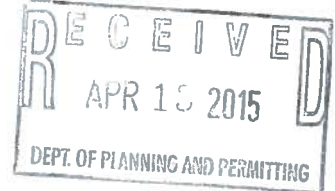


ORIGINAL

McCORRISTON MILLER MUKAI MacKINNON LLP

RANDALL F. SAKUMOTO 4848-0
MARGUERITE S. NOZAKI 8599-0
Sakumoto@m4law.com
Nozaki@m4law.com
500 Ala Moana Boulevard
Five Waterfront Plaza, 4th Floor
Honolulu, Hawai'i 96813
Telephone: (808) 529-7300
61878



Attorneys for Applicant
KAWAILOA SOLAR, LLC

BEFORE THE PLANNING COMMISSION
OF THE CITY AND COUNTY OF HONOLULU

In the Matter of the Application of)	FILE NO. 2014/SUP-6(RY)
)	
)	
KAWAILOA SOLAR, LLC)	APPLICANT'S SECOND
For a New Special Use Permit To Allow)	SUPPLEMENTAL FIRST LIST OF
Development of a 50-megawatt photovoltaic)	WITNESSES; FIRST LIST OF EXHIBITS;
(PV) Energy Generation Facility and)	EXHIBITS "1" – "23"; CERTIFICATE OF
Accessory Uses and Structures On Lands)	SERVICE
Rated Class A, B and C by the Land Study)	
Bureau, Ashley Road, Kawaiiloa Ahupua'a,)	
Waiialua District, Oahu, Hawai'i, Portions of)	
Tax Map Key Nos.: (1) 6-1-005:001 and (1))	
6-1-006:001, Part of Kamehameha School's)	
Kawaiiloa Plantation)	

APPLICANT'S SUPPLEMENTAL FIRST LIST OF WITNESSES;
FIRST LIST OF EXHIBITS

Applicant KAWAILOA SOLAR, LLC ("Kawaiiloa Solar" or "Applicant"), by and through its attorneys, McCorrison Miller Mukai MacKinnon LLP, hereby submits its **Second Supplemental** First List of Witnesses; First List of Exhibits; Exhibits "1" – "23" (additional exhibits included in List of Exhibits in **blue**), in support of the State Special Use Permit that was accepted by the Department of Planning and Permitting for processing on or around November

2014 and approved by the Land Use Commission in March, 2015. These witnesses and exhibits may be used in support of Applicant's request for a State Special Use Permit. Applicant reserves all rights to identify additional fact witnesses and add rebuttal expert witnesses and exhibits.

LIST OF WITNESSES

Name, Position, Organization	To be qualified as a witness in:	Subject matter	Written Testimony	Length of Direct
Wren Wescoatt/Development Director/Sun Edison LLC	N/A	Project development	Yes, Ex. 5	20-30
Crystal Kua/Director of External Affairs/Sun Edison LLC	N/A	Community relations	Yes, Ex. 11	15
Paul V. Luersen, ACP/Senior Environmental Planner/CH2M Hill	Environmental and Land Use Planning	Environmental and Land Use Planning	Yes, Ex. 9	Reserved

LIST OF EXHIBITS

(Attachments Submitted with the SUP Application Are Also Listed on the Following Table for Ease of Reference)

NO.	DESCRIPTION
N/A	SUP Application, November 2014
ATTM 1	Kawailoa Solar, LLC Organizational Structure
ATTM 2	IRS Determination Letter
ATTM 3	Site Plan and Drawings
ATTM 4	Representative Photographs within Project Site
ATTM 5	Letter of Intent for Sheep Pasturage
ATTM 6	Sheep and Solar Panels in Hawaii
ATTM 7	Decommissioning Plan
ATTM 8	Archaeological Inventory Survey
ATTM 9	Visual Simulations of Proposed Project
ATTM 10	Reflectivity Study
ATTM 11	North Shore Neighborhood Meeting Minutes
ATTM 12	Real Property Assessment for Dedicated Agricultural
EXHIBITS FILED MARCH 26, 2015	
Ex. 1	First Wind Team Biographies (Westcoatt, Siegel, Crown, Dailey)
Ex. 2	Resume of Paul V. Luersen
Ex. 3	Resume of Paul T. Matsuda
Ex. 4	Resume of Crystal Kua
Ex. 5	Resume of Robert B. Rechtman
Ex. 6	Written Direct Testimony of Wren Wescoatt
Ex. 7	Written Direct Testimony of Jed Dailey

Ex. 8	Written Direct Testimony of Tom Siegel
Ex. 9	Written Direct Testimony of David P. Cowan
Ex. 10	Written Direct Testimony of Paul V. Luersen
Ex. 11	Written Direct Testimony of Paul T. Matsuda
Ex. 12	Written Direct Testimony of Crystal Kua
Ex. 13	Kawaihoa Solar, LLC - Solar Farm Project Preliminary Civil Considerations, dated March 9, 2015, by Paul T. Matsuda
Ex. 14	Cultural Impact Assessment for the Proposed Kawaihoa Wind Farm Project, Multiple Ahupua'a, Waialua District, O'ahu Island, dated June 2011, by Joseph H. Genz, Ph.D. and Hallett H. Hammatt, Ph.D.
Ex. 15	<p>Comments to SUP Application:</p> <p><u>No Comments/No Impact:</u></p> <p>(A) Memorandum from DLNR Land Division, dated January 27, 2015. (B) Memorandum from Lori M.K. Kahikina, P.E. Director of Department of Environmental Services, dated January 30, 2015. (C) Memorandum from Mark Tsuyemura, Management Analyst of the Office of the Chief, Honolulu Police Department, dated February 2, 2015. (D) Memorandum from Michael D. Formby, Director of Department of Transportation Services, dated February 13, 2015. (E) Memorandum from Ernest Y.W. Lau, P.E. and Chief Engineer, Board of Water Supply, dated February 25, 2015.</p> <p><u>Comments:</u></p> <p>(F) Comment from Socrates D. Bratakos, Assistant Chief, Honolulu Fire Department, dated February 3, 2015. (G) Comments from Paul Murakawa, Aquatic Biologist, DLNR Department of Aquatic Resources, dated February 3, 2015. (H) Comments from Carty S. Chang, Chief Engineer, DLNR Engineering Division, dated February 9, 2015. (I) Comments from Laura Leialoha Phillips McIntyre, AICP, Project Manager, Environmental Planning Office, dated February 10, 2015. (J) Comments from Aaron Nadig, Island Team Manager, United States Department of the Interior, Fish and Wildlife Service, dated February 17, 2015. (K) Comments from Leo R. Asuncion, Acting Director, Office of Planning, dated February 17, 2015. (L) Comments from Scott E. Enright, Chairperson, Office of Planning, Department of Agriculture, dated February 19, 2015. (M) Comments from Ford N. Fuchigami, Director of Transportation, Department of Transportation, dated February 23, 2015. (N) Comments from Susan A. Lebo, Ph.D., DLNR State Historic Preservation Division, dated February 25, 2015. (O) Comments from Lisa J. Hadway, Administrator, DLNR, Division of Forestry and Wildlife, dated March 4, 2015.</p>

	(P) Comments from W. Roy Hardy, Acting Deputy Director, DLNR, Commission on Water Resource Management, dated March 4, 2015.
Ex. 16	CH2M Hill Responses to Comments, dated March 10, 2015, prepared by Paul Luersen, AICP
Ex. 17	CH2M Gill Responses to Comments, dated March 17, 2015, prepared by Paul Luersen, AICP.
Ex. 18	Email from Gary and Luann Gunder of Tin Roof Ranch to Raymond Young, dated March 9, 2015 RE: Letter in Support of SunEdison's Special Use Permit Application for Kawaihoa Solar.
Ex. 19	Letter from Richard Wallsgrove, Program Director for Blue Planet, to Raymond Young, dated November 24, 2014.
Ex. 20	Photographs (2) of Solar Farm/Sheep Grazing on Oma'o Ranch Lands
Ex. 21	Letter from Hawaii Renewable Energy Alliance, received on March 30, 2015
Ex. 22	Photographs of the Proposed Project Site, taken on March 30, 2015
Ex. 23	Preliminary Agricultural Plan; Attachment A (Beekeeping Plan); Attachment B (Montgomery Biography)

DATED: Honolulu, Hawai'i, APR 13 2015.



RANDALL F. SAKUMOTO
MARGUERITE S. NOZAKI

Attorneys for Applicant
KAWAIILOA SOLAR, LLC

PRELIMINARY AGRICULTURAL PLAN

**KAWAILOA SOLAR, LLC
Solar Photovoltaic Farm/Sheep Grazing Operation**

**Kawaiiloa Plantation
Waialua District, Oahu, Hawai'i
TMK Nos. 6-1-006:001 and 6-1-005:001**

April 2015

**Wren Wescoatt, Director of Development
Kawaiiloa Solar, LLC
1099 Alakea Street, Suite 2440
Honolulu, Hawai'i 96813**

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I. VISION/MISSION AND GOALS

Kawailoa Solar, LLC¹, is developing a 50-megawatt solar farm project to produce clean, low-cost renewable energy for the island of O‘ahu while also supporting local agriculture with plans to graze sheep on pastureland. Kawailoa Solar plans to lease the project area for the pasturage of sheep, which is a use recognized as being compatible with solar panels. Kawailoa Solar has been in discussions with several ranchers who have expressed an interest in leasing the property for sheep pasture, and has executed a letter of intent with John Morgan of Kualoa Ranch Hawaii, Inc. (“Kualoa Ranch”) for the pasturage of sheep at a rate of \$10 per acre per year. The sub-lease would commence after the Project is operational, and Kawailoa Solar will provide the tenant with fencing, access, and other infrastructure on the Project site.

The goals for the solar energy project are to have a compatible agricultural activity co-located with the solar farm and to control vegetation to prevent shading of panels by tall weeds and grasses. The goals for the proposed sheep ranch are to find good pasture land for grazing sheep and build a commercially successful agricultural enterprise. Co-locating sheep among the solar panels would be a mutually beneficial partnership that supports the generation of clean energy and the growth of local agriculture.

While it will still be a few years before the commencement of ranching activities on site in 2017, the purpose of this Preliminary Agricultural Plan is to provide initial information about the planned ranching activities and the use of the site for grazing and livestock management.

II. COMPANY SUMMARY

Kualoa Ranch is a Hawai‘i corporation doing business in the State of Hawai‘i. Although Kualoa Ranch is commonly known for tourist activities (*i.e.*, horseback rides, ATV tours, site tours, etc.), it has also been involved in cattle ranching since the 1870’s. Kualoa Ranch, which occupies 4,000 acres along Oahu’s northeastern coast, continues to raise 100% grass-fed, hormone- and antibiotics-free cattle for beef for consumption, and as of mid-2011, began retailing Kualoa Beef online and at its visitor center. Kualoa Ranch has about 500 head of cattle that graze on roughly 1,500 acres of Kualoa pasture. Focusing on agriculture and land stewardship, Kualoa Ranch is committed to expanding Kualoa’s operations to include sheep grazing.

Kawailoa Solar met with several ranchers interested in sheep grazing on the property, but Kualoa Ranch has a long-time connection to the local community and the ranching expertise to manage a large-scale ranching operation. The letter of intent signals the interest of both parties in working together to make both ventures successful.

¹ Kawailoa Solar, LLC, is a subsidiary of SunEdison, LLC.

III. OBJECTIVES

- Help provide affordable pasture land and infrastructure (e.g. fencing and roads) for the farmer or rancher, lowering costs and helping to promote local agribusiness.
- Sheep grazing could provide a sustainable way to manage vegetation, keeping the grass and weeds from shading the solar panels;
- The combined use could provide local residents with both lower-cost clean energy and locally-raised agricultural products; and
- Raising sheep on the otherwise fallow land in the project area will benefit consumers in Hawai'i because there is an unmet demand for local lamb meat on Oahu.

IV. MARKET ASSESSMENT

A. COMPETITION

There are three types of competitors that Kualoa Ranch would face:

1. **Supermarkets:** Local supermarkets sell lamb meat to consumers that are imported from Australia, New Zealand, or the Mainland U.S.
2. **Similar local farmers:** According to the 2012 Hawaii Census of Agriculture, the number of farms raising sheep and lambs in Hawaii is 353, 300 farms of which have an inventory of between 1-24 sheep, 41 of which have between 25 to 99 sheep, with only 12 farms having greater than 100 sheep. All of Oahu's sheep farms in 2012 had fewer than 100 sheep per farm. These are very similar operations to what Kualoa Ranch plans. There appears to be room in the market for additional sheep ranchers as there are no large scale sheep farm operations and the existing sheep farms do not produce enough lamb to meet market demands.
3. **Large distributors:** There are a number of lamb meat distributors or suppliers in the Mainland U.S. as well as internationally. The price is comparable and the quality can be comparable, but not necessarily. The disadvantage of a food distributor is the lack of flexibility relative to a local rancher when serving local customers.

B. TARGET MARKETS

Kualoa Ranch will have three distinct customers:

1. **Supermarkets:** Based on telephone surveys to determine the existing market for lamb meat, following are the some of the local supermarkets that carry lamb meat:

Times (Aiea, Wahiawa, Kahala, and Kalaeloa)
Whole Foods Market

Tamura's (Wahiawa)
Foodland
Safeway
KTA (Big Island)
VJ's Butcher Block (Haleiwa)

The majority of local supermarkets import their lamb meat because local sheep farmers are unable to meet the market demand. In addition, many of the supermarkets do not carry lamb meat year round due to the shortage. For example, Times (Aiea) sell lamb meat only around the holidays, while other Times locations sells lamb meat year-round but only certain cuts. Whole Foods Market sells lamb year-round but imports their lamb from New Zealand and the Mainland U.S. because there are no local lamb. In fact, in order to incentivize local farmers and ranchers, Whole Foods Market offers low interest loans. Having another local sheep rancher is attractive to local supermarkets because of the high demand for local lamb.

2. **Individual consumers.** This group of people buy local lamb meat because they have a more sophisticated palette and are more adventurous in terms of culinary habits. This group may purchase their produce and meats from farmer markets or small butcher operations. This group of consumers is more likely to make their own meals instead of going out, appreciate fine dining, and generally are from a higher socio/economic class. Direct marketing opportunities include farmers' markets and other food events like "Mealani's Taste of the Hawaiian Range." This group could also include members of different ethnic communities and other farmers who could purchase live lambs directly from the farmer for livestock or for cultural and religious celebrations and events.
3. **Restaurants.** The restaurants are a year round customer which is helpful to balance the seasonal demand of the consumers. Many restaurants, from fine dining to casual dining, will have a more convenient source for lamb meat, especially where there is a movement towards buying local. Lamb meat will be directly marketed to restaurants in Hawaii, similar to Shinsato Farm, which produces high quality pork. Shinsato Farm sells pork to a variety of Oahu restaurants, including, but not limited to: Bernini Honolulu, Town, La Tour Café, BLT Steakhouse, and Roy's Ko'olina. There are also a number of food events held year-round at which a sheep farmer may promote their product and increase awareness of the availability of local lamb to consumers, restaurateurs, and individual chefs.

IV. OPERATION COMPONENTS

A. PROPOSED SITE

The proposed site is within Kamehameha School's Kawailoa Plantation, which is comprised of agricultural fields and which is the current site of the Kawailoa wind farm built in 2012. The proposed project site is located within the State Agricultural District and would occupy approximately 332.3 acres of Class B land, 37.9 acres of Class C land, 12 acres of Class E land, and 1.9 acres of Class A land, which is comprised entirely of an existing roadway, under

which approximately 550 linear feet of electrical line would be installed. The proposed site area has recently been classified as Important Agricultural Land (“IAL”) under Part III of Chapter 205, HRS.

At the special use permit application hearing held on April 1, 2015, before the Planning Commission, Chair Hazama indicated that HRS §205-50 is ambiguous as to applicability and effect on Kawaihoa Solar’s special use permit application due to the project site’s recent designation as IAL, and requested an agricultural plan for Kawaihoa Solar’s intended sheep ranching operation as a compatible agricultural use.² In order to address the Planning Commission’s inquiry and request, Kawaihoa Solar provides the following to address HRS §205-50:

- (b) Upon acceptance by the county for processing, any application for a special permit involving important agricultural lands shall be referred to the department of agriculture and the office of planning for review and comment.

As part of the special use permit application process, Kawaihoa Solar’s application had been provided to the Department of Agriculture (“DOA”) and Office of Planning (“OP”) for comment.

The DOA noted in its February 19, 2015 comment letter that IAL designation appears to be contrary to one of the LUC’s guidelines in determining ‘unusual and reasonable use’ – that the land upon which the proposed use is sought is unsuited for the uses permitted within the (Agricultural) district.” (Ex. 15(L)). Notably, the DOA, in its letter dated January 29, 2015, regarding Kamehameha School’s application for IAL designation, stated that the project site “is also the most poorly suited to agricultural use because of the numerous gulches, poorer soil quality, and lack of supplemental irrigation water supply.” (Ex. 15(K)). Regardless, the DOA recommended that the City impose a condition to the effect that Kawaihoa “shall have established a sheep pasture operation or other agricultural enterprise on the property in compliance with Act 55, 2014 Session Laws of Hawaii for the duration of the operation of the solar energy generation facility.”

In its February 17, 2015 comment letter, the OP noted that the project is designated IAL, went through the guidelines for special use permits in HAR § 15-15-95, and then noted that since the project would be leased for the pasturage of sheep, which the OP recognizes as a viable agricultural activity, and since the site will be restored after the operational life of the solar farm, the project meets IAL requirements. The OP requested that the Commission include a condition that Kawaihoa meet the requirements of HRS § 205-4.5(a)(21)(A),(B),(C) re: compatible use (sheep), proof of financial security (letter of credit), and decommissioned (decommissioning plan submitted). (Ex. 15(L)).

- (c) Any decision by the land use commission or county pursuant to this section shall specifically consider the following standards and criteria:

² A sheep ranching operation is a permitted use in the State Agricultural District as well as in the City’s AG-1 zoning district (*see* HRS § 205-4.5(a) and LUO Table 21-3).

- (1) The relative importance of the land for agriculture based on the stock of similarly suited lands in the area and the State as a whole;

See Ex. 15(L), OP comment letter dated February 17, 2015. The project site area has been and is currently fallow. Kawailoa Solar is committed to introducing and implementing an agricultural component to the otherwise fallow land, in the form of sheep grazing.

- (2) The proposed district boundary amendment or zone change will not harm the productivity or viability of existing agricultural activity in the area, or adversely affect the viability of other agricultural activities or operations that share infrastructure, processing, marketing, or other production-related costs or facilities with the agricultural activities on the land in question;

Not applicable. This is an application for a special use permit, not a proposed district boundary amendment or zone change.

- (3) The district boundary amendment or zone change will not cause the fragmentation of or intrusion of nonagricultural uses into largely intact areas of lands identified by the State as important agricultural lands that create residual parcels of a size that would preclude viable agricultural use;

Not applicable. This is an application for a special use permit, not a proposed district boundary amendment or zone change.

- (4) The public benefit to be derived from the proposed action is justified by a need for additional lands for nonagricultural purposes; and

The public will benefit from installation of the 50 MW solar energy facility to provide clean, renewable power to HECO for integration into their electrical distribution system, ultimately reducing the cost for electricity to Oahu consumers. Kawailoa Solar is also committed to implementing an agricultural component to the solar farm in the form of a sheep ranching operation, which will provide a much-needed local source of lamb meat. The Project site is more than suitable for grazing sheep because the land is dry enough to ensure that foot rot will be at a minimum, but damp enough to sustain a large supply of forage for the sheep, and the land has a slight slope for good drainage. No barn or shed will be necessary as the PV panels provide shade.

- (5) The impact of the proposed district boundary amendment or zone change on the necessity and capacity of state and county agencies to provide and support additional agricultural infrastructure or services in the area.

Not applicable. This is an application for a special use permit, not a proposed district boundary amendment or zone change.

B. SHEEP STOCK

1. DESIRED SHEEP BREEDS

In the tropics, hair sheep breeds were developed for tropical climates. The biggest advantage that hair sheep have over woolled sheep, especially in the tropics is that they do not need to be sheared. Hair sheep tend to be more resistant to internal parasites. These sheep tend to have longer "sides" with greater lean, and less fat carcasses. Hair sheep can be horned (Dorper) or polled (without horns, St. Croix, Barbados). Polled breeds are easier to work with and the horns do not have to be trimmed or removed. The common hair sheep breeds are St. Croix, Kathadin, Barbados black belly, and Dorper, and their crosses.

2. STOCKING RATES

There are a number of factors that will influence the number of sheep that can be pastured at the project site, including:

- Arrangement of the solar panels
- Resulting number of grazeable acres after arrays are installed
- Grazing system used (i.e., continuous grazing vs. controlled grazing)
- Forage system used (i.e., perennial pastures vs. combination of perennials and annuals)
- Forage types (i.e., cool season vs. warm season)
- Soil type and fertility
- Climate

Under typical Hawaii pasture conditions, a 1000 lb. cow can use 2 acres of pasture, which equates to 7 ewes (@ 150 lbs. each of breeding stock) per 2 acres, depending upon body size. This would be the equivalent of 350 sheep per 100 acres of grazeable pastures. The stocking density of the will have to be adjusted to compensate for the shading due to the solar panels. If PV panels cover 1/3 of the fenced area, the number of sheep on the pasture, may have to be adjusted downward to ensure sufficient forage is available. Considering the factors identified above, a reasonable estimate for the number of sheep to pasture would likely fall within the range of 400-500 for the project area. Initially, Kualoa Ranch proposes to build up to a flock of 200 sheep, then expand from there as needed, to the optimal level.

C. GRAZING

1. Grazing Management System

Grazing management systems can be categorized into two broad areas, continuous grazing and controlled grazing. Continuous grazing allows sheep unrestricted access to a fixed pasture-unit of land throughout the majority of the grazing season. Controlled grazing involves the strategic movement of sheep through multiple grazing units based on the nutritional needs of the animals and the general well-being of the forages being grazed. Continuous grazing requires few inputs, while controlled grazing requires a higher level of management and additional resources in the form of fence and water.

In order to ensure that the project is not overgrazed, the sheep rancher will utilize a controlled grazing system, including creation of a schedule for rotating the herd from one paddock to another.

The total Project site will be separated into several pastures of varying sizes with fixed (unmovable) fencing of posts and hog-wire or similar construction. Within those pastures, the herd will be contained within smaller paddocks created by a movable electrified fences. The number of paddocks contained in a specific area is dependent upon several factors including the total acreage of the perimeter fencing of the solar arrays, the amount of vegetation and the location of infrastructure (e.g., inverters and roads). The total site would likely be divided into 30 paddocks of approximately 12-15 acres. Rotation also depends on the factors listed above but generally can take place once or twice weekly. While there will always be variation, the goal is to keep the average grass to a few inches without overgrazing. This creates sustainable forage in the pasture, keeps the animals healthy, minimizes runoff, and prevents shading of the solar panels.

A separate fenced vacant area approximately 20 acres in size located adjacent to the solar facility will be utilized for observation and maintenance of the animals -- culling, vaccination, castration, docking the tails, etc.

Observation is perhaps the most important tool for making grazing management decisions, including paddock arrangement and rotating the sheep. A sheep rancher can become adept at "eyeballing" the approximate amount and quality of forage being consumed by his livestock. Factors to consider include:

- Sheep rest and ruminate more than cattle: seven to 10 hours a day as opposed to four to nine hours a day for cattle.
- Sheep can graze rugged terrain more easily than cattle.
- Sheep are reluctant to graze areas that have natural predator cover.
- Sheep may walk from three to five kilometres for water (depending on topography). The distance they have to travel has a significant influence on production. The greater the distance to water, the more energy and time is needed to satisfy the sheep's requirements.
- Livestock seek shade and cool locations during hot summer periods, which may result in excessive grazing under trees and in riparian areas.
- Livestock usually overuse dry southern exposures early in spring and then switch to riparian and shaded areas during hotter times of the year. North facing slopes usually remain underused.
- Sheep have a strong flocking instinct and maintain social spacing and orientation in pens as well as pasture. Breed, stocking rate, topography, vegetation, shelter and distance to water may influence this instinct, but isolation of individual sheep usually brings about signs of anxiety and may cause the sheep to try to escape.
- Sheep tend to "follow" one another even in activities such as grazing, bedding down, reacting to obstacles and feeding.
- Assuring sheep mineral supplements are provided.

2. Water and Foraging

The amount of water consumed by a sheep is based upon the size, physiological condition (i.e. lactating, pregnant) and the environmental temperature. Higher temperature and humidity will result in greater consumption of water. Sheep will consume 0.5 to 2.0 gallons of water per day while grazing. Some of the water consumption may come through the eating wet forage. Water troughs are movable throughout the paddock and can help distribute sheep to different parts of the paddock. If an area is being under-grazed, moving the water source can encourage the sheep to move to areas where grazing pressure is needed.

Kawailoa Plantation receives water through an agricultural irrigation system constructed and maintained by Kamehameha Schools, which delivers water from a private water system from the Opaepala reservoir. The system capacity is adequate to support the proposed solar farm and the sheep ranching activities, as well as all other agricultural activities planned by Kamehameha Schools for the Kawailoa Plantation area. Kualoa Ranch will install water troughs and pumps and pipes required to deliver ample and accessible water. Should an alternative agricultural activity be pursued instead of sheep ranching, there would also be sufficient water available through the on-site irrigation system.

Typically forage constitutes 75 to 90 percent of the total diet for sheep. Sheep are excellent converters of forage to meat and fiber and are capable of producing a USDA Choice carcass from forage alone. Sheep consume a wide variety of forages, and selectively graze numerous weeds and other pasture menaces. Sheep prefer to graze hillsides and steep slopes and provide a means for improving forage utilization and fertility on areas not accessible to farm equipment

The vegetation in the project area is a mixture of aggressive weedy species that have taken over since the abandonment of sugarcane agriculture. The perennial Guinea grass which covers virtually all of the former sugarcane lands within the project area, was introduced from Africa to counteract erosion. Dense tussocks of this grass conceal the ground surface, and in some areas stand as tall as ten feet. Guinea grass is native to Africa but this grass was introduced to almost all tropical countries as a source of animal forage. It grows well on a wide variety of well-drained soils of good fertility and it is suitable to stop soil erosion. Guinea grass is a clump-forming perennial which grows best in warm, frost-free areas and can withstand continuous heavy grazing.

Strategic management of pasture forage through the use of controlled grazing provides a tool by which producers can lengthen the grazing season and improve overall forage utilization per unit of land area. The use of high tensile electrified wire and electrified temporary fence should make the application of controlled grazing economical. The number of sheep per acre will depend on large part the sheep's daily forage needs and then comparing that needed amount to the daily amount of forage produced in the pasture. Until the project site is prepared and the solar farm is in operation, these quantities and factors cannot be estimated exactly. The rancher's goal is to develop and maintain a target flock size that can efficiently graze the pasture areas without needing supplemental feed sources – even through several months of dry weather. The flock should also balance the number of sheep sold with the birthing rate each year.

Seasonal variation is to be expected, and continual management of the flock size and breeding is essential.

The following is a table illustrating the Daily Ewe Nutrient Requirements for consideration in estimating the number of sheep per pasture forages:

Table 1. Daily Ewe Nutrient Requirements*									
Ewe Bodyweight	DMI, lb			TDN, lb			CP, lb		
	FG	LG	L	FG	LG	L	FG	LG	L
154	3.1	4.0	6.2	1.7	2.3	4.0	.09	.42	.92
176	3.3	4.2	6.6	1.8	2.4	4.3	.31	.44	.96
198	3.5	4.4	7.0	1.9	2.5	4.6	.33	.47	.99

*Abbreviations used: DMI=Dry Matter Intake; TDN=Total Digestible Nutrients (Energy); CP=Crude Protein; FG=First 15 weeks of gestation; LG=Last 4 weeks of gestation; L=First 6-8 weeks of lactation

Alternatively, for a comparison to other foraging animals and forage types, refer to the following tables for context:

Table 1			
Animal Class	Pounds of Dry Forage*		
	Consumed Per		
	Day	Month	Year
Cow with calf:	26	790	9,490
1 yr. Old Cattle:	15.6	474	5,694
Mature Horse:	32.5	988	11,862
Mature Sheep:	5.2	158	1,898

Mature Goat:	3.9	118	1,423
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Table 2	
Type of Pasture	Average Annual Useable Pounds of Forage Per Acre Per Year*
Dryland Crested wheat Pasture	450
Dryland Pubescent/ Intermediate wheat Pasture	700
Irrigated Smooth brome Pasture	3,000
Dryland Native Pasture on Clayey Soils	375
Dryland Native Pasture on Deep Sand Soils	750
Dryland Native Pasture on Loamy Soils	375
Dryland Native Pasture on Wet-Meadow Sites	1,625
Dryland Native Pasture on Salt Flat Sites	375

Table 3		
How Much Forage is Needed?		
Total amount of forage needed per month (based on figures in Table1):		
Cow & Calf	2 Horses	Sheep

790	1,976	158
2,924		
Pounds Total		
How Much Forage Do We Have?		
Total Forage Produced Per Year:		
Acres	Pounds of Useable Forage	
	Per Acre Per Year	
	(based on figures in Table 2)	
10	375	
3,750		
Pounds Total		
Total Forage Produced Per Month:		
Total Pounds of Forage Produced Per Year	Months Per Year	
3,750	12	
312.5		
Pounds Per Month		
How Long Can This Pasture Support Our Cow & Calf, Two Horses, and One Sheep?		
Total Forage Available Per Month/Needed forage per month		
$312/2,924=0.1$ month / or 72 hours / or 3 days per month/ or 36 days per year.		

D. TRANSPORT AND SLAUGHTER

Slaughterhouses on all islands will process sheep. In addition, some entrepreneurs are exploring the feasibility of mobile or modular slaughter and processing technology for Hawai'i. According to the 2014 Hawai'i agricultural Statistics Service, fewer than 200 head of lamb, averaging 135 lbs. live weight, are slaughtered in USDA-inspected slaughterhouses statewide annually.

On Oahu, the lambs will be transported to the slaughterhouse. With a flock of 200, it is estimated that 25-30 animals would be transported for slaughter each month. The farmer could

also contract with a wholesaler who would then be responsible for slaughter and marketing of lambs.

The Hawaii Sheep and Goat Association (“HSGA”) has in the past served as a clearinghouse for sales of sheep inter-island. Its mission is to “support, improve and strengthen Hawaii’s sheep and goat Ag community and its infrastructure, through education, networking and marketing programs.” Kualoa Ranch may utilize local resources like HSGA to increase the likelihood of success of its sheep farming operation statewide.

E. PERCENT LAMB CROP

Percent lamb crop is usually defined as the number of quality lambs marketed per ewe exposed for breeding. While there are some additional costs associated with producing a higher percentage lamb crop (e.g. lamb finishing costs), for the most part extra lambs mean extra profit. It costs the same amount of money to maintain a ewe no matter how many lambs she produces. Overhead or fixed costs are reduced when productivity is higher. Most breeds of sheep are capable of producing a 200 percent lamb crop if they are fed and managed properly.

According to the 2012 Hawaii Census of Agriculture, the following is a ranking among the islands based on sales of sheep, goats, and mohair:

- Kauai (\$736,000)
- Hawaii (\$389,000)
- Maui (\$360,000)
- Oahu (\$82,000)

As the market for local Oahu-raised lamb grows, it is believed that sales of sheep/goat on this island could grow to more than \$1,000,000. If the sales from lamb raised at the Kawailoa project are successful, it is estimated that the ranching operation could generate 25% - 40% of Oahu-raised lamb sales.

V. CONTINGENCY PLAN

In the event that Kualoa Ranch does not ultimately lease the project area to raise sheep, Kawailoa Solar has considered the following options for compatible agricultural use for the project:

- *Another sheep rancher:* The first recourse would be to sign another sheep ranching operation. Several ranchers have expressed an interest. One company, Tin Roof Ranch already maintains a small sheep farming operation on nearby property and has expressed an interest in expanding its operations to Kawailoa Solar’s solar farm.

Should co-locating sheep with the solar farm not be successful, Kawailoa Solar has considered the following alternatives:

- *Grazing Lowline cattle.* These cattle are a breed of small, polled beef cattle developed in Australia, out of Angus breeds. These cattle are not dwarfs but a small breed, usually around 3 ½ to 4 feet tall and around 1300 lbs. as an adult. They tend to be very docile. There is only one rancher in Hawaii raising Australian Lowline cattle.
- *Free-range poultry.* Some solar farms in Europe have been experimenting with combining solar panels with free range meat birds, such as chickens. To qualify as “free-range” the birds need a certain minimum acreage, with the large solar farm would provide. As the birds would be flightless, the risk of them leaving the fenced pastures or landing on solar panels would be minimal. It is worth noting that poultry would not be as effective at grass management as grazing sheep or cattle.
- *Beekeeping.* Beekeeping is another compatible agricultural activity with solar panels. The project area is more than sufficient for successful beekeeping operations, because there is sufficient flat land to place the hives, access to potential hive sites for vehicles to transport honey-laden frames away from the site, and sufficient natural vegetation to provide bees with access to pollen and nectar from flowering plants throughout the year.

Attached as **Attachment A** is a proposed plan prepared by Steven Lee Montgomery, Ph.D. and Yuki Uzuhashi of Manoa Honey Co., LLC.

REFERENCES

Correa, Nicole Correa and Vincent, Douglas L., *Sheep and Solar Panels in Hawaii: A Report Written for First Wind*, Department of Human Nutrition, Food and Animal Sciences, College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa (2014).

Government of Saskatchewan, *Grazing Management for Sheep Production*, <http://www.agriculture.gov.sk.ca/Default.aspx?DN=3024b1e5-9515-458b-b759-6ed2501dba3c>.

Hawaii Sheep and Goat Association (2013), <https://hawaiisheepandgoatassociation/Home>.

Steven H. Umberger, Extension Animal Scientist, Sheep, *Sheep Grazing Management*, Virginia Cooperative Extension, Virginia Tech, Virginia State University, Publications and Educational Resources (May 1, 2009), <https://pubs.ext.vt.edu/410/410-366/410-366.html>.

Natural Resources Conservation for Small Acreage Land Users Brochure, Southeast Weld Soil Conservation District, 1996, 303-659-7004.

USDA, Natural Resources Conservation Service, Grazing Lands Technology Institute, National Range and Pasture Handbook, September 1997.

USDA, Natural Resources Conservation Service, Technical Guide, Section II-E, *Various Colorado Range Site Descriptions*, 1980 to 1989.

USDA, Natural Resources Conservation Service, Technical Guide, Section IV, Standards and Specifications, Pasture and Hayland Management, Colorado, April 1985.

RESOURCE BACKGROUND

Daryl Kaneshiro of Oma'o Ranch Lands on Kaua'i has been a cattle and sheep rancher for approximately 15 years. In 2013, he developed a 300-kilowatt fixed tilt solar array on three acres on his property and sells his power to the Kaua'i Island Utility Cooperative. Mr. Kaneshiro grazes sheep at his solar farm to control grass and other vegetation. Mr. Kaneshiro also has a contract with KIUC for vegetation management at KIUC's 12 MW solar farm in Koloa where he grazes about 120 head of sheep.

Proposal to operate beehives at site of Kawaiiloa Solar LLC, O'ahu



Ms. Bee - making Hawai'i sweeter



Steven Lee Montgomery, Ph. D. O'ahu Honey
94-610 Palai Street, Waipahu, Hawai'i 96797-4535
808-676-4974
manninga001@hawaii.rr.com

Yuki Uzuhashi Manoa Honey Co, LLC
930 Palm Pl Wahiawa HI 96786
808-927-0501
yuki@manoahoney.com

11 April 2015

At the request of Kawaiiloa Solar, LLC., Sun Edison Hawaii¹, we submit the following plan for a beekeeping operation at the site of the proposed Kawaiiloa Solar Farm, located on portions of Tax Map Key numbers (1) 6-1-5:1 and (1) 6-1-6:1, which comprise approximately 300 acres accessed at Ashley Road and Kamehameha Highway.

SITE REQUIREMENTS

This site incorporates several features that are required for a good 'bee yard' or apiary:

- Sufficient flat land on the perimeter of the planned solar panel arrays to place hives in small clusters;
- Access to hive sites for vehicles carrying the hives and transporting honey-laden frames away from the site;
- Security for the hives from tampering by the public, including a gate with entry code and remote location. We understand that construction of the Solar Farm will add perimeter fencing, providing additional security to the hives. If sheep or other livestock are present on the site, additional fencing may be required to ensure hives are not accidentally disturbed by the animals;
- Sufficient natural vegetation that would provide bees with access to pollen and nectar from flowering plants. Ravine slopes in and near the property are densely forested with 'ōhi'a lehua (*Metrosideros* sp.), alahe'e (*Canthium odoratum*), koa (*Acacia koa*), strawberry guava (*Psidium cattleianum*), African tulip (*Spathodea campanulata*), Christmas berry (*Schinus terebinthifolius*), Java plum (*Syzygium cumini*), and more.

¹ SunEdison Hawaii, 1099 Alakea St, #2440, Honolulu, HI 96813.

NUMBER OF BEEHIVES

Initially, approximately 15 Manoa Honey and 5 O'ahu Honey hives will be moved to the site. We anticipate, based on the vegetation now present at the site that as many as 50 hives might be supported there by the two companies.

SOURCES OF BEEHIVES

Both Manoa Honey and O'ahu Honey have existing, productive hives that could be moved to this location. [Figure 1 and 2] After construction is complete and permission is given, hives could be moved to the site in a timely manner. Approximately 20 hives could be moved to the agreed upon apiary sites initially.

Both beekeepers already have hives in several locations. This location is closer to their bases than some existing sites. Hives may be chosen for relocation to reduce travel time as a cost. Hive movement expense is mostly the beekeeper's time.

As the beekeepers become familiar with the honey flow results and experience practical, on-site logistics requiring adjustments to plan implementation, more could be added.

SOURCES FOR HIVE REPLACEMENTS and EXPANSION

Both Manoa Honey and O'ahu Honey receive calls from the general public and businesses when bee swarms are seen seeking new homes. [Figure 3] Also, both do bee removals when bees have established hives at inappropriate locations, such as inside the walls of homes or horse stalls, trees in school yards and similar public safety situations. [Figure 4] These bees need new, safe, managed homes where they can be protected from diseases and pests. These swarms will be used to increase the number of hives at Kawaiiloa Solar and to replace any faltering bee colonies.

Additionally, to attract mobile, wild swarms searching for a new home, we would place 2 or more empty hive boxes with wax foundation and covers at each bee yard to provide an attractive, 'fully furnished, ready to occupy' home to swarms.

HIVE MAINTENANCE

Each beekeeper will do hive maintenance tasks to keep existing hives healthy and to increase to 50 hives. Relocation tasks are conducted at night to assure all bees are present. Some tasks are conducted during daylight hours to assure fewer bees are present. Depending on the hive's condition, visits may be made approximately every 2 to 4 weeks. Neither beekeeper anticipates a measurable change in the cost of hive maintenance due to the location. These tasks must be carried out regardless of hive location, thus do not add to the cost of business.

Hive Maintenance [cont.]

- Number each hive and maintain records of hive placement, health, medicine, feeding, etc., especially, record queen brood laying patterns to be able to take appropriate remedial actions;
- Based on need, each beekeeper will inspect his hives for productivity, bee health, crowding, invasive pests, and other factors [Figure 5];
- Replace queens where hives show spotty brood due to erratic egg laying patterns;
- As needed, encourage queen egg laying by placing a soy / pollen-like “cookie” on brood box;
- Provide each hive with 1 empty box as appropriate to accommodate hive growth.

FOOD and WATER SOURCES

Bees need access to nectar, pollen, and water throughout the year. [Figure 6 and 7]

This site appears to provide all these resources. As the bee hives are established, the beekeepers will obtain experience with the blossoming cycle of vegetation in the greater area. Bees can forage for more than a mile when needed to obtain good nectar and pollen sources. If it appears the bees are not receiving adequate nutrition nearby, it may be prudent to establish more nectar and pollen rich plants on the outskirts of the solar farm. We understand that Kawaioloa Solar is willing to do so if necessary. Dr. Montgomery’s training as a biologist will allow him to assist in choosing plants that would thrive without maintenance and using existing rainfall. First choices would be varieties of native plants that are known as good nectar / pollen sources, but are low in stature so as not to shade the solar panels. Bushy ‘ōhi‘a lehua (*Metrosideros* sp.) and ‘ilima (*Sida* sp.) would be among the species considered, as both would have grown in the area naturally, provide nectar and pollen, and when the appropriate sub-species is chosen, will not become large. [Figure 7 and 8 show bees accessing ‘ilima blossoms.]

Water in nearby gulches appears sufficient for the bees’ needs. Bees also are known to use sources such as stock watering troughs, puddles that form after rains, and other transient opportunities.

HOW THE HONEY WILL BE SOLD

Each beekeeper will harvest honey based on the productivity of a particular hive. There is a steady and committed pool of buyers of ‘raw’ honey produced in Hawai‘i. All honey produced at Kawaioloa Solar will find a ready market.

Manoa Honey Co. has established commercial outlets for honey. Among the stores that carry their products are Wholefoods Markets, Down to Earth, Kokua Market, ABC Stores, and many others. Also Manoa Honey is served at Michel's at the Colony Surf, Hula Grill Waikiki, and several other restaurants. For a full list of outlets that carry Manoa Honey visit their web site <http://manoahoney.com/stores.html>.

How The Honey Will Be Sold [cont.]

O'ahu Honey is a small operator and markets through direct sales. Many buyers are steady repeat customers, one individual placing over 40 orders in a bit more than 16 months. Another customer reviewed the honey by writing "Holy Blessings!!! Your raw honey is the best honey I've ever tasted!!! Wow!!! Tastes like Magic!!!"

ANOTHER PRODUCT OF THE HIVES

Importantly, in addition to the products of honey and honeycomb, the hives provide an important service. **Pollination** of both commercial crops, home garden vegetables and fruits, as well as wild plants, native and introduced, is an important 'product'. Without bees, there would be far fewer edibles or even decorative flowers. Even 'greens' such as kale or lettuce, and root crops such as beets and carrots, begin life as a seed. Seeds are produced by pollinated flowers. Figure 8 and 9.

Qualifications

As background, both of us have decades of beekeeping experience and are both members and officers of the Hawai'i Beekeepers' Association. Both regularly rescue wild bee swarms and remove bees from private property as requested.

Mr. Yuki Uzuhashi is the owner / manager of Manoa Honey Co. Currently he farms 200+ colonies on O'ahu. He has been a beekeeper on a commercial scale since 2004 in Japan and U.S.

Dr. Steven Lee Montgomery has been a beekeeper and forest entomologist since 1957.

Ms. Anita Manning is his assistant and bottles and markets their honey.

Expectations

To make beekeeping safe and efficient at the site, the beekeepers will rely on Kawaioloa Solar to provide:

- clear maps marked to identify the areas where hives may be placed without interfering with the efficient functioning of the solar panels;
- prior notification when Kawaioloa Solar needs a hive to be moved with sufficient time for the beekeeper to schedule the change of location [minimum 21 business days];
- a system of independent access to the hives outside of normal business hours; relocating captured swarms into hives occurs without warning; moving hives and some hive maintenance work needs to be done at dusk or after dark to ensure all bees are present;
- for the safety of the bees and Kawaioloa Solar employees, assurance that a safe distance will be maintained by equipment, vehicles, etc. from the hive clusters [each hive requires approximately 4 sq. ft. with about 1 ft. between hives]. Sheep or other livestock, if present, should be kept away from the hives to ensure they will not knock over a hive accidentally.



FIGURE 1
Manoa Honey Company has sufficient hives to begin the population of the Kawaihoa Solar site.



FIGURE 2
Beekeeper Yuki Uzuhashi and his wife are active beekeepers as well as owners.



FIGURE 3

When wild hives become crowded a hive may raise a new Queen and divide – sending out a swarm to find a new home. Wild bee swarms will be one source of bees for expansion hives. Relocation of swarms is a service beekeepers provide to the community.

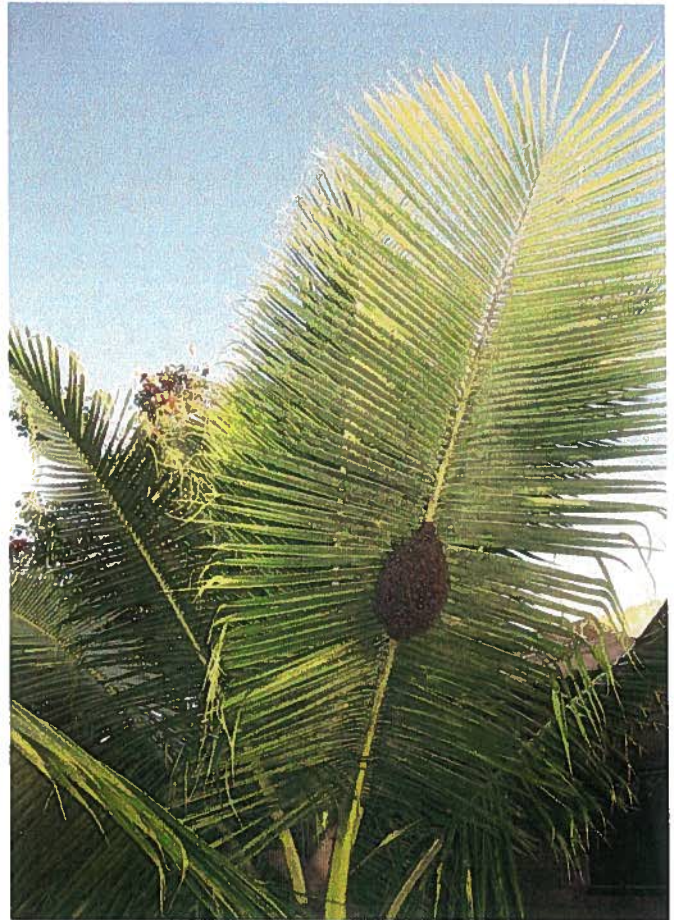


FIGURE 4

Removal of bees from structures is another source of bees to keep the hives growing and maintain a strong bee yard.

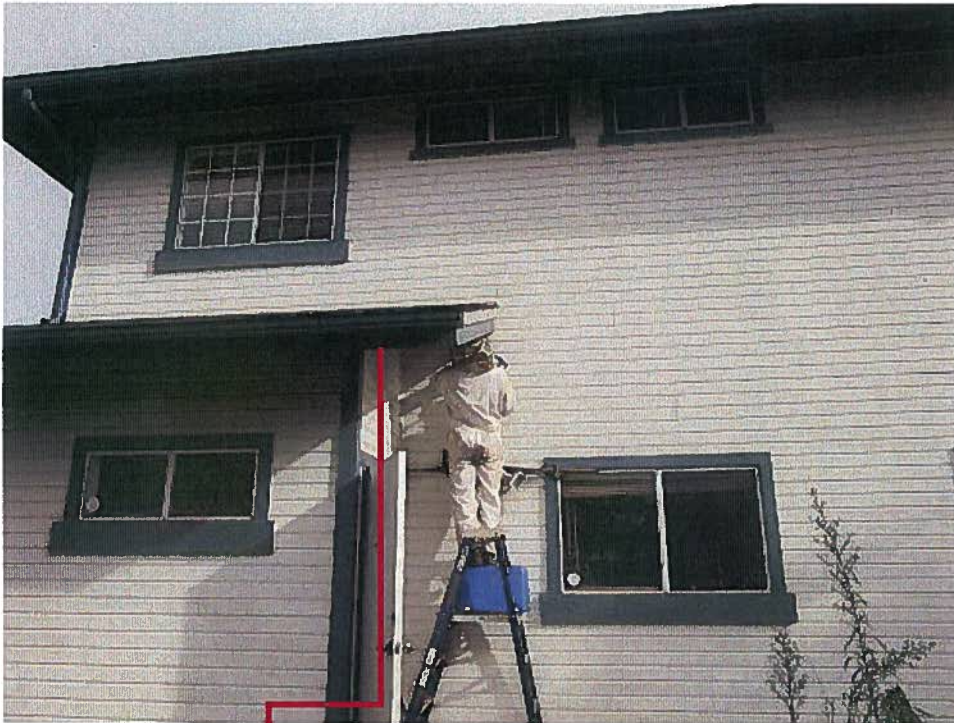




FIGURE 5
Periodic inspections will be done to check on the health and productivity of the individual hives.



FIGURE 6. A worker cleans up honey on a beekeeper's hand. Notice she has her straw-like mouth [proboscis, blue arrow] out AND her antenna [black arrow] on the honey. This is like a human taking a deep breath when entering a bakery to get the full aroma and appreciate the experience. Ms. Bee enjoys her work !



FIGURE 7. Bees pack pollen on their hind legs and carry to the hive as baby bee food. Ms. Bees doesn't need plastic shopping bags! She carries everything in an environmentally friendly way.



FIGURE 8 and 9. Bees visiting flowers become covered in pollen. They transfer some pollen to the next flower visited, cross pollinating plants and make most fruit and vegetable farms more productive.

Steven Lee Montgomery, Ph. D.
94-610 Palai Street, Waipahu, Hawai'i 96797-4535 USA
Phone (808) 676-4974 fax (808) 677-3721
email manninga001@hawaii.rr.com

Steven Montgomery has decades of beekeeping experience both in Hawai'i and Indiana. He has mentored several beginning beekeepers on multiple islands. In 2009, he arranged and managed packing, transport, and situating of a container-load of Kaua'i bees at a new O'ahu location.

He is an experienced biologist with field collections in terrestrial and fresh water habitats in Hawai'i and Oceania. His work has included research on the ecology of caterpillars and native *Drosophila* flies. He is credited with discovery of 18+ new insect species and several plant species in Hawai'i, and numerous rediscoveries, new localities, and new state or island records for insects and plants.

Montgomery has contributed to many Environmental Assessments for projects throughout the Hawaiian Islands. A self-employed biologist since 1978, he earned a Ph. D. and Masters in Entomology (University of Hawai'i, Manoa, 1984, 1975) with formal courses and seminar credits in the Bio-control specialty. In 1979, he served as Assistant Botanist, for the U. S. Fish and Wildlife Service Island Forest Bird Census Team, Hawai'i Island.

He is a volunteer Associate in Science with the Bernice P. Bishop Museum, Honolulu.

In 2014 and 1980 he was asked to serve as a technical consultant to the Advisory Subcommittee on Plants, Plant Quarantine Branch, Hawai'i Department of Agriculture. He served 10 years as a Governor's appointee to the Natural Area Reserves System Commission and 5 years on the State Land Use Commission. He worked for several years as a researcher for Hawai'i legislative committees, including Health, Marine Resources, Ecology, and Environment. He is a 44 year member and former officer of the Hawaiian Botanical Society. In part due to advocacy of natural and bio-control of weeds like *Miconia*, a tropical American escapee from several Pacific gardens, he received the 1997 Hawai'i Environmental Education Association award.

BEFORE THE PLANNING COMMISSION
OF THE CITY AND COUNTY OF HONOLULU

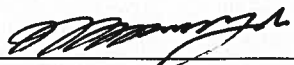
In the Matter of the Application of) FILE NO. 2014/SUP-6(RY)
)
)
KAWAIILOA SOLAR, LLC) CERTIFICATE OF SERVICE
)
For a New Special Use Permit To Allow)
Development of a 50-megawatt photovoltaic)
(PV) Energy Generation Facility and)
Accessory Uses and Structures On Lands)
Rated Class A, B and C by the Land Study)
Bureau, Ashley Road, Kawaiiloa Ahupua'a,)
Waialua District, Oahu, Hawai'i, Portions of)
Tax Map Key Nos.: (1) 6-1-005:001 and (1))
6-1-006:001, Part of Kamehameha School's)
Kawaiiloa Plantation)

CERTIFICATE OF SERVICE

THE UNDERSIGNED HEREBY CERTIFIES that on this date, a true and correct copy
of the aforementioned document was duly served upon the following by hand-delivery,
addressed as set forth below:

PLANNING COMMISSION
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

DATED: Honolulu, Hawai'i, APR 13 2015.



RANDALL F. SAKUMOTO
MARGUERITE S. NOZAKI

Attorneys for Applicant
KAWAIILOA SOLAR, LLC