

Bird and Bat Conservation Plan – Makani Energy Kite  
Project, South Kohala District,  
Island of Hawai‘i, Hawai‘i

BUSINESS CONFIDENTIAL INFORMATION

Makani, an X Project, Google LLC.

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## 1 Introduction

Makani, a project of X, an Alphabet Company, is proposing to test a utility-scale energy kite on privately owned property on Parker Ranch, Waimea, Island of Hawai‘i. This research project is aimed at testing this new technology to validate its efficacy in generating renewable energy on a utility-sized scale.

As part of its due diligence, Makani has conducted biological surveys on the Parker Ranch site, and has identified several avian and mammalian species which may use resources on and around the proposed facility. In keeping with the voluntary Land-Based Wind Energy Guidelines published by the U.S. Fish and Wildlife Service in 2012 (WEG, or “the Guidelines”), Makani has prepared this Bird and Bat Conservation Plan (BBCP) to document its environmental due diligence and risk modelling efforts, to avoid and minimize impacts on local wildlife, and in the unlikely event that a listed species or migratory bird is downed, injured or killed by project activities, to ensure that the appropriate emergency response and reporting protocols are in place as part of Makani’s Standard Operating Procedures (SOPs).

## 2 Regulatory Background and BBCP Scope

The Endangered Species Act of 1973 (16 U.S.C. §§ 1531 et seq.; ESA), among other provisions, prohibits the unauthorized take<sup>1</sup> of certain listed species. The Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.; MBTA), among other provisions, prohibits the take<sup>2</sup> of listed migratory birds. As part of its implementation of these and other statutes, and to advance its broader mission to “conserve, protect and enhance fish, wildlife, plants and their habitats,” the U.S. Fish and Wildlife Service (FWS) has prepared voluntary Guidelines for wind energy facilities aimed at addressing risks to species of concern (WEG, 1).

The Guidelines primarily contemplate long-term, commercial-scale wind energy facilities based on wind turbines of conventional design, as reflected in their five-tiered framework spanning multiple years of planning, construction, and operation (WEG, 5). However, because of the close alignment between the goals of the Makani project and the Guidelines’ stated goals of promoting compliance with law, conserving species of concern, and improving the state of the art in data gathering and risk mitigation, Makani intends to follow the recommendations set forth in the Guidelines to the extent applicable, and to work with FWS to tailor its approach to the circumstances of the Parker Ranch site in Hawai‘i.

Because of the research and development nature of the Makani project, described in Section 4, not all recommendations of the Guidelines are applicable, as summarized in

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<sup>1</sup> “The term ‘take’ means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” 16 U.S.C. § 1532.

<sup>2</sup> Here, “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.” 50 CFR 10.12

the table below. In the event of any significant expansion or extension of the testing program (including deployment of additional energy kites or operations beyond the anticipated testing period), Makani will revise this BBCS in coordination with FWS.

<b>Tier 1</b> – Preliminary site evaluation (landscape-scale screening of possible project sites)	<i>Applicable in part</i>
<b>Tier 2</b> – Site characterization (broad characterization of one or more potential project sites)	<i>Applicable in part</i>
<b>Tier 3</b> – Field studies to document site wildlife and habitat and predict project impacts	<i>Applicable in part</i>
<b>Tier 4</b> – Post-construction studies to estimate impacts	<i>Applicable in part</i>
<b>Tier 5</b> – Other post-construction studies and research	<i>Not applicable</i> <sup>3</sup>
Best Management Practices (WEG, ch. 7)	<i>Applicable in part</i>
Mitigation (WEG, ch. 8)	<i>Applicable in part</i>
Advancing Use, Cooperation, and Effective Implementation (WEG, ch. 9)	<i>Applicable in part</i>
Formal consultation or permitting under Sections 7(a)(2) and 10(a)(1)(B) of the ESA	<i>Not applicable</i> <sup>4</sup>

<sup>3</sup> Tier 5 consists of follow-up studies and improvements to risk mitigation that have proved necessary following data collection in Tier 4 studies, which are themselves expected to last at least one year (WEG, 34). Because the Makani project will only conduct operations for a limited one-year testing program, Tier 5 would not be applicable absent an expansion or extension of the testing program.

<sup>4</sup> Following a meeting with officials in the Pacific Region FWS office in Honolulu on April 20, 2015, Makani determined that, because of the very low risk of a take of a threatened or endangered species, the Section 10 “incidental take permit” process would not be appropriate for the testing program activities contemplated in this BBCP.

### 3 Technology Overview & Development History

Makani is developing energy kites that use a wing tethered to a ground station to efficiently harness energy from the wind, generating electricity at utility-scale.

As the kite flies in loops, rotors on the wing spin as the wind moves through them. Our latest prototype, the “M600,” is designed to transfer up to 600 kilowatts of electrical power generated onboard down the tether to the grid—enough to power about 300 homes.

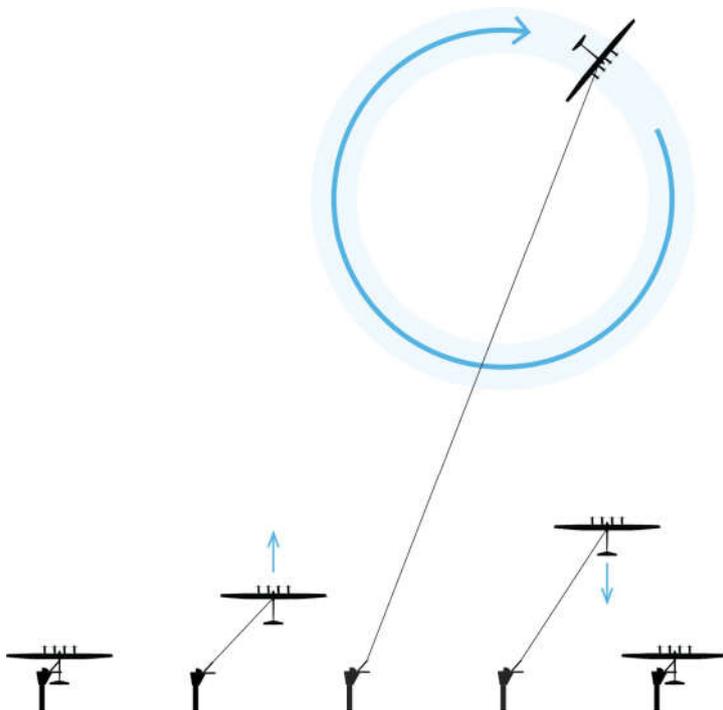
Makani has been researching and developing energy kites since 2006. Beginning with soft fabric kites that powered generators on the ground, Makani’s researchers found out early on that rigid kites could more efficiently harness energy from the wind. From 2012-2015, the team fabricated and tested “Wing 7,” which is a subscale prototype to the M600. Wing 7 validated the concept for controls, aerodynamics and power generation and operated for roughly 100 hours. In December 2016, Makani first generated electricity in crosswind flight with the M600 at a test site located on the China Lake Naval Air Weapons Station in California’s Mojave desert.



*Layered photographs of the kite in flight around different points on the crosswind loop illustrate the flight path of Makani’s “Wing 7” 20kW prototype operating in California, 2013.*



Makani's "M600" 600kW prototype operating in California, 2018.



The graphic to the left illustrates the kite's modes of operation. First the ground station positions the kite downwind. Then the kite uses electricity from the grid to climb vertically to an altitude dictated by the flight controller. Next the kite transitions into power generating crosswind flight. As the kite flies in circles rotors on the wing spin as the wind moves through them, generating electricity onboard that is sent down the tether to the grid. To end a flight, the kite transitions out of looping crosswind flight and hovers back down to its perch while the ground station reels in the tether.

## 4 General Site and Project Description

Makani is planning to continue testing its 600 kW energy kite prototype on Parker Ranch pasture lands north and east of the intersection of Māmalahoa Highway (State Route 190) and the Saddle Road (State Route 200). Unlike more traditional wind turbines, the energy kite consists of an airfoil that is tethered to a base station with a conductive cable. The kite produces power by driving onboard generators with propellers that are spun by the wind as the kite flies in circles at the end of its tether.

The three basic parts of the energy kite are the ground station, the tether, and the kite. The ground station is ~5 meters tall, the tether is ~434 meters long, and the kite is ~24 meters long. The typical maximum operational height of the kite is ~325 meters. The project area is composed of pastureland on a relatively flat area in the plains South of Waimea, at an elevation of approximately 925 meters above mean sea level. As a part of the project we have also upgraded an approximately 3.2-kilometer long four-x-four road to access the site.

Vegetation on the site is best characterized as pasture land predominately vegetated with a mix of alien pasture grasses and weedy species typical of pasture lands in the general Waimea area on the Big Island.



*The Makani test site on Parker Ranch Pasture land, 2017*

## 5 Species Addressed in the Plan

This plan addresses the following four bird species and one bat species:

- o Nēnē (*Branta sandvicensis*)
- o Hawaiian Petrel (*Pterodroma sandwichensis*),
- o Newell’s Shearwater (*Puffinus newelli*).
- o Band-rumped Storm-Petrel (*Oceanodroma castro*)
- o Hawaiian hoary bat (*Lasiurus cinereus semotus*)

## 6 Species Background

### 6.1 Nēnē

Nēnē, or Hawaiian Goose, are the lone extant Hawaiian endemic goose remaining in the Islands. This endangered species is found on Hawai‘i, Maui, Moloka‘i and Kaua‘i and has recently been reported on Lāna‘i and O‘ahu.

Nēnē, are an iconic species and are easily identified even by the most untrained of observers (Figure 1).



Figure 1 – Adult Nēnē

The Nēnē population on the Island of Hawai'i is doing well, and has recently been augmented by several hundred birds translocated by the State of Hawai'i, Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) from a golf course on the Island of Kaua'i to the Big Island. Although Nēnē were not recorded on the site during the biological surveys, this species is expanding on the Big Island and nests at several locations south and southwest of the project site. Nēnē are curious birds, and will investigate promising foraging or nesting sites. There is the potential that this species could show up on the site at some point during construction or operation of the testing program.

## 6.2 Seabirds - Hawaiian Petrel, Newell's Shearwater, Band-rumped Storm-Petrel

It is probable that the endangered Hawaiian Petrel, the threatened Newell's Shearwater (and the federally proposed Band-rumped Storm-Petrel over-fly the project area in small numbers between April and the middle of December each year. All three of these pelagic seabird species nest high in the mountains in burrows. There is no suitable nesting habitat for any of these three seabird species in the project site or for that matter in the larger Waimea plains area.

Unlike Nēnē the only real likelihood that construction personnel or facility operators are likely to see one of these three seabird species, is in the event that one is downed by natural causes or by interaction with the project device as these three species pass over the general project area during nighttime hours.

On the ground the species are distinctive, though can be difficult to identify to species level by an untrained observer. The following four images depict these species on the ground or in the hand.



**Figure 2 – Newell's Shearwater, note it is a black over white bird with a long relatively narrow bill and black and blue feet.**



**Figure 3 – Hawaiian Petrel note the relatively larger size than the previous species, heavier, thicker bill and less clean demarcation between the black and white areas on the bird**



**Figure 4 – Hawaiian Petrel note the relatively larger and shorter bill size than the previous species. Also note the less defined demarcation between black and white parts of the bird**



**Figure 5 – Band-rumped Storm-Petrel, note the tiny size, totally dark coloration, small tubenosed bill.**

### 6.3 Hawaiian Hoary Bat

It is probable that the endangered Hawaiian hoary bat overfly the general project area on a seasonal basis. As there are no suitable bat roosting trees within or even close to the site, any usage of the site by this endangered species is likely to be animals transiting the site while going elsewhere, or potentially foraging for insects over the project area on a seasonal basis.

The Hawaiian hoary bat is a subspecies of the continental hoary bay (*Lasiurus cinereus*) and as such is a typical lasiurine bat. They are a foliage roosting, over-dispersed species that is usually found roosting in leaves singly and widely separated from other members of the population. They are widely distributed on the Island of Hawai'i and are found on a seasonal basis in almost any area that still has tree cover.

Currently it is thought that this is the only bat species present in the Hawaiian Islands though two new scientific papers suggest that there are in fact two species—to the layperson differentiating between these two putative species is likely impossible.

The following two images depict Hawaiian hoary bats, the first is a bat photographed on the Big Island and the second is of a young bat on Kaua'i that was being rehabilitated.



**Figure 6 – Adult Hawaiian hoary bat**



**Figure 7 – Sub-adult Hawaiian hoary bat**

## 7 Potential Risks to Protected Species

### 7.1 Nēnē

The principal potential risks that the construction and operation of the device poses to Nēnē should they appear on the site are associated with the clearing, grubbing and construction phases of the project as vegetation is removed, and later following build-out, the potential that Nēnē could be attracted to the site and potentially be hit by vehicles. With that said the risks are extremely low, as this species is not currently known to frequent the site.

Construction activity has the potential to destroy Nēnē nests or to disturb sitting birds sufficiently that they abandon their nests, eggs or potentially chicks. Nēnē, are curious birds that are attracted to activity and are naïve as to the risks that humans and other mammals potentially pose to them. Nēnē, in the greater project area are potentially acclimated to humans as the bulk of the birds use resources and nest on and adjacent to the several golf courses in south Kohala and north Kona districts. Nēnē that have become habituated to humans often begging for food, human food is not good for Nēnē; they should be feeding on grass and other vegetation.

### 7.2 Seabirds

The principal potential impacts that construction and operation of the device poses to protected seabirds fall into two categories, lighting and physical contact with the kite and/or the tether. As this is relatively new technology, which as yet has not been used in the Hawaiian Islands there is no existing data as to the rate of collision with a device such as this. Seabird passage rates recorded by ornithological radar conducted at the site recorded very low seabird passage rates.

#### ***Lighting Impacts***

Exterior lighting during the seabird fledgling season poses an increased threat that birds will be downed after becoming disoriented by lights associated with the project during the nesting season. The two main areas that outdoor lighting could pose a threat to these nocturnally flying seabirds is if, 1) during construction it is deemed expedient, or necessary to conduct nighttime construction activities, 2) following build-out, the potential operation of security lighting during the seabird nesting season. It should be noted that seabird fledglings do fallout naturally on their first flight out to sea—a period when high natural levels of mortality occur.

#### ***Wing and Tether Impacts***

Seabirds can also collide with anthropogenic structures including power lines, utility poles, standard wind generator rotor blades and/or associated infrastructure. The potential risk is heightened if exterior lighting is present. As mentioned above it cannot

be ruled out that protected seabirds could potentially interact with the tether and/or kite if it is flown during crepuscular and nighttime hours.

### 7.3 Hawaiian Hoary Bat

The principal potential impacts that construction and operation of the proposed energy kite poses to Hawaiian hoary bats is the potential that bats may be attracted to, or just fly into the kite and tether sweep area and collide with one or both. As with protected seabirds Hawaiian hoary bats have been killed by standard wind turbine generators, usually by being struck by the rotor blade, often when apparently chasing the blade.

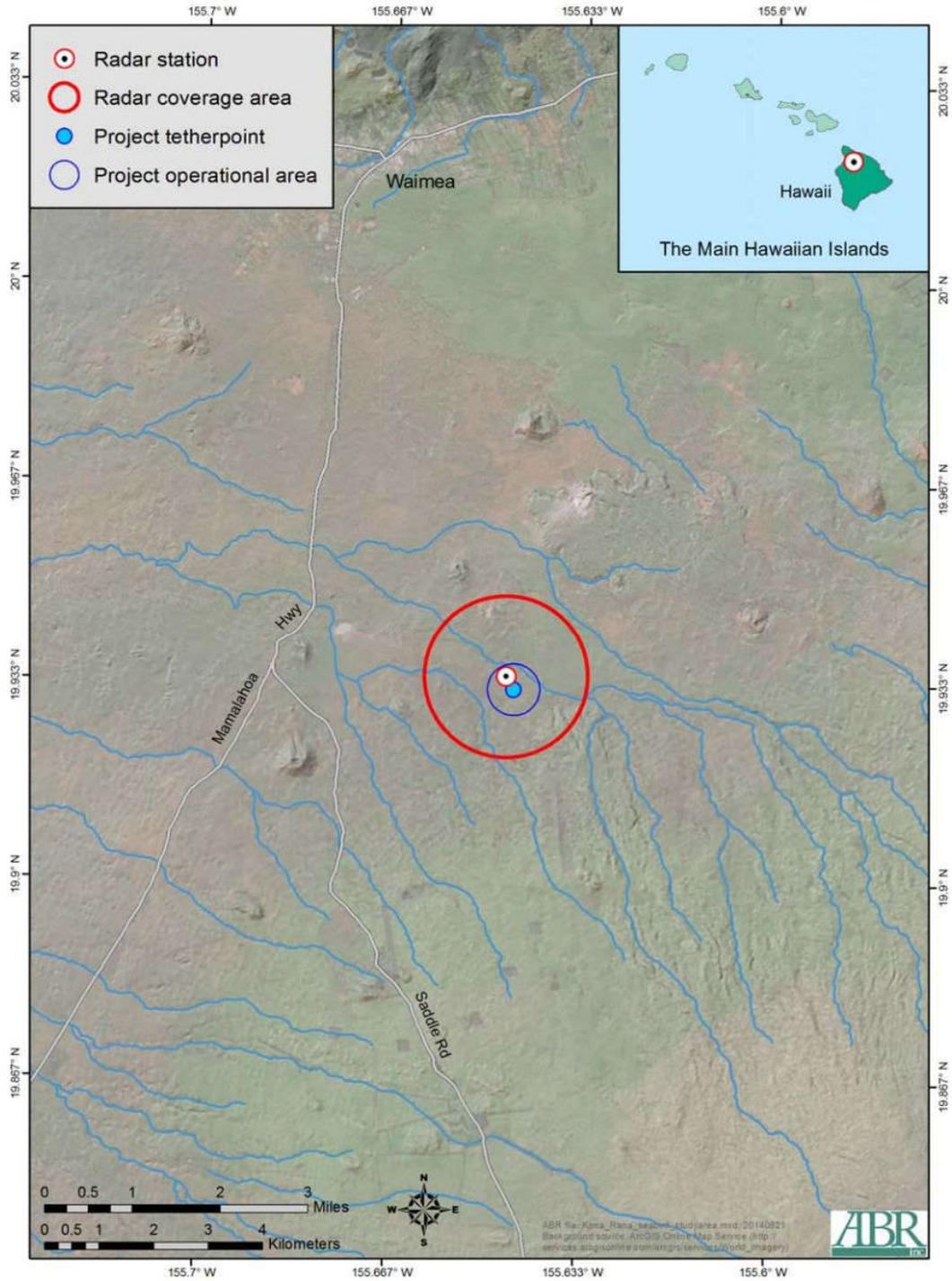
As there are no suitable bar roost trees anywhere close to the project site potential impacts to roosting bats that construction activity poses to roosting bats in many other areas in the Hawaiian Islands will not occur.

## 8 Pre-Construction Data Collection and Monitoring

As part of the early development of the test project, Makani engaged third party experts to guide siting in an area of low avian activity. Detailed monitoring of passage rates for relevant species was then conducted by ABR. A summary of ABR's methodology follows.

We used marine radar and binoculars and night-vision optics to collect radar and audiovisual (AV) data on the movements, passage rates, flight behaviors, and flight altitudes of seabirds for ten nights in summer 2014 (8 July–17 July). These sampling dates were selected to correspond with one of the main activity periods of the Hawaiian Petrel and Newell's Shearwater breeding season. Specifically, the summer sampling dates overlap with the incubation/early chick-rearing periods of both species (Ainley et al. 1995, Simons and Hodges 1998, Deringer 2009). The daily sampling effort consisted of a 3-hour (h) period beginning at sunset each evening (i.e., ~1900–2200 h) and the 2 h period beginning two hours prior to sunrise each morning (~0350–0550 h). Our daily sampling periods were selected to correspond with the evening and morning peaks of movement of petrels and shearwaters, as described near breeding colonies on Kaua'i (Day and Cooper 1995, Deringer 2009).

During sampling, we collected radar and AV data concurrently so the radar operator could provide locations and flight directions of incoming targets to help the AV observer locate targets (i.e., birds) for species identification. In return, the AV observer provided information to the radar operator on the identity and flight altitude of any targets observed. For the purpose of recording data, a calendar day began at 0701 h and ended at 0700 h the following morning; that way, an evening and the following morning were classified as occurring on the same sampling day



Map of study area and test site location.

Table 1. Sampling dates and summary of the number of petrel/shearwater-like radar targets and audio-visual observations of species of interest at the Makani Pilot Project Area, Island of Hawaii during summer 2014.

Date	Period	Number of Radar Targets			Audio-visual observations <sup>4</sup>
		Landward <sup>1</sup>	Seaward <sup>2</sup>	Other <sup>3</sup>	
8 July	Eve	0	0	0	2 BAOW, 1SEOW
	Mom	0	3	0	1 SEOW, 1 UNOW
9 July	Eve	0	0	0	1 BAOW, 1 UNOW
	Mom	0	4	0	1 SEOW
10 July	Eve	0	2	0	3 SEOW, 2 UNOW
	Mom	0	2	3	2 BAOW
11 July	Eve	0	0	2	2 BAOW, 1 SEOW, 1 UNOW
	Mom	0	0	1	1 BAOW, 2 UNOW
12 July	Eve	0	0	1	1 BAOW, 1 SEOW, 1 UNOW
	Mom	1	2	3	1 BAOW, 1 UNOW
13 July	Eve	0	0	0	2 BAOW, 1 UNOW
	Mom	0	1	0	4 BAOW, 1 SEOW, 2 UNOW
14 July	Eve	0	3	0	1 BAOW, 1 SEOW
	Mom	0	2	2	2 BAOW
15 July	Eve	0	5	2	4 BAOW
	Mom	0	4	3	3 BAOW
16 July	Eve	0	2	5	3 BAOW, 1 SEOW, 1 UNOW
	Mom	0	2	1	2 BAOW, 1 UNOW
17 July	Eve	0	5	1	5 BAOW
	Mom	0	1	2	
<b>TOTAL</b>		<b>1</b>	<b>38</b>	<b>26</b>	<b>36 BAOW, 11 SEOW, 14 UNOW</b>

<sup>1</sup> Landward flight directions = 65–185°.

<sup>2</sup> Seaward flight directions = 245–5°.

<sup>3</sup> Other flight directions = 6–64° and 186–244°.

<sup>4</sup> Audio-visuals: BAOW = Barn Owl; SEOW = Short-eared Owl.

*Above: Summary of study results.*

ABR then conducted modeling to estimate the potential risk to the species of concern using their typical simulations for conventional wind turbines, adapted to reflect the operational profile and geometry of Makani’s energy kite. Three scenarios were used to model the potential risk: low, medium, and high operational cases. The low case (6% operating time) corresponds to approximately 500 hours of testing over the course of the year. The high case (34%) corresponds to approximately 3000 hours of testing. The medium case (16%) is Makani’s best estimate of operational time in the first year of testing. Because this is an early stage R&D project, it is difficult to project total operational time, but it is unlikely to be greater than what is reflected in the high case scenario. Each of these scenarios was also modeled with three avoidance rates: 90%, 95%, and 99%

In all scenarios, the risk to the relevant species from one year of operation of the single energy kite prototype is very low.

Structure type	% Time Operating	Avoidance Rate	Fatality rate/structure (birds/structure/yr)	
			HAPE	NESH
Energy Kite	6%	90%	0.019–0.045	0.015–0.035
		95%	0.010–0.023	0.008–0.017
		99%	0.002–0.005	0.002–0.004
Energy Kite	16%	90%	0.035–0.077	0.0027–0.057
		95%	0.017–0.038	0.014–0.029
		99%	0.004–0.008	0.003–0.006
Energy Kite	34%	90%	0.063–0.133	0.049–0.098
		95%	0.032–0.067	0.025–0.049
		99%	0.006–0.013	0.005–0.010

Above: ABR’s summary of potential risk at various operating frequencies.

Simultaneously, ABR has installed and maintained an acoustic monitoring system to characterize bat activity at and near the test site. ABR will deliver a comprehensive report detailing a year of monitoring in 2016, and will be reflected in an updated version of this document. In the interim, a summary of bat activity through from December 2014 to May 2015 follows.

Table 1. Hawaiian Hoary Bat acoustic activity by month and year at the Parker Ranch, Hawai’i.

Year	Month	Mean passes/detector-night	SE <sup>1</sup>	n <sup>2</sup>
2014	December	0.90	0.26	29
2015	January	0.35	0.20	31
	February	0.25	0.10	28
	March	0.16	0.08	31
	April	0.07	0.05	30
	May	0.00	0.00	14
	<b>Total</b>		<b>0.31</b>	<b>0.07</b>

1. SE = Standard error of mean.

2. n = Number of detector-nights used in analysis.

Above: Summary of bat activity.

## 9 Specific BMPs and Minimization Measures

### 9.1 Construction

During the construction phase of the project the only protected species that construction personnel potentially could encounter are Nēnē. The following minimization measures will be implemented to ensure that construction activities do not result in deleterious impacts to Nēnē.

- Makani's primary construction contractor will be responsible for endangered species conditions compliance and response in the event of an incident with an endangered species.
- No pets will be allowed on property. Mammalian predators pose a threat to Nēnē and also may scavenge downed, injured or dead animals that potentially could occur on the site.
- Closed trash receptacles food and beverage container disposal will be provided. All food and beverage supplies consumed on site will be disposed of in the closed containers. Food and beverage trash can attract mammalian predators and may attract Nēnē.
- No feeding of birds, especially Nēnē will be permitted on the site.
- In the event that a downed, injured or dead protected bird or bat species is encountered the endangered species lead will immediately follow the Downed, Injured or Dead Protected Species Emergency Response Protocols outlined in the next section of the document.

### 9.2 Post-construction Device Operation

Following build-out facility operators will follow the following minimization guidelines to ensure that facility operation activities do not result in deleterious impacts to Nēnē, Newell's Shearwater, Hawaiian Petrel or Hawaiian hoary bats.

- Facility operators will undergo endangered species awareness training prior to starting work on the project.
- One person will be identified as being the lead for endangered species conditions compliance and emergency response in the event of an incident involving an endangered species.
- The project will maintain a service agreement in place for the duration of the project with the Hawai'i Wildlife Center to provide care, rehabilitation and other services for any downed or injured protected bird or bats that may be recovered on the site.
- No household pets will be allowed on property. Mammalian predators pose a threat to Nēnē and also may scavenge downed, injured or dead protected animals that potentially could occur on the site. Note: Parker Ranch routinely

uses trained dogs to herd cattle on the project site, but additional dogs or other pets will not be permitted.

- Closed trash receptacles for all staff food and beverage container disposal will be provided. Food and beverage trash can attract mammalian predators and may attract Nēnē.
- No feeding of birds, especially Nēnē will be permitted.
- On a regular basis the site will be inspected for any downed, injured or dead seabirds or bats.
- Monitoring activities will be recorded and the data archived following the protocols outlined in the Monitoring and Data Management section of this document.
- In the event that a downed, injured or dead protected bird or bat species is encountered the endangered species lead will immediately follow the Downed, Injured or Dead Protected Species Emergency Response Protocols outlined in the next section of the document.

## 10 Monitoring and Inspection During Operation

Makani's testing program in Parker Ranch is an early stage R&D effort to test and improve our technology, and thus we have an opportunity to undertake approaches to monitoring that are uncommon for traditional wind projects. Makani will implement a monitoring plan that ensures consistent inspection and allows for operational flexibility, while taking advantage of increased human and technical surveillance during operation. The plan consists of the following components:

1. Monitoring for bird and bat impacts will take place continuously throughout the test program.
  - a. The kite, tether, and ground station will be under live visual observation by Makani's testing team at all times during tests. The testing team will watch for potential avian interactions with the kite and will follow the protocols outlined below in the case of an incident.
  - b. Audio-visual recording will take place during all test operations from multiple camera angles. Testing and engineering teams regularly reviewing video will watch for potential avian interactions.
  - c. The kite, tether, and ground station will be regularly inspected while shut down outside of testing operations for damage. The testing team will watch for evidence of any impact to relevant species. Any indication of an incident based on inspection will trigger a comprehensive review of footage and data to identify a potential impact.
2. Third party monitoring may also be used to complement Makani's on site program.
  - a. Makani may hire expert biologists to continue acoustic monitoring of bats throughout the test program, with regular analysis to understand if and how bat activity is impacted by energy kite testing

- b. Makani may hire expert biologists to conduct radar studies of the kind described above during the testing program to better understand if and how energy kite testing impacts avian behavior
  - c. Makani may partner with an organization that provides professionally trained dogs to search the project area for relevant species. The animals would be used regularly to detect potential incidents. Any identification of an injured or killed bird will trigger a comprehensive review of footage and data to identify a potential impact.
3. If an incident is confirmed through any of these means, operation of the kite will immediately be curtailed in order to allow for further investigation and reporting protocols outlined below will be followed.

## 11 Downed or Injured Protected Species Emergency Response Protocols

A Threatened and Endangered Species Recovery Kit consisting of the following supplies will be maintained on site at all times and will be replenished as needed.

1. Medium pet carrier
2. 6 clean towels
3. 6 pairs nitrile gloves
4. 6 T&E Incident forms
5. 2 Pens

In the event that a downed, or injured protected species is encountered on the site, contact the Makani wildlife conservation leads who will implement the following protocols immediately.

1. The animal or carcass will be photographed from several angles to ensure correct identification to species. Seabirds in particular can be difficult to identify to species by a layperson.
2. Deploy the T&E Species Recovery Kit.
3. Slowly approach the injured or downed animal and gently wrap it in a clean towel, place it into the pet carrier and put the pet carrier in a shaded location before transporting it to the operations and maintenance tent on site.
4. Immediately call Hawai'i Wildlife Center for instructions on pick up
5. Record the position of the incident, and fill in an incident log sheet with all of the data required on that form.
6. Transfer the animal to Hawai'i Wildlife Center technician, per their instructions.
7. Turn in the completed incident reporting form to test site manager for data entry and archiving.
8. Any equipment or supplies used to recover an animal will be cleaned or replaced following an incident.

## 12 Monitoring and Data Management

Monitoring of the site for downed, injured or dead birds and bats is essential to determine whether the operation of the device results in impacts to protected bird and bat species. In the event that it does result in impacts these data will assist in formulating a solution to future such incidents.

The site will be inspected for any downed, injured, dead seabirds or bats every morning following operation of the device the night before. A monitoring checklist will be filled out for each monitoring event and turned in to the flight testing program manager for data entry and archiving.

Data gathered during monitoring events and any protected species incidents will be entered into a database and maintained by the company. These data will be used for any agency reporting that is deemed necessary and will also be used to develop additional minimization measures should the need arise in the future.

## 13 Reporting Loop

In the event that a protected species incident occurs on the project site the Project will report those incidents to the US Fish & Wildlife Service (USFWS) and the State of Hawai'i Division of Forestry and Wildlife (DOFAW) promptly. Any instructions that are received from either or both agencies will be complied with.

Current contact information for the two agencies is as follows:

USFWS	Diane Sether Alternative Energy Coordinator Hawai'i and Maui Nui Geographic Team
Phone #	(808) 792-9458
Email	diane_sether@fws.gov
DOFAW	Glenn Metzler
Phone #	(808) 587-4149
Email	glenn.m.metzler@hawaii.gov