flycatcher surveys and monitored nests/known locations for Roseburg Resources Co. I also carried out these surveys following their respective protocols. I professionally represented Sierra Pacific Industries (SPI) on Northern Goshawk, Bald Eagle, Osprey, Great Blue Heron and Northern Spotted Owl Consultations and botanical surveys with biologists and botanists from the USFS, CDFG and USFWS. I proposed mitigation and protection measures for these species. I wrote several Section IV's of the Option "a" and "c" for many Timber Harvest Plans for SPI. I completed botanical and biological investigations and surveys in the Klamath, Sierra Nevada and southern Cascades mountains. Full botanical and wildlife surveys were conducted by

Shaw and crew technicians for especially CNPS 1B and sensitive plants, as well as all sensitive and T&E plants and animals. Familiar with all sensitive and T&E plants and animals of California. Using Atlas G.I.S. and ArcView 3.2, created many varieties of biological, botanical and geographical maps. I was in charge of five cumulative impacts assessment THP portions as well as crews of natural resources personnel, making sure timelines and plans were completed on time and efficiently, and surveys and data were submitted accurately.

GIS Specialist/ Biologist, Enplan (10/97-5/98)
I spent half of my time between working with computer mapping programs (AutoCad versions 13, 14 and 14 Map, Map Info, and Arc View 3.1) and serving as the wildlife biologist. The mapping portion worked with programs that are used to digitize city streets, property boundaries, enter or locate coordinates, enter acreage, tabulate area, and create functional city, rural and biological maps for various northern California agencies. The wildlife biology portion required writing proposals and bids for endangered species projects for various government agencies. I also spent time in the field working on existing projects, identifying all animal and bird species within proposed development areas. I have worked on projects involving the cities of Grass Valley, Fort Jones, Montague, Redding, and Shasta County. Finally, I wrote a technical proposal for a Great Gray Owl/Northern Spotted Owl project that we eventually were awarded by the U.S. Forest Service. I headed up the field portion of this project as the supervising wildlife biologist over eight other field biologists. This included air photo station and call route placement based on habitat conditions (which differ per owl), suggested habitat management and field report writing to the BLM and USFS.

Scientific Aid, California Department of Fish and Game (8/15/97-10/1/98)
I worked as a biological scientific aid administering studies of salmonid populations on the northern portion of the Sacramento River between Cottonwood and Redding, CA. My duties included monitoring and maintenance of screwtraps, weighing, measuring and identifying all sizes and species of fish, snorkeling and seining, driving boats with both outboard and jet engines up to 18' long up and down an unpredictable river., data compilation, driving of government vehicles and much social interaction with a crew of eight other workers as well as the public. We also tagged the carcasses of the dying chinook salmon runs during their respective migrations.

Environmental Specialist 1, Jones and Stokes and Associates (6/1/97-8/15/97)
Determined population status of the Northern Spotted Owl and the Great Gray Owl near Detroit and Sisters, Oregon. Using voice imitated techniques as well as playing a tape through a tape recorder and loud speaker we drove in our personal vehicles along Williamette National Forest roads at night to illicit responses from the owls. All protocol techniques were used to draw the birds near including mousing, hooting, running to catch up to the bird and triangulation. Much exact map reading of topographic maps was necessary as well as extreme situational hiking through rugged terrain on the forest.

Supervising Wildlife Biologist, Jones and Stokes and Associates (6/1/96-9/1/96)
Supervised crew of four on forest carnivore goshawk, and spotted owl study of the Plumas National Forest, Quincy District. Used track plate and trailmaster cameras to monitor fisher, pine marten, fox, and any other small mammals of the forest. Used juvenile, alarm, and fledgling calls through a call box to illicit responses from the goshawks being studied. Also, we identified all tree and shrub species at our forested survey areas (northern Sierra Nevada species). Responsible for all data entry, expenses, monitoring work of others, air photo interpretation and placement of call stations and routes and helped with the final project report.

APPENDIX F: Lorex by FLIR Model is NR900 Series NVRs System

LOREX BY FLIR

4K ULTRA HD NETWORK VIDEO RECORDER

WELCOME THE FUTURE OF
HIGH DEFINITION VIDEO RECORDING

View your world in more detail than ever with real-time 4K HD recording for 4× the detail of 1080p. 4K video output lets you view multiple HD channels in full resolution on a 4K TV. The NVR's Power over Ethernet ports make setup quick and easy, with one cable installation per camera that provides both power and HD video.

FLIR SECURE

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Windows

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8/16/32 Channels **2-6TB** HDD **4K** Support **8/16** PoE Port

4K ULTRA HD NETWORK VIDEO RECORDER

FEATURES:

- Real-time recording up to 8MP on all channels – 4× the detail of 1080p
- Supports industry-leading 4K recording [1]
- 8/16 built in PoE (Power over Ethernet) ports providing video and power over a single Ethernet cable
- RapidRecap® – see the day in a minute with hours of activity compiled into a short video summary
- FLIR Secure™ apps for live viewing, playback, video recording & snapshots (iPhone® / iPad® / Android™) [2]
- PC and Mac compatible – FLIR Cloud™ video management software gives you complete control over your security system from anywhere [2]
- 24/7 security-grade pre-installed hard drive [3]
- Expandable high capacity storage up to 12TB (2×6TB HDD)
- Automatically detects compatible IP cameras in the network [4]
- 4K video output – view multiple HD channels at once in full resolution on a 4K TV
- H.265 / H.264 video compression offers reduced file size and improved network performance for remote viewing [3]
- Mirror hard drive recording – secure your recordings by backing up footage to an internal hard drive at the same time as recording to the primary hard drive [5]
- Pentaplex Operation – view, record, playback, back up & remotely control the system simultaneously
- Click-and-drag digital zoom in live view and playback
- Convenient front panel button controls
- Accurate time stamps with NTP & daylight savings time
- Instant backup of live video to a USB flash drive
- Automatic firmware upgrade over the Internet ensures your system is secure and up-to-date [6]
- Push notifications of motion events
- Instant email alerts with snapshot attachment
- Multi-streaming to conserve bandwidth
- Continuous, scheduled, and motion recording
- Dual video outputs (HDMI and VGA) to connect multiple monitors
- HDMI cable included for simple connection to HD & 4K TVs

4K ULTRA HD NETWORK VIDEO RECORDER
Specifications

SYSTEM	
Operating System	Linux (embedded)
Pentaplex	Simultaneous View, Record, Playback, Backup & Remote Monitoring
Number of Channels	8/16/32 Channels
Inputs/Outputs	
Video IN	8ch: 8 PoE Video Input 16/32ch: 16 PoE Video Input
Video OUT	No
VGA OUT	Yes
HDMI	Yes
Audio IN	1 Line IN (RCA) for service only
Audio OUT	1 Line OUT (RCA) for service only
USB Port	1 at the back, 1 at the front
Alarm IN	4 Alarm IN
Alarm OUT	2 Alarm OUT
Video Output Resolution	3840×2160, 1920×1080, 1280×1024, 1280×720, 1024×768
PTZ control	Lorex IP PTZ cameras only
Display	8ch: 1/4/8 16ch: 1/4/8/9/16 32ch: 1/4/8/9/16/25/36
Live Display Speed	8ch: 240fps NTSC / 200fps PAL 16ch: 480fps NTSC / 400fps PAL 32ch: 960fps NTSC / 800fps PAL
OSD	ON/OFF
System Navigation	USB Mouse, IR Remote Control, Front Panel Buttons
Motion Area Setting	Fixed Grid (22×18)
Sensitivity Levels	100
Firmware Upgrade	Automatic over the Internet & via USB device and network
User Authority	By user group
Time Synchronization	Automatic time sync by NTP server
RECORDING	
Video Compression	H.264 / H.265
Audio Compression	G.711
Resolution	Up to 4K (3840x2160), 1080p (1920×1080)
Record Rate	8ch: 240fps@720p/1080p/3MP/4MP/8MP 16ch: 480fps@720p/1080p/3MP/4MP/8MP 32ch: 960fps@720p/1080p/3MP/4MP/8MP
Recording Resolution Setting	Per camera for different resolutions
Recording Quality Control	6 Levels
Recording Schedule	By hour, by day, by recording mode, by motion, by alarm, by channel
Pre Recording	Max. 4 Secs
Post Recording	Max. 5 Minutes
Reliability	Watch-Dog, auto-recovery after power failure
Covert Video	Yes

PLAYBACK	
Playback Channel	1CH/4CH@4K, 8CH@4MP, 16CH@2MP
Playback Speed	Variable Max 16x
Playback Players	Backup Player
Search	By Time & Event
Log Search	Up to 1,000 lines for motion detected, configuration changes, connects/disconnects and video loss
Audio Play	Yes (audio camera required)
STORAGE & ARCHIVE	
Storage	Up to 2 HDDs (SATA)
Maximum Capacity	Up to 2x6TB (12TB Max)
Backup Media	USB Flash Drive & HDD
Backup File Format	DAV or ASF File
CONNECTIVITY	
Cloud Connection	FLIR Secure™
Supported Operating Systems	Windows™ / Mac OS X
Remote Software	Client Software (PC & Mac)
Email Notification	Text with snapshot
Instant Smart Phone & Tablet	Android™, iPad ®, iPhone ®
DDNS	Free Lorex DDNS
System Configuration	Full setup configuration over network
Ports	Programmable by User
Network Protocol	HTTP, IPv4/IPv6, TCP/IP, UPNP, RTSP, UDP, SMTP, NTP, DHCP, DNS, PPPOE, DDNS, FTP, IP Filter
Network Interface	10/100/1000-Base-TX, RJ-45
Network Bit Rate	320Mbps total, 48~8192kbps per camera
GENERAL	
Power Consumption	Approx. 15W (no HDD included)
Supply Voltage	100VAC-240VAC, 50/60Hz
Total PoE Power Output	130W (Max 25W per Camera)
Unit Dimensions (W × D × H)	14.7 × 12.9 × 2.1" / 375 × 327 × 53mm
Unit Weight	8ch: 5.1lbs / 2.6kg 16/32ch: 13.2lbs / 2.7kg
Operating Temperature	14° ~ 131°F / -10° ~ 55°C
Humidity	10 ~ 90% RH

RECORDING RESOLUTION (PIXELS) & MAXIMUM SPEED (FPS - FRAMES PER SECOND)

		720p	1080p	3MP	SUPER HD 4MP	4K
		1280×720	1920×1080	2048×1536	2688×1520	3840×2160
8ch	*Total*	240/200	240	240	240	240
	Per channel	30/25	30	30	30	30
16ch	*Total*	480/400	480	480	480	480
	Per channel	30/25	30	30	30	30
32ch	*Total*	960/800	960	960	960	960
	Per channel	30/25	30	30	30	30

4K ULTRA HD NETWORK VIDEO RECORDER
Product Information

NVR Inputs & Outputs

8 Channel

16/32 Channel

Dimensions:

Product Information:

MODEL	CONFIGURATION	PACKAGE	W x D x H Inches & millimeters	WEIGHT	CUBE	UPC Code
NR9082	8-Channel 4K HD NVR with 2TB HDD	Brown Box	18.5 × 6.9 × 16.7" / 470 × 175 × 425mm	11.6lbs / 5.3kg	1.3cbf / 0.04cbm	6-95529-01057-1
NR9163	16-Channel 4K HD NVR with 3TB HDD	Brown Box	18.5 × 6.9 × 16.7" / 470 × 175 × 425mm	11.8lbs / 5.3kg	1.3cbf / 0.04cbm	6-95529-01058-8
NR9326	32-Channel 4K HD NVR with 6TB HDD	Brown Box	18.5 × 6.9 × 16.7" / 470 × 175 × 425mm	12.4lbs / 5.6kg	1.3cbf / 0.04cbm	6-95529-01059-5
Includes: 4K HD NVR with pre-installed HDD, 1× HDMI Cable, 1× Ethernet Cable, 1× Power Adapter, 1× Mouse, 1× Remote Control, Quick Setup Guides						

Disclaimers:

1. 8MP IP cameras are required to take advantage of 4K recording.
2. Requires a high speed internet connection and a router (not included). A minimum upload speed of 3.5Mbps is required for the best video performance. Up to 3 devices may connect to the system at the same time. For the latest list of supported apps and devices, please visit www.lorextechnology.com/support
3. Recording time may vary based on recording resolution & quality, lighting conditions and movement in the scene.
4. Compatible with Lorex PoE HD IP cameras only. For a list of compatible cameras, please visit www.lorextechnology.com/support
5. Mirror recording requires a second hard drive (not included) to be installed in the NVR. Mirrored hard drive must be as large or larger than the primary hard drive to backup all recordings. Backup begins from when the mirrored hard drive is installed and configured.
6. Both firmware and software must be updated to latest version to ensure remote connectivity. Firmware updates are pushed to the NVR automatically over the Internet (available at www.lorextechnology.com). Always update to the latest software after upgrading the NVR firmware.

Lorex Corporation, a division of FLIR Commercial Systems Inc.

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Markham, Ontario,
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1-09232016

APPENDIX G: Cannabis Waste Management Plan

CANNABIS COMPOSTING PLAN

REGULATION

Pursuant to California Code of Regulations (CCR), Title 3, Division 8, Chapter 1, Section 8108, the applicant has prepared this Cannabis Waste Management Plan. A description of how, where, and what materials will be used for composting is provided. The applicant's site plan includes the location of the composting area. In compliance with CCR Title 14, Division 7, Chapter 3.1, Section 17855 (4), the composting site will not exceed 100 cubic yards and 750 sq. ft., so is excluded from state licensing for Composting Operations and Facilities.

Seasonal records associated with onsite composting will be kept at the site. Records will follow state and/or local regulations for content.

LOCATION

The 25' x 25' security fenced composing site is located north of the proposed metal building. To avoid mold and mildew problems associated with placing composting to close to cultivating sites, composting would occur approximately 113 feet northwest of the closest greenhouse.

EQUIPMENT USED

Pruning, weeding, plant failure, harvesting, and processing will all generate green waste before, during, and after the growing season. Typical tools required during these periods will include weed whackers, pruners, chainsaws, and an electric leaf mulcher/shredder.

COMPOSTING METHODS

Green waste will be placed in the designated area as shown on the applicant's site map. The applicant may follow the Procedure for Managing the Three-Bin Composting System (University of California UCCE Cooperative Extension). The following steps are recommended when using this procedure:

1. Add yard waste to one of the end bins. Mix in "green" materials like grass clippings or other fresh plant waste with "brown" materials like dried leaves, wood chips or shredded branches.
2. If only a very little green waste is available, add about 1 cup of a fertilizer that contains some nitrogen, such as an 8-8-8 or similar analysis fertilizer. Kitchen scraps or grass clippings will generally not need additional fertilizer since these already have a lot of nitrogen compared to carbon.
3. Add a layer of garden soil to introduce some of the microorganisms that do the composting.
4. Once the composting process is under way, it is not necessary to add more soil.

5. Check the temperature of the compost from time to time, ideally with a compost thermometer (see graphic). The pile should be warm in the middle. After the middle has reached 140 to 150ºF, turn the pile from the original bin into the adjacent center bin.
6. Close monitoring of the temperature is essential only for the most rapid composting since the process will go on at varying rates even if close attention is not given to temperature.
7. Additional yard waste can be placed on the recently turned compost, but turn the pile back into the original end bin when the temperature has been up around 150º
8. Turning should be repeated whenever the temperature gets high enough. Over time, less frequent turning will be needed, and the composted material can be held in one of the end bins until you are ready to use it in the yard or garden.
9. Repeat the process using the vacant end bin and alternate turning between that bin and the center bin.
10. Use the compost in the original end bin until it is gone; then you can start the composting process again in the vacated end bin.
11. Once set up, the three-bin composting system will consist of one bin with yard waste being composted; one bin empty, to or from which the compost is turned; and one bin containing finished, or nearly finished, compost (see graphic).

Nearly 1 cubic yard of compost can be produced per bin in the three bin composting system. However, the rate of composting differs greatly according to the kinds of materials placed in the system and the precision with which you manage the composting process.

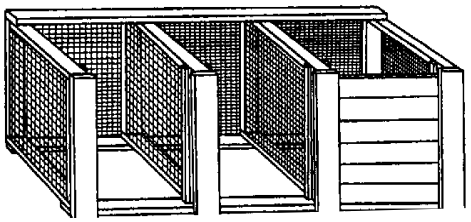
MATERIALS USED

Wooden compost bins would likely be utilized for holding compost as shown in the Procedure for Managing the Three-Bin Composting System (Appendix A). The applicant would likely have several bins to accommodate waste during different periods when needed. Using this system, there is an Incoming, Working, and Finished bin.

After compost is ready, it would be added to each cannabis box and mixed with soils during site preparation for the growing season. Soils at the site will be reused and flushed with compost tea before each new season.

Composting 101

Procedure For Managing The Three-Bin Composting System



1. Add yard waste to one of the end bins. Mix in "green" materials like grass clippings or other fresh plant waste with "brown" materials like dried leaves, wood chips or shredded branches.
2. If only a very little green waste is available, add about 1 cup of a fertilizer that contains some nitrogen, such as an 8-8-8 or similar analysis fertilizer. Kitchen scraps or grass clippings will generally not need additional fertilizer since these already have a lot of nitrogen compared to carbon.
3. Add a layer of garden soil to introduce some of the microorganisms that do the composting. Once the composting process is under way, it is not necessary to add more soil.
4. Check the temperature of the compost from time to time, ideally with a compost thermometer *(see graphic)*. The pile should be warm in the middle. After the middle has reached 140 to 150ºF, turn the pile from the original bin into the adjacent center bin. Close monitoring of the temperature is essential only for the most rapid composting since the process will go on at varying rates even if close attention is not given to temperature.
5. Additional yard waste can be placed on the recently turned compost, but turn the pile back into the original end bin when the temperature has been up around 150º.
6. Turning should be repeated whenever the temperature gets high enough. Over time, less frequent turning will be needed, and the composted material can be held in one of the end bins until you are ready to use it in the yard or garden.

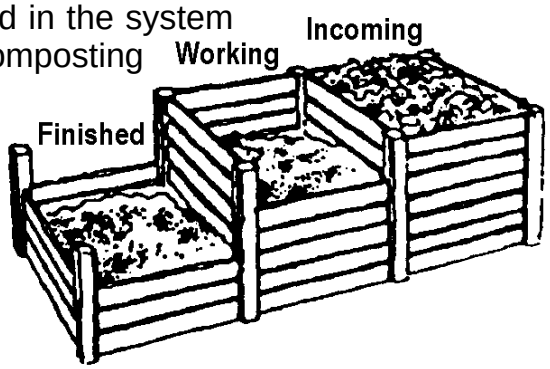
UNIVERSITY OF CALIFORNIA UCCE **COOPERATIVE EXTENSION**

Placer County
11477 E Avenue *(Bldg 306, DeWitt Center)*
Auburn, California 95603
(530) 889-7385
FAX (530) 889-7397
E-Mail: ceplacer@ucdavis.edu

Nevada County
255 So Auburn *(Veterans Memorial Building)*
Grass Valley, California 95945
(530) 273-4563
FAX (530 273-4769
E-Mail: cenevada@ucdavis.edu

7. Repeat the process using the vacant end bin and alternate turning between that bin and the center bin.
8. Use the compost in the original end bin until it is gone; then you can start the composting process again in the vacated end bin.
9. 9. Once set up, the three-bin composting system will consist of one bin with yard waste being composted; one bin empty, to or from which the compost is turned; and one bin containing finished, or nearly finished, compost *(see graphic)*.

Nearly 1 cubic yard of compost can be produced per bin in the three-bin composting system. However, the rate of composting differs greatly according to the kinds of materials placed in the system and the precision with which you manage the composting process.



APPENDIX H: Alternative Containers Information

W 337-D

BEYOND PLASTIC POTS

Part 4: Comparison of Alternative Nursery Containers

Quinn Cypher, Extension Associate
Amy Fulcher, Assistant Professor
Department of Plant Sciences

CONTENTS

PLANTABLE CONTAINERS

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	**Constraints**			
Peat Pots (Jiffypot/Jiffy)  Plantable container made from peat and wood pulp or paper fibers	'Florida Sun Jade' coleus same growth as plastic container[1] Medium levels of decomposition in the landscape, but does not hinder landscape establishment[2] Higher dry shoot weight in an ebb-and-flood production of cyclamen compared to plastic[3] Equal growth of 'Sunpatiens Compacta' impatiens[4]	Slower to de-nest and fill using mechanical filling machines in greenhouse production[1] and slower to de-nest manually[4] Mechanical filling resulted in higher damage (but less than 1.5%)[1] Size may not be compatible with mechanical lifting equipment[1] Due to mold/weakness not suitable for long (12-week) greenhouse production[4] Lowered substrate pH but did not affect growth of 'Sunpatiens Compacta' impatiens or 'Elegans Ice' lavender[4]	Low strength Suited for short production cycles Shuttle trays recommended to prevent damage during handling[1,4] Well-watered plants susceptible to shipping damage[1]	High More frequent watering needed to match growth in plastic containers (petunias in a greenhouse)[5] Shuttle trays reduce water use but still more than plastic[6] Greenhouse production of vinca used 1.5 times more water than in peat vs plastic[6]	High
Manure Pots (CowPot/CowPots)  Plantable containers made from compressed composted cow manure	'Florida Sun Jade' coleus same growth as plastic container[1] Equal growth of 'Sunpatiens Compacta' impatiens compared to plastic container[4] Higher dry shoot weight in an ebb-and-flood production of cyclamen plants and plants flowered in 70 days vs 76 in plastic*,[3] Decomposes quickly in the landscape (88% average decomposition in 3-4 months[2])	Slower to de-nest and fill using mechanical filling machines in greenhouse production[1] and slower to de-nest manually[4] Mechanical filling resulted in more damaged containers (but less than 1.5%)[1] Due to mold/weakness not suitable for long (12-week) greenhouse production[4] One study found lower pH compared to plastic (but did not affect growth of 'Florida Sun Jade' coleus).[1] However, another study found higher pH compared to plastic but this also had no effect on growth of impatiens or lavender.[4]	Low strength Suited for short production cycles[4] Shuttle trays recommended[1] Well-watered plants susceptible to shipping damage[1]	High More frequent watering needed to match growth in plastic containers (petunias in a greenhouse)[5] Shuttle trays reduce water use but still more than plastic[6] Greenhouse production of vinca used 1.9 times more water than in manure vs plastic[6]	High

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	Constraints			
Slotted Rice Hull (NetPot)/ Summit Plastic  Plantable container made from rice hulls	May improve petunia growth over plastic[5,7] Greater cleome growth in the landscape in Mississippi (equal in IL, WV, and TX)[2] Better overall plant growth in an ebb-and-flood production of cyclamen plants[3] Equal growth of 'Sunpatiens Compacta' impatiens and 'Elegance Ice' lavender[4] No mold growth in 12-week greenhouse production[4]	Low levels of decomposition in the landscape, but does not hinder landscape establishment[2]	Medium-high strength	Medium Equal amount of water to grow vinca[6] but used more water to grow petunia compared to plastic[5]	Medium
Paper Sleeve (Ellepot/ Blackmore)  Plantable container made from paper	Sedum and liriope growth equal to plastic and establish well in the landscape[8]	NA	Low strength Suited for short production cycles Production/shuttle tray required	Likely medium-high	Likely high

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	**Constraints**			
Coconut Coir (Myers/ITML)  Plantable container made from coconut fiber	Decomposes slowly in the landscape but does not restrict root growth (4-6 weeks after planting) [2,9] Evaporation through sidewalls and lighter color results in lower substrate temperatures[10] Equal growth of 'Sunpatiens Compacta' impatiens and 'Elegance Ice' lavender[4] May increase the growth/ survival of plants that typically suffer from root rot[11] 'Florida Sun Jade' coleus same growth as plastic container[1] Higher shoot dry weight in an ebb-and-flood production of cyclamen plants[3] Only plantable container currently available in small and large (~1 gal) size	Size/shape may not be compatible with mechanical lifting equipment[1] May not be suitable for a 14-week greenhouse crop (poinsettias) due to mold/algae;[12] however, no mold/algae growth in a 12-week greenhouse production of lavender in multiple studies[4] Resulted in smaller cleome, new guinea impatiens, and lantana plants in multiple studies[2]	High Flexible, tear and rupture strength similar to plastic[1]	Medium-high More frequent watering needed to match growth in plastic containers (petunias in a greenhouse)[5] Shuttle trays reduce water use but still higher than plastic[6] Greenhouse production of vinca used 1.5 times more water than in coir vs plastic[6]	High
Bioplastic Sleeve (SoilWrap/Ball Horticultural)  Plantable bottomless container made from bioplastic	Increased petunia growth over plastic[5] Greater shoot dry weight in a 12-week greenhouse production of lavender in multiple studies[4] No mold in 12-week greenhouse production[4]	The containers do not have bottoms; therefore, a shuttle tray is necessary. Medium levels of decomposition in the landscape, but does not hinder landscape establishment[2]	With the use of shuttle trays strength is not an issue	Low-medium Only slightly more water required than plastic[5]	Probably not, but need to use shuttle tray

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	Constraints			
Wood Fiber Pot (Fertilot) Fertil  Plantable wood fiber container	Equal growth of 'Sunpatiens Compacta' impatiens in multiple studies [4] Medium levels of decomposition in the landscape, but does not hinder landscape establishment[2]	Worse overall performance in an ebb-and-flood production of cyclamen plants, possibly due to no holes in bottom of container, low fertilizer uptake and water stress, however, plant still marketable[3] Due to mold/weakness not suitable for long (12-week) greenhouse production[4]	Low strength Suited for short production cycles[4] Shuttle trays recommended[1]	High More frequent watering needed to match growth in plastic containers (petunias in a greenhouse) Shuttle trays reduce water usage but still higher than plastic[6] Greenhouse production of vinca used 1.9 times more water than plastic [6]	NA
Straw Pots (Straw Pots/ Ivy Acres)  Plantable container made from straw	Outperformed plastic in 12 week greenhouse production of lavender[4] May increase the growth/ survival of plants that typically suffer from root rot[11] 'Florida Sun Jade' coleus same growth as plastic container[1] Higher dry shoot weight in an ebb-and-flood production of cyclamen[3]	Slower to de-nest and fill using mechanical filling machines in greenhouse production[1] Size may not be compatible with mechanical lifting equipment[1] May not be suitable for a 14-week greenhouse crop (poinsettias) due to mold/algae;[12] however, no mold/algal was found in a 12-week greenhouse production of lavender in multiple studies.[4] Resulted in smaller plants (straw and coir pots) compared with other biocontainers in some but not all studies.[2] Higher pH compared to plastic, but did not affect growth of 'Florida Sun Jade' coleus.[1]	Flexible; tear and rupture strength similar to plastic[1]	Probably high	Likely high

COMPOSTABLE CONTAINERS

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	**Constraints**			
Solid Rice Hull (ēco360 Easy Green/ Summit Plastic)  Compostable container made from rice hulls	Equal growth of 'Sunpatiens Compacta' impatiens and 'Elegance Ice' lavender[4] Better for poinsettia production[12] No mold/algae in 12-week greenhouse production[4] Better overall performance in an ebb-and-flood production of cyclamen plants[3] Container may provide some fertilizer (based on work with soy based containers)[13] Available in small and large—up to 1 gallon—sizes	'Yellow Madness' petunia had lower dry shoot weight than plastic in a greenhouse study.[5]	Medium-high strength Retained strength in 12-15-week greenhouse production[3,4]	Low (equal or less than plastic)[5]	Low

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	Constraints			
Fiber Container (Western Pulp)  Compostable container made from recycled paper and/or cardboard	In a three year outdoor study in MI, KY, MS, TX and TN, growth was equal to plastic except in one instance in TX where plants were not irrigated based on water usage.[14] May increase the growth/survival of plants that typically suffer from root rot[11] 'Florida Sun Jade' coleus same growth as plastic container[1] Evaporation through sidewalls and lighter color results in lower substrate temperatures.[10] Lower substrate temps and greater root aeration can improve growth of daylilies (Aztec Gold and Stella de Oro) (pots treated with SpinOut.[5]) Greater growth (than plastic) for poinsettia production[12] No mold/algae growth after a 12-month nursery production[16] Equal growth, water use, and root zone temperature in an outdoor pot-in-pot system[17] Available in small and large, up to 1 gallon, sizes	Damage may occur during mechanical lifting (equipment dependent).[1] May not be compostable in a home compost.[16] In a two year outdoor study in MS, KY, MI and TX, 'Green Velvet' boxwood had a lower growth in TX in 2011 but not in any other states.[14]	High strength Suited for long-term (up to 1 year) production cycles[17] Higher compression strength than plastic[16]	Medium-high Used more H_2O than plastic in outdoor production of 'Dark Knight' bluebeard and 'Green Velvet' boxwood in TN, KY, MS and TX[14] Irrigating the same volume as a plastic container resulted in slightly smaller plants than plastic in TX.[14] If overwintering without irrigation use caution due to potential desiccation.[14]	Medium

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	Constraints			
Fiber Container (Kord Fiber Grow/Kord)  Compostable container made from recycled paper and/or cardboard	Equal growth, water use, and temp in a pot-in-pot system[17] May increase the growth/survival of plants that typically suffer from root rot.[11] 'Florida Sun Jade' coleus same growth as plastic container[1] Evaporation through sidewalls and lighter color will likely result in lower substrate temperatures.[10] Greater growth for poinsettia production[12] No mold/algae growth after a 12-month nursery production[16] Suitable for a pot-in-pot production with equal growth to plastic[17]	Mechanical filling resulted in higher (but less than 1.5%) damage.[1] Lip may not be strong enough to use with mechanical lifting equipment.[1]	High strength Suited for long-term (up to 1 year) production cycles[17] Higher compression strength than plastic[16]	Medium Used more water than plastic in outdoor production of Roemertwo wintercreeper.[14] If overwintering without irrigation use caution due to potential desiccation.[14]	Medium
Keratin  Compostable prototype container made from processed chicken feathers	Equal growth of 'Green Velvet' boxwood in MS, KY, MI & TX in 2012 and equal growth in 2011 except TX, which was lower[14]	Similar substrate temperatures to plastic due to low porosity in sidewalls[10] Currently not in production	Likely high	Low (higher water use efficiency than black petroleum-based plastic, likely due to lighter color[14])	Low

R³ CONTAINERS

Container Name (Product Name/ Manufacturer)	Defining Characteristics		Strength/Longevity and Compatibility with Automation	Water Requirements	Potential to Dry During Shipping
	Benefits	Constraints			
Cloth (Root Pouch/ Root Pouch)  Recyclable container made from recycled soda and water bottles	May increase the growth/survival of plants that typically suffer from root rot[11] Equal growth index in outdoor production in MS, KY, and MI (lower in TX) in 2012 and in all four locations in 2011[14] Evaporation through sidewalls results in lower substrate temperatures.[10] Available in small and large (up to 25 gallon) sizes	Could result in nutrient loss through the container sidewall[14]	Low-high depending on container Some containers may not retain strength as long as claimed[16]	Medium Used more water than plastic in production of gold splash winter creeper and 'Green Velvet' boxwood[14]	Likely high

**The decrease in time to flower by six days was not a statistically different number of days, but because it will have relevance to crop scheduling for producers, we are deviating from convention and including this information. The remainder of the publication reports only results that were statistically different at alpha = 0.05.*

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Unless noted, photo credit to Koeser et al. 2013.

Ellepots - blackmoreco.com

Western Pulp Molded Fiber and
Keratin Prototype - Quinn Cypher

Fiber Grow Nursery Pot -
myerslawnandgarden.com/index.aspx

Root Pouch - rootpouch.com

W 337-D 11/15 16-0010

HortFact-6000
UK COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE
Horticulture Department

Alternative Containers for a Sustainable Greenhouse and Nursery Crop Production

With the ever-increasing customer demand for sustainable greenhouse and nursery products, many growers are exploring ways to make their businesses more 'green' – both in terms of environmental impact and public perception. Many consumers view the use of plastic products as an unsustainable practice (Hurley, 2008). Amidon (1994) estimated that the United States used 521 million pounds of plastic in agriculture, of which 66% of the total plastic was used in the nursery industry in the form of containers. In 2002, there were 1.678 billion pounds of plastic used in the agricultural sector (Levitan and Barros, 2003). Even though plastic containers meet the production needs of the nursery and greenhouse industry, plastic derived from petroleum is nonrenewable. Furthermore, used plastic containers are primarily disposed in landfills given limited access to recycling centers, high collection labor costs, chances of chemical contamination, photo degradation, and liability for poorly sanitized containers. Green industry stakeholders have identified the use of biodegradable container alternatives as a way to improve the sustainability of current production systems.

1. **Types of Alternative Containers**

Alternative containers similar to traditional petrochemical based plastic have been developed for use in nursery and greenhouse production. Alternative containers are classified based on the nature of degradability at the end of production life (Table 1).

1.1. Recycled plastic geotextile

These containers are produced from recycled plastic bottles that would have ended up in a landfill. The used bottles are turned into a liquid and blended with biodegradable natural fibers, such as cotton, jute, vegetable fibers or bamboo to create a mixture that when heat pressed bonds to produce a fabric like geotextile that is sewn into a container to grow plants. These containers are not biodegradable or compostable but will slowly disintegrate to a point that leaves behind a much reduced carbon footprint. An example of this type of product is the Root Pouch™.

1.2. Compostable

The containers are intended to be separated from the plant at planting and composted separately as they are not quickly or completely biodegradable in the landscape. Most bioplastics as well as hard rice hull and thick-walled paper/fiber containers intended for production of long term crops fall into this category. To further complicate this category some materials are only industrially compostable as they need specific environmental conditions to permit or hasten degradation process. Industrially compostable containers may not break down in a typical backyard compost pile due to the low and inconsistent temperatures, moisture, pH, aeration and microbial populations. ASTM D6400 is the main standard developed by American Society for Testing and Materials (ASTM) for certification of industrially compostable plastics in the United States (ASTM, 2004). It requires a biopolymer to disintegrate to a threshold of 60% biodegradation within 90 days at or above 140° F to be considered as compostable.

1.3. Plantable

The containers are intended to be planted in the soil together with the plant. These containers are intended for short term pre-production and are expected to reduce transplanting shock, save transplanting time and cost, as well as to avoid used container disposal. For these products to live up to these claims, it is imperative that the containers do in fact break down quickly once planted into the soil to allow rooting into surrounding soil and not require removal when the bed is replanted. The rate of container biodegradation following planting depends on the container material, nitrogen, moisture, temperature, pH, microbes, etc. of the soil in which the containers are planted. Scientists are beginning to study the longevity of containers during production and degradation of biocontainers following planting in landscapes. In a landscape trial, using five biocontainer types none completely degraded 8 weeks after planting (Evans et al., 2010). The highest container decomposition was found with CowPot™, which has cellulose and nitrogen from dairy manure. More moderate degradation was found for peat, rice straw and wood pulp containers, The lowest level of decomposition observed during the trial period was associated with coconut fiber containers due to their high lignin content. In a CfAHR(Center for Applied Horticultural Research) study (2009) using tomato plants reported fastest degradation of CowPot™ and DOTPots™ in soil compared to paper and coir containers. For annual landscapes these data suggests that the containers would need to be removed or manually broken apart and incorporated into the soil before the bed can be replanted (Taylor et al., 2010). Slow container degradation could cause root circling resulting in restricted water and nutrient movement and ability to adequately anchor (Appleton, 1993) woody perennials.

2. Sources of Alternative containers

Alternative containers are made from a variety of natural materials. These containers have positive environmental impact because they are generally made from renewable, recycled or waste products and they can significantly reduce landfill waste.

2.1. Pressed Fiber

There are a wide variety of hot-pressed fiber containers available on the market. These are constructed from fibrous materials such as rice hulls, wheat, peat, wood pulp, spruce fibers, coir (coconut fiber), rice straw, bamboo or mixed with composted cow manure. Fiber containers are semi porous and promote water and air exchange between the rooting substrate and surroundings. The containers may be biodegradable or compostable. Some include a natural or synthetic binding material such as resins, glue, wax, latex and even cow manure. Other containers rely on the material itself to provide structural stability and extended life span for long term use. Pressed fiber containers tend to have varying degrees of rigidity, material strength, and decay resistance. Unlike plastic, which provides relatively consistent performance in a mechanized production system, the resiliency of pressed fiber containers may depend on the container material, material moisture content, binder, irrigation practices, plant rooting pattern, and time in production. Also, some types of fiber containers weigh significantly more than a thin walled plastic container – especially when saturated.

2.2. Bioplastics

Bioplastics perform just like traditional plastics and are created from either biopolymers or a blend of bio and petrochemical based polymers. Bio based plastics are obtained using renewable raw materials such as starch or cellulose from organic feed stocks: corn, potato, cassava, sugarcane, palm fiber, beet, proteins from soybean or keratin from waste poultry feather, and lipids from plant oils and animal fats and are usually blended with fossil fuel-based polymers to reduce cost and/or enhance performance (Ezio et al., 2011). Petrochemical-based polymers are derived from petrochemical refining. There are 3 main types of bioplastics currently available on the market. (a) Starch-based plastics are water soluble so starch blends are produced by linking 20 to 80% of starch with either bio based or fossil fuel based polymers to improve their physical and chemical characteristics. (b) Poly lactic acid (PLA) produced by anaerobic fermentation of feedstock is mainly used with starch blends due to their slow biodegradability in soil and (c) poly-3-hydroxybutyrate (PHB) made from fermentation of organic feed stocks that are completely biodegradable. They can be processed easily on equipment designed for petrochemicals eliminating the need to develop new industrial machinery. The advantages of

biopolymers are their physical properties including weight, structural stability, rigidity and resistance to decay being the most similar to traditional plastics are allowing them to be easily integrated into a wide variety of production systems involving both short term and long term crops. Most of the bioplastic containers are intended to be composted or anaerobically digested at the end of plant production. Some containers such as the SoilWrap™ made from polyhydroxyalkanoate will degrade in the soils and have been incorporated into the design of plantable pots.

2.3. Sleeves

There are several types of containers available in small sizes that are simply growing substrate wrapped in a paper, fiber, or bioplastic sleeve. These are not true containers as they must be kept in a tray until the plant's roots hold the substrate together. These are often paper containers, which are plantable and fully degrade in a single season in the central and southern states. Further north, they may persist for over a year. Examples of commercially available sleeves include Ellepot™ made from paper and SoilWrap™ made from bioplastics.

3. **Impact of Alternative Containers on Plant Production**

The impacts of biocontainer use during ornamental crop production are largely unknown at this time. This section summarizes the current knowledge and potential issues associated with production and post-production impacts of biocontainer use.

3.1. Plant Growth and Development.

Studies so far have not found any significant negative impact of biocontainers on plant growth and development during production or during establishment into the landscape. A study conducted at the US Center for Applied Horticulture Research in Vista, California (CfAHR, 2010) indicated that Petunia grown in SoilWrap and NetPots resulted in plants that were bigger than plants grown in plastic pots whereas plants grown in OP47 BioPots, coir and plastic pots were similar in size and the number of flowers was very similar among the plants in different container types during pre and post production phases. CfAHR (2009) tested tomato growth in four types of biocontainers, DOTPot™, decomposed cow manure, paper pulp pots and coconut coir pots and compared them to plant growth in black plastic pots and found that the plants grown in plastic containers were heavier than others and the roots grew out of all the biocontainers except coir containers in a week. In contrast there was no effect on root or shoot dry weight of geranium and vinca plants produced and planted in peat or feather containers compared to transplants from plastic containers following six weeks in simulated field conditions

(Evans and Hensley, 2004). Preliminary results from a three month study showed no negative impact of plantable containers such as Soil Wrap^{R}, Ellepot^{TM} and slotted rice hull on the shoot and root development of two sedum species and liriope during the production period or during field establishment (Ingram and Nambuthiri, 2011).

3.2. Water Use

Due to the semi-porous nature of some biocontainer materials, water may be lost through the container side wall during plant production. The average water use of *Euonymus fortunei* plants grown in one gallon paper and wood pulp containers were 3 to 5 times higher than the standard plastic containers in Michigan based on a four month outdoor study (Wang et al., 2012). The highest rate of sidewall water loss was for peat, wood fiber and manure, followed by coir, rice straw, slotted rice hull, and the lowest sidewall evaporation was observed for bioplastic, solid rice hull and plastic containers (Nambuthiri et al., 2011). The increased drying rate in the fiber containers could mean increased and frequent water requirement for plants grown in these containers compared to plastic containers. A recent study found that the amount of water required producing a 4" geranium ranged from 0.55 gallons per container in plastic containers to 1.1 gallons in the wood fiber containers (Taylor, et al., 2010). The environmental benefits of using biocontainers would need to be weighed against increased water usage dependent upon the water demand of the crop, weather and cultural practices. Additionally, water loss in some of the smaller containers may be partially negated through the use of a shuttle tray.

3.3. Substrate temperature

The importance of keeping substrate temperature below 100°F (37.8°C) to avoid root injury is well documented (Kramer, 1949). However, during warmer months in the southeastern states it is common for the substrate temperature in black walled plastic containers to exceed 107.5°F (42°C) for several hours (Ruter and Ingram, 1990). Porous containers (clay, paper, peat, etc.) showed a slower increase in root zone temperature than non-porous (plastic, glass, paraffin protected, etc.) containers due to a higher latent heat for vaporization of water (Jones, 1931). A lab study reported higher substrate temperature in plastic, bioplastic and soild rice hull containers compared to lower heat buildup in decomposed cow manure, wood fiber pot, coir, peat, rice straw and slotted rice hull containers (Nambuthiri et al., 2011). Fiber containers were found to improve plant production, survival and quality by moderating the substrate temperature of 'Otto Luyken' cherry laurel (Ruter, 1999) and *Euonymus fortunei* 'Gold Splash' (Fulcher et al., 2011; Wang et al., 2012).

3.4. Durability of containers

Preliminary research indicates that some biocontainers tended to tear or break during greenhouse production, packaging, shipping, and retailing especially when wet. Evans et al. (2010) compared dry and wet strength in biocontainers. Hard rice hull containers had the highest wet vertical and lateral strengths. Containers composed of fiber or composted manure or peat had lowest wet vertical strength as these containers absorb water into the wall resulting in softening of the container wall and a subsequent reduction in strength. After 14 weeks, most poinsettia plants produced in peat and cow manure containers were not marketable due to loss of integrity or mold and/or algal growth creating a poor appearance (Camberato and Lopez, 2010). The plantable containers could be hence mostly appropriate for bedding plants or vegetables that have short preproduction phase.

3.5. Lifespan

Container life span can be made to vary from a few months to several years to match with the crop production cycle. Most plantable containers would biodegrade in a few months depending on the environmental conditions. Studies are going on to extend the lifespan of biocontainer using various natural or synthetic adhesives, resins, waxes and binding agents which later determine the rate of biodegradability or compostability of the containers. In general, nursery containers last from 1 to 5 years and usually are not quickly biodegradable, but may be compostable.

3.6. Marketing Advantage

Biocontainers can be considerably more expensive and their cost range from 10 to 40% more than their plastic counterparts (Robinson, 2009). This increased cost means that growers must be able to achieve a higher price for plants in biocontainers or reduce production costs for the system to be economically viable. A study was recently conducted to determine the willingness of consumers to pay more for biodegradable containers using experimental auctions in which consumers made purchases (Yue, et al., 2010). This system allowed researchers to determine what the consumers will actually do compared to what they say they will do on a survey. The results revealed that consumers will pay 58¢ more for a geranium in a 4-inch rice hull container, 37¢ more in straw, and 23¢ more in bioplastic containers than one in a traditional black plastic container. During the 2010 National Poinsettia Cultivar Trials at Purdue, customers were willing to pay 50¢ or $1 more for poinsettias grown in hard rice hull, OP-47, molded fiber and coir fiber containers than those grown in plastic containers (Camberato and Lopez, 2010).

4. **Future Prospects**

Clearly there is still much to learn about the impact of alternative containers on plant growth, water use, as well as the economic and environmental consequences along with energy costs associated with these new products. While there are many unknowns, it is certain that the supply of petrochemicals for conventional plastics will continue to increase in price and the public will become more conscious of our impact on the environment so the pressure to reduce plastics use will only increase. Recently alternative containers impregnated with various components such as natural color, slow releasing fertilizers, fungicides, insecticides and plant growth regulators that are released during plant growth are gaining entry to the market and that could enhance the efficiency of the production system. Industry and researchers are continuously working together to develop and fine-tune sustainable alternative containers to suit emerging grower and customer requirements.

Table 1. Examples of plantable and compostable alternative containers those are available in the market and their source material.

Name of Product	Material
Plantable	
Biopot	bamboo fiber
Coir pot	coconut coir fiber
CowPot™	composted cow manure and natural fiber
DOTPots™	spruce fiber, peat moss
Ellepot®	Paper
Fertil Pot	spruce wood fiber and peat moss
Jiffy-Pot®	Peat
Kord Fiber pot	wood and paper
Net Pot™	rice hull
SoilWrap®	Mirel® (biopolymer)
Straw Pot	rice straw
Western Pulp pot	molded wood pulp, recycled paper
Compostable	
Carbon Lite	Starch
Ecotainer	plant starch (PSM)
Kord Fiber Grow	recycled paper or cardboard
Large Pulp Pots	wax permeated wood pulp
TerraShell™Pot	Poly Lactic Acid (biopolymer from corn starch)
Rice hull pot	rice hull
Speedypot	peat and PLA biopolymer wrapper
Wax tough pot	wood and paper coated in wax

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